Preliminary version

Measuring Chinese Productivity Growth, 1952-2005

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Much of the sections on capital and TFP are at very first draft stage.

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List of abbreviations

CPI	Consumer Price Index
DRIE	Directly reporting industrial enterprise
GDP	Gross domestic product
GFCF	Gross fixed capital formation
GNP	Gross national product
GOV	Gross output value
NBS	National Bureau of Statistics
NIPA	National Income and Product Accounts
SOE	State-owned enterprise
SOU	State-owned unit
TFP	Total factor productivity

Table of Contents

1. Introduction 1
   1.1 Objectives 1
   1.2 Coverage and structure of this paper 1
   1.3 Basic data issues 2
      1.3.1 Industry/ sectoral classification 2
      1.3.2 Benchmark revisions following the economic census 2004 4
      1.3.3 Limits to understanding China's statistics 5

2. Output 6
   2.1 Data availability 6
      2.1.1 Production approach to the calculation of value added 7
      2.1.2 Expenditure approach to the calculation of value added 8
      2.1.3 Income approach to the calculation of value added 9
   2.2 Data quality 9
      2.2.1 Comparison of the results of the three approaches to the calculation of GDP 9
      2.2.2 Provincial vs. national data 10
      2.2.3 Derivation of GDP real growth rate from sectoral real growth rates 11
      2.2.4 Annual revisions of GDP data 11
      2.2.5 Benchmark revisions of GDP data 13
         2.2.5.1 Tertiary sector census 1992/93 13
         2.2.5.2 Industrial sector census 1995 13
         2.2.5.3 Economic census 2004 and the 2004/05 benchmark revisions 14
         2.2.5.4 Sectoral classification of the 2004/05 benchmark revisions 14
         2.2.5.5 Nominal 2004/05 benchmark revision values vs. earlier published values 16
         2.2.5.6 National nominal 2004/05 benchmark revision values vs. original provincial values 16
         2.2.5.7 2004/05 benchmark revision vs. earlier published real growth rates 17
         2.2.5.8 Economic census 2004 and expenditure/ income approach GDP 22
         2.2.5.9 Summary implications of the 2004/05 benchmark revisions 23
      2.2.6 GDP deflator 24
      2.2.7 Official GDP coverage and margin of error 27
      2.2.8 Directly reporting industrial enterprise data 29
   2.3 Choice of output data for productivity analysis 31
      2.3.1 Economy-wide and three main economic sectors, prior to 2004 economic census benchmark revision 31
      2.3.2 Economy-wide and three main economic sectors, following the 2004 economic census benchmark revisions 32
      2.3.3 Tertiary sector sub-sectors 34
      2.3.4 Directly reporting industrial enterprises 36

3. Labor 37
   3.1 Data availability 37
      3.1.1 Laborers in the population censuses and 1% population sample surveys 37
      3.1.2 Economy-wide time series total and sectoral labor data 38
         3.1.2.1 Economy-wide, and three main economic sectors, 1952-present 38

3.1.2.2 16 (13) sectors, 1978-2002 40
3.1.2.3 Agriculture vs. non-agriculture, 1952-95 40
3.1.2.4 Material vs. non-material production sectors, 1952-92 40
3.1.3 Urban vs. rural employment, and urban ownership classification 41
3.1.4 Urban employment by sector 41
3.1.5 Staff and workers 42
3.1.6 Rural laborers 43
3.1.7 Non-population censuses 44
3.1.8 Directly reporting industrial enterprises 44
3.2 Employment definitions and statistical breaks 44
3.2.1 Definition of laborers in the population censuses and 1% population sample surveys 44
3.2.2 Alternative definition of laborers 45
3.2.3 On-post vs. not-on-post staff and workers 47
3.2.4 Unemployment 48
3.2.5 Summary implications 48
3.3 Data quality 50
3.3.1 Employment in population censuses and 1% sample surveys 50
3.3.2 Revised employment data in the Statistical Yearbook 50
3.3.3 Report form data on employment, including detailed sectoral data 52
3.3.4 Data comparisons 52
3.3.4.1 Two sets of economy-wide and sectoral series 53
3.3.4.2 Discrepancies between population census sectoral values and other sectoral values 53
3.3.4.3 Dubious data quality in the pre-reform period 54
3.3.4.4 Additional data 55
3.4 Hours worked 55
3.5 Choice of labor data for productivity analysis 57
3.5.1 Economy-wide employment 57
3.5.2 Three main economic sectors 58
3.5.3 Detailed sectoral values (16 sectors, other classifications) 59
3.5.4 Directly reporting industrial enterprises 59

4. Capital 60
4.1 Data availability 60
4.1.1 Fixed asset data 60
4.1.1.1 Fixed asset definition 60
4.1.1.2 Availability of original values of fixed assets 62
4.1.1.3 Availability of depreciation data 62
4.1.2 Investment data 63
4.1.2.1 Gross fixed capital formation 63
4.1.2.2 Investment in fixed assets 63
4.2 Data quality 64
4.2.1 Fixed asset data 65
4.2.1.1 Original values of fixed assets 65
4.2.1.2 Depreciation data 67
4.2.2 Investment data 68
4.2.2.1 Limited and changing coverage of investment data 68
4.2.2.2 Capital construction and technological updating and transformation 70
4.2.2.3 Investment expenditures vs. GFCF 73

4.3 Choice of capital data for productivity analysis 74
4.3.1 Economy-wide capital data via perpetual inventory method 75
4.3.1.1 Effective investment / GFCF 75
4.3.1.2 Effective investment / GFCF by structure (type of assets) 77
4.3.1.3 Effective investment / GFCF by structure, at year 2000 constant prices 78
4.3.1.4 Effective investment / GFCF by structure, at year 2000 constant prices, in standard efficiency units (and corrected for mortality) 78
4.3.1.5 Aggregating gross capital stock across structures (fixed asset types) 79
4.3.2 Capital in form of depreciation divided by the depreciation rate 79
4.3.3 Sectoral capital data via perpetual inventory method 81
4.3.4 Directly reporting industrial enterprises 81

5. Productivity Analysis 82
5.1 Labor productivity 82
5.1.1 Economy-wide 82
5.1.2 Three main economic sectors 85
5.1.3 Tertiary sector sub-sectors 87
5.1.3.1 Eleven exhaustive sub-sectors in 1990-2002 88
5.1.3.2 Six exhaustive sub-sectors in 1978-2002 89
5.1.3.3 Two exhaustive sub-sectors in 1952-2002 90
5.1.4 Directly reporting industrial enterprises 91
5.2 Unit labor costs 91
5.2.1 Urban unit labor costs 91
5.2.1.1 First-level sectors 92
5.2.1.2 Second-level sectors 93
5.2.2 Unit labor costs by main economic sector in the NIPA 94
5.3 Total factor productivity growth 96
5.3.1 Economy-wide TFP growth, with capital via perpetual inventory method 98
5.3.2 TFP growth with capital via depreciation 98
5.3.3 TFP growth in the three main economic sectors, with capital via perpetual inventory method 99
5.3.4 TFP growth of the directly reporting industrial enterprises 99

6. Future Calculation of Productivity 100
6.1 Economy-wide and sectoral data 100
6.2 Directly reporting industrial enterprises 101
6.3 Extensions 101
6.4 Further observations 101
6.4.1 Urban-rural distinction 101
6.4.2 Detailed statistics 102
6.4.3 Changes in sectoral classification 102

Tables

Table 1. National GDP / Value Added Data: Key Sources and Their Data Coverage 108
Table 2. Three Approaches to GDP Calculation (values in %) 110
Table 3. Sum of Provincial Value Added Divided by Nationwide Value Added.....111
Table 4. Official Real GDP Growth Rate Less Weighted Sum Sectoral Real Growth Rates 112
Table 5. Annual Real GDP Growth Rates (in %) 113
Table 6. Economic Census 2004 Results 114
Table 7. Original Vs. Revised Real Growth Rates (2004 Economic Census) 116
Table 8. Expenditure Approach GDP, Pre- Vs. Post-Economic Census (b yuan RMB) 117
Table 9. Deflators for Industrial Output.....118
Table 10. Relative Size of Different Enterprise Groups, 1995 124
Table 11. Coverage of Industrial Sectors, 1995 126
Table 12. Employment: Key Sources and Their Data Coverage 128
Table 13. Urban Employment: Key Sources and Their Data Coverage 131
Table 14. Not-on-post Staff and Workers 134
Table 15. Economy-wide Work Hours per Week, 1995 1% Population Sample Survey 143
Table 16. Economy-wide (1995) and Urban (2001-04) Work Hours per Week.....144
Table 17. Fixed Assets / Depreciation: Key Sources and Their Data Coverage.....145
Table 18. Investment / GFCF: Key Sources and Their Data Coverage 148
Table 19. Economy-wide Gross Capital Stock 159
Table 20. Gross Capital Stock, Total and by Sector, via Depreciation.....161
Table 21. Labor Productivity: Economy-wide (constant year 2000 price yuan RMB value added per laborer-year) 165
Table 22. Labor Productivity: Main Economic Sectors, Report Form Employment (constant year 2000 price yuan RMB value added per laborer-year).....169
Table 23. Labor Productivity: Main Economic Sectors, Revised Employment (constant year 2000 price yuan RMB value added per laborer-year).....171
Table 24. Labor Productivity: Tertiary Sector Sub-sectors 1990-2002 (constant year 2000 price yuan RMB value added per laborer-year).....173
Table 25. Labor Productivity: Tertiary Sector Sub-sectors 1978-2002 (constant year 2000 price yuan RMB value added per laborer-year).....174
Table 26. Labor Productivity: Productive Vs. Non-productive Services (constant year 2000 price yuan RMB value added per laborer-year).....178
Table 27. Labor Productivity of the Directly Reporting Industrial Enterprises Across Industrial Sectors (constant year 2000 price yuan RMB value added per laborer-year).....181
Table 28. Unit Labor Costs: Average Wage of Staff and Workers in Three Main Economic Sectors, 1978-2002 (year 2000 price yuan RMB per staff/worker-year) 183
Table 29. Labor Remuneration per Employee (yuan RMB, in 2000 constant prices).....185
Table 30. Labor Remuneration per Employee in the Tertiary Sector (yuan RMB, in 2000 constant prices) 187
Table 31. Economy-wide Growth Rates of Output and Factor Inputs.....189
Table 32. Economy-wide TFP Growth 191
Table 33. Economy-wide and Sectoral Growth Rates of Employment and Output 195
Table 34. Economy-wide and Sectoral TFP Growth Based on Depreciation.....198
Table 35. TFP Growth in Three Main Economic Sectors.....200
Table 36. TFP Growth in DRIEs.....201

Figures

Figure 1. Pre- and Post-Economic Census GDP 115
Figure 2. Pre- and Post-Economic Census Primary Sector and Construction Value Added 115
Figure 3. Industrial Value Added Deflators 120
Figure 4. Industrial Value Added Deflators Vs. GOV Deflator 120
Figure 5. Industrial Value Added Deflators Vs. Sum Provincial GOV Deflator 121
Figure 6. Industrial Value Added Deflators Vs. DRIEs GOV Deflator 121
Figure 7. Industrial Value Added Deflators Vs. DRIEs GOV SOE Deflator 122
Figure 8. Industrial Value Added Deflators Vs. Deflator of Industrial Enterprises at Township Level and Above 122
Figure 9. Industrial Value Added Deflators Vs. Price Indices 123
Figure 10. Industrial Value Added Deflators Vs. Double-Deflated Industrial Value Added Deflator 123
Figure 11. DRIE Share in Value Added of Industry 125
Figure 12. Urban Employment 133
Figure 13. Staff and Workers as Share of (Report Form) Laborers (in %), 1978-2002 133
Figure 14. Unemployment (mio. laborers), 1978-2004 135
Figure 15. Economy-wide Employment Data 136
Figure 16. Employment in Agriculture / Primary Sector (mio. laborers), 1952-2004 137
Figure 17. Employment in Agriculture / Primary Sector (mio. laborers), 1978-2004 138
Figure 18. Secondary Sector Employment (mio. laborers), 1952-2004 139
Figure 19. Secondary Sector Employment (mio. laborers), 1978-2004 139
Figure 20. Employment in Industry (mio. laborers), 1952-2002 140
Figure 21. Employment in Construction (mio. laborers), 1952-2002 140
Figure 22. Tertiary Sector Employment (mio. laborers), 1952-2004 141
Figure 23. Employment in Transport, Trade, and Geological Prospecting (mio. laborers), 1952-2002 142
Figure 24. Employment in Non-Material Production Sectors (mio. laborers), 1952-2002 142
Figure 25. Gross Fixed Capital Formation vs. Total Investment in Fixed Assets 157
Figure 26. Ratio of Newly Increased Fixed Assets to Investment 157
Figure 27. Transfer Rates 158
Figure 28. Shares in Total Investment 163
Figure 29. Report Form (Aggregated) Sectoral Employment Values Divided by Corresponding Values in Three Main Economic Sectors 164
Figure 30. Economy-wide Labor Productivity, Report Form Employment 167
Figure 31. Economy-wide Labor Productivity: Revised Employment 167
Figure 32. Value Added of Agricultural Services Relative to Tertiary and Primary Sector Value Added 168
Figure 33. Main Sectoral Labor Productivity: Report Form Employment 172
Figure 34. Main Sectoral Labor Productivity: Revised Employment 172
Figure 35. Tertiary Sector Labor Productivity: All Aggregated Sub-sectors 176
Figure 36. Tertiary Sector Labor Productivity: Subset of Aggregated Sub-sectors 176
Figure 37. Share of Geological Prospecting and Water Conservancy in Tertiary Sector 177
Figure 38. Tertiary Sector Labor Productivity: Two Aggregates 180
Figure 39. Constant Price Average Wage of Staff and Workers in the Three Main Economic Sectors, 1978-2002 (year 2000 price yuan RMB per staff/worker-year) 184
Figure 40. Unit Labor Costs 186
Figure 41. Cumulative TFP Growth with Gross Capital Stock Based on Effective GFCF 194

Figure 42. Structural Shares in Investment in Fixed Assets and in GFCF 265

Appendices

Appendix 1 Pre-1984 Sectoral Classification Scheme As Evidenced in Year 1982 Population Census Employment (number of laborers) 204
Appendix 2 Year 1984 Sectoral Classification Scheme (GB/T4754-1984) with Year 1990 Population Census Employment Values (number of laborers) 207
Appendix 3 Year 1994 Sectoral Classification Scheme (GB/T4754-1994) As Evidenced in Year 2000 Long-Form Survey Employment Values (number of laborers) ... 211
Appendix 4 Year 2002 Sectoral Classification Scheme (GB/T4754-2002) 215
Appendix 5 ISIC Rev. 3.1 218
Appendix 6 Nominal GDP and Sectoral Value Added (b yuan RMB) 220
Appendix 7 GDP and Sectoral Value Added Real Growth (annual, in %) 222
Appendix 8 Implicit Deflators As First Published, and Real Growth Rates Using Revised Nominal Values (GDP and Sectoral Value Added) 224
Appendix 9 Detailed Tertiary Sector Nominal Value Added and Real Growth Values 1952-95 226
Appendix 10 Detailed Tertiary Sector Nominal Value Added and Real Growth Values 1990-2003 229
Appendix 11 Directly Reporting Industrial Enterprise Output Measures 1993-2002 (b yuan RMB) 231
Appendix 12 Directly Reporting Industrial Enterprise Output Measures 2003 (b yuan RMB) 235
Appendix 13 Revised Employment Values (end-year, million laborers) 236
Appendix 14 Report Form Employment (end-year, million laborers) 238
Appendix 15 Sectoral (Report Form) Employment (end-year, million laborers) 240
Appendix 16 Directly Reporting Industrial Enterprise Midyear Employment (in thousand laborers) 242
Appendix 17 Directly Reporting Industrial Enterprise Midyear Employment 2003 and 2004 (in thousand laborers) 244
Appendix 18 Average Wage of Staff and Workers, 1978-2002 (in yuan RMB per staff/worker-year) 245
Appendix 19 Average Wage of Staff and Workers, 2003-04 (in yuan RMB per staff/worker-year) 249
Appendix 20 Average Wage of Staff and Workers, Second-Level Classification GB1994, 1993-2002 (yuan RMB, current prices) 250
Appendix 21 Average Wage of Staff and Workers, Second-Level Classification GB2002, 2003 and 2004 (yuan RMB, current prices) 254
Appendix 22 Labor Remuneration, 1978-95 (b yuan RMB) 257
Appendix 23 Labor Remuneration, 1995-2002 (b yuan RMB) 259
Appendix 24 Investment in Fixed Assets Price Index / GFCF Deflator 260
Appendix 25 Effective Investment in Fixed Assets, and Effective GFCF 262
Appendix 26 Structural Shares in Investment Expenditures and Capital Construction (in %) 264
Appendix 27 Survival (Mortality) and Age-Efficiency Profiles 266
Appendix 28 Depreciation, 1978-95 (b yuan RMB) 268
Appendix 29 Depreciation, 1995-2002 (b yuan RMB) 270

Appendix 30 Directly Reporting Industrial Enterprise Productive Original Fixed Assets (in b yuan RMB at historic/revalued prices) 271
Appendix 31 Directly Reporting Industrial Enterprise Productive Original Fixed Assets 2003 and 2004 (in b yuan RMB at historic/revalued prices) 273
Appendix 32 Labor Share, 1978-95.....274
Appendix 33 Labor Share, 1995-2002.....276

1. INTRODUCTION

1.1 Objectives

1. This paper has two objectives.

- Assess the availability and the quality of the data series necessary to construct productivity measures for the Chinese economy.

- Produce a set of productivity statistics that can be integrated into the existing set of OECD productivity indicators and that can be updated later on.

2. Understanding Chinese productivity patterns and productivity change over time matters for studies of economic growth and such issues as international competitiveness, living standards, or technology levels. With China being the world's third largest exporter and importer, the world's fourth-largest economy in terms of gross domestic product (GDP), and, as of 2006, still growing at 8-10% per year, obtaining accurate productivity measures for China may become of increasing interest.

1.2 Coverage and structure of this paper

3. In sections two through four, the paper in turn examines the availability and quality of output, labor, and capital data. The fifth section discusses and calculates a range of productivity measures. The final, sixth section offers some thoughts on the future calculation of productivity measures for China.

4. Output, labor, and capital data are typically available at the national as well as at the provincial level. For many statistics, the National Bureau of Statistics (NBS) does not have independent national data. It uses the sum of provincial values, and in some instances adjusts this sum. The focus in the following is on national data, sometimes contrasted with, or constructed from, provincial data.

5. At both the national and the provincial level, data are typically available for the economy in total as well as by sector. The availability of sectoral data varies for each of the three variables output, labor, and capital. Taking the output data as the starting point, the main sectoral breakdown of the economy in the national income and product accounts (NIPA) is into primary, secondary, and tertiary sector.

6. The primary sector, i.e., agriculture, comprises farming, forestry, animal husbandry, and fishery. Data on these sub-sectors are too limited to proceed further.

7. The secondary sector comprises industry and construction, for which separate data are available in the NIPA. For industry, in turn, data are available on, depending on year, up to 39 individual industrial sectors. These data do not cover all enterprises in the individual industrial sectors, but only the directly reporting industrial enterprises (DRIEs); the data are provided in the industrial statistics (not in the NIPA).

8. Tertiary sector data, apart from the total, are also available for exhaustive sub-sectors. The most detailed breakdown of the tertiary sector is into 12 or 13 sub-sectors, available for some years (depending on variable) since 1978.

9. The fifth section discusses and calculates three types of productivity measures:

- Labor productivity, i.e., value added per person employed (and its real growth over time).
- Unit labor costs, in particular for industry by individual industrial sector (and their real growth over time).
- Multi-factor (or total factor) productivity (TFP) growth.

10. The People's Republic of China was founded in 1949. The economic reforms began in 1978. Systematic statistical reporting starts with data for 1952. Data availability differs for the years 1952-77 vs. 1978 through the present. Chinese official statistical publications, when reporting time series data, tend to report data for 1978-present. For the years 1952-77, data are more limited, especially in terms of sectoral coverage, and data quality is likely to be poorer in at least some of the pre-reform years. This paper uses all relevant data from 1952 through the present that are available to me.

11. The text of this paper is accompanied by tables, figures, and appendices. Appendices report data, including non-numerical information, from Chinese sources; with very few exceptions, no manipulations of data take place in the appendices. The data reported in the appendices are manipulated and described in tables and figures.

1.3 Basic data issues

12. Three recurrent data issues are the changes in sectoral classification that affect primarily output and employment data, the benchmark revision following the 2004 economic census with changes to the reach of the statistical system, and finally a multitude of data ambiguities if not inconsistencies.

1.3.1 Industry/ sectoral classification

13. In order to calculate productivity measures at sectoral (or: industry) level, output and employment need to follow the same sectoral classification. The use of different classifications for output and employment series requires special care in calculating productivity. Time series comparisons need to take into consideration revisions to the sectoral classification.

14. China's system of industrial classification changed three times in the reform period. The first formal classification standard (GB, *guobiao*) was issued in 1984, labeled GB/T4754-1984 (in the following abbreviated "GB1984"). The GB1984 was preceded by a different classification system that seems to not have been a formal standard (but only NBS practice). The GB1984 was revised in 1994 (GB/T4754-1994, or "GB1994"), following a trial revision in 1992, and was then revised a second time in 2002 (GB/T4754-2002, "GB2002").

15. An official list of categories is available only for the GB1984 and the GB2002. The GB1984 is reproduced in an internal compendium of statistical regulations (NBS, 1988, pp. 623-702). A list of first- and second-level categories of the four-level GB2002 is available in the online rules and regulations database of *China Infobank* (NBS, 14 May 2003), while some general description of the changes between the GB1994 and GB2002 are in the first through seventh 2003 issues of the magazine *Zhongguo tongji*. No direct comparisons of any two standards is available.

16. The sectoral employment data in the 1990 population census are presented in the official source in full accordance with the GB1984. This suggests that the available sectoral employment values of the 1982 and 2000 population censuses may also match the (unknown) pre-1984 standard and the (unknown) GB1994. The discussion in the magazine *Zhongguo tongji* of the changes between the GB1994 and the GB2002 likewise suggests that the classification of the employment values in the population census 2000 represents the GB1994.

17. Appendix 1 through Appendix 3 present three standards: the one of pre-1984 (which appears to not have been issued as a formal "standard" by China's authority for issuing standards), the GB1984, and the GB1994. The three appendices include the population census employment values of the corresponding years 1982, 1990, and 2000, since those data are available, while output values are not available in corresponding detail. Appendix 4 presents the GB2002, without data, since no data according to all details of this classification are yet available.[1] Appendix 5 has the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 3.1 for comparison; China's domestic classification systems at no point match ISIC 2, or 3, or 3.1, or 4 (draft version).

18. The first and last columns of Appendix 1 through Appendix 4, as relevant, show the transition between the different standards. Thus, the GB1984 newly included water conservancy and agricultural services in the primary sector, disaggregated and relabeled industrial sub-sectors (presumably keeping the aggregate of industry unchanged), and retained the pre-1984 tertiary sector sub-sector classifications. The two standards appear largely compatible for the three main economic sectors (primary, secondary, and tertiary sector) and also at the first level of the classification with 13 (exhaustive) sectors. One possible concern about agriculture is that it in 1984 newly included water conservancy and agricultural services, while these are not listed in any category in the pre-1984 classification (but may have been subsumed in the other agricultural sub-sectors).

19. In 1994, water conservancy moves from the primary to the tertiary sector (to become part of geological prospecting and water management), presumably a minor change. The industrial sub-sectors change again, but the aggregate of industry appears unchanged. Construction loses one small sub-sector, but that sub-sector may have been integrated in a different construction sub-sector. While the aggregate of the tertiary sector appears unchanged apart from the new inclusion of water conservancy, the sub-sector classification undergoes a major revision that makes comparisons of tertiary sector sub-sectors between the GB1984 and GB1994 near-impossible. The overall 13-sector first-level classification turns into a 16-sector classification. Apart from the switch of water conservancy/management from the primary to the tertiary sector, the three main economic sectors appear compatible between the GB1984 and the GB1994.

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[1] For the case of industry, the second volume of *Economic Census 2004*, contains data (for a number of variables, including average annual employment) on the directly reporting industrial enterprises by approximately 550 individual sectors, covering all four levels of sectors.

20. In the GB2002, all three main sectors experience changes. The tertiary sector is yet again subject to a major reclassification. The total number of first-level sectors becomes 20, with the classification now extending over four levels (*menlei*, *dalei*, *zhonglei*, *xiaolei*). According to the magazine *Zhongguo tongji*, at the fourth level the classification largely matches that of the ISIC Rev. 3, with in some cases China using a more refined breakdown, and in a few using a less refined breakdown. The NBS reports to have the correspondence between the GB2002 and the ISIC Rev. 3 programmed in its computer system so that it can easily produce sectoral statistics that match the ISIC Rev. 3, while its regularly published statistics follow the GB2002. Out of the 20 first-level sectors in the GB2002, 10 are reported to match ISIC Rev. 3 first level sectors.[2]

21. The description of the changes in the GB2002 (in comparison to the GB1994) provided in the first through seventh 2003 issues of the magazine *Zhongguo tongji* suggests a wide range of re-classifications, including across the three economic sectors. For example, in the GB2002 one second- and one third-level sector move from industry into agriculture: 'logging and transport of timber and bamboo' (in 1994 a sector within 'quarrying and mining'), and 'preliminary processing of textile fibers' (in 1994 a sector of the 'textile industry,' which in turn belongs to 'manufacturing'). One lower-level agricultural sector, namely 'household sideline businesses' (*jiating lianying fuye*), is dissolved into the corresponding other (including industrial) sectors. In industry, the main changes are reallocations of third-level sectors between industrial second-level sectors. In construction, one significant change is the switch of institutions involved in preparatory work for construction from the construction sector to the tertiary sector (into polytechnic services). In the tertiary sector, the first-level classification is revised and expanded, with reclassifications also of lower-level sectors. Overall, the three main economic sectors appear only approximately compatible between the GB1994 and the GB2002, with minor and bi-directional changes between economic sectors. In addition, the coverage of the tertiary sector appears to have extended to economic activities that were previously not included in the calculation of GDP.

22. In identifying the data relevant for productivity analysis, the issue of standards matters in ensuring consistency over time as well as across variables. The following sections, wherever relevant, refer back to the individual standards presented here. Because Chinese official data invariably come *without* an explicit statement of which standard is being used, the standard that official data follow must be deduced throughout, unless otherwise noted, from the individual sectoral labels used with the data.

1.3.2 Benchmark revisions following the economic census 2004

23. The benchmark revision of 1993-2004 data (following the economic census 2004), released in spring 2006, raise a number of questions, most of which are dealt with in the output section. One general effect of this benchmark revision is the expansion of economic activities covered by the NBS. Thus, Xu Xianchun (2006, p. 17), head of the National Income Accounts Division of the NBS, writes that the GDP coverage was expanded to newly include (i) economic activities previously ignored, such as those occurring in sub-ordinate units of an enterprise and outside the main business of the enterprise, and (ii) economic activities

[2] See *Zhongguo tongji*, no. 1 (2003), p. 26. Following the articles in the *Zhongguo tongji* issues no. 1 through 7 of 2003, a slightly more refined correspondence between the GB1994 and GB2002 could have been established than is presented here in Appendix 3 and Appendix 4, at the cost of space. But with a detailed list of third- and fourth-level sectors not available, this seemed pointless.

captured through statistical compilations outside the economic census (and previously not included in GDP), such as home-owners renting out housing, home teaching, or childcare services.

24. The corresponding, retrospective revisions of earlier data may not be complete. In the case of value added, the benchmark revision led to retrospective revisions of 1993-2004 values, but not of earlier values, a procedure that is questioned in the output section. In the case of other variables, retrospective revisions may never happen, not even corresponding to the output revisions, for 1993-2004.

25. The benchmark revision also provided an opportunity to change data compilation and calculation practices, an opportunity that was apparently used well. (Some details are again provided in the output section.) This creates uncertainty about in how far data, variable by variable, are comparable over time.

26. Obviously, if "better" procedures are being adopted, this is welcome, and future data (2004 forward) may yet be more reliable. The overall scope of revisions, in terms of nominal GDP in 2004, was a 16.8% upward revision. Spread over twelve years, 1993-2004, this scope of revision in the face of average annual real growth rates around 10% appears not a major stumbling block. When revisions cannot be taken into account, one would fare well to keep in mind the overall degree of accuracy of Chinese data, of which the benchmark revision gives some indication.

1.3.3 Limits to understanding China's statistics

27. In numerous instances, China's official statistics appear inconsistent. There are typically three possibilities to explain the inconsistencies: (i) outright mistakes; (ii) wrong, or misleading labels and explanations of time series; and (iii) unexplained changes to the definition of time series (including changes in data compilation methods).

28. While outright mistakes do appear to occur, their number is probably small. Wrong or misleading labels of time series, wrong or misleading explanations, and missing explanations when the definition of a time series changes appear more frequent. Oftentimes, extensive detective work can reveal that if a particular redefinition of a time series is assumed, the various statistics are consistent. In the end, a decision is required as to how to proceed, whether to reject some data as outright wrong, or to accept them by changing the label or deducing a change in the underlying definition of the series. This decision can only be made based on what one considers the most plausible explanation of the inconsistency.

29. The default assumption here is that the NBS data are consistent. If they appear inconsistent, then an attempt is made to unearth un-noted statistical breaks (changes in the definition of a time series); this usually requires a lengthy argument as to why a statistical break is likely. If a statistical break does not appear plausible, wrong or misleading labels and explanations may explain an apparent inconsistency. Outright mistakes are only the explanation of last resort.

2. OUTPUT

30. The output measure examined in the following is value added, i.e., at the national level, gross domestic product (GDP), or, at the provincial level, gross provincial product ("provincial GDP"). In some sectors, the NBS relies on gross output value (GOV) deflators to derive a deflator for value added.

2.1 Data availability

31. Data on value added are available in the (national) annual *Statistical Yearbook* starting with the 1988 issue, in *GDP 1952-95*, and in *GDP 1996-2002*.[3] For specific sectors or sub-sectors, corresponding yearbooks may be available; for the case of industry, this is the *Industrial Yearbook*.

32. All four sources also contain provincial-level data. Furthermore, since the late 1980s each province publishes its own provincial annual statistical yearbook; each issue of a province's statistical yearbook tends to provide more time series data than the national annual *Statistical Yearbook*, which only provides the current year's provincial data, but otherwise, ignoring occasional data discrepancies, the provincial statistical yearbooks together report the same data as the four sources above. A potential complication if one were to examine provincial data is that two provinces each split into two new provinces during the reform period. In 1988, Hainan became a province; previously, it was part of Guangdong. In 1997, Chongqing became a province; previously, it was part of Sichuan. Different data sources split out Hainan and Chongqing at different points of time.

33. Three further sources contain national and provincial output data, with limited sectoral coverage and limited coverage of the different approaches to calculating GDP: *Seventeen Years*, *Fifty Years*, and *Fifty-five Years*. All three compendia cover numerous aspects of China's economy and society, i.e., are not limited to output data. Apart from the more limited coverage, data quality in these three compendia may be lower than that in the first four sources. The three compendia come without definitions of variables, and without notes that flag changes in the definition of variables over time; their data are compiled by different departments in the NBS which may attribute less importance to such a joint endeavor than to their own publications or to the *Statistical Yearbook*, where each department is clearly responsible for a particular section. For output data, these three compendia are not discussed or used below.

34. Prior to the reform period, China's NIPA followed the Material Product System with its focus on material production. In 1988, the NBS began to provide a basic set of NIPA data in accordance with the System of National Accounts, at first consisting of data on gross national product (GNP) and primary, secondary, and tertiary sector value added, and with values reaching back to 1978. For 1992 the NBS reported a more detailed set of GDP data as well as the traditional data of the Material Product System. Since 1993, the Material Product System has been abandoned in favor of the 1993 United Nations version of the System of National

[3] A further volume, *GDP 1952-96*, reports substantially less data than *GDP 1952-95*, but includes one more year (1996). With the publication of *GDP 1996-2002*, *GDP 1952-96* became redundant except that it may present some data in more accessible form.

Accounts (with minor, and over time decreasing deviations in the Chinese case).[4] NIPA data following the System of National Accounts were also compiled for the years 1952-77, retrospectively, and became available with *GDP 1952-95* (which covers all years 1952-95).

35. Table 1 reports the data coverage of the key sources for Chinese NIPA data compiled and published in accordance with the System of National Accounts. China's official GDP data are derived using the production approach; this means use of the production approach as a rule (such as in agriculture and industry), supplemented by the income approach in a few sectors (some service sub-sectors).[5] While the official production approach value added data constitute the prime choice of output values in productivity analysis, the expenditure and income approaches to the calculation of value added are also discussed below because the expenditure approach provides data on gross fixed capital formation, potentially relevant for the construction of capital measures, and the income approach provides data on labor and capital shares in value added, potentially relevant in TFP analysis.

2.1.1 Production approach to the calculation of value added

36. In the production approach to the calculation of value added, in each sector, value added equals gross output value (GOV) less intermediate inputs, plus, since 1995, value added tax. (Prior to 1995, the at that time not prevalent value added tax was already included in GOV and thus didn't have to be added; it is no longer included in GOV since 1995.) Economy-wide, production approach GDP equals the sum of value added across the three main economic sectors: primary, secondary, and tertiary sector. The *Statistical Yearbook* of each year (starting with varying details in the 1988/1990/1991 issues) publishes the nominal national data and real growth rates of the previous year and all earlier years since 1978 (real growth rates since 1979), as well as the *provincial* nominal data of the previous year only. The typical coverage is primary sector (agriculture), secondary sector with separate data on the exhaustive sub-sectors industry and construction, and tertiary sector (with separate data on the two non-exhaustive sub-sectors transport & communication, and commerce & catering). The *1998* and *1999* issues, exceptionally, report national data going back to 1952/53.

37. Separately, *GDP 1952-95* covers GDP and the main economic sectors in all years since 1952, at the national and the provincial level, including both nominal values and real growth rates (since 1953); besides the secondary sector breakdown into industry and construction, *GDP 1952-95* also offers data on an exhaustive 8 tertiary sector sub-sectors. *GDP 1996-2002*, similarly, covers the years 1996-2002 with occasionally additional values for some earlier years.[6]

38. For the tertiary sector, at the national level, a more detailed classification into 13 sub-sectors is available for 1990-2003 in the *Statistical Yearbook* series, with not every issue repeating the data—nominal values and real growth rates (since 1991)—of all earlier years. For the names of the individual sub-sectors see notes to Table 1. *GDP 1952-95* reduces the exhaustive 13 sub-sectors to an exhaustive 12 sub-sectors, but also has data only for the years since 1990, while *GDP 1996-2002* covers all 13 sub-sectors in 1996-2002. The latter two compendia also report the corresponding provincial-level data.

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4 On the Chinese differences see Xu (2001).

5 See NBS (1997), pp. 12f., which also offers detailed explanations for all economic sectors and sub-sectors.

6 In some tables, the additional coverage is for the years 1952, 1958, 1963, 1966, 1971, 1976, 1981, 1986, 1989, and 1990-95, in others it is for the years 1952, 1978, 1985, 1990, and 1995.

39. The impact of changes in the classification scheme on the consistency of these data over time are discussed further below.

40. For industry, each issue of the *Statistical Yearbook* in its industry (not NIPA) section reports output data by industrial sector (and by province) for the previous year. Output data typically comprise value added starting with data for the year 1992 (net material product for 1992 and earlier years) and GOV.[7] The sectoral coverage extends only to the directly reporting industrial enterprises (DRIEs). Up through 1997, the group of DRIEs comprised all "industrial enterprises with independent accounting system at township level and above;" since 1998, it comprises the "industrial state-owned enterprises (SOEs) with independent accounting system and all industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB."[8]

41. The sectoral classification within industry changes over time, with consistent classifications for 1980-84 (13 sectors, with a very limited number of variables), 1980 and 1984-92 (30 sectors following the GB1984), 1993-1997 (39 sectors following the GB1994), 1998-2002 (37 sectors following the GB1994), and 2003-04 (39 sectors following the GB2002). For each variable, in each period, the sum across sectors comes close to the industry-wide value for the DRIEs, with the small difference presumably reflecting military industry and in some of the more recent periods the omission of one or two very minor industrial sectors ("other …"). The *Industrial Yearbook* series reports similar data, including provincial-level sectoral data, and including GOV at constant prices. [9] Provincial statistical yearbooks typically report the previous year's output values of the DRIEs across (provincial) industrial sectors; the degree of completeness of the statistics varies from province to province.[10]

2.1.2 Expenditure approach to the calculation of value added

42. In the expenditure approach to the calculation of GDP, GDP equals the sum of consumption (household and government consumption), gross capital formation (gross fixed capital formation and inventory investment), and exports, less imports. The *Statistical Yearbook* beginning with the 1995 issue reports the nominal values of these expenditure approach items for the years since 1978, except that exports and imports are only available in form of net exports. The *Statistical Yearbook* does not report real growth rates. *GDP 1952-95* reports national nominal data, and *real growth rates* for consumption and gross capital formation for the years 1952/53-95. At the provincial level, it also reports the provincial total expenditure approach value added and net exports, but not real growth rates for the total and the net exports. Most provinces set expenditure approach value added equal to production approach value added and obtain net exports as a residual in form of production approach

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[7] The *Statistical Yearbook 2005* does not report value added by industrial sector (but data on other variables, for 2004). Only future publications will tell if this is a one-year omission or a new pattern.

[8] The term "directly reporting industrial enterprises" is used here as a short form; these are the enterprises which report detailed statistics regularly (now monthly) and directly to the statistical authorities. At least since 1999, the data on all DRIEs are channeled individually to the NBS, i.e., not aggregated by lower-level statistical authorities. For further details, see Holz (2004b).

[9] One further national source of industrial sectoral data is the *China Markets Yearbook*, which covers approximately 500 third-level industries since 1995 (but not continuously for *every* year since 1995). The enterprise coverage is the DRIEs. In terms of output measures, value added and GOV are not included, only revenues.

[10] Holz and Lin (2001a, b) discuss problems of China's industrial statistics and a 1997-98 statistical break in the ownership classification and enterprise coverage.

value added less consumption and gross capital formation.[11] *GDP 1996-2002*, for 1996-2002, provides the same coverage and follows the same practices. In the latter two compendia, separate export and import data are available for some provinces in some years.

2.1.3 Income approach to the calculation of value added

43. In the income approach to the calculation of GDP, GDP equals the sum of labor remuneration, depreciation, net taxes on production, and operating surplus. No national data are available. The *Statistical Yearbook* series, starting with the 1995 issue, reports the provincial nominal data of two years earlier, and more recently, of the previous year. (No 1995 data are reported.) *GDP 1952-95* and *GDP 1996-2002* report the provincial nominal data for the years since 1978, province-wide, as well as by the main economic sectors within each province. No real growth rates are available.

2.2 Data quality

2.2.1 Comparison of the results of the three approaches to the calculation of GDP

44. Theoretically, the three approaches to the calculation of GDP should yield identical results. With income approach data only available at the provincial level, comparisons of value added obtained according to the three different approaches to calculating GDP are best conducted at the provincial level.

45. Table 2 provides a comparison of provincial GDP calculated according to the three approaches in the years 1993 (the first year for which the *Statistical Yearbook* reports provincial expenditure and income approach GDP), 1994, 1995, 2000, and 2003 (the most recent year for which provincial income approach GDP is available). In 1993, expenditure and income approach values tend to be the same, with production values up to 15% higher. Since 1995, production and income approach values are identical across all provinces, while expenditure approach values in 1995 differ in about one third of all provinces, and in fewer provinces in 2000 and 2003. The year 1994 exhibits an intermediate pattern with most provinces showing identical values according to all approaches, but not all provinces setting income approach value added equal to production approach value added.

46. Identical values according to all three approaches suggest that the provincial statistical bureaus calculate some items in the expenditure and income approach as residuals. *GDP 1952-95* and *1996-2002*, for the expenditure data they report, admit as much for "most provinces;" in the expenditure approach, net exports (to other provinces and other countries) is the residual. In the income approach, operating surplus may be the most likely candidate for being derived as residual. Gross fixed capital formation (in the expenditure approach) and labor remuneration (in the income approach), which are relevant for the construction of capital measures and unit labor costs below, are unlikely to be obtained as residual.

47. In 1993, in some provinces the discrepancies in the values of the three approaches are up to about 15%, which suggests a fair amount of uncertainty about provincial GDP. In the following years, the size of the discrepancies, in provinces in which discrepancies are allowed to occur, is significantly smaller, on the order of a few percentage points. The

[11] See the introductory section of *GDP 1952-95*.

smaller size could be due to manipulations by provincial statistical bureaus, or it could be a sign of increasing data quality.

48. Table 2 also has the national comparison, possible only between production and expenditure approach GDP (since no income approach GDP is published at the national level). At the national level, expenditure approach GDP is presumably compiled independently; data on net exports, now with regard to foreign countries, are readily available at the national level. In 1993, production approach GDP fell 9% short of expenditure approach, a gap that narrowed subsequently and disappeared by 2000, but reappeared in 2003.

49. None of the three approaches to the calculation of GDP is perfect. The problems range from the imputation of the rental value of owner-occupied housing to the calculation of depreciation and the compilation of data on labor remuneration in the face of non-monetary compensation in urban work units. In Holz (2002) I provide further details on some of the problems. In Holz (2004a) I show that NBS explanations on how household consumption is calculated are not fully consistent across different NBS sources. (Household consumption accounts for approximately half of expenditure approach GDP.) The household consumption values that I reconstruct, following NBS explanations, do not match the official data. The gap between the reconstructed and the official data is often substantial (several percentage points) and not systematic over time.

2.2.2 Provincial vs. national data

50. National GDP should equal the sum of provincial GDP. But the sum of provincial GDP routinely exceeds national GDP. Table 3 shows the extent of NBS adjustments to provincial data for production approach GDP and expenditure approach GDP. In both cases, the extent of NBS downward revisions to the sum of provincial GDP has increased since 1997; by 2004, the sum of provincial GDP in the production approach was 19.26% larger than the national value reported by the NBS. In the production approach, the NBS is revising downward provincial secondary sector and in particular provincial tertiary sector value added. In the expenditure approach, the NBS systematically revises provincial household consumption upward and government consumption and gross capital formation, particularly inventories, downward.

51. The rising gap coincides with a wave of reports on local data falsification in 1997 through approximately 2001. In response, the NBS with support of the State Council and the Chinese Communist Party Central Committee's Disciplinary Commission started a campaign against local data falsification in 1997/98.[12] The continuing revisions in the national data to the sum provincial data all the way up through 2005 would suggest that the campaign was not successful.

52. In 2004, the then NBS commissioner, Li Deshui, gave the following reasons for the discrepancy between national and sum provincial GDP: provinces use 1990 base year prices when calculating industrial real growth, while the NBS makes adjustments to this procedure based on a price index (and starting in 2004 the NBS fully switched to a price index in agriculture and industry); provinces double-count cross-provincial economic activities; provinces still use (presumably questionable) report forms for industrial enterprises with annual sales revenue below 5m yuan RMB (non-DRIEs); provinces use the opportunity of the

[12] For details, see Holz (2003).

as yet incomplete measurement of tertiary sector activities to adjust tertiary sector output upward such that the sectoral data add up to their desired aggregate output value; and provinces have incentives to exaggerate output (due to growth targets, comparisons of different localities by their output growth rates, and the use of statistics to measure local cadres' "achievements").

53. As to *how* the NBS adjusts provincial GDP data in deriving national GDP, earlier, in February 2000, Liu Hong, the then NBS commissioner, offered just two sentences. The NBS contrasts provincial GDP data with key economic data obtained through sample surveys in each province. The NBS also has available data on variables related to GDP, and assumes that the values of these variables cannot grow at a speed that is much different from that of GDP.[13] Li Deshui's 2004 reasoning for adjustments suggests, in addition, the use of a price index, survey data on small industrial enterprises, and controls against double-counting.

54. In the literature, Chinese authors also attribute the discrepancy to data falsification at the lower-level tiers as well as to problems in calculating provincial-level, let alone municipal- and county-level GDP. In the production approach (supplemented by income data), alleged local exaggeration in the tertiary sector is attributed to a lack of local data, with nationwide data presumably collected through centrally organized, nationwide sample surveys. In the expenditure approach, local imports and exports, which at the local level include trade with other localities, are impossible to determine, and data on changes in inventories are supposedly highly incomplete since such data are, at the local level, only available for the directly reporting enterprises in each economic sector.[14]

55. Despite these arguments in favor of the national rather than sum provincial data, the 2004 economic census with its subsequent benchmark revisions to the GDP values of 1993-2004, discussed below, suggests that the provincial GDP values, and thereby the sum provincial value added, may in recent years have been more accurate than the national data.

2.2.3 Derivation of GDP real growth rate from sectoral real growth rates

56. The NBS does not explain how it derives real GDP growth rates from sectoral real growth rates. Table 4 examines four possibilities using the GDP and sectoral real growth rates published in the *Statistical Yearbook 2005*. None of these four methods yields exactly the official real GDP growth rates, but at least the first three come reasonably close. The previous-year weights appear best in reconstructing the official real GDP growth rates, followed by the use of a Törnqvist index, and then current-year weights. Using decade weights (year 1980 weights for the years 1980-89, and similarly with 1990 and 2000 weights) yields results that are furthest from the official real GDP growth rates.

2.2.4 Annual revisions of GDP data

57. The NBS retrospectively revises data in annual and in benchmark revisions. Every year, the NBS in the *Statistical Yearbook* provides a revised set of production approach nominal GDP and sectoral value added for the last previously published annual data. For example, the *Statistical Yearbook 2005*, published in September 2005, provides (final) revised nominal GDP data for 2003 together with preliminary GDP data for the latest year, 2004. Year 2003

[13] See *China Infobank*, 29 February 2000.
[14] See, for example, Pan Zhenwen and An Yuli (2003).

GDP was revised upward by 0.1%, while in some earlier years the correction was on the order of 1%. Prior to the publication of the *Statistical Yearbook*, the revised 2003 figure already appeared in the *Statistical Abstract 2005*, published in May 2005, which otherwise provides the first comprehensive data for 2004.[15] Retrospective annual revisions that go back more than to the year before the current reporting year are rare; when they occurred, they were on a very minor scale, except in the *Statistical Yearbook 1989* where revisions went back several years and for some years reached a scale of about 3%.

58. The NBS in its publications reports nominal value added and real growth rates but no deflators. An *implicit* deflator immediately follows from these two variables. This GDP deflator reflects the (implicit) deflators of sectoral value added.

59. In the *Statistical Yearbook* series, while the nominal data of a particular year are typically revised in the next year's issue of the *Statistical Yearbook*, the real growth rates are typically not revised. Yet, in as far as the first published (implicit) sectoral deflators reflect the best possible estimate of the true deflator for the whole economy, they are applicable not only to the first published GDP data but also to the later revised nominal GDP data.[16]

60. First published deflators are likely to be the final ones because the revisions to nominal data largely, if not exclusively, stem from revised data on those statistical units that do not report directly to the NBS. The data collected from or guesstimated for these statistical units are likely to consist only of nominal data (no constant-price output values), in many instances not even of direct output measures but of related measures such as sales revenue. Deflators, in contrast, in most sectors are derived by the NBS from data provided by the directly reporting statistical units; such data are typically not revised later (first data are final data). When the NBS uses price indices, such as for some sub-sectors of the tertiary sector, these are with near-certainty final by the time the NIPA data are first published in the *Statistical Yearbook*; the price indices published in the *Statistical Yearbook* have never been retrospectively revised. In other words, the first published (implicit) deflators of sectoral value added are likely to be final, and later revisions to nominal value added should trigger corresponding revisions to real growth rates, which, in practice, they usually do not.

61. If the NBS uses previous-year weights or a index in deriving real GDP growth from weighted sectoral growth rates, revisions to nominal sectoral data (the relative weights) may impact on real GDP growth. Changes to nominal sectoral data, thus, even if they were accompanied by changes of similar size to the sectoral deflator—which, as argued in the previous paragraph, is not plausible—should affect *real* GDP growth through the changing weights as long as sectoral real growth rates are not identical. But they typically do not. On the other hand, because the published real growth rates only come with one decimal, small changes in nominal values may not affect the real GDP growth rate.

62. The first column of Table 5, for the years 1987-2004, reports the real GDP growth rate as first published and for the years 1987-91 as published in the *Statistical Yearbook 1993*. The second column reports the real GDP growth rate as most recently published, in the *Statistical*

[15] A statistical bulletin is issued typically in February of every year (in the year 2005, on 28 February), before the annual meeting of the National People's Congress and the publication of the annual economic and social development plan for the current year. The statistical bulletin focuses on the just completed year and usually does not publish revised figures for the year before.

[16] The (first published) implicit deflator of 1987, for example, is based on the nominal values of 1986 and 1987 as published in the *Statistical Yearbook 1988* and the 1987 real growth rate as published in the same *Statistical Yearbook 1988*. The implicit deflator of 1988 relies on values from the *Statistical Yearbook 1989*.

Yearbook 2005, which incorporate the benchmark revisions following the 1992/93 tertiary sector census.[17] Throughout the early 1990s, first and later published real GDP growth rates differ by up to approximately one percentage point. Since 1995, real growth rates have rarely been revised.

63. The third column of Table 5 reports real GDP growth rates for all years obtained by combining the *Statistical Yearbook 2005* nominal sectoral data for the primary sector, industry, construction, and the tertiary sector with the first published implicit deflators of these sector to obtain real growth rates for these sectors, and then aggregating the sectoral real growth rates using a Törnqvist index (with the nominal values of the *Statistical Yearbook 2005* as weights). The underlying assumption of these real growth rates is that the first published implicit GDP deflators are correct, i.e., the annual revisions to nominal data should trigger similar revisions to real growth rates (which they usually do not). The resulting real growth rates are substantially different from those first published for 1991-1994, with only the 1991-1993 difference possibly explainable by the incorporation of tertiary sector census results in the more recent set of nominal data. In the subsequent years, the difference can reach up to 1.5 percentage points. Real growth in 1998 would only have been 6.3%, in contrast to the first published (or the *Statistical Yearbook 2005*'s) 7.8%, and in 2001 it would have been 8.8% rather than 7.3% or 7.5%.

2.2.5 Benchmark revisions of GDP data

2.2.5.1 Tertiary sector census 1992/93

64. Two benchmark revisions of earlier GDP values have so far occurred. The first is the benchmark revision following the 1992/93 tertiary sector census, reflected in the *Statistical Yearbook 1995* and all subsequent issues of the *Statistical Yearbook*, as well as in *GDP 1952-95*. Tertiary sector value added of 1993 was revised upward by 32.04%, and thereby GDP by 9.99%. Tertiary sector value added and GDP of all years back to 1978 were revised, with a 1978 revision of 4.37% and 1.00%. The real growth rates reported in the second data column of Table 5 (with data from the *Statistical Yearbook 2005*) for the years 1987-93 reflect these revisions.

2.2.5.2 Industrial sector census 1995

65. The industrial census of 1995 led to a downward revision in industrial GOV of 1991 through 1994 by 6, 7, 9 and 10%.[18] Yet industrial value added of these years in the NIPA, as well as GDP, were not revised retrospectively. This is plausible only if the value of intermediate inputs was revised downward in these four years by exactly the same absolute amount; industry-wide census data on intermediate inputs are not available.[19]

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[17] The starting year is 1987 because the *Statistical Yearbook 1988* (with most recent data for 1987) is the first *Statistical Yearbook* issue with GDP data. For some data limitations in the years 1987-91, see notes to the table.

[18] Compare *Statistical Yearbook 1995*, p. 377, and *2000*, p. 409, or see the discussion in Holz and Lin (2001a).

[19] The revisions to industrial GOV occurred solely to the data of non-state enterprises, with perhaps a further limitation to those non-state enterprises which are not directly reporting. For these enterprises, the NBS is unlikely to have any intermediate input data, nor value added data, to begin with. Value added in these enterprises is in all likelihood estimated as GOV times a value added *rate*, which itself is estimated from a sample of non-DRIEs. Given these constraints, it may have seemed preferable not to attempt to adjust industrial value added in the NIPA.

2.2.5.3 Economic census 2004 and the 2004/05 benchmark revisions

66. The 2004 economic census, covering the secondary and tertiary sector, led to a second benchmark revision of the NIPA. The benchmark revision was announced by the NBS on 9 January 2006 with revised nominal values and real growth rates of value added (GDP), economy-wide, for the three main economic sectors, and for industry and construction, for 1993-2004.[20] A follow-up announcement on 8 March 2006 elaborated further. The NBS does not provide an explanation of why the year 1993 is the earliest year whose NIPA data are being revised; 1993 was the latest year for benchmark revisions following the 1992/93 tertiary sector census, i.e., 1993 data have now been subjected to two benchmark revisions.

67. The benchmark revisions are incorporated in the *Statistical Abstract 2006*. The *Statistical Abstract* is typically published in May of each year (as the *Statistical Yearbook* is in September or October of each year) and contains final figures for all years except the latest one. The *Statistical Abstract 2006* in a NIPA table covering 1978-2005 reports the same revised 1993-2004 nominal values and real growth rates as the *Economic Census 2004*. It further reports a revised tertiary sector series for the years 1978-92, which then also implies a revised GDP series for these years; only nominal values are revised. The *Statistical Abstract 2006* also reports nominal values and real growth rates for the two tertiary sector sub-sectors transport & communication and commerce & catering, and, beyond previous publications, includes data for the year 2005.

68. A four-volume compendium solely on the 2004 economic census (*Economic Census 2004*) became available in June 2006.

69. In sum, the benchmark revisions published so far concern nominal values and real growth rates of GDP, the three main economic sectors, and industry and construction. For the years 1993-2004, the *Statistical Abstract 2006* reports values that are identical to those in the *Economic Census 2004* and revises those of the *Statistical Yearbook 2005*. For the years 1978-92—for which the *Economic Census 2004* does not report any revisions—the *Statistical Abstract 2006* in comparison to the *Statistical Yearbook 2005* reports revised nominal tertiary sector and GDP values.

2.2.5.4 Sectoral classification of the 2004/05 benchmark revisions

70. The revised data are classified according to the GB2002. This follows from an explicit statement in the State Council explanations of the economic census stipulations (SC 5 Sept. 2004) to use the GB2002 in compiling economic census values, accompanied by the corresponding sectoral list. It also follows from the list of tertiary sector sub-sectors given in the definitions of NIPA data in the *Statistical Abstract 2006* (p. 217). The list exactly matches the GB2002 (and is not compatible with the GB1994). It finally follows from the fact that the benchmark revisions revised primary sector nominal value added of 1993-2004, even though the primary sector was not subject of the economic census; these revisions to primary sector value added are then presumably due to the reclassification, which also indicates that all

[20] It also includes a GDP index with its 1978 value set at 100. The *original* GDP index, reproduced in the *Economic Census 2004* (9 Jan. 2006), turns out to be identical to the original *GNP* index in the *Statistical Yearbook 2005*, p. 54, rather than the original *GDP* index. The published *revised* GDP index implies annual real growth rates that match the published revised (annual) real GDP growth rates.

benchmark revision values of 1993-2004 follow the GB2002. The more recent, 2005 data in the *Statistical Abstract 2006* then presumably also follow the GB2002.[21]

71. Beyond the application of the new sectoral classification, Xu Xianchun (2006, pp. 17f.) elaborates on three innovations in the calculation of sectoral value added, implemented to better comply with international practices. Interest on household savings deposits was previously counted as financial sector value added, but is now attributed to the individual sectors that produced this particular value added. Depreciation on residential housing was previously based on construction costs, but is now based on current market values. Expenditures on computer software are not handled uniformly by all statistical units in China (the 1993 System of National Accounts regards it as gross fixed capital formation, the 1968 version, however, as an intermediate input), but the economic census collected data on income from computer software sales which allows the NBS to in gross fixed capital formation include approximate expenditures on computer software.

72. The fact that the *Statistical Abstract 2006* revised tertiary sector values of 1978-2004 raises questions about the classification scheme underlying its pre-1993 tertiary sector values. The official definition of the tertiary sector in the *Statistical Abstract 2006* (p. 217)—matching the definition of the tertiary sector in the GB2002—comes without any qualifying statement, i.e., should apply to all years. If so, then the 1978-1993 tertiary sector values in the NIPA tables of the *Statistical Abstract 2006* (pp. 20ff.) also follow the GB2002. The values of all other sectors in 1978-92 in the same tables are identical to those in the *Statistical Yearbook 2005* and therefore follow the GB1994; GDP in 1978-93 then would be a mixture of the primary and secondary sector following the GB1994, and the tertiary sector following the GB2002. This leads to inconsistencies, because in the GB2002, in comparison to the GB1994, lower-level sectors are reclassified between the primary, secondary, and tertiary sector (but the primary and secondary values of 1978-92 are not revised in the *Statistical Abstract 2006*). Thus, either the 1978-93 NIPA values in the *Statistical Abstract 2006* are inconsistent, or the official definition of the tertiary sector in the *Statistical Abstract 2006* (p. 217) needs to be limited to the years since 1993.

73. Suppose the definition is wrong as it stands in its general form and should only apply to the years since 1993. One conceivable scenario then would be that the tertiary sector values of 1978-92 in the *Statistical Abstract 2006* still follow the GB1994, but are expanded to cover economic activities previously not covered in the NIPA. This would seem plausible.

74. One variation is the following. *GDP 1952-95* (preface p. 1) states that the national and provincial data reflect the benchmark revisions that followed the tertiary sector census of 1993, except for the case of Guangdong. The phrasing is ambiguous, but suppose the *national* data in *GDP 1952-95* has the pre-tertiary sector census Guangdong tertiary sector values. The value of national 1992 tertiary sector value added in *GDP 1952-95* (p. 27) is identical to that in the *Statistical Yearbook 2005* (p. 51), i.e., the pre-economic census national values in the *Statistical Yearbook* may also be based on Guangdong values that do not incorporate the 1993 tertiary sector census. The *Statistical Abstract 2006* (p. 26), revising 1978-1992 tertiary sector value added (in addition to the post-economic census benchmark revisions of the years

[21] The NIPA data in the *Statistical Yearbook* for the years since 2003 could theoretically also follow the GB2002. This is unlikely given that the detailed tertiary sector data published in the *Statistical Yearbook* are categorized and labeled as in the GB1994. Since the detailed tertiary sector data add up to the published tertiary sector total, and since the latter together with primary and secondary sector data add up to the published GDP value, it is not possible that tertiary sector value added follows the GB2002.

1993-2004), raises tertiary sector value added of 1992 by 28.54b yuan RMB. This amount is equal to 36.87% of the published Guangdong 1992 tertiary sector value added of 77.41b yuan RMB (*GDP 1952-95*, p. 724) that does not incorporate the tertiary sector census revisions of 1993. This percentage is remarkably close to the average (i.e., national) upward adjustment of 1992 tertiary sector value added by 33.15% (*Statistical Yearbook 1994*, p. 32, *2005*, p. 51).

75. Overall, the inter-sector classification since 1993 follows the GB 2002 (and incorporates new national income accounting practices). The inter-sector classification prior to 1993 follows the GB1994 except for the tertiary sector, which is either defined (i) as in the GB 1994, plus additional activities or with revised Guangdong data, or (ii) as in the GB2002, which would make the revised 1978-92 sectoral values internally inconsistent (due to double-counting and/or omission of economic activities that were reclassified between the GB1994 and the GB2002).

76. Finally, the two sub-sectors of the tertiary sector on which data are reported, transport & communication and commerce & catering, in the *Statistical Abstract 2006* are labeled as in the GB1994, and the values for the years prior to 1993 are identical to those in the *Statistical Yearbook 2005*. I.e., for these two sub-sectors of the tertiary sector, the new classification (the GB2002) at least in 1978-93 does not apply; if the GB2002 were to apply, with its new coverage for these two sectors, the 1978-93 values for these two sub-sectors would have had to be revised. In the years since 1993 the GB1994 appears to continue to apply for these two sub-sectors, for two reasons. First, the label of the series is unchanged, without any note of a change in coverage. Second, the change in the values of these two series between 1992 and 1993 (when the switch to the GB2002 could occur) appears too large to accommodate their (downward) redefinitions from the GB1994 to the GB2002.

2.2.5.5 Nominal 2004/05 benchmark revision values vs. earlier published values

77. Table 6 presents the revised nominal data (following the 2004 economic census) and the percentage increase over the original nominal values (as previously published in the *Statistical Yearbook*, including the annual revisions). The revised nominal GDP figure of 2004 is 16.8% higher than the originally published one, with most of this increase due to an almost 50% upward revision to tertiary sector value added. At the sectoral level, the comparison is not perfectly permissible due to the reclassification among sectors. The primary sector was not part of the economic census and the annual upward revisions to primary sector value added across all years (1993-2004) remain below 1%, presumably reflecting only reclassification. Upward revisions to industrial value added remain below 4%, reflecting reclassification and possibly adjustments due to the census. Construction value added was reduced by up to 9.2%, also reflecting reclassification and possibly adjustments due to the census. Tertiary sector value added is increased from 5.9% in 1993 to 48.7% in 2004, reflecting reclassification, adjustments, and presumably an increased coverage to reach economic activities previously not covered in the NIPA.

2.2.5.6 National nominal 2004/05 benchmark revision values vs. original provincial values

78. Contrary to (former) NBS commissioner Li Deshui's explanation of the discrepancy between national and sum provincial data (reported above), the 2004 economic census results imply that provinces did *not* over-report tertiary sector value added. A comparison of 2004 benchmark values to the pre-economic census sum provincial data is also included in Table 6. If the 2004 economic census results are correct, provinces in 1993-2004 *under-reported*

tertiary sector value added by 3.2% to 11.7%; the degree of under-reporting should be reduced due to the fact that the economic census values, following the GB2002, presumably have a wider coverage than the earlier published provincial values that follow the GB1994 (with the wider coverage due to reclassification and probably to extension to previously excluded economic activities).

79. The provincial data on the primary sector appear highly accurate. The reclassifications make the economic census data and the earlier published provincial data not fully comparable, but at the national level, as noted above, the revisions due to the reclassification remained below 1%, so that the comparison is almost perfectly valid. The provinces appear to have over-reported secondary sector output, especially in construction, but it is not clear to what extent the difference is due to reclassifications. At the national level, reclassifications plus adjustments, together, led to a major downward revision of construction value added in the 2004 economic census. Overall, original (pre-economic census) sum provincial GDP in 2004 was only 2.1% larger than the revised national figure. The original national figure, on the other hand, was 14% too low.

80. The *Statistical Abstract 2006* (p. 27) also reports post-economic census provincial GDP values for 2004; the sum of these provincial values is 4.8% higher than national post-economic census GDP. (Sectoral post-economic census provincial values for 2004 are not available in the source.) The post-economic census values of 2005, with only preliminary data on the provinces, shows a sum provincial GDP value that is 7.8% higher than the national value, with no discrepancy in the primary sector, a 11.8% higher sum provincial value in the secondary sector, and a 5.7% higher sum provincial value in the tertiary sector (Table 6).[22] I.e., the issue of a discrepancy between provincial and national figures appears to continue. The NBS has recently stated its intention to move to its own calculation of provincial GDP values, which would then presumably side-track data that come out of the provincial statistical bureaus altogether.[23]

2.2.5.7 2004/05 benchmark revision vs. earlier published real growth rates

81. Yet another consistency check is possible based on real growth rates as published prior to the economic census vs. in the benchmark revisions. The comparison is not perfectly justified because of the reclassification across sectors in the benchmark revisions. However, if the impact of the reclassifications were minor, which is the case at least in agriculture, the comparisons would be wholly valid. With no possibility to gauge the impact of the reclassifications on the secondary sector and the tertiary sector, the following discussion mostly ignores the reclassifications, i.e., assumes that the three economic sectors (and the two secondary sector sub-sectors) are fully comparable between the GB1994 and the GB2002.

82. Table 7, for GDP and sectoral value added, presents three real growth rates and two implicit deflators. The three real growth rates are the pre-economic census ones reported in the *Statistical Yearbook 2005*, the revised ones (following the 2004 economic census), and a here newly constructed mixed one which uses the *revised* nominal data of the 2004 economic census and the sectoral deflators implicit in the *Statistical Yearbook 2005* (with secondary sector/ GDP real growth rates aggregated based on the industry and construction/ three main economic sectors, using a Törnqvist index). The two implicit deflators reported in Table 7 are

[22] The provincial data are highly preliminary in that they are based on the annual "quick reports" (*kuaibao*); see *Statistical Abstract 2006*, p. 27.

[23] See *Xinbao* (a Hong Kong daily newspaper), 22 May 06.

the one implicit in the *Statistical Yearbook 2005* data and the one implicit in the economic census values.

83. In the primary and in the secondary sector, with both industry and construction, the revised real growth rates equal the original real growth rates. This means that what the NBS has done in the primary sector is to revise the nominal values, presumably following the adoption of the GB2002, and assumed that the reclassified activities experienced the same real growth rates as the primary sector in the GB1994. It implies that the NBS has retrospectively imposed upward revisions on the implicit deflators of 1993-2004.[24]

84. In the primary sector, the reclassification in 1993 increased the previously published nominal primary sector value added by only 0.1%, but in 2004 by 0.9% (with a continuous increase in the years in between, see Table 6). I.e., the value of newly added agricultural activities between 1993 and 2004 increases significantly faster than the value of original agricultural activities, and if the newly added activities were subject to the same deflator as the original ones, the resulting new real growth rate of total agricultural activities should go up.[25]

85. The case of industry and construction is similar, except that the revisions to the 2004 values are much larger (+3.8%, -9.2%) than in the primary sector. The revisions to the *1993 values* are also significantly smaller (+0.3%, -0.8%) than those to the 2004 values. I.e., both sub-sectors have experienced changes in nominal output that differ significantly from the pattern inherent in the previously published data, and one would expect the real growth rates to change correspondingly. Again, the implication of not changing real growth rates is that the NBS has imposed revisions on the implicit deflators. The NBS raised the implicit deflator of industry, and lowered that of construction.

86. There are two possible interpretations of this pattern. One, the NBS used the opportunity of the 2004 economic census to in agriculture, industry, and construction switch to a new deflator. It seems unlikely that the nationwide collection of comprehensive secondary and tertiary sector data changes deflators (including of the primary sector) and nothing else; the census was not about deflators for the years 1993-2004, nor about year 2004 prices. The new deflators, then, must come from some other source, and the 2004 economic census only provides an excuse to apply the new deflators to earlier data.

87. It is strange, however, that better deflators are only available for the years since 1993 and not for the years 1978-92. The years 1978-93 were subject to the previous benchmark revision following the 1993 tertiary sector census; that census largely retained the earlier published implicit deflators.[26] It is also strange that the new deflators of 1993-2004 are able

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[24] Given the small volume of reclassifications, it may also be the case that each *annual* change in the real growth rate is too small to be captured by an annual (percentage) real growth rate reported only with one decimal. But over a period of several years, the impact should be noticeable in some of the years, even when real growth rates are only reported (in percentages) with one decimal.

[25] One could easily believe a constant real growth rate series if the 1993 nominal primary sector value had been revised by the same percentage as the 2004 primary sector value, but that is not what the statistics show.

[26] That was a tertiary sector census. Of the two sub-sectors of the tertiary sector on which data were published in the *Statistical Yearbook* prior to and after the tertiary sector census, the first, transport & telecommunications, did not experience any change in deflator in the years 1979-89, and the second, commerce & catering, did not experience any change in deflator in 1979 and 1980, a two percentage point change in 1981, and very minor changes, typically at the first percentage decimal, in 1982-1992. The primary and secondary sector (and secondary sector sub-sectors) did not experience any change in deflator. (*Statistical Yearbook 1993*, pp. 31f., *1994*, p. 32, *1995*, p. 32, and *2005*, pp. 51 and 54.)

to perfectly compensate for the newly found 2004 nominal value added, such that the real growth rates of 1993-2004 remain exactly unchanged from the pre-economic census ones. That does not seem plausible.

88. A second possible interpretation is that the implicit deflators are not changed. To take the case of industry, the 2004 economic census resulted in an increase of 2004 nominal value added of industry by 3.8%, and no change in the 1992 value. If the deflator of the years 1993-2004 were indeed unchanged, then either the revised pre-2004 nominal values or the revised (equals original) real growth rates are *incorrect*. To explore these possibilities further, it is useful to distinguish between a pure net reclassification of economic activities from the primary and tertiary sector (as well as construction) to industry, vs. the collection of new data within a given sectoral classification.

89. Since the 2004 economic census focused on 2004 nominal values, those of earlier years were probably simply adjusted backwards such that by 1992 each variable could retain its previously published value. According to Xu Xianchun (2006, p. 19), the NBS followed OECD advice and used the "trend-difference" method; the 1992-04 trend is established twice, using the pre-economic census (original) 2004 value as well as the post-economic census (new) 2004 value, and the original annual relative divergence from the trend applied to the new trend line to obtain annual values for 1993-2003 based on the post-economic census 2004 value. Figure 1, for GDP, and Figure 2, for primary sector and construction value added, where the underlying data allow the pattern to be clearly visible, suggest that such a procedure was indeed used.[27]

90. Suppose *all* of the 2004 adjustment were due to reclassifications. Then the reduction in reclassifications to zero in 1992 is not plausible. More likely than not, the reclassification should occur in roughly the same proportion in each year. Reducing the revisions to zero in 1992 would simply be a matter of convenience, in order to obtain a smooth-looking time series and to not have to revise pre-1993 data. The implication would be that the pre-2004 nominal values are all underestimates (should have experienced larger reclassifications); in this case it cannot be ruled out that the original industrial real growth rates may still be the relevant ones, and it is the official, revised nominal values that are wrong.

91. But reclassifications are most unlikely to account for all of the revision to 2004 industrial nominal value added. The NBS in the *Statistical Yearbook 2005* published pre-economic census 2004 values for the group of "industrial SOEs with independent accounting system and industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB," i.e., the "directly reporting industrial enterprises" (DRIEs). The post-economic census 2004 number of DRIEs is up 26% over the pre-economic census 2004 value, and the post-economic census 2004 gross output value up 8% (with similar changes for other variables). Values change across virtually all individual industrial sectors, and independent of if their label changed between the pre-economic census GB 1994 and the post-economic census GB2002 or not.[28]

92. This suggests that the 2004 economic census collected a new set of data on industry that reflects not only (i) reclassifications, but also, and perhaps more significantly, (ii) the

[27] Industry and the tertiary sector are omitted because the industry pattern is very similar to that of construction (but with a smaller difference between original and revised series), and the tertiary sector trends of both series are almost a straight line (albeit increasingly moving apart). The revision using a deviation-from-trend procedure is, given the underlying data, best visible in the two figures presented.

[28] For the data, see *Statistical Yearbook 2005*, pp. 488, 493, and *Economic Census 2004*, Vol. 2, pp. 10ff.

coverage of new (more) statistical units, and (iii) the coverage of economic activities not (or not properly) covered under the previous classification system.[29] For example, Xu Xianchun (2006, p. 17) writes that the GDP coverage was expanded to newly include (i) economic activities previously ignored, such as those occurring in sub-ordinate units of an enterprise and outside the main business of the enterprise, and (ii) economic activities captured through statistical compilations outside the economic census (and previously not included in GDP), such as home-owners renting out housing, home teaching, or childcare services.

93. In this more realistic case of the benchmark revision capturing more statistical units and/or more economic activities, reducing the adjustment of nominal values to zero by 1992 is realistic if these additional statistical units or economic activities did not exist in 1992. The revised data of 2004 then simply reflect the inability of the NBS to *in recent years* capture the proliferation of economic activities. But in that case, real growth rates should have been revised, which they were not. I.e., the published "revised" real growth rates are incorrect.[30]

94. Beyond the questions about the real growth rates of the primary sector, industry, and construction, the fact that the NBS retained its *secondary sector* real growth rate reveals an unambiguous inconsistency. The secondary sector real growth rate is a weighted average of the real growth rates of industry and construction, with as weights the shares of industry and construction in secondary sector nominal value added. Retaining the pre-economic census secondary sector real growth rates implies that the NBS did not change the weights of industry and construction in the calculation of secondary sector real growth rates. This is despite the increase in nominal value added of industry and the decrease in nominal value added of construction, and even though these changes are sufficiently large to at least in some years change the real growth rate of the secondary sector, calculated with one decimal and using a Törnqvist index or previous-year weights. This appears an outright mistake.

95. It is not an outright (calculation) mistake only if the NBS uses pre-1993 nominal weights to aggregate sectoral real growth rates. However, that would amount to gross misspecification because inappropriate weights would be applied to sectoral growth rates. It would also mark a severe deviation from earlier practice in that the official pre-economic census GDP real growth rates are best matched by applying previous-year weights to sectoral real growth rates or by using a Törnqvist index. Using decennial weights (1990, 2000), on the other hand, yields results that are rather different from the official pre-economic census GDP real growth rates.

96. With only the tertiary sector real growth rates allowed to increase, the overall effect on real GDP growth is smaller than the increase in nominal 2004 GDP of 16.8% over the

[29] Theoretically, the NBS could in the economic census have moved some of the non-DRIEs into the DRIE category, and the non-DRIE category could then have been reduced correspondingly in the economic census. This cannot be checked, because the *Statistical Yearbook* series did not publish 2004 data on non-DRIEs (nor did any other source). However, one cue in support of the argument that the 3.8% upward revision of 2004 industry value added in the economic census is not solely due to reclassification of economic activities from the primary and tertiary sector (or construction) to industry is the following. The size of different industrial sectors changed in the economic census, even when the label remained unchanged. I.e., reclassifications due to a change in the classification system from the GB1994 to the GB2002 cannot fully account for changes in the relative size of individual industrial sectors (within the DRIE coverage). But if a truly new collection of data occurred for the individual industrial sectors, then probably also for *all industry*, and an explanation of the change in industry value added in terms of reclassifications only is insufficient.

[30] Perhaps the truth is somewhere in between: 1992 (and earlier) nominal values should have been revised upward somewhat, and 1993-2004 real growth rates should have been revised upward somewhat. The implicit deflators, in all likelihood should not have been revised.

original figure would suggest. The original average annual real growth rate (*Statistical Yearbook 2005*) between 1992 and 2004 is 9.4%, the revised one (*Economic Census 2004*) is 9.9%, but a revised real growth rate based on the revised nominal data combined with the sectoral deflators implicit in the *Statistical Yearbook 2005* data, using a Törnqvist index of real GDP growth, is 10.7% (mixed case in Table 7).[31] This calculation obviously has to assume that the reclassifications do not change the appropriateness of the earlier implicit sectoral deflators.

97. Going one step further, and applying the *first published* implicit sectoral deflators (agriculture, industry, construction, tertiary sector) to the *revised* nominal sectoral values (following the 2004 economic census), and aggregating into real GDP growth using the Törnqvist index, results in an average annual real growth rate for 1992-2004 of 10.9%.[32] This again assumes that the earlier implicit sectoral deflators are appropriate for the new classification. Beyond reclassifications at the level of the main economic sectors, this also ignores that the first published tertiary sector deflator may no longer be accurate due to changes in the relative nominal size of tertiary sector sub-sectors in the benchmark revision. The annual real GDP growth rates are reported in the last column of Table 5. Compared to the real growth rates as first published (Table 5), the combination of 2004 economic census nominal values and the first published implicit deflator yields real growth rates that in 1993 and 1994 are several percentage points higher (the 1993 difference represents in part the benchmark revision following the 1992/93 tertiary sector census), and in the years since are higher by between a fraction of a percentage point and up to two percentage points, except in 1996, with a 0.2 percentage point decline.

98. The overall impression is that no matter where one searches for an explanation of the unrevised real growth rates, a compelling explanation cannot be found unless one assumes that the nominal values of earlier years are all underestimates, or that the NBS all of a sudden has available new price data, by sector, for the years 1993-2004. Both assumptions are unlikely. It appears more likely that the NBS simply did *not want to* increase the real growth rates in these two sectors, for whatever reason, ranging from convenience to political arguments. It therefore adjusted the deflators of agriculture, industry, and construction in a very peculiar way (to exactly match changes to the nominal data) and ignored the changing weights of the real growth rates of industry and construction.

99. The post-economic census revisions to 1978-1992 nominal tertiary sector value added and therefore also GDP are not accompanied by changes to real growth rates, and therefore imply a revision of the implicit deflators of the tertiary sector and GDP in these years. But because the proportion of the change to tertiary sector value added is rather similar in 1978 and 1992, with 2.4% and 3.1% upward revisions, keeping the old real growth rates appears a

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[31] The latter real GDP growth rate (of 10.7%) is the weighted average of the real growth rates of primary, secondary, and tertiary sector, where the secondary sector real growth rate itself is the weighted average of the real growth rates of industry and construction. Weights are based on revised (following the 2004 economic census) nominal sectoral value added. Real growth rates of individual sectors are obtained using the revised nominal values combined with the deflators implicit in the *Statistical Yearbook 2005* data.

[32] In detail, (i) the nominal revised (2004 economic census) value added data of the primary sector, industry, construction, and the tertiary sector of all years 1993-2004 are deflated using the first published implicit deflators of these sectors (as calculated from first published nominal and real growth data in the *Statistical Yearbook* series); (ii) the real growth rates of industry and construction are aggregated into secondary sector real growth rates using the Törnqvist index with post-economic census nominal value added weights for industry and construction; (iii) the real growth rates of the primary sector, secondary sector, and tertiary sector are aggregated into real GDP growth rates again using the Törnqvist index with post-economic census nominal value added weights of these three sectors. For simplicity, the corresponding annual series is not included in Table 7.

simplifying assumption with bearable consequences. Between 1978 and 1992, the (cumulative) implicit deflator of tertiary sector value added using the pre-economic census nominal values rose 28.5%, and the implicit deflator using the post-economic census nominal values 29.9%. No systematic difference persists across all individual years.[33]

2.2.5.8 Economic census 2004 and expenditure/ income approach GDP

100. In the expenditure approach to the calculation of GDP, which is not the official approach to calculating GDP in China, the NBS has chosen not to revise the 1993-2003 values. The original and revised 2004 nominal values are reported in Table 8. GDP was revised upward by 12.6%. This comprises, first, a 15.4% upward revision to final consumption, which in turn reflects an 8.2% upward revision to household consumption and a 41.1% upward revision to government consumption. Second, gross capital formation was revised upward by a lesser proportion, of only 10.0%, which in turn reflects a 4.4% upward revision of gross fixed capital formation and a 673.2% upward revision to inventory investment.

101. The accuracy of the expenditure approach has been questioned before in an examination of the NBS's derivation of household consumption in the national income and product accounts. Calculating expenditure approach household consumption in accordance with the NBS explanations on how the NBS does it, one is unable to replicated the NBS's results (Holz, 2004). The post-economic census revisions to 2004 data only confirm the earlier suspicions.[34] The revisions to government consumption are very large and one may wonder where the 41.1% upward revision could possibly come from. Does the government have many more people on its payroll than it officially admits, or did it spend many times more on its military than originally thought?[35]

102. Since gross fixed capital formation constitutes one measure of investment, of potential use in the calculation of a value for physical capital below, the 10% revision in 2004 without corresponding revisions to the values of the earlier years creates a problematic statistical break. Without explanations by the NBS of where the 10% come from, it is not clear if (i) this is a statistical break per se, in terms of a redefinition of the term "gross fixed capital formation", (ii) constitutes an admission by the NBS that its investment statistics, from which gross fixed capital formation values are derived, have been inaccurate in the past, or (iii) is simply a convenient adjustment for expenditure approach GDP to come close to the post-economic census production approach GDP value. Presumably, part of the 10% consists of

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[33] The two implicit deflators differ significantly in 1993 and 1978, the two connecting years. In 1993, the original pre-economic census implicit deflator (from the *Statistical Yearbook 2005*) is 11.9% and the post-economic census implicit deflator 13.5%. In 1978, the two values are 0.8% and 3.3%.

[34] The household consumption measure relies largely, but not solely, on social retail sales (see Holz, 2004). Retail sales focus on purchases by households and other social entities in retail transactions, something that is difficult to measure. The NBS is reportedly "gradually" (*zhubu*) switching to the sales of commercial units as the variable on which to collect data. Since 2003, it reportedly dropped the direct retail sales of consumer goods by factories from the "social retail sales." In addition, or as consequence, the two categories "manufacturing" and "agricultural production" within the social retail sales measure were dropped. (*Zhongguo tongji*, no. 1, 2003, p. 15)

[35] Government consumption comprises the four items (i) routine (*jingchangxing*) expenditures of administrative facilities (*shiye*) paid for out of the budget, (ii) routine expenditures paid for out of extrabudgetary funds, (iii) fixed asset depreciation of administrative units (*xingzheng danwei*) and of not-for-profit administrative facilities, and (iv) gross output value less business revenue of urban and rural neighborhood committees. For details on the numerous subcategories of each of these three items see NBS (1997), pp. 153-6; the first item, for example, includes military expenditures.

expenditures on computer software that are now supposedly consistently counted as gross fixed capital formation (Xu Xianchun, 2006, p. 18), but that part is unlikely to be large. Finally, the seven-fold upward revision to inventory investment suggests that this item is a rather meaningless residual in the NBS's calculations.[36] It implies, for example, that the data on inventory change cannot serve as a measure of macroeconomic cycles.

103. In the as yet absence of revised real growth rates of consumption and gross capital formation, the question of if the implicit consumption and investment deflator has been revised cannot be answered.[37] If real growth rates were not changed corresponding to the nominal growth rates, the whole body of price indices, from the consumer price index with its numerous sub-indices to the investment in fixed asset price index, would all have to be revised for the years 1993 through 2004. The task appears so daunting (how should previously correct price indices be improved?) that the NBS may rather choose to limit its revisions in the expenditure approach to the revision of nominal 2004 values only, not bother with publishing real growth rates, and live with the large statistical break this creates in the expenditure approach series.

104. Revised national—in form of sum provincial—income approach data are not yet available; only a few provinces have so far released their 2004 economic results, and only for the production approach (apart from the production approach summary statistics published in the *Statistical Abstract 2006* for all provinces).[38] The *Statistical Abstract 2006* does not report income approach values.

105. The NBS's procedure of only revising *tertiary sector* real growth rates (together with the tertiary sector implicit deflators, as in the other sectors) may facilitate the revisions to income approach data, in that the NBS could somewhat plausibly focus on revising labor remuneration data only, corresponding perhaps most to tertiary sector activities. In the end, the necessary adjustments may not be too large because income approach data were so far compiled only at the provincial level. Provincial income approach GDP typically equaled provincial production approach GDP, and provincial production approach GDP always added up to a national value that comes close to the national benchmark revision values.

2.2.5.9 Summary implications of the 2004/05 benchmark revisions

106. Overall, the 2004 economic census benchmark revisions reveal a number of problems in NBS practices. The fact that the 2004 economic census validated original provincial GDP data and invalidated original national GDP data raises severe questions about the capacity of the NBS to accurately compile national data. It retrospectively questions the existence, or at least the seriousness, of the supposed "wind of falsification and embellishment" that was claimed to rage across China in the late 1990s. (Was this only a ploy by the NBS to strengthen its hand in the eternal bureaucratic struggle for power?)

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[36] At the provincial level, on the other hand, net exports are likely to be obtained as residuals. That in turn requires inventory investment to be estimated rather than being obtained as residual. The sum provincial inventory investment may therefore be a somewhat reliable measure for use in business cycle analysis. In recent years, the (pre-economic census) sum provincial value was many times the national value.

[37] Real growth rates are not available in the *Statistical Abstract 2006*, except for per capita household consumption (average, rural, urban) in the years *through 2003* (p. 37).

[38] See http://www.stats.gov.cn/zgjjpc/cgfb/ (accessed on 29 April 2006), with only Inner Mongolia and Hunan presenting detailed benchmark revisions for (production approach) GDP.

107. While revising the deflators of agriculture, industry, and construction of 1993-2004 in the exact fashion needed to offset the changes to nominal data in these sectors could remotely be justified, ignoring the changing weights in the calculation of secondary sector real growth rates (with implications also for GDP real growth) cannot be justified.

108. In recent years, the NBS has repeatedly dropped hints of under-reported national tertiary sector value added, which suggests it knowingly reported false GDP data for at least the most recent years. The fact that the 2004 economic census did not yield a change in the real growth rate of the secondary sector (and changes in secondary sector nominal values are potentially solely due to reclassifications) raises questions about the accuracy or relevance of the economic census in the secondary sector.

109. The scope of revisions across China's statistical data that the 2004 economic census implies is enormous, and so far only the very first step, with the revision of national production approach GDP values, has been made. Revisions to expenditure and income approach GDP values are likely to affect the consumption statistics in the national income and product accounts, retail sales, household survey statistics, the whole range of investment statistics, wage statistics and welfare statistics, profit in the national income and product accounts, and the whole range of price indices. It could well be that the NBS will choose not to consider all the implications and to live with the statistical breaks while keeping quiet about how they came about, and about how NIPA data will be compiled differently in the future in order to maintain consistency of future values with the 2004 values. One consolation is that production approach GDP values, which constitute the core of China's statistical system, may now, after the benchmark revisions, be somewhat accurate.

2.2.6 GDP deflator

110. The NBS does not publish GDP deflators. The GDP deflator used here is an implicit deflator obtained by contrasting nominal and real GDP growth. Nominal GDP is the sum of sectoral GDP; real GDP growth is the weighted sum of sectoral real growth. Sectoral real growth, in turn, depends on (unpublished) sectoral deflators. The NBS's derivation of such sectoral deflators varies from sector to sector.

111. For example, in agriculture, the NBS obtains real value added (with value added taxes added separately in those years when not included in GOV) as the difference between real GOV and the real value of intermediate inputs. Real GOV is obtained by first multiplying output quantities by NBS-provided prices, and then applying the resulting constant-price index to the base year value of agricultural GOV. The real value of intermediate inputs is obtained by applying 14 price indices to the current-price values of 14 different categories of intermediate inputs.[39]

112. Given the criticism of official real growth rates of industry in the literature, the case of industry is examined in more detail here.[40] The NBS obtains real growth rates for industry by applying a deflator to current-price industrial value added.

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[39] See, for example, NBS (1997), pp. 21-30, or Xu (2000), pp. 75f.

[40] For example, Maddison (1998) states, without presenting evidence, that "there are two official price indices which provide a more realistic measure of the pace of inflation" than official implicit deflators; these are the producer price index for industrial products (in official terms, the "ex-factory price index of industrial products"), and the retail price of industrial products in rural areas (p. 140); Wu (2000) provides a more detailed

113. Current-price value added of all industry is the sum of two separate datapoints. In the case of the DRIEs, value added is obtained as the difference between gross output value and the value of intermediate inputs, plus, since 1995 (when GOV no longer includes value added taxes), value added taxes applicable to the products produced. In the case of all other industrial enterprises—those enterprises too small to be included in the first set—a sample survey collects data on gross output value and the income components of value added; the ratio of value added to gross output value in this sample is then applied to the gross output value of all small industrial enterprises.[41]

114. The deflator for industrial value added is a gross output value deflator with adjustments. The gross output value deflator is obtained in a two-step procedure. First, enterprises—and presumably these are the DRIEs only—price their output at (base year) product-specific constant prices provided by the NBS and revised approximately every decade;[42] the NBS thereby obtains a constant-price gross output value time series. This yields a constant-price (real) growth index. Since some NBS-determined (base year) constant prices may differ from base year *market* prices, the NBS applies its constant-price growth index to base year current (i.e., market) price gross output value (of, again, presumably, the DRIEs) to obtain a real gross output value time series in (market) base year prices for the (presumably) DRIEs. Contrasting this time series to current-price gross output value of these enterprises yields the deflator. Adjustments are made to the deflator depending on the development of the raw materials price index. (Otherwise, the underlying assumption for this deflator to be relevant for value added would be that intermediate inputs experience the same price changes as GOV.) The adjusted deflator is finally applied to the *value added* of *all* industry in order to obtain the real growth rates of value added.

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argument. Wu (2000) proceeds to estimate alternative real growth rates based on output quantities; his results in an earlier working paper are used by Maddison (1998). In Holz (2006a, including the appendices) I question the rationales for abandoning the official data and argue that the alternative procedure is likely to severely underestimate real growth.

[41] See Xu (2000), pp. 23-26. The applicable value added tax is derived from the value of value added tax actually paid, taking into consideration timing (time of sales revenue when the value added tax accrues vs. time of production) and corrections for tax reimbursements (for example, in the case of exports) and value added tax paid on bought-in products. Small enterprises may simply apply a flat 6% rate to sales revenue (which not necessarily equals production) to obtain their value of value added tax for the purpose of calculating value added. The gross output value of some small enterprises may be approximated with business revenue. For the complications of the statistical break in the GOV series in 1995 see Holz and Lin (2001a and 2001b).

NBS (1997), pp. 32-7 provides similar explanations; the DRIE at that point of time were defined differently and this source provide further details for the case of the non-DRIEs. The *GDP Manual*, p. 21, states that the ratio of value added to gross output value which is to be applied to the non-DRIEs' GOV is provided through sample surveys of the (NBS) enterprise survey teams.

[42] The constant-price list applies to all industrial enterprises at township level and above. It explicitly does not apply to village and below-village level enterprises or to the urban or rural self-employed (NBS, 30 Sept. 1990). The constant-price list consists of two parts. One is a national list that covers approximately 1500 industrial products in 45 categories; while the national list reprinted in NBS (1995, pp. 1055-1132) does not contain prices, it names, for each category, a government department or company which presumably determines the price. The second part consists of a supplemental list at the provincial level; it may not substitute for or replace items included the national list, and it is to be filed with the NBS. A number of special cases are discussed in the regulation (NBS, 30 Sept. 1990). For example, if an enterprise's product differs in specification to one included in the list, then the constant price of that enterprise's product is obtained by the local statistical bureau based on the product's 1990 relative price compared to the item included in the list. Newly introduced products are to be reported up to the relevant government department, which is to determine the constant price; with approval of the local statistical bureau, a temporary procedure is to use as constant price the ex-factory price when the product is first produced.

115. For details on these procedures also see Xu (2000), pp. 76f. Given the brevity and vagueness of these explanations (as well as in other compendia, such as NBS, 1997), the possibility cannot be ruled out that the NBS calculations of the constant-price GOV growth index are based on *all* industrial enterprises. However, this appears technically impossible in that the NBS does not have available product quantity data for all industry.[43] According to the NBS (NBS Industry and Communication Division, 1999, p. 4), the regular annual statistical reporting system in industry comprises a number of report forms (listed in detail in this source); the only annual report form to include product quantities is a report form filed by the DRIEs. The reprinted report form for small enterprises (p. 38) collects data only on four variables, namely *current-price* gross output value (or business revenue, *yingye shouru*, if gross output value data are not available), tax payments, paid-in capital, and year-end employment.

116. The *GDP Manual* of 2001, an internal document on the compilation of GDP data, states that the GOV deflator, which is applied to current-price value added in order to obtain real growth rates of value added, is in fact the ex-factory price index compiled by the urban survey team (p. 67). This contrasts with the constant price method outlined above, and the data do not bear out this claim.[44] Former NBS commissioner Li Deshui's statement, reported above, suggests that the price index method (without specifying the use of the ex-factory price index) became the standard method in 2004.

117. Table 9 reports the implicit deflators of industrial value added and a wide range of related industrial deflators and price indices. All deflators are *implicit* deflators obtained from nominal values and real growth rates, and all data are on industry. Figure 3 through Figure 10 chart the key series.

118. The 1978-2004 value added deflators published in the *Statistical Yearbook 2005* differ in a few years from the deflators as first published (in the corresponding year's *Statistical Yearbook*); see Figure 3. In as far as GOV is usually not revised in a later year—1991-1994 values were revised following the 1995 industrial census—a comparison of value added deflators with GOV deflators should focus on the value added deflators as *first published*, available for the years since 1991.[45]

119. Figure 4 through Figure 10 reproduce the two value added deflators (i) according to the *Statistical Yearbook 2005* and (ii) as first published, and contrast them with related deflators and price indices in an attempt to identify the source of the NBS's deflators for value added. The GOV deflator matches the two value added deflators in some years well, and in other years less well, but is never far off (Figure 4). The deflator of sum provincial GOV offers a better match throughout, especially with the first published value added deflators in the years

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[43] The collection of industry-wide product quantities would require massive guesswork by lower-level statistical officials (and is contradicted by the findings of Holz, 2003). Considering the number of private and collective-owned small enterprises in the countryside it appears utterly implausible that any serious guess as to their types of products, their output quantities, and the quality/ specifications of these products can be made. Furthermore, for small enterprises to report constant price output, they need to know the constant prices. It appears not the case that millions of copies of the constant price manual are flooding the countryside—it is not even publicly available. It may, in fact, simply be a long series of sector-specific publications.

[44] For the data from 1979 through 2004 see various editions of the *Statistical Yearbook*, or Table 9 or Figure 9 below.

[45] The 2004 economic census benchmark revisions to nominal data, in the case of industry, implied minor revisions to the deflator in comparison to the *Statistical Yearbook 2005* data; because of the only minor differences, the deflator according to the benchmark revisions is not used in the following.

1990-92 and 1993-95 (Figure 5). The GOV deflator of the DRIEs also matches well, as does the GOV deflator of SOEs (a sub-category of the DRIEs); see Figure 6 and Figure 7.

120. With the DRIE deflators only available for the years since 1994, one alternative, also suggested by the 1990 constant price regulation issued by the NBS (30 Sept. 1990), is the deflator of the (industrial) enterprises at township level and above, i.e., covering all DRIEs (at this time the industrial enterprises with independent accounting system at township level and above), plus industrial enterprises at township level and above *without* independent accounting system. In 1995, for example, the DRIE accounted for 96.86% of the GOV of all enterprises at township level and above. Figure 9 shows a near-perfect match of the GOV deflators of the enterprises at township level and above with the value added deflators for the years 1979-85, and a good match thereafter. Data on this group were discontinued after 1998, with similar tables in the *Statistical Yearbook* series now provided for the DRIEs only.

121. Neither the ex-factory price index nor the purchasing price index of raw materials, fuel and power match the deflators of value added well (Figure 9). One step further is two deflate GOV using the ex-factory price index, and to deflate the value of intermediate inputs using the purchasing price index of raw materials, fuel and power. The difference of the two deflated series equals real value added. Combining this real value added series with nominal value added (as published in the *Statistical Yearbook 2005*) yields a final value added deflator (Figure 10). Since 1987, this "double deflator" matches the value added deflator in the *Statistical Yearbook 2005* rather well (and better than it does the first published value added deflator).

122. In conclusion, the NBS does not seem to strictly follow one specific procedure. The following scenario is plausible: as a rule, the NBS, to deflate industrial value added in its *Statistical Yearbook* series, used the GOV deflator of the enterprises at township level and above through the early 1990s, and the GOV deflator of the DRIEs (perhaps with reference also to that of the SOEs within this group) thereafter. Since the NBS is unlikely to have real GOV data on all industrial enterprises, it may also use these two GOV deflators to deflate the GOV of the non-DRIEs or the enterprises below township level. The good match of the deflator based on the combination of output and input price indices ("double deflator") with the value added deflator of the *Statistical Yearbook 2005* suggests that the NBS could, since 1987, be considering the development of the purchasing price index or of the double deflator, especially in its annual revisions to the NIPA data.

123. As to the remaining sectors (besides agriculture and industry), in construction, real value added is obtained using a price index. In the tertiary sector, most sub-sectors use price indices, but real value added of some activities in transport & communication is obtained in similar fashion as in industry (using constant prices), while in other activities base-year value added is multiplied by an output quantity growth factor.[46]

2.2.7 Official GDP coverage and margin of error

124. The NBS in it GDP calculations does not include shadow economy activities, a factor that is estimated to account for 8 to 30% of GPD in OECD countries (Schneider and Enste, 2000). If economic activities in the shadow economy change at a different rate over time than

[46] For details, see, for example, Xu (2000), pp. 77-80, or the *GDP Manual*, pp. 67-74.

economic activities in the formal economy do, China's official GDP growth rate misrepresents the change in all economic activities.

125. Some activities covered by the NBS in its GDP calculations have been questioned in the literature as misestimated, and attempts have been made to improve on China's official GDP statistics (without, yet, incorporating the shadow economy). In 1994, the World Bank adjusted China's GDP upward by 34.3%; Xu Xianchun argued that this overall adjustment is not warranted, and in 1999 the World Bank accepted China's official statistics (Xu, 1999b).[47] A second attempt to systematically adjust China's GDP statistics is by Angus Maddison (1998); in Holz (2006a) I argue that his adjustments to the official GPD statistics are not justified.[48] Xu (2002) examines five areas in which he views Chinese value added statistics as problematic (too high or too low), but concludes that on average the official statistics are accurate. Unless (i) there is good reason to reject the NBS's measurement of value added for some specific economic activities, and (ii) an unambiguously better measure is available, China's official data remain the first choice of data.

126. One procedure to estimate the quality of the official GDP data (obtained following the production approach) is to determine, for each economic sector, what share of value added is likely to have been obtained through accurate compilation procedures, and what data are only somewhat reliable or unreliable. For example, in industry, the value added figure of the DRIEs, given the characteristics of the underlying reporting system, is likely to be reliable, while the value added figure of all other industrial enterprises, obtained through surveys, questionable report forms, or guesstimates, reflects no more than a rough estimate. In Holz (2004b) I assumed that the unreliable data come with a margin of error of one-third. The margin of error in national GDP then is at most 15%; but errors across different sectors could cancel out. If measurement biases were consistently of the same sign and size over time, GDP growth rates would still be quite accurate with a margin of error of about 1 percentage point.

127. The two benchmark revisions following the 1992/93 tertiary sector census and the 2004 economic census suggest a continuous bias of substantial size in the tertiary sector. In as far as the NBS has already been hinting for years prior to the 2004 economic census that it is underestimating tertiary sector value added, the scale of errors in tertiary sector value added, now for the second time made explicit in benchmark revisions, is unnecessary. Perhaps the NBS did not know how to correct its estimates before the 2004 economic census results were available, but then it is not clear how it could use the 2004 economic census results to make meaningful *retrospective* revisions to the values of earlier years. (The retrospective revisions do not simply reflect linear interpolation between 1992 and 2004 values, nor do various proportionality checks of the adjustments yield any pattern.)

128. Since both benchmark revisions that have occurred in the reform period so far point towards large underestimation by the NBS of tertiary sector value added, one could, in estimating an overall margin of error for future GDP data, assume a similar (large) future bias in tertiary sector estimates as was revealed in the two benchmark revisions for the years 1978-2004, and otherwise work with the basic estimates of the sectoral margins of errors as determined by the sectoral methods of data compilation. On the other hand, after having

[47] In Holz (2002) I provide details on the discussion.

[48] Maddison in a reply (2006) disagrees, but I am not persuaded by his reply (Holz, 2006b). A number of other authors have criticized the accuracy of Chinese statistics and offered partial adjustments of official data (partial in terms of sectoral or year coverage). In Holz (2003) I argue that those criticisms of Chinese data that I have examined are unfounded. A brief review is in Holz (2005a).

twice gone wrong on the tertiary sector values, one could expect the NBS to not repeat its mistakes a third time, so that the tertiary sector bias may finally be eliminated.

2.2.8 Directly reporting industrial enterprise data

129. The available annual data on industrial sectors (i.e., individual industries) do not cover all industrial enterprises, but only the DRIEs, and some ownership groups within the DRIEs. Value added data on the DRIEs are available since 1992. No value added data on the DRIEs (or any other group of industrial enterprises) for the years prior to 1992 have been published retrospectively, and the data on the DRIEs are always final as first published.

130. For the years prior to 1993, the *Industrial Yearbook 1993*, pp. 90ff., reports sectoral data on the DRIEs in 40 sectors for the years 1980 and 1984-92. The output variables are GOV and net material product (following the Material Product System), both in current prices, apart from current-price value added in 1992 only. Net material product equals value added less depreciation, plus service charges paid to non-productive units. Value added for the years prior to 1992 could be approximated by adding depreciation values to net material product and ignoring the service charges, but depreciation values are not included in the source. Depreciation values could be approximated by applying an assumed sectoral depreciation rate to the year-end sectoral original value of fixed assets, data on which are included in the source. Sectoral output deflators are also not available. The GOV deflator of the industrial enterprises at township level and above (Table 9) could be applied uniformly to all sectors; otherwise, the (14) sub-categories of the ex-factory price index (*Statistical Yearbook 1998*, p. 317) could be approximately matched with the industrial sectors, but Figure 9 below suggests that the (overall) ex-factory price index of these years overestimates the deflator of industrial value added.[49]

131. How representative are the DRIEs of all industrial enterprises? This matters because the production structure of DRIEs may be different from that of other enterprises. Table 10 provides a comparison for 1995, the year for which industrial census data are available. Although the industrial census, as all other sources, does not provide a breakdown of *total* industrial output by individual industrial sectors, it does provide a breakdown for one more exhaustive group than the DRIEs, namely for "industrial enterprises at village level and above *plus* private, joint, and individual-owned industrial enterprises with annual sales revenue in excess of 1m yuan RMB," in the following abbreviated "village+ enterprises." I.e., the only missing enterprises are private, joint, and individual-owned industrial enterprises with annual sales revenue *below* 1m yuan RMB. The "village+ enterprises" in 1995 accounted for 85% of industrial GOV, with data on value added not available. The DRIE accounted for 67% of industrial GOV, and for 62% of industrial value added.[50]

132. The degree to which the DRIE, in the aggregate across sectors, are representative of all industry is likely to have changed over time. For example, the DRIE's share in value added has fallen continuously from above 95% to 75% in 1992 and reached a low of 61% in 1997

[49] The *Industrial Yearbook 1993* also provides employment data for these sectors in these years in the same table.

[50] The *Industrial Census 1985* in the publication available to me provides sectoral data only on the DRIEs, which in 1985 accounted for 87% of GOV (pp. 3, 44). In 1980, the DRIEs accounted for 91% of GOV (*Industrial Yearbook 1993*, pp. 17, 142), and in 1999, the most recent year for which economy-wide GOV is available (except as sum provincial value in *GDP 1996-2002*), for 58% (*Statistical Yearbook 2000*, pp. 409, 414).

(Figure 11, with estimated DRIE value added through 1992). After the statistical break in the definition of the DRIEs in 1997/98, their share in industry value added rose from 58% in 1998 to 87% in 2004, reflecting the fact that an increasing number of industrial enterprises reach annual sales revenue of 5m yuan RMB. Figure 11 shows an implausible jump of the share of the DRIEs from 75% in 1992 to 91% in 1993, and then an equally implausible drastic decline to 76% in 1994 and 62% in 1995. The concept of value added was introduced in 1993 only, with data on value added of the DRIEs available for the years since 1992; enterprises may have experienced difficulty in compiling data on this newly introduced variable in the early years.[51] Alternatively, and less likely, the industry value added data could be problematic.[52] The dubious share values of 1993 and 1994 urge caution in the interpretation of DRIE productivity values of these years.

133. Table 11 examines the sectoral coverage of the DRIEs, in terms of GOV, in comparison to the "village+ enterprises," of which the DRIEs represent a sub-category. In sectors in which the DRIEs produce only a small share of the GOV of the "village+ enterprises," the sectoral data on DRIE may not be that representative. In the monopoly sectors petroleum and natural gas extraction, tobacco, and utilities (sectors 37-39), the DRIEs dominate with shares in the GOV of the "village+ enterprises" above 90% (column II); presumably the same pattern holds for the DRIEs' share in the GOV of *all units* operating in these sectors (on which no data are available).

134. Continuing the analysis without the monopoly sectors, utilities, and the two very small sectors 6 and 36, the GOV shares of the SOEs (all of which are DRIEs) parallel those of the DRIEs, with the correlation coefficient across sectors significant at the 0.1% level. DRIEs as well as SOEs account for a large share in the GOV of the "village+ enterprises" in those sectors in which the value added of the DRIEs, per enterprise, is large (correlation significant at the 0.1% level). Since the enterprises excluded from the "village+ enterprises" are the private etc. enterprises with annual sales revenue below 1m yuan RMB, i.e., of small size, this would suggest that when DRIEs are relatively large—which also comes with a large share of the GOV of the "village+ enterprises"—they also account for a large share of output in the particular sector. On the other hand, a sector with low value added per DRIE is also characterized by a low share of the DRIEs in the GOV of the "village+ enterprises," and probably also in the GOV of all enterprises. Columns (II) and (V), thus, with data on the share of the DRIEs in the GOV of "village+ enterprises" and on value added per DRIE, allow rough guesses as to how representative the DRIE data are of *all enterprises* in a particular sector.[53]

135. Overall, the DRIEs account for less than 50% of "village+ enterprise" GOV in two sectors (5, 16), and for 80% or more in 21 sectors. In the latter 21 sectors one might consider the DRIEs as relatively representative of all enterprises in that sector, while in the former two they are unlikely to be. When the DRIE share in the "village+ enterprise" GOV is low, the DRIE share in the GOV or value added of *all* industrial enterprises is likely to be even lower, because the small (in terms of sales revenue) private etc. enterprises are likely to crowd into

[51] DRIE nominal value added rose by 68% in 1993.The ratio of DRIE value added to DRIE GOV, on a long-term gradual declining trend, jumped by 17% in 1993 before dropping by almost as much in the following year.

[52] Here, the growth rates in nominal value added of 38, 37, and 28% in 1993 through 1995 are all plausible (once taking into consideration the inflation rates of these years), as are the ratios of industry value added to industry GOV.

[53] The data on the DRIE share in the *number* of "village+ enterprises" (column VII) match the patterns inherent in the DRIE market share data (II), at the 0.1% significance level, and, thus, contain no salient new information.

sectors with low capital requirement / low production size. Even sectors in which the DRIEs' share in the "village+ enterprise" GOV is in the 60-70% range may have quite a few small private etc. enterprises. For example, the garments industry, leather etc. industry, and timber etc. production (sectors 13-15) all come with low DRIE value added per enterprise, and do not have government-imposed restrictions on access, which suggests they are natural entry industries for the private etc. enterprises.

136. When the DRIE account for a relatively small share of the output of a sector, their labor productivity or TFP measures may not be representative of the whole sector. The capital intensity (value of fixed assets per unit of output) of DRIEs is probably higher than that of other enterprises, which are unlikely to have similar access to external financing. I.e., labor productivity in DRIEs is probably higher than in non-DRIEs. In the absence of data on the capital intensity of "village+ enterprises"—and in the absence of any sectoral data on the residual private, joint, and individual-owned industrial enterprises with annual sales revenue below 1m yuan RMB—one indicator that the DRIEs in a particular sector are representative of all enterprises in that sector could be a DRIE share in the GOV of "village+ enterprises" in this sector of 80% or above. In this case, the DRIEs would be representative of the whole sector in 21 out of the 40 sectors in 1995. These 21 sectors in 1995 account for 70% of DRIE value added and for 59% of "village+ enterprise" GOV.

137. Analysis of DRIE data needs to also keep in mind the change in the definition of the DRIEs in 1998. This re-definition is also accompanied by a change in the ownership classification among the DRIEs (for example, the SOE category prior to 1998 and since 1998 are not identically defined). Analysis that moves beyond value added to GOV of DRIE needs to keep in mind the change in the definition of GOV in 1995.[54]

2.3 Choice of output data for productivity analysis

2.3.1 Economy-wide and three main economic sectors, prior to 2004 economic census benchmark revision

138. The production approach is China's official approach to calculating GDP. Data on GDP and value added of the main economic sectors are available for the years since 1952 and are reproduced in Appendix 6, with the real growth rates in Appendix 7. For real GDP growth, one may want to replace the official data with a Törnqvist index of the official sectoral data, also reported in Appendix 7.

139. Since 1990, the values of three main economic sector values as reported in the *Statistical Yearbook* series (and with identical values in *GDP 1952-95*) in all likelihood follow the GB1994; the only exception is that, in the statistics, the agricultural services are included in the tertiary sector rather than, as stipulated by the GB1994, in agriculture. The same tables in the *Statistical Yearbook* series also report values on the exhaustive two sub-sectors industry and construction within the secondary sector, and on the two sub-sectors 'transport & communication' and 'commerce & catering' within the tertiary sector; these series similarly follow the GB 1994.

[54] For details on industry data and changing definitions see Holz and Lin (2001a,b).

140. The reasoning as to why the values of the three main economic sectors since 1990 follow the GB1994 (with the one exception of the classification of agricultural services) is the following. First, the aggregate tertiary sector values as well as the two tertiary sector sub-sector values in Appendix 6 match those of the detailed tertiary sector classification in Appendix 10 (below), and the latter with near-certainty follow the GB1994 (as explained below). Second, the secondary sector appears to be consistently or near-consistently defined for the GB1984 and GB1994; at worst, it has experienced extremely minor changes, such as possibly in construction where a slight reclassification took place (that appears to not have affected non-secondary sectors, and probably also not industry). Third, with the aggregate tertiary sector values following the GB 1994 (except for the inclusion in the statistics of the agricultural services), and the secondary sector likely to be consistently defined between the GB1984 and GB 1994, the primary sector values must comply with the GB1994 (except for the exclusion in the statistics of the agricultural services).

141. For the years prior to 1990, the picture is unclear. The preface to *GDP 1952-95* contains a note stating explicitly that its data follow the GB1984, with some exceptions. The key exception in the context of main sectoral data is that agricultural services (including water conservancy services) are included in science etc., i.e., in a tertiary sector sub-sector, rather than, as the GB1984 requires, in agriculture. At the level of the three main economic sectors, this is consistent with the de facto practice in the years since 1990 of including agricultural services in the tertiary sector.

142. In addition, the preface to *GDP 1952-95* makes no statement as to where water management is included. In the GB1984, it is included in agriculture, while in the GB1994, it is included in the tertiary sector. Since the preface of *GDP 1952-95* does not state otherwise, and since its default is the GB1984, water management in the *GDP 1952-95* should be included in agriculture. But the aggregate tertiary sector values of 1990-1995 in the *GDP 1952-95* match the aggregate tertiary sector values of these years in the *Statistical Yearbook*, where the tertiary sector values follow the GB1994, and water management (or water conservancy) is included with the tertiary sector. Because the detailed tertiary sector classification in the *Statistical Yearbook* series, available for the years since 1990, is explicit in the labeling of its categories, the aggregate tertiary sector value since 1990 must include water management (or the individual category labeling is wrong in at least 1990-95). Because the *GDP 1952-95* tertiary sector values for 1990-95 are identical to those of the *Statistical Yearbook*, the preface of *GDP 1952-95* is incorrect in claiming the default use of the GB1984. At least the tertiary sector values since the year 1990 in *GDP 1952-95* follow the GB1994 (which implies that the primary sector values follow the GB1994). This does not rule out the possibility of a statistical break in 1990, with only the pre-1990 data in *GDP 1952-95* using the GB1984 as default classification.

2.3.2 Economy-wide and three main economic sectors, following the 2004 economic census benchmark revisions

143. For the years 1978-2004, the appendices report two sets of data, namely those published in the *Statistical Yearbook 2005* and just discussed, and the benchmark revisions following the 2004 economic census. The benchmark revisions are reported in most comprehensive form in the *Statistical Abstract 2006*, which, beyond the 1993-2004 revisions also includes data for 1978-92, of which only tertiary sector values and GDP values are revised. The *Statistical Abstract 2006* also has data for 2005. The benchmark revisions of the years 1993-2004, and the subsequently published 2005 value, all follow the GB2002; the limited

benchmark revisions of the years 1978-92 are likely to follow the GB1994 with extended coverage to include economic activities previously not covered (or to correct for previously inaccurate Guangdong data). The switch in classification scheme implies a statistical break between 1992 and 1993 in all three main economic sectors, as well as in the two secondary sector sub-sectors and in almost all tertiary sector sub-sectors ('public organizations and social organizations' appears to be the only exception). The only possibility for there not to be a (small) statistical break between 1992 and 1993 is if the value of the economic activities in all categories which the GB2002 (in comparison to the GB1994) shifted from one of the three main economic sectors to another were zero in the years prior to 1992 (or the various shifts exactly cancelled out in all pre-1993 years).

144. While, in general, the benchmark revisions should be superior in quality, they come with two caveats. First, the aggregation of sectoral real growth rates into real GDP growth in the official data appears wrong, as explained above, and one may want to switch to the Törnqvist index.

145. Second, the correction in the benchmark revisions of the *nominal values only* in the primary sector, industry, and construction appears not plausible. Even if the corrections to nominal values in agriculture, industry, and construction were solely due to changes in the classification, one would still expect, given the systematic variation in the proportions of the revisions over time, that these changes in the sectoral allocation also lead to changes in real growth rates. The NBS practice of revising nominal but not real data means that the implicit deflators are being changed; but if real growth rates should have changed, then this revision to implicit deflators captures not only the changed implicit deflators but also, in addition, the changes in the real growth rates.

146. As an alternative, one could switch to the deflators implicit in the previously published data, and the *Statistical Yearbook 2005* nominal and real growth data are included in the appendices. One could also use the implicit deflator as first published; this would be the way to go if one believes that the NBS when it first publishes the nominal values and real growth rates of a particular year in a *Statistical Yearbook* has available final deflators (which is highly likely). Implicit deflators as first published are available only for the years since 1989, and are reported in Appendix 8.

147. Two complications of switching to earlier published implicit deflators in the years 1993-2004 are the following. First, obviously, with the sectoral classification revised, the earlier implicit sectoral and sub-sector deflators no longer exactly match the new classification. By switching to the earlier published implicit deflators, the NBS corrections to nominal data are fully assigned to the real growth rates (when, in reality, the NBS corrections to the nominal data should probably be split between corrections to implicit deflators due to the reclassification on the one hand and corrections of real growth rates due to reclassification and due to new data on the other hand). Switching to implicit deflators as first published, however, may still be desirable if one thinks these to be the most reliable deflators; the error introduced by the sectoral mismatch is then probably of minor size (compared to the size of the corrections due to using significantly different implicit deflators).

148. Second, the benchmark revisions within the secondary and tertiary sector have caused a change in the relative weights of each sub-sector in the derivation of aggregate secondary or tertiary sector real growth (or deflators). A comprehensive set of benchmark revisions for the sub-sector data in the tertiary sector has not yet been released (not even in the *Statistical Abstract 2006*). Once these revisions have been released, one could apply earlier published

implicit sub-sector deflators to the benchmark revised nominal sub-sector value added to derive an aggregate tertiary sector real growth rate (or deflator).

149. Given these complication, one may want to, for the time being, simply use the benchmark revisions as are, but to keep in mind that these data are problematic: (i) the derivation of real GDP growth from sectoral values is inconsistent (no change in the weights for the aggregation of sectoral data into real GDP growth despite changing nominal sectoral data), which suggests the switch to a Törnqvist index of sectoral real growth rates; (ii) the revision of only nominal value added in the primary sector, industry, and construction is dubious; and (iii) it is not even clear if the official tertiary sector real growth rate of the benchmark revisions takes into account the changed sub-sector weights.

2.3.3 Tertiary sector sub-sectors

150. Appendix 10, for the tertiary sector, reports comprehensive sub-sector data on nominal value added and real growth, available for the years 1990-2002. For this classification into 12 sub-sectors, the data are published with a one-year time lag, i.e., the published values already reflect the annual revisions. Compared to the data published on the primary sector, secondary sector (with industry and construction), and the overall tertiary sector, there are no "first published" tertiary sector sub-sector values, only the ones that have already undergone the annual revision. This means the implicit deflator as "first published" is the "revised" one (the one based on revised nominal values).

151. The tertiary sector sub-sectors in 1990-2002 are classified according to the GB1994 with one exception, namely that the tertiary sector statistics include a sub-category agricultural services which in the GB1994 are included in agriculture. Three independent considerations suggest the match with the GB1994, apart from the one exception. First, all individual sub-sector labels used in the statistics match those of Appendix 3, the GB1994 (except for the additional listing of agricultural services). Second, NBS (1997), on the compilation of value added, provides details on the production approach (pp. 21-137) and explicitly follows GB1994 (p. 9). While the sectoral labels in NBS (1997) match those of the GB1994, this source also does not list agricultural services with agriculture, but as a separate sector after construction and before the other tertiary sector sub-sectors. Third, the tertiary sector sub-sector values reported in Appendix 10 for the years since 1990 were first published in the *Statistical Yearbook 1998*, i.e., at a time when the GB1994 was in effect.

152. It is theoretically possible that the GB1994 presented in Appendix 3 is inaccurate. Because the original regulation is not available, Appendix 3 (presenting the GB1994) is based on the employment classification inherent in the year 2000 population census data, which need not necessarily conform 100% with the GB1994. However, in that case, the description of the changes between the GB1994 and the GB2002 in *Zhongguo tongji*, which is particularly elaborate for the agricultural sector, should mention that the agricultural services in the GB2002 have moved from the tertiary to the primary sector, which it does not. That, in turn, implies that the classification of agricultural services is identical in the GB1994 and the GB2002. In the available GB2002 classification, it is included in agriculture (as it is in the population census 2000 that underlies the GB1994 classification reported here).[55]

[55] All details in the description in *Zhongguo tongji* of the changes in the GB2002 in comparison to the GB1994 confirm the GB1994 as reported in Appendix 3.

153. For the years prior to 1990, *GDP 1952-95* provides data on an exhaustive 8 tertiary sector sub-sectors; these are reported in full, for 1952-95, in Appendix 9.

154. The preface to *GDP 1952-95* contains a note stating explicitly that its data follow the GB1984, with some exceptions. These are the following. (i) Agricultural (including water conservancy) services are included in science etc., i.e., in the tertiary sector, rather than, as in the GB1984, in agriculture. In the GB1984, these agricultural services (including water conservancy) constitute a separate primary sector sub-category. In the GB1994, agricultural services also constitute a separate primary sector sub-category, and water management (conservancy) is included in the geological prospecting sub-category of the tertiary sector. I.e., the treatment of agricultural services (including water conservancy) in *GDP 1952-95*, as part of the tertiary sector, reflects neither the GB1984 nor the GB1994. (ii) Geological investigation and prospecting is also included in science etc. (rather than constituting a separate category as in the GB1984, or a separate category together with 'water management' in the GB1994). (iii) 'Real estate administration, public facilities, resident services, and consulting services' (one sub-sector in the GB1984) is split into 'real estate,' 'public facilities,' and (social) 'services,' a classification that is not present in this form in the GB1994 (or in the GB1984, or in the pre-1984 classification). The first exception matches the practice in the 1990-2002 tertiary sector statistics. The second and third exception simply reclassify within the tertiary sector.

155. Two problems arise which the preface to the *GDP 1952-95* does not address. First, in the GB1984, water conservancy is included in agriculture, but in the GB1994, it is included in the tertiary sector "geological prospecting and water management." The aggregate tertiary sector values in Appendix 9 and Appendix 10, based on *GDP 1952-95* and the *Statistical Yearbook*, respectively, for 1990-95 are identical. This implies that *GDP 1952-95*, without stating so, also incorporates the exception from the GB1984 of excluding water conservancy from agriculture, and including it in the tertiary sector. A further possibility is that the *GDP 1952-95* values, in this one respect, follow the GB1984 in the years prior to 1990, and the GB1994 in the years 1990-95.

156. The second problem is the extensive relabeling and reclassification among tertiary sector sub-sectors. This is particularly true for transport & communication and for commerce & catering (see Appendix 3). The explanations in the preface to *GDP 1952-95* make no special mentioning that the 1952-95 data for these two sectors do not follow the default classification, the GB1984. The preface of GDP 1952-95, furthermore, for these two sectors, lists as complete titles (which are abbreviated in the statistical tables of this source) those that are used in the GB1984, and which immediately signal the different content in comparison to the GB1994.[56] However, the values of these two sub-sectors in 1990-95, as reported in Appendix 10 (with all data from the *GDP 1952-95*), are identical to those in Appendix 9 (with data for 1990-2002 from the *Statistical Yearbook*), and the latter follow the GB1994. This means that, either, the preface is incorrect in its labeling and default acceptance of the GB1984 in this instance, or, alternatively, that the 1952-95 data for these two sectors follow the GB1994 in 1990-95, but the GB1984 in earlier years.

[56] "Transport & communication" in the GB 1984 as well as in *GDP 1952-95* (preface, p. 2) represents transport, post and telecommunication services, but in the GB1994 transport, *storage*, post and telecommunication services (and in the GB2002 transport, storage, and postal services). "Commerce & catering" in the GB 1984 as well as in *GDP 1952-95* (preface, p. 2) represents trade, public catering, material supply and marketing cooperatives, and storage, but in the GB1994 wholesale and retail trade, and catering services (and in the GB2002 wholesale and retail trade).

157. These two problems, with the allocation of water management, a rather small sector, and the definition of transport & communication and commerce & catering, suggest that the pre-1990 tertiary sector sub-sector values should be treated with caution. The values of the latter two tertiary sector sub-sectors in 1989 and 1990 (Appendix 9) hint at a statistical break: the value of transport & communication, which in the GB1994 newly (in comparison to the GB1984) includes storage, in 1990 increased drastically by a nominal 46%, while the value of commerce & catering, which in the GB1994 newly excludes storage as well as marketing and supply cooperatives (the latter may have been reclassified within commerce), decreased by a nominal 16%. This pattern would suggest that the series follow the GB1984 through 1989, and the GB1994 since 1990.

158. Independently, the fact that the last decimal of most tertiary sector sub-sector values is zero through the early 1970s—except for the two "material production sectors" transport & communication, and commerce & catering—suggests that these values of the early years of the People's Republic of China may not be particularly reliable.

159. For the years after 2003, no detailed tertiary sector sub-sector values are yet available. Presumably, once they become available, they will follow the GB2002. The *Statistical Abstract 2006* reports 1978-2005 values for transport & communication, and commerce & catering (see Appendix 4), since 1993 incorporating the benchmark revisions following the 2004 economic census. The title of the second category (commerce & catering) changed between the GB1994 and GB2002 from 'wholesale and retail trade, and catering services' to 'wholesale and retail trade.' The *Statistical Abstract 2006* retains the GB1994 title. This suggests that these values, and probably also those of transport & communication, still follow the GB1994, even though the main economic sectors in the same table appears to follow the GB2002.

2.3.4 Directly reporting industrial enterprises

160. Appendix 11 reports output data on the DRIEs for the years 1993-2002. The output variables are GOV in 1990 constant price, nominal GOV, and nominal value added. The classification is the GB1994. As seen above, the 1993 and 1994 data on the DRIEs are likely to be highly problematic, and one may want to start productivity analysis in the year 1995 only. While sectoral value added data are also available for 1992, they follow the previous sectoral classification, the GB1984. The limited sectoral data available for the years 1980 and 1984-92 also follow the GB1984, and are not reported here because no real output values are available. The sectoral classification finally changed between 2002 and 2003 from the GB1994 to the GB2002; Appendix 12 reports the 2003 data (with no more recent sectoral data available so far).

3. LABOR

161. This section examines the availability of employment data across different sources, the varying employment definitions across sources and time, and the quality of the data. The issue of hours worked per week is considered, although long-run, comprehensive data on hours worked to make adjustments to employment data are not available. Finally, a choice of employment data for productivity analysis is presented.

3.1 Data availability

162. Employment data are available for specific years in the various censuses, in particular the population censuses, and otherwise on a regular basis, usually with time series data, in the *Statistical Yearbook* and in the *Labor Yearbook*. On the availability and sources of employment data, discussed here, also see Table 12. The terms "employment" and "laborers" are used interchangeably.

163. Much data is available following an urban-rural distinction, and over time increasingly so. However, output data seem to never follow an urban-rural distinction. The urban-rural employment data, thus, are not useful for productivity analysis, but, due to the availability of (limited) urban wage data, have some use in calculating unit labor costs.

3.1.1 Laborers in the population censuses and 1% population sample surveys

164. Since the beginning of the economic reform period in 1978, China has conducted three economy-wide population censuses, in 1982, 1990, and 2000, and two population 1% sample surveys, in 1987 and 1995. Population censuses and 1% sample surveys cover a wide range of information, including information on employment.[57]

165. The population census/ survey day in 1982, 1987, and 1990 was 1 July (0:00 am); in 1995 and 2000 it was 1 November (0:00 am).[58] Due to the differences in census/survey day, for comparisons over time adjustments have to be made to either the 1982/87/90 data or the 1995/2000 data.

166. All three population censuses list military personnel separately (4,238,210 in 1982, 3,199,100 in 1990, and 2,498,600 in 2000). Military personnel refers to military employment only; family members of military personnel, for example, are included in the regular population census data. Military personnel are not part of any of the published population census tables such as on population or laborers.[59] The 1987 and 1995 sample survey data do not come with separate military data.[60]

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[57] At least since 1988, data from a 1‰ sample survey on population change are published for those years when no census or 1% sample survey was conducted. These 1‰ sample surveys are likely to also collect information on labor but that information is not published.

[58] See *Population Census 1982*, p. 4; *1990*, Vol. 1, p. 1; *2000*, Vol. 1, p. I; *Population Survey 1987*, p. 1; *1995*, p. 1) The survey day for the 1‰ sample surveys is probably end-year.

[59] The *Population census 2000*, Vol. 3, p. 1, makes this explicit: "this material [these 3 books with data on the 2000 population census] does not include the 2.50m persons in the Chinese People's Liberation Army." The third volume, at the very end, in an appendix, has two pages with data on military personnel. The previous two

167. The population censuses of 1982, 1990, and 2000 provide exhaustive sectoral breakdowns of total employment (excluding military personnel), limited to these specific years. The 1982 employment data come with a breakdown into 13 first-level sectors, 57 second-level sectors, and approximately 150 third-level sectors, following the pre-1984 sectoral classification. The 1990 employment data come with a breakdown into 13 first-level sectors and 75 second-level sectors, following the GB1984. The 2000 employment data come with a breakdown into 16 first-level sectors and 92 second-level sectors, following the GB1994.

3.1.2 Economy-wide time series total and sectoral labor data

168. Two alternative sources of economy-wide employment data are the *Statistical Yearbook* and the *Labor Yearbook* (available since 1989). The following relies primarily on the more readily available *Statistical Yearbook*, supplemented by the *Labor Yearbook* where that provides additional, relevant data.

169. Economy-wide employment data come with a breakdown into either the three main economic sectors (primary, secondary, tertiary sector) or into 16 or 13 sectors (Table 12).[61] The 16-sector classification follows the GB1994, the 13-sector classification the GB1984. In contrast to the case of the output data, agricultural services, in the employment data, do not constitute a separate first-level sector within the tertiary sector. Presumably, they are included in agriculture (as the GB 1994 and the GB1984 imply).

3.1.2.1 Economy-wide, and three main economic sectors, 1952-present

170. Economy-wide employment data and data on the employment in the three main economic sectors are available for the years since 1952. The following revisions occurred over time. First, in the *Statistical Yearbook 1997*, all previously published values of the years 1990-95 were significantly revised upward. The revision followed the year 1990 population census results. Second, the *Statistical Yearbook 1998* slightly reallocated the *sectoral* data of 1985-89 within the unchanged economy-wide employment total in comparison to the values reported for these years in, for example, the *Statistical Yearbook 1997*, and, similarly, the *Statistical Yearbook 2000* reallocated the pre-1985 sectoral data (with not all years reported

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population censuses have similar brief tables at the end, but do not come with an explicit statement that military personnel are not included in the other tables. Given the same practice in the 1982 and 1990 population censuses as in the 2000 population census of listing the military personnel separately in an appendix at the end, I assume the published population and laborer data in the 1982 and 1990 population censuses also exclude military personnel, as in 2000.

[60] The instructions on the 1995 sample survey state explicitly that the military personnel data are to be collected by the military and to be passed on to the national 1% sample survey joint meeting (*lianxi huiyi*). They are to be "lumped into" the national data (*yu quanguo shuju yibing gongbu*). (*Population Survey 1995*, p. 633) Presumably the military personnel data are complete data rather than 1% sample survey data. These complete data are presumably included in the official estimate of the nationwide total population which is based on the 1% sample survey, and are otherwise not published. It does not seem plausible that the NBS takes a 1% sample of the complete military personnel data and then adds these military personnel to the population and employment tables in which it reports the 1% sample survey data. More likely, it proceeds as in the population censuses where it does not mix military personnel data with non-military data in the published data from the population censuses.

[61] The Chinese term for employment changed over time from "social laborers" (*shehui laodongzhe*) prior to 1993 to "employed persons" in 1993 (*congye renyuan* in 1993-2000, *jiuye renyuan* since 2001); the change in terms does not imply a change in definition. Changes in definition did occur, independently of the change in terms, and are explained below.

in the source).[62] Third, the year 1990-2000 economy-wide employment data were revised a second time in the *Statistical Yearbook 2002*, following the year 2000 population census, and were accompanied by corresponding, minor changes in the three sectoral values.

171. The re-allocated employment values of the three main economic sectors match the correspondingly aggregated 16-sector employment values in the years 1978-1989 (with the latter first available for 1978, and the first being adjusted according to the population censuses starting in 1990).[63] This suggests that the re-allocation was done to bring all 3-sector employment values, since 1952, up to the GB1994 sectoral classification (which the 16-sector classification follows).[64] The 3-sector data prior to the reallocations that occurred among these 3 sectors, in the *Statistical Yearbook 1998* and *2000* (and continued in later issues), probably use the 1984 and the pre-1984 classification, depending on the year of publication.[65]

172. This follows from the following comparisons. First, the original 3-sector data in the secondary sector match the earlier used 13-sector (instead of 16-sector) classification available for 1978-1992. The earlier used 13-sector classification follows the GB1984, and the secondary sector coverage in the pre-1984 sectoral classification and in the GB1984 appear identical. Second, the primary sector values of the original 3-sector data are lower than those of agriculture in the earlier used 13-sector classification of 1978-1992. The GB1984, in comparison to the pre-1984 sectoral classification, newly lists with agriculture the two sub-sectors water conservancy, and agricultural (and water conservancy) services.[66] This suggests that the primary sector values of the original 3-sector data follow the pre-1984 sectoral classification. Third, the tertiary sector values of the original 3-sector data are higher

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[62] Depending on primary vs. tertiary sector and on the year, these changes are typically on the order of a fraction of one percent to about three percent.

Earlier issues of the *Statistical Yearbook* report yet other economy-wide total and sectoral employment values. For example, the *Statistical Yearbook 1984* reports economy-wide 1978 employment as 398.56m and industrial and agricultural sector employment as 50.09m and 294.26m (pp. 107, 109); aggregates for the three main economic sectors are not reported. The sectoral classification presumably is the pre-1984 one (an identical economy-wide value is reported in the *Statistical Yearbook 1981*, p. 105, with no sectoral values for 1978 reported in this issue). The *Statistical Yearbook 1991* reports 401.52m economy-wide employment in 1978, with 60.91m laborers in industry and 283.73m laborers in agriculture. The sectoral classification presumably is the GB1984. Around 1985 non-agricultural economic activities which were previously included in agriculture may have been reclassified into other sectors; this cannot be ascertained at the first- and second-level sectors, the list of which is available or can be deduced (Appendix 1 through Appendix 4). The sectoral (but not economy-wide) values reported in the *Statistical Yearbook 1991* differ yet again from those reported in the *1996* issue.

The first *Statistical Yearbook* to report data on the three main economic sectors is the *1996* issue (p. 124), with values for 1985; the economy-wide total and the values of the three main economic sectors differ significantly from those reported in, for example, the *Statistical Yearbook 1986* (p. 88); the secondary sector value equals the sum of industry, construction, *and* "geological prospecting" (with a GB1984 label).

[63] For this comparison, the 16th category in the 16-sector employment statistics, the category "others," is included in the tertiary sector in full. The primary sector is matched with agriculture, the secondary sector with mining and quarrying, manufacturing, utilities, and construction, and the tertiary sector with the remaining 11 sectors.

[64] Theoretically, the revisions in the *Statistical Yearbook 2002* to the employment values since 1990 could reflect the adoption of the GB2002. There are two reasons why this is unlikely to be the case. First, the GB2002 became effective only on 1 January 2003 (and the *Statistical Yearbook*, published in fall 2002, must have been compiled in the first half of 2002). Second, the revisions are accompanied by an explanation, presented further below, that is not related to the classification scheme.

[65] These earlier 3-sector values are available in the *Statistical Yearbook* issues through the *1996* issue.

[66] The pre-1984 sectoral classification lists a third-level sector "agricultural services" within farming (*Population Census* 1982, p. 390), but otherwise does not list services nor water conservancy in the agricultural sector. It is unclear where in the pre-1984 classification water conservancy (or water management) are located; it is possibly included in polytechnic services or in "other services," both sub-sectors of the tertiary sector.

than those of aggregated tertiary sector values in the 13-sector classification of 1978-92. This could reflect the reduction of the tertiary sector in the GB1984, in comparison to the pre-1984 sectoral classification, by the sub-sector(s) that were moved into agriculture, which would then suggest that the tertiary sector values of the original 3-sector data follow the pre-1984 sectoral classification.

173. It is unclear if the employment values of the three main economic sectors since 2003 follow the GB2002, in which case a slight statistical break occurs between 2002 and 2003, or if they continue to adhere to the GB1994.

3.1.2.2 16 (13) sectors, 1978-2002

174. Employment data on 16 exhaustive sectors are available for the years 1978-2002, following the GB1994 (and for 13 exhaustive sectors for 1978-92, following the GB1984). The sum-sectoral values through 1995 equal the economy-wide values as originally published, i.e., before the revisions following the 1990 population censuses were implemented. Since 1995, or, if revised economy-wide values are used for all years for which they are available, since 1990, the sum-sectoral value is smaller than the economy-wide value. After 2002, the detailed sectoral breakdown, now for an exhaustive 19 sectors that follow the GB2002 (with the exclusion of the sector "international organizations"), is limited to urban units.

3.1.2.3 Agriculture vs. non-agriculture, 1952-95

175. For the years 1952-95, employment values are available for agriculture and non-agriculture, with one sub-category "industry" for the latter. The sum of agriculture and non-agriculture equals the 16-sector total through 1990, and in 1991-95 matches neither the 16-sector total nor the revised employment value (but is even slightly higher than the revised employment value). The employment value for agriculture matches that in the 16-sector classification through 1990 (and that in the revised primary sector value through 1989), and in 1991-95 is higher. This suggests that the sectoral classification scheme underlying these values, as published in the *Labor Yearbook 1996*, is the GB1994. Combining the industry values with the secondary sector values through 1989 yields an implicit employment series for the sector construction (with identical values as the 16-sector values on construction for 1978-1989, with 1978 being the first year for which the 16-sector values on construction are available).

3.1.2.4 Material vs. non-material production sectors, 1952-92

176. Employment in material production sectors and non-material production sectors add up to a total that matches the 16-sector economy-wide employment data in 1952-92. The term "non-material production sectors" refers to all services except transport & communication, commerce & catering, and geological prospecting and water conservancy. Subtracting the non-material production employment values from the tertiary sector employment values yields implicit employment in 'transport, communication, commerce, catering, geological prospecting, and water conservancy.'

177. This classification reflects the Material Product System in use prior to the adoption of the System of National Accounts. It either follows the pre-1984 sectoral classification (with water conservancy and possibly some agricultural services not included in the primary but in the tertiary sector, as in the GB1994), or operates outside the various sectoral classification

schemes.[67] The employment values of the non-material production sectors in 1978-90 are identical to a correspondingly aggregated value from the 16-sector classification (with 1978 being the first year for which the 16-sector data are available). The recently published (reallocated) tertiary sector values less employment in the non-material production sector are identical to correspondingly aggregated values from the 16-sector classification in 1978-89 (with the tertiary sector value of 1990 newly revised upward). This suggests that the employment values in this Material Product System classification de facto follow the GB1994 through 1989.

3.1.3 Urban vs. rural employment, and urban ownership classification

178. Employment data are available for 1952-2004 in a table with an exhaustive breakdown into urban and rural employment. Total, urban, and rural employment in these tables also experience the 1990 statistical break and the later (minor) revisions to the 1990-2000 data. Urban plus rural employment data add up to the total, and the total equals the (revised) economy-wide employment values of above.

179. Urban employment is further broken down into up to ten ownership categories, with the ownership-specific employment values prior to 1990 equal to the numbers of staff and workers in separate, ownership-specific tables.[68] The ownership-specific employment values prior to 1990 also equal the sum sectoral staff and workers (explained below, and where data are available for 1978-2004).[69] Since 1990, the urban ownership categories no longer add up to the urban total.

180. Rural values come with the non-exhaustive sub-categories township and village enterprises, private enterprises, and the self-employed (see Table 12 for the specific years for which data are available for individual sub-categories); the very large implicit residual includes farmers.

3.1.4 Urban employment by sector

181. The *Labor Yearbook* series provides detailed data on the urban part of the economy. Table 13 summarizes the different data that are available. Urban employment consists of employment in urban "units" (*chengzhen danwei*) and a non-specified residual, here called urban "non-units." Sectoral data on urban employment are only available for 1994-2002, for the 16 sectors following the GB1994.

182. Employment in urban units consists of staff and workers and "others." Figure 12 shows that employment values for "urban units" almost matched those of "urban employment" in

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[67] The various time series employment values in this classification are identical in the *Statistical Yearbook 1991* and in the *Statistical Yearbook 1993*, the most recent source of these data. But when the *Statistical Yearbook 1991* was compiled, the GB1994 had not yet been issued (it was issued on a trial basis in 1992).

[68] The self-employed are presented as one category of urban employment; these do not constitute staff and workers. Ownership-specific staff and worker tables are typically available for state-owned units, collective-owned units, and "other units" (excluding the self-employed). The ownership classification expands over time to a maximum of ten categories; some *Statistical Yearbook* issues of the 1990s report a very small extra category "others," but this was at a time when the classification did not yet comprise ten categories.

[69] This correspondence through 1989 but not in later years does not depend on if the sum of urban ownership categories is obtained as "urban total less urban self-employed," or as "sum urban ownership categories, excluding the urban self-employed."

the mid-1990s but by 2004 urban employment was two and a half times larger than employment in urban units. (The notes to the figure discuss some data anomalies.) Consistently close to 100% of employment in urban units consists of staff and workers, with less than 5% "others."

183. Sectoral data on urban units is available for 1994-2004, following the GB1994 with 16 sectors in 1994-2002, and following the GB2002 with 19 sectors (lacking the sector "international organizations) in 2003-04. Furthermore, second-level sectoral employment values for urban units are available for the same years, following the same classification scheme (GB1994, GB2002); these are employment values for the sub-sectors of agriculture, mining & quarrying, manufacturing, etc. all the way through the sector government. One exception is that in the years 1994-97 the employment data on (only) mining & quarrying, manufacturing, and public utilities come without second-level sectors; in these years, these data cover the staff and workers, who account for 97% of employment in urban units.

184. Sectoral data on "others" (within the urban units) is available for the years 1993-2004 following the GB1994/GB2002. No second-level sectoral data are available. With more detailed data available on staff and workers, the second-level sectoral data on "others" could be obtained as a residual from employment in urban units and the group of staff and workers.

3.1.5 Staff and workers

185. "Staff and workers" (*zhigong*), also labeled "formal employment," comprise all laborers receiving a salary and being employed by (i) state-owned units (SOUs), (ii) urban collective-owned units, (iii) joint operation units (joint operations between two or more units), (iv) shareholding units (limited liability companies and stock companies), (v) foreign-owned units, (vi) units with investment from/ owned by persons in Hong Kong, Macao, or Taiwan, and by (vii) units subordinate to one or more of the above units. The term "unit" denotes enterprises and all non-enterprise units, such as government departments or administrative facilities (for example, universities).[70]

186. In contrast, employment, or (total) laborers, covers (i) all formal employment (the staff and workers in the previous paragraph), and all laborers (employer and employees) in (ii) township and village enterprises, (iii) private enterprises, and (iv) self-employment (*getihu*, in English also "individual-owned enterprises"), including laborers employed by those in self-employment. Employment also includes (v) retired staff and workers in re-employment (not as staff and workers), (vi) rural laborers, (vii) foreigners and Hong Kong/ Macao/ Taiwan laborers, and (viii) others, such as teachers in local non-official schools, staff in religious institutions, or military laborers.[71]

187. Staff and workers, thus, by definition, represent a sub-category of total employment. Staff and workers, furthermore, are de facto all urban. They constitute the largest sub-

[70] The data show that not all laborers in state-owned units are "staff and workers" (in recent years only around 95%), and similarly for the other units whose laborers should all be regarded as staff and workers. The difference in the data could come from the re-employment of retired staff and workers, or could reflect non-formal employment conditions for some laborers. Presumably this residual constitutes the "others" discussed in the previous paragraph(s).

[71] For the definitions see, for example, *Statistical Yearbook 1998*, p. 178, and *Statistical Yearbook 2005*, p. 179. Holz and Lin (2001a) also provide some discussion for the case of industrial employment data.

category of employment in urban units (always above 95%); employment in urban units, in turn, is a in size over time decreasing sub-category of urban employment (Figure 12).

188. Data on staff and workers are available with a breakdown into 16 sectors for 1978-02 following the GB1994, or with a separate breakdown into 12 sectors for 1978-1992 following the GB1984 but excluding the sector "others," and with a breakdown into 19 sectors since 2003, following the GB2002 but excluding the sector "international organizations." Second-level data are available for 1994-2004 (GB1994/GB2002), but in 1998-2002 without second-level employment values in (only) mining & quarrying, manufacturing, and public utilities; in these years, the detailed second-level data cover the slightly larger employment in urban units.

189. With data on urban employment limited to the 16 sectors in 1994-2002, and data on employment in urban units limited to 1994-04, the longer time series data available on staff and workers at the first-level sectoral classification suggest the use of staff and worker data whenever possible. These values, if they are collected as part of a regular reporting system, are likely to be highly accurate. The data on urban employment, on the other hand, are likely to include guesstimates. For analysis of second-level sectors, both the employment values on urban units or the staff and workers series come with an equal supply of data; the second-level data on industry prior to 2003 switch back and forth between urban units and staff and workers.

190. Figure 13 shows just how limited the coverage of the staff and workers is in terms of sectoral employment (using the 16-sector classification). In the period 1978-2002, staff and workers account for less than 3% of agricultural laborers and a drastically declining share in industry and construction from around 70% to about 40% and 20%. Only in the tertiary sector is their share increasing, from near-zero in 1978 to just below 30% in 2002.

3.1.6 Rural laborers

191. The agriculture section in the *Statistical Yearbook*, for 1978, 1980, and 1983-04 reports "rural laborers" in six sectors, namely in agriculture, industry, construction, transport & communication, commerce & catering, and "other nonagricultural occupations." The data are collected by the rural survey teams of the NBS. Rural survey teams are located at county level, which implies the possibility that farmers in urban districts, if these exist, as is likely, may not be captured. In the statistics introduced in the previous paragraphs, the ownership categories add up to the urban total in the years prior to 1990 (prior to the statistical break), and none of the ownership categories could possibly include farmers. This implies that farmers in urban districts do not exist, or are extremely few, so that the published ownership data still add up to the urban total at the degree of rounding used. Or it implies that the NBS rural survey teams, though not covering urban areas, still somehow obtain data on these farmers in urban districts and count them as rural. Since the NBS rural survey teams do not cover all counties in China, the published national data must be estimates.[72]

192. Identical values for these years can also be found in the *Labor Yearbook*; the *Labor Yearbook*, furthermore, for the years 1978-97, divides rural laborers into 12 sectors following the GB1994 (Table 13 in addition to Table 12).

[72] The distinction into NBS rural, urban, and enterprise survey teams was abandoned in 2005. I.e., NBS rural survey teams no longer exist in name; they now are simply NBS survey teams, located in rural areas.

3.1.7 Non-population censuses

193. Besides in the population censuses, data on end-year laborers were also collected in the 1993 tertiary sector census (for 1991 and 1992), in the 1985 and 1995 industrial censuses (for 1985 and 1995), and in the 1996 agricultural census (for 1996). The industrial censuses do not offer a comprehensive employment breakdown by sector. The agricultural census offers a total for agriculture, with a breakdown into pure farmers, farmers with primary employment in agriculture (and secondary employment in other occupations), and rural laborers with only secondary employment in agriculture (and primary employment in other occupations); the three shares in the total are 60.02%, 24.41%, and 15.57%.[73] The employment values cover all laborers starting at age 7. The age issue is not made explicit in the other (non-population) censuses.

3.1.8 Directly reporting industrial enterprises

194. Employment data for the DRIE are available in the same tables as the output data, in the *Industrial Yearbook* series. While the employment values are labeled "staff and workers" through the 1998 issue, before a switch to "laborers," the limitation to staff and workers in the title is incorrect. A comparison of the data on staff and workers in industrial SOUs in the *Statistical Yearbook* with the SOE employment value in the *Industrial Yearbook* shows the latter to be larger. The difference is particularly striking in the case of collective-owned units, where the *Industrial Yearbook* value is twice as large, which is only possible if the *Industrial Yearbook* value covers not only staff and workers in this ownership form—by definition limited to *urban* collective-owned units—but all (or at least a larger category) of laborers, including those in rural township and village enterprises. Since the employment data (or "staff and worker" data in the earlier issues) are presented in the same table as the output, balance sheet, and profit and loss account data, they presumably have the same coverage.[74]

3.2 Employment definitions and statistical breaks

195. Apart from the distinction between laborers and staff and workers, the exact definition of the term "laborers," or "employment," itself depends on the source and the publication date, leading to differences in employment values across different sources and to statistical breaks within the data in any one type of source.

3.2.1 Definition of laborers in the population censuses and 1% population sample surveys

196. Across the three population censuses and two 1% sample surveys, the category laborers (*zai ye renkou*) covers persons age 15 and above. In 1982 and 1990, laborers comprise two groups of person, (i) those with a fixed occupation (*gudingxing zhiye*), except those who are on leave for further, tertiary level education,[75] and (ii) those without a fixed occupation.

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[73] See *Agricultural Census 1996*, p. 57. A separate employment value is provided for non-agriculture; it is equivalent to 8.19% of total employment in agriculture. The source does not explicitly state that the employment values are end-year values.

[74] The *Industrial Census 1995* reports employment values for both laborers (*congye renyuan*) and staff and workers (*zhigong*) of the DRIEs; the total value for the first is 84.3552m, and for the second 83.5972m.

[75] Retirees who still worked in the month before the population census and drew a salary were to be counted as laborers.

Those without a fixed occupation are defined as persons who on 30 June 1982/1990 held a temporary job and had worked on a cumulative 16 days or more in June 1982/1990. (*Population Census 1982*, p. 607; *Population Census 1990*, Vol. 4, p. 515) The 1987 1% sample survey data do not come with detailed definitions but presumably the category of laborers (in 1987 also *zai ye renkou*) is defined as in the 1982 and 1990 population censuses.

197. In 2000, laborers comprise those persons age 15 and above who worked for monetary or non-monetary compensation (including profit and family gain) for at least one hour in the week preceding the population census (25 through 31 October 2000); the same definition holds for the 1995 1% sample survey.[76] In 2000, the labor question is only asked in the long form of the population census, and, thus, was only answered by about 9.5% of the population. (*Population Census 2000*, Vol. 3, p. 1899) In the published data, laborers starting in 2000 (not yet in 1995) are no longer explicitly labeled "laborers" (*zai ye renkou*); they are now the "population" in the various economic sectors, or "employed persons" (*jiuye renkou*). The new definition of employment in the 1995/2000 population survey/census corresponds to international practice.[77] The switch in definition between the 1990 population census and the 1995 population 1% sample survey constitutes a statistical break.

3.2.2 Alternative definition of laborers

198. The economy-wide number of laborers published in the *Statistical Yearbook* or in the *Labor Yearbook* for the years prior to 1995 (or in post-1996 issues of the *Statistical Yearbook* for the years prior to 1990), as well as all sectoral data on laborers, are presumably collected in the traditional reporting system.

199. The introductory passage to the employment section in the *Statistical Yearbook* (for example, *2005*, p. 116) mentions that the employment data are based on

(i) the "comprehensive labor statistics reporting system" covering all units with independent accounting system, i.e., excluding township and village enterprises, private units, and the self-employed;[78]

(ii) the "township and village social and economic surveys" (presumably covering at least the township and village enterprises, if not rural private units);

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[76] In the 2000 population census, the work is further qualified as (undefined) "social labor" (*shehui laodongli*). Compensation can be in cash or in kind. The *Survey 1995*, pp. 646ff., provides instructions on how to handle a list of special cases.

[77] See the " Resolution concerning statistics of the economically active population, employment, unemployment and underemployment, adopted by the Thirteenth International Conference of Labour Statisticians (October 1982),"at http://www.ilo.org/public/english/bureau/stat/download/res/ecacpop.pdf, item 9, as kindly pointed out to me by Sara Elder of the ILO Key Indicators of the Labour Market Team on 26 April 2005. Item 9 distinguishes between paid employment (for wage or salary, in cash or in kind) and self-employment (for profit or family gain, in cash or in kind), and requires "some work" within a specified brief period of either one week or one day, for operational purposes defined as work for at least one hour. China's population census 2000 (and 1995 1% sample) definition of labor matches the definition in this resolution. The U.S. uses the same criterion of one hour of work for compensation in the previous week. For the U.S. and China's definition of employment see, for example, the International Labor Organization website (http://laborsta.ilo.org/applv8/data/ssm3/e/US.html vs. …/CN.html), accessed in April 2005.

[78] It is unclear why private units should be excluded. It would seem plausible that urban private units are included, at least those above a certain size, but that rural private units are not.

(iii)complete enumeration of laborers in private units and of the self-employed (including their employees), as provided by the State Administration for Industry and Commerce.

200. In other words, except for the township and village data, employment data are based on complete enumeration. The Agricultural Ministry should have regular report form data on township and village enterprises, but the *Statistical Yearbook* does not refer to these. It lists as source of data for the first two items the Department of Population and Employment Statistics of the NBS. Beyond the introductory passage of the employment section, a note to the first table in the employment section then mentions the adjustments following the 1990 and 2000 population censuses, equally relevant for the following tables in the employment section.

201. The same introductory passage to the employment section in the *Statistical Yearbook* mentions two further sources of data, namely "population change sample surveys," and a "statistical reporting system on training and employment" covering the urban population only. The first source presumably helps extrapolate the total employment data based on population census employment definitions in years between and after population censuses, while the latter is likely to underlie the urban unemployment data.

202. The *Statistical Yearbook* defines laborers as persons age 16 or above who perform a specific type of work (*yiding shehui laodong*) for remuneration or business income. The 16-year lower age limit contrasts with the 15-year lower age limit in the population censuses.

203. The *Statistical Yearbook* (or the *Labor Yearbook*) does not specify the required extent of work in order to be counted as laborer. It appears possible that at least up through some time in the reform period, and perhaps up through the present, laborers counted in the traditional reporting system must have worked for at least 2 months in the previous year.[79] The *Statistics Manual* (1990, p. 203) lists a 3-month work requirement for rural laborers to be counted as laborers. It otherwise counts all staff and workers of SOUs, urban collective-owned units, joint units (*gezhong heying danwei*), and of foreign-funded units, plus township and village laborers, the self-employed, those in "household sideline occupations" (*jiating fuye*) if a minimum income level is met, and various other specific cases mostly linked to meeting a minimum income requirement. Liu Chengxiang et al. (2000, p. 70) has a requirement of one hour of work in the previous week for remuneration or business income, but it is unclear if this refers to the series revised following the population censuses or to the report form series (Liu Chengxiang et al. do not distinguish between the two). If a 2- or 3-month per year requirement were used for at least some laborers in the regular reporting system, this contrasts with the 1-hour per previous week requirement in the 2000 population census and 1995 1% sample survey, and with the 16-day per previous month requirement for temporary jobs in the earlier population censuses and 1% sample survey.

204. As mentioned above, in the *Statistical Yearbook 1997*, all previously published economy-wide employment values of the years 1990-95 (and those of the three main economic sectors), originally collected through the report form system, were significantly revised upward following the 1990 population census, with further, minor revisions to the 1990-2000 employment data in the *Statistical Yearbook 2002*. I.e., the total employment series and the three main sectoral series experience a statistical break in 1990 (or 1995).

[79] The 2-month requirement was pointed out to me by Thomas Scharping in communication on 21 February 2005.

Separately, in the *Statistical Yearbook 1998* and *2000* pre-1990 sectoral values were slightly re-allocated within the given economy-wide employment values.

3.2.3 On-post vs. not-on-post staff and workers

205. In the years prior to 1998, the *Statistical Yearbook* employment data based on report forms include those staff and workers who are officially part of an urban work unit but are no longer "on their post." In the years since 1998, those not on their post are not included in the staff and worker data (and thereby presumably also not in the employment data). Being no longer on one's post implies that one is no longer performing work for one's work unit, i.e., one is de facto laid off, but is still regarded as a member of that work unit and enjoys at least some of the usual privileges accorded to the members of a particular work unit, such as housing benefits. The issue of staff and workers not being on their post is likely to have become relevant only in the early to mid-1990s, thus potentially biasing the staff and worker and employment values upward in the years since perhaps 1994, through 1997.

206. Table 14 reports the stock of not-on-post staff and workers relative to the number of on-post staff and workers for the years for which the necessary data are available, the years since 1996. In the aggregate across all ownership categories, the number of not-on-post staff and workers was equivalent to 6.39% of the number of on-post staff and workers in 1996, rising to a high of 19.62% in 2000, before falling off to 15.18% in 2004. With two-thirds of all staff and workers employed by SOUs, the percentages for SOUs are similar to the aggregate across ownership categories. The percentages for collective-owned units are significantly higher, and those of units in other ownership forms significantly lower.

207. The size of the annual increase in the ratio from 6.39% in 1996 to 10.85% in 1997 and 16.03% in 1998 suggests that furloughed staff and workers are a phenomenon that began one or two years before 1996, but no data are available for the years prior to 1996. Table 14 also reports the ratio, in percent, of the number of on-post staff and workers to the total number of laborers (employment values as of 2005, revised following the population censuses in 1990 and 2000). In 1996, on-post staff and workers accounted for 20.24% of total employment, and in 1997 for 18.95%. These values suggest that the official employment data may overestimate actual employment by up to approximately 1.3% in 1996 and 2.1% in 1997, and less so in 1995 (and perhaps 1994).[80]

208. Overestimation of that extent occurs only if (i) all furloughed staff and workers did not take up any other (unregistered) work while furloughed *and* (ii) the employment values published in the *Statistical Yearbook* do not make corrections for the number of furloughed laborers.[81] Because the population censuses and 1% sample surveys use their own definitions of laborers based on days actually worked, the second condition is unlikely to be met for the key employment values in the *Statistical Yearbook*. I..e., it is possible that economy-wide

[80] In 1996, aA number of not-on-post staff and workers equivalent to 6.39% of all on-post staff and workers may have been included in the total employment figure, where on-post staff and workers accounted for 20.24% of total employment (6.39% of 20.24% is 1.29%).

[81] If the furloughed staff and workers took up other work, there exists the possibility that they are actually double-counted in the years prior to 1998, first as staff and workers, and, second, in their actual occupation. If they became self-employed or set up their own private enterprise, double counting is unlikely because "furloughed laborers" was a special group (implying special privileges) in official documents and probably as well in the statistics of the State Administration of Industry and Commerce (which provides the data on the self-employed and private enterprises).

employment and the employment values by main economic sectors are not affected by the issue of furloughed workers. The report form data on employment, on the other hand, prior to 1998 in all likelihood simply included all persons who carried the label "staff and workers," independent of if they were on their post or not. This means that the detailed, 16-sector sectoral employment data could be biased upward starting in approximately 1994 or 1995, through 1997. The *staff and worker* data of these years are clearly biased upward.

3.2.4 Unemployment

209. The *Statistical Yearbook*, for the years since 1978, also provides data on the "economically active population" (*jingji huodong renkou*), i.e., those persons age 16 and above who can work and are working or wish to work (*Statistical Yearbook 2005*, p. 179). Figure 14 shows that in 1978-1989 this series is the sum of economy-wide employment plus the *urban* (formal) unemployed. Since 1990, this series exceeds the sum of economy-wide employment and urban unemployed. The *Statistical Yearbook* does not specify how the series is obtained since 1990, i.e., what the difference between economically active population and employment means.

210. The urban unemployed reflect urban non-farmers between age 16 and the retirement age who have an urban household registration, have worked before, are able to work, and have registered with the local employment service institution (*Statistical Yearbook 2005*, p.179). I.e., the definition incorporates limitations based on age, household registration, as well as on if the person has worked before or not; otherwise, the person is considered to be a "young person waiting for work" (*daiye qingnian*).[82]

211. Furloughed laborers, i.e., laid-off workers who have not severed their ties to their former work unit, are not regarded as unemployed. As Figure 14 shows, their number in 2000 exceeded the official number of urban unemployed four-fold. The number of furloughed laborers in all years for which the data are available (1996-2004) exceeds the difference between the economically active population and economy-wide employment; i.e., the economically active population excludes the furloughed laborers or the economy-wide employment value includes some furloughed workers.

3.2.5 Summary implications

212. Figure 15 compares economy-wide employment according to the different sources. One series is the traditional report form series available for the years 1952-95, with the most recent values reported in the *Statistical Yearbook 1996*. Sectoral employment values are available for 1978-2002. In the overlapping years, the traditional report form (total) employment series is series is identical to the sum sectoral employment values. The sum sectoral employment series exhibits a sharp reduction in 1998, presumably due to the omission, starting in 1998, of the not-on-post staff and workers. Ideally, the not-on-post staff and workers, an issue relevant starting in approximately 1994, but with values only available for 1996 and 1997, are removed from this series in 1994-97 for it to be consistently defined for all years.

[82] The latter exclusion may have been abandoned in recent years.

213. Starting with the *Statistical Yearbook 1997*, the new economy-wide series, revised following the year 1990 population census, is introduced for the years since 1990; the *Statistical Yearbook 2001* is the most recent yearbook that reports the same data for 1990 onwards as the earlier *Statistical Yearbook* issues starting with the 1997 issue. In the *Statistical Yearbook 2002*, the previously revised values of 1990 onwards are revised a second time, now following the year 2000 (and 1990) population census(es). Figure 15 shows that the first and second revised series match closely but not perfectly, and both are significantly higher than the report form series, on the order of 50-100m laborers. The difference between the latest revised series and the report form series is likely to be due to two factors: (i) the revised series, by following the population census and 1% sample survey values, is likely to adopt the much less stringent requirements of the population censuses and 1% sample surveys regarding the number of days worked in some period prior to the census/survey/report date, and (ii) the revised series is likely to avoid the not-on-post problem starting in approximately 1994, through 1997.

214. The last series in Figure 15 are the population census and 1% sample survey values of 1982, 1987, 1990, 1995, and 2000. These values are clearly higher than the report form values, and are close to the two revised series, but do not match either of them perfectly. The difference between the population census/ 1% sample survey values and the revised series could be due to the following reasons: (i) the *Statistical Yearbook* values only cover laborers age 16 and up, rather than age 15 and up, and (ii) the *Statistical Yearbook* values are end-year values, while the population census/ 1% sample survey values prior to 1990 are 1 July values and since then 1 November values.

215. The two rounds of revisions in the *Statistical Yearbook* to economy-wide employment values of first 1990 onwards and then 1990-2000 were accompanied by corresponding revisions to the values of the individual sectors in the main sectoral breakdown (primary, secondary, and tertiary sector). These two rounds of revisions did not revise economy-wide values of years prior to 1990. However, separately, the *Statistical Yearbook 1998* and *2000* changed the allocation of the unchanged economy-wide values among the three main economic sectors in the years prior to 1990, apparently to create a consistent time series based on the GB1994 sectoral classification.

216. Overall, the following revisions to the main sectoral data have occurred. Starting point are the *Statistical Yearbook 1991* and *1996* which together provide one complete set of data for 1952-95 (with previous issues of the *Statistical Yearbook* not providing any revisions). The first change is in the *Statistical Yearbook 1997*, which not only revised the economy-wide values since 1990 upward but similarly the sectoral values. Second, the *Statistical Yearbook 1998* reallocated the sectoral data of 1985-89, and the *Statistical Yearbook 2000* those of pre-1985 (with not all years reported in the source). Third, the second revision to economy-wide values for 1990-2000 in the *Statistical Yearbook 2002* was accompanied by a similar revision of the sectoral values.

217. The implication for the main (3-sector) sectoral employment values is that, as in the case of the economy-wide values, 1990 represents a severe statistical break. The revisions to the sectoral data of earlier years are rather minor. Separately, the detailed 16-sector report form series of 1978-2002 were never revised.

3.3 Data quality

3.3.1 Employment in population censuses and 1% sample surveys

218. If the population censuses and 1% sample surveys were perfectly reliable, the size of age cohort X in year Y should equal the size of (the same) age cohort X+1 in year Y+1, less the number of those who died during the year. In particular, a specific age cohort cannot *grow* over time (after accounting for changes in the census/survey dates during the year, and for movements in and out of the military), but the data show instances where this has happened. Cohort-specific double-checks reveal that all population censuses and surveys are problematic. The population census data appear the most consistent; the 1% sample surveys of 1987 and 1995 have more shortcomings.[83] The degree of inaccuracy in population data presumably applies equally to the employment data collected on the same forms as the population data.

3.3.2 Revised employment data in the Statistical Yearbook

219. The revised *Statistical Yearbook* values on economy-wide employment and employment in the three main economic sectors rely on the population census data. The NBS somehow interpolates the employment values for the years between censuses, presumably with the help of the annual population change sample surveys, but details have not been made public.[84] Figure 15 rules out the possibility that the growth rate of the revised series, at least through the 1990s, was derived from the growth rate of the report form series.

220. The revised *Statistical Yearbook* values for the census/ sample survey years do not necessarily match the population census/ survey employment values in these years. The most recent, revised employment value in the *Statistical Yearbook* for end-1990 comes close to the mid-1990 population census value, 647.49m vs. 650.44m (647.24 plus military personnel, since the *Statistical Yearbook* employment data comprise military personnel; Liu Chengxiang et al., 2000, p. 70). Subtracting the 15-year age group from the census value yields a comparison between the 647.49m end-1990 *Statistical Yearbook* value with a 642.03m mid-1990 population census value.[85] The difference of (or increase by) 5.46m between the mid-1990 population census value and the end-1990 *Statistical Yearbook* value is plausible given that the report form total rose by 14.11m in the 12 months from end-1989 to end-1990 (*Statistical Yearbook 1996*, p. 88).

221. The *Statistical Yearbook* end-1995 employment figure again comes close to the now 1 Nov. 1995 survey value (680.65m vs. 680.03m, the latter presumably excluding military). Adjusting the 1995 survey value to exclude the 15-year old laborers and to include an interpolated military personnel value (from the 1990 and 2000 population census values), yields a comparison between end-1995 680.65m laborers in the *Statistical Yearbook* and

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[83] For details, see Holz (2005b). The annual 1‰ population sample survey data appear most unreliable, and they do not come with labor data, anyway.

[84] A note to the first table in the employment section of the *Statistical Yearbook 2005*, p. 117, states explicitly that the employment values since 2001 (including of 2001) are extrapolated based on the population change sample survey.

[85] For the military, the age classification starts with the category "18 years and below," accounting for 0.84% of total military personnel (*Population Census 1990*, Vol. 4, p. 495). No correction for 15-year olds is made here to the military personnel value in 1990 (or in any other year).

678.32m laborers on 1 Nov. 1995 in the adjusted 1995 survey. The difference of (increase by) 2.33m laborers in the last two months of 1995 appears slightly too large in comparison to the 12-month increase between end-1994 and end-1995 of 6.10m laborers in the revised economy-wide employment series in the *Statistical Yearbook 2005* (p. 118).

222. In 2000, the *Statistical Yearbook* end-year value of 720.85m laborers is significantly larger than the 1 November population census value of 706.33m laborers (including the military with 2.50m). Dropping the 15-year old laborers from the population census value yields a comparison between the *Statistical Yearbook* end-year 2000 value of 720.85m laborers and a population census value for 1 November 2000 of 699.67m. I.e., the *Statistical Yearbook* value implies a gain of 21.18m laborers in the last two months of 2000, when the 12-month increase in laborers between end-1999 and end-2000 was only 6.91m laborers (and the trend every year is upward, *Statistical Yearbook 2005*, p. 118). This is not plausible. In other words, sometime after 1995 the *Statistical Yearbook* series began to diverge from the population census values which the *Statistical Yearbook* explicitly claims to follow.

223. One explanation for the discrepancy could be that the labor count in the 2000 population census was based on the long-form questionnaire, which only about 10% of the population filled in. The NBS could believe in a downward bias in the number of laborers who filled in the long-form questionnaire, and may then have decided to adjust the total number of laborers. The census number of laborers reported here is obtained by adjusting the number of laborers obtained in the long-form questionnaire by the ratio of the total population to the number of person who filled in the long-form questionnaire.[86]

224. Potential questions also arise from the large difference between the revised *Statistical Yearbook* series and the report form series (Figure 15). If one tries to identify the types of laborers potentially not captured by the report forms, the following types come to mind: (i) migrant laborers, especially those not employed by formally registered institutions, for example, maids employed by urban households; (ii) furloughed laborers in unregistered self-employment; (iii) employees of government and administrative units who are not part of the official, authorized staff (*bianzhi*). Regarding the latter, a series of administrative reforms forced government and administrative units at all levels to reduce the number of their staff, which, however, all too often only meant the creation of unofficial positions or positions in subordinate or affiliated units, with data on the number of these laborers possibly not reported to the statistical authority.

225. One may wonder to what extent the population censuses are able to capture various types of laborers not included in the report form system. Cheating about birth figures in the census is a well-known phenomenon (and the data bear it out, when comparing the data on the youngest age cohorts in one census to the data on the same cohorts in the next census). In the case of birth figures, there are clear incentives to not report unapproved children. In the case of laborers, the census may not be able to reach all laborers, and some laborers may have disincentives to reveal that they are working and receiving income (which might lead to

[86] Another explanation for the discrepancy between the 2000 census and 2000 *Statistical Yearbook* values could be the following. In the *Statistical Yearbook 2002*, the NBS revised the 1990-2000 employment series upward, although these values were already previously based on the 1990 population census. It is possible that the 2000 population census revealed an undercount of laborers in the 1990 population census, just as the youngest age cohorts (especially age 0-7) are routinely underreported in the population censuses, which then becomes apparent in the next population census. (For details, see Holz, 2005b.) Perhaps the NBS made precautionary adjustments to the number of laborers obtained in the 2000 population census. But then should not 1990 employment have been revised similarly?

taxation or to the discontinuation of benefits such as unemployment benefits). Given the large size of China's rural population with its migrant workers and shifting employment patterns, the data on laborers in China's population census are likely to be of lesser quality than in more stable economies. The revised employment values in the *Statistical Yearbook*, derived from the population census values, are equally affected.

3.3.3 Report form data on employment, including detailed sectoral data

226. The almost certain inclusion of not-on-post laborers in the report form employment values prior to 1998 implies that the data for the years immediately prior to 1998, perhaps starting in 1994, are not meaningful in a time series comparison.[87]

227. The report form data, as reported above, stem from three sources. The "comprehensive labor statistics reporting system" is likely to yield highly reliable data. This is the traditional reporting system of the planned economy, covering mostly sizable units with good accounting and statistical systems. The "township and village social and economic surveys" are likely to be of much lesser quality, with questions about the extent to which these data are guesstimated vs. actually collected, i.e., about the extent to which sample surveys of varying quality substitute for complete enumeration. The third source of employment data, the State Administration for Industry and Commerce's register on laborers in private units and on the self-employed, is unlikely to be up-to-date and complete. An explanation of how the farmers come in is lacking altogether.

228. The proper classification of farmers is an issue in itself. For example, Thomas Rawski and Robert Mead (1998) reconstruct farm employment from labor input requirements per crop-area and sown acreage by crop, and find up to 100m "phantom farmers" in official agricultural employment data as reported in the sectoral report form statistics (or in the rural employment statistics in the agricultural section of the *Statistical Yearbook*). They speculate that these phantom farmers work in construction, transport, and trade. Perhaps the population censuses and 1% sample surveys manage to properly classify these phantom farmers, but this is not certain.

229. The upshot is that the report form values are not only too small, as already seen, but in all likelihood also not too accurate in their sectoral breakdown, in particular for agriculture and the tertiary sector. Employment in industry and construction, which constituted the key sectors of the traditionally planned economy, may be more reliable.

3.3.4 Data comparisons

230. Figure 16 through Figure 24 contrast the different labor series, first for the primary sector (agriculture), then for the secondary sector (with a breakdown into industry and construction), and finally for the tertiary sector (with a breakdown into non-material production sectors and residual other services). Four summary conclusions emerge.

[87] One would think that the NBS has the means to retrospectively adjust the pre-1998 values, but this has not happened.

3.3.4.1 Two sets of economy-wide and sectoral series

231. For the three main sectors (primary, secondary, and tertiary sector), two since 1990 fundamentally different time series are available: the 3-sector (revised) series with values for 1952 to the present and a statistical break in 1990 (and incomplete coverage prior to 1990), and the (aggregated) 16-sector classification series with values for 1978-2002 and the statistical break in 1998 due to the exclusion of not-on-post staff and workers. The two sets of data have identical values for the years 1978-89.

232. The two sets of data translate into two long-run series economy-wide and for each of the three sectors (Figure 15, Figure 16 or Figure 17, Figure 18 or Figure 19, and Figure 22). One set consists of the 3-sector series as is, for the years 1952-2004, with the statistical break in 1990. This revised employment series for 1952-2004 covers only the report form laborers through 1989 and then, in 1990, when it switches to complete coverage, suffers from a severe statistical break.

233. The second set consists of the 3-sector series for the years 1952-1978 (or 1989), and the aggregated 16-sector classification since then and through 2002. Since the pre-1990 3-sector series stem from the (for the years prior to 1978 not available) detailed sectoral classification, this second set is a consistently defined report form series; however, it suffers from a statistical break in 1998 due to the new exclusion of not-on-post staff and workers (or, rather, the 1994-1997 values are not particularly meaningful due to the inclusion of the not-on-post staff and workers). The 1998 statistical break in the second series affects industry and construction most, since this is where the share of staff and workers—the only types of laborers who potentially qualify for the attribute "not-on-post"—is relatively large. Its effect on the agricultural labor series (in the 16-sector classification) appears negligible, and on the services minor (Figure 13 shows the share of staff and workers in all laborers, including by main economic sector.)

234. The 16-sector classification obviously also provides data on all 16 individual sectors for the years 1978-2002, with the same caveats (incomplete coverage in all years, statistical break in 1998).

3.3.4.2 Discrepancies between population census sectoral values and other sectoral values

235. A second conclusion is that while the economy-wide number of laborers in the population census closely matches the economy-wide number of laborers in the revised employment series reported in the *Statistical Yearbook*, at the sectoral level the differences are large, with, according to the population censuses, the number of agricultural laborers 20% higher than the (revised) number reported in the *Statistical Yearbook*, and the number of secondary and tertiary sector laborers in 1990 and 2000 20% lower.

236. The reason why the *Statistical Yearbook* sectoral values are so much different from those of the censuses are not clear. The *Statistical Yearbook* employment section does not come with sector-specific definitions.

237. The 2000 population census, in the long-form questionnaire, asked for the name of the work unit and, if relevant, the main products produced or the business scope. The instructions to the 2000 population census specify what constitutes an economically productive (work) unit, and how to handle special cases and the allocation to individual production sites within a work unit. The self-employed, migrant workers, farmers temporarily entering urban areas,

and workers in enterprises that have stopped production or work, if they do not have a clearly defined job, are to respond to the question with the main work they have done in the week prior to the census. Farmers, in particular, are to not just enter "agriculture" but to specify their type of agricultural activity or business activity.

238. This is similar for the previous two population censuses. The 1982 population census only asked for the name of the work unit (and in the case of the self-employed, what they were engaged in), which in the rural case meant the name of the commune, production brigade, and production team. The 1990 population census asked for the name of the work unit and what concrete work the person was doing.[88]

239. The only available cue as to the reason for the difference in sectoral values between the population censuses and the *Statistical Yearbook* comes from the agricultural census of 1996. The year 2000 population census number of primary sector laborers is 453.10m (long-from questionnaire value adjusted to population-wide value). It compares to 518.96m farmers in the agricultural census 1996; this total consists of 311.50m solely farmers according to the agricultural census, plus 126.67m farmers whose primary but not sole occupation was farming, and 80.79m farmers whose primary occupation was not farming. Summing those who solely or primarily farm, the total in 1996 was 438.17m, 14.93m less than in the population census in 2000.[89] Noting that the number of farmers, according to the population censuses, decreased between 1990 and 2000 (Figure 16 or Figure 17), a 20m higher 1996 agricultural census figure for solely and primarily farming laborers of about 460m would have perfectly explained the population census value.[90] Alternatively, as in the economy-wide case, the long-form number of laborers in the 2000 population census may not be an accurate representation of the total population.

240. The (revised) *Statistical Yearbook* figure for 1996 is 348.20m, which exceeds the agricultural census value of solely farmers by 36.70m, and falls 89.97m short of the sum of solely and primarily farmers in the agricultural census. It is again unclear, how this discrepancy can be explained.

3.3.4.3 Dubious data quality in the pre-reform period

241. Figure 16, Figure 18, and Figure 21 on primary, secondary, and tertiary sector employment, in 1958 through 1962 all exhibit large deviations from the long-term trend. These values of the "Great Leap Forward" period are unlikely to be of good quality, and it may not be meaningful to match them with output values. On the other hand, the (in the System of National Accounts retrospectively compiled) output data may be of similarly poor quality, as the NBS may have guesstimated both employment and output values of these years jointly.

242. Similarly, although the data show no interruption, the near-closure of the NBS during the "Cultural Revolution" raises questions about data quality from the late 1960s to the mid-1970s. Perhaps the curves in the charts are as smooth as they are in this period simply due to

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[88] See *Population Census 1982*, p. 607, and questionnaire insert; *Population Census 1990*, Vol. 4, pp. 515f., and questionnaire insert; *Population Census 2000*, Vol. 3, p. 1899, and questionnaire insert.

[89] This ignores that approximately 1% of the farmers in the agricultural census are between age 7 and 15, whereas the population census only counts laborers age 15 and up.

[90] For the data see *Population Census 2000*, Vol. 1, p. 215, and Vol. 2, pp. 800, 881-934; *Agricultural Census 1996*, p. 57.

some retrospective interpolation by the NBS of these values from those in the mid-1960s and late 1970s.

3.3.4.4 Additional data

243. The charts show that data on agricultural vs. non-agricultural employment, available for the years 1992-95, provide no new information for 1978-95 beyond the 3-sector revised employment series and the 16-sector classification series. The agricultural values are identical to those reported in the 3-sector revised series and in the 16-sector classification series through 1989/90, with some inexplicable deviations in 1991-95 (Figure 16). The industry values, published as a sub-category of non-agricultural employment, are identical to those in the 16-sector classification in all overlapping years, i.e., in 1978-95 (Figure 20). Construction values can be obtained as difference between (prior to 1990/96: report form) secondary sector employment and industrial employment. The obtained industry and implicit construction values of the years 1952-1977 are not available in other sources.

244. The charts also show that the data on non-material production sectors, available for the years 1952-1992, match up with the corresponding values in the 16-sector classification in 1978-1990, with minor discrepancies in 1991 and 1992. In other words, if a series on employment in the total of 'transport & communication, commerce & catering, and geological prospecting & water conservancy' is desired, the non-material production sector values can be used through 1978 or 1990 and then continued with the corresponding values in the 16-sector classification. The same holds for all other services, for which the non-material production sector values combined with the tertiary sector values yield a series for 1952-1989, which can then be continued with the corresponding values in the 16-sector classification. These data are all limited to the report form coverage.

3.4 Hours worked

245. The Chinese government regulates the number of work hours per week for *staff and workers*. This number of work hours changed over time. Prior to 1 March 1994, the rule was a 48-hour work week; starting 1 March 1994 it was 44 hours, and starting 1 May 1995 40 hours. Implementation of the 40-hour work week after 1 May 1995 appears to have encountered numerous difficulties; the Labor Ministry in 1995 extended the deadline to "at the latest" 1 May 1997, but even that deadline could be broken, and was broken, as a Labor and Social Security Ministry circular of 1997 suggests. The reduction in work hours, de facto, thus, was implemented only gradually.

246. The State Council regulations only mention staff and workers, employed within China in state organs, social organizations, enterprises and administrative facilities, and in other organizations. But one sentence in the broader implementing instructions issued by the Labor Ministry in 1995 extends the coverage to the self-employed (presumably, in the terminology used at the time, including private enterprises). In 1995, non-agricultural staff and workers accounted for 44% of total non-agricultural (revised) employment, and all staff and workers accounted for 22% of economy-wide (revised) employment.[91]

[91] The various regulations mentioned here are SC 23 Feb. 1994 and 25 March 1995, Labor Ministry 10 April 1995, and Labor and Social Security Ministry 24 April 1997. Gary H. Jefferson et al. (2000, p. 809) have one

247. Data to check on actual work hours are scarce. One source of work hour data is the 1995 1% sample survey with economy-wide data. Another source are recent issues of the *Labor Yearbook* with data for urban units only. Table 15 reports the economy-wide number of hours worked per week according to the 1995 1% population sample survey. The vast majority of all laborers worked either between 33-40 hours per week (53.06%) or 41 hours or more (42.86%); only about 4.08% worked less, and most of these are in the 25-32 and 17-24 brackets. The published economy-wide average number of hours worked per week and laborer in 1995 was 40.7 hours.

248. In 2001-04, now limited to urban areas, the work hours per week range from 44.9 hours in 2001 to 45.5 hours in 2004, with a continuous increase in between (Table 16). I.e., laborers in urban areas in 2001-04 worked 4-5 hours more than laborers economy-wide did in 1995. Staff and workers are urban, and it seems unlikely that (the larger group of) urban laborers worked significantly more hours in 1995 than in 2001. The 2001-04 trend in hours worked by urban laborers then suggests that the State Council regulation of 1995 on limiting work hours of staff and workers to 40 hours per week has, on average, had little effect.

249. Data across sectors are also available, but the sectoral classification changed in 2002; the 2001 values are reported in the source according to the 2002 classification, with the 2001 values apparently entered in those 2002 sectors which they matched best. The variation across sectors is what one would expect, with, in 2001-04, work hours per week in industry around 42-46 hours, in construction (with perhaps more migrant laborers) around 48 hours, in commerce & catering around 50 hours, and in the government-related or other tertiary sector sub-sectors such as in banking just above 40 hours.

250. Across sectors in 2001-04, and ignoring international organizations, urban work hours ranged from 40.8 to 50.1. This implies that comparisons of the number of laborers, or of labor productivity, across sectors is problematic; the number of laborers should be adjusted for the different numbers of hours worked. Over the four years, there is little change in hours worked. On urban average, the number of hours worked per week increased by 0.6; over a longer period, however, such changes add up, especially when State Council regulations formally reduce the work week by four hours, twice (in 1994 and 1995).

251. The data on hours worked appear by far too limited to make meaningful changes to the number of laborers, no matter how much such adjustments would be desirable for productivity analysis. Not only are the data limited to the years 1995 and 2001-04, but the coverage changes between 1995 and 2001 from economy-wide to urban.[92] Sector-specific

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paragraph on the two State Council regulations. The percentages are calculated from data in the *Statistical Yearbook 2005*, pp. 118 and 126.

[92] The question also arises as to the quality of these data. The 1995 data on hours worked per week could be of low quality because they are obtained in the 1% population sample survey, which could have a sectoral or regional bias. While the 1995 data are reported in the *Population Statistical Yearbook 1999*, pp. 84f., the *Population Survey 1995*, pp. 646f., provides details on who is to be counted as laborer; it also lists a default work time of 40 hours in a variety of special circumstances: sickness/ machinery breakdown that temporarily prevents work, temporarily not working during a job switch (left previous job, not yet assumed new job), seasonal labor not working at the time of the survey, and temporary leave from work for studies (less than one semester). The average reported hours, thus, appear biased upward. On the other hand, those persons who are on leave from work to study for more than one semester, by definition, work 0 hours. As to the urban data, no explanation is offered in the source on how they were collected. Presumably they are obtained in the urban labor survey which is conducted twice a year since 2002, and three times a year before 2002 (*Zhongguo tongji*, January 2003, p. 15), presumably by the NBS urban survey teams; the coverage is likely to be even lower than 1% (of the urban population or urban laborers).

productivity analysis without adjusting the number of laborers for hours worked may be quite reasonable, given the low degree of change in work hours in each individual series between 2001 and 2004. Economy-wide, the difference in work hours across sectors matters if the relative allocation of laborers to different sectors changes drastically over time; in the short run, this may not be the case, but in the long run it is (Figure 17, Figure 19, Figure 22).

3.5 Choice of labor data for productivity analysis

252. A number of employment series are meaningful for use in productivity analysis. All data reported below (in the appendices) are end-year values, unless otherwise stated, following the practice in all data sources. The end-year employment values can easily be turned into midyear values by taking the arithmetic mean of previous year end-year and current year end-year values. The sectoral classification, unless otherwise stated, follows the GB1994.

3.5.1 Economy-wide employment

253. For the years since 1990, the (revised) economy-wide employment values published in the most recent *Statistical Yearbook* appear the first choice of data. These data follow the 1990 and 2000 population census results, with the second revision of 2002 presumably updating the values (of 1990-2000) to the year 2000 census definition. The definition of laborers in the 2000 population census matches the internationally used definition of covering everybody age 15 or above who has worked for monetary or non-monetary compensation (including profit and family gain) for at least one hour in the week preceding the population census.

254. The economy-wide employment values published in the *Statistical Yearbook* cover the laborers age 16 and above, and thus presumably remove the 15-year group from the population census values. Military values are presumably included. The match between the 1990 and 2000 population census values or the 1995 1% population sample survey value on laborers (all corrected for the age discrepancy and including military personnel) with the corresponding *Statistical Yearbook* economy-wide employment values was (above) found plausible throughout, with a minor discrepancy in 2000, which, however, may have a good explanation.

255. The *Statistical Yearbook* total employment values for the years prior to 1990 are report form values. In order to create a consistent series for the years 1978-2004, the pre-1990 values need to be adjusted similarly as the NBS adjusted the post-1989 values. This can be done using the 1982 and 1990 population census employment values as anchors. Values for the years 1983-89 can be obtained by, in each year, covering the same proportion of the distance between the 1982 and 1990 values as the sum of the report form sectoral data do.[93] The growth rates of the sum sectoral data prior to 1982 can be used to obtain values backward from the 1982 population census value to 1978. The resulting 1978-2004 values are

[93] The growth in aggregate report form sectoral values appears rather constant over time and aggregate growth between 1982 and 1990 is similar for the sum sectoral values and the population census employment values (Figure 15). The (midyear) 1982 population census employment value (including military personnel, excluding the 15-year age group) is 1.1659 times the midyear report form sum sectoral employment value, while the ratio in 1990 is 1.1458; the small difference in the ratios would suggest that the two series move in step, but has no further significance as long as the annual growth pattern of the sum sectoral values is applicable to the population census employment values.

reported in Appendix 13, with details on the manipulations of the pre-1990 data provided in the notes to the appendix.

256. The key shortcoming of this method is that the requirement to be counted as laborer in the 1982 population census was much more stringent than in 2000. However, in the early reform period nearly all, if not all urban laborers are likely to have had a "full-time" job. The share of, de facto full-time, staff and workers in all laborers was very high in industry and construction (Figure 13). Agricultural laborers were probably all included, and the tertiary sector was small (and thus cannot introduce major data problems).

257. An alternative series for the years 1952-2002 consists of the report form data, consistently defined across all years, but not covering all laborers (and perhaps so to different degrees in different years), and exhibiting a statistical break in 1994/98 (with the not-on-post laborers excluded only starting in 1998). The economy-wide employment data reported in the *Statistical Yearbook* for the years prior to 1990 are report form data; for the years since 1989, the separately listed sectoral values of 1978-2002 can be added up (with identical results for the overlapping years). Appendix 14 reports these values, with those of the years since 1978 obtained as the sum of the sectoral values.

258. The sources of economy-wide data are the same as those for the three main economic sectors, provided in the next section.

3.5.2 Three main economic sectors

259. As in the case of the economy-wide values, one (revised) set of primary, secondary, and tertiary sector series is available for the years since 1990. These values follow the GB1994, and possibly the GB2002 since 2003.

260. Values for the years 1978-1989 can be approximated by applying the sectoral shares of the pre-1990 employment values to the adjusted pre-1990 total employment values (previous section). This is not perfect, but no better procedure seems available.[94] The data are included in Appendix 13, with details on the manipulations of the pre-1990 data provided in the notes to the appendix.

261. An alternative series for the years 1952-2002 consists of the report form data, presumably following the GB1994, with the same shortcomings as the economy-wide report form data. I.e., these data are consistently defined across all years, but do not cover all laborers (and perhaps so to different degrees in different years), and exhibit a statistical break in 1994/98 (with the not-on-post laborers excluded only starting in 1998). Appendix 14 reports these values, with those of the years since 1978 obtained as aggregates of the corresponding individual series of the 16-sector report form classification.

262. The data on the three main economic sectors should be taken from a source more recent than the *Statistical Yearbook 2001*, because the 1990-2000 3-sector values were revised (in part a second time) in the *Statistical Yearbook 2002*. Prior to 1990, the 3-sector values are report form values. These data should be taken from a source more recent than the *Statistical Yearbook 1999*, because the 1952-1989 values of the three sectors, as far as reported in the

[94] The 1982 population census data on sectoral employment are not used due to the discrepancy between the population census sectoral labor values and the sectoral labor values reported in the *Statistical Yearbook* in 1990 and in 2000, as noted above. (The 1990- values follow the *Statistical Yearbook*.)

Statistical Yearbook, were slightly reallocated in the *Statistical Yearbook 1998* and *2000* presumably to match the GB1994 in all years. Because recent *Statistical Yearbook* editions do not report the data of all earlier years, one convenient source of 3-sector and economy-wide values is the *Labor Yearbook 2005* (pp. 7f.), which reports the revised data, including the reallocations, for all years 1952-2004.

3.5.3 Detailed sectoral values (16 sectors, other classifications)

263. Detailed sectoral values are only available from the report forms, for the years 1978-2002, following the GB1994, for example in the *Statistical Yearbook 2005*. The values are reported in Appendix 15.

264. Two additional sets of data for the years 1952-1978 are available, with the values included in Appendix 14 (and the sources listed in the notes to the appendix). Both are, de facto, report form data, and thus link up to the report form data of 1978-2002. One is for industry and construction (separately), the other for two exhaustive groups within the tertiary sector. Data on industry and construction can be obtained from the agriculture vs. non-agriculture classification, which lists a sub-group "industry" for non-agriculture; construction follows by subtracting industry from secondary sector values.[95]

265. The second set of pre-reform sectoral data can be derived from the material vs. non-material production sector classification. Employment in the non-material production sector implies employment in transport & communication, plus commerce & catering, plus geological prospecting and water conservancy. Employment in all other tertiary sector subsectors can be obtained by subtracting employment in the non-material production sector from employment in the total tertiary sector.

266. Since both additional sets in the early overlapping years (1978-89/90) have the same values as the report form data, and the report form data follow the GB1994, the earlier values of the two additional sets presumably also follow the GB1994.

3.5.4 Directly reporting industrial enterprises

267. Employment data for the DRIEs are available in the same tables of the published statistics as the output and fixed asset values, in the form of *midyear* employment values. The employment values of the years 1993-2002 (following the GB1994) are reported in Appendix 16, and those of the years 2003 and 2004, following the new sectoral classification scheme, the GB2002, in Appendix 17.[96]

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[95] The secondary sector values, as described above, in the years prior to 1990 are report form values, so that the derived implicit employment in construction also comes with the report form coverage.

[96] Employment values are also available for the DRIEs in 1980, 1984, 1985, and 1987-1992 in the *Industrial Yearbook 1993*, pp. 90ff., following a yet different sectoral classification; since no constant price value added data are available, these employment values are not reported here.

4. CAPITAL

268. This section first considers the availability of data on physical capital and on investment. It then proceeds to examine the limitations of these data. Finally, a choice of capital values for productivity analysis is presented.

4.1 Data availability

269. The value of physical capital is available, or can be derived, in two different ways. First, a limited set of fixed asset data is available. Alternatively, dividing the depreciation value in the NIPA by the depreciation rate directly yields a fixed asset value. Table 17 summarizes the various sources that report fixed asset values or depreciation. Third, annual investment can be aggregated over time using either data on investment in fixed assets or on gross fixed capital formation from the NIPA. Table 18 summarizes the various sources for investment data.

4.1.1 Fixed asset data

270. The Chinese accounting system uses a number of "fixed asset" terms, each with a clearly defined meaning. In the following, the different terms are clarified first. Availability of data on the different fixed asset measures is examined afterwards.

4.1.1.1 Fixed asset definition

271. The term "fixed assets" (*guding zichan* [*heji*]) in China's accounting system denotes the sum of (i) net fixed assets (*guding zichan jingzhi*), (ii) corrections to fixed assets (*guding zichan qingli*) due to, for example, sale, damage, or the decommissioning of the fixed asset, (iii) fixed assets under construction (*zaijian gongcheng*), and (iv) unresolved net losses on fixed assets (*dai chuli guding zichan jing sunshi*). The first item in this list, net fixed assets, is by far the largest in size; it is officially obtained as the difference between the original value of fixed assets (*guding zichan yuanzhi*) and cumulative depreciation (*leiji zhejiu*).[97]

272. The balance sheet summary item "fixed assets" does not constitute a measure of the contribution of physical capital to production. The accounts "corrections to fixed assets" and "unresolved net losses on fixed assets" (items ii and iv) capture the counter entries in the double-entry bookkeeping system to changes in such accounts as "original value of fixed assets;" they reflect values of what no longer constitutes fixed assets. "Fixed assets under construction" (item iii) do not yet contribute to production. Net fixed assets (item i), as part of the balance sheet summary item or as independent measure of fixed assets, approximates a hypothetical remaining value of the stock of fixed assets rather than the contribution of fixed

[97] See, for example, Finance Ministry (1999), Vol. 1, p. 438, for the case of industry. The fourth item is a net item, i.e., unresolved losses on fixed assets less gains on fixed assets; this item comes from the account "unresolved losses or gains on fixed assets" (*dai chuli guding zichan sunyi*) (p. 430). Actual data following this breakdown of fixed assets are available for collective-owned township and village enterprises (*xiangzhen jiti qiye*). In 2002, net fixed assets accounted for 90.69% of their fixed assets, corrections to fixed assets for 0.33%, fixed assets under construction for 8.83%, and unresolved net losses on fixed assets for 0.15%. Cumulative depreciation was equivalent to 39.12% of net fixed assets, and the original value of fixed assets was indeed 139.12% of the net fixed asset value. (*TVE Yearbook 2003*, pp. 229f.)

assets to production. For example, a machine (say, a computer) that has already been written off in full may still be in use and contribute as much to production as a new machine of the same quality, but its net fixed asset value is zero. Similarly, the fact that the hypothetical remaining value of a machine is 20% of its original purchasing price does not imply that its contribution to production is only 20% of what it was when the machine was bought.[98]

273. Viewed differently, output of a particular period is created by combining the inputs capital and labor (and other inputs). Labor is not adjusted for the *remaining* lifetime of the laborers employed in this period. Why should fixed assets be adjusted for the *remaining* lifetime after this period? Just as the variable labor in production function estimations is a count of the laborers (or their hours worked) during the production period, the appropriate fixed asset measure is a count of the fixed assets used during the production period. This count is the original value of fixed assets, price-adjusted so that all fixed assets reflect a common price level.[99] Even a machine that is completely written off is included in the account "original value of fixed assets," at its purchasing price, as long as it is still in use; as long as the machine is still in use, it is likely to potentially operate at the same capacity as at its purchasing date. Only once the machine is decommissioned is there an impact on production; the original value of fixed assets then reduces by the original value of this particular machine.[100]

274. The OECD manual on measuring productivity (OECD, 2001a, Chapter 5) goes a step further and considers the actual *services* rendered by labor and capital in the production of output. For labor, this is the number of labor hours worked, and for capital, machine hours. If the growth rate of hours worked is the same as of the number of laborers, it does not matter which measure is used in productivity analysis, and the same holds for machine hours vs. the (constant price) stock of capital. In the case of China, comprehensive data on work hours are not available and the number of laborers is therefore used; similarly, capital services has to be approximated by the stock of capital.

275. The original value of fixed assets in Chinese statistics corresponds to the OECD's "gross capital stock" (OECD, 2001a, p. 53). Chinese original values of fixed assets are at historic prices, i.e., each individual fixed asset is priced at its original price.[101] In accounting practice, the purchase of a fixed asset is registered in the account "original value of fixed assets" at the purchasing price. Once it is scrapped, it is debited in full against this account (credited to cumulative depreciation), at the original purchasing price, once it is scrapped. The pricing at historic prices makes the Chinese measure of original values of fixed assets difficult to use, but it is the only official fixed asset measure with some potential use as a measure of capital.

276. The OECD manual on measuring productivity obtains the gross capital stock through the accumulation of constant-price investment (for the case of China done below) and

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[98] The value of depreciation and, thus, *net* fixed assets, furthermore, is determined by the government (and, where firms have some choice, possibly by tax considerations, competition, the speed of innovation and other factors). It is not clear why government-set depreciation rates should determine the physical contribution of buildings and machinery to the creation of output.

[99] The count could also be the rent that would have to be paid for these capital services if they were leased, in all likelihood corresponding to a *fixed percentage of the original value*.

[100] For further discussion, see Holz (2006c), in particular the appendix on the concept of fixed assets in production function and growth estimations. Chow (2006), in response to Holz (2006c) prefers to use the depreciated value of fixed assets in production function estimations, with which Holz (2006d) disagrees.

[101] By implication, the Chinese net fixed asset data, not further used here, are also at historic prices.

incorporates an age-efficiency adjustment to its gross capital stock. The rationale for the age-efficiency adjustment is that towards the end of the lifetime of a fixed asset its contribution to production may diminish. This is unlikely to be the case for computers, which are either fully operational or not at all (and then are no longer included in the original value of fixed assets), but is conceivable for other fixed assets. For example, one may not feel comfortable driving a truck at its original maximum speed when it approaches the end of its lifetime.

4.1.1.2 Availability of original values of fixed assets

277. Economy-wide fixed asset data are not available. Some provinces, in their provincial statistical yearbooks, publish a "social balance sheet" that includes an item "fixed assets." A reliable national value cannot be obtained by summing across provinces (and interpolating for missing provinces), because too few provinces publish a balance sheet. The available provincial data typically do not distinguish by economic sector. The fixed asset measure itself is not particularly useful since it comprises net fixed assets plus three items that do not measure any contribution to production (see above).[102]

278. Original fixed asset values are available for budgetary SOEs, i.e., those SOEs that are included in the budget, for the years 1952-99; industrial budgetary SOEs are listed separately (Table 17). Original fixed asset values of budgetary SOEs with a (non-exhaustive) sectoral breakdown are available for 1975-96 and a few earlier years. Fixed asset values of non-budgetary SOEs are not available, nor are those of the non-enterprise SOUs. Comprehensive fixed asset data on *non-state-owned* units are not available at all; the various censuses provide limited data for the census years.[103] Lacking output and employment values of budgetary SOEs, their original fixed asset values are not pursued further.

279. For the DRIEs, original fixed asset values are available, by sector, for the same years (in the same tables) as value added and employment data, i.e., for the years since 1993. Data for 1980 and 1984-92 are also available, following the earlier sectoral classification, GB1984. Total DRIE original fixed asset values, i.e., not by sector, are available for the years since 1952. These original fixed asset values are potentially useful as a measure of capital, and used below.

4.1.1.3 Availability of depreciation data

280. Economy-wide and sectoral depreciation values are only available at the provincial level, in *GDP 1952-92*, and in *GDP 1996-02*, as part of the in come approach to the calculation of GDP. Sectoral values cover the three main economic sectors, industry, construction, and 10 or 12 (depending on year) tertiary sector sub-sectors.

281. National values can be obtained in three steps. In a first step, the provincial values of labor remuneration, net taxes on production, depreciation, and operating surplus are summed, for each of the four categories separately, across provinces. Second, summing across the four categories yields sum provincial income approach GDP. This allows the calculation of the

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[102] One example of a province that publishes a social balance sheet is Shaanxi province, with province-wide data in the *Shaanxi Statistical Yearbook 2005*, p. 54, for 1995, 2000, 2002, and 2003. The source does not offer a sectoral breakdown.

[103] Holz (2006c) uses the available (dispersed) original fixed asset values to construct (economy-wide) SOU original fixed asset values in specific years, to double-check against original fixed asset values derived from investment data.

share of depreciation in sum provincial income approach GDP. Third, because the provincial data are not complete for all provinces in all years (the shortcomings are minor), the share of depreciation in sum provincial income approach GDP is best applied to national GDP to obtain an approximation of national depreciation.

282. To obtain an approximate original value of fixed assets, depreciation is divided by the depreciation rate. Economy-wide or sectoral depreciation rates are not available. Holz (2006c, Table 3, pp. 158-61) constructs an approximate economy-wide depreciation rate for the years 1953-2003 based on the available, dispersed data. The same tables in this source suggest a slightly higher depreciation rate in industry than economy-wide.[104]

4.1.2 Investment data

283. Two sets of investment data are available. One is the gross fixed capital formation (GFCF) data compiled by the NBS's National Income Accounts Division and published in the NIPA section of the *Statistical Yearbook* series, with historical data in *GDP 1952-95* and *GDP 1996-2002*. The second set of data is the investment in fixed asset data compiled by the NBS's Investment in Fixed Asset Statistics Division and published in the investment section of the *Statistical Yearbook* series, in the occasional *Investment Yearbook*, and in an investment compendium with historical data (*Investment 1950-2000*).

284. The OECD manual on measuring productivity (OECD 2001a) suggests the use of GFCF as a measure of investment. In the case of China, these data are limited in their sectoral details and come with a number of shortcomings (as do the investment data). Below, both series, GFCF and investment are considered.

4.1.2.1 Gross fixed capital formation

285. Economy-wide gross fixed capital formation (GFCF) data are available for the years 1952-05 (Table 18). At the sectoral level, only data on the three main economic sectors are available, and only at the provincial level, for 1978-02. National data can be derived from the provincial data in same fashion as in the case of depreciation (sectoral shares derived from the provincial data are applied to national economy-wide values). A breakdown into more detailed sectors must use the sectoral proportions of the investment data.

4.1.2.2 Investment in fixed assets

286. Chinese investment in fixed asset statistics come in two variations: investment expenditures, and the "newly increased value of fixed assets through investment" (*xinzeng guding zichan*), here labeled "effective investment." While the data on investment expenditures are far more numerous than the data on effective investment, it is the latter which are of interest in the construction of capital measures. It is not the money spent on investment in a particular year that increases fixed assets. The money could be spent but the investment may not be completed by the end of the year (a key factor in China), or may be in

[104] Separately, depreciation rates for budgetary SOEs only, including for a non-exhaustive sectoral breakdown, are available for 1953-98 (in the same sources as the fixed asset data on budgetary SOEs, see item 1.a. in Table 17, on close-by pages). Due to the limitation to budgetary SOEs, these values are not used here. The (slight) sectoral dispersion could indicate the direction and size of adjustments to the economy-wide depreciation rate in sectoral analysis, if one wished to distinguish.

part unusable, or the money could be spent on fees and other costs that may not end up as part of the value of the completed fixed asset.[105] What matters is effective investment.

287. Official statistics usually explicitly provide annual investment with effective investment data in the same table, and usually also the (presumably residual) "transfer rates," i.e., the ratio of effective investment to investment expenditures. Comprehensive time series data on effective investment, economy-wide or by sector, are not available.

288. Chinese statistics on investment in fixed assets (and effective investment) are largely ownership-focused, with much detail on state-owned units and urban collective-owned units. Data is particularly rich for a breakdown "by management" into capital construction vs. technological updating and transformation, which through 1992 are categories applied exclusively to state-owned units.

289. Beginning around 2003, the arrangement of investment statistics shifted towards an urban-rural distinction, similar to the case of employment, with the capital construction and technological updating and transformation categories last used in 2003. The urban data are available from approximately 1995 onwards (in part published retrospectively). While the urban data are relatively plentiful, those on rural areas are rather few. The numerous data sources are provided in Table 18.

290. Since economy-wide effective investment data are only available for the years since 1981, Holz (2006c) creates several economy-wide effective investment series for the earlier years by first constructing a (highly reliable) SOU effective investment series, and then estimating non-SOU values using different procedures. Some of these data are also used here and the derivation procedures are explained below. The economy-wide series are broken down into sectors using one of the two approaches described in the previous paragraphs.

4.2 Data quality

291. Chinese fixed asset, depreciation, investment and GFCF data come with a number of limitations. Naturally, none of these measures considers changes in capacity utilization over time. They simply capture the available fixed asset stock or the investment that occurred. While official data on capacity utilization are not available, the 1995 industrial census and the 2004 economic census provide some data on the production capacity of the DRIEs, for specific products, which could be contrasted with the output volumes for these products.[106]

[105] Government fees and the costs of feasibility studies, environmental impact studies, etc., all constitute investment expenditures but do not necessarily turn into fixed assets. Regarding the time lag, which is presumably the largest factor, suppose investment expenditures last year were $100 and are $200 this year, and suppose it takes one year (or just above one year) to complete an investment. Then the increase in the value of fixed assets this year, if based on investment expenditures, is $200, when actually it is only $100. For example, in the case of the Three Gorges project, investment occurred over many years, but the newly created fixed asset entered production only in the final year(s).

[106] While these are product-specific data, output values, employment, and fixed asset/investment data are industry-specific.

4.2.1 Fixed asset data

292. Fixed asset values are available in two forms, as the original value of fixed assets, for the DRIEs, and as depreciation in the NIPA divided by the depreciation rate, for the economy in total and for all 16 sectors in the GB1994.

4.2.1.1 Original values of fixed assets

293. The official original fixed asset values of the DRIEs come with two complications. One is the pricing of fixed assets at purchasing price, the other that not all these fixed assets constitute fixed assets in productive use.

294. If the original value of fixed assets in a particular year were simply the sum of all fixed assets (not yet scrapped) at their purchasing price, if a long-term series were available, and if one knew which specific fixed assets were scrapped in a particular year, then it would be possible to turn the official data into a constant price series, as needed to have a meaningful capital measure. None of the three "if's" is met.

295. First, a series of revaluations occurred in the 1990s. Rapid inflation in the late 1980s and mid-1990s meant that depreciation funds, based on the original value of fixed assets, became too low to replace obsolete fixed assets. In 1993, the government asked state-owned enterprises to revalue all fixed assets purchased before 1991 to market prices (and to raise their depreciation funds correspondingly); enterprises were allowed to spread the revaluation over several years if they could not afford to implement them immediately. Enterprises in other ownership forms were asked to follow suit in the following years.[107] Companies that want to list on the stock market undergo a complete audit (and possibly revaluation) prior to listing. As a result, in the years immediately after 1992 the aggregate stock of fixed assets in a particular ownership group and/or sector reflects an unknown mix of fixed assets valued at original prices and of fixed assets valued at current market prices.

296. Second, the DRIE original fixed asset values by individual sector are limited in terms of years covered and in terms of their meaning. With value added on DRIEs only available since 1993, of key interest in the following are the years since 1993. Because the sectoral classification of the DRIEs changed in 1993 (through the adoption of the GB1994, which was designed two years earlier), original fixed asset values of earlier years are not comparable sector by sector; the sectoral classification changed yet again in 2002. The definition of the DRIEs themselves changed in 1998. Finally, because the DRIEs are defined by an administrative criterion (through 1997) or a size criterion (since 1998), rather large movements in and out of the DRIE group may occur, so that the overlap between the enterprise coverage in the previous year and the current year may be far from perfect.

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[107] The issue of revaluation first arose in 1990. By 1992, a central leading group was handling first trials. The q*ingchan hezi* campaign, here translated as revaluation, not only concerns the (positive) revaluation of fixed assets but also clarification of ownership rights, properly cleaning up past losses hidden in balance sheets, accounting for asset stripping, and other issues related to assets. In the early phase, the revaluation of fixed assets appears to have played only a very minor role, but starting in 1993, when the policy was applied to SOEs nationwide, became more prominent. Rural collectives were asked to revalue their fixed assets in 1995, urban collectives in 1996. Several hundred regulations over the years cover or mention revaluation. The key regulations were issued by the State Council in 1993 (SC 3 May 1993, and the implementing instructions SC 14 May 1993). The Finance Ministry five years later, on 21 Sept. 1998, issued a detailed regulation for "day-to-day" use (in contrast to the campaigns of the early and mid-1990s).

297. Third, the annual increase in original fixed assets reflects new investment and the scrapping of some old fixed assets. Because the original value of fixed assets is an aggregate value, no information on individual fixed assets is available, and thus no information on the purchasing year of fixed assets that are scrapped in the current year. But the purchasing year is needed to determine the price level of the fixed asset that is being scrapped. Holz (2006c) derives an average, year-specific scrap rate that could be used. But without consistent time series data, there seems no point in proceeding with the application of scrap rates to the original fixed asset values of individual industrial sectors.

298. In order to proceed further in spite of the revaluations and the lack of consistent time series data, a simplifying assumption is made. This is that the original value of fixed assets in each year 1993-96 is a current-price value, in part justifiable by the revaluations occurring in these years, although probably not for each enterprise in each year. Prices changed little in 1997-2004 and the assumption of constant prices in these years appears minor. This allows the derivation of a constant price original fixed asset series simply by adjusting all fixed assets in any given year by that year's (investment in fixed assets) price index. This simplifying assumption overcomes all three "if's," but may not be perfect, especially not for the years 1993-96.

299. Deflating all original fixed assets of a given year by that's year's fixed asset prices may introduce a bias towards exaggerated real growth rates; i.e., measures of TFP growth are likely to be biased downward. On the other hand, the available price index on investment in fixed assets, if in doubt, is likely to not fully take into account quality changes, i.e., introduce a bias towards underestimated real growth rates.

300. One piece of evidence suggests that the procedure adopted here could potentially be very valid and not introduce any bias. The NBS apparently compiles price data for more than approximately 10,000 individual fixed asset types, and these are being used to update fixed asset values. The only question is if the updating is done on an annual basis, in which the procedure adopted here would be perfectly correct. The NBS's data, in index form for each fixed asset type, have been published in two volumes covering 1984-2000 (NBS, 2001).

301. The second complication of the original fixed asset data is that the original fixed asset data on DRIEs by sector reflect a total that consists of "productive" (*shengchanyong*) and "non-productive" fixed assets. If the objective is, as here, to relate industrial output to industrial inputs, industrial fixed assets should be free of non-productive components.[108] Separate data on *productive* original fixed assets are available for 1995 and 2001-04 (Table 18). Below, for each specific industrial sector, the 1995 share of productive in all original fixed assets is applied to the 1993 and 1994 original fixed asset values. For the years 1996-00, the mean of the shares of 1995 and 2001 is used.[109] Appendix 30 and Appendix 31 report the productive original fixed asset values of DRIEs by individual industrial sector.

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[108] If the objective were to relate economy-wide output to economy-wide inputs, all fixed assets would be relevant, including the "non-productive" fixed assets. For example, because GDP includes imputed rent on housing, the non-productive fixed asset housing needs to be included on the input side. Since across the industrial sectors, value added only reflects industrial value added, only the productive share of fixed assets is considered here.

[109] There seems to be no consistent pattern in the development of this share over time, as judged by the values of original fixed assets and productive original fixed assets available, following the GB1994, by individual industrial sector, for 1995, 2001 and 2002. Therefore the mean share of 1995 and 2001 is used rather than a linear extrapolation for the individual years 1996-2000.

302. With original fixed assets values only available since 1993 and no consistent time series, trying to apply an age-efficiency pattern to the original fixed asset values appears too far-fetched.

4.2.1.2 Depreciation data

303. Calculating original fixed assets via depreciation divided by the depreciation rate, possible economy-wide and for the 16 (since 2003 20) sectors comes with three shortcomings. First, the depreciation values may not be very accurate, for a variety of reasons. For example, it could be that loss-making firms do not properly depreciate their fixed assets. The NBS itself imputes depreciation for some fixed assets, such as for housing, using depreciation rates that may be too low.[110] In contrast to the directly available original value of fixed assets of the DRIEs, however, depreciation in the NIPA should classify all depreciation correctly by sector, so that the issue of productive vs. non-productive fixed assets does not arise.

304. A second shortcoming is the absence of accurate depreciation rates. If the ratio of the depreciation rate used here to the (unknown) true depreciation rate were constant over time, the growth rate of the resulting original fixed asset values would be the same as that of the (unknown) true original fixed asset values.

305. Third, the original fixed asset values obtained by dividing depreciation by the depreciation rate reflect only those fixed assets which have not yet been fully depreciated. In the accounting system, once a fixed asset has been fully depreciated, no further depreciation occurs. In as far as depreciation rates are set to match the average lifetime of a fixed asset, the coverage of the NIPA depreciation values may not be a problem, because while some fixed assets outlast their lifetime (no depreciation occurs after completion of the lifetime and fixed assets are underestimated here), others are scrapped earlier (and in the final year are depreciated from their as yet un-depreciated value all the way to zero, or to the scrap value). I.e., on balance, dividing depreciation by the depreciation rate could well yield a resulting value that is reasonably close to the original value of fixed assets.

306. As in the case of the DRIEs, revaluations are reflected in the depreciation data. In comparison to the case of DRIEs, however, the revaluations may not be as comprehensive. For example, as long as the NBS imputed depreciation on owner-occupied housing based on construction costs, the underlying fixed assets were not corrected for price changes over time. This will have changed with the switch to using market values as the basis for depreciation in 2004. Again, as in the case of the DRIEs, a simplifying assumption in the absence of any other feasible procedure is to regard the original fixed asset values obtained by dividing depreciation by the depreciation rate as current price values.

307. Depreciation values are available since 1978 and at the sectoral level the data coverage may be highly consistent over time (specific fixed assets do not move in and out of sectors easily). This suggests that an age-efficiency pattern could be applied to the original fixed asset values to take into consideration potential reductions in the efficiency of a fixed asset

[110] The output value of (imputed rent on) owner-occupied housing is approximately 2% of the "value" of housing in rural areas, and 4% of the "construction costs" of housing in urban areas (Xu Xianchun 2000, pp. 51f.). NBS (1997), p. 100, uses 2-4% of the original housing value without distinction between rural and urban areas. Xu Xianchun (2006, pp. 17f.) writes that whereas previously construction costs formed the basis for depreciation, this has now changed, with the economic census 2004, to the market value.

over time. To do so, assumptions about the vintage pattern of the 1978 original fixed assets are needed.

4.2.2 Investment data

308. Investment data comprise the data on investment in fixed assets and on gross fixed capital formation (GFCF). Each set of data comes with its own shortcomings. With effective investment values based on the investment expenditure data, and the latter more plentiful and, thereby, allowing more double-checks, the examination of investment data focuses on investment expenditures.

4.2.2.1 Limited and changing coverage of investment data

309. A complication of investment expenditures and effective investment is that they are unlikely to cover all investment across the economy. The official "total society" investment in fixed asset statistics comprise the following items:[111]

(i) capital construction (*jiben jianshe*) of 500,000 yuan RMB and above;
(ii) technological updating and transformation (*gengxin gaizao*) of 500,000 yuan RMB and above;
(iii) investment by urban collective-owned units of 500,000 yuan RMB and above (this category excludes township and village enterprises);
(iv) other investment by state-owned units, including investment with a value of 500,000 yuan RMB and above that does not constitute capital construction or technological updating and transformation;
(v) investment of 500,000 yuan RMB and above by joint enterprises, limited liability companies, stock companies, Hong Kong, Macao, and Taiwan-invested enterprises, foreign-funded enterprises, urban private enterprises (*siying qiye*) and the urban individual-owned economy (*getihu*);
(vi) all real estate units (presumably investment in real estate through real estate units);
(vii) private investment in housing in urban and in industrial mining areas (*gongkuangqu*);
(viii) rural collective-owned and individual-owned investment (in housing and in productive assets).

310. These "total society" investment values fall short of measuring total economy-wide investment for a variety of reasons. First, prior to 1997, the value limit in items (i) through (v) was 50,000 rather than 500,000 yuan RMB.[112] The published data of 1996 come according to both definitions; the new coverage eliminates 0.26% of the previous coverage in terms of investment value.[113] In the calculations here, the statistical break is ignored (new data are used starting 1997).

311. Second, the total comes with a breakdown by ownership category (state, collective, individual, other). The revised 1996 value on the category "individual," which presumably covers both private and individual-owned enterprises, is identical to that using the earlier, lower cut-off point; this appears not credible in that much investment by the (urban) private and individual-owned economy (item v) is likely to be of small scale (below 500,000 yuan

[111] For the definition and explanations see Liu Chengxiang et al. (2000), pp. 74f.
[112] See, for example, Liu Chengxiang et al. (2000), pp. 75.
[113] See for example, *Statistical Yearbook 2004*, p. 188.

RMB). The revision in the cut-off point should have led to a significant reduction in the value of investment by the urban private and individual-owned economy and. The fact that it didn't, would suggest that only the largest urban individual-owned investment projects were covered in the investment statistics in 1997.[114]

312. Third, an explanatory note on the investment statistics states that prior to 1999, *urban* private and individual-owned investment are not included in the statistics.[115] Urban private and individual-owned investment since 1999 are presumably captured in items (v) and (vii).

313. Fourth, non-real-estate investments below 500,000 yuan RMB by all types of enterprises and units except by state-owned units, rural collective-owned enterprises, and the rural individual-owned economy are not included ever.

314. It is further questionable if non-real-estate investment below 500,000 yuan RMB by state-owned units, rural collective-owned enterprises and the rural individual-owned economy are indeed included (as items vi-viii imply). NBS (1997, p. 165) for the case of state-owned units states explicitly that the "odd" (*lingxing*) investment of state-owned units with a value below 50,000 yuan RMB (the relevant limit prior to 1997) is "currently not included in the investment in fixed asset statistics" (and therefore needs to be estimated in the compilation of gross fixed capital formation in the calculation of expenditure approach GDP); it is reported to have been included at some earlier point.[116] In the case of the rural collective-owned economy, these small investments are also to be estimated (in the compilation of gross fixed capital formation), which suggests that they are not part of the investment statistics (p. 169).[117]

315. Fifth, in general, it is highly questionable if truly all investment in fixed assets by rural collective-owned enterprises and the rural individual-owned economy are included. These data are collected by the rural survey teams of the National Bureau of Statistics (NBS) through surveys; these surveys are unlikely to be very reliable. All other investment in fixed asset statistics are collected by the NBS Investment in Fixed Assets Division through complete statistical reporting, which raises additional questions as to how complete these data really are.[118]

316. Sixth, the definition is as of 2000, with the officially acknowledged changes (1) and (2) in 1996/97 and in 1999. The coverage of the investment data in the early reform period or even before the reform period may well have been much narrower. For example, a break-

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[114] A more recent publication, the *Statistical Abstract 2006*, explicitly states that real estate development, rural collective-owned investment, individual-owned investment (without specifying rural or urban), and "other investment" did not experience the shift from the 50,000 to the 500,000 yuan RMB minimum investment requirement. This contrasts with the inclusion of the urban individual-owned economy in (v) in the list. Futhermore, the precise meaning of the term *geren* used in the Statistical Abstract is unclear as to whether it encompasses only the individual-owned economy (*getihu*) or also private enterprises (*siying qiye*).

[115] See Liu Chengxiang et al. (2000), pp. 75.

[116] Another piece of evidence that not all such investment is included is a 1993 accounting regulation for industry, covering specific accounting issues, which, for example, requires individual test equipment with a value below 50,000 yuan RMB that was purchased for the purpose of developing new products or new technologies to be entered into the cost accounts. I.e., this equipment is not regarded as a fixed asset. (Finance Ministry, 1999, Vol. 1, p. 462)

[117] In the case of the urban individual-owned economy, because the collection of data is "difficult," only real estate investment is covered in the compilation of gross fixed capital formation (p. 170); presumably, and as the definition of investment also suggests, non-real-estate investment of the urban individual-owned economy are not included in the official investment statistics.

[118] On who collects which statistics, see *Statistical Yearbook 2004*, p. 185.

down of total investment by "channel of management" (*an guanli qudao*), i.e., by capital construction, technological updating and transformation, real estate development, and "others," shows real estate development to start in 1986 only; a breakdown by ownership makes do with the categories state-owned, collective-owned, and individual-owned economy until 1993, when a fourth category "other types of ownership is introduced."[119]

317. Seventh, data on total investment in fixed assets by state-owned units (SOUs) are not available for the years prior to 1980; what is available for 1953-2003 are data on the funding sources of SOU investment, with a total for all sources. This second series is identical to the first in 1980 through 1993, but differs by a few percentage points every year since.[120] Logically, the two series need not be identical; the first supposedly covers actual investment, the second the funding that is in place. The fact that the two series are identical through 1993 suggests that earlier total investment data could be based on funding data rather than on actual investment.

318. Eighth, "investment in fixed assets" in China so far does not include intangible assets (NBS, 28 June 2006).

319. One complication in the use of *SOU* investment data is that they appear to exclude investment by state-controlled companies, i.e., what is labeled as SOU investment does not match the "state-owned and state-controlled" coverage used in other statistics, such as those on output, since 1998. Two pieces of evidence are the labels, which consistently refer to investment by *state-owned units* without any mentioning of state-controlled units, and the detailed investment classification in recent issues of the *Statistical Yearbook* (for example, *2004*, pp. 190f.) which shows investment by shareholding units to be more than half the size of the investment by SOUs, presumably too large to exclude investment by state-controlled units, and SOU investment appears too small to include investment by state-controlled units.[121]

4.2.2.2 Capital construction and technological updating and transformation

320. The two categories "capital construction" and "technological updating and transformation" are of particular interest here because data are available on investment in these two categories for all years (including the years prior to 1981), up through 2003, and also on the annual increase in fixed assets through investment in these two categories (in the second category only starting 1980).

321. The two terms "capital construction" and "technological updating and transformation" are traditional planned economy terms. Their coverage extends only to projects with

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[119] See, for example, *Statistical Yearbook 2004*, pp. 188 and 193.

[120] See *Investment 1950-2000*, p. 15, for total investment in fixed assets by SOUs for 1980 through 2000, supplemented by the *Statistical Yearbook 2004*, p. 188, for 2001-3, and *Investment 1950-2000*, p. 25, for investment in fixed assets of SOUs by "sources of funds -- total" for the years 1953-2000, supplemented by the *Statistical Yearbook 2004*, p. 189, for 2001-3. Relative to the total investment in fixed assets by SOUs, investment in fixed assets of SOUs in the sources of fund table are 4.57% larger in 1994, 1.13% larger in 1995, 0.31% larger in 1996, 0.30% smaller in 1997, 0.86% smaller in 1998, 2.26% smaller in 1999, 3.45% smaller in 2000, 2.39% smaller in 2001, 1.82% smaller in 2002, and 0.25% smaller in 2003.

[121] The individual categories add up to the total, ruling out double-counting of investment by state-controlled units in both categories, shareholding units and SOUs.

investment of 500,000 yuan RMB or above (50,000 and above prior to 1997).[122] Capital construction comprises

(i) projects included in this year's central or local capital construction plan, and projects not included in this but in previous years' plan(s), in as far as the projects are continued this year;
(ii) new construction with investment included in this year's capital construction plan as well as in this year's technological updating and transformation plan; extension projects to increase production capacity as long as these projects meet the large or medium size criterion; also includes the relocation of complete factories;
(iii) any other new construction, extensions, resumption of projects with investment of 500,000 yuan RMB or above [50,000 prior to 1997], by SOUs, that is not part of the capital construction plan or the technological updating and transformation plan, including the relocation of complete factories; this also includes the construction of business premises by government and administrative facilities (*xingzheng, shiye danwei*), and the construction of welfare facilities (*shenghuo fuli shehi*) by government and administrative facilities.

322. Technological updating and transformation comprises

(i) projects included in this year's central or local technological updating and transformation plan, and projects not included in this but in last year's plan, in as far as the projects are continued this year;
(ii) technological updating and transformation of enterprises' and administrative facilities' original equipment with investment included in this year's technological updating and transformation plan as well as in this year's capital construction plan; extension projects of main workshops or factory branches to increase production capacity as long as these projects do *not* meet the large or medium size criterion; also includes the relocation of complete factories due to urban environmental protection and production safety needs;
(iii) any other technological updating and transformation project with investment of 500,000 yuan RMB or above [50,000 prior to 1997], by SOUs or administrative facilities, that is not part of the capital construction plan or the technological updating and transformation plan, including relocation of complete factories due to urban environmental protection and production safety needs.

323. The data reveal that between 1953 and 1980, SOU investment equals capital construction plus technological updating and transformation.[123] Between 1953 and 1985, SOU investment also equals capital construction plus a technological updating and transformation series that comes with the note "excludes other state-owned investment since 1994," i.e., presumably includes other state-owned investment prior to 1994.

324. Between 1953 and 1980, the two series of technological updating and transformation, i.e., the not further defined series and the series with the note, are identical. The *Statistical Yearbook* (for example, *2002*, p. 181) confirms that the identical 1953-1980 data in both series include "other" SOU investment. Data on technological updating and transformation

[122] For the definitions below see Liu Chengxiang (2000), pp. 76f., or *Statistical Yearbook 2004*, p. 266.
[123] Data on capital construction are available for the years since 1950, data on technological updating and transformation for the years since 1953, and SOU investment data also for the years since 1953 (total of funding sources through 1979).

following the earlier definition to include "other" SOU investment, thus, are available for the years 1953-1993, while data following the new definition, to exclude "other" SOU investment, are available since 1981 with in some statistics also an alternative (lower) 1980 value which in all likelihood excludes "other" SOU investment.[124] The absolute difference between technological updating and transformation that includes "other" SOU investment and technological updating and transformation that does not is equal to 4.39% of total SOU investment in 1981, rising steadily to 11.20% in 1984, and then falling steadily back to 4.56% in 1993.[125]

325. Overall, the data reveal the following coverage:

- between 1953 and 1985, SOU investment equals capital construction plus technological updating and transformation, the latter including "other" SOU investment;
- between 1986 and 1992, SOU investment de facto equals capital construction, technological updating and transformation including "other" SOU investment, plus all (starting in 1986 newly reported) real estate development;
- starting in 1993, SOU investment falls short of the sum of capital construction, technological updating and transformation including "other" SOU investment, and all real estate development.[126]

326. The data, thus, also imply that through 1992 capital construction, technological updating and transformation, and real estate development only cover *state-owned* such investment. *Seventeen Years of Reform* claims that this is the case for 1985 through 1995, but the turning point may have come as early as 1993 or 1994.[127] Presumably, what is happening is that with the Company Law of 1992 shareholding companies (i.e., limited liability companies and stock companies) were set up and began to invest in 1993 or 1994. Investment by such companies, if largely or exclusively in state ownership, is almost surely included in the investment plan and thus enters one of the two categories capital construction and technological updating and transformation. I.e., capital construction and technological updating and transformation capture investment (of 500,000 yuan RMB and above) by "state- and state-controlled" units. The SOU category in the investment statistics, instead, continues to cover the traditional (pure) SOEs/ SOUs only.

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[124] The two 1980 data points are 18.701b yuan RMB and 13.738b yuan RMB. (Investment 1950-2000, p. 21 and p. 241 vs. p. 298 in the same source or the Statistical Yearbook 2004, p. 193) The smaller 1980 value appears only in tables that cover technological updating and transformation since 1980, with the years after 1981 showing these data to exclude "other" SOU investment (in contrast to the table that explicitly does not exclude "other" SOU investment until 1994).

[125] Presumably this difference consists of "other" SOU investment only; the phrasing in the sources, such as that technological updating and transformation prior to 1994 includes "other" SOU investment, is not perfectly exact. It does not rule out that yet other items are also included, although that is unlikely and probably not meant to be implied by the phrasing.

[126] The category real estate development is by definition "urban" only.

[127] *Seventeen Years of Reform*, p. 134, with investment data for the years 1985-1995, lists capital construction and technological updating and transformation as sub-categories of SOU investment, where the data all match those in other sources, and the technological updating and transformation are those without "other" SOU investment.

The ratio of SOU investment to capital construction and technological updating and transformation rises from unity in 1980 (and earlier years) to a maximum of 1.2291 in 1992, before falling rapidly to 1.1636, 1.0747, 1.0298, and 0.9885 in 1993-96.

4.2.2.3 Investment expenditures vs. GFCF

327. An alternative to the investment in fixed asset data is the component "gross fixed capital formation" (GFCF) in the expenditure approach to the calculation of GDP. Because GDP is a comprehensive measure of economy-wide production activities, GFCF could be a comprehensive measure of investment.

328. The definitions of GFCF and investment differ. According to the *GDP Manual* (2001), pp. 92-5, 106f., GFCF in the expenditure approach to the calculation of GDP comprises (i) "total society investment in fixed assets" (this is economy-wide investment), (ii) value-added created in the sale of real estate, (iii) fixed assets created in the prospecting for mineral resources (*kuangcang kantan*, valued at 75% of costs), and (iv) fixed assets created in the improvement of land (unless already included in total investment of society), less three items. The three items to be subtracted are (a) the purchase of old structures (*jianzhuwu*), old equipment (*shebei*), and land, (b) other items in "other costs" (*qita feiyong*) which do not constitute fixed asset investment, and (c) investment in afforestation, unless these numbers are very small and not easy to obtain, in which case they can be ignored.[128]

329. A key difference is the purchase of land, which is included in the investment data but not in GFCF. [129]Through the early 1990s, such purchases are likely to be of negligible size. Since then they may have grown in size, but no data are available. There is a chance that the *effective investment* data net out these purchases. After all, purchases of old structures, old equipment, and land do not lead to newly increased fixed assets. A second difference, already mentioned above, is that the investment data, de facto, do not cover intangible assets.[130]

330. Data on economy-wide investment, i.e., "total (society) investment in fixed assets, are available since 1980. Figure 25 shows that in 1980 GFCF exceeded economy-wide investment by 44.69%. This difference diminished rapidly in the following years and by 1986 GFCF was approximately equal to economy-wide investment.

331. Between 1986 and 2000, the ratio lingered around unity (with a rise in 1990/91 and a minor dip in 1998), but between 2001 and 2003 fell from 0.9892 to 0.9223 and then to a pre-economic census ratio of 0.8847 in 2004 (with a post-economic census ratio of 0.9240).[131] GFCF increasingly falling short of total investment in fixed assets could reflect an increasing share of purchases of old structures, old equipment, and land in investment. But in order to make a conclusive comparison, one would need data on the other items comprised in GFCF besides economy-wide investment.

332. Does this imply that official investment data underestimate actual investment in the years prior to 1986? If the GFCF values are wrong on the scale the 1980 data suggest, this would question the official expenditure approach GDP, and, because that value is highly

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[128] For the three items to be deducted, they must have been included in one of the four components of gross fixed capital formation in the first place. This is possibly total society investment in fixed assets, but the source refers to total society investment in fixed assets only for item b ("other items in other costs"). The source provides further details on components (i) and (ii). NBS (1997, pp. 164-71) also offers detailed instructions on how to obtain GFCF in the expenditure approach to the calculation of GDP, ownership form by ownership form.

[129] For the real estate units, the *Statistical Yearbook* (for example, *2004*, p. 266) explicitly excludes land trade; land development, on the other hand, for example the construction of roads, is explicitly included.

[130] On these two differences also see NBS, 28 June 2006.

[131] For the 2004 values see the *Statistical Yearbook 2005*, pp. 64, 185, and the *Statistical Abstract 2006*, pp. 35, 53.

similar to that for production approach GDP, the official Chinese GDP data.[132] However, GFCF through the mid-1980s may not be what it seems. These data were constructed retrospectively by manipulating data from the Material Product System to fit into the newly adopted System of National Accounts (with the variable gross fixed capital formation). Lacking clear definitions of the early data, the possibility cannot be ruled out that early GFCF might include some inventory investment or consumption. I.e., Figure 25 can be interpreted as evidence for the early 1980s of underestimated investment or of overestimated GFCF, or of both.

333. One shortcoming of the GFCF data is that they are only available since 1978, while some of the investment data go back to 1953. GFCF data also still need to be turned into "effective" GFCF values. Sectoral GFCF values are only available at the provincial level, for the years since 1978, and only for the three main economic sectors (primary, secondary, and tertiary sector).

4.3 Choice of capital data for productivity analysis

334. Following the OECD manuals on measuring productivity and on measuring capital (OECD 2001a, 2001b), ideally one would want GFCF or investment data by detailed sector, and within each sector by type of asset (in the Chinese statistics labeled "by structure," i.e. construction and installation; purchase of equipment, tools, and appliances; "others"). One applies the appropriate age-efficiency profile and retirement (or: mortality, survival) function to each type of asset (at constant prices) in each sector, and then aggregates the fixed asset values in standard efficiency units using the asset- and sector-specific user costs.

335. This approach appears to have two conceptual problems. First, GFCF is an expenditure measure rather than a measure of the value of the newly created fixed assets. The Chinese data allow the use of effective GFCF (or effective investment) values.

336. Second, the OECD recommends the use of a Winfrey curve or lognormal distribution to approximate mortality patterns (OECD 2001b, pp. 54ff.), and of a hyperbolic function for the age-efficiency pattern (OECD 2001b, p. 73). But this implies that while the mortality function extends into the future indefinitely, the hyperbolic function yields an efficiency value of zero at the average service life. Multiplying the two values means that the fixed asset disappears exactly at the average service life, i.e., in terms of mortality, the right side of the distribution (more years than the average service life) is truncated. This would suggest that if a hyperbolic age-efficiency profile is applied, there is no proper room for a mortality function. The fact that the OECD does not use *effective* investment values, furthermore, potentially biases the OECD's choice of parameters for the mortality function and age-efficiency pattern.

337. Given these two reservations, the procedure adopted here differs slightly from the OECD recommendations. First, effective investment / GFCF values are used throughout.

338. Second, the age-efficiency profile is not allowed to go to zero at the average service life (or at any point of time); as long as the fixed asset is still in use (according to the mortality function), its contribution to production should not be zero. The way to achieve this, while

[132] In 1980, gross fixed capital formation accounted for 28.96% of expenditure approach GDP. A 44.69% overestimate of gross fixed capital formation implies a 12.94% overestimate of expenditure approach GDP. In 1980 expenditure approach GDP was equal to 100.74% of production approach GDP. (*Statistical Yearbook 2004*, pp. 53, 65f.)

maintaining a concave age-efficiency pattern, is to apply one minus the cumulative normal distribution as age-efficiency profile. The parameters of the cumulative normal are set such that at the average service life its value is 0.5, i.e., the average service life is the mean of the normal distribution; the standard deviation chosen is one-quarter the average service life. The retirement (mortality) function, finally, in form of a lognormal distribution, is superimposed on this age-efficiency profile.[133]

339. This combination of age-efficiency profile and retirement function implies very little decline in the productive capacity of a fixed asset in the early years. The procedures recommended in the OECD manuals, in comparison, appear to imply a faster decline, which furthermore starts earlier. However, the data used for China are *effective* investment in fixed assets, and *effective* GFCF, which, in any given year, account for only just below 60% to just below 90% of investment/GFCF expenditures (which are the values used in the OECD manuals). In other words, with the procedure used here, fixed asset values starts at a 10-40% smaller value than would be the case if the same data were used as in the OECD manuals.

340. The aggregation of types of different fixed assets by applying user costs is only relevant for the economy-wide case, and explained there.

341. The adjustment to constant prices is done using the investment in fixed asset price index, available since 1990 (with a breakdown by structure), and the implicit GFCF deflator in the earlier years. Appendix 24 reports the data.[134]

4.3.1 Economy-wide capital data via perpetual inventory method

342. The perpetual inventory method is applied to two measures of investment separately, effective investment and effective GFCF. Use of the perpetual inventory method involves five steps. First, the economy-wide annual effective investment in fixed asset or effective GFCF values are obtained. Second, these annual values are broken down by structure. Third, the investment values, by structure (as far as possible), are turned into constant price values. Fourth, an age-efficiency pattern is applied and investment values are cumulated for each year. Fifth, weights to aggregate these capital values across structure are derived in form of relative user costs, and the capital values are finally aggregated into a standard efficiency unit constant-price gross capital stock.

4.3.1.1 Effective investment / GFCF

343. In the first step, effective economy-wide investment in fixed asset and effective GFCF values are obtained. In order to turn GFCF values into effective GFCF values, transfer rates are needed. These are the ones of investment in fixed assets. Therefore, the derivation of effective investment in fixed asset values is in the following discussed first.

344. Data on economy-wide effective investment are available for the years 1981 through 2005 only, and data on SOU effective investment for the years 1981 through 2003 (Table 18). Data on effective investment prior to 1981 are not immediately available. Such data can be

[133] The parameters of the lognormal distribution are as recommended by the OECD (2006b, pp. 57ff.).

[134] For a discussion of the two deflators and alternatives see an appendix to Holz (2006c) on the selection of the investment in fixed asset deflator. The pre-1990 values are slightly different from those reported in Holz (2006c, p. 158) due to the new availability (here) of a 1990 value for the investment in fixed asset price index.

estimated for SOUs via capital construction and technological updating and transformation. Data on effective capital construction are available for the years 1953-2003, but data on effective technological updating and transformation are only available for the years 1980 through 2003.

345. Data on SOU effective investment in 1953 through 1980 can be constructed. An estimate of *effective* technological updating and transformation in the years 1953 through 1980 can be obtained by, in each year, applying the ratio of 'effective capital construction to capital construction' (the transfer rate of capital construction) to the values of investment in technological updating and transformation.[135] This procedure is justified if one assumes that the ratio of effective capital construction to capital construction investment is the same as the ratio of (unknown) effective technological updating and transformation to technological updating and transformation investment, i.e., that the transfer rate of investment into effective investment is the same for capital construction as for technological updating and transformation (including the small category "others").

346. Charting and comparing the transfer rates of capital construction vs. technological updating and transformation in 1980-2000 suggests that this is not an implausible assumption (Figure 26). Furthermore, the further back in the pre-reform period, the less the accuracy of the match matters, because, going backwards in time, technological updating and transformation becomes very small relative to capital construction. In 1953, technological updating and transformation (including "other" SOU investment) was equivalent to just 1.27% of capital construction; at the highest pre-1980 level, the percentage was 43.40% in 1977, before falling back to 33.46% in 1980.[136]

347. Since capital construction and technological updating prior to 1981 add up to SOU investment, effective capital construction and technological updating and transformation by definition must add up to SOU effective investment in the years prior to 1981. What is still needed, then, to construct pre-1981 economy-wide effective investment values are non-SOU values. In the pre-reform economy, these values may have been small, but not necessarily negligible; the share of SOU effective investment in economy-wide effective investment fell from close to 0.7 in 1981 to approximately 0.5 in 2000.

348. Lacking investment and effective investment data for non-SOUs in the years prior to 1981, effective investment data for non-SOUs are estimated. This is done by extending the 1986 value of non-SOU effective investment back in time to 1949 based on the real growth rate of non-SOE industrial gross output value. This assumes that the ratio of gross output value to capital of non-SOUs is constant over time, and that output of *non-industrial* non-SOUs grows at the same rate over time as that of *industrial* non-SOUs. The year 1986 is chosen as the base year from which to construct the retrospective non-SOU effective investment values in order to avoid the questions about the accuracy of effective investment values in the early 1980s raised by Figure 25.[137] This appears the only feasible method using

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[135] In 1980, the available data point on technological updating and transformation excludes "other" SOU investment (included in the data on technological updating and transformation in prior years, and therefore included in the estimated effective technological updating and transformation in earlier years); in 1980, the transfer rate based on capital construction and technological updating and transformation is applied to total SOU investment to obtain the value of effective investment by SOUs. Data for the years after 1980 are official data on effective investment by SOUs.

[136] For more details, see Holz (2006c), appendix on investment data.

[137] The gross output value series starts in 1949 and the cumulative 1953 value is the sum of the 1949-53 values; aggregate 1949 through 1952 non-SOU effective investment is approximately equal to only 1% of 1980 non-

historical data, apart from the GFCF method, presented next, which, however, was constructed retrospectively by the NBS. Economy-wide effective investment in the years prior to 1981 is the sum of SOU plus non-SOU effective investment. (For the data see Appendix 25.)

349. With GFCF values available for the years since 1952, all that needs to be done is to translate these values into effective GFCF. This is achieved by applying the transfer rate of economy-wide investment. For the years since 1981, the transfer rate is immediately available from investment and effective investment data.

350. For the years prior to 1981, the economy-wide transfer rate is estimated using the SOU transfer rate and the industrial gross output value data as

economy-wide transfer rate =
constant a_0 + a_1 * SOU transfer rate + a_2 * ratio of non-SOE to SOE industrial GOV,
with a_0 = 0.226504,
a_1 = 0.769739, and
a_2 = 0.029341.

The coefficients are obtained in a regression using 1981-92 values, with 1992 being the last year for which the ratio of non-SOE to SOE industrial gross output value is available.[138] The intercept is significant at the 0.1% level, the coefficient of the SOU transfer rate at below the 0.005% level, and the coefficient of the ratio at the 5% level; the R^2 is 0.9502. Figure 27 charts the available and the estimated transfer rates.[139] (For the economy-wide transfer rate and effective GFCF see Appendix 25.)

4.3.1.2 Effective investment / GFCF by structure (type of assets)

351. In the second step, the economy-wide effective investment / GFCF values are each broken down by type of fixed assets (in the Chinese source labeled "by structure"): construction & installation, purchase of equipment & tools & appliances, and others. Such a breakdown is available for investment expenditures, at the economy-wide level, for the years since 1981.

SOU effective investment (in real terms), which renders any attempt to approximate pre-1949 effective non-SOU investment pointless. For further details see Holz (2006c), including an appendix on the ratio of gross output value to capital of non-SOUs that elaborates further on the plausibility of these assumptions and shows that the same method would work well for SOUs. The industrial gross output value data are from the *Industrial Yearbook 1993*, p. 35 (nominal values), and p. 34 (real growth rates for total industry, with no such values available by ownership category; used to establish an industrial gross output value deflator).

[138] The industrial gross output value data are from the *Industrial Yearbook 1993*, p. 35. On the SOU transfer rate see the text below.

[139] One may wonder as to which of the three series effective investment, investment, and transfer rates the NBS compiles independently. It probably compiles the first two independently and obtains the third as residual. If the transfer rate were exogenous, perhaps derived from a subset of the economy, then the investment data presumably constitute the other independent variable and the effective investment data the dependent variable. These considerations matter if one ponders the implications of potentially inaccurate effective investment data. If effective investment data are inaccurate, are the investment data also inaccurate (compiled through the same channels)? Or are effective investment data inaccurate due to a poor transfer rate (in which case the investment data may still but need not be accurate).

352. For the years prior to 1981, the available breakdown by structure of capital construction is used. This seems the only investment category for which such a breakdown is available for the years 1953-80 (Table 18). Using the structure of capital construction seems permissible because it is very similar to the structure of economy-wide investment expenditures in the years 1981-2003, when both sets of data are available. Capital construction accounted for approximately 100% of (estimated) economy-wide investment in 1953, falling to just above 50% in 1980. For the percentages by structure see Appendix 26, and for a graphical comparison of the structural shares in economy-wide investment expenditures vs. in capital construction Figure 42; the figure also reports the share of capital construction in economy-wide investment expenditures. (The resulting effective investment and effective GFCF values by structure are not reported separately.)

4.3.1.3 Effective investment / GFCF by structure, at year 2000 constant prices

353. Third, the effective investment and effective GFCF values are deflated. For the years 1990-2005, this is possible using the individual investment in fixed asset price indices for the three structural components (Appendix 24). For the years prior to 1990, the (one) GFCF deflator is applied to all effective investment and effective GFCF components indiscriminately. (The resulting effective investment and effective GFCF values by structure, in year 2000 constant prices, are not reported separately.)

4.3.1.4 Effective investment / GFCF by structure, at year 2000 constant prices, in standard efficiency units (and corrected for mortality)

354. In the fourth step, each year's constant-price effective investment / GFCF value is subjected, over time, to the survival profile and the age-efficiency profile.

355. Average service life data by year are reported in Holz (2006c) for economy-wide effective investment, with the average service life values declining year after year. OECD (2001b), Annex 3, reports average service lives by type of fixed asset for the U.S., Canada, the Czech Republic, and the Netherlands. The values of the Czech Republic, as another transition economy, may the most relevant, but cover only "transport equipment" and "other machinery and equipment" (for some sectors). In comparison to the other countries, these values tend to be on the lower side. In terms of building construction, the service life values of Canada appear rather short in comparison (due the climate?). Those of the Netherlands, with a climate perhaps similar to that of China, on average, appear most suitable.

356. Consequently, based on the values of Holz (2006c), the Czech Republic, and the Netherlands, for China the average service life of building construction is assumed to be 50 years in 1953-85, and 45 years in 1986 onwards; the average service life of equipment, tools, and appliances is assumed to be 20 and 15 years, respectively. Lacking separate service lives of the category "others," this category is included with equipment, tools and appliances. The split into two time periods reflect the planning period, which extended well into the reform period, and the post-introduction reform period since 1986.[140] Appendix 27 reports the survival rates (one minus cumulative mortality), the age-efficiency profile, and the multiplied values of the two. Table 19 reports the resulting gross capital stock, based on effective

[140] Combining the two different types of structures (construction & installation vs. equipment, tools, appliances, and others) with their specific service lives using the effective investment / GFCF values as weights yields average *economy-wide* service life values that approximately match those derived in Holz (2006c).

investment or effective GFCF, at constant year 2000 prices, in standard efficiency units and adjusted for mortality.

4.3.1.5 Aggregating gross capital stock across structures (fixed asset types)

357. In order to obtain a measure of capital services, each type of fixed asset is multiplied by its price; the services of the different assets are then added up. The price equals the real cost of financial capital, plus the rate of depreciation, plus changes to the price of the fixed asset.[141] This means, in particular, that a fixed asset that is depreciated over a longer period of time, tends to cost less than a fixed asset that is depreciated over a shorter period of time.

358. A simplified procedure is used here. Price changes are ignored (or captured by using nominal interest rates). In the period 1953-85, interest rates were low (with no time series data available); assume an interest rate of 2%. A service life of 20 years for equipment, tools, and appliances (and others) implies an annual depreciation rate of 5% at linear depreciation (as used in China); the price of this type of fixed asset then is 7% (2% + 5%). A service life of 50 years for construction & installation implies an annual depreciation rate of 2%; the price of this type of fixed asset then is 4%. The relative prices are approximately 2:1, and thus the gross capital stock of the two types of fixed assets is weighted correspondingly (2/3, 1/3). The result is the weighted sum reported in Table 19.

359. In the period after 1985, interest rates varied widely, from middle single-digit levels to double-digit levels. Assuming a 8% interest rate, a service life of 15 years implies a price of approximately 15%, and a service life of 45 years a price of approximately 10%. The relative prices for the years since 1986 then are 3:2, and the weights for combining the two types of fixed assets 3/5 and 2/5.

360. The resulting weighted sum is neither a service value nor a gross capital stock value, but simply a measure of real growth, which is all that is needed to calculate TFP. This is clearly a shortcut. A more elaborate procedure would be to back the age-price structure out of the age-efficiency / mortality functions. The only immediate drawback of the shortcut is the slight statistical break between 1985 and 1986. The growth rates of the unweighted and the weighted sum clearly differ in 1986 (Table 31, based on values in Table 19); the one of the weighted case is up to twice as high as one of the unweighted sum. But in the long-run, the average growth rate of the weighted sum is very close to that of the unweighted sum.

4.3.2 Capital in form of depreciation divided by the depreciation rate

361. The available depreciation values, by sector for 1978-1995 and 1995-2002, are reported in Appendix 28 and Appendix 29 (which also lists average economy-wide annual depreciation rates). Lacking national data, the depreciation values are sum provincial values. Some (minor) shortcomings of these data are listed below the appendices.[142]

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[141] For details, see Chapter 6 in OECD (2006a) or Chapter 9 in OECD (2006b).

[142] The share of depreciation in GDP from the summed provincial data could be applied to the national GDP value to obtain an approximation of national depreciation. Since the depreciation values come with a more complete tertiary sector breakdown for the years prior to 1990 than the national value added data, this would discard information. The sum provincial GDP values, furthermore, approximately equals the post-economic census revised national GDP values, so that these sum provincial depreciation values are likely to be quite accurate.

362. The available data cover 13 of the 16 sectors following the GB1994; no breakdown of industry into mining & quarrying, manufacturing, and public utilities is available, and for the years prior to 1995 no data on geological prospecting and water conservancy.[143] Dividing depreciation by an average economy-wide depreciation rate yields original fixed assets.

363. A gross capital stock at constant prices, incorporating the age-efficiency profile and mortality rates, is constructed in three steps. First, a real series consisting of a base-year (1978) capital stock plus annual increments is established. The year 1978 original fixed asset value is deflated in full at the 1978 value of the investment in fixed assets price index (in 1978-1989 the implicit deflator of GFCF); this is the base-year capital stock. Annual increments are obtained as first differences of the nominal original fixed asset values; the annual increments are deflated using the particular year's investment in fixed asset price index.

364. This derivation of annual increments represents a slight simplification, because the annual increments comprise two element, one is gross new capital formation, the other, with a negative sign, scrap value. Theoretically, a scrap rate could be applied, and the deflator of the earlier year when the fixed asset was created/purchased applied to the scrap value, while gross new capital formation is deflated at the current-year price level.[144] Given China's high growth rates in gross capital formation, the scrap value plays only a very minor role, and the simplification, in comparison to the other data problems in calculating productivity, is unlikely to have much impact.

365. Second, because small variations in the depreciation rate have a large impact on fixed asset values, a 3-year moving average of each year's increment is used (in 1979 the 2-year average of 1979 and 1980, and similarly in 2002).[145] The depreciation rates of the early and mid-1990s presumably reflect revaluations, with the consequence that annual increments in the early 1990s may be exaggerated (should in part have happened earlier), implying an upward biased growth rate of the capital stock in the early and mid-1990s.

366. In the third step, the age-efficiency profile and survival function are applied to each sector's 1978 fixed asset value and annual increments. The age-efficiency profile and survival function differ from sector to sector, depending on the average service life of fixed assets in a sector. The average service life of fixed assets by sector is again chosen by considering values from the Czech Republic, the Netherlands, and Holz (2006c); details on the rationales for the individual sectors' average service lives are provided in the notes to Table 20 (the specific profiles corresponding to particular service lives are, unlikely in the economy-wide case with Appendix 27, not presented). In applying the age-efficiency profile and survival function to the 1978 fixed asset value, it is assumed that all 1978 fixed assets are, in 1978, at half their service life. In every year, the increments (and base-year capital stock), at standard efficiency units with adjustment for mortality, are aggregated to obtain the gross capital stock reported in Table 20.

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[143] Since 1995, data on geological prospecting and water conservancy as well as on agricultural services (as a sub-category of the tertiary sector) are available, even though the latter is not one of the 16 sectors of the GB1994.

[144] This procedure is adopted in Holz (2006c), using economy-wide data.

[145] For the fluctuations when annual, economy-wide values are used directly, see Holz (2006c).

4.3.3 Sectoral capital data via perpetual inventory method

367. Economy-wide effective investment in fixed assets or effective GFCF could theoretically be broken down by sector, using the various available data on investment expenditures. However, sectoral data are only available for 2002 (following the GB1994) and for 2003 and 2004 (following the GB2002). For earlier years, total investment could first be disaggregated by ownership, channel of management, or an urban-rural distinction, and attempts could then be made to obtain estimates of sectoral values within the various subcategories.

368. For the distinction by channel of management, some sectoral data are available for capital construction and for technological updating and transformation, but for collective-owned units the sectoral data become rather sparse, and for individual-owned units a breakdown is not available at all. Even where data are available, they may be aggregated across sectors in some years, or are missing for years in between. (See Table 18 for what data are available.) Figure 28 shows the relative size of the different channels, which suggests that sectoral data for capital construction and technological updating and transformation would go a long way towards estimating sectoral shares across the economy, but the difficulty is to properly capture the small tertiary sector sub-sectors. As long as the available sectoral data do not cover the whole economy, one can never be sure not to be miss out investment that occurs predominantly in one (or a few) small sectors.

369. Another source of sectoral data are the NIPA at the provincial level, with a breakdown of GFCF into the three main economic sectors for 1978-2002. Applying sum-provincial sectoral shares to national effective GFCF yields approximate national sectoral GFCF values, which are then subjected to the sector-specific average service lives (with the corresponding age-efficiency profile and mortality function). This is pursued further in the calculation of TFP below; for the details see the notes to Table 35. One shortcoming is that the provincial values are pre-economic values, where the 2004 economic census led to major upward revisions to tertiary sector value added, which perhaps comes with the need to similarly revise fixed asset values.

4.3.4 Directly reporting industrial enterprises

370. The capital values of the DRIEs for 1993-2004 were already derived or explained above and presented in Appendix 30 and Appendix 31. This is a gross capital stock at historic prices except for revaluations of fixed assets starting in the early 1990s. Given the complications of these original fixed asset values, the approach here, as explained and justified above, is to simply deflate the complete DRIE original fixed asset values by the current-year (total) investment in fixed asset price index (Appendix 24). This is done across all sectors. The deflated capital values are not reported separately.

5. PRODUCTIVITY ANALYSIS

5.1 Labor productivity

371. Labor productivity is here understood to be constant-price value added per laborer. Laborers, or employment, is the number of end-year laborers without correction for hours worked. A switch to mid-year employment values would easily be possibly by taking the arithmetic mean of previous-year and current-year end-year values.

372. Four different sets of labor productivity can be calculated: (i) at the economy-wide level (1952-2002, or 1978-2005), (ii) for each of the three main economic sectors (1952-2005), including the secondary sector breakdown into industry and construction, (iii) for the tertiary sector subsectors (1990-2002, and with limited sub-sector coverage for 1978-2002 and 1952-95), and (iv) for the DRIEs (1993-2002). These are taken up below in turn.

373. The labor report form employment values are frequently the only employment values available. For time series comparisons of labor productivity within one sector, the fact that the report form values may not cover all laborers in a particular sector matters less if the shortfall is constant, in proportion to the report form value, over time. Figure 29, for the years since 1990, shows that at least in the primary and secondary sectors the ratio of report form (aggregated) employment to revised employment is not constant. The scale of variation suggests that over a ten-year horizon, a 10% change in primary or secondary sector labor productivity based on report form values (assuming that the revised 3-sector values are accurate) may not be significant, but could reflect data problems. This scale of uncertainty should also be kept in mind when considering labor productivity measures for the various sub-sectors in the more detailed 16-sector classification. For the years prior to 1990, the available employment values are all report form values, but *approximated* (revised) values for the three sectors in 1978-89 were constructed above to link up to the revised values after 1990 (Appendix 13). The resulting ratios for the three main economic sectors in 1978-89 in Figure 29, by construction of the approximated 3-sector employment values in 1978-89, are identical, and similarly for the economy-wide ratio (for details on the construction of the approximated series in 1978-89 see the employment section).

5.1.1 Economy-wide

374. Economy-wide labor productivity is calculated using two employment series and five output series. The two employment series are (i) the report form totals (since 1978 or 1990 the sum sectoral report form values) available for 1952-2002 (Appendix 14), and (ii) the official, revised economy-wide employment values of 1990-2005 combined with correspondingly approximated economy-wide employment values of 1978-1989 (Appendix 13).

375. In order to obtain a constant price output series, all values are expressed in year 2000 prices. This means that output values of other years are obtained by applying real growth rates to year 2000 nominal value added. The five real growth rate series of output are distinguished by (i) the use of pre- vs. post-economic census real growth rates for the years 1993-2004, where "post-economic census" refers to the benchmark revisions that occurred in 2005/06, following the economic census 2004, for GDP and tertiary sector value added in

1978-2004 and for primary and secondary sector value added in 1993-2004; (ii) the use of published real GDP growth rates vs. a Törnqvist index of the real growth rates of value added of the three main economic sectors; and (iii) the use of official real growth rates vs. alternative real growth rates for the years 1987/92-2004, where the alternative real growth rates are obtained by applying the first published implicit deflator of a particular year to the most recently published nominal value of that year.

376. To evaluate the three choices, (i), presumably the post-economic census real growth rates (and nominal values) are preferable to the pre-economic census ones. (ii) With real growth rates published in percentage form with only one decimal, i.e., reflecting a high degree of rounding, it is questionable how much a Törnqvist index of real GDP growth can improve on the official real GDP growth values. As will be seen below, the results are not much different. (iii) The NBS's tendency to in its annual revisions only revise nominal values but not the earlier published real growth rates is, as explained in the output section above, not plausible. The deflators implicit in the first published nominal values and real growth rates are likely to be the final ones, i.e., real growth rates should change whenever nominal values change. Since NIPA data compiled according to the System of National Accounts are only available since the late 1980s, and GDP in the first years of publication only follows from the sum of the published three main economic sector values, implicit deflators as first published are available for GDP since 1992 and for the three main economic sectors since 1987; due to the benchmark revisions, no implicit deflator as first published is available for 2005. This limits the applicability of first published implicit deflators to 1987/92-2004 and the published real growth rates have to be used in other years.

377. The five output series to be explored further are:

(i) the official *pre-economic census* real GDP growth rates of 1952-2004 (Appendix 7);

(ii) the *post-economic census* official real GDP growth rates of 1993-2005, combined with earlier real GDP growth rates as in (i) (Appendix 7);

(iii) the same as in (ii), but using a Törnqvist index of the real growth rates of value added of the three main sectors (Appendix 7);

(iv) the same as in (ii), but obtaining the real GDP growth rates of 1992-2004 by applying the first published implicit deflators to the nominal values, which prior to 1993 are the pre-economic census ones, and since 1993 the post-economic census ones (Appendix 7, Appendix 8);

(v) the same as in (iii), but obtaining the real growth rates of value added of the three main economic sectors of 1987-2004 by applying the first published implicit sectoral deflators to the nominal values, which, since 1987/93, are the post-economic census ones with pre-1993 nominal values revised by the economic census only in the tertiary sector (Appendix 7, Appendix 8).

378. For the first output series, year 2000 nominal GDP is the pre-economic census value, while for the second through fifth output series, year 2000 nominal GDP is the post-economic census value as published in the benchmark revisions (both values in Appendix 6).

379. Table 21 reports the resulting ten labor productivity series (two employment scenarios times five output scenarios), while Figure 30 and Figure 31 chart them. The first five series in

the table are based on report form employment values. The long-run growth rates reported at the bottom of Table 21 show that constant price value added per report form laborer in 1978 was approximately 2.5 times the 1952 value. Because no implicit deflators are available for the years prior to 1978 and all values are pre-economic census values, the report form series for the years prior to 1978, in terms of *real growth rates* of labor productivity, reduce to only two series with identical growth rates (a last digit one-unit difference in one series appears due to rounding).

380. In the next 24 years, between 1978 and 2002, value added per report form laborer increased approximately 5.5-fold in the first three output scenarios (was 5.5 times higher in 2002 than in 1978), and approximately 6.5-fold in the last two output scenarios (which deflate revised nominal values of 1987/92-2002 using the first published implicit deflator).

381. The report form employment values, in the short run, suffer from the non-exclusion of not-on-post staff and workers prior to 1998, and relevant starting in approximately 1994. Of more severe, and continuing consequences, is that they do not capture all laborers. But using the official revised economy-wide employment values for the years since 1990 and the here approximated economy-wide employment values for 1978-89, the *growth rates* of constant price value added relative to revised employment are very similar in 1978-2002 (the overlapping years), output scenario by output scenario, to the results based on report form employment (second five series in Table 21).

382. The labor productivity values based on revised economy-wide employment are likely to be the most accurate and most appropriate values to be had, and economy-wide employment values may be the only ones to be published in the future; the report form series appears to have ended in 2002. These labor productivity values can be calculated for the years 1978-2005. Of the five output scenarios using revised economy-wide employment values, the fifth one would probably be the best choice, relying on the first published implicit sectoral deflators in the years 1987-2004 (in calculating the real growth rates of the three main economic sectors to be used in the Törnqvist GDP index).[146] If one does not wish to rely on the first published implicit deflators and if one trusts the NBS's aggregation of sectoral real growth rates into a GDP real growth rate, then the second output scenario is the relevant one; this would be the "official" series, with post-economic census value added. Its growth rates tend to be on the lower side.

383. For the years prior to 1978, one has no choice but to resort to the series using report form employment values. If one assumes that the number of migrant and informal laborers was small in the mid-1950s, i.e., that the report form number of laborers in the early years captures all employment, then it is plausible to link up the earlier values of one of the report form series to the preferred series for the reform period. This allows a long-run comparison between the 1950s and 1978, followed by the annual labor productivity values based on the revised economy-wide employment values since 1978. As reported at the bottom of Table 21, in such a comparison, continuing with the fifth output scenario, year 2004 labor productivity was 15.63 times the 1952 labor productivity (and in the second output scenario 14.14 times).[147]

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[146] The fourth one, using the first published implicit *GDP deflator*, appears equally good, except that first published implicit GDP deflators are only available since 1992, whereas the sectoral ones are available since 1987. The potential shortcoming of applying sectoral implicit deflators as first published to slightly re-defined sectors in 1978/93-2004 is discussed in the output section.

[147] 2004 is used as the most recent year because 2005 output figures are preliminary values.

384. The two charts, Figure 30 and Figure 31, reveal little additional information. They clearly show two dips in labor productivity, in 1960 during/after the "Great Leap Forward," and in 1967 after the onset of the "Cultural Revolution." The low-growth period of 1989/1990 coincides with the Tian'anmen "incident"/"massacre" and the period of economic retrenchment and consolidation. The slight increase in labor productivity calculated using the report form employment values in 1998, due to the new exclusion of not-on-post staff and workers, is just barely visible. The choice of post-economic census output values leads to higher labor productivity in recent years than the use of pre-economic census output values (used only in the first output scenario), and there is virtually no difference between using GDP real growth rates or a Törnqvist index of the real growth rates of the three main economic sectors. Obtaining real growth rates by applying the first published implicit deflator to the most recent nominal output values, rather than accepting the all-too-often unrevised official real growth rates (in the face of revised nominal values), leads to slightly higher long-run labor productivity growth.

5.1.2 Three main economic sectors

385. Labor productivity of the three main economic sectors, including the secondary sector subsectors industry and construction, is calculated using two employment series and two output series. The two employment series are (i) the report form totals (since 1978 or 1990 an aggregate of sectoral report form values) available for 1952-2002 (Appendix 14), and (ii) the official, revised economy-wide employment values of 1990-2005 for the three main economic sectors (not available for industry and construction) combined with correspondingly approximated economy-wide employment values of 1978-1989 (Appendix 13).

386. The output series rely on the post-economic census benchmark revision data as far as the revisions reach back (and the previously published values for the earlier years). One output series uses official real growth rates, the other uses real growth rates calculated from the first published implicit deflator and nominal values whenever feasible (Appendix 7, Appendix 8); unless one prefers to stick to the official real growth rates, the latter output growth scenario appears superior.[148] A Törnqvist index would be relevant for the secondary sector, combining industry and construction, but is not pursued. The output values are in constant year 2000 prices, which implies applying real growth rates to year 2000 (post-economic census) nominal value added in order to obtain time series of constant price output.

387. A problem in the calculation of the main sectoral labor productivity measures is that while the sectoral classification of employment (in both the report form values and the revised values) consistently follows the GB1994, the pre-economic census output values only approximately follow the GB1994, since 1990, and possibly since 1952; the output values of 1952-89 otherwise follow the GB1984. The post-economic census values of 1978/93 through the present follow the GB2002. Two complications are the following.

388. The first one is the difference between the output classification in use prior to the economic census and the GB1994. The output classification across all sources lists agricultural services as a tertiary sector sub-sector, contrary to the GB1994 (which lists it as

[148] First published implicit deflators are available for the primary, secondary, and tertiary sector in 1987-2004, and for industry and construction in 1990-2004. Post-economic census revised nominal values are available for the tertiary sector for the years 1978-2004, in contrast to all other sectors where nominal values were only revised for 1993-2004.

part of the primary sector). Output values specifically on the agricultural services are available only for 1990-2003.

389. The agricultural services constitute a rather small sector. Figure 32 shows value added of agricultural services in relation to tertiary and primary sector value added in 1990-2003. Agricultural services account for approximately 0.6-0.8% of tertiary sector value added, and are equivalent to 0.9-1.8% of agricultural value added. With no output data on agricultural services available for years prior to 1990, but labor productivity values to be calculated for the years since 1952, two options are available.

390. One option is to correct the primary and tertiary sector output values, i.e., to in the years 1990-2003 move the output of agricultural services from the tertiary sector to the primary sector, and to in all other years subtract, say, 0.8% from the tertiary sector and to add that amount to the primary sector output. Switching a constant percentage of tertiary sector output has no impact on labor productivity *growth* in the tertiary sector, and minimal impact on labor productivity growth in the primary sector. Furthermore, the size of agricultural services appears negligibly small in the context of the degree of inaccuracy in pre-1978 output values. The second option, followed here, then is to ignore the fact that agricultural services are classified differently in the output and employment series. As a consequence, labor productivity in the primary sector is slightly understated (by perhaps 1.8% in recent years and less than 1% prior to about 1990), and slightly overstated in the tertiary sector (by perhaps around 1% per year); labor productivity *growth rates*, at the degree of precision reported here, are probably not affected at all.

391. The second complication, the use of the GB2002 in the post-economic census benchmark revisions, has no ready solution. If one uses the pre-economic census output values, which would closely match the employment data, then the tertiary sector output values since 1978 are too small, and possibly also the secondary sector values since 1993; these output data end in 2004 and will not be continued in the future.

392. If one uses the post-economic census output values, then the question is to what extent these values correct previous values within the same sectoral classification, and to what extent they reflect a change in sectoral classification. In the case of agriculture, which was not subject of the economic census, the maximum adjustment in output of an upward 0.9% in 2004 (Table 6) in all likelihood reflects solely the change in sectoral classification and will lead to, given the employment coverage, a 0.9% over-estimate of labor productivity (which partly neutralizes the first complication noted just above). In the case of the secondary sector, the maximum adjustment is 2.1% upward (in 2004), and it is not clear if this is solely due to reclassification or in part to corrections of earlier values within the same sectoral classification. Nevertheless, 2.1% at the maximum still does not appear large. For the secondary sector breakdown into industry and construction, the consequences are larger with a maximum 9.2% underestimate in the case of construction in 2004 (assuming uniform labor productivity across all construction sub-sectors). For the tertiary sector, the effect of reclassification of lower-level sectors from the primary and secondary sector is the counterpart of the adjustments to primary and secondary sector, plus the new coverage of economic activities within the tertiary sector previously not covered in the NIPA (of unknown size); otherwise, the (large) adjustments are due to revised data within the original sectoral classification (GB1994).

393. Overall, except for construction, the amount of output change due to reclassification appears small, on the order of a few, lower single-digit percentage points even at the

maximum, in 2004. Second, the future output values will all follow the GB2002. Third, the revised sectoral employment values are not supported by any detailed data (and exceeded the aggregate report form values significantly in the years when the report form values were published, through 2002); these revised sectoral employment values, currently the only ones published on a continuous basis, could have switched to the GB2002 in any year since 2003, without this being documented publicly by the NBS and without it being obvious in the data (due to the small size of the changes). These three points suggest to switch to the post-economic census values and to accept a lower single-digit percentage point margin of error in the values of sectoral labor productivity.

394. Table 22 has the labor productivity values based on report form employment (with both output measures), while Figure 33 provides a graphical presentation using the *second output measure* (with real growth rates, as far as possible, based on the first published implicit deflator); the two output measures yield near-identical charts. Table 23 reports the labor productivity values based on the revised employment values and is accompanied by Figure 34.

395. Based on report form employment, between 1952 and 1978 labor productivity in the primary sector remained virtually constant, rose approximately 3.5-fold (to a level 3.5 times the 1952 value) in the secondary sector and in industry, 2-fold in the rather small sector construction, and 1.5-fold in the tertiary sector. (These long-run growth values are identical in both output scenarios since first published implicit deflators are only relevant starting 1987.) Between 1978 and 2002, across the two output scenarios, labor productivity in the primary sector grew 2.5- to 3-fold, in the secondary sector 7-fold (9- or 10-fold in industry and 2-fold in construction), and 3- or 4-fold in the tertiary sector. Figure 33 exhibits the same patters over time as in the economy-wide case. Particularly striking are the large differences in labor productivity between sectors by 2002.

396. The labor productivity growth rates based on the revised employment values (Table 23) are similar to those based on report form employment in the overlapping time period of 1978-2002.[149] These values extend to 2005, continuing the growth patterns of earlier years. The patterns are near-identical in the two output scenarios, except that in the tertiary sector the use of first published implicit deflators leads to slightly faster growth. Linking these series, as in the economy-wide case, to the 1952 labor productivity values based on report form employment, shows 2004 labor productivity (in the second output scenario) in the primary sector to be 3.02 times the 1952 value, in the secondary sector 23.81 times, and in the tertiary sector 6.00 times.

5.1.3 Tertiary sector sub-sectors

397. Labor productivity in tertiary sector sub-sectors can be calculated for three different sets of data, all explored in the following. Employment data on tertiary sector sub-sectors are only available as report form values, which end in 2002. One severe shortcoming is that a good number of report form laborers is not allocated to specific tertiary sector sub-sectors but captured in a residual category "others," while on the output side, almost all output is

[149] As before, the report form employment values, in the short run, suffer from the non-exclusion of not-on-post staff and workers prior to 1998, and relevant starting in approximately 1994. They do not capture all laborers. On the other hand, revised employment figures of 1978-89 are approximated values.

allocated to specific tertiary sector sub-sectors. A second shortcoming is that the output data include agricultural services in the tertiary sector while the employment data do not.

5.1.3.1 Eleven exhaustive sub-sectors in 1990-2002

398. Tertiary sector output values for 12 sub-sectors are available for the years 1990-2003. These values are pre-economic census output values; post-economic census output values for tertiary sector sub-sectors are not (yet?) available.

399. Tertiary sector employment values for 11 sub-sectors are available for the years 1978-2002. These are report form values, i.e., do not capture all laborers in a particular sector or sub-sector, and from approximately 1994, through 1997, include the not-on-post staff and workers. Revised employment values beyond the three main economic sectors are not available.

400. The output and employment classification both follow the GB1994, with the one exception that the output values come with an additional (twelfth) separate tertiary sector sub-sector "agricultural services," which in the employment statistics is (presumably) included in agriculture. The detailed tertiary sector output statistics are reported in the official statistics in a table on their own. The detailed tertiary sector employment statistics are part of the 16-sector employment tables that do not distinguish between the three main economic sectors but simply list the exhaustive 16 individual sectors. The 16th sector is labeled "others." A comparison of these report form values—aggregated to the three main economic sectors—with the in the official statistics separately listed (unrevised) values for the three main economic sectors shows that "others" refers to the tertiary sector only.[150]

401. Table 24 reports the labor productivity values for all sub-sectors of the tertiary sector in 1990 through 2002, as well as one total tertiary sector series which inappropriately includes agricultural services on the output side, and one total tertiary sector series which is net of the agricultural services. Because the output values are, by necessity, pre-economic census output values, total tertiary sector labor productivity here (in Table 24) is lower than in Table 22 which uses *post*-economic census output values.

402. Labor productivity over the 12-year period on average increased by 62%. The growth rate is highest in geological prospecting and water conservancy (the 2002 value is 4.64 times the 1990 value), lowest in "others" where it actually fell slightly, and second-lowest in real estate where it increased 27%. In absolute terms, labor productivity in 2002 ranges from 485 yuan RMB per laborer-year in "others" and 17,110 in commerce (the second-lowest value) to 46,245 in scientific research and polytechnic services.

403. A labor productivity value, in "others," of 485 yuan RMB per laborer year is not credible. The category "others" is a small tertiary sector residual category in terms of output, at 1% of tertiary sector output in 2000. At the same time, in terms of employment the category "others" is a large tertiary sector residual category, accounting for 33% of tertiary sector employment in 2000. It seems that while the output statistics manage to attribute almost all tertiary sector output accurately to one of the tertiary sector sub-sectors, the employment statistics come with a very large residual, labeled "others." This means that the

[150] If "others" is included in the tertiary sector, there is a perfect match for the three main economic sectors in the years 1978-89/95, when the comparison is possible (see details in section on employment above).

employment values of all or some other tertiary sector sub-sectors are in all likelihood too low in comparison to the output values of those sub-sectors.

404. Comparisons of labor productivity across tertiary sector sub-sectors then are only possible if the number of missing laborers in each sub-sector is proportional to the number actually allocated to that sub-sector. Similarly, time series comparisons within one tertiary sector sub-sector are only meaningful if the number of missing laborers stands in a fixed proportion to the number actually allocated to this tertiary sub-sector in each year. These assumptions are unlikely to be met and the mismatch between output and employment data cannot be resolved.

405. The publication of report form employment values ceased with the 2002 data. Since then, detailed employment data, including for tertiary sector sub-sectors, are only available for laborers in urban units, and for staff and workers. Overall, the labor productivity values for the eleven tertiary sector sub-sectors in 1990-2002 appear of little further use: output values are pre-economic census values, employment values do not capture all laborers (but only report form employment), employment values are not fully allocated to the sub-sectors, and some of the necessary data cease in 2002.

5.1.3.2 Six exhaustive sub-sectors in 1978-2002

406. A second set of tertiary sector sub-sector labor productivity values covers six aggregated and exhaustive sub-sectors. Output values on eight sub-sectors are available for 1952-1995, and for 12 sub-sectors (as already used in the previous section) for 1990-2002. Report form employment values for 11 sub-sectors (as already used in the previous section) are available for 1978-2002. The output and employment data are comparable if they are aggregated into six categories. As in the previous section, the output values are pre-economic census values and the employment values are report form values, both with the corresponding shortcomings.

407. Table 25 reports the resulting labor productivity measures. Across five of the six sub-sectors, labor productivity in 2002 was between 2 and 4 times the 1978 value, except in one highly aggregated category were it was 5.5 times the 1978 value. This highly aggregated category covers a wide range of services: agricultural services and water conservancy (on the output side only), geological investigation and prospecting, social services, health care, sports, social welfare, education, culture and arts, radio, film and television, scientific research and polytechnic services.

408. The data come with the same complications as in the previous section, namely that the output values include agricultural services, while the employment values do not, and that there is nothing that can be done to redistribute the large residual employment category "others" among the other sub-sectors. In Table 25, the employment category "others" is once included with "government and Party agencies, and social organizations," as it is on the output side, and once excluded from employment (while still included in the output side, by necessity, given that the pre-1990 output values combine government etc. and "others"); the corresponding labor productivity growth rates and absolute values obviously differ significantly.

409. In absolute terms, labor productivity values in banking & insurance and in real estate move in step and by 2002 are six times higher than those of the other sub-sectors (Figure 35, Figure 36). Commerce & catering is a laggard, while transport & telecommunications, government (excluding the category "others" on the employment side only), and the highly

aggregated category move in step and by 2002 reach values almost twice the value of commerce & catering.

410. It is unclear if the sectoral classification of the output values does not experience a statistical break between 1989 and 1990 (from the GB1984 to the GB1994), which would mostly affect commerce & catering (reduced coverage) and transport & telecommunications (increased coverage). While the labels of these two categories differ in *GDP 1952-95* (with its eight exhaustive sub-sectors in 1952-95) in comparison to the *Statistical Yearbook* series (with its 12 exhaustive sub-sectors in 1990-2003), the values of commerce & catering in the two sources are identical in the overlapping years 1990-95, as are the values of transport & telecommunications. The labor productivity values in Figure 36 suggest a statistical break in commerce & catering but not necessarily in transport & telecommunications.

5.1.3.3 Two exhaustive sub-sectors in 1952-2002

411. Labor productivity can finally be calculated for the productive vs. non-productive tertiary sector sub-sectors. Official employment values of non-productive sectors, i.e., of all service sectors except (i) transport & telecommunications (transport, storage, post & telecommunications), (ii) commerce & catering (wholesale and retail trade & catering services), and (iii) geological prospecting and water conservancy are available for 1952-92. Subtracting this series from the separately published tertiary sector employment figures yields employment in the productive services. Employment in these two categories can also be obtained for 1978-2002 from the detailed sectoral report form employment data with identical values in the years 1978-90.

412. Output in the productive sector has to be approximated by adding up transport & telecommunications and commerce & catering; i.e., the small sector geological prospecting and water conservancy, for which no data are available for the years prior to 1990, is ignored on the output side. Figure 37 shows that in 1990-2003, the years for which these data are available, geological prospecting and water conservancy accounted for only 1 to 1.5% of tertiary sector value added. Transport & telecommunications and commerce & catering together, on the other hand, account for approximately half of tertiary sector output (Appendix 6). The error due to the mismatch of output and employment values thus is likely to be small.

413. Focusing on the post-economic census output values, labor productivity in the productive services in 2002 was six times the 1952 value, with a doubling between 1952 and 1978 and then a three-fold increase between 1978 and 2002 (Table 26 or Figure 38). In the non-productive services, labor productivity remained flat between 1952 and 1978, before rising three-fold between 1978 and 2002. The absolute values by 2002 are almost the same. Using pre-economic census output values, the growth rates and absolute values are slightly lower.

414. In these calculations, employment in the problematic category “others” (see sub-sections above) is fully counted with the non-productive services, and may thus bias labor productivity in the productive services upward and in the non-productive services downward in recent years (and less so in earlier years, last column of Table 25). The (unavoidable) inclusion of value added in agricultural services in the labor productivity values of the non-productive services, on the other hand, slightly bias these values upward.

5.1.4 Directly reporting industrial enterprises

415. Labor productivity for the DRIEs can be calculated for the years 1993-2002 (Table 27). The sectoral classification follows the GB1994. Since 2002, output values following the GB2002 are available for 2003 only, and employment values for 2003 and 2004.

416. The labor productivity values of the DRIEs come with a number of special characteristics (for details see notes to Table 27). First, employment values are midyear values in the official statistics, unlike above, where the official statistics report end-year values. Second, a statistical break occurs in 1998 in that the enterprise coverage changes and in that the not-on-post staff and workers are not included in the employment data starting in 1998. Third, real values are obtained by deflating nominal value added using the deflator implicit in nominal and 1990-price GOV. Fourth, as noted in the output section above, the 1993 and possibly even 1994 output values may not be very accurate.

417. Overall, labor productivity across the DRIEs in 1997 was 1.41 times the 1993 value, and in 2002 1.67 times the 1999 value. Due to the statistical break in 1998 and the lack of *real* output values in 1998, a direct comparison of 1993-97 (at constant 1997 prices) and 1999-2002 (at constant 2000 prices) is not possible. But if one considers that the implicit deflator of industry as first published in the NIPA in 1998 was -5.3%, in 1999 -3.5%, and in 2000 2.6% (Appendix 8), the price level differences between 1997 and 2000 are likely to be small; furthermore, the statistical break in enterprise coverage is unlikely to be large. The absolute value of labor productivity of all DRIEs in 2002 then was about three and a half times the 1993 value.

418. Labor productivity growth differs across the individual industrial sectors. Electronic and telecommunications equipment manufacturing and transport equipment manufacturing experienced the highest growth rates in the two periods. Only a very few industrial sectors experiences no increase in labor productivity, or even a decrease, and they are all small sectors where data problems could be large or the exit of a few enterprises could have a large effect.

5.2 Unit labor costs

419. Unit labor costs can be calculated for sub-groups of urban employment in some detail, as well as economy-wide by major sector.

5.2.1 Urban unit labor costs

420. Wage data covering the first-level economic sectors are available for urban units (1994-2004) and their exhaustive two sub-groups staff and workers (1978-04) and "others" (1993-2004). Second-level sectoral data are available for urban units and the staff and workers, not always complete, for 1994-2004. The different groups of urban employment values marked with a star in Table 13 come with corresponding wage data.

421. Because the time series of staff and workers goes back longer, and since the staff and workers account for more than 95% of employment in urban units (as noted above, or Figure 12), the coverage here is the staff and workers, i.e., the formal employees in urban units. By 2004, they account for about 40% of total urban employment (in urban "units" plus the by

then larger urban "non-units"), and their share in individual sectors, as noted above, is relatively small (Figure 13).

422. Official average age data are available for staff and workers. The official average wage is the ratio of the wage bill to the average number of staff and workers in a particular year (*Labor Yearbook 2005*, p. 648). A double-check shows that the average number of staff and workers is not the arithmetic mean of the previous-year and current-year number of staff and workers, but dividing the available wage bill data by the number of end-year, or mid-year (arithmetic mean) staff and workers yields rather similar results (see notes to Appendix 18).

423. The wage bill, and by implication average wages, covers all labor remuneration, whether monetary or non-monetary; the wage bill explicitly includes wages, piece rates, boni, allowances, subsidies, overtime payments, and any wage paid under "special circumstances" (*Labor Yearbook 2005*, p. 648).

5.2.1.1 First-level sectors

424. Official first-level sector data are available on average wages (1978-2004) and on their real growth rates (1978-2002), reproduced in Appendix 18 for 1978-2002. These two series can be combined to yield average wages in *year 2000* prices, and they imply implicit deflators (also included in Appendix 18). The implicit deflator of all (total) staff and workers equals the urban CPI, as it should by definition (*Labor Yearbook 2005*, p. 648), except in 1979 and in 1998, when the differences are 1.7 and 8.4 percentage points. The notes to the appendix explore the reasons for these two discrepancies, but they cannot be resolved; these are possibly statistical breaks. Across the *individual sectors*, the implicit deflators differ from the urban CPI; an explanation for this divergence is not given in the official source.[151]

425. Real wage growth of each of the 16 first-level sectors (and the total) can easily be calculated from the last block of data in Appendix 18, which reports average wages of 1978-2002 in year 2000 prices. The last line of the appendix also reports the ratio of the 2002 to the 1978 value, with sectoral real growth rates in average wages ranging from 2.79 (agriculture) to 6.99 (social services); commerce is on the low side, with 3.07, and finance at the high side with 6.58.

426. Appendix 19 reports nominal average wages in 2003 and 2004, following the new sectoral classification (GB2002). Real growth rates are not available, but sectoral average wages in year 2000 prices can be obtained by applying the urban CPI *uniformly* to all individual sectors. The resulting values, for the now different sectoral classification, are also reported in Appendix 19. At the aggregate level, real average wages of all (total) staff and workers rose by 23.67% between 2002 (Appendix 18) and 2004 (Appendix 19).

427. Table 28 finally aggregates the real average wages of the individual sectors into real average wages in the three main economic sectors plus industry and construction, and Figure 39 charts the sectoral values. (See notes to the table for details on the manipulations via staff and worker numbers.) In terms of absolute values in 2002 or 2004 as well as in terms of real

[151] Comparing 2002 to 1978, across sectors, the growth in the real average wage is negatively correlated with the implicit deflator (significant at the 5% level); i.e., sectors with high real growth in the average wage experience a low deflator. This suggests a clear trade-off in how the nominal increases in average wages are allocated between real and price growth. Implicit deflators may vary across individual sectors if sectors are concentrated in different regions (as many are), different regions experience a different urban CPI (as they do), and the NBS data are aggregate local, including *locally deflated*, wage data.

growth rates, the primary sector and construction are the laggards, while the tertiary sector fares best. In contrast, in 1978, unit labor costs were highest in construction, followed by industry, the tertiary sector, and then the primary sector.

428. Nominal average wage data are also available for all (total) staff and workers for the years 1952-77, but no real growth rates (and not sectoral data). Assuming no inflation between 1952 and 1978, i.e., assuming real growth rates to be equal to nominal growth rates, unit labor costs in 1978 were 1.38 times their 1952 value (38% higher). In the next period, of equal length, unit labor costs in 2004 reached a value 4.86 times that of 1978.

5.2.1.2 Second-level sectors

429. Second-level sector average wage data are available for all staff and workers in the years 1993-2002, except for the second-level sectors of the three industrial sectors (mining and quarrying, manufacturing, public utilities) in 1998-2002, when second-level sector data in industry cover all employees in urban units, not only the staff and workers.[152] However, in each of the three industrial sectors, the end-year number of all employees exceeds the end-year number of staff and workers by less than 1% (1998-2000) or less than 2% (2001/02), which suggests that the average wage of employees is likely to be a good proxy of the average wage of staff and workers in these years. Appendix 20 has the data; they follow the GB1994.

430. Real growth rates of average wages are not published. Nominal wages are therefore deflated using the urban CPI. In the most recent year, 2002, wages of staff and workers nationwide were 2.12 times their 1994 level (Appendix 20); 1993 data are also available, and reported in the appendix, but at least in terms of employment, Yunnan Province is not included in the data.[153]

431. Across the individual sectors, real growth between 1994 and 2002 varies. The ratio of 2002 to 1994 values ranges from a low of 1.25 in logging and transport of timber and bamboo to a high of 4.39 in computer applications. Within manufacturing, the range is narrower with a low of 1.50 in chemical fiber manufacturing and a high of 2.84 in tobacco processing.

432. In as far as industries are regionally concentrated, nominal wage growth rates are likely to reflect local prices. Deflating all industries equally by the national urban CPI, thus, is not optimal. An alternative would be to use the first-level sector implicit deflators of Appendix 18, available for 1978-2002 (only), to deflate all second-level sectors within each first-level sector.

433. For the years after 2002, second-level sector average wage data are also available for all staff and workers, but now following the GB2002, and again without real growth rates. Appendix 21 has the data. Matching the GB1994 (with values for 1993-2002) and the GB2002 (with values for 2003 and 2004) as much as possible, and applying the urban CPI uniformly in a given year to all sectors, allows the calculations of real growth (Appendix 21).

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[152] Average wage data for second-level sectors are also available for all employees of urban units in the same period, 1993-2004, except in the three industrial sectors prior to 1998; the staff and worker data are reported here to match up with the longer staff and worker time series for first-level sectors above.

[153] Even if Yunnan were not included in the official average wage data, this would not matter at all if Yunnan's wages, sector for sector, match the average of all other provinces. (Also see notes to Appendix 20.)

The average wage of staff and workers in 2004 was 2.62 the average wage in 1994.[154] Similar comparisons can be made sector by sector.

5.2.2 Unit labor costs by main economic sector in the NIPA

434. The NIPA provide a breakdown of GDP from the income side into the exhaustive four components labor remuneration, net taxes on production, depreciation, and operating surplus. *GDP 1952-95*, for each province in the years 1978-95, reports the four components province-wide as well as by main economic sector, and for industry, construction, and the tertiary sector sub-sectors. It does not report national values. *GDP 1996-2002* covers the provincial data for 1995 through 2002, with a slightly more detailed tertiary sector sub-sector breakdown, and with, for some provinces, slightly different 1995 values.[155] Appendix 22 has the *sum provincial* labor remuneration data for 1978-1995, and Appendix 23 for 1995-2002; the notes to the appendices list a number of data limitations.

435. Labor remuneration in these statistics covers all labor income, whether monetary or non-monetary (including wages, boni, and allowances), self-produced self-consumed goods and services, public health services, transportation subsidies, and various social insurance fees paid by the work unit. Sector-specific instructions provide further details. For example, in agriculture, labor remuneration comprises all net income (net of depreciation) of farmers from agriculture. In industry, labor remuneration also includes that part of enterprises' contributions to the labor union, business travel costs, and the costs of meetings/ conferences which is paid to individuals. If the income of the self-employed in industry cannot be split into labor remuneration and operating surplus, it is to be counted as labor remuneration.[156]

436. Unit labor costs are obtained by dividing real labor remuneration by employment values. Real labor remuneration is obtained by applying the CPI (as reported in the appendices with values on labor remuneration); for the years prior to 1985, only the urban CPI is available. Alternatively, the provincial implicit household consumption deflator of the national income and product accounts could have been applied to labor remuneration of each province, before aggregating (the then real) labor remuneration across provinces. Employment values are either the revised values, economy-wide and for the three main sectors, available for 1990-2005 and constructed above for 1978-1989, or the 16-sector report form employment values available for 1978-2002.

437. Table 29 reports the resulting (real) unit labor costs economy-wide and for the three main economic sectors, using both types of employment values (and also separately listing

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[154] The national wage growth rates reported in Appendix 20 and Appendix 21 (2002 or 2004 in comparison to 1993 or 1994) should be identical to growth rates calculated from the values in year 2000 prices reported in Table 28. This is not the case because underlying Table 28 are the published real growth rates, whereas for the official statistics of second-level sectors (including first-level sectors and the national value in those tables, as reported in Appendix 20 and Appendix 21) no published real growth rates are available and therefore all nominal values are deflated by the urban CPI. As noted above, the deflator implicit in the nominal and real data on first-level sector wages match the urban CPI *except* in 1998 (and 1979). Table 28 implies a 2002 wage that is 1.958 times the 1994 wage; multiplying by the difference between the implicit deflator and the urban CPI in 1998 of 8.4 percentage points (i.e., by 1.084), yields a value of 2.12, identical to the one obtained in Appendix 20.

[155] It also has highly fragmentary data for 1952, 1978, 1985, and 1990. The *Statistical Yearbook* series only reports, for each province, the four components province-wide in the years 1993 through 2003 (except for 1995).

[156] See NBS (1997), p. 15 for a general definition, and the further pages throughout the book on each sector separately.

industry and construction when the report form employment values are used). Figure 40 shows the unit labor costs with revised employment values.

438. Independent of the choice of employment data, economy-wide unit labor costs in 2002 were approximately five times higher than in 1978; in the primary sector they were only three times higher, but in the secondary and tertiary sector three times higher.[157] While the growth rates across the two sets of employment are similar, unit labor costs are obviously lower when labor remuneration is divided by the revised rather than by the report form employment figures.

439. Across sectors, primary sector unit labor costs in 1978 were about two-thirds of economy-wide unit labor costs, but by 2002 less than half. Secondary sector unit labor costs were about twice the economy-wide level in both years, and tertiary sector unit labor costs about one-third higher in both years. In 2002, unit labor costs in the secondary sector, using revised employment figures, were 14,755 yuan RMB (in year 2000 prices), in the tertiary sector 11,204 yuan RMB, economy-wide 8,158 yuan RMB, and in the primary sector 3,593 yuan RMB.

440. The labor remuneration data end in 2002, but the NBS in all likelihood continues to compile such detailed within-province sectoral data, and more recent data are likely to be published in the future, although it may yet take another special compendium. The revised employment values continue to be published on an annual basis, while publication of the report form employment values ceased in 2002.

441. Table 30 reports the (real) unit labor costs across the tertiary sector sub-sectors, with the notes elaborating on a number of complications. The employment data are, by necessity, the report form employment data. As in the case of labor productivity, a major complication is the fact that these employment data come with a large category "others," while labor remuneration in the residual category "others" is relatively small (as is the case for value added). I.e., the employment data are unlikely to match the labor remuneration data sub-sector by sub-sector.

442. Another complication, as in the case of labor productivity, is the fact that the labor remuneration data since 1995/96 comprise a sub-sector agricultural services and a sub-sector geological prospecting and water conservancy, while in 1978-95 agricultural services and geological *investigation and prospecting* (according to the preface in the source) were included in the science sub-sector. Furthermore, the employment values come with a sub-sector geological prospecting and water conservancy, but no sub-sector agricultural services (which are probably included in agriculture). The sub-sector "science" in Table 30, focusing on whatever is called "science" in any one of the statistics, thus, is highly likely to be defined inconsistently across labor remuneration and employment prior to 1995/96 (and the data bear that out in the transition between the first vs. second series' 1995 value). What is labeled "science+" in Table 30 simply puts agricultural services and geological prospecting and water conservancy, whenever and wherever available as separate sub-sectors, into the science category; this yields more meaningful results, except that the employment values are unlikely

[157] The fact that economy-wide unit labor costs, using the revised employment values, rose faster than in any of the three main sectors, is presumably due to a shift of labor out of the low-growth primary sector into the other sectors. Given the difference in unit labor costs across sectors, the individuals that shift out of agriculture experience very high unit labor cost growth (above economy-wide average).

to cover agricultural services, which implies that the unit labor costs are likely to be biased upward.

443. The last complication is the coverage of labor remuneration in transport & communication and in commerce & catering, which, as in the case of labor productivity, could well change in the late 1980s (between 1989 and 1990?). The later coverage of labor remuneration then matches the employment coverage, while the earlier one does not perfectly match.[158]

444. Across the tertiary sector sub-sectors, ignoring the sub-sector "others," (real) unit labor costs in 2002 were between three and a half times and twenty times higher than in 1978. Given the rapidly increasing employment in "others" over this period, the growth rates of unit labor costs in the other sub-sectors are probably biased upward. Unit labor costs rose fastest in real estate, followed by "science+," health, and finance. The lowest growth rates are in commerce & catering (abbreviated "trade"), social services, and in transport & telecommunications (abbreviated "transp.").

445. In absolute terms in 2002, (real) unit labor costs are highest in real estate, followed by finance and "science+," and lowest in commerce & catering, education, and transportation & telecommunications. This contrasts starkly with 1978, when commerce & catering and transportation & telecommunications were towards the top, and real estate and "science+" towards the bottom of the unit labor cost range.

446. Compared to the average wage of staff and workers (in year 2000 prices, Appendix 18 and Appendix 20), unit labor costs (in year 2000 prices, Table 29) in 2002 are lower economy-wide and in the primary and tertiary sector. Even though labor remuneration is a broader concept than wages, the fact that unit labor costs are lower suggests that staff and workers are very much better paid than the average laborer economy-wide and in the primary and tertiary sector. In the secondary sector, unit labor costs in 2002 are higher than the average wage of staff and workers, and particularly so in industry. This is presumably due to the fact that in the secondary sector a large share of laborers are staff and workers (Figure 13, comparing staff and workers to report form employment), and the wider scope of labor remuneration (in comparison to the wage) then outbalances the possibly lower wages of non-staff and workers in the secondary sector.

5.3 Total factor productivity growth

447. In growth accounting, total factor productivity growth is the difference between real growth in value added on the one hand and the weighted real growth of the different factor inputs on the other hand. This growth accounting equation is typically derived from the Cobb-Douglas production function. The factor inputs considered here are capital and labor services, approximated by the gross capital stock and the quantity of laborers. The weights are the output elasticities of the Cobb-Douglas production function.

[158] It is also possible that different provinces change the coverage in these two sub-sectors at different points of time, or that individual provinces consistently report data classified in one of the two ways for all years but that provinces differ in their choice.

448. Production function estimations for China, especially for the reform period, tend to be instable. In other words, output elasticities in China are not constant, and therefore weights are not available for the growth accounting exercise.[159]

449. The output elasticities could theoretically be constant over short periods of time, periods that are too short for output elasticities to be estimated in production estimations using annual data. One solution then is to assume perfect competition, in which case the (unknown short-run) output elasticities in the Cobb-Douglas production function equal the current factor shares in the national income and product accounts. One may doubt if China meets the assumption of a perfectly competitive economy. Even if one were willing to somewhat accept the assumption for the most recent years, to assume that a planned economy (pre-reform period, and well into the reform period) works by the principles of perfect competition remains a stretch. In other words, using factor shares as weights probably constitutes a rather arbitrary choice of weights, with the assumption of perfect competition providing a potentially false sense of reliability.[160] Holz (2005c) bypasses the problem by dropping the production function concept and switching to a different growth accounting procedure (which then does not yield explicit TFP growth).

450. Since the literature and the OECD manual on measuring productivity (OECD 2001a, p. 114) ignore the theoretical problems and simply use factor shares as weights, this is what will be done below, too. It would, however, be prudent, to remember that factor shares are at best an approximation of the output elasticities. Because labor and capital growth rates in China are very different, small inaccuracies in weights easily translate into large inaccuracies in TFP growth.

451. Factor shares are derived from income approach GDP. Income approach GDP data are only available at the provincial level, since 1978, with a number of (probably minor) data shortcomings as noted above for the case of labor remuneration. The procedure used here is to first sum each income component across provinces and to then obtain the labor share as the share of labor remuneration in the sum of (total across province) labor remuneration, depreciation, and operating surplus; the capital share is one minus the labor share. This means that net taxes on production are split proportionally between labor and capital. For the years prior to 1978, the average share values of 1978-80 are used. For the years since 2003, with the income approach data not yet available, the year 2002 share values are used. For the years 1979-2002, each year's weights are mean values of the previous- and current-year share values.[161] Appendix 32 and Appendix 33 report the labor shares across sectors, available for 1978-1995, and 1995-2002. The capital share is one minus the labor share.

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[159] For estimations of reform period production functions, and discussion of such estimations in the literature, see Holz (2005c). The literature tends to either switch to an ARIMA model, which yields stable coefficients—but these are not weights that can be used to combine capital and labor growth in the growth accounting exercise because the ARIMA model does not equal in form the production function from which the growth accounting equation is derived—or chooses arbitrary weights (on which more in the text).

[160] Holz and Felipe (2001) derive the growth accounting equation directly from the definition of GDP in the income approach. The derivation requires two assumptions: constant factor shares, and constant growth rates of wages and of the rental rate of capital. The authors explore to what extent these two assumptions can be violated before the growth accounting equation/ production function becomes instable. In the case of China (Holz 2005c), the problem is that the growth rates of wages and of the rental rate of capital are not sufficiently stable.

[161] The calculation follows the OECD manual on measuring productivity, implementation sheet 9 (OECD, 2001a, p. 114).

5.3.1 Economy-wide TFP growth, with capital via perpetual inventory method

452. Table 31 summarizes the growth rates of real value added, employment, and gross capital stock (at year 2000 prices, in standard efficiency units adjusted for mortality), as well as the labor share. All these values were already derived earlier; employment and gross capital stock are end-year values. Solving for the TFP growth rate yields the results reported in Table 32, with a distinction of if effective investment or effective GFCF is used, if the capital measure is an unweighted or weighted sum of the gross capital stock of the two different types of fixed assets, and if the adjusted (revised) or the report form employment data are used.

453. The results show a decline in the TFP level in the pre-reform period through the early 1960s (Great Leap Forward), a rise in the mid-60s followed by a decline in the late 60s (Cultural Revolution), and then a continuous rise throughout the reform period. The slight decline in the late 1980s coincides with a period of retrenchment and consolidation (presumably low capacity utilization). Figure 41 charts the cumulative TFP series in the case where gross capital stock was derived based on effective GFCF.

454. It makes virtually no difference for annual or average (long-run) TFP growth rates if the capital value is based on effective investment or effective GFCF, if it is an unweighted or weighted sum, and which employment values are used. The 1986 statistical break in the weighted sum series is just barely noticeable.

5.3.2 TFP growth with capital via depreciation

455. The calculation of TFP growth with capital derived via depreciation is possible for the years 1978-2002, economy-wide, for the three main economic sectors, and for 13 individual sectors. The capital values are reported in Table 20, the growth rates of employment and value added in Table 33, and labor shares in Appendix 32 and Appendix 33.

456. Table 34 reports the resulting TFP growth rates using two sets of employment values, the report form employment values (available by individual sectors) and the revised employment values (available only economy-wide and for the three main economic sectors). The choice of employment values makes no difference to the conclusions.

457. Between 1978 and 2002, TFP growth was highest in industry, followed by agriculture, construction, and the tertiary sector. In the tertiary sector, the findings vary widely across sub-sectors, with high average growth rates in education and health, but low average growth rates in transport & telecommunications, commerce & catering, and finance, and a declining average growth rate in the sub-sector "others." As in the case of labor productivity, a major problem is the increasing and currently very large size of employment in "others," while value added of "others" is minimal throughout all years. If the investment and fixed asset statistics do not properly capture small productive units (for example, because their individual investment is below 50,000 yuan RMB), then this large number of "other" laborers could, in the statistics (only), well operate largely without capital, and quite likely also without output.

458. In the economy-wide total, the TFP growth rates are remarkably close to those obtained in the section on economy-wide TFP growth using the perpetual inventory method, above.

5.3.3 TFP growth in the three main economic sectors, with capital via perpetual inventory method

459. Table 35 reports TFP growth in the three main economic sectors for 1978-2002. The assumptions supporting the calculations are noted underneath the table. The results are similar to those of the previous section, but with average annual TFP growth slightly lower. One complication is that the underlying sectoral GFCF values are all pre-economic census values, and thus may not be perfectly relevant in comparison to the post-economic census benchmark value added.

460. A more detailed sectoral breakdown could be possible if the various dispersed data on sectoral investment (classified first by ownership, or channel of management) were reconciled and combined with assumptions to make up for the lack of data. This is currently not pursued here.

5.3.4 TFP growth of the directly reporting industrial enterprises

461. Value added at current prices is provided in Appendix 11 for the years 1993-02 following the GB1994, and in Appendix 12 for 2003 following the GB2002, with values for 2004 not available. This allows the calculation of growth rates only through the years 2002. Sector-specific deflators are provided in the same appendices through GOV in current and 1990 prices; sector specific deflators for 1998 are not available (GOV in 1990 prices is not available) and the negative 5.3% deflator value from all industry in the NIPA (Appendix 8) is applied indiscriminately across all individual industrial sectors.

462. Mid-year employment values for 1993-2002 are provided in Appendix 16 (with the first of the two sets of 1995 employment values used in the following).

463. Capital values for 1993-2002 are provided in Appendix 30 and are deflated to year 2000 prices using the (total) investment in fixed assets price index (Appendix 24) indiscriminately for all individual industrial sectors. End-year values are used; it would be no difficulty to switch to mid-year values by taking the mean of previous year end-year and current year end-year values (the first year would be lost to the analysis).

464. The weights for labor are the labor shares reported for industry in Appendix 32 and in Appendix 33, and the weights for capital the capital shares obtained as one minus labor share value.

465. The TFP growth rates, in annual and cumulative form, are reported in Table 36. While overall TFP growth trends tend to be positive and of values that one would typically expect, such time series interpretations could be unreliable due to the simplifying assumptions made in the derivation of real capital. Cumulatively, for the DRIEs in total, TFP grew by 75% between 1993 and 2002, and would have grown faster had there not been a dip in 1994 and 1995 (which could be due to the only gradual revaluations across enterprises).

466. Cross-sectional comparisons should be fully valid. Examining the cumulative values, TFP growth is low in mining, medium in such industries as food processing/food production, plastic products, or cultural, educational and sports goods, and high in furniture making, medical and pharmaceutical products, transport equipment manufacturing, and especially in electronic and telecommunications equipment.

6. FUTURE CALCULATION OF PRODUCTIVITY

6.1 Economy-wide and sectoral data

467. Value added on the 20 sectors following the GB2002 will certainly be available in the future. Output data are not published with an urban-rural distinction, a trend that is occurring in the employment and investment statistics.

468. Economy-wide employment data will certainly be available in the future, and probably also (revised) employment in the three main economic sectors. The report form employment data in the 16-sector classification ended with the 2002 data. These data were problematic all along due to their limited coverage, and due to the large residual "others" in the tertiary sector (in contrast to the small residual "others" in value added).

469. Sectoral data that are likely to continue are the urban employment data available for the years since 1994 according to the 16-sector GB1994 and more recently the 20-sector GB2002. These could be combined with the rural employment data, so far published with a breakdown into six sectors. It is conceivable that the rural data will come with a more detailed classification in the future.

470. Economy-wide gross fixed capital formation (GFCF) data will certainly be available in the future. The GFCF data by main economic sector have in the past only been published at the provincial level, and so far with a time lag of several years (in two historical compendia, *GDP 1952-95*, and *GDP 1996-2002*). The 31 provincial annual statistical yearbooks are likely to report these data on an annual basis.[162] Alternatively, effective investment values by sector could be used to break down GFCF into sectoral values, or could be used in their own right.

471. In the future, effective investment values are likely to be available for the 20 sectors in the GB2002, and in even more detail, for the urban areas. Rural effective investment can be decomposed into sectoral values using the since 2003 available rural investment expenditure values with the 20 sectors in the GB2002; the rural sectoral values appear to be published only in the (sporadically appearing) *Investment Yearbook*, but sectoral proportions could, if need be, interpolated or extrapolated for years with missing data. Alternatively, economy-wide effective investment itself could be decomposed into the 20 sectoral values using the sectoral (20 sectors, GB2002) investment expenditure values reported in the *Statistical Yearbook* (so far for 2003 and 2004).

472. Depreciation values in the NIPA are likely to continue to be published at the provincial level and reported in the *Statistical Yearbook*, with typically a one- or two-year time lag.

473. Average wage data for staff and workers in the 20 sectors (GB2002) are likely to continue to be published in the future. The publication of a sector-specific real growth rate—which allows sector-specific price corrections—appears to have ended with the 2002 data (which followed the GB1994), and the aggregate urban CPI will have to be used to deflate the nominal values.

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[162] *Shaanxi Statistical Yearbook 2005*, p. 52, even provides a more detailed breakdown that includes mining and quarrying, manufacturing, utilities, construction, and five exhaustive tertiary sector sub-sectors.

474. Similarly, average wage data for staff and workers at the second-level sectoral classification are likely to continue to be published. The second-level sectoral classification comprises all 39 industrial sectors. An alternative but (due to an extremely high overlap) very similar series is the average wage data on all employees in urban units.

475. Labor remuneration values are likely to continue to be published at the provincial level, similar to the depreciation values, and presumably following the GB2002. The challenge will be to either obtain from the NBS or to construct suitable employment values, where the constraint is on the rural sectoral data (see above).

6.2 Directly reporting industrial enterprises

476. Value added of the DRIEs by industrial sector has so far not been published for 2004, and it is possible that it may no longer be published in the future. The same is true for GOV in current or in fixed prices.

477. The published data by industrial sector include sales revenue—i.e., an approximation of gross output value would be possible—but do not include intermediate inputs. Fixed ratios of intermediate inputs to sales revenue obtained from the past could be applied to the future. On the income side, only profit and tax data are available, not enough to reconstruct value added.

478. As deflators for the individual industrial sectors, the ex-factory price index with its breakdown into 14 categories could be used.

479. Employment and original fixed asset values for the individual industrial sectors are likely to continue to be published in the future.

6.3 Extensions

480. With the population of individual Chinese provinces the size of European countries, at some point it may become relevant to extend the analysis to the provincial level. In principle, the various types of national data used here are all available at the provincial level, too. The primary source of provincial data are the individual provincial statistical yearbooks, perhaps supplemented by *GDP 1952-95*, *GDP 1996-2002*, and the compendia *Seventeen Years*, *Fifty Years*, and *Fifty-five Years*.

6.4 Further observations

6.4.1 Urban-rural distinction

481. For employment and investment, the NBS appears to be gradually moving towards a primary urban-rural distinction in its data, with very detailed data on the urban areas, and less detailed data on the rural areas. However, this split is not implemented for output values, which makes hampers the calculation of productivity measures.

482. The distinction is probably welcome, since it comes with corresponding, different degrees of reliability. The urban values are likely to be quite reliable, and the rural values less so. It remains up to the researcher to combine the two. A downside of the new primary

distinction is that the definition of urban vs. rural areas appears to have changed frequently over the years. While it is likely to be consistent in recent years, since the distinction has taken on so much importance, it is not sure that this will also be the case in the future.

6.4.2 Detailed statistics

483. The various investment statistics that are available suggest that the NBS has at its disposal a database that far exceeds what is being published. The NBS probably has far more detailed data on investment and possibly GFCF than is being published, including cross-classifications between sectors and type (structure) of investment. The same may be true for value added. The weakest data appear to be the employment statistics.

6.4.3 Changes in sectoral classification

484. The changes in sectoral classification over time raise severe challenges for the calculation of productivity measures. This affects primarily the tertiary sector sub-sectors. It seems virtually impossible to link the GB2002 to the GB1994 for the tertiary sector sub-sectors; for the primary and secondary sector, the statistical break may be small enough to be ignored (although this is not certain for the sector construction). New time series may have to be started for the tertiary sector sub-sectors, although an attempt could be made to link some of the tertiary sector sub-sectors across the GB1994-2002 divide.

485. Unfortunately, the GB2002 does not conform with the ISIC Rev. 3, so that, should China in the future adopt the ISIC Rev. 3 (or a later version), another statistical break will occur. The NBS claims that at the third or fourth level of the GB2002, individual sectors can be re-aggregated to match the ISIC Rev. 3, and that its computers have been programmed to be able to do so. This would mean a completely new set of statistics classified unlike all those published so far.

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Table 1. National GDP / Value Added Data: Key Sources and Their Data Coverage

	- - - *Statistical Yearbook* - - - nominal values	real growth	- - - *GDP 1952-95* and *GDP 1996-2002* - - - nominal values	real growth
Production approach				
Total	since 1978, published starting with *1988* issue	same as on left	1952-1995; 1996-2002 [also by province]	same as on left
Main economic sectors[a]	since 1978, published starting with *1988* issue, no sub-categories of secondary sector before *1990* issue and of tertiary sector before *1991* issue	same as on left	1952-1995 and 1996-2002 (*GDP 1952-95* has exhaustive details on "other services" in 6 categories for 1952-95) [also by province]	same as on left
Detailed tertiary sector classification[b]	13 sub-sectors since 1990, published starting with *1998* issue	same as on left	12 sub-sectors for 1990-1995; 13 sub-sectors for 1996-2002 [also by province]	same as on left
Within industry: industrial sectors[c]	only for DRIEs: nominal value added since 1992 (also nominal GOV, and GOV in base year prices, in these and other years)	n.a.	n.a.	n.a.
Expenditure approach[d]	since 1978, published starting with *1995* issue; net export data (no separate export and import data)	n.a.[e]	1952-95: only consumption and gross capital formation (and their sub-categories); provincial data come with total and net export data, occasionally also export/import data for some years. 1996-2002: same, but with total and net export data; provincial data occasionally come with export/import data for some years	1952-95, 1996-2002: only for consumption and gross capital formation (and sub-categories)
Income approach[f]	provincial data only, starting with 1993 data in *1995 issue* [no 1995 data]	n.a.	provincial data only, starting with 1978 data, with a breakdown according to main economic sectors	n.a.

n.a.: not available.

a Main (economic) sectors: primary sector, secondary sector (with a breakdown into industry and construction), tertiary sector (with a breakdown into transportation & communication, commerce & catering, and an implicit category other services).

b Detailed tertiary sector breakdown: (i) services for farming, forestry, animal husbandry, and fishery, (ii) geological prospecting and water conservancy, (iii) transport and storage, (iv) post and telecommunications, (v) wholesale and retail trade and catering services, (vi) finance and insurance, (vii), real estate, (viii) social services, (ix) health care, sports and social welfare, (x) education, culture and arts, radio, film and television, (xi) scientific research and polytechnic services, (xii) government agencies, party agencies and social organizations, (xiii) others. In *GDP 1952-95*, the last two categories are combined into one.

c For the years 1980-84, the *Statistical Yearbook* series reports output data on 13 sectors and a total (with limited enterprise coverage, for details see Holz and Lin, 2001a); in the period 1985 through 1992, the *Statistical Yearbook* reports output (and data on various balance sheet and profit and loss account items) for the DRIE in each of 30 industrial sectors (apart from a "total" that may further comprise the military industry, and perhaps some residual small "other" item); value added values are available since 1992 (and net material product values for 1992 and earlier years). In the period 1993 through 1997, the industry classification changes to cover the DRIE in 39 individual sectors (with possibly only the military industry omitted); beginning with 1998, the coverage extends to 37 industrial sectors, and since 2003 to 39 industrial sectors. The *Industrial Yearbook* series reports similar data. For example, the *Industrial Yearbook 1994*, *1995*, and *1998* (with no 1996 and 1997 issues) report the same data as the *Statistical Yearbook* on 37 sectors for 1993, 1994, and 1997, including by province (unlike in the *Statistical Yearbook*, which reports sectoral data at the national level only). The *Industrial Yearbook* issues of *2001* through *2004* report on 37 sectors in 1999-2002 and 39 industrial sectors in 2003; provincial sectoral data are only available for 25 sectors. The *Industrial Census 1995* volumes have detailed data for 1995. The *Statistical Yearbook* of a particular year reports the industry data of the previous year only (i.e., no earlier data), in its industry section (not in the NIPA section). The *Industrial Yearbook* of a particular year also reports the industry data of the previous year only, except for the *2001* issue which has data for 1999 and 2000. *Industry, Transport, and Energy 50 Years*, reports value added by sector for 1993-99, and net material product by sector for 1985-92; the *Statistical Yearbook* and *Industrial Yearbook* series together report the data of the same (and other) years. The *Economic Census 2004* does not report value added for the DRIEs.

d Total, with breakdown into consumption (household, government), gross capital formation (gross fixed capital formation, inventory investment), exports, and imports.

e Starting with the *1998* issue, data on the real growth in per capita household consumption are available for the years 1978, 1980, 1985, and 1987 on. (Later issues drop values of some of the earlier years.)

f Total, with breakdown into labor remuneration (compensation of employees, *laodongzhe baochou*), depreciation, net taxes on production, and operating surplus.

Table 2. Three Approaches to GDP Calculation (values in %)

	1993			1994			1995			2000			2003		
	P/E	P/I	E/I	P/E	P/I	E/I	P/E	P/I	E/I	P/E	P/I	E/I	P/E	P/I	E/I
National	91			97			98			100			96		
Beijing	100	100	100	82	100	122	82	100	122	100	100	100	100	100	100
Tianjin	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Hebei	93	93	100	100	98	98	100	100	100	100	100	100	100	100	100
Shanxi	92	92	100	100	100	100	100	100	100	100	100	100	98	100	102
Inner Mon.	91	91	100	100	100	100	102	100	98	101	100	99	99	100	101
Liaoning	90	90	100	105	105	100	100	100	100	100	100	100	100	100	100
Jilin	94	94	100	103	103	101	99	100	101	98	100	102	97	100	103
Heilongj.	90	90	100	100	100	100	100	100	100	101	100	99	105	100	96
Shanghai	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Jiangsu	92	92	100	101	100	99	101	100	99	101	100	99	100	100	100
Zhejiang	89	89	100	100	100	100	99	100	101	100	100	100	100	100	100
Anhui	92	92	100	100	100	100	100	100	100	100	100	100	100	100	100
Fujian	91	91	100	100	100	100	100	100	100	101	100	99	101	100	99
Jiangxi	97	97	100	109	109	100	99	100	101	101	100	99	100	100	100
Shandong	97	97	100	102	100	98	102	100	98	100	100	100	100	100	100
Henan	95	95	100	99	99	100	100	100	100	100	100	100	100	100	100
Hubei	90	91	101	99	100	101	98	100	102	103	100	97	100	100	100
Hunan	93	93	100	100	100	100	100	100	100	100	100	100	100	100	100
Guangdong	100	100	100	100	100	100	94	100	107	100	100	100	100	100	100
Guangxi	88	88	100	100	100	100	100	100	100	100	100	100	100	100	100
Hainan	87	87	100	100	100	100	100	100	100	100	100	100	100	100	100
Chongqing										99	100	101	97	100	103
Sichuan	93	93	100	100	100	100	100	100	100	100	100	100	100	100	100
Guizhou	98	98	100	101	100	99	100	100	100	100	100	100	100	100	100
Yunnan	85	85	100	100	100	100	100	100	100	100	100	100	100	100	100
Tibet	101	81	81	98	100	102	80	100	124	98	100	102	100	100	100
Shaanxi	92	92	100	104	104	100	100	100	100	100	100	100	100	100	100
Gansu	96	96	100	100	100	100	100	100	100	100	100	100	100	100	100
Qinghai	96	96	100	100	100	100	100	100	100	104	100	96	100	100	100
Ningxia	94	95	100	100	100	100	100	100	100	100	100	100	100	100	100
Xinjiang	95	95	100	100	100	100	101	100	99	100	100	100	100	100	100
Min	85	81	81	82	98	98	80	100	98	98	100	96	97	100	96
Max	101	100	101	109	109	122	102	100	124	104	100	102	105	100	103
SD	4.2	4.5	3.5	3.9	2.0	4.0	4.8	0.0	5.9	1.1	0.0	1.1	1.3	0.0	1.3
Mean	94	93	99	100	101	101	99	100	102	100	100	100	100	100	100

P, E, I: Provincial GDP calculated using the production approach, expenditure approach, and income approach. P/E: Provincial GDP calculated using the production approach divided by provincial GDP calculated using the expenditure approach. P/I and E/I are similarly defined.

1993 is the first year for which the *Statistical Yearbook* reports provincial expenditure and income approach GDP, 2003 the latest year for which the *Statistical Yearbook* (*2004* and *2005*) report (provincial) income approach GDP.

Sources: national values: *Statistical Yearbook 1994*, pp. 32, 36; *1995*, pp. 32, 36; *1996*, pp. 42, 46; *2001*, pp. 49, 61; *2004*, pp. 53, 65; provincial values: 1993: *Statistical Yearbook 1993*, pp. 34, 38, *1995*, p. 41; 1995: *Statistical Yearbook 1996*, p. 43, *1997*, p. 48, *GDP 1952-95*, p. 79; 2000: *Statistical Yearbook 2001*, pp. 57, 60, 63; 2003: *Statistical Yearbook 2004*, pp. 61, 64, 67.

Table 3. Sum of Provincial Value Added Divided by Nationwide Value Added

	Total (GDP)	Primary sector	Secondary sector	# Industry	# Construction	Tertiary sector
Production approach						
1993[a]	1.091	1.028	1.004	1.001	1.019	1.307
1994	1.013	0.982	1.013	1.024	0.946	1.019
1995	0.989	0.996	0.957	n.a.	n.a.	1.034
1996	1.000	1.004	0.950	0.960	0.886	1.077
1997	1.029	1.047	0.981	0.994	0.898	1.093
1998	1.043	1.018	0.997	0.998	0.994	1.123
1999	1.070	1.011	1.008	1.003	1.043	1.194
2000	1.087	1.044	1.007	0.998	1.065	1.232
2001	1.113	1.064	1.016	1.005	1.087	1.283
2002	1.126	1.006	1.038	1.023	1.139	1.316
2003	1.156	1.005	1.084	1.069	1.178	1.336
2004	1.193	1.006	1.139	1.128	1.213	1.370

	Total (GDP)	Final con-sump-tion	# House-hold cons.	## Rural house-holds	## Urban house-holds	# Gov-ernment	Gross capital forma-tion	# Fixed capital form.	# Change in inven-tories	Net exports
Expenditure approach										
1993	0.990	0.911	0.924	0.978	0.869	0.868	1.038	0.916	1.803	-0.665
1994	0.978	0.909	0.920	0.989	0.855	0.867	1.084	0.911	2.998	0.811
1995	0.979	0.892	0.887	0.933	0.842	0.909	1.106	0.964	2.063	1.086
1996	0.999	0.923	n.a.	n.a.	n.a.	n.a.	1.120	n.a.	n.a.	0.841
1997	1.009	0.922	0.894	0.924	0.864	1.041	1.160	0.994	2.640	0.849
1998	1.035	0.942	0.912	0.955	0.873	1.059	1.210	1.034	3.450	0.708
1999	1.061	0.942	0.902	0.950	0.861	1.095	1.245	1.061	6.564	1.196
2000	1.088	0.960	0.910	0.948	0.879	1.143	1.278	1.067	-17.365	1.470
2001	1.080	0.985	0.912	0.940	0.891	1.240	1.211	1.056	10.020	1.417
2002	1.097	1.029	0.947	0.948	0.946	1.317	1.195	1.063	30.951	1.111
2003	1.115	1.064	0.965	0.943	0.980	1.420	1.198	1.095	40.715	0.795
2004	1.147	1.097	0.990	0.919	1.038	1.481	1.243	1.138	13.796	0.604

# denotes a sub-category, ## a sub-sub-category. The list of sub-categories is complete, as is the list of sub-sub-categories.

a The large downward adjustments to provincial production-income approach GDP in 1993 are due to the fact that 1993 provincial-level data, published a year late, already incorporate the retrospective upward revisions to GDP following the tertiary sector census, while the nationwide data do not.

1993 is the first year in which GDP data calculated according to the expenditure approach became available in the *Statistical Yearbook*. Provincial-level expenditure data for 1993 and 1994 were published only in the *Statistical Yearbook 1995* and *1996*, i.e. one year late; this implies that provincial-level data could be revised data (while nationwide data are those as first published). In all other instances, both provincial and nationwide data are as first published, since no revised provincial data are usually published.

Sources: *Statistical Yearbook 1994*, pp. 32, 35; *1995*, pp. 32-4, 36-40; *1996*, pp. 42-44, 46-50; *1997*, pp. 42, 44, 46-50; *1998*, pp. 55, 62f., 67-71; *1999*, pp. 55, 63, 67-71; *2000*, pp. 53, 60f., 65-9; *2001*, pp. 49, 57, 60-65; *2002*, pp. 51, 59, 63-7; *2003*, pp. 55, 63, 67-71; *2004*, pp. 61, 67-9; *2005*, pp. 59, 65-7; *GDP 1952-96*, p. 106 (for year 1996 expenditure approach provincial-level value added).

Table 4. Official Real GDP Growth Rate Less Weighted Sum Sectoral Real Growth Rates

	Weights for sum sectoral real growth rates:			
	current-year	previous year	Törnqvist	decade (1980, 1990, 2000)
1978	0.1			
1979	0.1	0.1	0.1	
1980	0.4	0.6	0.7	0.4
1981	-0.2	-0.1	-0.1	-0.1
1982	-0.1	0.0	0.0	0.1
1983	0.1	0.2	0.2	0.1
1984	0.0	0.1	0.1	0.1
1985	-0.3	0.4	0.3	0.0
1986	-0.1	0.0	0.0	0.3
1987	0.1	0.1	0.2	0.5
1988	0.3	0.4	0.5	0.7
1989	0.0	0.0	0.0	0.2
1990	-0.2	-0.1	-0.2	-0.2
1991	-0.2	0.0	0.0	0.0
1992	-0.4	0.0	0.0	0.2
1993	-0.4	0.1	0.0	0.6
1994	-0.1	-0.1	0.1	0.9
1995	0.1	0.2	0.2	0.7
1996	0.2	0.2	0.2	0.7
1997	0.1	0.1	0.1	0.6
1998	0.1	0.1	0.1	0.6
1999	0.1	0.1	0.1	0.6
2000	0.2	0.3	0.3	0.2
2001	0.0	0.0	0.0	0.0
2002	-0.1	0.0	0.0	0.0
2003	-0.1	0.0	0.0	0.1
2004	0.0	0.0	0.0	0.1
Sum abs. dev.	3.9	3.4	3.6	8.0
Maximum	0.4	0.6	0.7	0.9
Average	-0.01	0.11	0.12	0.30
Standard dev.	0.18	0.15	0.17	0.29

Sectoral growth rates are those of the primary, secondary, and tertiary sectors.
Weights are provided by the shares of sectoral nominal value added in nominal GDP.
Törnqvist weights are the arithmetic mean of previous-period and current period shares.
Source: *Statistical Yearbook 2005*, pp. 51, 53.

Table 5. Annual Real GDP Growth Rates (in %)

	As first published	As in *Statistical Yearbook 2005*	*Statistical Yearbook 2005* nominal values, first implicit deflator	2004 economic census benchmark revisions	2004 economic census nominal values, first implicit deflator
1987	10.4 / 11.1	11.6			
1988	10.4 / 11.2	11.3			
1989	3.5 / 4.3	4.1			
1990	5.0 / 3.9	3.8	3.6		
1991	7.8 / 8.0	9.2	12.0		
1992	13.2	14.2	17.2		
1993	13.4	13.5	14.5	14.0	16.9
1994	11.8	12.6	15.5	13.1	16.9
1995	10.5	10.5	10.4	10.9	11.4
1996	9.6	9.6	8.1	10.0	9.0
1997	8.8	8.8	8.1	9.3	9.1
1998	7.8	7.8	6.3	7.8	7.6
1999	7.1	7.1	7.1	7.6	8.5
2000	8.0	8.0	7.8	8.4	9.3
2001	7.3	7.5	8.8	8.3	10.6
2002	8.0	8.3	8.4	9.1	10.2
2003	9.3	9.5	9.4	10.0	10.9
2004	9.5	9.5	n.a.	10.1	11.0

Explanations and sources:

As first published: individual issues of the *Statistical Yearbook* series. 1987-91 data on GDP are not available; for these years, the first figure represents the weighted average of the real growth rates of the three main economic sectors (using earlier-year nominal values as weights), the second figure is the one published retrospectively in *Statistical Yearbook 1993*, pp. 31f.

As in *Statistical Yearbook 2005*: *Statistical Yearbook 2005*, p. 53.

Statistical Yearbook 2005 nominal values, first implicit deflator: the first published implicit deflators for the primary sector, industry, construction, and the tertiary sector (from nominal values and real growth rates as first published in the Statistical Yearbooks series, with the industry-construction distinction first available in the *Statistical Yearbook 1991*) are applied to the nominal values of these sectors for all years as reported in the *Statistical Yearbook 2005* in order to obtain these sectors' real growth rates, which are then aggregated into real GDP growth rates using a Törnqvist index with the nominal shares from the *Statistical Yearbook 2005* as weights. (The latter step involves first aggregating to secondary sector real growth rates, and then to real GDP growth rates.)

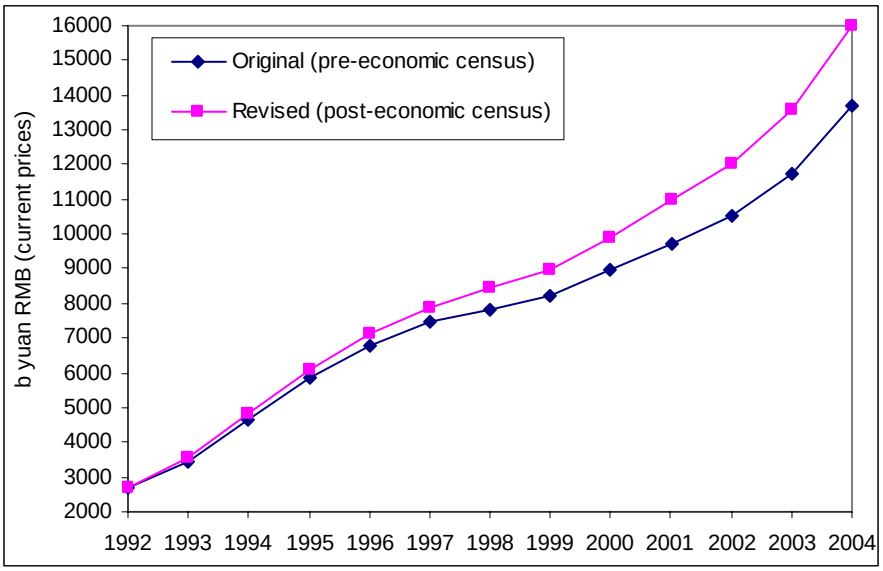
2004 economic census benchmark revisions: *Economic Census 2004* (9 Jan. 2006).

2004 economic census nominal values, first implicit deflator: same procedure as in third column, but with nominal values from the *Economic Census 2004* (9 Jan. 2006) rather than the *Statistical Yearbook 2005*.

Table 6. Economic Census 2004 Results

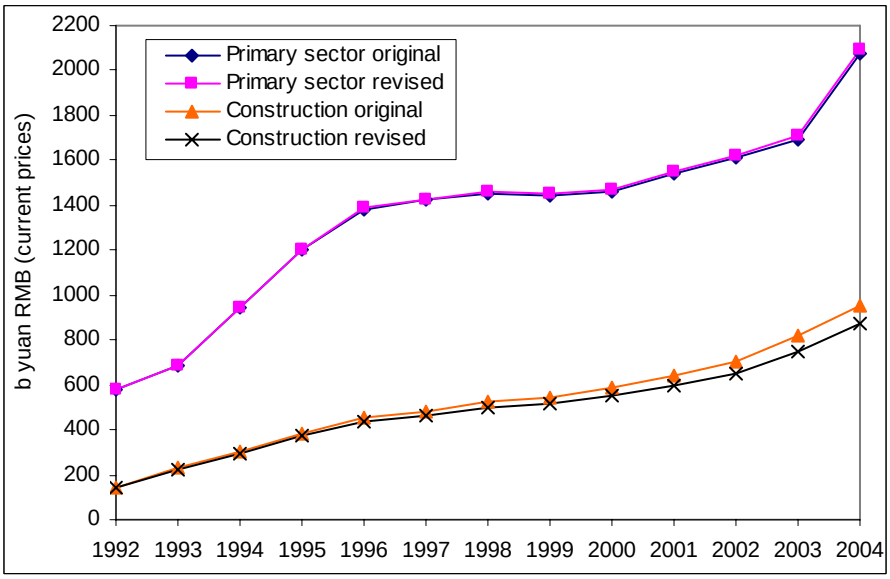
	GDP	Primary sector	Secondary sector	# Industry	# Construction	Tertiary sector
Nominal values (100m yuan), 2004 economic census						
1993	35334	6887	16454	14188	2266	11992
1994	48198	9471	22445	19481	2965	16281
1995	60794	12020	28679	24951	3729	20094
1996	71177	13886	33835	29448	4387	23456
1997	78973	14265	37543	32921	4622	27165
1998	84402	14618	39004	34018	4986	30780
1999	89677	14548	41034	35861	5172	34095
2000	99215	14716	45556	40034	5522	38942
2001	109655	15516	49512	43581	5932	44627
2002	120333	16239	53897	47431	6465	50197
2003	135823	17068	62436	54946	7491	56318
2004	159878	20956	73904	65210	8694	65018
Percentage difference in economic census values vs. the national values in Statistical Yearbook 2005						
1993	2.0	0.1	0.2	0.3	-0.8	5.9
1994	3.1	0.1	0.3	0.6	-1.6	9.0
1995	4.0	0.2	0.5	0.9	-2.4	12.0
1996	4.8	0.3	0.7	1.3	-3.2	14.8
1997	6.1	0.4	0.9	1.6	-3.9	18.0
1998	7.7	0.5	1.0	1.9	-4.7	22.3
1999	9.3	0.5	1.2	2.2	-5.5	26.1
2000	10.9	0.6	1.4	2.5	-6.2	30.2
2001	12.7	0.7	1.6	2.8	-6.9	34.6
2002	14.4	0.8	1.7	3.2	-7.7	39.1
2003	15.7	0.8	1.9	3.5	-8.4	43.7
2004	16.8	0.9	2.1	3.8	-9.2	48.7
Percentage difference in economic census values vs. sum provincial (pre-economic census) values in the Statistical Yearbook series						
1993	3.2	0.7	0.9	0.2	5.6	8.1
1994	6.2	2.2	4.2	3.7	8.1	11.7
1995	5.5	0.6	6.3	n.a.	n.a.	7.4
1996	3.8	-0.4	6.0	5.5	9.3	3.2
1997	2.6	-2.4	4.1	4.3	2.5	3.4
1998	2.0	-1.7	1.1	2.0	-4.7	5.0
1999	2.3	-0.5	0.7	2.2	-8.9	5.6
2000	2.1	-0.9	-0.5	1.4	-12.4	6.5
2001	2.7	-0.2	-0.7	1.7	-15.5	7.9
2002	2.0	0.1	-3.0	-0.3	-19.0	8.6
2003	0.2	-0.6	-6.0	-3.2	-22.3	8.4
2004	-2.1	0.3	-10.4	-7.9	-25.1	8.5
Post-economic census: percentage difference in national values vs. sum provincial values (Statistical Abstract 2006)						
2004	4.8					
2005	7.8	0.0	11.8	11.4	15.1	5.7

Sources: *Economic Census 2004* (announcement of 9 Jan. 2006, with original and revised nominal values), originally published national values (incorporating the annual revisions) from *Statistical Yearbook 2005*, p. 51; originally published provincial values from each year's issue of the *Statistical Yearbook* (provincial values are never revised in the *Statistical Yearbook*— the 1993 provincial values incorporate the 1993 benchmark revisions following the 1991/92 tertiary sector census, the original national values do not); 2005 values from the *Statistical Abstract 2006*, pp. 20f., 31f.



Sources: pre-economic census values from *Statistical Yearbook 2005*, p. 51, post-economic census values (for 1993-2004) from *Economic Census 2004* (9 Jan. 2006).

Figure 1. Pre- and Post-Economic Census GDP



Sources: pre-economic census values from *Statistical Yearbook 2005*, p. 51, post-economic census values (for 1993-2004) from *Economic Census 2004* (9 Jan. 2006).

Figure 2. Pre- and Post-Economic Census Primary Sector and Construction Value Added

Table 7. Original Vs. Revised Real Growth Rates (2004 Economic Census)

	GDP					Primary sector				
	Real growth rate (%)			Implicit defl. (%)		Real growth rate (%)			Implicit defl. (%)	
	Orig.	Rev.	Mix	Orig.	Rev.	Orig.	Rev.	Mix	Orig.	Rev.
1993	13.5	14.0	15.8	14.6	16.4	4.7	4.7	4.8	13.3	13.4
1994	12.6	13.1	13.6	19.9	20.6	4.0	4.0	4.1	32.1	32.2
1995	10.5	10.9	11.3	13.2	13.7	5.0	5.0	5.1	20.8	20.9
1996	9.6	10.0	10.3	5.9	6.4	5.1	5.1	5.2	9.8	9.9
1997	8.8	9.3	9.6	0.8	1.5	3.5	3.5	3.6	-0.8	-0.7
1998	7.8	7.8	9.2	-2.4	-0.9	3.5	3.5	3.6	-1.1	-1.0
1999	7.1	7.6	8.3	-2.2	-1.3	2.8	2.8	2.9	-3.3	-3.2
2000	8.0	8.4	9.2	0.9	2.1	2.4	2.4	2.5	-1.3	-1.2
2001	7.5	8.3	9.1	1.2	2.1	2.8	2.8	2.9	2.5	2.6
2002	8.3	9.1	10.0	-0.2	0.6	2.9	2.9	3.0	1.6	1.7
2003	9.5	10.0	10.9	1.9	2.6	2.5	2.5	2.6	2.5	2.5
2004	9.5	10.1	11.0	6.5	6.9	6.3	6.3	6.4	15.4	15.5

	Secondary sector					# Industry				
	Real growth rate (%)			Implicit defl. (%)		Real growth rate (%)			Implicit defl. (%)	
	Orig.	Rev.	Mix	Orig.	Rev.	Orig.	Rev.	Mix	Orig.	Rev.
1993	19.9	19.9	20.0	17.1	17.3	20.1	20.1	20.5	14.5	14.9
1994	18.4	18.4	18.4	15.0	15.2	18.9	18.9	19.3	15.1	15.5
1995	13.9	13.9	14.0	12.0	12.2	14.0	14.0	14.4	12.0	12.3
1996	12.1	12.1	12.2	5.1	5.2	12.5	12.5	12.8	4.6	4.9
1997	10.5	10.5	10.3	0.2	0.4	11.3	11.3	11.6	0.1	0.4
1998	8.9	8.9	9.1	-4.7	-4.6	8.9	8.9	9.2	-5.4	-5.1
1999	8.1	8.1	8.1	-2.8	-2.7	8.5	8.5	8.8	-3.1	-2.8
2000	9.4	9.4	9.5	1.3	1.5	9.8	9.8	10.1	1.4	1.7
2001	8.4	8.4	8.7	0.1	0.3	8.7	8.7	9.0	-0.2	0.1
2002	9.8	9.8	10.0	-1.0	-0.9	10.0	10.0	10.3	-1.4	-1.1
2003	12.7	12.7	12.9	2.6	2.8	12.8	12.8	13.2	2.4	2.7
2004	11.1	11.1	11.3	6.3	6.5	11.5	11.5	11.8	6.1	6.4

	# Construction					Tertiary sector				
	Real growth rate (%)			Implicit defl. (%)		Real growth rate (%)			Implicit defl. (%)	
	Orig.	Rev.	Mix	Orig.	Rev.	Orig.	Rev.	Mix	Orig.	Rev.
1993	18.0	18.0	17.0	36.9	35.7	10.7	12.1	17.2	11.9	17.1
1994	13.7	13.7	12.8	16.0	15.1	9.6	11.0	12.9	20.3	22.3
1995	12.4	12.4	11.5	12.8	11.9	8.4	9.8	11.3	10.9	12.4
1996	8.5	8.5	7.6	9.3	8.4	7.9	9.4	10.7	5.5	6.7
1997	2.6	2.6	1.8	3.5	2.7	9.1	10.7	12.1	3.3	4.6
1998	9.0	9.0	8.1	-0.2	-1.0	8.3	8.3	12.3	0.9	4.6
1999	4.3	4.3	3.4	0.3	-0.5	7.7	9.3	11.1	-0.3	1.3
2000	5.7	5.7	4.9	1.8	1.0	8.1	9.7	11.6	2.3	4.1
2001	6.8	6.8	6.0	1.4	0.6	8.4	10.2	12.1	2.3	4.0
2002	8.8	8.8	7.9	1.0	0.2	8.7	10.4	12.4	0.1	1.9
2003	12.1	12.1	11.2	4.2	3.4	7.8	9.5	11.3	0.8	2.5
2004	8.1	8.1	7.2	8.2	7.4	8.3	10.0	12.1	3.0	5.0

Orig.: original values (real growth rates, or implicit deflator) as in the *Statistical Yearbook 2005*.
Rev.: revised values (real growth rates, or implicit deflator) following the 2004 economic census.
Mix: revised nominal values from 2004 economic census combined with implicit deflators from *Statistical Yearbook 2005*; secondary sector real growth rates are aggregates of industry and construction real growth rates (using a Törnqvist index, with 2004 economic census nominal values for weights); real GDP growth rates are aggregates of the three main economic sectors.
Sources: *Economic census 2004* (9 Jan. 2006); *Statistical Yearbook 2005*, pp. 51, 53.

Table 8. Expenditure Approach GDP, Pre- Vs. Post-Economic Census (b yuan RMB)

	--- --- 2004 --- ---			2005
	Statistical Yearbook 2005 (1)	*Statistical Abstract 2006* (2)	(1) / (2)	*Statistical Abstract 2006*
Expenditure approach GDP	14239.42	16028.04	1.1256	18549.62
1. Final consumption	7543.97	8703.29	1.1537	9671.41
(a) household consumption	5899.45	6383.35	1.0820	7084.98
(b) government consumption	1644.52	2319.94	1.4107	2586.43
2. Gross capital formation	6287.53	6916.84	1.1001	8043.66
(a) gross fixed capital formation	6235.14	6511.77	1.0444	7817.64
(b) inventory investment	52.39	405.07	7.7318	226.02
3. Net exports of goods and services	407.92	407.91	1.0000	834.55

Sources: *Statistical Yearbook 2005*, pp. 63f.; *Statistical Abstract 2006*, pp. 34f.

Table 9. Deflators for Industrial Output

	Industrial value added			Industrial GOV[a]		DRIEs GOV[a,c]		GOV of ind. ent. at township level & above		Price indices		Ind. value added via defl. GOV + intermediate inputs[e]
	Statistical Yearbook 2005	*Economic census 2004*	*As first published*	*Statistical Yearbook* issues	Sum provinces[b]	All DRIEs	SOEs	All	Large and medium-sized	Ex-factory pr. index	Purchasing price index[d]	
1979	1.3			1.5	1.1			1.6		1.5		
1980	0.1			0.8	0.3			0.4		0.5		
1981	0.9			0.5	0.5			0.4		0.2		
1982	-0.2			-0.2	-0.3			-0.2		-0.2		
1983	0.1			0.0	0.0			0.0		-0.1		
1984	2.2			1.4	1.3			1.4		1.4		
1985	4.6			5.1	5.0			5.4		8.7	18.0	-4.9
1986	5.0			3.2	2.9			3.3	3.9	3.8	9.5	-3.6
1987	2.1			4.8	5.1			5.2	5.7	7.9	11.0	1.8
1988	9.3			9.2	8.7			9.9	10.4	15.0	20.2	6.8
1989	6.8			11.3	11.1			12.4	14.2	18.6	26.4	6.1
1990	2.3		1.9	0.8	0.9			1.1	3.2	4.1	5.6	0.9
1991	3.1		4.9	-3.0	3.2			3.6	5.8	6.2	9.1	6.4
1992	4.9		3.9	4.2	1.4			3.5	-1.0	6.8	11.0	1.5
1993	14.5	14.9	13.5	9.9	13.4			13.3	27.0	24.0	35.1	13.5
1994	15.1	15.5	10.0	16.7	8.6	7.5	12.4	7.9	9.9	19.5	18.2	16.2
1995	12.0	12.3	10.0	8.9	8.1	9.3	9.5	9.8	6.8	14.9	15.3	12.6
1996	4.6	4.9	4.6	3.8		0.5	0.6	0.3		2.9	3.9	
1997	0.1	0.4	-1.7	1.0	-1.6	-2.6	-1.4	-2.4		-0.3	1.3	
1998	-5.4	-5.1	-5.3	-5.5	-5.1					-4.1	-4.2	
1999	-3.1	-2.8	-3.5	-5.1	-4.2	-4.6	-2.8			-2.4	-3.3	
2000	1.4	1.7	2.6		0.8	0.8	4.0			2.8	5.1	
2001	-0.2	0.1	0.2		-1.9	-2.8	-3.0			-1.3	-0.2	
2002	-1.4	-1.1	-0.2		-1.7	-1.8	-1.5			-2.2	-2.3	
2003	2.4	2.7	2.4			2.3	3.6			2.3	4.8	
2004	6.1	6.4	6.1			0.5				6.1	11.4	

The period covered in the table is 1978 through 2004, which implies that the first deflator is that of 1979 in comparison to 1978.

a The definition of GOV changed in 1995, with for 1995 data available according to both the old and the new stipulations; the new stipulations introduced four differences, of which the most significant one is that since 1995 the value added tax is not included in GOV (for details see Holz and Lin, 2001a). In calculating the deflator, the 1995 data according to the old stipulations was used for the 1995 deflator, and the 1995 data according to the new stipulations for the 1996 deflator.

b The national industrial GOV deflator is derived by comparing the sum provincial nominal industrial GOV to the "sum provincial" real industrial GOV growth rate. The sum provincial real industrial GOV growth rate is obtained by weighting provincial growth rates with the average of previous-year and current year provincial shares in sum provincial industrial GOV, i.e., for simplicity, the "ln version" of the Törnqvist index is used (making use of the fact that, for example, ln(1.05)≈5%).

For Tibet, values are only available since 1994; the contribution of Tibet's 1994 real growth rate to the sum provincial real growth rate uses only the year 1994 provincial nominal value (divided by the sum provincial value) as weight. For Hainan, nominal values are available starting in 1990, and real growth rates starting in 1991. Prior to 1990, Hainan could be included in the Guangdong data in the source, but probably is not. Chongqing data start in 1995/1996; prior to 1996, Chongqing is included in the Sichuan data.

The sum provincial industrial GOV exceeds the national industrial GOV in the *Statistical Yearbook* issues since 1991; the source of the provincial industrial GOV data, *GDP 1952-95*, does not incorporate the revisions following the industrial census of 1995. But the discrepancy also continues after 1995; it is never larger than 9% of the national value.

c In 1998, the group of DRIEs was redefined from "industrial enterprises with independent accounting system at township level and above" to "industrial state-owned enterprises (SOEs) with independent accounting system and all industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB." Starting in 1998, the category "SOEs" also includes state-controlled companies. For the statistical break in 1998, see Holz and Lin (2001b).

The deflator of 1991-2003 is derived from the "constant 1990 price" and current price gross output value series; the fact that there is no "constant 2000 price" gross output value series suggests that the 1990 price manual has been in use at least through 2003. For 2004, a real growth rate instead of a value in constant 1990 prices is published.

d Purchasing price index *of raw material, fuel, and power*.

e Industrial value added obtained via deflated industrial GOV and deflated intermediate inputs: a series of real industrial value added is constructed first, which is then contrasted to the *Statistical Yearbook 2005* series of nominal industrial value added. Real industrial value added is the difference of industrial GOV (the nominal data underlying the fourth data column), deflated by the ex-factory price index, and the value of intermediate inputs, deflated by the purchasing price index. The value of intermediate inputs equals nominal industrial GOV less nominal industrial value added. The calculated series ends in 1995 due to the change in the definition of GOV with a lack of data on value added taxes that would be needed for a continuation of the calculations after 1995.

Sources:

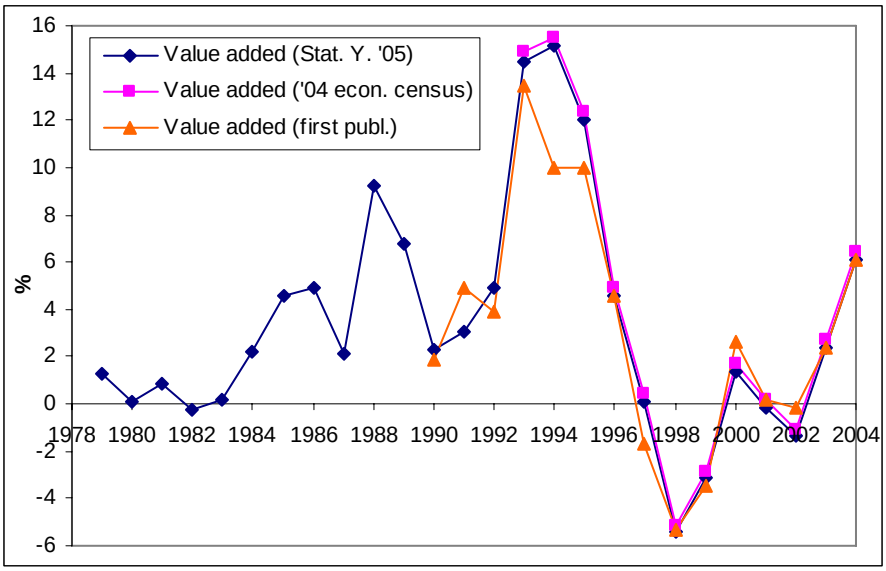
As first published: *Statistical Yearbook* series starting with *1991* issue (when data on industrial value added were first published).

Industrial GOV: *Statistical Yearbook* issues: *Statistical Yearbook 1993*, p. 412; *1996*, p. 403, *1997*, p. 413, *2000*, p. 409; sum provinces: *GDP 1952-95*, *GDP 1996-2002* (pages of each individual province).

DRIEs GOV: *Industrial Yearbook 1994*, pp. 81, 84; *1995*, pp. 79, 82; *1998*, p. 77; *Industrial Census 1995*, pp. 46f.; *Statistical Yearbook 2004*, p. 514; *2005*, p. 488; *Fifty-five Years*, pp. 36f.

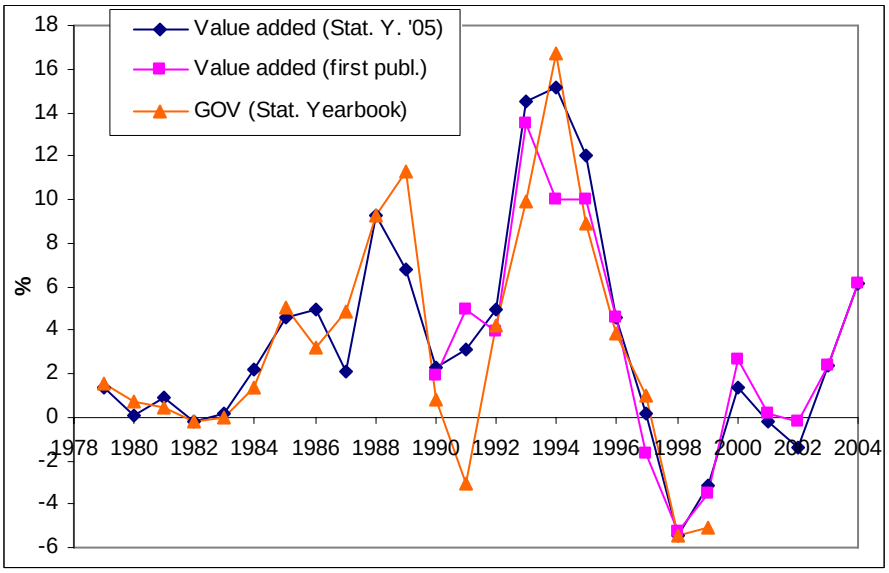
Industrial enterprises at township level and above: *Seventeen Years*, p. 145.

Price indices: ex-factory price index: *Statistical Yearbook 1994*, p. 246; *2004*, p. 323; *2005*, p. 301; purchasing price index of raw material, fuel, and power: *Price Yearbook 1992*, p. 538; *Statistical Yearbook 2004*, p. 323; *2005*, p. 301



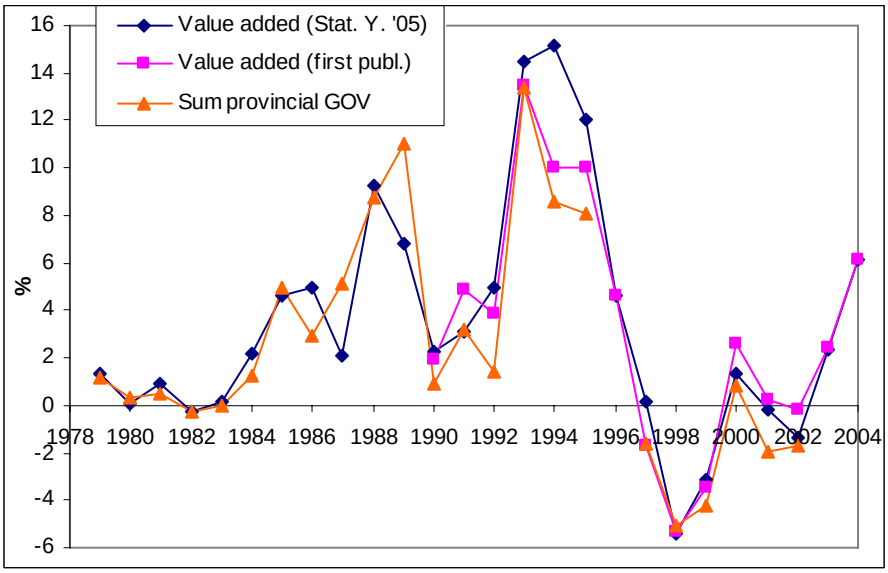
Sources: see Table 9.

Figure 3. Industrial Value Added Deflators



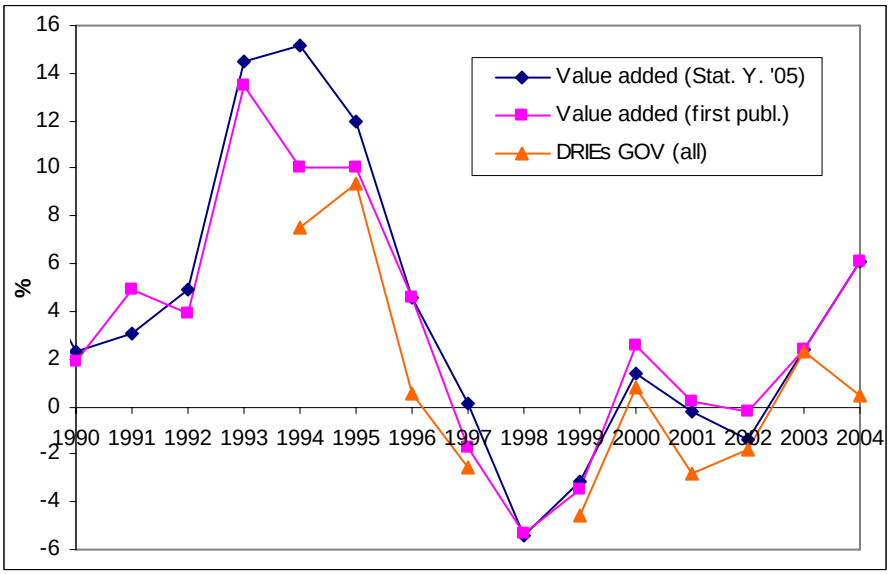
Sources: see Table 9.

Figure 4. Industrial Value Added Deflators Vs. GOV Deflator



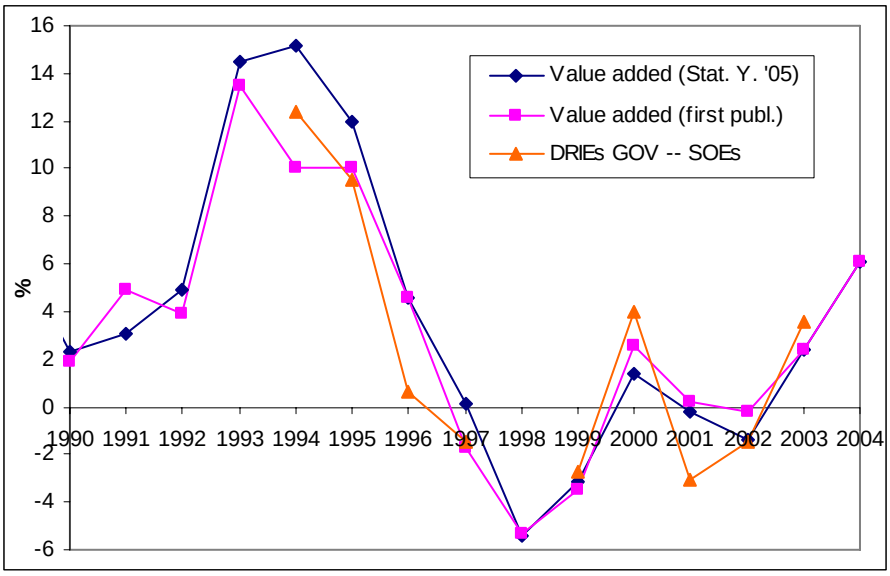
Sources: see Table 9.

Figure 5. Industrial Value Added Deflators Vs. Sum Provincial GOV Deflator



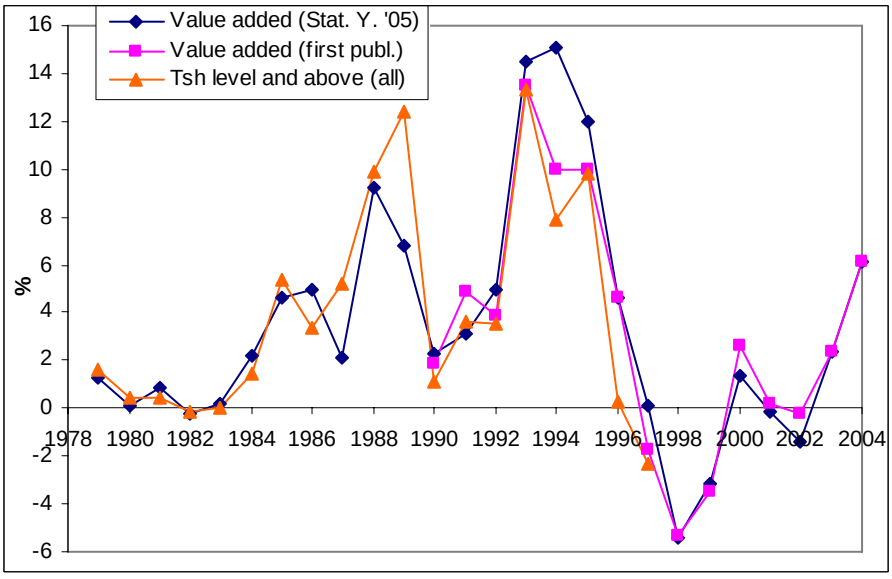
Sources: see Table 9.

Figure 6. Industrial Value Added Deflators Vs. DRIEs GOV Deflator



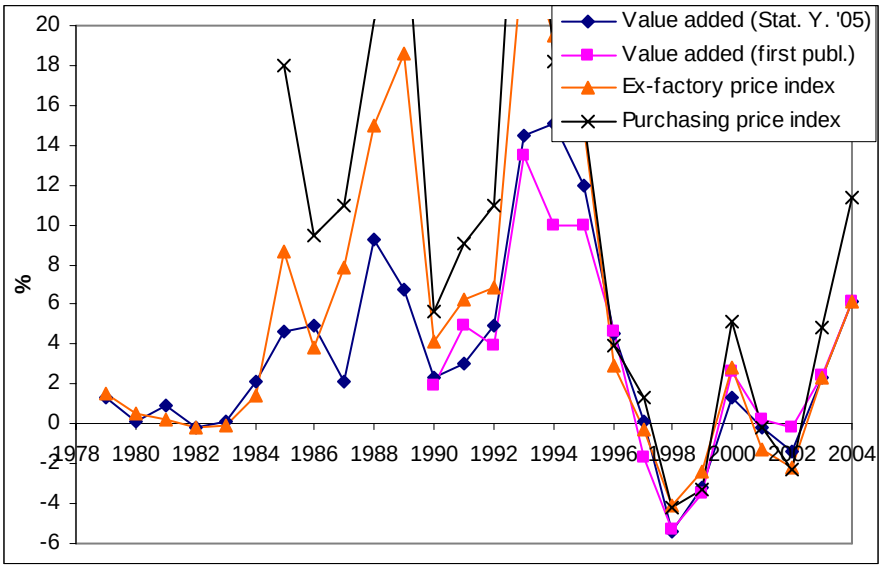
Sources: see Table 9.

Figure 7. Industrial Value Added Deflators Vs. DRIEs GOV SOE Deflator



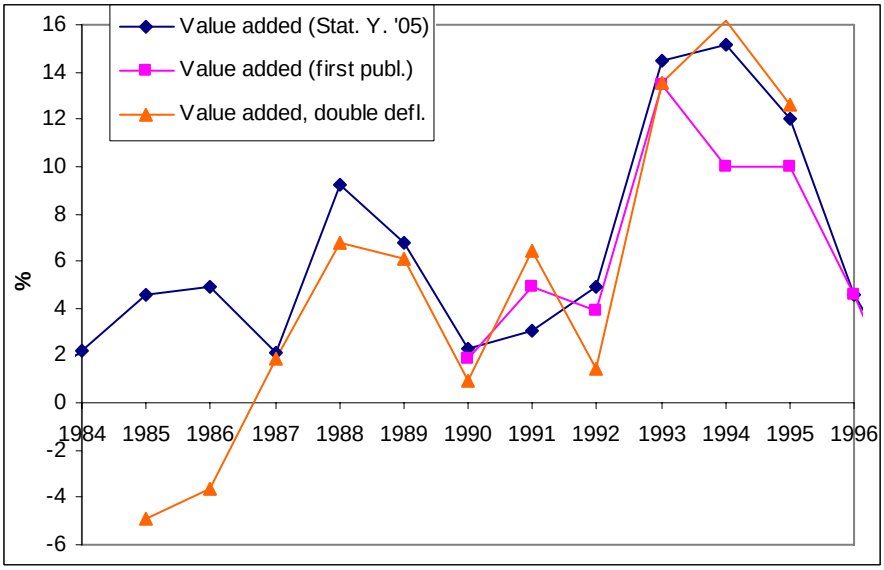
Sources: see Table 9.

Figure 8. Industrial Value Added Deflators Vs. Deflator of Industrial Enterprises at Township Level and Above



Sources: see Table 9.

Figure 9. Industrial Value Added Deflators Vs. Price Indices



Sources: see Table 9.

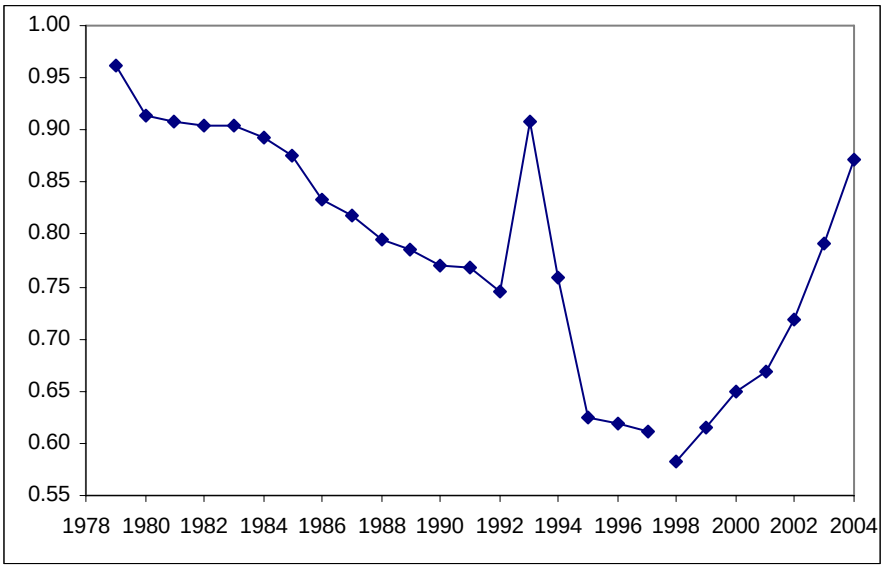
Figure 10. Industrial Value Added Deflators Vs. Double-Deflated Industrial Value Added Deflator

Table 10. Relative Size of Different Enterprise Groups, 1995

	GOV			Value added		
	Value (b yuan RMB)	in % of national value	sectoral data available?	Value (b yuan RMB)	in % of national value	sectoral data available?
1. National	(8229.663)	(100)	--	2435.37	100	--
2. Industrial enterprises and production units	8229.663	100	--	(2435.37)	(100)	--
3. Industrial enterprises	8051.961	98	--	n.a.	n.a.	--
4. Ind. ent. at village level and above; plus private, joint, and individual-owned ind. ent. with annual sales revenue in excess of 1m yuan RMB	6963.096	85	Yes	n.a.	n.a.	--
5. Ind. ent. with independent accounting system at township level and above (DRIE)	5494.686	67	Yes	1544.613	63	Yes
6. DRIE – SOEs	2588.993	31	Yes	830.719	34	Yes

"Industrial enterprises and production units" presumably is the national total. GOV values follow the new stipulations.

Sources: GOV: (2) *Industrial Census 1995*, Vol. 1, p. 1; (3) *Industrial Census 1995*, Vol. 1, p. 2; (4) *Industrial Census 1995*, Vol. 1, pp. 3f., including sectoral data; (5) *Industrial Census 1995*, Vol. 1, pp. 46ff., or *Statistical Yearbook 1996*, p. 414, both including sectoral data, except that the *Statistical Yearbook* also has data on two very small sectors not listed in the *Industrial Census 1995* volume; (6) *Industrial Census 1995*, Vol. 2, pp. 16ff., or *Statistical Yearbook 1996*, p. 418, both including sectoral data, except that the *Statistical Yearbook* also has data on two very small sectors not listed in the *Industrial Census 1995* volume; Value added: (1) *Statistical Yearbook 1996*, p. 42; (5) and (6) as in the case of GOV.



Data on value added of the DRIEs for the years prior to 1992 are not available. For the years 1980 and 1982-91, the ratio of industry value added to industry net material product is applied to the net material product values of the DRIEs. For the years 1979 and 1981, when DRIE net material product values are not available, DRIE value added is derived based on the ratio of DRIE GOV to constructed DRIE value added in 1980 and 1982; for 1979 and 1981, the ratios of 1980 and 1982 are linearly interpolated and then multiplied with the 1979 and 1981 DRIE GOV values. (A 1978 DRIE GOV value is not available.) Linear interpolation is justified by the trend in the ratio during the period 1980 and 1982 through the 1990s.

Sources: Industry value added: *Statistical Yearbook 2005*, p. 51; industry net material product (1978-92): *Statistical Yearbook 1993*, p. 33; DRIE value added: *Statistical Yearbook 1993*, p. 417, *1994*, p. 378, *1995*, p. 388, *1996*, p. 414, *1997*, p. 424, *1998*, p. 444, *1999*, p. 432, *2000*, p. 414, *2001*, p. 410, *2002*, p. 432, *2003*, p. 468, *2005*, p. 488; DRIE net material product (1980, 1982-92): *Statistical Yearbook 1984*, p. 216, *1986*, p. 278, *1987*, p. 263, *1988*, p. 320, *1989*, p. 292, *1990*, p. 419, *1991*, p. 399, *1992*, p. 411, *1993*, p. 417, *Industrial Yearbook 1986*, p. 21; DRIE GOV (1980, 1982-92): *Seventeen Years*, p. 146.

Figure 11. DRIE Share in Value Added of Industry

Table 11. Coverage of Industrial Sectors, 1995

			GOV		DRIE value added		Number of ent.	
		Village+, private Value (b yuan RMB) - I -	DRIE Value in % of I - II -	DRIE — SOEs Value in % of I - III -	Sectoral share in % - IV -	VA per ent. (mio. yuan RMB) - V -	Village+, private - VI -	DRIE share in VI (in %) - VII -
	National total	6963	79	37	100.0	3.0	40	7
1	Coal mining and processing	142	81	63	3.9	5.0	38	7
2	Petroleum and natural gas extraction	144	99	95	6.1	701.0	76	31
3	Ferrous metals mining and processing	20	57	26	0.3	1.9	28	3
4	Nonferrous metals mining and processing	41	78	44	0.7	3.0	51	13
5	Nonmetal minerals mining and processing	81	45	14	0.9	1.1	23	2
6	Other minerals mining and processing	n.a.	n.a.	n.a.	0.0	1.0	n.a.	n.a.
7	Logging and transport of timber and bamboo	18	94	90	0.6	7.3	29	18
8	Food processing	416	73	38	3.2	1.6	18	6
9	Food manufacturing	129	77	29	1.4	1.3	50	16
10	Beverage manufacturing	133	87	46	2.3	2.4	45	11
11	Tobacco processing	104	97	94	4.0	144.8	4	3
12	Textile industry	558	83	33	5.8	3.5	44	7
13	Garments and other fiber products	224	66	5	2.2	1.7	43	2
14	Leather, furs, down and related products	141	69	6	1.3	1.9	45	4
15	Timber proc., bamboo, cane, palm fiber, straw prod.	70	58	10	0.6	0.6	39	3
16	Furniture manufacturing	47	48	4	0.4	0.6	37	2
17	Papermaking and paperproducts	145	70	26	1.5	1.7	44	6
18	Printing and record pressing	56	74	30	0.8	0.8	64	15
19	Stationery, educational and sports goods	53	69	7	0.6	1.6	51	5
20	Petroleum processing and coking products	217	94	83	3.6	20.5	40	6
21	Raw chemical materials and chemical products	448	85	48	6.1	3.3	57	12
22	Medical and pharmaceutical products	103	93	48	1.7	4.9	79	31
23	Chemical fibers	87	93	32	1.3	15.2	52	10
24	Rubber products	78	80	32	0.9	3.0	48	7
25	Plastic products	176	64	8	1.5	1.2	43	4

26	Nonmetal mineral products	501	60	20	5.8	1.5	30	4
27	Smelting and pressing of ferrous metals	419	87	60	6.8	14.4	43	6
28	Smelting and pressing of nonferrous metals	164	84	46	2.0	6.5	48	8
29	Metal products	274	60	8	2.5	1.2	42	3
30	Ordinary machinery manufacturing	332	71	29	4.3	2.3	46	7
31	Special purpose equipment manufacturing	212	83	42	2.9	2.4	60	14
32	Transportation equipment manufacturing	376	88	45	5.2	4.1	54	11
33	Electric equipment and machinery	322	81	18	3.9	3.1	56	8
34	Electronic and telecommunications equipment	270	94	24	4.1	7.9	66	13
35	Instruments, meters, cultural and office machinery	50	84	28	0.8	2.2	68	14
36	Other manufacturing	n.a.	n.a.	n.a.	1.1	1.0	n.a.	n.a.
37	Electric power, steam and hot water prod. and supply	246	99	77	7.9	9.7	67	25
38	Gas production and supply	8	98	88	0.0	0.8	77	55
39	Tap water production and supply	19	97	82	0.5	1.6	68	30
	Sum sectors	6823	80	38	99.6	3.0	41	7
40	Implicit residual	140	20	16	0.4	39.0	0	0
	40+6+36	140	70	21	1.6	1.4	50	4

"Village+, private" means industrial enterprises at village level and above, plus private, joint, and individual-owned (*getihu*) industrial enterprises with annual sales revenue in excess of 1m yuan RMB.

The implicit residual presumably includes the (unlisted) weapons and ammunition manufacturing industry.

Sources: (I, VI) GOV and number of enterprises: *Industrial Census 1995*, Vol. 1, pp. 3f.; (II, IV, V) GOV, value added, and number of enterprises: *Industrial Census 1995*, Vol. 1, pp. 46ff., or *Statistical Yearbook 1996*, p. 414 (including data on sectors 6 and 36); (III) *Industrial Census 1995*, Vol. II, pp. 16ff., or *Statistical Yearbook 1996*, p. 418 (including data on sectors 6 and 36);

Table 12. Employment: Key Sources and Their Data Coverage

Coverage	Years	Sources	Remarks
1. Economy-wide	1952-2004	*Labor Yearbook 2005*, pp. 7f. (all years); *Statistical Yearbook 2005*, p. 118 (for 1952, 57, 78-02)	* statistical break in 1990 (between 1989 and 1990) with adjustments following the 1990 population census; minor revisions of 1990-2000 data following the 2000 population census * in the *Statistical Yearbook* series, new values for years since 1990 first published in *1997* issue; values for 1990-2000 slightly revised upward since the *2002* issue
	1982, 87, 90, 95, 2000	*Population Census 1982*, *1990*, *2000*; *Population Survey 1987*, *1995*	* population census 1953 and 1964 data on laborers are not (publicly?) available * census/survey day in 1982-1990 is 1 July, since 1995 1 November; the definition of laborers changes in 1995 (to one used internationally); the 2000 count is based on the approximately 10% of the population who filled in the long-form questionnaire
2. Main economic sectors			
a. Primary, secondary, tertiary	1952-2004	Same as economy-wide	Same as economy-wide
b. Agriculture, non-agric., industry, (implicit) construction	1952-1995	*Labor Yearbook 1996*, p. 12	* data cover the three categories of agricultural laborers, non-agricultural laborers, and the latter's sub-category industry; construction can be obtained by subtracting industry from the secondary sector data (above) * data do not incorporate the 1990 statistical break (i.e., are original data)
c. Material prod. vs. non-material prod., implicit sum of transportation and trade	1952-1992	*Statistical Yearbook 1993*, p. 100	* sum of the two categories equals the economy-wide value (above) * non-material production reflects production in the tertiary sector except in (i) transportation & communication, and in (ii) commerce & catering * tertiary sector values (above) less non-material production values yields employment in 'transport & communication plus commerce & catering' * data do not incorporate the 1990 statistical break (i.e., are original data)
3. Detailed sectors (exhaustive list of sectors but incomplete coverage within each sector)			
a. 16 (13) sectors	1978-02 (1978-92)	*Statistical Yearbook 2005*, p. 125 (1978, 80, 85, 89-02), *Labor Yearbook 1996*, pp. 13f. (1978-95)	* consistent report form data without statistical break * since 1990, sectoral values do not add up to the economy-wide value (above) in revised form * data on 13 sectors in *Statistical Yearbook 1993*, p. 98; the 13 sectors cannot be aggregated from the 16 sectors * alternative source of recent data: *Labor Yearbook 2005*, p. 9 (1978, 80, 85-02)
b. 57 sectors	1982	*Population Census 1982*	*Population Census 1982*, pp. 440, 444; also ~150 categories, pp. 390ff.; milit. separate
c. 75 sectors	1990	*Population Census 1990*	*Population Census 1990*, Vol. 2, pp. 296-339; military personnel separate

d. 92 sectors	2000	*Population Census 2000*	*Population Census 2000*, Vol. 2, pp. 881-934; military personnel separate
e. Urban 19 sectors	2003-04	*Stat.Yearb. 2005*, pp. 122-4	* data are limited to urban "units;" also see Table 13
4. Detailed (16, 12, 19) sectors: staff and workers ("formal urban employment")	1978-02, 1978-92, 2003-04	*Statistical Yearbook 2005*, p. 126 (127-9 for 2003-04), *1998*, pp. 134f., *1994*, pp. 88f.; 12 sectors 1978-92 in *Statistical Yearbook 1993*, p. 104	* staff and workers is a 'non-exhaustive urban' sub-category of laborers (employment) * exhaustive list of sectors in each classification, complete coverage within each sector * 16 sectors in 1978-02 (with alternative 12-sector classification for 1978-92; the 12 sectors cannot be aggregated from the 16 sectors), exhaustive 19 sectors in 2003-04 * the 16/19 sector data for 1978-02/2003-04 are also available in *Labor Yearbook 2005*, p. 25 (29-30 for 2003-04), *1996*, pp. 19f. * also see Table 13
5. Urban vs. rural, and urban ownership classification	1952-04	*Statistical Yearbook 2005*, pp. 120f., *1998*, pp. 130f., *1994*, pp. 84f.; *Labor Yearbook 1990*, pp. 6, 9 for most pre-78 years	* statistical break in 1990 in total number of laborers and in urban – rural (total) values * exhaustive breakdown into urban – rural values * urban values: exhaustive breakdown into up to ten ownership categories through 1989 (or 1995, in *Statistical Yearbook 1996*, pp. 90f), non-exhaustive breakdown or incomplete coverage within each category since 1990 due to new urban total values; through 1989, the values of the individual ownership categories are identical to the values of staff and workers in other, ownership-specific tables (except for the category self-employed, who by definition cannot be staff and workers) * rural values: non-exhaustive breakdown into township and village enterprises (1978, 1980, 1983-), private enterprises (1990-), and the self-employed (1990-); the implicit residual includes farmers
6.Rural laborers (6 sectors)	1978, 80, 83-2004	*Statistical Yearbook 2005*, p. 446; *1994*, p. 328	* data consist of the rural labor statistics in the agriculture section of the *Statistical Yearbook* collected by the NBS's rural survey team * 6 sectors: agriculture (farming, forestry, animal husbandry and fishery), industry, construction, transport (transport, storage, post and communication services), trade (wholesale and retail trade, catering services), other nonagricultural occupations * data do not incorporate the 1990 statistical break (i.e., are original data) * also see Table 13
7. Non-population censuses			
a. Industry	1985, 1995	*Industrial Census 1985*, *1995*	*Industrial Census 1985*, p. 32, *1995*, p. 1
b. Tertiary sector	1991, 1992	*Tertiary Sector Census 1993*	*Tertiary Sector Census 1993*, p. 14
c. Agriculture	1996	*Agricultural Census 1996*	*Agricultural Census 1996*, p. 57
d. Economic	2004	*Economic Census 2004*	* industry: *Economic census 2004*, Vol. 2, pp. 6-9 average annual employment for total industry by 39 sectors, pp. 100-29 for the DRIEs by approx. 550 sectors, and pp. 284f. for the non-DRIEs by 39 sectors

			* construction: Vol. 3, p. 375 * tertiary sector: Vol. 4; data are provided by individual tertiary sector sub-sector
8. DRIE by approx. 40 sectors	1980, 1984-2003	*Industrial Yearbook* series	* average annual employment * *Industry, Transport, and Energy 50 Years* also reports these data, for 1985-99

All data are end-year values unless otherwise stated. The definition of employment differs across sources and over time; for details see text.

The 13-/ 16-/ 19-sector classification follow the GB1984, GB1994, and GB2002.

While the *Statistical Yearbook* and the *Labor Yearbook* report most data in units of 10,000 laborers and without decimals, the CDs that accompany some of the yearbook issues may have a number of decimals for the data of some years.

The table lists the most recent sources for the data. Earlier issues of the yearbooks will have the same times series data (but not covering as many years). The *Statistical Yearbook* series is considered first (since it is the most widely available), then, when needed, or in addition, the *Labor Yearbook* series.

Basic population data from the 1953 and 1964 population censuses are available in *Population Census 1982*, pp. 535-47, and in *Population Statistics 1949-1985*; neither source contains data on laborers.

Table 13. Urban Employment: Key Sources and Their Data Coverage

	Coverage	Year	*Labor Yearbook*	2004 value (total, th.)
Total	with urban-rural breakdown	1952-2004	’05:7f	752000
A. Urban	total + 16 sectors (GB1994)	1994, …, 2002	’95:14f; ’96:15f; ’97:12f; ’98:12f; ’99:11f; ’00:11f; ’01:11f; ’02:10f; ’03:10f	
	total + limited ownership	1994, …, 2004	’95:16; ’96:17; ’97:14; ’98:14; ’99:13; ’00:13; ’01:13; ’02:12; ’03:12; ’04:12; ’05:13	264760
1. Urban “units”*	total + 16 sectors (GB1994)	1994-02	’05:14	
	partial second-level cat. (GB1994)	1994, … , 1997	’95:119f; ’96:133f; ’97:131f; ’98:141ff	
	second-level categories (GB1994)	1998, … , 2002	’99:137f,184ff; ’00:105f,152ff; ’01:91f,138ff; ’02:155f,202ff; ’03:169f,216ff	
	total + 19 sectors (GB2002)	2003, 04	’05:10ff.	110989
	second-level categories (GB2002)	2003, 2004	’04:179ff; ’05:191ff	110989
1a. Staff & workers*	total + 16 sectors (GB1994)	1978-95	’96:19f.	
	total + 16 sectors (GB1994)	1978, 80, 85-02	’05: 25	
	second-level categories (GB1994)	1993, … , 1997	’94:109f,195ff; ’95:121f,209ff; ’96:139f,185ff; ’97:137f,183ff; ’98:147f,200ff	
	partial second-level cat. (GB1994)	1998, …, 2002	’99:139f; ’00:107f; ’01:93f; ’02:157f; ’03:171f;	
	total + 19 sectors (GB2002)	2003, 04	’05:29f.	105759
	second-level categories (GB2002)	2003, 2004	’04:183ff; ’05:195ff	105759
1b. Others*	total + 16 sectors (GB1994)	1993, … , 2002	’94:248ff; ’95:262ff; ’96:209ff; ’97:207ff; ’98:224ff; ’99:210ff; ’00:183ff; ’01:169ff; ’02:233ff; ’03:247ff	
	total + 19 sectors (GB2002)	2003, 2004	’04:277ff; ’05:289ff	5230
2 Urban “non-units”	not available			
2a. Urban private enterprises and the self-employed	total + 13 sectors (GB1994)	1978, 80, 83-95	’96:30	
	total + 13 sectors (GB1994)	1978, 80, 85-97	’98:27	
	total + 8 sectors (GB1984?)	1978-89	’90:13 (same total coverage as next line)	
	total + 8 sectors (GB1994)	1978, 80, 85-00	’01:27	
2b. Rural employment in urban units	total + limited ownership	1993, … , 2003	’94:28; ’95:33; ’96:39; ’97:36;’98:36;’99:26; ’00:27; ’01:29; ’02:27; ’03:27; ’04:30	
	total + 19 sectors (GB2002)	2003, 04	’05:33ff	13186
2c. Residual	not available			

B. Rural	total + 12 sectors (GB1994)	1978-95	'96:31	
	total + 12 sectors (GB1994)	1978, 80, 85-97	'98:28	
	total + 6 sectors	1978, 80, 85-03	'04:29	
	total + 8 sectors	2004	'05:31	487240

* These employment values come with some form of wage data (total wage bill, or average wage), in the same table (often) or in a table located elsewhere in the same source.

Year, …, year: each issue of the listed *Labor Yearbook* reports the previous year's data.

Second-level categories refers to the sub-categories of the 16- or 19- sector classification (GB1994, GB2002), and includes the total and the first-level values.

Partial second-level categories: no second-level categories for mining & quarrying, manufacturing, and public utilities, but for all other first-level categories.

All staff and workers are urban.

Staff and worker data are typically also available in the classification state-owned units, urban collective-owned units, and "others."

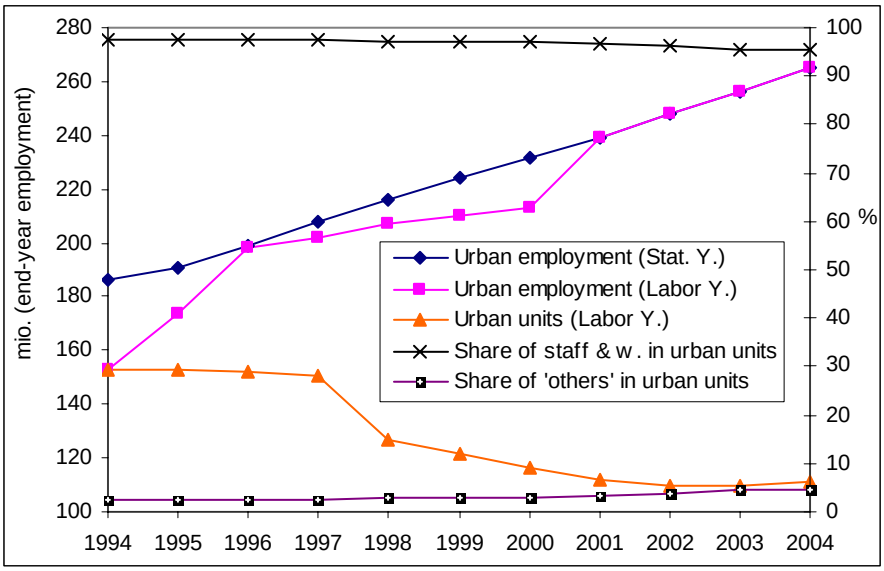
Since 1998, staff and workers only cover "on-post" staff and workers (the sources make this explicit in the label of the tables in which these data are reported).

Rural: total + 12 sectors (GB1994): the following sectors are not listed: mining & quarrying, public utilities, geological prospecting and water conservancy, and real estate. The sum of the numerical values of the 12 sectors equals the numerical value of the total.

Some time series data (i.e., more than one year) are reported in several issues of the *Labor Yearbook*; typically, the most recent one is listed here (which tends to cover all previously published values). Some of the recent *Labor Yearbook* issues do not report data for the earliest years; the *Labor Yearbook 1996* tends to cover all of the earliest years for which time series data are available.

This table refers only to the *Labor Yearbook*. The *Statistical Yearbook* reports some but not all of the data reported in the *Labor Yearbook*, and appears to have nothing beyond what the *Labor Yearbook* has, except a *summary* table of total employment with a breakdown into urban and rural, and then ownership sub-categories in the urban case (as well as some sub-categories in the rural case).

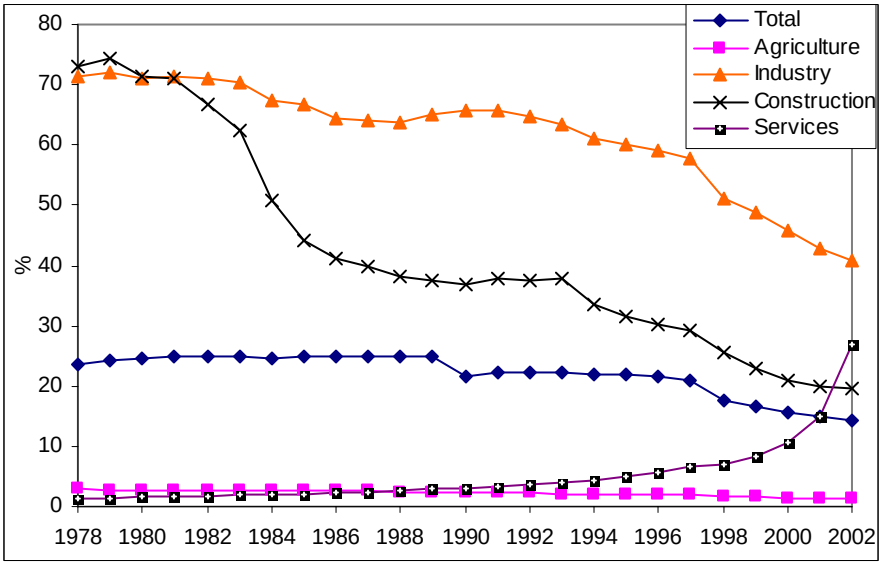
The *Labor Yearbook 1990* issues of 1989-1993 would have second-level data for 1988-92 on staff and workers in SOUs and in urban collective-owned units (separately), but not for "other" urban units; the classification appears to be the GB1984.



Identical staff and worker data are available in the *Statistical Yearbook* and in the *Labor Yearbook*. The *Statistical Yearbook* does not report employment data for urban units prior to 2003 (with in 2003 and 2004 identical values as in the *Labor Yearbook*) or for "other" urban units.

In 1994, the urban employment value of the *Labor Yearbook* is identical to the urban units employment value (of the *Labor Yearbook*), which suggests a change in definition in the following years for urban employment to cover not only the urban "units" but also urban "non-units;" presumably, urban "units" are part of a regular reporting system, while the "non-units" are not. The *Statistical Yearbook* may have "guesstimated" urban employment (beyond the urban units coverage) all along; why the *Statistical Yearbook* and the *Labor Yearbook* urban employment values are near-equal in 1996 (the chart cannot show that they are not identical), then drift apart again, before becoming identical starting in 2001, is unclear.
Sources: see Table 13.

Figure 12. Urban Employment



All values are end-year values. Pre-1978 and post-2002 data are not available.
Sources: staff and workers: *Statistical Yearbook 2005*, p. 126; *Labor Yearbook 1996*, pp. 19f.; laborers: *Statistical Yearbook 2005*, p. 125; *Labor Yearbook 1996*, pp. 13f.

Figure 13. Staff and Workers as Share of (Report Form) Laborers (in %), 1978-2002

Table 14. Not-on-post Staff and Workers

	Stock of not-on-post staff and workers[a] / on-post staff and workers, in %				On-post staff and workers / total employment, in %
	Total	SOUs	COUs	Others	
1996	6.39	5.53	10.77	3.38	20.24
1997	10.85	9.45	18.86	5.74	18.95
1998	16.03	14.01	29.38	11.33	17.47
1999	18.30	16.06	35.17	13.17	16.49
2000	19.62	17.55	38.81	13.70	15.62
2001	19.46	17.56	41.27	13.43	14.78
2002	18.56	17.03	42.63	12.63	14.32
2003	17.01	15.94	42.70	11.09	14.10
2004	15.18	14.68	42.19	9.17	14.06

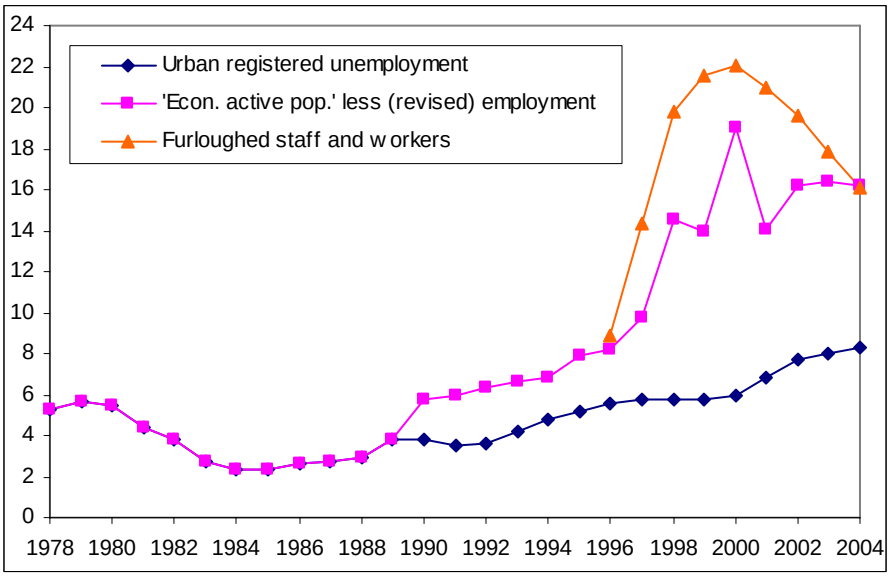
a The sources do not make explicit that the number of not-on-post staff and workers represents the *stock* of furloughed staff and workers; the size of the percentages suggests so.

SOUs: state-owned units; COUs: collective-owned units.

Not-on-post staff and workers: 1996 and 1997: furloughed staff and workers (*xiagang zhigong*), with no data available for earlier years; since 1998: not-on-post staff and workers (*bu zaigang zhigong*). The change in terminology presumably has no further implications.

Official data on staff and workers prior to 1998 include the not-on-post staff and workers, since 1998 they do not; in calculating the percentages in the table, the pre-1998 data on staff and workers were corrected for the not-on-post staff and workers, so that the percentages are identically defined for all years.

Sources: *Labor Yearbook 1997*, p. 213; *1998*, p. 230; *1999*, p. 220; *2000*, p. 193; *2001*, p. 179; *2002*, p. 243; *2003*, p. 257; *2004*, p. 288; *2005*, pp. 7f. (total employment), 24 (staff and worker data), 300.



Sources:

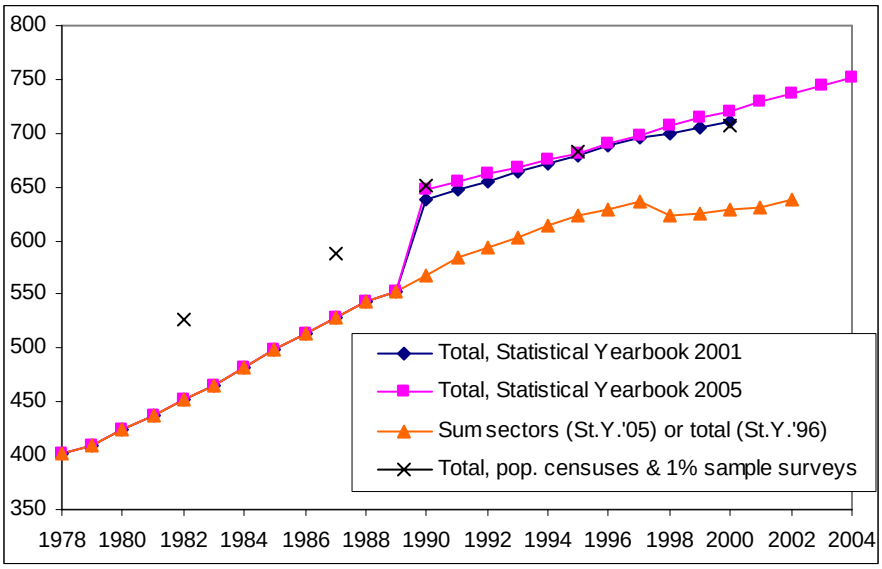
Urban registered unemployment: *Labor Yearbook 2005*, p. 157

Economically active population, employment: *Statistical Yearbook 2005*, p. 118.

Furloughed staff and workers: *Labor Yearbook 1997*, p. 213; *1998*, p.230; *1999*, p. 220; *2000*, p. 193; *2001*, p. 179; *2002*, p. 243; *2003*, p. 257; *2004*, p. 288; *2005*, p. 300.

All values are end-year values. Pre-1978 data are not available (except for the 'economically active population less employment' series for 1952 and 1957, with values of 2.77 and 2.00m).

Figure 14. Unemployment (mio. laborers), 1978-2004

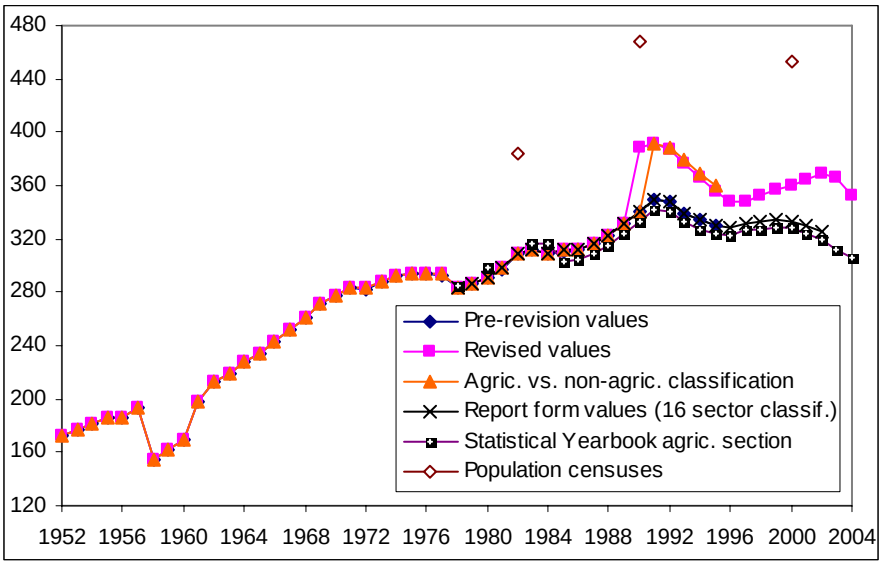


Prior to 1996, the sum across sectors equals total employment reported in the *Statistical Yearbook* (through the 1997 issue). The *Statistical Yearbook 1997* is the first to report revised total employment values for the years since 1990. The sectoral data end in 2002.

Statistical Yearbook data are end-year data. Population census and survey data through 1990 are midyear data, survey and population census data in 1995 and 2000 are 1 Nov. data; they are the sum of the laborer values plus military. Lacking military data for 1987 and 1995, these values are interpolated from the population census military values of 1982, 1990, and 2000.

Sources: total: *Statistical Yearbook 2001*, p. 108, *2005*, p. 118; sum across sectors: reported as total (and equals the sum across sectors except for what appear rounding differences) in *Statistical Yearbook 1994*, p. 86, *1996*, p. 92, and calculated as sum across sectors since 1996 from data in *Statistical Yearbook 2005*, p. 125; population censuses / surveys: *Population Census 1982*, p. 440, 505; *Population Census 1990*, Vol. 2, p. 476, Vol. 4, p. 496; *Population Census 2000*, Vol. 1, p. 215, Vol. 2, pp. 800, 1241 (with adjustments of the long-form labor data according to the share of long-form respondents in the total population), Vol. 4, p. 1883; *Population Survey 1987*, pp. 1, 224 (p. 1 reports the sample size relative to the economy-wide population, used to augment the sample number of laborers to the economy-wide number of laborers); *Population Survey 1995*, pp. 1, 124 (p. 1 reports the sample size relative to the economy-wide population, used to augment the sample number of laborers to the economy-wide number of laborers).

Figure 15. Economy-wide Employment Data



Sources and explanations:

Pre-revision values: *Statistical Yearbook 1991*, p. 99; *1996*, p. 88.

Revised values: *Labor Yearbook 2005*, pp. 7f. (or *Statistical Yearbook 2005*, p. 118, for reform period and some pre-reform years).

Agricultural vs. non-agricultural classification: *Labor Yearbook 1996*, p. 12. Agricultural values are identical to the (revised) primary sector values through 1989, but then are not revised by the same amount as the primary sector values starting in 1990 (not even as those first revised in the *Statistical Yearbook 1997*); values are equal to those of agriculture in the 16-sector report form classification in 1978-1990. Values are not identical to the pre-revision primary sector values ever (which do not incorporate the slight reallocations of pre-1990 sectoral values that occurred in the late 1990s).

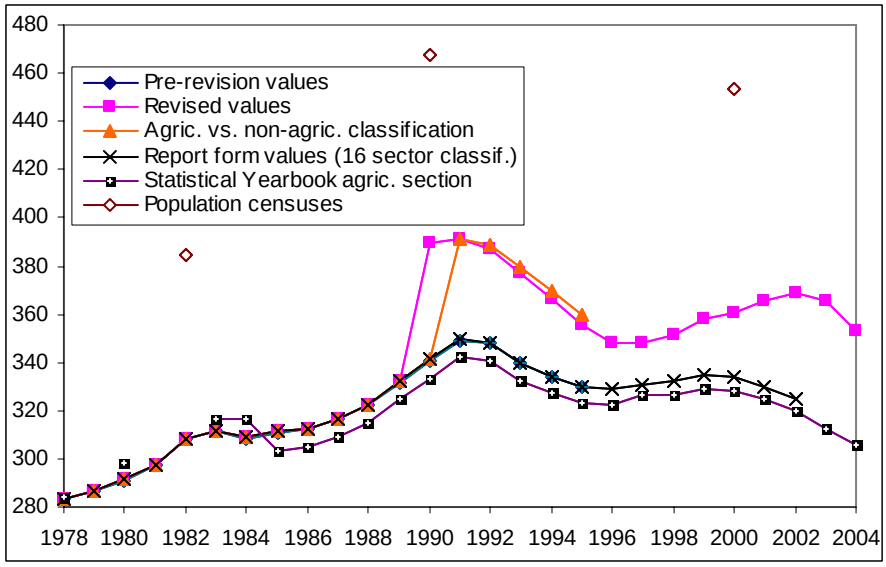
Report form values (16 sector classification): *Statistical Yearbook 2005*, p. 125; *Labor Yearbook 1996*, pp. 13f. Values are identical to the revised primary sector values through 1989, but not to the pre-revision values ever (which implies that the 16-sector values incorporate the slight reallocations of pre-1990 sectoral values that appear in the revised primary sector series in the late 1990s).

Statistical Yearbook agricultural section: *Statistical Yearbook 1994*, p. 328; *2005*, p. 446.

Population censuses: *Population Census 1982*, pp. 440, 444; *Population Census 1990*, Vol. 2, pp. 296-339; *Population Census 2000*, Vol. 1, p. 215, Vol. 2, pp. 800, 881-934.

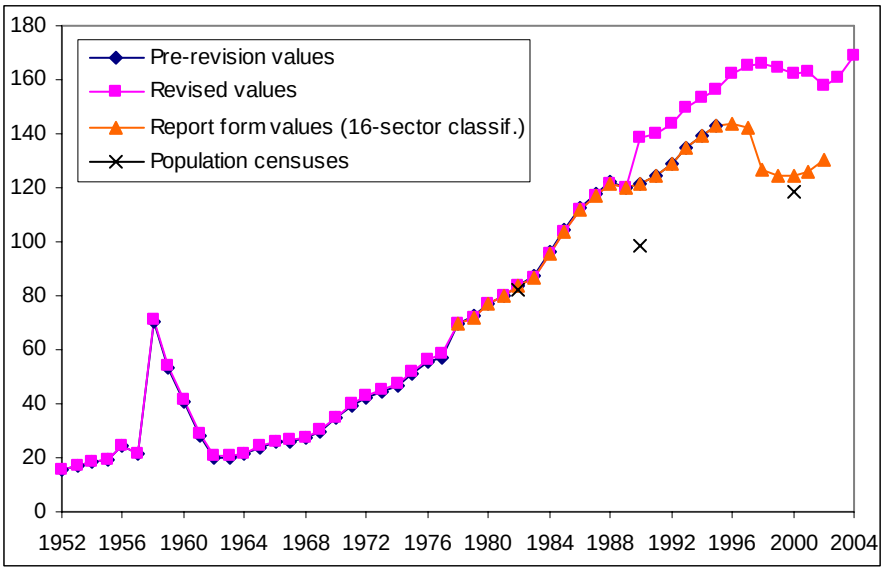
All values except population census values are end-year values. Population census values are 1 July values in 1982 and 1990, and 1 November values in 2000.

Figure 16. Employment in Agriculture / Primary Sector (mio. laborers), 1952-2004



For sources and explanations see Figure 16.

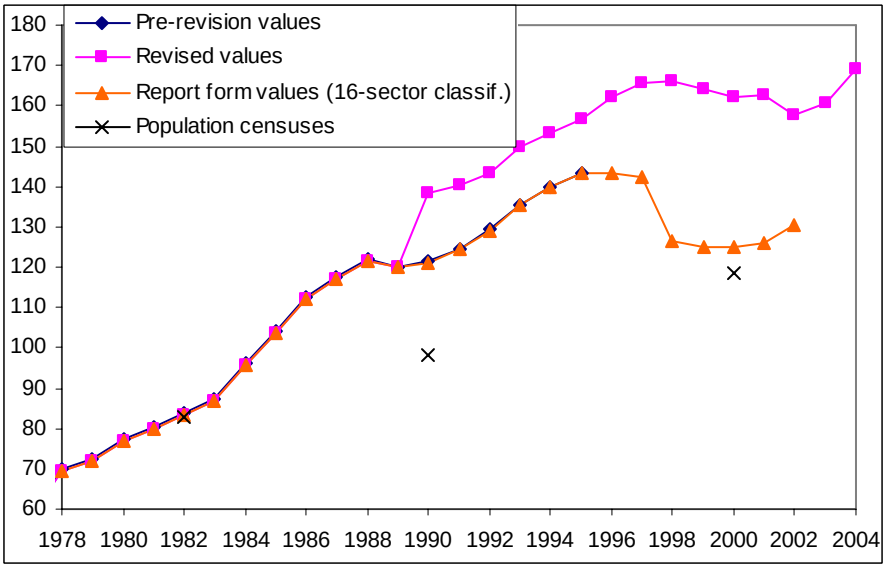
Figure 17. Employment in Agriculture / Primary Sector (mio. laborers), 1978-2004



For sources and explanations see Figure 16.

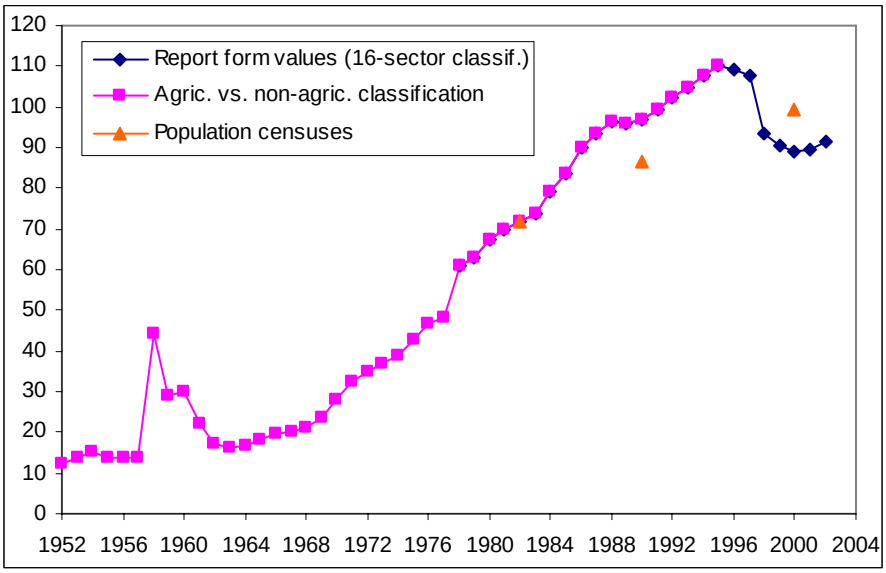
The report form values are the sum of mining and quarrying, manufacturing, production and supply of electricity/ gas/ water, and construction. The report form values differ slightly from the pre-revision values (as published in the *Statistical Yearbook 1996*) in all years through 1992, i.e., not in 1993-95), and they differ from the revised values in all years since 1990.

Figure 18. Secondary Sector Employment (mio. laborers), 1952-2004



For sources and explanations see Figure 16 and Figure 18.

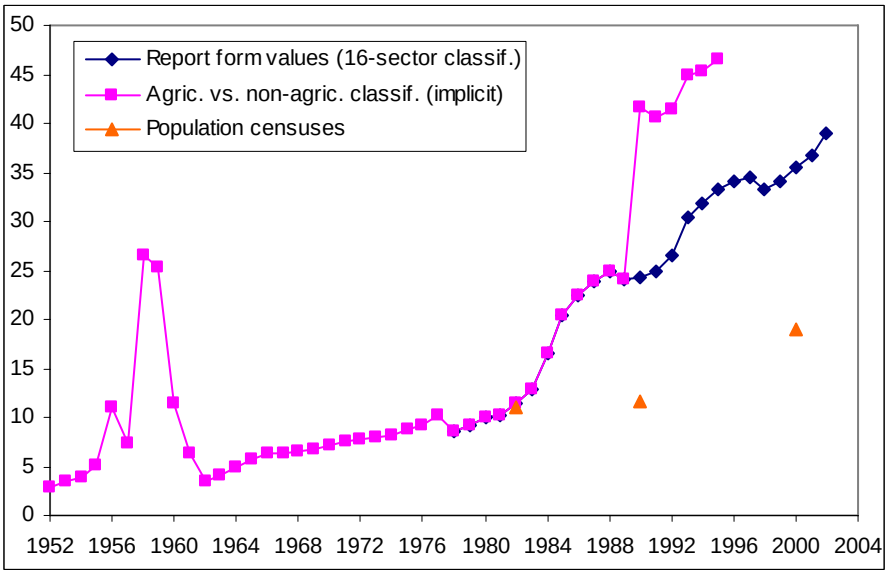
Figure 19. Secondary Sector Employment (mio. laborers), 1978-2004



For sources and explanations see Figure 16.

The report form values are the sum of mining and quarrying, manufacturing, and the production and supply of electricity/ gas/ water. They are identical to the industry values reported as a sub-category of the non-agricultural category in the agriculture vs. non-agriculture classification.

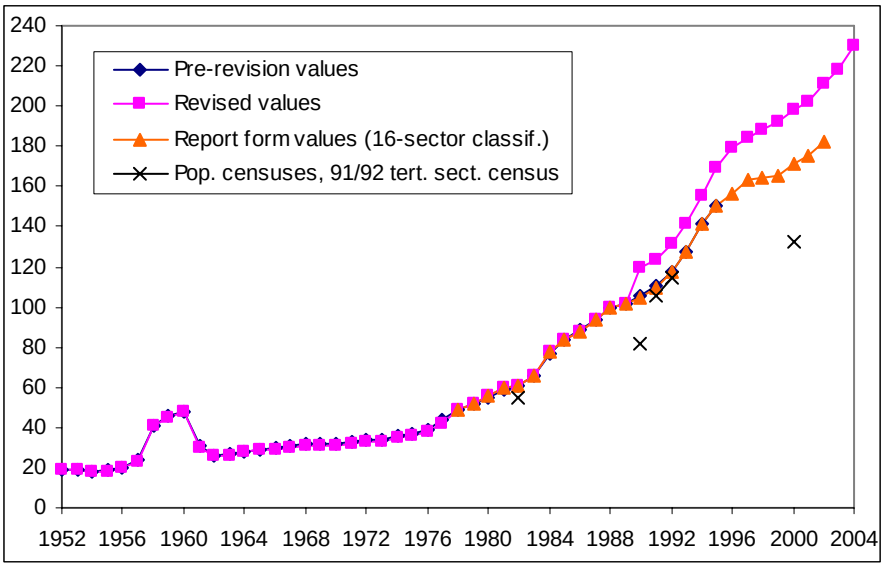
Figure 20. Employment in Industry (mio. laborers), 1952-2002



For sources and explanations see Figure 16.

The construction values in the agriculture vs. non-agriculture classification are obtained by subtracting the industry values in this classification from the revised secondary sector values. Consequently, this implicit series is identical to the report form series in 1978-89 (as it must be since the secondary sector values equal the 'industry plus construction' values in the 16-sector classification in those years, Figure 18), but then diverges starting in 1990 (due to the upward revisions to secondary sector values, but not to industry values in the agriculture vs. non-agriculture classification or in the 16-sector classification).

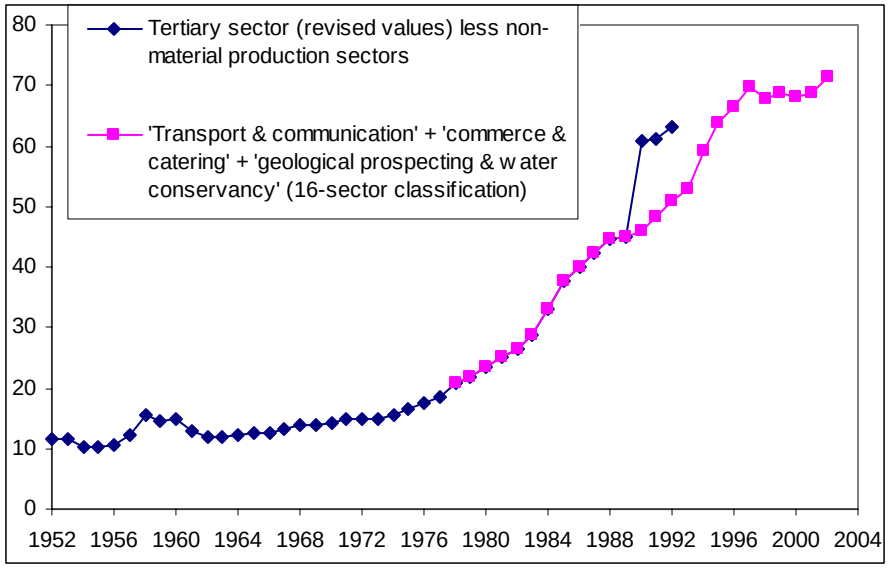
Figure 21. Employment in Construction (mio. laborers), 1952-2002



For sources and explanations see Figure 16. Tertiary sector census values for 1991 and 1992 are from *Tertiary Sector Census 1993*, Vol. 1, p. 14. Population census values do not include military personnel of 4.24m (1982), 3.20m (1990), and 2.50m (2000).

Report form values are identical to the revised tertiary sector values through 1989, but not to the pre-revision values ever (which implies that the 16-sector values incorporate the slight reallocations of pre-1990 sectoral values that appear in the revised tertiary sector series in the late 1990s).

Figure 22. Tertiary Sector Employment (mio. laborers), 1952-2004



Sources and explanations:

Tertiary sector employment (revised values): *Labor Yearbook 2005*, pp. 7f.

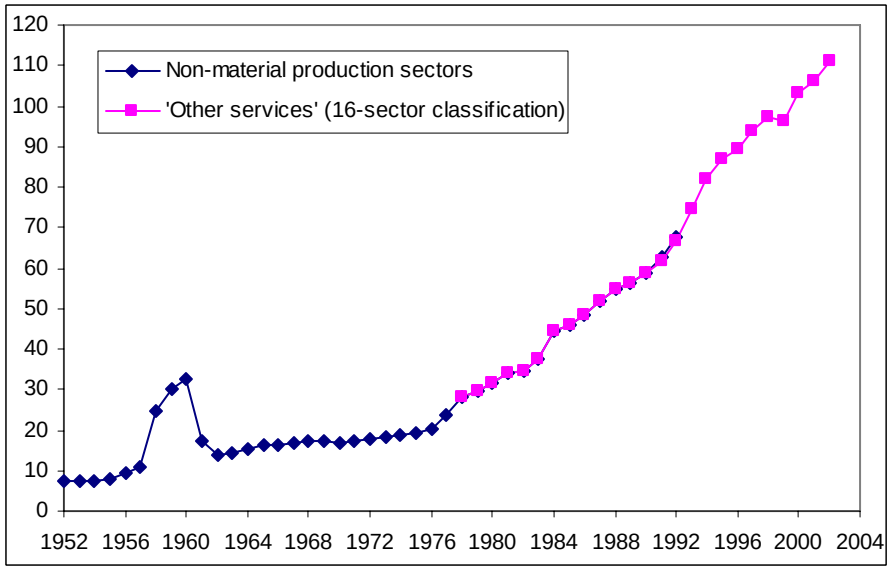
Non-material production sectors: *Statistical Yearbook 1993*, p. 100.

Report form values on transport & communication, commerce & catering, and geological prospecting & water conservancy (all in 16 sector classification): *Statistical Yearbook 2005*, p. 125; *Labor Yearbook 1996*, pp. 13f.

The two series are identical through 1989. The discrepancy starting in 1990 is due to the use of revised tertiary sector data from which the non-material production sector data are subtracted. With pre-revision tertiary sector data, the two series differ by a small amount in all years.

All values are end-year values.

Figure 23.Employment in Transport, Trade, and Geological Prospecting (mio. laborers), 1952-2002



Sources and explanations: see notes to Figure 23. Other services denotes the sum of all services in the report form 16-sector classification except transport & communication, commerce & catering, and geological prospecting & water conservancy. The two series are identical through 1990, with minor discrepancies in 1991 and 1992.

Figure 24. Employment in Non-Material Production Sectors (mio. laborers), 1952-2002

Table 15. Economy-wide Work Hours per Week, 1995 1% Population Sample Survey

Working hours per week	Number of laborers	Labor share in %
	Total: 6981639	
1-8	2151	0.03
9-16	16460	0.24
17-24	81212	1.16
25-32	185098	2.65
33-40	3704188	53.06
41+	2992515	42.86
41-48	597465	8.56
48+	2395050	34.31
Official average: 40.7	Sum: 6981624	

An implied average work hours per week of 40.67 hours is obtained by multiplying the mid-point work hours of each work-hour category by the labor share. For working hours in excess of 40 hours, the mid-point of the 41-48 category is used, and 48 hours are used for the 48+ category.

Source: *Population Yearbook 1999*, pp. 84f.

Table 16. Economy-wide (1995) and Urban (2001-04) Work Hours per Week

	Economy-wide employment 1995	Urban employment Oct. 01	Oct. 02	Nov. 03	Nov. 04
Total	40.7	44.9	45.2	45.4	45.5
Farming, forestry, animal husbandry and fishery	41.2	43.2	43.0	44.1	42.9
Mining and quarrying	40.6	44.8	44.4	44.1	45.4
Manufacturing	39.5	44.7	46.0	46.4	46.9
Utilities	37.8	41.6	42.1	42.2	42.4
Construction	41.2	46.5	48.4	48.4	48.0
Transport, storage, and postal services	40.3	45.1	46.0	46.1	46.5
Information transmission, computer services and software			43.0	43.1	43.6
Wholesale and retail trade		49.5	49.4	49.2	50.1
Accommodation and catering			49.8	50.1	49.1
Wholesale and retail trade, catering services	40.7				
Finance		41.1	40.9	41.1	41.7
Banking and insurance	37.4				
Real estate	37.4	41.8	42.0	42.2	42.4
Leasing and commercial services			45.9	46.3	45.2
Scientific research, polytechnic services, and geol. prosp.		42.3	41.4	42.2	42.2
Geological prospecting and water conservancy	38.6				
Scientific research and poly-technical services	36.7				
Administration of water, environm., and public facilities			42.1	41.6	42.2
Resident and other services		47.2	47.6	47.5	47.0
Social services	40.1				
Education		41.2	41.1	41.0	41.1
Education, culture and arts, radio, film and television	37.5				
Public health, social insurance, and social welfare		42.0	42.3	42.0	43.0
Health care, sports and social welfare	38.6				
Culture, sports, and entertainment			42.8	43.2	44.1
Public administration and social organizations		40.9	40.8	40.9	41.1
Government agencies, Party agencies and social organiz.	38.1				
International organizations			38.4	34.6	43.0
Other sectors	37.9				

The employment classification changed starting in 2001 (from the GB1994 industry classification to the GB 2002 industry classification). 2001 values are, *in the source*, matched into the more recent classification whenever the categories are approximately comparable. 1995 values (following the GB1994) are matched here as far as possible and otherwise retained in separate categories.

According to the source, reference week for October is 24-30 September, and for November 25-31 October. The sectoral allocation of laborers is according to their main sectoral affiliation, with their total work hours (in this and other sectors) then counted in their main sector.

Sources: 1995 (population 1% sample survey): *Population Yearbook 1999*, pp. 84f.; 2001-04: *Labor Yearbook 2005*, pp. 102f.

Table 17. Fixed Assets / Depreciation: Key Sources and Their Data Coverage

Coverage	Years	Sources	Remarks
A. Fixed assets			
1. Budgetary SOEs			
a. net and original fixed assets (*guding zichan jingzhi*, *guding zichan yuanzhi*)	1952, 57, 62, 65, 70, 75-96	*Statistical Yearbook 1991*, p. 27; *1998*, p. 35;	* total with non-exhaustive breakdown into industry, agriculture, construction, transport & post & telecommunications, commerce & grain & foreign trade, urban public facilities * budgetary SOEs may account for perhaps 80% of SOE fixed assets
	1952-98	*Fiscal Yearbook 1992*, p. 930; *1998*, p. 477, *1999*, p. 481 (typo in label)	* total, and industry * since 1998 state and state-controlled enterprises
b. fixed assets (*guding zichan*)			* total assets with breakdown into asset categories
(i) industry	1994-98	*Fiscal Yearbook 1999*, p. 491	
(ii) total	1997-2004	*Fiscal Yearbook* 2003, p. 379; *2005*, p. 382	
2. State assets (*guoyou zichan*)	1995, 97, 98, 99, 00, 01, 02	*Fiscal Yearbook 1997*, p. 496; *1998*, p. 495; *1999*, p. 498; *2000*, p. 457; *2001*, p. 407; *2002*, p. 412; *2003*, p. 394	* total, state industrial and commercial enterprises (presumably budgetary ones only) with a breakdown into approx. 30 sectors and sub-sectors, state financial enterprises, administrative units (*xingzheng shiye danwei*), capital construction units, real estate management and administration units (in 1995 and 97, enterprises abroad (starting 1997); slight reclassification starting in *2000* issue of 98- values; reduced classification in *2003* issue (with 2000 and 2001 values) * asset values may be revalued ones, including land values
3. Directly reporting industrial enterprises			* in enterprise coverage matching the output and employment statistics (of the same tables), with the 1998 statistical break
a. industry total, SOEs: original fixed assets, net fixed assets	1952-03	*Industrial Yearbook*, *1993*, p. 65 (66); *1998*, p. 51 (52); *2004*, p. 25 (26)	
	2004	*Statistical Yearbook 2005*, pp. 492f.	
b. by industrial sector			* in sectoral coverage matching the output and employment statistics (of the same tables)

(i) original fixed assets (also: for productive use), net fixed assets	1980, 84-92	*Industrial Yearbook 1993*, pp. 103-15	* GB1984
(ii) original and net fixed assets, average annual net fixed assets	1993	*Industrial Yearbook 1994*, pp. 130-245	* same variables covered in *Statistical Yearbook 1994*, pp. 378f.
(iii) original fixed assets, average annual net fixed assets	1994	*Industrial Yearbook 1995*, pp. 124-231	* *Statistical Yearbook 1995*, pp. 388-90, reports assets, fixed assets, original fixed assets, and average annual net fixed assets
(iv) assets, fixed assets, original fixed assets, average annual net fixed assets	1995	*Statistical Yearbook 1996*, pp. 410-2	* also see industrial census 1995, below
(v) assets, fixed assets, original fixed assets, average annual net fixed assets	1996, 97, 98	*Industrial Yearbook 1998*, pp. 78f, 142-252 (for 1996 and 1997); *Statistical Yearbook 1999*, pp. 432f. (for 1998)	* *Statistical Yearbook 1997*, pp. 424f., *1998*, pp. 448f., and *1999*, pp. 432f. cover the same variables for 1996, 1997, and 1998
(vi) assets, original fixed assets, net fixed assets	1999, 2000	*Industrial Yearbook 2001*, pp. 48-51	* *Statistical Yearbook 2000*, pp. 420f., and *2001*, pp. 420f. cover assets, original fixed assets, and average annual net fixed assets
(vii) assets, fixed assets, original fixed assets (also: for productive use), net fixed assets, average annual net fixed assets	2001-03	*Industrial Yearbook 2002*, pp. 58-61, *2003*, pp. 58-61, *2004*, pp. 54-57	* these *Industrial Yearbook* issues also have data on annual and cumulative depreciation * *Statistical Yearbook 2002*, pp. 432f., *2003*, pp. 474f., and *2004*, pp. 524f. cover assets, original fixed assets, and average annual net fixed assets
(viii) assets, average annual net fixed assets	2004	*Statistical Yearbook 2005*, pp. 492f.	* also see economic census 2004, below
(ix) assets, original and net fixed assets	1993-99	*Industry, Transport, and Energy 50 Years*, pp. 94-109	
4. Censuses			
a. Tertiary sector census 1993	1991, 92	*Tertiary Sector Census 1993*, pp. 524-35, 60-71, 1672-95	* enterprises: original fixed assets, net fixed assets, depreciation * administrative units: original fixed assets, cumulative depreciation, depreciation
b. Agricultural census 1996		*Agricultural Census 1996*	* number of specific fixed assets, no monetary values
c. Industrial census			
(i) 1985	1985 (1980)	*Industrial Census 1985*, pp. 218-21 (pp. 222-5 for 1980)	* all industrial enterprises with independent accounting system (presumably at township level and above)
(ii) 1995	1995	*Industrial Census 1995*, Vol. 1, pp. 46-197	* all industrial enterprises with independent accounting system at township level and above * assets, fixed assets, original fixed assets (also: for productive use),

			cumulative depreciation, average annual net fixed assets
d. Economic census 2004			* has data on industry, construction, and the tertiary sector
(i) Industry	2004	*Economic Census 2004*, Vol. 2, pp. 10-69 for DRIEs, 282f. for non-DRIEs	* DRIEs, in approx. 550 industrial sectors (at all levels): assets, original fixed assets (also: for productive use), cumulative depreciation, depreciation, net fixed assets, average annual net fixed assets * non-DRIEs, in 39 sectors: assets, original fixed assets, depreciation
(ii) Construction	2004	*Economic Census 2004*, Vol. 3, pp. 535f.	* assets, fixed assets, original fixed assets (also: for productive use), cumulative depreciation, depreciation
(iii) Tertiary sector	2004	*Economic Census 2004*, Vol. 4	* individually by tertiary sector sub-sectors or sub-sub-sectors: for some, but not all, data on assets, original fixed assets, and depreciation are available
B. Depreciation (as sum provinces)			
1. Total, 3 main economic sectors, industry, construction, 10 tertiary sector sub-sectors	1978-95	*GDP 1952-92*	* from the same provincial tables (with data on the income approach to GDP) as the labor remuneration data used in unit labor costs
2. Total, 3 main economic sectors, industry, construction, 12 tertiary sector sub-sectors	1978, 85, 90, 95-02	*GDP 1996-02*	* from the same provincial tables (with data on the income approach to GDP) as the labor remuneration data used in unit labor costs * total and each of the three main economic sectors also in summary tables (with provincial data) on pp. 67-90
3. Total	1993, 94, 96-03	*Statistical Yearbook* series	

Net and original fixed assets: net value of fixed assets, original value of fixed assets.

Since 1993, some fixed asset data are also available in the construction section of the *Statistical Yearbook* (*1994* issue onward, year by year); to judge by the value added given in the construction section, in comparison to the national income and product accounts section, the enterprises covered in the construction section (with changing coverage over time) account for around half or less of economy-wide construction value added; data on employment would also be available in the construction section, presumably with the same (in some years un-specified) enterprise coverage.

The GB classification standard, where noted, is deduced from the sectoral labels. None of the sources lists the GB used.

Table 18. Investment / GFCF: Key Sources and Their Data Coverage

Coverage	Years	Sources	Remarks
A. Investment in fixed assets			
1. Total	1980-00	*Inv. 1950-00*, p. 15	* also with 4 exhaustive ownership categories
	1980, 85-03	*Stat. Yearb. 2004*, p. 188	* also with 4 exhaustive ownership categories
	1995-04	*Stat. Yearb. 2005*, p. 187	
	1981-05	*Stat. Abstr. 2006*, p. 53	* statistical break in 2004 due to the economic census; 2004 value according to previous definition is implicit in nominal growth rate * exhaustive ownership breakdown into 3 categories
2. Urban	1995-04	*Stat. Yearb. 2005*, p. 187	* includes a sub-category "real estate development" * also available by three types of construction (p. 198)
	1981-05	*Stat. Abstr. 2006, p. 54*	* presumably not revised following 2004 economic census
a. 16 sectors	1995-02	*Stat. Yearb. 2005*, p. 208	* GB1994
b. 20 sectors	2003-04	*Stat. Yearb. 2005*, p. 209-11	* GB2002
c. detailed sectors	2004	*Stat. Yearb. 2005*, pp. 200-3	* GB2002, with breakdown by type of construction and by structure
3. Rural	2002, 03	*Inv. Yearb. 2004*, p. 429	
	1995-04	*Stat. Yearb. 2005*, p. 187	* rural comes with a breakdown into agricultural households (*nonghu*) and non-agricultural households (*fei nonghu*)
	1981-05	*Stat. Abstr. 2006*, p. 54	* presumably not revised following 2004 economic census
by 20 sectors: non-agricultural households, agricultural hhs.	2003	*Inv. Yearb. 2004*, pp. 435-7, 444-6	* GB2002 * separate tables for non-agricultural vs. agricultural households
4. By sector			
16 sectors	2002	*Inv. Yearb. 2003*, pp. 26-8	* data on the three main economic sectors are on p. 13
20 sectors	2003-04	*Stat. Yearb. 2005*, pp. 192-4	* GB2002
5. By ownership	1980-00	*Inv. 1950-00*, p. 15	* total, state-owned units, collective-owned units, individuals, "others"
	1990, 91, 92, 93, 94, 95, 19, 97, 98, 99, 00, 01, 02	*Stat. Yearbook 1991*, p. 144, *1992*, p. 146, *1993*, p. 146, *1994*, pp. 140f., *1995*, pp. 138f., *1996*, pp. 140f., *1997*, pp. 152f., *1998*, pp. 188f., *1999*, pp. 186f., *2000*, pp. 170f., *2001*, p. 160, *2002*, pp. 178f.; *2003*, pp. 188f.	* total and eight ownership categories starting 1993; three ownership categories in earlier years * for each ownership category (and total): breakdown by structure

	2003, 04	*Stat. Yearb. 2004*, pp. 190f., *2005*, pp. 188f.	* total and eight ownership categories * 2003 for each ownership category (and total): breakdown by structure
	1981-05	*Stat. Abstr. 2006*, p. 53	* total, "state and others," collective-owned units, individuals
a. state-owned			
(i) by source of funding	1953-00	*Inv. 1950-00*, p. 25	* categories: state appropriation, domestic loan, foreign investment, fundraising and others * further data of funding of specific investment categories are typically available, but not explored further here
(ii) by type of construction	1981-00	*Inv. 1950-00*, p. 41	
	2000, 01	*Stat. Yearb. 2002*, p. 180	* also has data for 1990, 95, and 98
	2002, 03	*Stat. Yearb. 2004*, p. 192	* also has data for 1995, 98, and 00
(iii) by structure	1981-00	*Inv. 1950-2000*, pp. 28f.	
	2000-03	*Stat. Yearb. 2002*, p. 180; *2004*, p. 192	* also has data for 1990, 95, and 98
(iv) main economic sectors	1981-00	*Inv. 1950-00*, p. 55	* primary, secondary, and tertiary sector
	2000, 01	*Stat. Yearb. 2002*, p. 180	* also has data for 1990, 95, and 98
	2002, 03	*Stat. Yearb. 2004*, p. 192	* also has data for 1995, 98, and 00
(v) 16 sectors	1981-00	*Inv. 1950-00*, pp. 42-7	* GB1994
	2002	*Inv. Yearb. 2003*, pp. 54-6	
(vi) 39 industrial sectors	1981-00	*Inv. 1950-00*, pp. 56-61	* GB1994
	2002	*Inv. Yearb. 2003*, pp. 57-62	
b. collective-owned			
(i) total, urban, rural	1980-00	*Inv. 1950-00*, p. 397	
total	1980, 85-03	*Stat. Yearb. 2004*, p. 188	
urban	1983-03	*Stat. Yearb. 1995*, p. 179, *2004*, p. 239	* also by structure
(ii) productive vs. non-productive (total, urban, rural)	1981-95	*Inv. Yearb. 1950-95*, p. 362 (total), p. 377 (urban, starting 1980), p. 403 (rural)	* the separate urban and rural data come with a sub-category residential housing for non-productive investment
(iii) by structure	1981-00	*Inv. 1950-2000*, pp. 28f.	
	1985-03	*Stat. Yearb. 2000*, p. 201, *2004*, p. 239	
(iv) by sector			* for 1981-95 by 4 exhaustive sectors * for 1996-00 by 16 sectors (GB1994)

4 exhaustive sectors	1981-95	*Inv. 1950-00*, pp. 401	* industry is one of the sectors (the others are highly aggregated)
16 sectors	1995	*Stat. Yearb. 1996*, p. 180	
	1996-00	*Inv. 1950-00*, pp. 402f.	* GB1994
	2002	*Inv. Yearb. 2003*, pp. 108-10	* GB1994
(v) urban units by 16 sectors	1982-00	*Inv. 1950-00*, pp. 421-7	* GB1994 * in some years, some sectors are combined
	1997, 98, 99, 00, 01, 02	*Stat. Yearb. 1998*, p. 228, *1999*, p. 226, *2000*, p. 210; *2001*, p. 200, *2002*, p. 218, *2003*, p. 228	* GB1994 * also for earlier years in earlier issues of the *Statistical Yearbook*
by 20 sectors	2003	*Stat. Yearb. 2004*, p. 238	* GB2002
(vi) urban units by industrial sector	1978-00	*Inv. 1950-00*, pp. 435-7	* for 1978-84 by 12 sectors * for 1985-00 by 39 sectors (GB1994) * in some years, some sectors are combined
	2002	*Inv. Yearb. 2003*, pp. 131-6	* GB1994
(vii) rural units by sector	1981-00	*Inv. 1950-00*, pp. 456-8	* for 1981-95 total with breakdown into industry and two other sectors; also with a category "purchase of equipment, tools and appliances" * for 1996-00 by 16 sectors (GB1994)
	2002	*Inv. Yearb. 2003*, pp. 169-71	* GB1994, 16 sectors
(viii) residential housing	1981-00	*Inv. 1950-00*, p. 401	
urban units	1980-00	*Inv. 1950-00*, p. 420	* also has total investment by urban collective-owned units
rural units	1981-00	*Inv. 1950-00*, p. 455	* also has total investment by rural collective-owned units
c. individual-owned			
(i) total, urban, rural	1980-00	*Inv. 1950-00*, p. 469	
total	1980, 85-03	*Stat. Yearb. 2004*, p. 188	
	2003, 04	*Stat. Yearb. 2005*, p. 185	
rural	1982-98	*Stat. Yearb. 1993*, p. 206, *1999*, p. 231	* including sub-category of buildings, and sub-sub category of residential housing * also has sub-category "purchase of productive investment in fixed assets" which together with the sub-category buildings adds up to the total
	1985-04	*Stat. Yearb. 2000*, p. 205, *2005*, p. 232	* including sub-category of buildings, and sub-sub category of residential housing
(ii) by structure	1981-00	*Inv. 1950-2000*, pp. 28f.	

(iii) urban residential buildings, and urban residential housing	1981-00	*Inv. 1950-00*, pp. 481f.	
(iv) rural residential housing	1982-00	*Inv. 1950-00*, p. 501	* *Inv. Yearb. 1950-95*, p. 436 also has rural individual-owned investment in buildings
	1985, 89-04	*Stat. Yearb. 2005*, p. 232	
d. other	1980-00	*Inv. 1950-00*, p. 15	* this is the summary table on all ownership forms (line "1." above) * entries for "others" start in 1993, with a relatively small value * in the *Statistical Yearbook* issues, more ownership categories tend to be available (which then reduces the residual "others")
6. By channel of management			* de facto exhaustive categories 1980-92: capital construction, technological updating and transformation, real estate investment (de facto, urban), investment by collective-owned units (urban & rural), and investment by individual-owned units (urban & rural)
three categories, non-exhaustive of total	1952-00	*Inv. 1950-00*, p. 21	* covers three categories capital construction, technological updating and transformation, real estate development * categories do not add up to total value in *Inv. 1950-00*, p. 15
four exhaustive categories	1980, 85-03	*Stat. Yearb. 2004*, p. 193	* three categories as in line above, plus "others"
a. capital construction	1950-00	*Inv. 1950-00*, p. 87	
	1978, 80, 85-03	*Stat. Yearb. 2004*, p. 195	
(i) by type of construction	1953-00	*Inv. 1950-00*, p. 106	* 1966-70 as one data point
	1978, 80, 85-03	*Stat. Yearb. 2004*, p. 195	
(ii) by structure	1950-00	*Inv. 1950-00*, p. 110	
	1978, 80, 85-03	*Stat. Yearb. 2004*, p. 195	
(iii) residential housing	1950-00	*Inv. 1950-00*, p. 108	
(iv) productive vs. non-prod.	1950-95	*Inv. Yearb. 1950-95*, p. 96	
(v) main economic sectors	1953-00	*Inv. 1950-00*, p. 113	* primary, secondary, and tertiary sector * 1966-70 and 1971-74 data not by year (two data points)
(vi) 16 sectors	1953-65, 75-00	*Inv. 1950-00*, pp. 114-21	* GB1994; in some years, some sectors are combined
	1989-02	*Stat. Yearb. 2004*, p. 198	* GB1994; also has data for 1978, 80, and 85
(vii) 39 industrial sectors	1985, 1986-00	*Stat. Yearb. 1992*, p. 160, *Inv. 1950-00*, pp. 128-31	* GB1994
	2002	*Inv. Yearb. 2003*, pp. 453-8	* GB1994
(viii) detailed sectors	1990, 91, 92, 93, 94, 95, 96,	*Stat. Yearb. 1991*, pp. 159f., *1992*, pp. 161f., *1993*, pp.	* GB1994 since 1993, GB1984 earlier, with breakdown (of each sector) by type of construction

	97, 98, 99, 00, 01, 02	161f., *1994*, pp. 148f., *1995*, pp. 144f., *1996*, pp. 146f., *1997*, pp. 158f., *1998*, pp. 194f., *1999*, pp. 192f., *2000*, pp. 176f., *2001*, pp. 166f., *2002*, pp. 184f., *2003*, pp. 194f.	* 1990-92 data also with breakdown by productive vs. non-productive use (and a sub-category residential housing for the latter)
	2002	*Inv. Yearb. 2003*, pp. 463-5	* GB1994, with breakdown by structure
	2003	*Stat. Yearb. 2004*, pp. 196f.	* GB2002, including 39 industrial sectors, sub-sectors of primary sector, and sub- and sub-sub-sectors of tertiary sector * with breakdown by type of construction
b. technological updating and transformation	1953-00	*Inv. 1950-00*, pp. 241	* has note that "other state-owned investment" is excluded since 1994
	1989-03	*Stat. Yearb. 2004*, p. 216	* also has data for 1980 and 85
(i) by type of construction	1981-00	*Inv. 1950-00*, p. 256	
	1989-03	*Stat. Yearb. 2004*, p. 216	* also has data for 1980 and 85
(ii) by structure	1980-00	*Inv. 1950-00*, p. 257	
	1989-03	*Stat. Yearb. 2004*, p. 216	* also has data for 1980 and 85
(iii) residential housing	1980-00	*Inv. 1950-00*, p. 258	
(iv) main economic sectors	1980-00	*Inv. 1950-00*, p. 113	* primary, secondary, and tertiary sector
(v) 16 sectors	1980-00	*Inv. 1950-00*, pp. 260-3	* GB1994 * in some years, some sectors are combined
	1989-02	*Stat. Yearb. 2004*, p. 220	* GB1994; also has data for 1980 and 85
(vi) 39 industrial sectors	1980-00	*Inv. 1950-00*, pp. 266-9	* GB1994 * in some years, some sectors are combined
	2002	*Inv. Yearb. 2003*, pp. 568-73	
(vii) detailed sectors	1990, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02	*Stat. Yearb. 1991*, pp. 179f., *1992*, pp. 186f., *1993*, pp. 186f., *1994*, pp. 160f., *1995*, pp. 164f., *1996*, pp. 166f., *1997*, pp. 178f., *1998*, pp. 214f., *1999*, pp. 210, *2000*, pp. 193f., *2001*, pp. 183f., *2002*, pp. 201f., *2003*, pp. 211f.	* GB1994 since 1993, GB1984 earlier, with breakdown by type of construction * 1990-92 data also with breakdown by productive vs. non-productive use (and a sub-category residential housing for the latter)

	2002	*Inv. Yearb. 2003*, pp. 557-9	* GB1994, with breakdown by structure; by type of constr. pp. 580-2
	2003	*Stat. Yearb. 2004*, pp. 217f.	* GB2002, including 39 industrial sectors, sub-sectors of primary sector, and sub- and sub-sub-sectors of tertiary sector * with breakdown (of each sector) by type of construction
c. real estate development	1986-00	*Inv. 1950-00*, p. 369	* by definition, urban (see *Stat. Yearb. 2005*, p. 187)
	1997-02	*Stat. Yearb. 2003*, p. 241	* with breakdown into residential housing, office buildings, commercially used buildings, and "others"
	2000-04	*Stat. Yearb. 2004*, p. 245; *2005*, p. 233	* total investment is labeled "investment completed this year" (identical year 2000 value as in source in previous line)
	2000-05	*Stat. Abstr. 2006*, p. 62	* with breakdown into residential housing, office buildings, commercially used buildings, and "others" * with breakdown by structure
7. By structure (exhaustive of total)	1981-00	*Inv. 1950-00*, pp. 28f.	* three categories add up to total value in *Inv. 1950-00*, p. 15 * each by ownership form: state-owned units, collective-owned units, and individuals
	2001, 02	*Stat. Yearb. 2003*, p. 185	
	2003, 04	*Stat. Yearb. 2005*, p. 185	
	2005	*Stat. Abstr. 2006*, p. 52	
8. Residential housing construction	1981-00	*Inv. 1950-00*, p. 32	* also by ownership, and by urban-rural distinction
	2002	*Inv. Yearb. 2003*, p. 19	* by 8 ownership categories
	1995-04	*Stat. Yearb. 2005*, p. 191	* with a breakdown urban (also, of which: real estate development) and rural (also, of which: rural households)
B. Effective investment (newly increased fixed assets)			* exhaustive sub-categories are not available
1. Total, state-owned units	1981-00	*Inv. 1950-00*, p. 77	
total	2002, 03	*Inv. Yearb. 2004*, p. 3	
	2004, 05	*Stat. Abstr. 2006*, p. 52	* also has data for 1990, 95, and 00
state-owned units	2001-03	*Stat. Yearb. 2002*, p. 180, *2004*, p. 192	* the two sources also have data for 1995, 98, and 00
by ownership	1996-98	*Inv. Yearb. 1997*, *1998*, *1999*, all pp. 4f.,	* with similar details as for 2002 (next line)
	(2001), 2002	*Inv. Yearb. 2003*, pp. 4f.	* 2001 values for SOUs and collective-owned units on pp. 35, 105 * by detailed sectors in 2002 (with investment values): SOUs, pp. 46-8; collective-owned units, pp. 122-4; joint enterprises, pp. 187-9; shareholding enterprises, pp. 247-9; foreign-owned enterprises, pp.

			309-11, Hong Kong/ Macau/ Taiwan enterprises, pp. 369-71 * one value for urban private/ individual-owned enterprises, p. 425 (also with investment value)
2. Urban	1995-04	*Stat. Yearb. 2005*, p. 224	* also has investment values
a. 16 sectors	1995-02	*Stat. Yearb. 2005*, p. 219	* GB1994
b. 20 sectors	2003-04	*Stat. Yearb. 2005*, pp. 220-2	* GB2002
c. detailed sectors	2003	*Inv. Yearb. 2004*, pp. 74-6	* GB2002, also has investment values
	2004	*Stat. Yearb. 2005*, pp. 212-5	* GB2002, also has investment values
3. Rural	2003	*Inv. Yearb. 2004*, p. 431	* with a breakdown into agricultural household and non-agricultural household
4. Capital construction	1953-00	*Inv. 1950-00*, p. 202	
	1989-03	*Stat. Yearb. 2004*, p. 208	* also has data for 1978, 80, and 85
a. 16 sectors			
by planning period	1953-00	*Inv. 1950-00*, pp. 208f.	* 1953-57, 58-62, 63-65, 66-70, 71-75, 76-80, 81-85, 86-90, 91-95, 96-00 (all GB1994)
annual	1985-02	*Stat. Yearb. 1996*, pp. 152f., *2004*, p. 204	* GB1994
b. 20 sectors	2003	*Stat. Yearb. 2004*, pp. 205-7	* GB2002
c. 39 industrial sectors			
by planning period	1986-00	*Inv. 1950-00*, pp. 214f.	* GB1994 * 1986-90, 91-95, 96-00
annual	1985-90	*Stat. Yearb. 1991*, p. 166	* GB1984, 40 sectors
	2002	*Inv. Yearb. 2003*, pp. 473-8	
d. detailed sectors	1990, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02	*Stat. Yearb. 1991*, pp. 167f., *1992*, pp. 169f., *1993*, pp. 170-71, *1994*, pp. 164-9, *1995*, pp. 156f., *1996*, pp. 158f., *1997*, pp. 170f., *1998*, pp. 206f., *1999*, pp. 203f., *2000*, pp. 187f., *2001*, pp. 177f. *2002*, pp. 195f., *2003*, pp. 205f.	* GB1994 since 1993, GB 1984 earlier * same table typically also has investment values (not for years prior to 1993) * 2002 data by type of construction in *Inv. Yearb.* 2003, pp. 485-7
	2003	*Stat. Yearb. 2004*, pp. 211f.	* GB2002, also has investment values
5. Technological updating and transformation	1980-00	*Inv. 1950-00*, p. 298	

	2001, 02	*Stat. Yearb. 2004*, p. 226	
	2003	*Stat. Yearb. 2004*, p. 227	
a. main economic sectors	1980-00	*Inv. 1950-00*, p. 324	
b. 16 sectors	1980-00	*Inv. 1950-00*, pp. 312f.	* GB1994
	1985-02	*Stat. Yearb. 1996*, pp. 168f., *2004*, p. 226	* GB1994, *Stat. Yearb. 2004* also has data for 1980
c. 20 sectors	2003	*Stat. Yearb. 2004*, pp. 227-9	* GB2002
d. 39 industrial sectors by planning period	1980-00	*Inv. 1950-00*, pp. 316f.	* GB1994 * in some years, some sectors are combined
e. detailed sectors	1990, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02	*Stat. Yearb. 1991*, pp. 183f., *1992*, pp. 190f., *1993*, pp. 190f., *1994*, pp. 164-9, *1995*, pp. 170f., *1996*, pp. 172f., *1997*, pp. 184f., *1998*, pp. 220f., *1999*, pp. 217f., *2000*, pp. 202f., *2001*, pp. 192f., *2002*, pp. 210f., *2003*, pp. 220f.	* GB1994 since 1993, GB1984 earlier, also has investment values
	2002	*Inv. Yearb. 2003*, pp. 557-9	* GB1994; also has investment values * by type of construction on pp. 589-91
	2003	*Stat. Yearb. 2004*, pp. 230f.	* GB2002, also has investment values
6. Urban collective-owned units	1978-00	*Inv. 1950-00*, p. 441	
total, by 16 sectors	1990, 91, 92, 93, 94, 95, 96, 97, 98, 99, 00, 01, 02	*Stat. Yearb. 1991*, p. 194, *1992*, p. 200, *1993*, p. 200, *1994*, p. 177, *1995*, p. 178, *1996*, p. 180, *1997*, p. 192, *1998*, p. 228, *1999*, p. 226, *2000*, p. 210; *2001*, p. 200, *2002*, p. 218, *2003*, p. 228	* GB1994 since 1993; also has investment values * 1990-92 values following the GB1984 in 13 sectors
total, by 20 sectors	2003	*Stat. Yearb. 2004*, p. 238	* GB2002; also has investment values
total, by detailed sectors	2002	*Inv. Yearb. 2003*, pp. 122-4	* GB1994; also has investment values
7. Real estate development	2001, 02	*Inv. Yearb. 2003*, p. 631	* also has investment values
C. Gross fixed capital formation			
1. Total	1952-95	*GDP 1952-95*, p. 50	
	1990-02	*GDP 1996-02*, p. 27	* also has data for 1952, 58, 63, 66, 71, 76, 81, 86, 89, and 1990-95

	1978-04	*Stat. Yearb. 2005*, p. 64	
	1978-05	*Stat. Abstr. 2006*, p. 35	
2. Primary, secondary, tertiary sector (sum across provinces)	1978-95; 1952, 78, 85, 90, 95-02	*GDP 1952-95*; *GDP 1996-02*	* only available as sum provinces, and not reported for all provinces * the provincial data on the early (pre-1996) years in *GDP 1996-00* are highly incomplete
D. Investment in fixed assets price index	1992-00	*Inv. 1950-00*, pp. 9-13	* with breakdown by structure
	2001, 02	*Stat. Yearb. 2003*, p. 333	* with breakdown by structure
	2003, 04	*Stat. Yearb. 2005*, p. 323	* with breakdown by structure
	1990-04	*Stat. Abstr. 2006*, p. 104	* with breakdown by structure

Stat. Yearb. = Statistical Yearbook; Inv. Yearbook = Investment Yearbook; *Stat. Abstr. = Statistical Abstract*; *Inv. 1950-00 = Inv. 1950-00*.

Categorization by type of construction: new construction (*xinjian*), expansion (*kuojian*), and reconstruction/replacement (*gaijian*). In some publications, the categorization further includes the following items (then accounting for perhaps 10% of the total): facilities/installations purely for non-productive use ("for living," *danchun jianzao shenghuo sheshi*), relocation (*qianjian*), restoration/resumption (*huifu*), pure "purchase" (*danchun gouzhi*).

Categorization by structure: construction and installation (*jianzhu anzhuang gongcheng*), purchase of equipment, tools, and appliances (*shebei gongju qiju gouzhi*), and other costs (*qita feiyong*).

Categorization by management: non-exhaustive of total: capital construction, technological updating and transformation, and real estate development.

Detailed sectors: typically comprises the 16 or 20 first-level sectors and all or most second-level sectors (in particular, all [usually around 39] industrial sectors); may also comprise some third-level sectors in the tertiary sector.

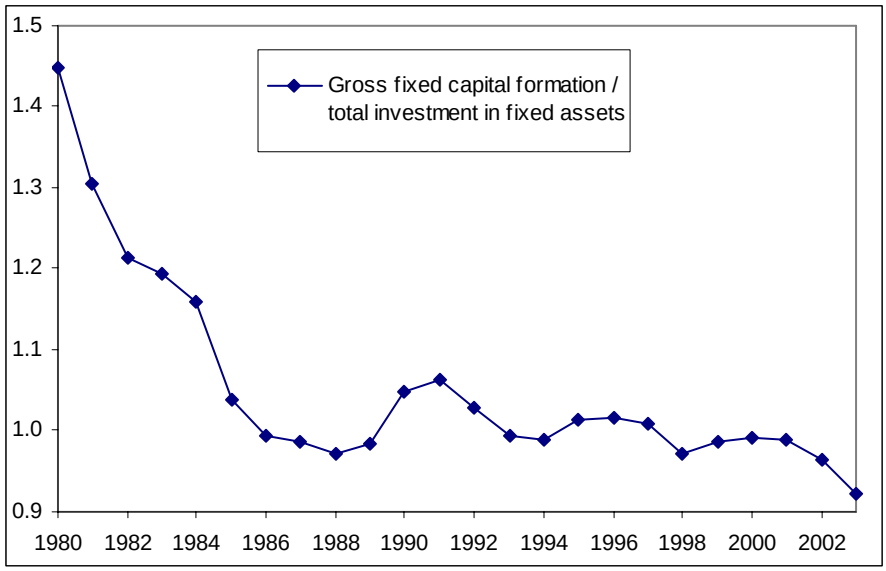
Many time series experience two statistical breaks. The first statistical break occurs in 1996 or 1997 (some tables report two 1996 values, following the old and the new definition): since 1997, the minimum investment size for investment to be included in the statistics is 500,000 yuan RMB, except for real estate investment, rural collective-owned investment, and individual-owned investment, for which the minimum size remains at (the previously uniformly applied) 50,000 yuan RMB. The second statistical break occurs with the economic census revision of 2004 investment values. Both statistical breaks, across various time series examined, appear extremely small, on the order of one percentage point.

Technological updating and transformation in some sources, through 1993, includes "other SOU investment." In 1953-85, SOU investment equals capital construction plus technological updating and transformation (the latter including "other SOU investment"). In 1986-92, SOU investment equals capital construction plus technological updating and transformation (the latter including "other SOU investment"), plus all (since 1986 newly reported) real estate development.

The *Investment Yearbook* is not a recurrent annual publication, but has only been published occasionally (see references). The *Statistical Yearbook* appears a more reliable source of investment data. The various data sources, especially the *Investment 1950-2000* compendium, contain numerous further statistics, such as on sources of funding, on central vs. local subordination, or on provincial data. The coverage in the table here focuses on those investment series of greatest interest in the context here, and where multiple sources are available lists the most recent ones.

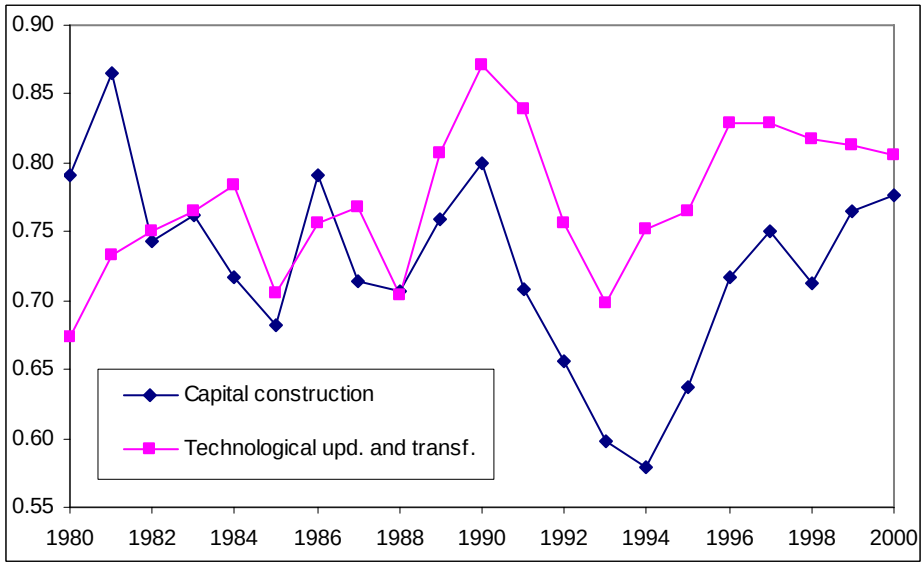
The *Statistical Yearbook* series was consulted starting with the *2005* issue, and working backwards to the *1991* issue. Earlier issues contain additional data for a very few of the categories covered here (typically: investment by ownership, capital construction and technological updating and transformation investment as well as effective investment, by detailed sector).

The GB classification standard, where noted, is deduced from the sectoral labels. None of the sources lists the GB used.



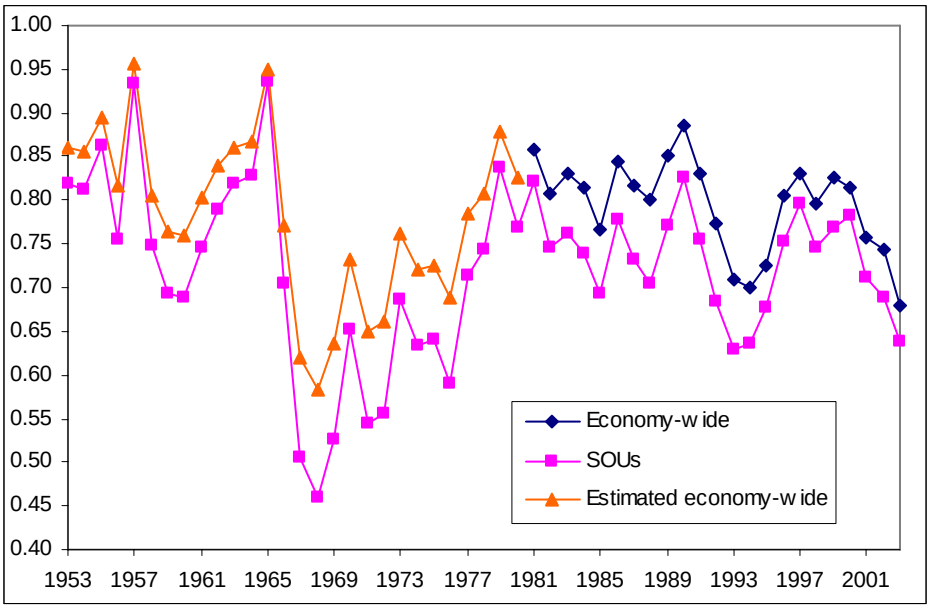
Sources: gross fixed capital formation: *GDP 1952-1995*, p. 50, *Statistical Yearbook 2004*, p. 66; total investment in fixed assets: *Investment 1950-2000*, p. 15, *Statistical Yearbook 2004*, p. 188.

Figure 25. Gross Fixed Capital Formation vs. Total Investment in Fixed Assets



Sources: capital construction: *Investment 1950-2000*, p. 202 (both for newly increased fixed assets through capital construction, and for capital construction investment); technological updating and transformation (excluding "other" SOU investment): *Investment 1950-2000*, p. 298 (both for newly increased fixed assets through technological updating and transformation, and for technological updating and transformation investment).

Figure 26. Ratio of Newly Increased Fixed Assets to Investment



Sources:

Effective investment 1981-2003 economy-wide and SOUs: *Investment 1950-2000*, p. 77, *Investment Yearbook 2003*, p. 3 (for economy-wide values of 2001 and 2002), *Investment Yearbook 2004*, p. 27 (for economy-wide value of 2003), *Statistical Yearbook 2002*, p. 180 (for SOU value of 2001), and *2004*, p. 192 (for SOU values of 2002 and 2003).

Effective investment 1953-1980, SOUs: sum of capital construction and technological updating (where the latter data are estimates through 1979 and include "other" SOU investment).

Investment: economy-wide: *Investment 1950-2000*, p. 15, *Statistical Yearbook 2004*, p. 188; SOUs: *Investment 1950-2000*, p. 15 (source of funds table used for 1953-1979) and p. 25 (for 1980-2000, with identical data as in the source of funds table for 1980-1993), *Statistical Yearbook 2004*, p. 188.

For the regression equation underlying the estimated economy-wide values of the years through 1980, see the text. Gross output values are from the *Industrial Yearbook 1993*, p. 35.

Figure 27. Transfer Rates

Table 19. Economy-wide Gross Capital Stock

	Gross capital stock based on effective investment at year 2000 constant prices, adjusted for mortality and age-efficiency				Gross capital stock based on effective GFCF at year 2000 constant prices, adjusted for mortality and age-efficiency			
	Constr.	Equipm.	Sum	W. sum	Constr.	Equipm.	Sum	W. sum
1953	97.790	33.611	131.401	55.004	133.355	45.834	179.189	75.008
1954	117.886	42.630	160.516	67.715	161.071	58.295	219.366	92.553
1955	140.229	53.163	193.391	82.185	191.153	72.451	263.604	112.018
1956	174.299	68.377	242.676	103.684	235.219	92.014	327.232	139.749
1957	216.660	86.930	303.591	130.174	281.456	111.796	393.252	168.349
1958	270.488	119.154	389.642	169.599	344.737	149.438	494.175	214.538
1959	335.099	154.345	489.444	214.596	420.288	190.309	610.597	266.969
1960	406.152	193.915	600.067	264.661	501.493	235.226	736.719	323.982
1961	437.203	208.146	645.350	284.499	543.628	254.579	798.207	350.929
1962	456.019	213.899	669.919	294.606	576.697	265.789	842.487	369.425
1963	480.950	220.947	701.896	307.614	618.513	278.859	897.371	392.077
1964	516.697	232.721	749.417	327.379	676.520	299.429	975.949	425.126
1965	568.484	253.973	822.457	358.810	753.037	332.047	1085.084	472.377
1966	613.181	275.289	888.469	387.919	821.501	366.579	1188.080	518.220
1967	640.430	281.757	922.187	401.315	867.097	380.901	1247.998	542.966
1968	659.236	284.793	944.029	409.607	903.662	393.187	1296.849	563.345
1969	695.455	296.312	991.766	429.359	962.211	415.837	1378.048	597.962
1970	758.515	327.967	1086.482	471.483	1050.102	461.733	1511.835	657.856
1971	826.830	352.506	1179.335	510.614	1142.604	496.222	1638.825	711.682
1972	897.843	375.698	1273.541	549.746	1239.116	528.920	1768.036	765.652
1973	985.963	410.596	1396.558	602.385	1354.675	574.862	1929.537	834.800
1974	1073.293	445.220	1518.513	654.578	1476.712	624.464	2101.176	908.547
1975	1175.964	491.152	1667.117	719.423	1617.761	688.005	2305.765	997.923
1976	1274.345	532.150	1806.496	779.549	1748.716	741.858	2490.574	1077.477
1977	1403.805	582.540	1986.345	856.295	1912.906	803.434	2716.340	1173.258
1978	1563.714	645.753	2209.467	951.740	2114.107	879.970	2994.077	1291.349
1979	1761.203	706.000	2467.203	1057.734	2367.058	954.133	3321.191	1425.108
1980	1969.974	761.428	2731.402	1164.277	2641.513	1024.400	3665.913	1563.438
1981	2181.032	800.712	2981.745	1260.819	2916.544	1072.455	3988.999	1687.151
1982	2426.698	853.116	3279.814	1377.643	3213.439	1129.911	4343.350	1824.420
1983	2708.675	920.660	3629.335	1516.665	3548.767	1203.555	4752.321	1985.292
1984	3034.831	1017.569	4052.400	1689.990	3924.679	1307.278	5231.957	2179.745
1985	3426.141	1148.813	4574.955	1907.923	4326.644	1429.672	5756.316	2395.330
1986	3932.380	1317.488	5249.869	2363.445	4823.618	1580.500	6404.117	2877.747
1987	4492.987	1514.336	6007.324	2705.797	5370.594	1757.031	7127.625	3202.456
1988	5098.764	1727.345	6826.109	3075.913	5952.632	1944.963	7897.594	3548.030
1989	5669.695	1891.214	7560.909	3402.607	6506.633	2086.840	8593.472	3854.757
1990	6224.050	2048.751	8272.800	3718.870	7080.412	2236.422	9316.834	4174.018
1991	6798.294	2220.817	9019.111	4051.808	7682.848	2405.364	10088.212	4516.358
1992	7447.087	2438.700	9885.787	4442.055	8341.795	2613.980	10955.775	4905.106
1993	8166.865	2726.985	10893.851	4902.937	9045.683	2881.423	11927.107	5347.127
1994	9013.211	3052.122	12065.333	5436.557	9870.903	3184.193	13055.096	5858.877
1995	10041.084	3382.640	13423.725	6046.018	10901.272	3504.968	14406.240	6463.490
1996	11292.575	3802.739	15095.314	6798.673	12159.695	3918.755	16078.450	7215.131
1997	12581.687	4335.144	16916.831	7633.761	13445.758	4442.599	17888.357	8043.863
1998	13988.942	4914.814	18903.756	8544.465	14797.604	4986.135	19783.739	8910.722
1999	15514.629	5549.716	21064.345	9535.681	16286.634	5596.781	21883.415	9872.722

2000	17118.529	6261.081	23379.611	10604.061	17858.116	6287.387	24145.503	10915.679
2001	18753.027	7023.286	25776.313	11715.182	19455.753	7027.219	26482.972	11998.633
2002	20589.660	7939.685	28529.345	12999.675	21202.972	7887.442	29090.414	13213.654
2003	22615.338	9079.144	31694.482	14493.622	23045.172	8899.559	31944.731	14557.804
2004	24907.505	10462.429	35369.934	16240.459	25133.171	10135.893	35269.064	16134.804
2005	27534.906	12105.281	39640.187	18277.131	27414.149	11519.258	38933.407	17877.215

Construction: Construction & installation.

Equipm. = equipment: Purchase of equipment & tools & appliances, and "others."

Sum: sum of construction and equipment values.

W. sum = weighted sum: in an approximation of relative prices, construction and equipment are weighted 1:2 (i.e., 1/3 vs. 2/3) in 1953-85, and 2:3 in the years since 1986. For the rationale see the text.

The 1953 fixed asset value is obtained as noted with Appendix 25. The structural breakdown follows that of the 1953 effective investment (or GFCF) value. In adjusting the 1953 fixed asset value for mortality and age-efficiency, it is assumed that its age in 1953 is equal to half the service life. Sources: for the effective investment / GFCF values see Appendix 25, for the breakdown by structure Appendix 26, for the price index Appendix 24, and for the survival and age-efficiency profiles Appendix 27.

Table 20. Gross Capital Stock, Total and by Sector, via Depreciation

	Total	***Prim.***	***Sec.***	Industry	Constr.	***Tert.***	Transp.	Trade	Finance	Real est.	Soc. serv.	Health	Educ.	Science	Gov.	Others
Life	25	20	22	23	20	30	13	40	35	50	35	30	35	30	35	35
1978	267.503	25.565	159.295	145.238	9.767	89.472	18.608	12.385	1.083	34.141	4.216	2.974	6.324	2.615	4.414	0.306
1979	291.344	28.149	169.201	153.990	10.908	100.559	18.587	14.133	1.230	39.365	5.266	3.017	7.331	2.961	4.994	0.384
1980	310.531	30.235	175.543	159.966	11.408	110.817	18.437	15.758	1.370	44.267	6.166	3.193	8.235	3.286	5.539	0.473
1981	333.854	32.101	183.171	167.107	12.161	123.961	18.968	17.676	1.618	50.150	7.419	3.561	9.131	3.702	6.420	0.634
1982	356.094	34.752	189.198	173.109	12.563	136.715	20.299	19.631	1.920	55.398	8.506	3.988	10.129	4.083	7.262	0.772
1983	391.488	37.961	202.796	185.841	13.905	154.422	23.630	22.034	2.393	62.372	9.189	4.557	11.670	4.684	8.453	0.816
1984	431.697	38.315	220.011	201.246	16.220	176.154	28.152	25.077	2.862	71.355	9.604	5.191	13.870	5.324	9.487	0.890
1985	484.089	40.638	241.021	220.391	18.654	204.314	34.683	29.033	3.531	82.097	10.474	5.978	16.378	5.990	11.052	1.008
1986	555.590	44.556	273.617	250.446	21.793	238.432	42.815	33.794	4.529	94.907	12.358	6.741	18.581	6.805	13.034	1.241
1987	654.660	52.677	321.287	294.941	25.632	280.885	53.963	40.966	6.129	106.705	15.604	7.770	20.444	8.326	15.901	1.425
1988	774.171	59.703	383.434	353.159	30.246	330.427	67.484	49.567	8.306	119.505	18.316	8.844	22.603	10.503	19.154	1.906
1989	908.834	66.901	448.560	414.647	34.520	391.968	83.927	60.210	10.941	133.392	21.707	10.614	25.841	13.597	24.045	2.952
1990	1043.460	70.300	513.102	476.275	38.096	457.802	101.355	70.502	14.197	147.053	24.382	11.985	30.454	16.768	31.221	4.358
1991	1204.105	73.891	597.765	555.737	44.028	529.210	117.666	82.818	17.974	162.169	28.113	13.653	35.124	20.171	38.586	5.890
1992	1312.456	75.394	656.275	609.283	49.871	576.347	126.997	91.578	21.163	173.990	30.571	14.020	37.444	21.414	42.092	6.855
1993	1443.688	80.679	726.945	675.420	55.436	630.127	137.456	100.383	25.878	189.178	34.634	14.841	38.615	23.477	44.312	6.842
1994	1608.227	88.814	804.063	750.264	58.873	707.602	154.968	112.468	31.837	212.408	39.619	16.084	40.604	25.113	47.565	6.963
1995	1941.189	104.020	958.434	897.720	67.166	868.867	193.784	137.901	42.342	261.747	48.249	18.078	46.280	29.889	56.011	8.036
1996	2345.552	119.078	1146.734	1077.510	77.231	1067.514	240.159	168.361	54.131	325.873	59.366	20.738	54.582	34.197	65.890	10.113
1997	2855.038	135.199	1389.850	1304.936	94.771	1315.244	300.474	206.486	70.104	398.715	77.210	24.182	64.856	40.510	77.368	12.740
1998	3207.158	138.443	1546.940	1452.473	106.445	1504.442	340.009	237.686	82.624	452.648	92.357	28.498	73.664	44.853	85.692	14.444
1999	3493.606	138.840	1654.973	1555.838	113.566	1679.868	370.473	268.992	94.806	506.016	107.397	32.172	80.569	48.457	92.385	15.945
2000	3567.510	130.815	1651.969	1555.386	113.774	1762.240	378.159	279.915	100.721	534.343	114.088	34.695	84.937	49.143	95.496	15.441
2001	3733.476	129.879	1698.477	1599.353	119.469	1880.157	392.081	291.375	110.344	574.982	125.729	36.699	90.814	51.038	100.724	16.210
2002	3870.966	128.435	1737.889	1631.283	130.545	1977.413	403.286	295.457	118.993	605.031	135.889	38.891	97.179	53.013	105.477	16.956
Gr.	11.8	7.0	10.5	10.6	11.4	13.8	13.7	14.1	21.6	12.7	15.6	11.3	12.1	13.4	14.1	18.2

Life = assumed average service life. For the rationale of the assumptions see below with the sectoral definition.
Gr. = average annual growth rate.

The 1978 fixed asset value is depreciation divided by the depreciation rate, with the resulting original fixed asset value deflated in full using the 1978 price level. In adjusting the 1978 constant-price fixed asset value for mortality and age-efficiency, it is assumed that its age in 1978 is equal to half the service life (when the service life number is odd, to half the service life plus 0.5). For subsequent years, say, 1979, the 1978 original fixed asset value is subtracted from the 1979 original fixed asset value (both fixed asset values not adjusted for prices), and this increment then adjusted for prices. The 1978 (deflated fixed asset) value and all (deflated) increments are subjected to the age-efficiency and survival functions, and then added up.

The average service life for each sector is obtained by assuming service lives for construction & installation vs. equipment, tools, and appliances (and others) separately. The assumptions follow the values of the Czech Republic and the Netherlands as far as available. For each sector, the two values are weighted using assumed proportions. The resulting average service life for each sector is then simplified to a round number, and usually slightly adjusted downward, keeping in mind the economy-wide values obtained by Holz (2006c). Below, after the definition of each sector, is listed (i) the assumed average service life of construction & installation (for example, in agriculture, 45 years), (ii) in parentheses, its proportion (for example, in agriculture, 25%), (iii) the assumed average service life of equipment, tools, and appliances (and others) (for example, in agriculture, 15 years, with the proportion being 100% minus 25% and not being noted), and the simplified final average service life that is being used here and listed in the table above (for example, in agriculture, 20 years)

Prim., sec., tert. = primary, secondary (simplified overall 22 years), tertiary sector (simplified overall 30 years).

Agric. = agriculture = farming, forestry, animal husbandry, and fishery; 45 (25%), 15, 20.

Industry = mining and quarrying (45 (25%), 15, 20), manufacturing (45 (25%), 20, 25), and public utilities (45 (25%), 20, 25); a simplified overall 23 years is used.

Constr. = construction; 45 (25%), 15, 20.

Transp. = transport, storage, post and telecommunications; 45 (10%), 10, 13.

Trade = wholesale and retail trade & catering services; 45 (90%), 15, 40.

Finance = finance (banking) and insurance; 45 (75%), 10, 35.

Real est. = real estate; 60 (90%), 15, 50.

Soc. serv. = social services; 45 (75%), 15, 35.

Health = health care, sports, and social welfare; 45 (50%), 15, 30.

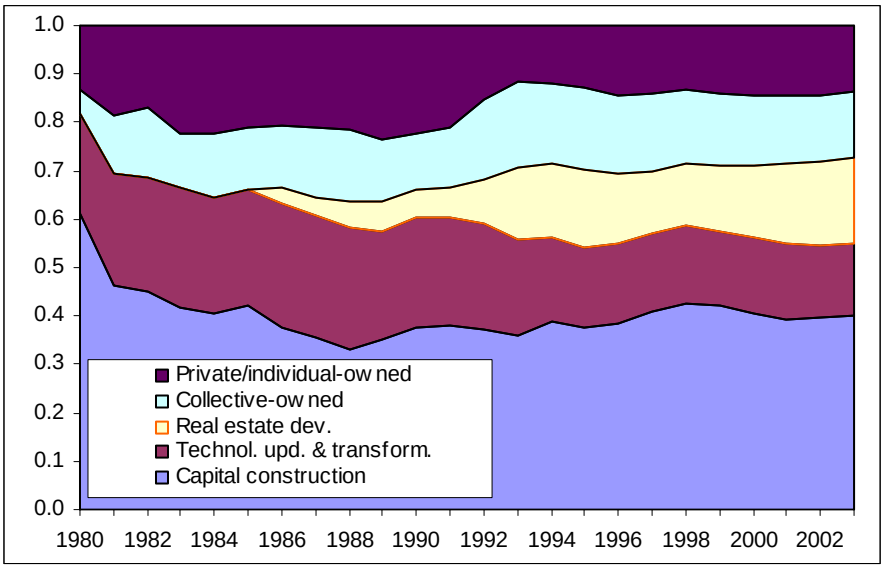
Educ. = education, culture and arts, radio, film and television; 45 (75%), 15, 35.

Science = scientific research and polytechnic services, plus agricultural services, plus geological prospecting and water conservancy; 45 (50%), 15, 30.

Gov. = government agencies, Party agencies, and social organizations; 45 (75%), 15, 35.

Others; 45 (75%), 15, 35.

Sources and explanations: depreciation values and depreciation rates from Appendix 28 and Appendix 29 (from *GDP 1952-95*, and *GDP 1996-2002*), price indices from Appendix 24. With a set of 1995 values in each appendix, the 1995 values of the second set are used (the differences are very minor). The second set of data, for 1995-2002, lists separately "agricultural services" and geological prospecting and water conservancy;" in order to match up with the earlier data for 1978-95, these two tertiary sector sub-sectors are folded into "science" (as they are in the source of the earlier data, and the two 1995 values in the two sources then match well). The labeling of transport and trade changes between the two sources, with possible storage moving from trade to transport in the second source; this is the same issue as with the value added data from these sources, discussed earlier in the text.



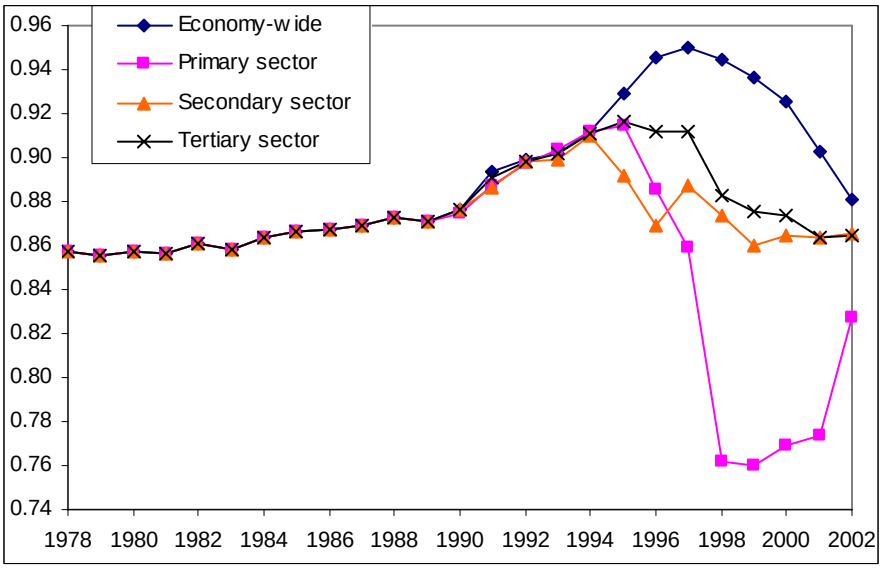
The five categories add up perfectly to 100% in 1980-92, but not since then; at the minimum, in 1996, they accounted for 97.63% of total investment, and at the maximum, in 2003, for 103.33%.

The (small) statistical break between 1996 and 1997 (with the rise in the size criterion for investment in fixed assets to be included, relevant at least for the bottom two types of investment) is ignored.

Technological updating and transformation since 1994 excludes "other" SOU investment, and prior to 1994 includes such investment.

Sources: *Investment 1950-2000*, pp. 15, 87, 241, 369, 397, 469; *Statistical Yearbook 2004*, pp. 188, 195, 216 (for 2001-03).

Figure 28. Shares in Total Investment



In the years 1990-2002, the primary sector series reflects the agricultural employment value in the 16-sector classification divided by (revised) primary sector employment in the 3-sector classification; similarly for the secondary and tertiary sector.

Since in 1978-89 the official 3-sector classification uses the report form values, in the figure the (here) approximated values of 1978-89 are used in calculating the ratio.

Sources: economy-wide: *Statistical Yearbook 2005*, p. 118, and for years prior to 1990 the approximated values from Appendix 13; 16-sector classification: *Statistical Yearbook 2005*, p. 125, and *Labor Yearbook 1996*, pp. 13f.; 3-sector classification: *Statistical Yearbook 2005*, p. 118, and for years prior to 1990 the approximated values from Appendix 13.

Figure 29. Report Form (Aggregated) Sectoral Employment Values Divided by Corresponding Values in Three Main Economic Sectors

Table 21. Labor Productivity: Economy-wide (constant year 2000 price yuan RMB value added per laborer-year)

	Report form (economy-wide) employment[a]					Revised economy-wide employment[b]				
	Value added as explained underneath table:									
	(i)	(ii)	(iii)	(iv)	(v)	(i)	(ii)	(iii)	(iv)	(v)
1952	1240	1335	1403	1202	1263					
1953	1391	1498	1579	1348	1421					
1954	1418	1527	1610	1374	1449					
1955	1481	1595	1681	1435	1513					
1956	1652	1779	1869	1601	1682					
1957	1681	1811	1900	1629	1711					
1958	1822	1963	2056	1766	1851					
1959	2015	2170	2265	1953	2039					
1960	2032	2188	2277	1969	2050					
1961	1494	1609	1706	1448	1536					
1962	1393	1500	1604	1350	1445					
1963	1493	1608	1721	1447	1550					
1964	1696	1827	1947	1644	1753					
1965	1920	2068	2191	1861	1973					
1966	2044	2202	2318	1981	2087					
1967	1865	2009	2139	1807	1926					
1968	1726	1860	1991	1673	1793					
1969	1939	2088	2182	1879	1965					
1970	2234	2406	2466	2165	2220					
1971	2310	2489	2551	2239	2296					
1972	2382	2566	2628	2309	2366					
1973	2515	2709	2773	2437	2497					
1974	2523	2718	2783	2445	2506					
1975	2685	2892	2959	2602	2664					
1976	2597	2797	2862	2517	2577					
1977	2756	2968	3031	2671	2729					
1978	3019	3252	3314	2926	2984	2587	2787	2841	2508	2558
1979	3179	3425	3487	3081	3140	2719	2929	2982	2635	2685
1980	3319	3575	3617	3217	3257	2846	3066	3102	2758	2793
1981	3383	3644	3690	3278	3322	2898	3122	3161	2809	2846
1982	3562	3837	3886	3453	3499	3067	3303	3345	2972	3012
1983	3854	4151	4196	3735	3778	3307	3562	3601	3205	3242
1984	4277	4607	4653	4145	4190	3694	3979	4018	3580	3618
1985	4691	5054	5090	4547	4583	4066	4380	4411	3940	3972
1986	4964	5347	5386	4811	4850	4304	4636	4670	4171	4204
1987	5382	5798	5830	5216	5220	4677	5038	5066	4533	4536
1988	5819	6269	6274	5640	5660	5080	5473	5478	4924	4941
1989	5949	6409	6415	5766	5736	5179	5579	5584	5019	4993
1990	6022	6487	6505	5836	5811	5277	5684	5701	5114	5093
1991	6393	6887	6907	6196	6334	5697	6137	6155	5522	5644
1992	7169	7723	7745	7155	7314	6441	6938	6958	6428	6571
1993	8030	8689	8752	8156	8344	7239	7832	7889	7352	7522
1994	8858	9627	9680	9349	9548	8073	8773	8821	8519	8701
1995	9645	10519	10558	10280	10480	8840	9642	9678	9422	9606
1996	10494	11488	11509	11165	11341	9565	10470	10490	10176	10336
1997	11270	12394	12405	12078	12213	10277	11301	11312	11014	11136
1998	12403	13640	13640	13329	13403	10950	12042	12042	11768	11833

1999	13256	14646	14646	14486	14512	11603	12820	12820	12680	12703
2000	14206	15754	15754	15754	15754	12411	13764	13764	13764	13764
2001	15254	17041	17041	17387	17387	13171	14714	14714	15013	15013
2002	16331	18380	18380	18925	18925	14125	15897	15897	16369	16369
2003						15324	17325	17325	17952	17968
2004						16608	18880	18862	19634	19741
2005							20578	20559	21400	21517
1978/52	2.43	2.44	2.36	2.43	2.36					
2002/78	5.41	5.65	5.55	6.47	6.34	5.46	5.70	5.60	6.53	6.40
2004/78						6.42	6.77	6.64	7.83	7.72
2005/78							7.38	7.24	8.53	8.41
2002/52	13.17	13.77	13.10	15.74	14.98					
2004/52[c]						13.40	14.14	13.45	16.34	15.63

a Report form employment values since 1998 exclude the not-on-post staff and workers; this is an issue relevant since perhaps 1994, implying and over-estimate of report form laborers in 1994-98.

b Employment values for the years prior to 1990 are approximated (adjusted) as described in the notes to Appendix 13 and in the text.

c The ratio of the 2004 to 1952 value uses labor productivity values of 2004 based on revised employment, and labor productivity values of 1952 based on report form employment.

Employment values are end-year values.

Report-form employment values starting in approximately 1994 include the new phenomenon of not-on-post staff and workers, since 1998 they do not; revised employment values probably do not include not-on-post staff and workers at any point of time.

The five series of economy-wide value added (GDP) are:

(i) pre-economic census GDP: the official pre-economic census real GDP growth rates of 1952-2004 (with values from the *Statistical Yearbook 2005* and from *GDP 1952-95*);

(ii) post-economic census GDP: the post-economic census official real GDP growth rates of 1993-2005, combined with earlier real GDP growth rates as in (i);

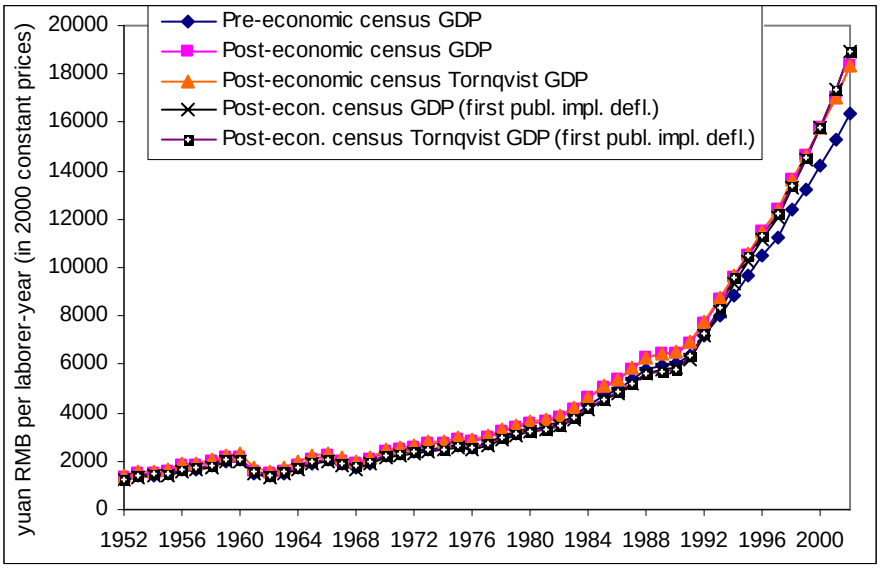
(iii) post-economic census Törnqvist GDP: the same as in (ii), but using a Törnqvist index of the real growth rates of value added of the three main sectors;

(iv) post-economic census GDP (first published implicit deflators): the same as in (ii), but obtaining the real GDP growth rates of 1992-2004 by applying the first published implicit deflators to the nominal values (which prior to 1993 are the pre-economic census ones, and since 1993 the post-economic census ones); first published implicit GDP deflators for years other than 1992-2004 are not available;

(v) post-economic census Törnqvist GDP (first published implicit deflators): the same as in (iii), but obtaining the real growth rates of value added of the three main economic sectors of 1987-2004 by applying the first published implicit sectoral deflators to the nominal values (since 1987/93, the post-economic census ones with pre-1993 nominal values revised by the economic census only in the tertiary sector); first published implicit sectoral deflators for years other than 1987-2004 are not available.

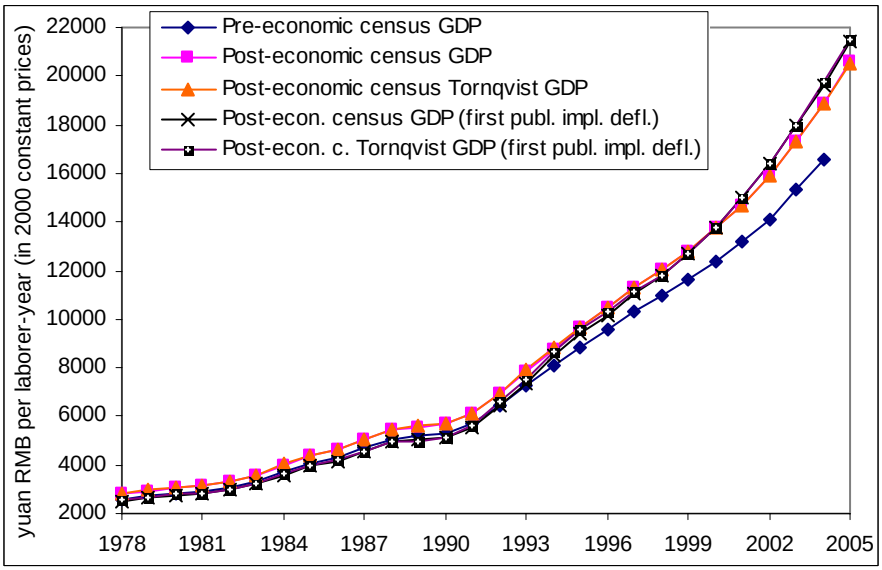
For the first output series, year 2000 GDP is the pre-economic census value (from the *Statistical Yearbook 2005*) of, economy-wide, 8946.81b yuan RMB, while for the second through fifth output series, year 2000 GDP is the post-economic census value as published in the benchmark revisions (for example, in the *Statistical Abstract 2006*) of, economy-wide, 9921.46b yuan RMB.

Sources: report form employment from Appendix 14, revised employment from Appendix 13, year 2000 GDP values from Appendix 6, pre-economic and post-economic census GDP as well as Törnqvist GDP real growth from Appendix 7, and real growth rates based on implicit deflators (for GDP and Törnqvist GDP) from Appendix 8.



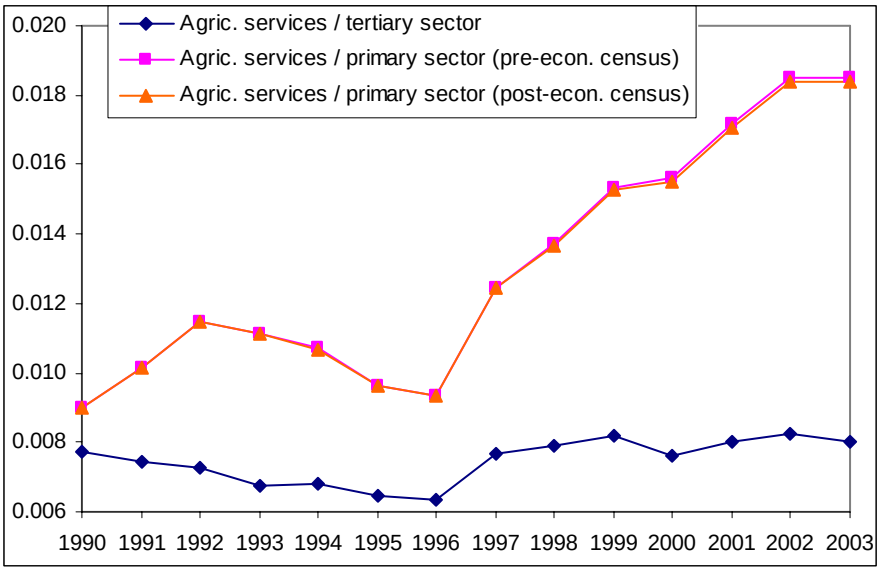
For data sources and explanations of the individual series see notes to Table 21.

Figure 30. Economy-wide Labor Productivity, Report Form Employment



For data sources and explanations of the individual series see notes to Table 21.

Figure 31. Economy-wide Labor Productivity: Revised Employment



Sources: Appendix 10 and Appendix 6.

Figure 32. Value Added of Agricultural Services Relative to Tertiary and Primary Sector Value Added

Table 22. Labor Productivity: Main Economic Sectors, Report Form Employment (constant year 2000 price yuan RMB value added per laborer-year)

	Post-economic census values since 1993					Post-economic census nominal values combined with first published implicit deflator since 1987/90				
	Prim. sector	Sec. sector	# Industry	# Constr.	Tertiary sector	Prim. sector	Sec. sector	# Industry	# Constr.	Tertiary sector
1952	1811	1801	1692	3964	5441	1669	1674	1531	3731	4591
1953	1801	2184	2084	4506	6850	1659	2030	1886	4241	5780
1954	1791	2303	2274	3911	7199	1650	2140	2058	3681	6074
1955	1886	2437	2599	3305	7431	1738	2265	2352	3111	6270
1956	1980	2541	3404	2637	7705	1824	2362	3080	2483	6502
1957	1961	3162	3721	3614	6982	1806	2939	3367	3402	5891
1958	2454	1464	1811	1510	4734	2261	1360	1639	1422	3995
1959	1965	2412	3584	1684	4889	1810	2241	3243	1585	4125
1960	1570	3346	3677	3800	4852	1447	3109	3327	3577	4094
1961	1372	2789	3005	2357	5735	1264	2592	2719	2219	4839
1962	1331	3451	3398	5210	6041	1226	3207	3074	4904	5097
1963	1435	3992	4022	5719	6161	1322	3710	3639	5383	5198
1964	1561	4681	4864	5976	6816	1438	4350	4401	5625	5751
1965	1668	5270	5674	5561	7579	1537	4898	5134	5235	6395
1966	1722	5974	6505	5637	7335	1587	5552	5885	5306	6189
1967	1694	5003	5365	5329	7174	1561	4649	4854	5017	6053
1968	1610	4407	4784	4176	6936	1483	4095	4328	3931	5853
1969	1560	5310	5628	5499	7938	1437	4935	5092	5176	6698
1970	1638	6165	6406	6725	8433	1509	5729	5796	6330	7116
1971	1634	6104	6251	7061	8564	1506	5673	5655	6646	7226
1972	1626	6077	6220	6709	8823	1498	5648	5627	6315	7444
1973	1737	6265	6387	6866	9285	1601	5823	5779	6463	7835
1974	1786	6056	6127	7077	9061	1646	5629	5543	6661	7645
1975	1807	6414	6470	7534	9182	1665	5961	5854	7091	7747
1976	1776	5742	5724	7422	8682	1636	5337	5179	6986	7325
1977	1743	6261	6389	6787	8544	1605	5818	5781	6389	7209
1978	1879	6045	5872	8073	8355	1732	5618	5313	7600	7050
1979	1972	6297	6173	7678	8508	1817	5852	5585	7227	7179
1980	1910	6695	6526	8973	8432	1760	6223	5904	8446	7114
1981	1999	6570	6388	8945	8662	1841	6106	5780	8420	7309
1982	2150	6653	6544	8326	9555	1981	6183	5921	7837	8062
1983	2307	7063	6991	8685	10147	2126	6564	6326	8175	8562
1984	2629	7319	7493	7438	10342	2422	6802	6780	7002	8726
1985	2653	8017	8412	7415	11327	2445	7450	7611	6979	9558
1986	2730	8179	8572	7821	12047	2515	7601	7756	7362	10164
1987	2821	8895	9328	8649	12925	2604	8187	8440	8141	10848
1988	2839	9828	10400	8939	13834	2621	9045	9409	8415	11837
1989	2841	10351	11035	8474	14303	2623	9417	9984	7977	12099
1990	2969	10554	11258	8516	14114	2743	9666	10226	8127	11811
1991	2967	11724	12557	9115	14693	2739	10559	11206	8675	13629
1992	3121	13713	14814	10291	15414	2889	12452	13351	9802	15378
1993	3348	15666	17370	10591	15949	3191	14475	15838	10584	15970
1994	3542	17957	20065	11521	15968	3386	17348	19202	11695	16579
1995	3761	19949	22418	12427	16447	3598	19594	21906	12514	16952
1996	3965	22314	25347	13143	17381	3783	21957	24834	13137	17538

1997	4081	24890	28670	13324	18331	3965	24912	28696	13319	17795
1998	4207	30452	36044	15056	19707	4075	30535	36142	15229	19007
1999	4291	33385	40239	15312	21482	4165	33662	40609	15444	21022
2000	4412	36518	44861	15547	22711	4412	36518	44861	15547	22711
2001	4588	39189	48720	16075	24554	4842	39081	48675	15819	25400
2002	4792	41556	52286	16483	25969	5062	41101	51811	16086	27765
1978/52	1.04	3.36	3.47	2.04	1.54	1.04	3.36	3.47	2.04	1.54
2002/78	2.55	6.87	8.90	2.04	3.11	2.92	7.32	9.75	2.12	3.94
2002/52	2.65	23.07	30.89	4.16	4.77	3.03	24.55	33.83	4.31	6.05

Employment values are end-year report form values (for which publication ceased in 2002). Starting in approximately 1994, they include the new phenomenon of not-on-post staff and workers, since 1998 they do not; revised employment values probably do not include not-on-post staff and workers at any point of time.

The output measure in labor productivity is obtained by applying annual real growth rates to the year 2000 nominal value added. Year 2000 nominal value added consists of the post-economic census values. In the first five data columns, real growth rates of the years prior to 1993 are the pre-economic census values, since 1993 the post-economic census values (the economic census did not change any sectoral real growth rates of the years prior to 1993). The same holds for the last five columns, except that in the years for which first published implicit deflators are available (1987-2004 for the primary, secondary, and tertiary sectors, and 1990-2004 for industry and construction), these are applied to the nominal values; nominal values are post-economic census revised nominal values for 1993-2004 across all sectors, and post-economic census revised nominal values for (only) the tertiary sector in 1987-92 (only for the tertiary sector are post-economic census revised nominal values available for years prior to 1993).

The sectoral classification is the GB1994 through 1978 or 1993, or possibly the GB1984 through 1989, except that in the output series the lower-level sector agricultural services is classified in the tertiary sector and not in the primary sector, as GB1994 stipulates and as holds for the employment data. The output benchmark revisions of 2004/05 follow the GB2002; these revisions led to new values for GDP and tertiary sector value added in 1978-2004, and to new values for the primary and secondary sector in 1993-2004. Employment values follow the GB1994 throughout with possibly a switch to the GB2002 since 2003. (For details see the text.)

Sources: report form employment from Appendix 14, year 2000 nominal value added from Appendix 6, pre-economic and post-economic census real growth rates from Appendix 7, and real growth rates based on implicit deflators from Appendix 8.

Table 23. Labor Productivity: Main Economic Sectors, Revised Employment (constant year 2000 price yuan RMB value added per laborer-year)

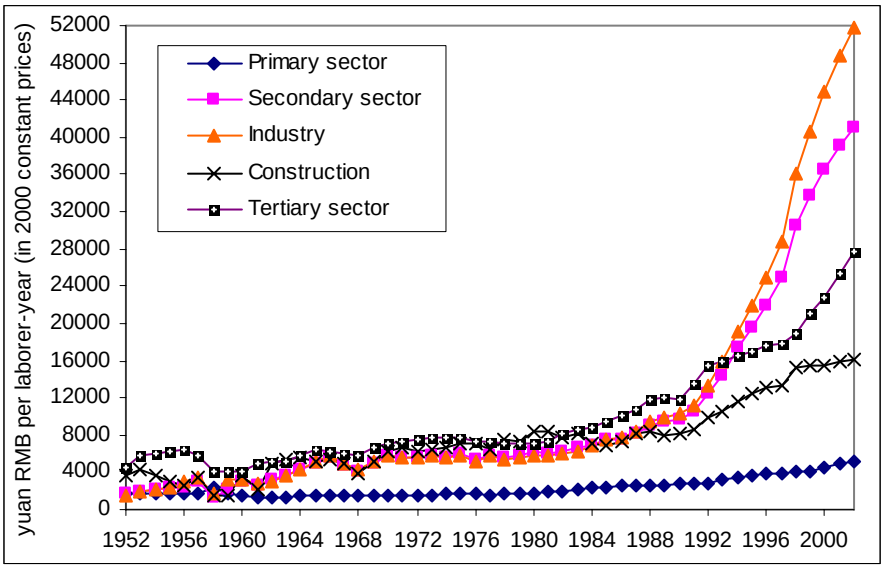
	Post-economic census values since 1993			Post-economic census nominal values combined with first published implicit deflator since 1987/90		
	Primary sector	Secondary sector	Tertiary sector	Primary sector	Secondary sector	Tertiary sector
1978	1611	5182	7162	1484	4816	6043
1979	1687	5385	7277	1554	5005	6140
1980	1638	5742	7230	1509	5336	6101
1981	1712	5629	7421	1578	5231	6262
1982	1851	5727	8225	1706	5323	6940
1983	1980	6060	8707	1824	5632	7347
1984	2270	6321	8932	2091	5874	7536
1985	2299	6947	9816	2119	6456	8282
1986	2367	7091	10444	2181	6590	8812
1987	2452	7730	11231	2263	7114	9426
1988	2479	8580	12078	2288	7897	10334
1989	2473	9011	12451	2283	8197	10532
1990	2603	9233	12372	2405	8457	10353
1991	2653	10397	13027	2449	9364	12084
1992	2806	12303	13838	2598	11172	13806
1993	3018	14150	14346	2876	13074	14364
1994	3229	16374	14536	3086	15819	15092
1995	3495	18241	14670	3344	17917	15120
1996	3748	19757	15112	3576	19440	15248
1997	3877	21377	16270	3767	21396	15794
1998	3974	23206	17221	3850	23269	16609
1999	4018	25359	18484	3900	25569	18089
2000	4083	28088	19645	4083	28088	19645
2001	4143	30326	21215	4373	30242	21947
2002	4222	34361	22465	4461	33985	24018
2003	4366	38010	23788	4572	37661	25920
2004	4809	40125	24800	5041	39864	27539
2005	5261	41804	26263	5514	41531	29164
2002/78	2.62	6.63	3.14	3.01	7.06	3.97
2004/78	2.99	7.74	3.46	3.40	8.28	4.56
2005/78	3.27	8.07	3.67	3.72	8.62	4.83
2004/52	2.66	22.27	4.56	3.02	23.81	6.00

Employment values are end-year values. Employment values for the years prior to 1990 are approximated (adjusted) as described in the notes to Appendix 13 and in the text.

The ratio of the 2004 to 1952 values uses labor productivity values of 2004 based on revised employment, and labor productivity values of 1952 based on report form employment.

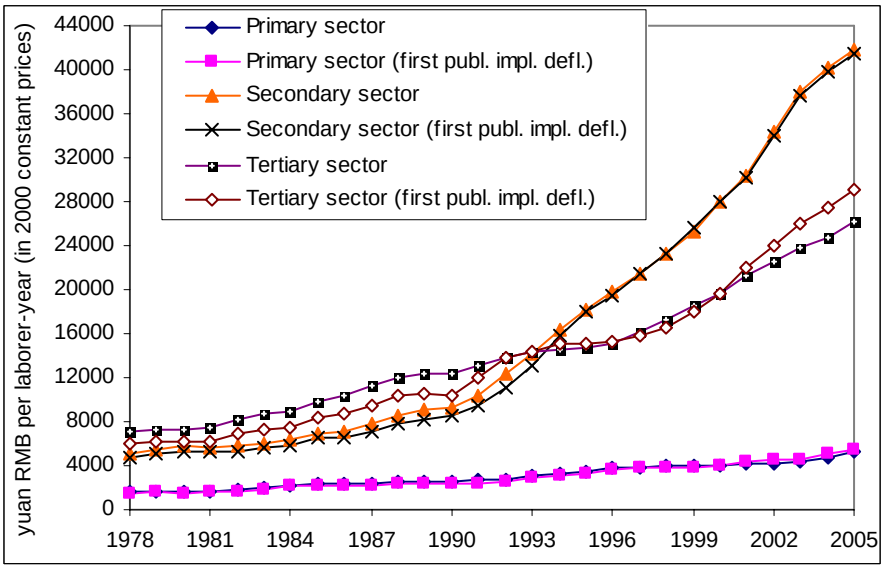
The sectoral classification is the GB1994 through 1978 or 1993, or possibly the GB1984 through 1989, except that in the output series the lower-level sector agricultural services is classified in the tertiary sector and not in the primary sector, as GB1994 stipulates and as holds for the employment data. The output benchmark revisions of 2004/05 follow the GB2002; these revisions led to new values for GDP and tertiary sector value added in 1978-2004, and to new values for the primary and secondary sector in 1993-2004. Employment values follow the GB1994 throughout with possibly a switch to the GB2002 since 2003. (For details see the text.)

Sources: revised employment from Appendix 13, year 2000 nominal value added from Appendix 6, pre-economic and post-economic census real growth rates from Appendix 7, and real growth rates based on implicit deflators from Appendix 8.



For data sources and explanations of the individual series see notes to Table 22.

Figure 33. Main Sectoral Labor Productivity: Report Form Employment



For data sources and explanations of the individual series see notes to Table 23.

Figure 34. Main Sectoral Labor Productivity: Revised Employment

Table 24. Labor Productivity: Tertiary Sector Sub-sectors 1990-2002 (constant year 2000 price yuan RMB value added per laborer-year)

	Total	Total[a]	Geolog.	Transp.	Commerce	Finance	Real est.	Social s.	Health	Educ.	Science	Gov.	Others
1990	11929	11846	7856	12025	12553	120493	138052	18030	6666	6073	12031	9833	536
1991	12418	12330	8624	12950	12422	114836	141733	22483	7423	6372	13023	10694	579
1992	13028	12936	9779	13823	13126	117022	169702	25196	7949	6777	14688	11492	571
1993	13312	13226	15254	15408	12981	119203	153842	35475	12069	9782	16609	13795	417
1994	13159	13074	18379	15279	12333	133371	153676	33325	12517	9479	19031	14896	415
1995	13382	13295	19945	16439	11932	138416	159777	31396	13019	9960	20568	15653	417
1996	13948	13859	21938	17668	11966	140644	158255	31024	13921	11067	23319	15848	449
1997	14497	14385	22881	19110	12214	144672	159063	30872	14633	12346	25719	16958	464
1998	15585	15459	25623	21791	13579	148861	158554	31863	15543	13467	29777	18298	477
1999	16741	16606	28438	23990	14232	149347	164410	32391	16123	14482	33855	19782	523
2000	17440	17307	29873	26656	15612	159541	169040	35286	16928	15279	35983	21266	486
2001	18548	18402	32453	29074	16603	165205	175359	36927	18700	16562	40753	22881	490
2002	19314	19158	36440	30664	17110	174526	174754	36633	20421	18419	46245	25403	485
2002/90	1.62	1.62	4.64	2.55	1.36	1.45	1.27	2.03	3.06	3.03	3.84	2.58	0.91

Employment values are end-year report form values (for which publication ceased in 2002). Starting in approximately 1994, they include the new phenomenon of not-on-post staff and workers, since 1998 they do not; revised employment values probably do not include not-on-post staff and workers at any point of time.

Output values are the pre-economic census values.

The sectoral classification is the GB1994 throughout.

Total: Total tertiary sector value added, including agricultural services, relative to total tertiary sector employment (excluding agricultural services).

Agricultural services is farming, forestry, animal husbandry, and fishery services.

Total[a]: Total tertiary sector value added (excluding agricultural services), relative to total tertiary sector employment (excluding agricultural services).

Geolog.: Geological prospecting and water conservancy.

Transp. = transport, storage, post and telecommunications.

Commerce = wholesale and retail trade & catering services.

Finance = finance (banking) and insurance.

Real est. = real estate.

Social s. = social services

Health = health care, sports, and social welfare.

Educ. = education, culture and arts, radio, film and television.

Science = scientific research and polytechnic services.

Gov. = government agencies, Party agencies, and social organizations (presumably incl. military personnel, see Xu, 1999a, p. 12.)

Sources: report form employment values from Appendix 15, value added (nominal 2000 value and real growth rates 1991-2002) from Appendix 10.

Table 25. Labor Productivity: Tertiary Sector Sub-sectors 1978-2002 (constant year 2000 price yuan RMB value added per laborer-year)

	Total	Transport & telecom.	Com-merce & cat.	Aggre-gated category	Banking & insurance	Real estate	Gov. etc. + others	Gov. etc.	Reference: "others" in total empl.
	1	2	3	4	5	6	7	8	9
1978	7062	8443	9013	5041	45679	43695	4229	8948	0.11
1979	7191	8732	9074	5416	39238	41473	4268	8721	0.10
1980	7126	8955	8095	5704	36335	41121	4491	9502	0.11
1981	7321	8703	9620	6065	35064	38638	4032	9970	0.14
1982	8076	9345	9456	6731	48010	42154	4661	10017	0.12
1983	8577	9643	10489	7173	58888	45544	4519	10668	0.13
1984	8741	9251	11070	7890	71124	59776	3738	10304	0.17
1985	9574	9211	12338	8801	76516	74720	3947	10464	0.16
1986	10182	9657	13041	8670	91421	89121	3929	9950	0.15
1987	10924	10060	13865	8683	100786	112279	3937	10330	0.16
1988	11693	10889	14883	9317	105540	117500	3882	10500	0.17
1989	12089	11393	13515	9539	125745	133015	3924	10485	0.17
1990	11929	12025	12553	9375	120493	138052	4022	10725	0.17
1991	12418	12950	12422	10662	114836	141733	4351	11667	0.17
1992	13028	13823	13126	11832	117022	169702	4194	12643	0.20
1993	13312	15408	12981	16654	119203	153842	3305	15307	0.29
1994	13159	15279	12333	16390	133371	153676	3298	16564	0.29
1995	13382	16439	11932	16756	138416	159777	3290	17449	0.30
1996	13948	17668	11966	17666	140644	158255	3425	17723	0.29
1997	14497	19110	12214	18803	144672	159063	3492	19023	0.30
1998	15585	21791	13579	20215	148861	158554	3623	20523	0.31
1999	16741	23990	14232	21420	149347	164410	4019	22141	0.30
2000	17440	26656	15612	22857	159541	169040	3887	23753	0.33
2001	18548	29074	16603	24651	165205	175359	4035	25484	0.33
2002	19314	30664	17110	26868	174526	174754	4144	28221	0.34
1990/78	1.69	1.42	1.39	1.86	2.64	3.16	0.95	1.20	
2002/90	1.62	2.55	1.36	2.87	1.45	1.27	1.03	2.63	
2002/78	2.73	3.63	1.90	5.33	3.82	4.00	0.98	3.15	

Employment values are end-year report form values (for which publication ceased in 2002). Starting in approximately 1994, they include the new phenomenon of not-on-post staff and workers, since 1998 they do not; revised employment values probably do not include not-on-post staff and workers at any point of time.

Output values are the pre-economic census values.

The sectoral classification of the aggregated output series reflects an aggregated GB1994 at least starting in 1990, and possibly also in 1978-89, otherwise the GB1984 in these earlier years (for details see the output section). The employment values follow an aggregated GB1994 throughout.

1 Total (tertiary sector) output includes agricultural services, total (tertiary sector) employment does not.

8 In terms of output, "government etc." includes "others" (combined in the source), while in terms of employment, "government etc." does not include "others."

9 Ratio of employment in the category "others" to total tertiary sector employment, where tertiary sector employment values do not include agricultural services (in the official statistics and here).

The output values are from different sources, one with 8, the other with 12 tertiary sector sub-sectors. The two sources are fully compatible at the level of aggregation provided in the table here, with 6 sub-sectors, except possibly for transport & telecommunications, and for commerce & catering

(see text). The data from the two sources are reported in Appendix 9 and Appendix 10 and are matched here as follows (Appendix 9: Appendix 10):

2 Transport & telecommunications = transport, post and telecommunications (matching the label in the GB1984 [except for one character, which does not change the meaning]): transport, storage, post, and telecommunication (matching the label in the GB1994).

3 Commerce & catering = trade, public catering, material supply and marketing cooperatives, and storage (matching the label in the GB1984): wholesale and retail trade and catering services (matching the label in the GB1994).

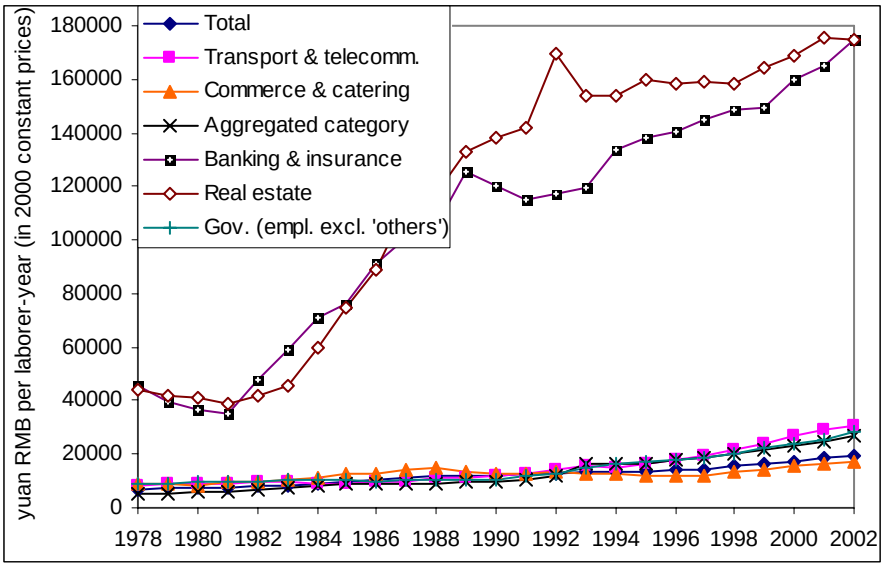
4 Aggregated category = (social) services; public facilities; science etc. (science, education, culture, health care, sports, social welfare, agricultural services including water conservancy services, geological investigation and prospecting): farming, forestry, animal husbandry, and fishery (services); geological prospecting and water conservancy; social services; health care, sports, and social welfare; education, culture and arts, radio, film and television; scientific research and polytechnic services.

5 Banking & insurance: banking and insurance.

6 Real estate: real estate.

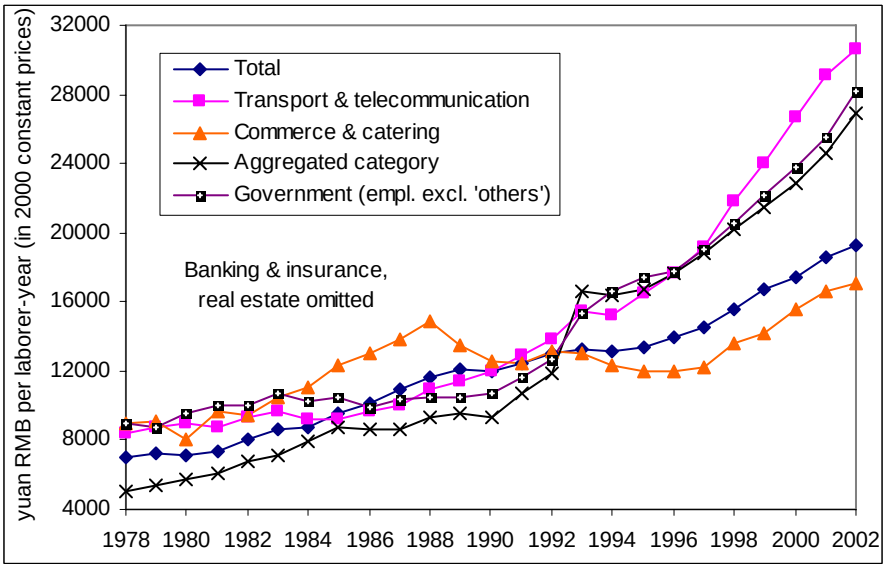
7,8 Government etc. = Government and Party agencies, social organizations, and others: government agencies, Parties and social organizations; others.

Sources: output data from Appendix 9 and Appendix 10, employment data from Appendix 15.



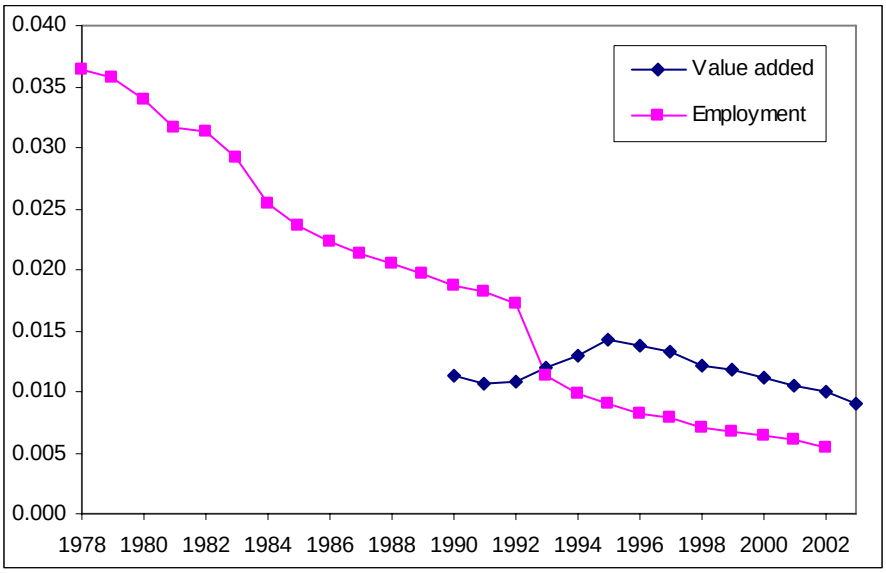
For data sources and explanations of the individual series see notes to Table 25.

Figure 35. Tertiary Sector Labor Productivity: All Aggregated Sub-sectors



For data sources and explanations of the individual series see notes to Table 25.

Figure 36. Tertiary Sector Labor Productivity: Subset of Aggregated Sub-sectors



The tertiary sector total does not include agricultural services (in the case of value added, the necessary correction to the total was made). Output values are pre-economic census values. Employment is report form end-year number of laborers (with the complication of the not-on-post staff and workers being included in approximately 1994, through 1997). The sectoral classification is the GB1994.
Sources: Appendix 10 and Appendix 6.

Figure 37. Share of Geological Prospecting and Water Conservancy in Tertiary Sector

Table 26. Labor Productivity: Productive Vs. Non-productive Services (constant year 2000 price yuan RMB value added per laborer-year)

	Pre-economic census value added[a]			Post-economic census value added[a]		
	Total	Productive	Non-prod.	Total	Productive	Non-prod.
1952	4599	3813	5869	5441	4468	7014
1953	5790	5208	6675	6850	6101	7992
1954	6085	5975	6234	7199	7000	7469
1955	6281	6014	6631	7431	7047	7936
1956	6513	6557	6463	7705	7686	7728
1957	5901	5696	6133	6982	6678	7325
1958	4002	5199	3259	4734	6104	3885
1959	4132	6246	3110	4889	7339	3704
1960	4101	6086	3201	4852	7158	3807
1961	4848	4917	4796	5735	5780	5702
1962	5106	4735	5427	6041	5562	6456
1963	5207	4942	5429	6161	5803	6460
1964	5761	5367	6075	6816	6300	7227
1965	6406	5842	6836	7579	6867	8123
1966	6200	6640	5857	7335	7801	6972
1967	6064	6251	5916	7174	7338	7045
1968	5863	5494	6162	6936	6452	7330
1969	6709	6706	6712	7938	7875	7989
1970	7128	7311	6975	8433	8588	8304
1971	7238	7155	7308	8564	8408	8695
1972	7457	7739	7222	8823	9095	8596
1973	7848	8406	7390	9285	9878	8800
1974	7658	7953	7415	9061	9346	8826
1975	7760	7783	7741	9182	9151	9209
1976	7338	7192	7462	8682	8457	8874
1977	7221	7720	6835	8544	9078	8131
1978	7062	8033	6350	8355	9441	7560
1979	7191	8192	6453	8508	9626	7683
1980	7126	7746	6667	8432	9105	7932
1981	7321	8599	6379	8662	10098	7603
1982	8076	8739	7566	9555	10265	9009
1983	8577	9507	7866	10147	11163	9372
1984	8741	9798	7950	10342	11502	9474
1985	9574	10641	8692	11327	12485	10371
1986	10182	11231	9315	12047	13179	11111
1987	10924	11905	10121	12925	13967	12071
1988	11693	12847	10749	13834	15072	12823
1989	12089	12200	12001	14303	14320	14290
1990	11929	11840	11999	14114	13905	14277
1991	12418	12090	12675	14693	14202	15076
1992	13028	12838	13172	15414	15080	15668
1993	13312	13406	13245	15949	16027	15894
1994	13159	12975	13293	15968	15786	16099
1995	13382	13053	13623	16447	16167	16653
1996	13948	13459	14312	17381	16977	17682
1997	14497	14024	14850	18331	18013	18568
1998	15585	15775	15453	19707	20277	19310
1999	16741	16869	16649	21482	22083	21053

2000	17440	18644	16644	22711	24854	21294
2001	18547	20042	17577	24554	27198	22837
2002	19314	20825	18340	25969	28768	24164
1990/78	1.69	1.47	1.89	1.69	1.47	1.89
2002/90	1.62	1.76	1.53	1.84	2.07	1.69
1978/52	1.54	2.11	1.08	1.54	2.11	1.08
2002/78	2.73	2.59	2.89	3.11	3.05	3.20
2002/52	4.20	5.46	3.13	4.77	6.44	3.45

a The data in this table come with two limitations:

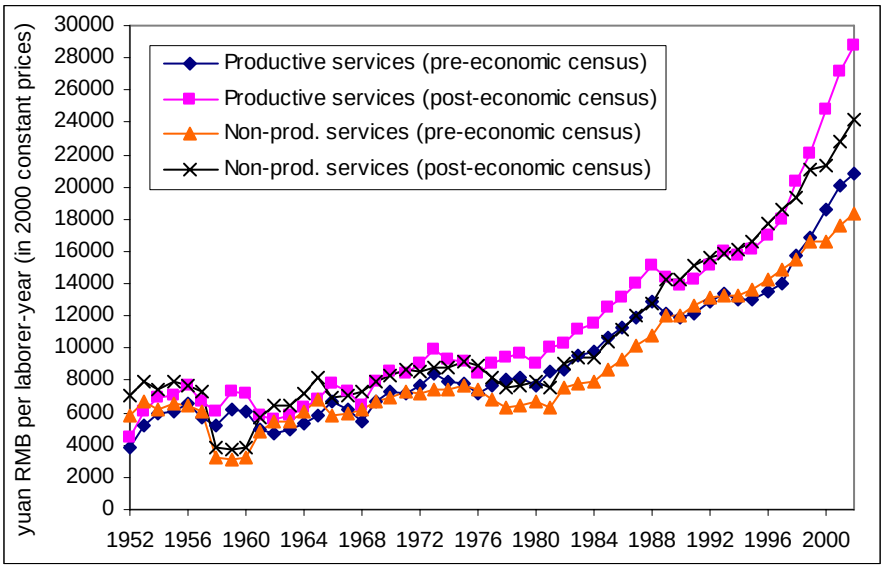
In the employment statistics, the productive sector refers to (i) transport, storage, post & telecommunication services; (ii) wholesale and retail trade & catering services; and (iii) geological prospecting and water conservancy. In the output statistics, lacking data on the (small) third category prior to 1990, the productive sector values are aggregated here from the first two categories in all years.

Other notes:

Employment values are end-year report form values (for which publication ceased in 2002). Starting in approximately 1994, they include the new phenomenon of not-on-post staff and workers, since 1998 they do not; revised employment values probably do not include not-on-post staff and workers at any point of time. Employment values follow the GB1994.

Pre-economic census output values (year 2000 nominal value combined with real growth rates for other years) follow the GB1994 since 1990, but possibly the GB1984 in earlier years, particularly in the two sub-categories of the tertiary sector. Post-economic census output values follow the GB2002 since 1993 (or 1978, real growth rates of the tertiary sector in 1978-92 were not revised), and rely on the pre-economic census output values in other years. (On further details see the notes to Appendix 6 and the text in the output section.)

Sources: output data from Appendix 6 and Appendix 7, employment data from Appendix 14.



For data sources and explanations see notes to Table 26.

Figure 38. Tertiary Sector Labor Productivity: Two Aggregates

Table 27. Labor Productivity of the Directly Reporting Industrial Enterprises Across Industrial Sectors (constant year 2000 price yuan RMB value added per laborer-year)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	1997/ 1993	2002/ 1999
	in 1997 constant prices						in 2000 constant prices					
Total	17807	18890	17927	21447	25195	n.a.	37452	45679	53558	62620	1.41	1.67
Coal mining and dressing	8616	9069	10430	11873	12522	for	13003	14604	17652	21607	1.45	1.66
Petroleum and natural gas extraction	83773	82712	72160	88185	96371	this	140884	382514	292630	278021	1.15	1.97
Ferrous metals mining and dressing	13307	11962	11929	15931	17718	year	21630	25568	29997	34975	1.33	1.62
Nonferrous metals mining and dressing	13110	12984	13392	15672	18758		24377	28777	32233	35934	1.43	1.47
Nonmetal minerals mining and dressing	13725	12543	11594	13697	15983		19245	22234	24360	29244	1.16	1.52
Logging and transport of timber and bamboo	8398	9754	7990	8227	4266		7675	8314	8329	9105	0.51	1.19
Food processing	28359	28431	19374	27623	31686		39377	49749	56885	64934	1.12	1.65
Food production	14785	15895	13150	19854	25023		35003	45310	50795	57757	1.69	1.65
Beverage production	24829	27584	23937	30332	38494		53536	60546	67686	79382	1.55	1.48
Tobacco processing	184098	228830	222817	257434	265713		332783	361452	394460	463829	1.44	1.39
Textile industry	13987	13871	9769	12522	15292		22168	26359	29339	33750	1.09	1.52
Garments and other fiber products	15243	14928	12914	17057	19019		24671	27455	29042	28332	1.25	1.15
Leather, furs, down and related products	14248	15520	13508	19853	21195		26170	28702	30808	32630	1.49	1.25
Timber processing, bamboo, cane, palm etc.	10370	909	9197	14370	18011		27526	31481	37760	41803	1.74	1.52
Furniture manufacturing	11036	12901	11609	15928	19413		30351	35081	39782	41000	1.76	1.35
Papermaking and paper products	11529	13360	12555	16922	20221		30493	36383	42432	51370	1.75	1.68
Printing and record medium reproduction	13200	12934	11770	15189	18623		32966	36078	46246	53377	1.41	1.62
Cultural, educational and sports goods	11403	12270	13021	17436	18106		21895	23797	26961	27621	1.59	1.26
Petroleum processing and coking	69389	66960	70913	74335	77658		102919	123723	161175	197750	1.12	1.92
Raw chemical materials and chemical prod.	17996	19537	18932	23708	25510		33252	40847	52118	63701	1.42	1.92
Medical and pharmaceutical products	24095	21750	21912	29053	35558		49334	63668	73066	84629	1.48	1.72
Chemical fiber	31663	31502	26784	30863	34856		60099	68882	64015	81382	1.10	1.35
Rubber products	17781	17905	14779	19960	22662		28008	32895	40032	45717	1.27	1.63
Plastic products	16820	16944	13841	19749	23053		35406	41675	46866	50619	1.37	1.43
Nonmetal mineral products	12404	12175	10991	13189	14934		22877	27436	31293	36036	1.20	1.58
Smelting and pressing of ferrous metals	29708	31797	26102	26986	30006		38602	49648	61607	76916	1.01	1.99
Smelting and pressing of nonferrous metals	27003	25757	22378	23622	26328		39491	48500	57693	67729	0.98	1.72

Metal products	14493	15511	13653	17639	20047	32570	37519	43082	48884	1.38	1.50
Ordinary machinery manufacturing	12953	14316	13622	14622	17065	24336	29498	35717	44163	1.32	1.81
Special purpose equipment manufacturing	12513	14117	12430	14339	16361	23314	28095	33907	43609	1.31	1.87
Transport equipment manufacturing	17252	18440	18309	20742	24535	37056	43233	55860	75828	1.42	2.05
Electric equipment and machinery	18350	17805	19453	23434	27282	43079	53742	62772	69789	1.49	1.62
Electronic and telecommunications equipm.	20016	25189	31488	32880	47843	71122	92930	101731	111617	2.39	1.57
Instruments, meters, cultural and off. mach.	12104	13751	12540	14216	16717	31649	38115	45945	48657	1.38	1.54
Prod./supply of electric power, steam etc.	55346	59836	65712	66183	73548	91469	99846	112147	124327	1.33	1.36
Production and supply of gas	4995	1829	1872	-8066	5325	23184	21781	31184	34986	1.07	1.51
Production and supply of tap water	26762	25559	25023	25308	24639	32834	33656	33154	35545	0.92	1.08
Sum sectors (above)	17899	18873	18130	21648	25157	37425	46335	53689	62837	1.41	1.68
Implicit residual	7407	20395	10576	13765	27916	20240	21133	24290	26753	3.77	1.32

Employment values are mid-year values.

The enterprise coverage changed in 1998 from "all industrial enterprises with independent accounting system at township level and above" to "all industrial SOEs with independent accounting system plus all industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB."

Since 1998 the employment data do not include those staff and workers who are not on their post; prior to 1998, they do.

Labor productivity is calculated as constant price value added divided by the number of laborers. Constant price value added in years other than the constant-price-year is obtained by applying real growth rates to the constant-price-year nominal values. Real growth rates are obtained by applying an implicit deflator to nominal value added. The (industry-specific) implicit deflator is obtained from nominal GOV and GOV in 1990 prices (with GOV defined in 1993-1995 according to the old stipulations, and in 1995-2002 according to the new stipulations).

For 1998, no constant price GOV is available. If one were willing to assume a particular deflator value for 1998, and to assume that it is equally applicable to all individual industries, labor productivity values for 1998 could be calculated and the labor productivity values of all years could be expressed in 2000 prices. (The implicit deflator of industrial value added in the NIPA in 1998, for example, was -5.3%; see Appendix 8.)

The negative value for production and supply of gas in 1996 is not a typo here (but possibly in the source).

Sources: Appendix 11 and Appendix 16 (with the first employment value, of laborers, for 1995).

Table 28. Unit Labor Costs: Average Wage of Staff and Workers in Three Main Economic Sectors, 1978-2002 (year 2000 price yuan RMB per staff/worker-year)

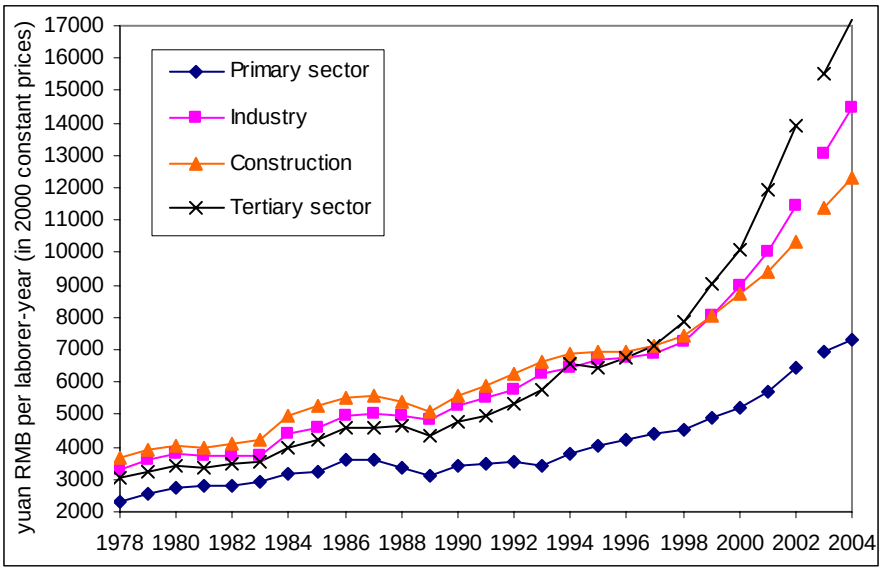
	Total	Primary sector	Secondary sector	# Industry	# Con-struction	Tertiary sector
1952	2298					
1978	3176	2302	3354	3307	3688	3022
1979	3386	2539	3647	3609	3898	3210
1980	3592	2758	3829	3799	4031	3412
1981	3549	2782	3765	3731	3999	3387
1982	3595	2830	3779	3729	4115	3466
1983	3649	2898	3795	3730	4222	3544
1984	4189	3144	4469	4389	4973	3965
1985	4411	3207	4679	4587	5247	4228
1986	4778	3576	5024	4943	5530	4586
1987	4825	3586	5092	5015	5574	4587
1988	4787	3328	5041	4990	5374	4644
1989	4557	3105	4866	4831	5110	4357
1990	4976	3400	5296	5260	5555	4789
1991	5175	3468	5555	5509	5872	4944
1992	5522	3534	5852	5791	6259	5334
1993	5914	3400	6311	6253	6647	5751
1994	6369	3760	6481	6415	6886	6538
1995	6611	4023	6708	6667	6969	6472
1996	6863	4253	6761	6735	6920	6730
1997	6938	4389	6932	6897	7149	7119
1998	7438	4507	7277	7253	7413	7859
1999	8412	4872	8052	8054	8043	9043
2000	9371	5184	8936	8972	8735	10097
2001	10795	5702	9932	10031	9416	11910
2002	12469	6421	11260	11452	10311	13899
2003	13958	6928	12783	13072	11411	15490
2004	15421	7325	14079	14451	12290	17155
2002/78	3.93	2.79	3.36	3.46	2.80	4.60
2004/78	4.86	3.18	4.20	4.37	3.33	5.68

1978-2002 values are calculated as follows: applying real growth rates (of the individual 16 sectors) to the 2000 nominal average wage yields average wages in constant prices; average wages in constant prices are multiplied by the end-year number of staff and workers to obtain the constant price wage bill in each sector; the wage bills of different sectors are aggregated to the categories in the table here, and then divided by the end-year number of staff and workers to obtain the average wage in constant prices for the aggregated sectors. The reason for the use of the end-year rather than mid-year number of staff and workers is explained in the notes to Appendix 18. The choice of end-year vs. midyear values does not make a significant difference since the same employment values are first used to *multiply* average constant price wages for the purpose of aggregation, and then to *divide* the aggregates. (Official mid-year values could have been backed out of the official wage bill and the official average wage data, except that the wage bill values come with a residual.)

2003 and 2004 values are obtained in similar fashion from the data reported in Appendix 19. The sectoral classification changes slightly between 2002 and 2003 (from the GB1994 to the GB2002).

The 1952 value is obtained by assuming zero inflation between 1952 and 1978. Nominal average wages are available for 1952-77 in, for example, *Labor Yearbook 2005*, p. 43, and *1996*, p 4; real growth values are only available starting 1978.

Sources: see Appendix 18 and Appendix 19 (2003 and 2004 staff and worker numbers are from *Labor Yearbook 2005*, p. 29.



For data see Table 28. The sectoral classification that underlies the aggregates reported here changes between 2002 and 2003 from the GB1994 to the GB2002, which implies a slight incomparability.

Figure 39. Constant Price Average Wage of Staff and Workers in the Three Main Economic Sectors, 1978-2002 (year 2000 price yuan RMB per staff/worker-year)

Table 29. Labor Remuneration per Employee (yuan RMB, in 2000 constant prices)

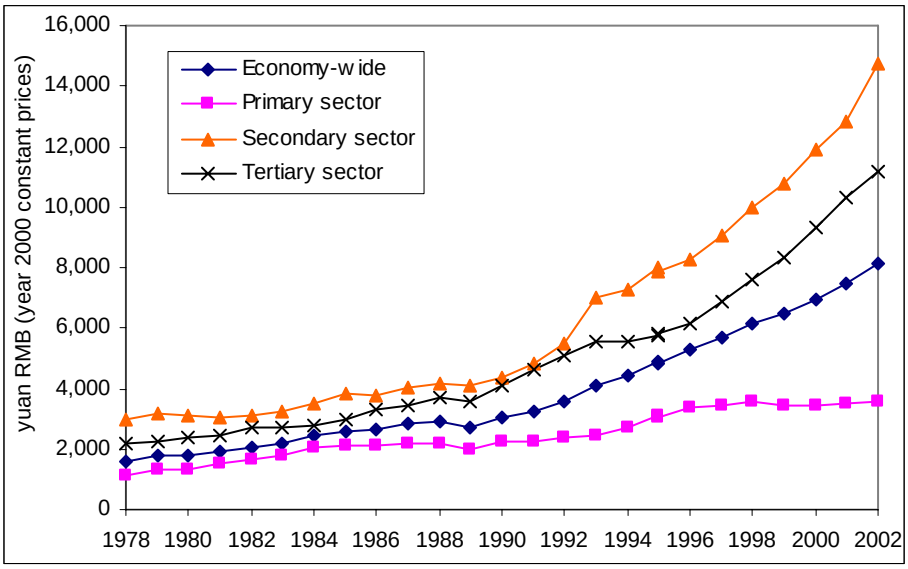
	Based on revised empl. values				Based on report form employment values					
	Total	Prim. sector	Sec. sector	Tert. sector	Total	Prim. sector	Sec. sector	# In-dustry	# Con-struction	Tert. sector
1978	1583	1136	2985	2182	1847	1326	3482	3078	6363	2546
1979	1788	1355	3156	2277	2091	1584	3690	3263	6627	2663
1980	1792	1332	3119	2368	2090	1553	3637	3241	6310	2761
1981	1900	1493	3013	2438	2217	1743	3517	3113	6254	2845
1982	2042	1632	3079	2699	2372	1896	3577	3175	6110	3136
1983	2184	1786	3218	2704	2545	2081	3751	3365	5976	3151
1984	2462	2045	3537	2796	2851	2368	4096	3772	5647	3238
1985	2610	2087	3858	3008	3012	2409	4452	4183	5515	3471
1986	2668	2106	3751	3283	3077	2429	4327	4076	5311	3787
1987	2828	2207	4030	3423	3255	2540	4638	4433	5419	3939
1988	2915	2206	4159	3695	3339	2527	4764	4588	5427	4233
1989	2729	1968	4100	3602	3135	2261	4710	4700	4727	4138
1990	3034	2234	4352	4110	3463	2548	4974	4945	5069	4688
1991	3264	2264	4851	4629	3663	2532	5470	5451	5527	5221
1992	3573	2348	5501	5080	3977	2612	6132	6044	6446	5659
1993	4123	2447	6976	5565	4573	2714	7724	7934	6983	6187
1994	4409	2718	7280	5570	4838	2981	7984	8324	6834	6119
1995	4891	3105	8025	5742	5336	3342	8777	9322	6972	6438
1995	4845	3059	7847	5817	5285	3292	8582	9110	6837	6522
1996	5258	3387	8277	6163	5769	3583	9348	9998	7262	7089
1997	5690	3461	9040	6898	6240	3643	10526	11326	8028	7771
1998	6131	3539	9961	7595	6945	3747	13072	14172	9988	8691
1999	6454	3463	10763	8341	7374	3698	14170	15609	10349	9694
2000	6945	3434	11879	9290	7949	3711	15443	17175	11091	10740
2001	7472	3504	12848	10308	8654	3880	16603	18606	11727	11930
2002	8158	3593	14755	11204	9432	4077	17845	20210	12283	12952
1995/78	3.09	2.73	2.69	2.63	2.89	2.52	2.52	3.03	1.10	2.53
2002/95	1.68	1.17	1.88	1.93	1.78	1.24	2.08	2.22	1.80	1.99
2002/78	5.15	3.16	4.94	5.13	5.11	3.08	5.12	6.57	1.93	5.09

For limitations of the labor remuneration data, see notes to Appendix 22. Depending on source (*GDP 1952-95*, *GDP 1996-2002*), the 1995 values differ slightly. (The 1995 values of individual provinces differ across the data sources.)

Real labor remuneration is obtained by applying the CPI; for the years prior to 1985, only the urban CPI is available (and used). Alternatively, the provincial implicit household consumption deflator of the national income and product accounts could have been applied to labor remuneration of each province, before aggregating (the then real) labor remuneration across provinces.

Revised employment values are the here constructed values of 1978-1989, and the official values since 1990. Report form employment values suffer from the inclusion of the not-on-post staff and workers starting in approximately 1994, through 1997.

Sources: labor remuneration from Appendix 22 and Appendix 23, and employment from Appendix 13 and Appendix 15.



Unit labor costs are labor remuneration in year 2000 constant-price yuan RMB divided by revised employment figures.
Source: first four data columns in Table 29; the year 1995 value in the figure is the second 1995 value in the table.

Figure 40. Unit Labor Costs

Table 30. Labor Remuneration per Employee in the Tertiary Sector (yuan RMB, in 2000 constant prices)

	Geol.	Transp.	Trade	Fin.	Real	Social	Health	Educ.	Sci.[a]	Sci.+[a]	Gov.	Others
1978		2745	3453	3862	2353	4698	2024	1758	5729	1952	2800	1455
1979		2890	3573	4003	3058	4476	2094	1864	5969	2094	2869	1475
1980		2969	3543	4372	2828	3933	2312	2074	6348	2383	3086	1380
1981		2943	3628	4839	3592	3863	2776	2396	6518	2628	3271	1070
1982		3261	3882	5488	4040	4164	2982	2602	6760	2763	3307	1372
1983		3366	3719	6470	3827	4052	3185	2768	7494	3057	3570	1169
1984		3654	3898	6673	4202	4291	3643	3126	8534	3501	3690	798
1985		3766	3935	7526	6015	5237	3674	3394	9240	3902	3928	810
1986		4197	4153	8999	6217	5326	4167	3651	9882	4304	4331	865
1987		4313	4356	9575	5735	5902	4476	3822	11042	4874	4535	739
1988		4446	4809	10410	6811	6416	4757	4145	11785	5198	5246	609
1989		4407	4508	11038	6469	5841	4769	3991	12139	5502	5520	614
1990		4730	5055	11783	8046	6266	5393	4337	13601	6359	7301	679
1991		5015	5740	13374	9948	6810	6229	4638	14512	6872	8588	701
1992		5946	6440	13397	12164	7732	6659	5108	16654	7916	9333	651
1993		7848	7155	14616	15905	10991	10057	7251	20749	11324	10896	532
1994		7733	6743	20075	14797	11165	10244	6540	22555	12665	11902	491
1995		8932	6974	19270	16833	11919	11191	7005	23765	13644	12286	483
1995	8922	9217	7187	18596	17213	12105	11272	6862	12416	13878	12284	493
1996	10965	10355	7536	21602	20332	13150	12142	7404	12337	15120	12739	528
1997	11506	12063	8134	24296	21829	14103	13324	8140	13703	16517	14164	581
1998	14276	13723	9094	27948	26080	15575	15162	9595	16334	20026	15817	629
1999	16801	14809	9536	28234	32826	17334	17215	11320	20003	24099	18176	726
2000	19256	16483	10821	36754	40244	20529	19703	13307	22441	27239	20648	725
2001	22398	17862	11831	40680	44679	22407	22581	15842	28752	33609	24445	650
2002	26204	19200	12332	46210	49033	23680	25983	18860	32637	38492	28807	683
'95/78		3.25	2.02	4.99	7.15	2.54	5.53	3.99	4.15	6.99	4.39	0.33
'02/95	2.94	2.08	1.72	2.48	2.85	1.96	2.31	2.75	2.63	2.77	2.35	1.39
'02/78		6.99	3.57	11.97	20.84	5.04	12.84	10.73	5.70	19.72	10.29	0.47

a The category "science+" denotes labor remuneration in the tertiary subsectors (i) agricultural services (since second 1995-value), (ii) geological prospecting and water conservancy (since second 1995-value), and (iii) scientific research and polytechnic services, divided by report form employment in (i) geological prospecting and water conservancy, and (ii) scientific research and polytechnic services. The employment statistics do not have a tertiary sector sub-category "agricultural services;" these laborers are probably included in the primary sector. For 1978-95, the source does not provide labor remuneration in agricultural services and in geological prospecting and water conservancy, but states that these are included in the category "science" (also see note to Appendix 22). This means that the "pure" science category as presented in the table here experiences a statistical break between 1978-95 (when labor remuneration includes the other two sub-categories) and 1995-2002 (when it doesn't).

For the years since 1995, when labor remuneration values for agricultural services are listed as a tertiary sector sub-sector, labor remuneration of agricultural services could alternatively have been included with the primary sector (on the employment side, agricultural services are probably included with the primary sector). The source of the pre-1996 data, *GDP 1952-95*, in its preface states that agricultural (and water conservancy) services (as well as geological investigation and prospecting) are included with the science category.

The coverage of transport & telecommunications and of commerce & catering in labor remuneration is likely to be the same as in the case of value added, which is possibly different from

that in the case of report form employment; this is the same issue as in the discussion of labor productivity. (Also see notes to Table 25 and the discussion of the table in the text.)

For the complete sub-sector titles see Appendix 23.

For limitations of the labor remuneration data, see notes to Appendix 22. Depending on source (*GDP 1952-95*, *GDP 1996-2002*), the 1995 values differ slightly. (The 1995 values of individual provinces differ across the data sources.)

Real labor remuneration is obtained by applying the CPI; for the years prior to 1985, only the urban CPI is available and used. Alternatively, the provincial implicit household consumption deflator of the national income and product accounts could have been applied to labor remuneration of each province, before aggregating (the then real) labor remuneration across provinces.

All employment values are report form values. Report form employment values suffer from the inclusion of the not-on-post staff and workers starting in approximately 1994, through 1997. Employment values in the tertiary sector sub-sector "others" are rather large, in comparison to labor remuneration values (similar to the case of labor productivity above); presumably the coverage of "others" in labor remuneration and in employment differs.

Sources: labor remuneration from Appendix 22 and Appendix 23, and employment from Appendix 15.

Table 31. Economy-wide Growth Rates of Output and Factor Inputs

	Real growth	Employment growth		Real growth of gross capital stock based on effective investment		Real growth of gross capital stock based on GFCF		Labor share
	of value added	adj. series	report f. series	unweigh-ted sum	weighted sum	unweigh-ted sum	weighted sum	
1953	1.156		1.031					0.5769
1954	1.042		1.022	1.222	1.231	1.224	1.234	0.5769
1955	1.068		1.023	1.205	1.214	1.202	1.210	0.5769
1956	1.150		1.031	1.255	1.262	1.241	1.248	0.5769
1957	1.051		1.033	1.251	1.255	1.202	1.205	0.5769
1958	1.213		1.119	1.283	1.303	1.257	1.274	0.5769
1959	1.088		0.984	1.256	1.265	1.236	1.244	0.5769
1960	0.997		0.989	1.226	1.233	1.207	1.214	0.5769
1961	0.727		0.989	1.075	1.075	1.083	1.083	0.5769
1962	0.944		1.013	1.038	1.036	1.055	1.053	0.5769
1963	1.102		1.028	1.048	1.044	1.065	1.061	0.5769
1964	1.183		1.041	1.068	1.064	1.088	1.084	0.5769
1965	1.170		1.034	1.097	1.096	1.112	1.111	0.5769
1966	1.107		1.040	1.080	1.081	1.095	1.097	0.5769
1967	0.943		1.034	1.038	1.035	1.050	1.048	0.5769
1968	0.959		1.036	1.024	1.021	1.039	1.038	0.5769
1969	1.169		1.041	1.051	1.048	1.063	1.061	0.5768
1970	1.194		1.036	1.096	1.098	1.097	1.100	0.5769
1971	1.070		1.035	1.085	1.083	1.084	1.082	0.5770
1972	1.038		1.007	1.080	1.077	1.079	1.076	0.5766
1973	1.079		1.022	1.097	1.096	1.091	1.090	0.5769
1974	1.023		1.020	1.087	1.087	1.089	1.088	0.5775
1975	1.087		1.021	1.098	1.099	1.097	1.098	0.5755
1976	0.984		1.017	1.084	1.084	1.080	1.080	0.5779
1977	1.076		1.014	1.100	1.098	1.091	1.089	0.5790
1978	1.117		1.020	1.112	1.111	1.102	1.101	0.5695
1979	1.076	1.024	1.022	1.117	1.111	1.109	1.104	0.5853
1980	1.078	1.030	1.033	1.107	1.101	1.104	1.097	0.5821
1981	1.052	1.033	1.032	1.092	1.083	1.088	1.079	0.5980
1982	1.091	1.031	1.036	1.100	1.093	1.089	1.081	0.6061
1983	1.109	1.028	1.025	1.107	1.101	1.094	1.088	0.6056
1984	1.152	1.031	1.038	1.117	1.114	1.101	1.098	0.6086
1985	1.135	1.031	1.035	1.129	1.129	1.100	1.099	0.6015
1986	1.088	1.028	1.028	1.148	1.239	1.113	1.201	0.6037
1987	1.116	1.027	1.029	1.144	1.145	1.113	1.113	0.5944
1988	1.113	1.025	1.029	1.136	1.137	1.108	1.108	0.5947
1989	1.041	1.021	1.018	1.108	1.106	1.088	1.086	0.5938
1990	1.038	1.019	1.025	1.094	1.093	1.084	1.083	0.6140
1991	1.092	1.011	1.029	1.090	1.090	1.083	1.082	0.6013
1992	1.142	1.010	1.018	1.096	1.096	1.086	1.086	0.5784
1993	1.140	1.010	1.013	1.102	1.104	1.089	1.090	0.5882
1994	1.131	1.010	1.021	1.108	1.109	1.095	1.096	0.5928
1995	1.109	1.009	1.015	1.113	1.112	1.103	1.103	0.6035
1996	1.100	1.013	1.007	1.125	1.124	1.116	1.116	0.6048
1997	1.093	1.013	1.013	1.121	1.123	1.113	1.115	0.6089
1998	1.078	1.012	0.980	1.117	1.119	1.106	1.108	0.6127

1999	1.076	1.011	1.002	1.114	1.116	1.106	1.108	0.6059
2000	1.084	1.010	1.008	1.110	1.112	1.103	1.106	0.5996
2001	1.083	1.013	1.001	1.103	1.105	1.097	1.099	0.5990
2002	1.091	1.010	1.012	1.107	1.110	1.098	1.101	0.5924
2003	1.100	1.009		1.111	1.115	1.098	1.102	0.5924
2004	1.101	1.010		1.116	1.121	1.104	1.108	0.5924
2005	1.099	1.008		1.121	1.125	1.104	1.108	0.5924
1953-78	1.061	n.a.	1.026	1.120	1.121	1.119	1.121	0.5767
1978-05	1.097	1.018	1.017	1.113	1.116	1.100	1.102	0.5971
1953-05	1.079	n.a.	1.023	1.114	1.116	1.107	1.109	0.5875

All growth rates are in form of current-period value divided by previous-period value.

Average growth rates (geometric average) reported at the bottom of the table for the three periods 1953-78, 1978-05, and 1953-05 are based on the years available in the stated periods. In the case of the labor share, these are obviously simply geometric averages (not growth rates).

Sources and explanations:

Real growth of value added: Appendix 7, with benchmark revision values for 1993-2004.

Employment growth: based on Appendix 13 and Appendix 14.

Real growth of gross capital stock: based on values in Table 19, with "unweighted" denoting the sum of gross capital stock in (i) construction & installation, (ii) equipment & tools & appliances, and (iii) "others," and "weighted" denoting the weights applied to the first vs. second and third item. For the weights see notes to Table 19.

Labor share: Appendix 32 and Appendix 33 with economy-wide labor shares for 1978-2002 (the 1995 value is from Appendix 33). For the years 2003-05, the labor share of 2002 is used, for the years prior to 1978 the average labor share of 1978-80.

Table 32. Economy-wide TFP Growth

	Gross capital stock based on effective investment								Gross capital stock based on effective GFCF							
	--- --- TFP growth --- ---				--- Cumulative TFP growth ---				--- --- TFP growth --- ---				--- Cumulative TFP growth ---			
Cap.	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
Empl.	b	b	a	a	b	b	a	a	b	b	a	a	b	b	a	a
1953					1.000	1.000							1.000	1.000		
1954	0.945	0.942			0.945	0.942			0.945	0.941			0.945	0.941		
1955	0.974	0.971			0.921	0.915			0.975	0.972			0.921	0.916		
1956	1.026	1.024			0.946	0.937			1.031	1.029			0.950	0.942		
1957	0.938	0.937			0.887	0.878			0.954	0.954			0.907	0.898		
1958	1.023	1.016			0.908	0.893			1.032	1.026			0.936	0.922		
1959	0.997	0.994			0.905	0.888			1.004	1.001			0.940	0.923		
1960	0.921	0.918			0.833	0.815			0.927	0.925			0.871	0.853		
1961	0.710	0.710			0.591	0.578			0.707	0.707			0.616	0.604		
1962	0.923	0.924			0.545	0.534			0.916	0.917			0.564	0.553		
1963	1.063	1.065			0.580	0.569			1.056	1.058			0.596	0.585		
1964	1.124	1.126			0.652	0.640			1.115	1.117			0.665	0.654		
1965	1.104	1.104			0.720	0.707			1.098	1.098			0.730	0.718		
1966	1.048	1.047			0.754	0.741			1.042	1.041			0.760	0.747		
1967	0.911	0.912			0.686	0.675			0.906	0.907			0.689	0.678		
1968	0.931	0.932			0.639	0.629			0.925	0.925			0.637	0.627		
1969	1.119	1.120			0.715	0.704			1.113	1.114			0.709	0.698		
1970	1.125	1.124			0.804	0.792			1.125	1.123			0.797	0.784		
1971	1.013	1.014			0.815	0.803			1.014	1.015			0.808	0.796		
1972	1.001	1.002			0.816	0.805			1.001	1.003			0.810	0.798		
1973	1.025	1.025			0.836	0.825			1.027	1.027			0.831	0.820		
1974	0.976	0.977			0.816	0.806			0.976	0.976			0.811	0.800		
1975	1.032	1.032			0.842	0.832			1.032	1.032			0.837	0.826		
1976	0.942	0.942			0.793	0.783			0.943	0.943			0.790	0.779		
1977	1.026	1.026			0.814	0.803			1.029	1.030			0.813	0.802		
1978	1.056	1.056			0.859	0.848	1.000	1.000	1.060	1.060			0.861	0.850	1.000	1.000
1979	1.014	1.016	1.013	1.015	0.871	0.862	1.013	1.015	1.017	1.019	1.016	1.018	0.876	0.867	1.016	1.018
1980	1.014	1.017	1.016	1.018	0.883	0.877	1.029	1.033	1.015	1.018	1.017	1.020	0.889	0.882	1.033	1.038

1981	0.996	0.999	0.995	0.999	0.880	0.876	1.024	1.032	0.997	1.001	0.997	1.000	0.887	0.883	1.030	1.038
1982	1.028	1.031	1.031	1.034	0.905	0.903	1.056	1.067	1.033	1.035	1.035	1.038	0.916	0.914	1.066	1.078
1983	1.050	1.052	1.048	1.050	0.950	0.950	1.107	1.120	1.054	1.057	1.052	1.055	0.966	0.966	1.122	1.137
1984	1.079	1.079	1.083	1.084	1.024	1.025	1.198	1.214	1.085	1.086	1.089	1.090	1.047	1.049	1.222	1.239
1985	1.060	1.060	1.062	1.062	1.086	1.087	1.272	1.289	1.071	1.071	1.073	1.073	1.121	1.123	1.311	1.330
1986	1.013	0.983	1.013	0.983	1.100	1.068	1.289	1.267	1.026	0.995	1.026	0.995	1.150	1.117	1.344	1.323
1987	1.039	1.039	1.041	1.040	1.143	1.109	1.342	1.318	1.051	1.051	1.052	1.052	1.208	1.174	1.415	1.392
1988	1.039	1.039	1.042	1.041	1.187	1.152	1.398	1.373	1.049	1.049	1.052	1.052	1.268	1.232	1.489	1.465
1989	0.988	0.989	0.986	0.987	1.173	1.139	1.378	1.355	0.995	0.996	0.993	0.994	1.262	1.227	1.479	1.457
1990	0.987	0.987	0.991	0.991	1.157	1.124	1.365	1.343	0.990	0.991	0.994	0.995	1.249	1.215	1.470	1.449
1991	1.038	1.038	1.048	1.049	1.201	1.167	1.431	1.408	1.040	1.041	1.051	1.051	1.300	1.265	1.545	1.523
1992	1.088	1.088	1.093	1.093	1.306	1.270	1.565	1.539	1.092	1.092	1.097	1.097	1.420	1.382	1.696	1.672
1993	1.086	1.086	1.089	1.088	1.419	1.378	1.703	1.674	1.092	1.091	1.094	1.093	1.550	1.508	1.856	1.828
1994	1.072	1.071	1.079	1.078	1.521	1.476	1.837	1.805	1.077	1.076	1.084	1.083	1.669	1.623	2.011	1.980
1995	1.053	1.053	1.057	1.057	1.602	1.555	1.941	1.908	1.057	1.057	1.060	1.060	1.764	1.715	2.132	2.100
1996	1.045	1.045	1.042	1.042	1.674	1.626	2.023	1.988	1.049	1.049	1.045	1.045	1.849	1.798	2.228	2.194
1997	1.037	1.036	1.037	1.036	1.736	1.684	2.098	2.060	1.040	1.039	1.040	1.039	1.923	1.868	2.318	2.280
1998	1.046	1.045	1.025	1.024	1.815	1.760	2.151	2.110	1.050	1.049	1.029	1.029	2.019	1.960	2.385	2.345
1999	1.030	1.030	1.025	1.024	1.870	1.812	2.204	2.161	1.033	1.032	1.028	1.027	2.086	2.024	2.451	2.409
2000	1.035	1.034	1.034	1.033	1.936	1.874	2.279	2.233	1.038	1.037	1.036	1.036	2.164	2.098	2.541	2.495
2001	1.041	1.040	1.033	1.033	2.015	1.949	2.355	2.306	1.043	1.042	1.036	1.035	2.257	2.186	2.631	2.581
2002	1.040	1.039	1.041	1.040	2.095	2.025	2.452	2.398	1.043	1.042	1.044	1.043	2.354	2.278	2.748	2.692
2003			1.048	1.046			2.569	2.510			1.053	1.052			2.893	2.831
2004			1.046	1.045			2.689	2.622			1.051	1.049			3.041	2.971
2005			1.044	1.042			2.807	2.733			1.050	1.049			3.194	3.116
53-78	0.994	0.993			0.994	0.993			0.994	0.994			0.994	0.994		
78-05	1.039	1.038	1.039	1.038	1.038	1.037	1.039	1.038	1.044	1.043	1.044	1.043	1.043	1.042	1.044	1.043
53-05	1.015	1.015			1.015	1.015			1.018	1.017			1.018	1.017		

Cap. = gross capital stock at year 2000 constant prices.

a: "unweighted" sum of gross capital stock in (i) construction & installation, (ii) equipment & tools & appliances, and (iii) "others."

b: "weighted" sum of gross capital stock in (i) vs. (ii) and (iii). For the weights see notes to Table 19.

Empl. = employment.

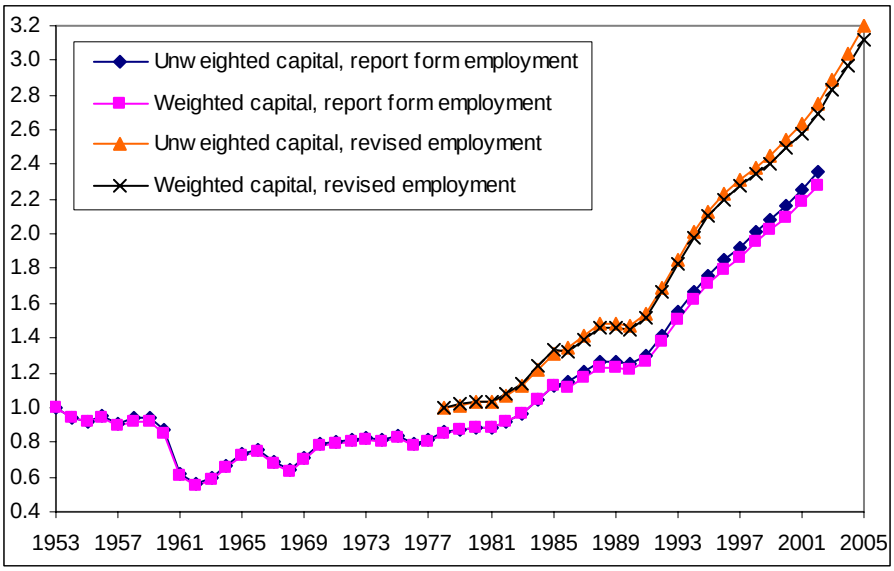
a: adjusted (revised) economy-wide employment.

b: report form total (economy-wide) employment.

TFP growth is obtained as the "A-ratio" in $\frac{Y_t}{Y_{t-1}} = \frac{A_t}{A_{t-1}} \left(\frac{L_t}{L_{t-1}}\right)^{\alpha} \left(\frac{K_t}{K_{t-1}}\right)^{1-\alpha}$ where Y stands for real value added, L for the mid-year number of laborers, and K for real capital; t denotes time, and α is the mean labor share in industry of the previous and the current year.

Average growth rates (geometric average) reported at the bottom of the table for the three periods 1953-78, 1978-05, and 1953-05 are based on the years available in the stated periods. The differences between average growth rates calculated based on TFP growth vs. cumulative TFP growth is due to the fact that the first year of each period experiences TFP growth, but that first year's growth does not figure in the cumulative values.

For all data see Table 31.



For the data see Table 32.

Figure 41. Cumulative TFP Growth with Gross Capital Stock Based on Effective GFCF

Table 33. Economy-wide and Sectoral Growth Rates of Employment and Output

	Total	***Prim.***	***Sec.***	Ind.	Con.	***Tert.***	Tran.	Trade	Fin.	R.e.	Social	Health	Educ.	Sci.	Gov.	Others	G.&O.	***Total***	***Prim.***	***Sec.***	***Tert.***
								Report form employment											***Revised employment***		
1978																					
1979	1.022	1.011	1.039	1.034	1.073	1.059	1.041	1.081	1.132	1.097	1.173	1.063	1.035	1.087	1.081	1.012	1.045	1.0240	1.0134	1.0411	1.0610
1980	1.033	1.017	1.068	1.066	1.084	1.069	1.031	1.106	1.151	1.088	1.314	1.008	1.014	1.130	1.044	1.116	1.080	1.0298	1.0143	1.0654	1.0658
1981	1.032	1.022	1.038	1.039	1.035	1.075	1.048	1.094	1.081	1.027	1.105	0.964	0.955	1.124	1.055	1.393	1.233	1.0332	1.0235	1.0395	1.0756
1982	1.036	1.036	1.043	1.033	1.111	1.024	1.040	1.057	1.056	1.000	1.056	1.064	1.030	1.039	1.099	0.857	0.955	1.0309	1.0314	1.0378	1.0196
1983	1.025	1.009	1.040	1.027	1.123	1.085	1.066	1.099	1.035	0.974	1.140	1.040	1.020	1.008	1.057	1.252	1.161	1.0285	1.0127	1.0433	1.0882
1984	1.038	0.991	1.105	1.072	1.295	1.172	1.199	1.151	1.085	0.973	1.196	1.048	1.046	1.030	1.150	1.485	1.343	1.0313	0.9845	1.0979	1.1639
1985	1.035	1.008	1.083	1.053	1.226	1.080	1.140	1.156	1.087	1.000	0.913	1.074	1.057	1.051	1.075	1.011	1.034	1.0312	1.0050	1.0791	1.0764
1986	1.028	1.004	1.080	1.076	1.099	1.054	1.076	1.046	1.101	1.056	1.162	1.032	1.040	1.056	1.093	1.014	1.044	1.0278	1.0036	1.0796	1.0536
1987	1.029	1.013	1.045	1.040	1.066	1.066	1.056	1.068	1.118	1.026	1.075	1.029	1.039	1.039	1.060	1.123	1.098	1.0269	1.0107	1.0431	1.0639
1988	1.029	1.019	1.036	1.034	1.045	1.058	1.047	1.065	1.141	1.077	1.066	1.024	1.020	1.019	1.050	1.102	1.082	1.0246	1.0137	1.0315	1.0526
1989	1.018	1.030	0.986	0.990	0.966	1.019	1.001	1.010	1.057	1.024	1.030	1.020	1.016	1.025	1.053	1.033	1.040	1.0212	1.0333	0.9884	1.0224
1990	1.026	1.027	1.012	1.013	1.007	1.037	1.029	1.025	1.063	1.023	1.080	1.035	1.022	1.048	1.056	1.052	1.053	1.0187	1.0195	1.0071	1.0295
1991	1.029	1.025	1.025	1.026	1.024	1.045	1.033	1.056	1.073	1.091	1.017	1.032	1.027	1.035	1.053	1.062	1.059	1.0115	1.0047	1.0115	1.0333
1992	1.018	0.995	1.036	1.027	1.072	1.071	1.035	1.070	1.060	1.125	1.065	1.022	1.015	1.022	1.011	1.211	1.136	1.0101	0.9898	1.0243	1.0582
1993	1.013	0.976	1.050	1.024	1.147	1.083	1.008	1.078	1.089	1.222	0.844	0.736	0.796	0.945	0.897	1.617	1.378	1.0099	0.9737	1.0425	1.0813
1994	1.021	0.983	1.033	1.029	1.045	1.109	1.104	1.134	0.978	1.121	1.153	1.043	1.187	1.029	1.003	1.111	1.088	1.0097	0.9721	1.0232	1.0955
1995	1.015	0.989	1.025	1.020	1.042	1.066	1.042	1.095	1.045	1.081	1.123	1.023	1.028	1.022	1.009	1.079	1.065	1.0090	0.9700	1.0224	1.0880
1996	1.007	0.997	1.002	0.995	1.026	1.035	1.037	1.051	1.058	1.050	1.063	1.032	1.025	1.005	1.049	1.018	1.024	1.0130	0.9800	1.0350	1.0620
1997	1.013	1.006	0.991	0.984	1.012	1.050	1.024	1.063	1.055	1.036	1.084	1.028	1.029	1.016	1.000	1.066	1.053	1.0126	1.0006	1.0212	1.0282
1998	0.980	1.004	0.890	0.866	0.965	1.007	0.970	0.969	1.019	1.080	1.072	1.015	1.010	0.957	1.004	1.053	1.044	1.0117	1.0097	1.0032	1.0232
1999	1.002	1.008	0.986	0.972	1.026	1.003	1.011	1.023	1.045	1.021	1.063	1.008	0.997	0.972	1.005	0.971	0.977	1.0107	1.0168	0.9892	1.0183
2000	1.008	0.996	1.000	0.985	1.041	1.038	1.003	0.986	0.997	1.042	0.998	1.012	0.998	1.006	1.002	1.136	1.111	1.0097	1.0077	0.9877	1.0322
2001	1.001	0.989	1.010	1.001	1.033	1.019	1.004	1.011	1.028	1.070	1.060	1.010	1.002	0.948	0.997	1.037	1.031	1.0130	1.0130	1.0040	1.0204
2002	1.012	0.985	1.035	1.025	1.061	1.044	1.023	1.049	1.012	1.103	1.121	1.000	0.998	0.988	0.976	1.067	1.053	1.0098	1.0098	0.9690	1.0426
2003																		1.0094	0.9912	1.0188	1.0341
2004																		1.0103	0.9651	1.0524	1.0551
2005																		1.0083	0.9617	1.0693	1.0349
Ave.	1.019	1.006	1.027	1.017	1.065	1.056	1.044	1.063	1.064	1.057	1.078	1.013	1.015	1.024	1.035	1.109	1.087	1.018	1.001	1.030	1.054

Value added																					
1978	1.117	1.041	1.150	1.164	0.994	1.137	1.089	1.231	1.098	1.057											1.077
1979	1.076	1.061	1.082	1.087	1.020	1.078	1.077	1.088	0.972	1.041											1.054
1980	1.078	0.985	1.136	1.127	1.267	1.059	1.057	0.987	1.066	1.079											1.137
1981	1.052	1.070	1.019	1.017	1.032	1.104	1.019	1.300	1.043	0.965											1.107
1982	1.091	1.115	1.056	1.058	1.034	1.130	1.117	1.039	1.446	1.091											1.104
1983	1.109	1.083	1.104	1.097	1.171	1.152	1.100	1.219	1.270	1.052											1.126
1984	1.152	1.129	1.145	1.149	1.109	1.194	1.150	1.215	1.311	1.277											1.111
1985	1.135	1.018	1.186	1.182	1.222	1.183	1.135	1.289	1.169	1.250											1.092
1986	1.088	1.033	1.102	1.096	1.159	1.121	1.128	1.106	1.316	1.259											1.039
1987	1.116	1.047	1.137	1.132	1.179	1.144	1.100	1.135	1.233	1.293											1.100
1988	1.113	1.025	1.145	1.153	1.080	1.132	1.133	1.143	1.195	1.127											1.067
1989	1.041	1.031	1.038	1.051	0.916	1.054	1.047	0.917	1.259	1.159											1.051
1990	1.038	1.073	1.032	1.034	1.012	1.023	1.086	0.952	1.019	1.062											1.080
1991	1.092	1.024	1.139	1.144	1.096	1.088	1.112	1.045	1.023	1.120	1.268	1.149	1.078	1.114	1.145	1.148	1.268	1.149	1.078	1.114	1.145
1992	1.142	1.047	1.212	1.212	1.210	1.124	1.105	1.131	1.080	1.347	1.193	1.094	1.080	1.143	1.086	1.195	1.193	1.094	1.080	1.143	1.096
1993	1.140	1.047	1.199	1.201	1.180	1.121	1.145	1.084	1.109	1.108	1.189	1.118	1.149	1.075	1.077	1.179	1.189	1.118	1.149	1.075	1.087
1994	1.131	1.040	1.184	1.189	1.137	1.110	1.116	1.095	1.094	1.120	1.083	1.082	1.150	1.159	1.083	1.106	1.083	1.082	1.150	1.159	1.085
1995	1.109	1.050	1.139	1.140	1.124	1.098	1.141	1.077	1.085	1.124	1.058	1.064	1.080	1.083	1.060	1.086	1.058	1.064	1.080	1.083	1.063
1996	1.100	1.051	1.121	1.125	1.085	1.094	1.136	1.072	1.075	1.040	1.050	1.103	1.139	1.095	1.062	1.095	1.050	1.103	1.139	1.095	1.065
1997	1.093	1.035	1.105	1.113	1.026	1.107	1.129	1.104	1.085	1.041	1.079	1.081	1.148	1.129	1.070	1.102	1.079	1.081	1.148	1.129	1.073
1998	1.078	1.035	1.089	1.089	1.090	1.083	1.106	1.078	1.049	1.077	1.106	1.078	1.102	1.082	1.083	1.081	1.106	1.078	1.102	1.082	1.083
1999	1.076	1.028	1.081	1.085	1.043	1.093	1.134	1.091	1.048	1.059	1.081	1.046	1.072	1.084	1.086	1.065	1.081	1.046	1.072	1.084	1.084
2000	1.084	1.024	1.094	1.098	1.057	1.097	1.136	1.101	1.065	1.071	1.087	1.063	1.053	1.053	1.077	1.056	1.087	1.063	1.053	1.053	1.075
2001	1.083	1.028	1.084	1.087	1.068	1.102	1.116	1.093	1.064	1.110	1.109	1.116	1.086	1.072	1.073	1.044	1.109	1.116	1.086	1.072	1.070
2002	1.091	1.029	1.098	1.100	1.088	1.104	1.099	1.100	1.069	1.099	1.112	1.092	1.110	1.101	1.084	1.057	1.112	1.092	1.110	1.101	1.081
2003	1.100	1.025	1.127	1.128	1.121	1.095	1.083	1.110	1.070	1.098	1.093	1.072	1.075	1.040	1.079	1.045	1.093	1.072	1.075	1.040	1.076
2004	1.101	1.063	1.111	1.115	1.081	1.100	1.171	1.081													
2005	1.099	1.052	1.114	1.114	1.119	1.096	1.113	1.114													
Ave.	1.096	1.046	1.113	1.115	1.098	1.106	1.110	1.099	1.122	1.117	1.114	1.089	1.101	1.094	1.082	1.096	1.114	1.089	1.101	1.094	1.085

All growth rates are in form of current-period value divided by previous-period value.

Average growth rates (geometric average) reported at the bottom of the table cover exactly those years for which annual growth rates are available.

For the complete sectoral labels see the notes to Table 20.

Sources and explanations:

Report form employment growth rates are based on the employment data in Appendix 15, with categories aggregated to match value added and capital data. Geological prospecting and water conservancy is being aggregated with science. It is unclear if the source includes agricultural services in science or in agriculture; presumably in the latter, and to that extent the match between employment on the one hand and capital and output on the other hand is not perfect. Revised (adjusted) employment values are from Appendix 13.

Real growth of value added is based on Appendix 7, for the total, the primary, secondary, and tertiary sector, industry, construction, transport, and trade; for 1993-2004, the benchmark revision values for 1993-2004 are used. Data on the remaining tertiary sector sub-sectors are based on Appendix 9 and Appendix 10. Values from Appendix 10, which has data for 1990-2003, are used first, with agricultural services and geological prospecting and water conservancy incorporated into science in order to match the capital data (even though agricultural services, according to the classification system in use with these data, the GB1994, should go into agriculture); separately, government and others are also presented as an aggregate category. Whenever aggregation occurs, nominal value added and real growth rates are combined to yield an implicit deflator, the nominal values are deflated using the sector-specific implicit deflators, the constant-price values of the different categories are then aggregated, and the real growth rate of the aggregate is calculated. For the years prior to 1990, data on the remaining tertiary sector sub-sectors are more scarce (Appendix 9), and a match can only be established for three sectors, namely finance, real estate, and "government and others."

Table 34. Economy-wide and Sectoral TFP Growth Based on Depreciation

							Report form employment											Revised employment			
	Total	***Prim.***	***Sec.***	Ind.	Con.	***Tert.***	Tran.	Trade	Fin.	R.e.	Social	Health	Educ.	Sci.	Gov.	Others	G.&O.	***Total***	***Prim.***	***Sec.***	***Tert.***
TFP growth																					
1979	1.025	1.040	1.028	1.034	0.941	0.987	1.062	0.980	0.856	0.905							0.998	1.024	1.038	1.027	0.986
1980	1.030	0.963	1.082	1.075	1.180	0.975	1.050	0.889	0.953	0.961							1.048	1.032	0.965	1.083	0.977
1981	1.002	1.043	0.978	0.975	0.989	1.006	0.984	1.174	0.893	0.856							0.904	1.002	1.042	0.978	1.006
1982	1.041	1.071	1.018	1.022	0.951	1.062	1.055	0.961	1.236	0.993							1.127	1.044	1.076	1.020	1.065
1983	1.052	1.065	1.043	1.038	1.048	1.040	0.976	1.098	1.042	0.941							0.970	1.050	1.062	1.041	1.038
1984	1.084	1.137	1.047	1.065	0.883	1.034	0.963	1.061	1.108	1.124							0.850	1.088	1.144	1.050	1.037
1985	1.063	1.005	1.088	1.096	1.015	1.055	0.950	1.114	0.961	1.093							1.037	1.065	1.008	1.090	1.057
1986	1.013	1.021	0.992	0.985	1.038	1.008	0.966	1.004	1.044	1.094							0.976	1.013	1.021	0.992	1.009
1987	1.027	1.018	1.020	1.010	1.078	1.018	0.938	1.001	0.932	1.155							0.986	1.028	1.020	1.021	1.019
1988	1.022	0.995	1.024	1.023	1.001	1.012	0.973	1.010	0.901	1.008							0.967	1.025	0.999	1.026	1.014
1989	0.965	0.991	0.962	0.963	0.907	0.954	0.918	0.835	0.982	1.043							0.974	0.963	0.989	0.961	0.953
1990	0.968	1.042	0.958	0.953	0.982	0.927	0.958	0.879	0.805	0.967							0.984	0.972	1.049	0.961	0.930
1991	1.015	0.997	1.044	1.042	1.039	0.987	1.000	0.945	0.826	1.016	1.181	1.091	1.024	1.021	1.058	1.004	1.048	1.025	1.014	1.051	0.992
1992	1.091	1.049	1.137	1.139	1.113	1.040	1.039	1.041	0.930	1.251	1.110	1.070	1.052	1.103	1.060	1.001	0.971	1.096	1.054	1.143	1.046
1993	1.087	1.061	1.112	1.124	1.038	1.030	1.089	0.998	0.921	1.009	1.237	1.401	1.365	1.085	1.167	0.854	0.832	1.089	1.063	1.116	1.031
1994	1.069	1.042	1.109	1.111	1.083	0.995	0.999	0.971	0.921	0.998	0.942	1.028	0.993	1.114	1.068	1.016	1.001	1.076	1.052	1.114	1.001
1995	1.019	1.038	1.034	1.031	1.049	0.962	0.999	0.938	0.850	0.924	0.913	1.019	1.029	1.012	1.024	0.993	0.981	1.023	1.055	1.035	0.952
1996	1.016	1.036	1.029	1.029	1.022	0.974	1.006	0.959	0.871	0.850	0.935	1.044	1.080	1.046	0.992	1.030	1.012	1.013	1.051	1.011	0.961
1997	1.004	1.013	1.014	1.020	0.957	0.979	1.005	0.981	0.875	0.866	0.928	1.020	1.083	1.057	1.040	0.999	0.997	1.004	1.018	0.998	0.990
1998	1.043	1.028	1.104	1.111	1.082	1.015	1.062	1.041	0.922	0.954	0.989	1.025	1.064	1.076	1.061	1.011	1.026	1.023	1.023	1.035	1.006
1999	1.039	1.021	1.056	1.065	1.006	1.039	1.082	1.026	0.936	0.958	0.982	1.010	1.055	1.078	1.068	1.068	1.090	1.034	1.013	1.054	1.030
2000	1.070	1.036	1.095	1.107	1.027	1.052	1.123	1.094	1.022	1.016	1.064	1.034	1.044	1.045	1.070	0.961	0.980	1.069	1.026	1.102	1.055
2001	1.063	1.039	1.064	1.071	1.029	1.060	1.094	1.070	0.994	1.032	1.031	1.093	1.070	1.101	1.067	1.004	1.034	1.055	1.018	1.068	1.060
2002	1.068	1.044	1.066	1.076	1.017	1.054	1.071	1.062	1.016	1.037	1.006	1.077	1.098	1.099	1.099	0.995	1.028	1.069	1.022	1.104	1.055
Ave.	1.036	1.033	1.045	1.047	1.018	1.010	1.014	1.002	0.945	0.998	*1.022*	*1.072*	*1.076*	*1.069*	*1.064*	*0.993*	0.990	1.036	1.034	1.044	1.010
Cumulative TFP growth																					
1979	1.025	1.040	1.028	1.034	0.941	0.987	1.062	0.980	0.856	0.905							0.998	1.024	1.038	1.027	0.986
1980	1.056	1.001	1.112	1.112	1.110	0.963	1.115	0.871	0.816	0.870							1.045	1.056	1.001	1.112	0.963

1981	1.059	1.044	1.088	1.084	1.098	0.969	1.097	1.023	0.729	0.744							0.945	1.058	1.043	1.088	0.969
1982	1.102	1.118	1.108	1.109	1.044	1.030	1.157	0.982	0.901	0.739							1.065	1.105	1.123	1.110	1.032
1983	1.160	1.191	1.156	1.151	1.093	1.071	1.130	1.079	0.939	0.696							1.033	1.160	1.192	1.156	1.071
1984	1.257	1.354	1.210	1.226	0.966	1.107	1.088	1.145	1.040	0.782							0.879	1.263	1.364	1.214	1.111
1985	1.336	1.361	1.317	1.343	0.980	1.168	1.034	1.276	1.000	0.855							0.911	1.344	1.375	1.323	1.174
1986	1.353	1.390	1.307	1.324	1.017	1.177	0.999	1.281	1.044	0.935							0.890	1.362	1.404	1.313	1.184
1987	1.389	1.414	1.333	1.337	1.096	1.199	0.937	1.282	0.974	1.080							0.877	1.401	1.432	1.341	1.206
1988	1.420	1.407	1.365	1.368	1.097	1.212	0.912	1.295	0.877	1.089							0.848	1.436	1.431	1.376	1.223
1989	1.370	1.395	1.313	1.317	0.995	1.157	0.837	1.081	0.861	1.136							0.825	1.383	1.415	1.322	1.165
1990	1.326	1.454	1.258	1.255	0.977	1.072	0.802	0.950	0.693	1.099	1.000	1.000	1.000	1.000	1.000	1.000	0.812	1.344	1.484	1.269	1.084
1991	1.346	1.449	1.313	1.307	1.015	1.058	0.802	0.898	0.572	1.117	1.181	1.091	1.024	1.021	1.058	1.004	0.851	1.378	1.505	1.334	1.075
1992	1.468	1.520	1.492	1.489	1.129	1.100	0.833	0.934	0.532	1.397	1.310	1.167	1.078	1.126	1.121	1.005	0.826	1.510	1.586	1.525	1.124
1993	1.596	1.612	1.660	1.674	1.173	1.133	0.908	0.932	0.490	1.410	1.621	1.635	1.471	1.222	1.309	0.858	0.688	1.645	1.687	1.702	1.159
1994	1.706	1.680	1.841	1.860	1.270	1.127	0.907	0.905	0.451	1.406	1.527	1.682	1.461	1.360	1.398	0.872	0.689	1.770	1.775	1.897	1.160
1995	1.739	1.744	1.903	1.917	1.332	1.084	0.906	0.849	0.384	1.300	1.395	1.713	1.503	1.376	1.431	0.866	0.675	1.810	1.873	1.964	1.104
1996	1.767	1.806	1.957	1.973	1.362	1.056	0.912	0.814	0.334	1.105	1.304	1.788	1.624	1.440	1.420	0.892	0.684	1.833	1.968	1.986	1.061
1997	1.773	1.830	1.986	2.012	1.304	1.034	0.916	0.798	0.292	0.957	1.210	1.825	1.758	1.521	1.478	0.891	0.682	1.840	2.003	1.983	1.050
1998	1.850	1.881	2.191	2.236	1.410	1.049	0.973	0.831	0.269	0.913	1.196	1.871	1.871	1.637	1.568	0.901	0.700	1.883	2.049	2.051	1.057
1999	1.923	1.920	2.314	2.380	1.418	1.090	1.053	0.853	0.252	0.874	1.174	1.889	1.974	1.765	1.675	0.962	0.763	1.947	2.075	2.163	1.089
2000	2.058	1.989	2.533	2.634	1.456	1.147	1.182	0.933	0.258	0.888	1.249	1.954	2.060	1.844	1.792	0.924	0.748	2.081	2.129	2.384	1.149
2001	2.187	2.067	2.696	2.822	1.499	1.216	1.293	0.998	0.256	0.917	1.288	2.135	2.205	2.031	1.911	0.928	0.773	2.195	2.166	2.545	1.217
2002	2.335	2.158	2.875	3.036	1.523	1.282	1.385	1.059	0.260	0.951	1.296	2.300	2.420	2.232	2.100	0.923	0.795	2.347	2.215	2.809	1.284
Ave.	1.036	1.033	1.045	1.047	1.018	1.010	1.014	1.002	0.945	0.998	1.022	1.072	1.076	1.069	1.064	0.993	0.990	1.036	1.034	1.044	1.010

Ave. denotes the average annual growth rate of the years for which annual growth rates are available.

The complete labels of sectors are as in Table 20 (with slightly stronger abbreviations used here).

TFP growth is obtained using the formula as noted underneath Table 32.

For the capital data see Table 20 (turned into growth rates), for the growth rates of employment and output Table 33, and for labor shares Appendix 32 and Appendix 33 (the 1995 values of the more recent source are used).

Table 35. TFP Growth in Three Main Economic Sectors

	TFP growth			Cumulative TFP growth		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
1979	1.038	1.008	0.981	1.038	1.008	0.981
1980	0.965	1.048	0.956	1.001	1.056	0.937
1981	1.043	0.949	0.995	1.044	1.002	0.932
1982	1.079	0.992	1.050	1.126	0.994	0.979
1983	1.066	1.034	1.034	1.200	1.027	1.012
1984	1.140	1.045	1.031	1.368	1.073	1.043
1985	1.011	1.082	1.053	1.383	1.161	1.099
1986	1.025	1.000	1.006	1.417	1.161	1.105
1987	1.030	1.033	1.017	1.460	1.199	1.124
1988	1.005	1.042	1.014	1.467	1.249	1.140
1989	0.994	0.961	0.954	1.457	1.201	1.088
1990	1.044	0.963	0.935	1.522	1.156	1.017
1991	1.009	1.065	0.992	1.535	1.231	1.008
1992	1.045	1.123	1.009	1.604	1.382	1.017
1993	1.059	1.089	0.986	1.699	1.505	1.003
1994	1.044	1.073	0.948	1.774	1.615	0.951
1995	1.047	1.037	0.932	1.858	1.674	0.886
1996	1.045	1.017	0.939	1.942	1.703	0.832
1997	1.013	1.002	0.969	1.966	1.707	0.807
1998	1.006	1.008	0.964	1.978	1.720	0.778
1999	0.995	1.024	0.986	1.968	1.761	0.767
2000	1.000	1.041	0.990	1.968	1.834	0.759
2001	1.002	1.022	1.012	1.972	1.875	0.768
2002	1.005	1.062	1.008	1.981	1.991	0.774
Ave.	1.029	1.029	0.989	1.029	1.029	0.989

Ave. denotes the average annual growth rate of 1979-2002.

TFP growth is obtained using the formula as noted underneath Table 32.

Capital value are obtained by splitting economy-wide effective GFCF (Appendix 25) into the three main economic sectors using sectoral share values available for the individual provinces in *GDP 1952-95* and *GDP 1996-2002*. Provincial sectoral shares are shares in the sum provincial—across sector—GFCF value, not in the sum provincial total GFCF value; i.e., the shares add up to 100%. The provincial data are not always complete (but when values are missing, they are missing simultaneously for all three sectors). In 1978, the sum provincial sectoral GFCF values accounted for just 70% of the national GFCF value; by 2002, the sum provincial value exceeded the national value by 7%. The provincial sectoral GFCF values are only available for 1978-2002; pre-1978 values were obtained by assuming an agricultural share of 15%, a secondary sector share of 60%, and a tertiary sector share of 25%. The shares in the reform period trend away from agriculture and the secondary sector into the tertiary sector; the assumed shares for 1953-78 take into account the trend and strive for an earlier average value.

Employment values are the revised ones of Appendix 13. For the labor shares see Appendix 32 and Appendix 33 (the 1995 values of the more recent source are used).

Table 36. TFP Growth in DRIEs

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Annual TFP growth (1.X)										
Total		0.979	0.846	1.105	1.086	1.119	1.108	1.147	1.097	1.129
Coal mining and dressing		1.018	1.019	1.045	1.003	0.985	0.881	1.078	1.075	1.147
Petroleum and natural gas extraction		0.955	0.915	1.039	1.036	1.084	0.983	1.838	0.701	0.890
Ferrous metals mining and dressing		0.803	0.914	1.258	1.065	0.933	1.090	1.142	1.136	1.011
Nonferrous metals mining and dressing		0.929	0.997	1.085	1.135	1.057	1.169	1.119	1.043	1.073
Nonmetal minerals mining and dressing		0.943	0.822	1.206	1.088	0.914	1.026	1.010	1.080	1.123
Logging and transport of timber and bamboo		1.010	0.910	0.979	0.726	1.455	0.847	1.014	0.996	0.981
Food processing		0.932	0.588	1.344	1.106	1.018	1.211	1.230	1.128	1.129
Food production		0.982	0.703	1.357	1.202	1.132	1.052	1.232	1.079	1.117
Beverage production		0.984	0.787	1.179	1.175	1.098	1.072	1.089	1.055	1.098
Tobacco processing		1.059	0.862	1.039	0.945	1.091	0.864	1.012	1.039	1.091
Textile industry		0.904	0.642	1.188	1.132	1.074	1.172	1.159	1.069	1.115
Garments and other fiber products		0.899	0.788	1.205	1.030	1.149	1.029	1.122	1.054	0.991
Leather, furs, down and related products		1.061	0.784	1.362	1.027	1.114	1.022	1.108	1.085	1.099
Timber processing, bamboo, cane, palm etc.		0.835	0.882	1.450	1.108	0.985	1.184	1.120	1.165	1.062
Furniture manufacturing		1.072	0.796	1.284	1.096	1.286	0.935	1.126	1.125	1.037
Papermaking and paper products		1.116	0.815	1.272	1.053	1.076	1.120	1.064	1.080	1.164
Printing and record medium reproduction		0.906	0.781	1.232	1.111	1.225	1.064	1.026	1.155	1.158
Cultural, educational and sports goods		0.986	0.947	1.236	1.002	1.192	0.895	1.065	1.087	1.027
Petroleum processing and coking		0.846	0.992	0.935	0.986	0.854	1.095	1.083	1.185	1.157
Raw chemical materials and chemical prod.		0.988	0.867	1.154	0.972	1.027	1.118	1.151	1.155	1.166
Medical and pharmaceutical products		0.890	0.889	1.308	1.116	1.114	1.170	1.222	1.135	1.097
Chemical fiber		0.948	0.826	1.100	1.103	0.968	1.308	1.113	1.031	1.191
Rubber products		0.917	0.736	1.198	1.047	1.061	1.005	1.135	1.087	1.128
Plastic products		0.931	0.737	1.343	1.081	1.214	1.017	1.135	1.095	1.080
Nonmetal mineral products		0.899	0.784	1.103	1.065	1.098	1.109	1.154	1.099	1.096
Smelting and pressing of ferrous metals		0.951	0.735	0.960	1.045	1.032	1.149	1.212	1.171	1.179
Smelting and pressing of nonferrous metals		0.952	0.766	0.985	1.030	1.057	1.217	1.189	1.177	1.046
Metal products		0.955	0.776	1.197	1.043	1.235	1.055	1.116	1.103	1.134
Ordinary machinery manufacturing		1.033	0.835	0.987	1.112	1.082	1.096	1.157	1.146	1.164

Special purpose equipment manufacturing		1.039	0.776	1.074	1.097	1.079	1.106	1.172	1.115	1.229
Transport equipment manufacturing		0.966	0.886	1.018	1.075	1.193	1.094	1.105	1.197	1.308
Electric equipment and machinery		0.911	0.922	1.104	1.072	1.212	1.109	1.220	1.093	1.112
Electronic and telecommunications equipm.		1.100	1.145	0.951	1.334	1.206	1.186	1.243	1.016	1.105
Instruments, meters, cultural and off. mach.		1.022	0.819	1.047	1.115	1.373	1.049	1.190	1.136	1.031
Prod./supply of electric power, steam etc.		0.961	1.037	0.973	1.030	1.137	0.963	1.023	1.040	1.061
Production and supply of gas		0.308	0.969	-3.999	-0.696	1.436	2.721	0.915	1.357	1.078
Production and supply of tap water		0.841	0.879	0.960	0.932	1.153	0.812	1.002	0.933	1.053
Cumulative TFP growth (1.X)										
Total	1.000	0.979	0.828	0.915	0.994	1.113	1.233	1.414	1.551	1.751
Coal mining and dressing	1.000	1.018	1.037	1.084	1.087	1.070	0.943	1.017	1.093	1.254
Petroleum and natural gas extraction	1.000	0.955	0.874	0.909	0.942	1.021	1.004	1.845	1.294	1.152
Ferrous metals mining and dressing	1.000	0.803	0.734	0.923	0.983	0.917	0.999	1.141	1.297	1.311
Nonferrous metals mining and dressing	1.000	0.929	0.926	1.005	1.140	1.205	1.408	1.577	1.645	1.764
Nonmetal minerals mining and dressing	1.000	0.943	0.776	0.936	1.018	0.930	0.955	0.964	1.041	1.170
Logging and transport of timber and bamboo	1.000	1.010	0.919	0.899	0.653	0.950	0.805	0.816	0.812	0.797
Food processing	1.000	0.932	0.549	0.737	0.815	0.830	1.005	1.236	1.394	1.574
Food production	1.000	0.982	0.690	0.937	1.126	1.274	1.340	1.651	1.782	1.991
Beverage production	1.000	0.984	0.774	0.913	1.073	1.178	1.263	1.376	1.452	1.594
Tobacco processing	1.000	1.059	0.912	0.948	0.896	0.977	0.845	0.855	0.889	0.969
Textile industry	1.000	0.904	0.580	0.689	0.780	0.838	0.982	1.139	1.217	1.357
Garments and other fiber products	1.000	0.899	0.709	0.854	0.879	1.010	1.039	1.166	1.229	1.217
Leather, furs, down and related products	1.000	1.061	0.832	1.133	1.163	1.296	1.325	1.467	1.592	1.749
Timber processing, bamboo, cane, palm etc.	1.000	0.835	0.736	1.068	1.183	1.166	1.380	1.545	1.800	1.912
Furniture manufacturing	1.000	1.072	0.853	1.094	1.200	1.542	1.442	1.623	1.826	1.894
Papermaking and paper products	1.000	1.116	0.909	1.156	1.218	1.311	1.468	1.562	1.687	1.963
Printing and record medium reproduction	1.000	0.906	0.708	0.872	0.969	1.187	1.263	1.296	1.497	1.734
Cultural, educational and sports goods	1.000	0.986	0.933	1.154	1.156	1.377	1.233	1.313	1.427	1.466
Petroleum processing and coking	1.000	0.846	0.839	0.785	0.774	0.660	0.723	0.783	0.928	1.074
Raw chemical materials and chemical prod.	1.000	0.988	0.857	0.988	0.961	0.987	1.103	1.270	1.468	1.712
Medical and pharmaceutical products	1.000	0.890	0.791	1.035	1.155	1.287	1.506	1.841	2.088	2.291
Chemical fiber	1.000	0.948	0.783	0.861	0.950	0.919	1.202	1.338	1.380	1.643
Rubber products	1.000	0.917	0.675	0.808	0.846	0.898	0.902	1.024	1.113	1.255
Plastic products	1.000	0.931	0.686	0.921	0.995	1.209	1.229	1.395	1.528	1.650
Nonmetal mineral products	1.000	0.899	0.705	0.778	0.828	0.909	1.008	1.163	1.279	1.401

Smelting and pressing of ferrous metals	1.000	0.951	0.699	0.670	0.701	0.723	0.831	1.007	1.179	1.391
Smelting and pressing of nonferrous metals	1.000	0.952	0.729	0.718	0.739	0.782	0.951	1.130	1.331	1.392
Metal products	1.000	0.955	0.741	0.886	0.924	1.142	1.205	1.344	1.483	1.682
Ordinary machinery manufacturing	1.000	1.033	0.862	0.851	0.947	1.025	1.123	1.299	1.489	1.734
Special purpose equipment manufacturing	1.000	1.039	0.806	0.866	0.950	1.025	1.134	1.328	1.482	1.821
Transport equipment manufacturing	1.000	0.966	0.855	0.871	0.936	1.117	1.222	1.351	1.617	2.115
Electric equipment and machinery	1.000	0.911	0.840	0.927	0.994	1.205	1.337	1.630	1.782	1.982
Electronic and telecommunications equipm.	1.000	1.100	1.259	1.197	1.596	1.925	2.283	2.837	2.882	3.184
Instruments, meters, cultural and off. mach.	1.000	1.022	0.837	0.876	0.977	1.340	1.406	1.672	1.899	1.957
Prod./supply of electric power, steam etc.	1.000	0.961	0.997	0.970	1.000	1.137	1.095	1.119	1.164	1.235
Production and supply of gas	1.000	0.308	0.298	-1.192	0.830	1.192	3.244	2.967	4.025	4.340
Production and supply of tap water	1.000	0.841	0.739	0.709	0.661	0.762	0.619	0.620	0.578	0.609

TFP growth is obtained as the "A-ratio" in:

$$\frac{Y_t}{Y_{t-1}} = \frac{A_t}{A_{t-1}} \left(\frac{L_t}{L_{t-1}} \right)^{\alpha} \left(\frac{K_t}{K_{t-1}} \right)^{1-\alpha}$$

where Y stands for real value added, L for the mid-year number of laborers, and K for real capital; t denotes time, and α is the mean labor share in industry of the previous and the current year.

The values in the sector production and supply of gas are not a typo but reflect strong negative value added in 1996.

Sources: Value added at current prices is from Appendix 11; sector-specific deflators are provided in the same appendix through GOV in current and 1990 prices; sector specific deflators for 1998 are not available (GOV in 1990 prices is not available) and the negative 5.3% deflator value from all industry in the NIPA (Appendix 8) is applied indiscriminately across all individual industrial sectors. Mid-year employment values for 1993-2002 are from Appendix 16 (with the first of the two sets of 1995 employment values used in the following). Capital values are from Appendix 30 and are deflated to year 2000 prices using the (total) investment in fixed assets price index (Appendix 24) indiscriminately for all individual industrial sectors. The weights for labor are the labor shares reported for industry in Appendix 32 and in Appendix 33, and the weights for capital the capital shares obtained as one minus labor share value.

Appendix 1 Pre-1984 Sectoral Classification Scheme As Evidenced in Year 1982 Population Census Employment (number of laborers)

				Employment	Share of subgroup (in %)	Share of total (in %)	Changes in switch to 1984 classification
			Total	521505618		100.00	
I		农，林，牧，渔业	Agriculture	384155030	100.00	73.66	
	1	农业	Farming	375123822	97.65	71.93	
	2	畜牧业	Forestry	4489956	1.17	0.86	
	3	林业	Animal husbandry	2692609	0.70	0.52	
	4	渔业	Fishery	1848643	0.48	0.35	
II-IV		工业	Industry	71570392		13.72	
II		矿业及木材采运业	Mineral and timber extraction	8401845	100.00	1.61	
	1	矿业	Minerals	7550143	89.86	1.45	
	(1)	煤炭采选业	Coal mining and dressing	4616751	54.95	0.89	
	(2)	石油和天然气开采业	Petroleum and natural gas extraction	396458	4.72	0.08	
	(3)	金属矿业	Metal mining	1015450	12.09	0.19	disaggregated
	(4)	非金属矿业	Nonmetal mining	1521484	18.11	0.29	relabeled?
	2	木材及竹材采选业	Logging and transport of timber and bamboo	851702	10.14	0.16	
III		电力，煤气，自来水的生产和供应业	Utilities	1500343	100.00	0.29	
	1	电力，蒸汽和热水的生产和供应业	Prod. and supply of electric power, steam and hot water	1240962	82.71	0.24	relocated
	2	煤气生产和供应业	Production and supply of gas	50599	3.37	0.01	subsumed elsewh.
	3	自来水生产和供应业	Production and supply of tap water	208782	13.92	0.04	relocated
IV		制造业	Manufacturing	61668204	100.00	11.83	
	1	食品， 饮料和烟草制造业	Food, beverage, and tobacco processing	4563044	7.40	0.87	
	(1)	食品制造业	Food manufacturing	3569261	5.79	0.68	
	(2)	饮料制造业	Beverage manufacturing	792032	1.28	0.15	
	(3)	烟草加工业	Tobacco processing	201751	0.33	0.04	
	2	纺织业	Textile industry	6646580	10.78	1.27	
	3	缝纫业	Sewing industry	3068476	4.98	0.59	
	4	皮革，毛皮及其制品制造业	Leather, furs and related products	1026637	1.66	0.20	
	5	木材加工业	Timber processing	880550	1.43	0.17	relabeled?

6	家具制造业	Furniture manufacturing	2306805	3.74	0.44	
7	制浆，造纸及纸制品业	Paper pulp, papermaking and paper products	1402762	2.27	0.27	relabeled
8	文教，艺术用品制造业及印刷业	Manufacture of cultural and arts products, printing	3971169	6.44	0.76	disaggregated
9	化学工业	Chemical industry	3508985	5.69	0.67	disaggregated?
10	医药制造业	Manufacture of medical products	553796	0.90	0.11	
11	橡胶及塑料制品制造业	Rubber and plastic product manufacturing	1939617	3.15	0.37	disaggregated
12	石油及煤制品制造业	Petroleum and coal product manufacturing	510910	0.83	0.10	disaggregated
13	非金属矿物制品制造业	Nonferrous metals products manufacturing	7413201	12.02	1.42	relabeled?
14	冶金工业	Metallurgical industry	2214573	3.59	0.42	disaggregated
15	金属制品制造业	Metal products manufacturing	3919606	6.36	0.75	
16	一般机械（不包括电气机械）制造业	Ordinary machinery manufacturing (excl. electric machinery)	8697947	14.10	1.67	relabeled
17	电气，电子机械设备制造业	Electric and electronic machinery/equipment manufacturing	3448322	5.59	0.66	disaggregated
18	交通运输设备制造业	Transport equipment	2569887	4.17	0.49	
19	精密机械及仪器仪表制造业	Precision machinery and instruments and meters manufacturing	1229772	1.99	0.24	relabeled?
20	其他制造业及修理业	Other manufacturing and repairs	1795565	2.91	0.34	repairs omitted
III	地质勘查和普查业	Geological investigation and prospecting	824043		0.16	
	地质勘查和普查业	Geological investigation and prospecting	824043		0.16	
IV	建筑业	Construction	11009419	100.00	2.11	
1	土木工程建筑业	Building projects	9920987	90.11	1.90	
2	线路，管道和设备安装业	Installation of lines, pipelines, and equipment	602351	5.47	0.12	
3	勘察设计	Design	270219	2.45	0.05	
4	筹建机构	Preparatory organizations	215862	1.96	0.04	dropped
V	交通运输,邮电通信业	Transport, post and telecommunication services	8980972	100.00	1.72	
1	运输业	Transport	8207026	91.38	1.57	
2	邮电通信业	Post and telecommunications	773946	8.62	0.15	
VI	商业，饮食业，物资供销及仓储业	Trade, public catering, material supply and marketing cooperatives, and storage	15507928	100.00	2.97	
1	商业	Trade	12079932	77.90	2.32	
2	饮食业	Public catering	1979667	12.77	0.38	
3	物资供销	Material supply and marketing cooperatives	818903	5.28	0.16	
4	仓储业	Storage	629426	4.06	0.12	

VII	住宅管理，公用事业管理和居民服务业	Housing admin., public facilities, and household serv.	2441405	100.00	0.47	relab., expanded?
1	房地产管理事业	Real estate administration	324389	13.29	0.06	
2	公用事业	Public facilities	544823	22.32	0.10	
3	居民服务业	Resident services	1572193	64.40	0.30	
VIII	卫生，体育和社会福利事业	Health care, sports, and social welfare facilities	4101355	100.00	0.79	
1	卫生事业	Health care	3945368	96.20	0.76	
2	体育事业	Sports	53405	1.30	0.01	
3	社会福利事业	Social welfare facilities	102582	2.50	0.02	
IX	教育，文化艺术事业	Education, culture and arts	12382079	100.00	2.37	
1	教育事业	Education	11284817	91.14	2.16	
2	文化艺术事业	Culture and arts	1097262	8.86	0.21	
X	科学研究和综合技术服务	Scientific research and polytechnic services	1202272	100.00	0.23	
1	科学研究	Scientific research	988837	82.25	0.19	
2	综合技术服务事业	Polytechnic services	213435	17.75	0.04	
XI	金融,保险业	Finance and insurance	1022975	100.00	0.20	
1	金融业	Finance	1011653	98.89	0.19	
2	保险业	Insurance	11322	1.11	0.00	
XII	国家机关，政党和群众团体	Government agencies, Party agencies, and social organizations	8018546	100.00	1.54	
1	国家机关	Government agencies	6051618	75.47	1.16	
2	政党机关	Party agencies	419238	5.23	0.08	
3	群众团体	Social organizations	339088	4.23	0.07	
4	企业管理机关	Enterprise administrative agencies	1208602	15.07	0.23	
XIII	其他行业	Others	289202		0.06	
	其他行业	Others	289202		0.06	

Source: *Population Census 1982*, pp. 440, 444.

Appendix 2 Year 1984 Sectoral Classification Scheme (GB/T4754-1984) with Year 1990 Population Census Employment Values (number of laborers)

Changes in switch from pre-1984 classification				Employment	Share of subgroup (in %)	Share of total (in %)	Changes in switch to 1994 classification
			Total	647244706		100.00	
	I	农，林，牧，渔，水利业	Agriculture and water conservancy	467593223	100.00	72.24	
	1	农业	Farming	458158168	97.98	70.79	
	2	林业	Forestry	1923440	0.41	0.30	
	3	畜牧业	Animal husbandry	3204832	0.69	0.50	
	4	渔业	Fishery	2381572	0.51	0.37	
new	5	水利业	Water conservancy	603082	0.13	0.09	relocated
new	6	农，林，牧，渔水利服务业	Agricultural (and water conservancy) services	1322129	0.28	0.20	dropped water
	II	工业	Industry	86578757	100.00	13.38	
	1	煤炭采选业	Coal mining and dressing	5432001	6.27	0.84	
	2	石油和天然气开采业	Petroleum and natural gas extraction	541316	0.63	0.08	
newly disaggregated	3	黑色金属矿采选业	Ferrous metals mining and dressing	446528	0.52	0.07	
newly disaggregated	4	有色金属矿采选业	Nonferrous metals mining and dressing	829008	0.96	0.13	
relabeled?	5	建筑材料及其他非金属矿采选业	Construction and other nonmetal minerals mining and dressing	1185680	1.37	0.18	relabeled
newly disaggregated	6	采盐业	Salt mining	277520	0.32	0.04	dropped
new	7	其他矿采选业	Other minerals mining and dressing	1570	0.00	0.00	
	8	木材及竹材采运业	Logging and transport of timber, bamboo	861004	0.99	0.13	
	9	自来水生产和供应业	Production and supply of tap water	353872	0.41	0.05	relocated
	10	食品制造业	Food manufacturing	4599086	5.31	0.71	newly disaggregated
	11	饮料制造业	Beverage manufacturing	1466453	1.69	0.23	
	12	烟草加工业	Tobacco processing	322898	0.37	0.05	
new	13	饲料工业	Feed processing	182738	0.21	0.03	dropped
	14	纺织业	Textile industry	10124687	11.69	1.56	
	15	缝纫业	Sewing industry	4086437	4.72	0.63	relabeled?, expanded?

	16	皮革，毛皮及其制品业	Leather, furs and related products	1350773	1.56	0.21 expanded
relabeled?	17	木材加工及竹，藤，棕，草制品业	Timber processing, bamboo, cane, palm fiber and straw products	1255338	1.45	0.19
	18	教具制造业	Furniture manufacturing	1640075	1.89	0.25
relabeled	19	造纸及纸制品业	Papermaking and paper products	1854668	2.14	0.29
	20	印刷业	Printing industry	1364989	1.58	0.21
newly disaggregated	21	文教体育用品制造业	Cultural, educational and sports goods	725679	0.84	0.11
newly disaggregated	22	工艺美术品制造业	Crafts and art production	2069553	2.39	0.32 dropped
	23	电力，蒸汽，热水生产和供应业	Production and supply of electric power, steam and hot water	1986050	2.29	0.31 relocated
newly disaggregated	24	石油加工业	Petroleum processing	388090	0.45	0.06 expanded
new coverage	25	炼焦，煤气及煤制品业	Coking, gas, and coal processing	429847	0.50	0.07 newly disagg./ reclass.
newly disaggregated	26	化学工业	Chemical industry	4440986	5.13	0.69 relabeled
	27	医药工业	Medical industry	903138	1.04	0.14
newly disaggregated	28	化学纤维工业	Chemical fiber industry	397956	0.46	0.06
newly disaggregated	29	橡胶制品业	Rubber products	960814	1.11	0.15
newly disaggregated	30	塑料制品业	Plastic products	1704711	1.97	0.26
relabeled?	31	建筑材料及其他非金属矿物制品业	Construction materials and other nonmetal minerals processing	7526594	8.69	1.16 relabeled?
newly disaggregated	32	黑色金属冶炼及压延加工业	Smelting and pressing of ferrous metals	2424353	2.80	0.37
newly disaggregated	33	有色金属冶炼及压延加工业	Smelting and pressing of nonferrous metals	767101	0.89	0.12
	34	金属制品业	Metal products	3588463	4.14	0.55
relabeled	35	机械工业	Machinery industry	10270999	11.86	1.59 newly disaggregated
	36	交通运输设备制造业	Transport equipment	3688484	4.26	0.57
newly disaggregated	37	电气机械及器材制造业	Electric equipment and machinery	3097966	3.58	0.48
newly disaggregated	38	电子及通信设备制造业	Electronic and telecommunications equipment	1761358	2.03	0.27
relabeled?	39	仪器仪表及其他计量器具制造业	Instruments, meters, and other measuring tools manufacturing	843371	0.97	0.13 relabeled
new	40	其他工业	Other manufacturing	426603	0.49	0.07
	III	地质普查和勘探业	Geological investigation and prospecting	798147		0.12 relabeled, expanded
		地质普查和勘探业	Geological investigation and prospecting	798147		0.12 relabeled

	IV		建筑业	Construction	11642485	100.00	1.80 new coverage
		1	土木工程建筑业	Building projects	10382037	89.17	1.60
		2	线路，管道和设备安装业	Installation of lines, pipelines, and equipment	871132	7.48	0.13
		3	勘察设计业	Design	389316	3.34	0.06 dropped
	V		交通运输，邮电通讯业	Transport, post and telecomm. services	11751280	100.00	1.82 expanded
		1	交通运输业	Transport	10761616	91.58	1.66 newly disaggregated
		2	邮电通讯业	Post and telecommunications	989664	8.42	0.15
	VI		商业，公共饮食业，物资供销和仓储业	Trade, public catering, material supply and marketing cooperatives, and storage	25771405	100.00	3.98 new coverage
		1	商业	Trade	20795912	80.69	3.21 reclassified
		2	公共饮食业	Public catering	2888588	11.21	0.45 reclassified
		3	物资供销社	Material supply and marketing coop.	1251531	4.86	0.19 dropped?, reclassified?
		4	仓储业	Storage	835374	3.24	0.13 relocated
relabeled	VII		房地产业管理，公用事业居民服务和咨询服务业	Real estate administration, public facilities, resident services, and consulting services	6188251	100.00	0.96 new coverage
		1	房地产管理业	Real estate administration	485033	7.84	0.07
		2	公用事业	Public facilities	1558511	25.18	0.24 relocated, relabeled
		3	居民服务业	Resident services	4017682	64.92	0.62 relocated
new		4	咨询服务业	Consulting services	127025	2.05	0.02 relocated
	VIII		卫生，体育和社会福利事业	Health care, sports, and soc. welfare fac.	5167832	100.00	0.80
		1	卫生事业	Health care	4974019	96.25	0.77
		2	体育事业	Sports	61623	1.19	0.01
		3	社会福利事业	Social welfare facilities	132190	2.56	0.02 relabeled or expanded
	IX		教育，文化艺术和广播电视事业	Education, culture and arts, radio, film, and television	15102055	100.00	2.33
		1	教育事业	Education	13747000	91.03	2.12
		2	文化艺术事业	Culture and arts	1107482	7.33	0.17
		3	广播电视事业	Radio and film	247573	1.64	0.04
	X		科学研究和综合技术服务事业	Scientific research and polytechn. serv.	1450491	100.00	0.22
		1	科学研究事业	Scientific research	1125753	77.61	0.17
		2	综合技术服务事业	Polytechnic services	324738	22.39	0.05
	XI		金融保险业	Finance and insurance	2132142	100.00	0.33

	1	金融业	Finance	2023565	94.91	0.31
	2	保险业	Insurance	108577	5.09	0.02
XII		国家机关，政党机关和社会团体	Government agencies, Party agencies, and social organization	12952647	100.00	2.00
	1	国家机关	Government agencies	9384828	72.45	1.45
	2	政党机关	Party agencies	723002	5.58	0.11
	3	社会团体	Social organizations	988316	7.63	0.15
	4	企业管理机关	Enterprise administrative agencies	1856501	14.33	0.29 dropped
XIII		其他行业	Others	115991		0.02
		其他行业	Others	115991		0.02

Sources: NBS (1988), pp. 623-702, for classification; *Population Census 1990*, Vol. 2, pp. 296-339 (with embedded identical classification).

Appendix 3 Year 1994 Sectoral Classification Scheme (GB/T4754-1994) As Evidenced in Year 2000 Long-Form Survey Employment Values (number of laborers)

Changes in switch from 1984 classification				Long-form employ-ment	Share of subgroup (in %)	Share of total (in %)	Changes in switch to 2002 classification
			Total	66874889		100.00	
new coverage	I	农，林，牧，渔业	Agriculture	43051661	100.00	64.38	
	1	农业	Farming	41224929	95.76	61.64	
	2	林业	Forestry	157140	0.37	0.23	
	3	畜牧业	Animal husbandry	1189778	2.76	1.78	
	4	渔业	Fishery	336224	0.78	0.50	
	5	农，林，牧，渔服务业	Agricultural services	143590	0.33	0.21	
	II	采掘业	Mining and quarrying	697862	100.00	1.04	
	6	煤炭采选业	Coal mining and dressing	378844	54.29	0.57	relabeled
	7	石油和天然气开采业	Petroleum and natural gas extraction	50104	7.18	0.07	
	8	黑色金属矿采选业	Ferrous metals mining and dressing	41443	5.94	0.06	
	9	有色金属矿采选业	Nonferrous metals mining and dressing	67155	9.62	0.10	
relabeled	10	非金属矿采选业	Nonmetal minerals mining and dressing	126882	18.18	0.19	
	11	其他矿采选业	Other minerals mining and dressing	5781	0.83	0.01	relabeled
	12	木材及竹材采运业	Logging and transp. of timber and bamboo	27653	3.96	0.04	into agriculture
	III	制造业	Manufacturing	8333044	100.00	12.46	
newly disaggregated	13	食品加工业	Food processing	397453	4.77	0.59	reclassified
newly disaggregated	14	食品制造业	Food manufacturing	226006	2.71	0.34	
	15	饮料制造业	Beverage manufacturing	134691	1.62	0.20	
	16	烟草加工业	Tobacco processing	34126	0.41	0.05	
	17	纺织业	Textile industry	806700	9.68	1.21	sub-category to agric.
relabeled?, expanded?	18	服装及其他纤维制品制造业	Garments and other fiber products	747232	8.97	1.12	expanded/ relabeled?
expanded	19	皮革，毛皮，羽绒及其制品业	Leather, furs, down and related products	296565	3.56	0.44	relabeled
	20	木材加工及竹，藤，棕，草制品业	Timber processing, bamboo, cane, palm fiber and straw products	229120	2.75	0.34	
	21	教具制造业	Furniture manufacturing	240687	2.89	0.36	
	22	造纸及纸制品业	Papermaking and paper products	179689	2.16	0.27	

	23	印刷业 [记录媒介的复制]	Printing industry [Printing and record medium reproduction]	139529	1.67	0.21
	24	文教体育用品制造业	Cultural, educational and sports goods	188288	2.26	0.28
expanded	25	石油加工及炼焦业	Petroleum processing and coking	59256	0.71	0.09 expanded
relabeled	26	化学原料及化学制品制造业	Raw chemical materials and chemical products	357526	4.29	0.53
	27	医药制造业	Medical and pharmaceutical products	104866	1.26	0.16
	28	化学纤维制造业	Chemical fiber	54194	0.65	0.08
	29	橡胶制品业	Rubber products	82212	0.99	0.12
	30	塑料制品业	Plastic products	237486	2.85	0.36
relabeled?	31	非金属矿物制品业	Nonmetal mineral products	679357	8.15	1.02
	32	黑色金属冶炼及压延加工业	Smelting and pressing of ferrous metals	199262	2.39	0.30
	33	有色金属冶炼及压延加工业	Smelting and pressing of nonferrous metals	88212	1.06	0.13
	34	金属制品业	Metal products	442679	5.31	0.66
newly disaggregated	35	普通机械制造业	Ordinary machinery	459530	5.51	0.69 relabeled
newly disaggregated	36	专用设备制造业	Special purpose equipment	255159	3.06	0.38
	37	交通运输设备制造业	Transport equipment	512928	6.16	0.77
new	38	武器弹药制造业	Weapons and ammunition manufacturing	30954	0.37	0.05 into special purpose machinery
	39	电气机械及器材制造业	Electric equipment and machinery	372417	4.47	0.56
	40	电子及通信设备制造业	Electronic and telecommunications equipment	352795	4.23	0.53 relabeled
relabeled	41	仪器仪表及文化，办公用机械制造业	Instruments, meters, cultural and office equipment	101254	1.22	0.15 reclassified
	42	其他制造业	Other manufacturing	322871	3.87	0.48
	IV	电力，燃气及水的生产和供应业	Utilities	418822	100.00	0.63
	43	电力，蒸汽，热水的生产和供应业	Production and supply of electric power, steam and hot water	322303	76.95	0.48 new coverage?
newly disaggregated	44	煤气生产和供应业	Production and supply of gas	31427	7.50	0.05
	45	自来水的生产和供应业	Production and supply of tap water	65092	15.54	0.10 relabeled, expanded
new coverage	V	建筑业	Construction	1794657	100.00	2.68 reclassified
	46	土木工程建筑业	Building projects	1445877	80.57	2.16 relabeled
	47	线路，管道和设备安装	Installation of lines, pipelines, and	88086	4.91	0.13 dropped

		业	equipment			
new	48	装修装饰业	Renovation and decoration	260694	14.53	0.39 disaggregated
new coverage	VI	地质勘查业，水利管理业	Geological prospecting and water management (conservancy)	84500	100.00	0.13 dropped
relabeled	49	地质勘查业	Geological prospecting	36292	42.95	0.05 relocated
new	50	水利管理业	Water management (conservancy)	48208	57.05	0.07 relocated
expanded	VII	交通运输，仓储及邮电通信业	Transport, storage, post and telecommunication services	1724636	100.00	2.58 reclassified
newly disaggregated	51	铁路运输业	Railway transport	200073	11.60	0.30
newly disaggregated	52	公路运输业	Road transport	977866	56.70	1.46 relabeled/ reduced
newly disaggregated	53	管道运输也	Pipeline transport	3214	0.19	0.00
newly disaggregated	54	水上运输业	Water transport	68119	3.95	0.10
newly disaggregated	55	航空运输业	Air transport	15964	0.93	0.02
newly disaggregated	56	交通运输补助业	Subsidiary transport business	194429	11.27	0.29 reclassified
newly disaggregated	57	其他运输业	Other transport	2827	0.16	0.00 aggregated
relocated	58	仓储业	Storage	86800	5.03	0.13
	59	邮电通信业	Post and telecommunications	175344	10.17	0.26 partly to G category
new coverage	VIII	批发和零售贸易，餐饮业	Wholesale and retail trade, and catering services	4474040	100.00	6.69 new coverage
reclassified	60	食品，饮料，烟草和家庭用品批发业	Wholesale of foods, beverages, tobacco, and consumer goods	590085	13.19	0.88 reclassified
reclassified	61	能源，材料和机械电子设备批发业	Wholesale of energy, raw materials, machinery, and electronic equipment	352935	7.89	0.53 reclassified
reclassified	62	其他批发业	Other wholesale	81118	1.81	0.12 reclassified
reclassified	63	零售业	Retail trade	2571655	57.48	3.85 reclassified
reclassified	64	商业经纪与代理业	Commission trade	21692	0.48	0.03 into wholesale
reclassified	65	餐饮业	Catering services	856555	19.15	1.28 relocated
	IX	金融保险业	Finance and insurance	394752	100.00	0.59 new coverage
	66	金融业	Finance	340254	86.19	0.51 reclassified
	67	保险业	Insurance	54498	13.81	0.08
new coverage	X	房地产业	Real estate	154814	100.00	0.23
reclassified	68	房地产开发与经营业	Real estate development	71855	46.41	0.11 newly aggregated
reclassified	69	房地产管理业	Real estate administration	78219	50.52	0.12 newly aggregated
reclassified	70	房地产代理与经纪业	Real estate agencies	4740	3.06	0.01 newly aggregated
new	XI	社会服务业	Social services	1438738	100.00	2.15 reclassified

relocated, relabeled	71	公共服务业	Public services	424821	29.53	0.64 relabeled, relocated
relocated	72	居民服务业	Resident services	543993	37.81	0.81 relocated, expanded
reclassified from?	73	旅馆业	Hotels	205013	14.25	0.31 relocated, relabeled
reclassified from?	74	租赁服务业	Leasing	11181	0.78	0.02 relocated
reclassified from?	75	旅游业	Tourism	29549	2.05	0.04 relocated (to N cat.?)
reclassified from?	76	娱乐服务也	Entertainment	57397	3.99	0.09 relocated
relocated	77	信息，咨询服务业	News and consulting	59435	4.13	0.09 dropped/ relabeled
reclassified from?	78	计算机应用服务业	Computer applications	30639	2.13	0.05 relocated
reclassified from?	79	其他社会服务业	Other social services	76710	5.33	0.11 relocated, relabeled
	XII	卫生，体育和社会福利业	Health care, sports, and social welfare	709875	100.00	1.06 disaggregated, recl.
	80	卫生	Health care	676731	95.33	1.01 relocated
	81	体育	Sports	7411	1.04	0.01 relocated
relab. or expanded	82	社会福利保障业	Social welfare and insurance	25733	3.63	0.04 newly disaggregated
	XIII	教育，文化艺术及广播电影电视业	Education, culture and arts, radio, film, and television	1710824	100.00	2.56 newly disaggregated
	83	教育	Education	1551969	90.71	2.32 relocated
	84	文化艺术业	Culture and arts	91415	5.34	0.14
	85	广播电影电视业	Radio, film, and television	67440	3.94	0.10 partly to G category
	XIV	科学研究和综合技术服务业	Scientific research and polytechnic services	149861	100.00	0.22 expanded coverage
	86	科学研究业	Scientific research	58928	39.32	0.09 relabeled
	87	综合技术服务业	Polytechnic services	90933	60.68	0.14 relabeled
	XV	国家机关，党政机关和社会团体	Government agencies, Party agencies, and social organization	1572764	100.00	2.35 relabeled
	88	国家机关	Government agencies	1220264	77.59	1.82
	89	政党机关	Party agencies	74782	4.75	0.11 newly disaggregated
	90	社会团体	Social organizations	36971	2.35	0.06 relabeled
new	91	基层群众自治组织	Autonomous grassroots organizations	240747	15.31	0.36
	XVI	其他行业	Others	164039		0.25 dropped
	92	其他行业	Others	164039		0.25 dropped

Item 23, terms in [] are from the industry section of the *Statistical Yearbook*.

English language titles are in part from the industry section and from the National Income and Product Accounts section of the *Statistical Yearbook*.

The economy-wide number of laborers (rather than only the long-form number of laborers) can be obtained by multiplying by the ratio of the total population to the number of persons who filled in the long form (1,242,612,226 / 118,067,424).

Source: *Population Census 2000*, Vol. 2, pp. 881-934; with population values from Vol. 1, p. 215 and Vol. 2, p. 800. A category-by-category description of the main changes between the GB1994 and the GB2002 is provided in the first seven issues of the magazine *Zhongguo tongji* of 2003.

Appendix 4 Year 2002 Sectoral Classification Scheme (GB/T4754-2002)

Changes in switch from 1994 classific.				
	A		农，林，牧，渔业	Agriculture
		1	农业	Farming
		2	林业	Forestry
		3	畜牧业	Animal husbandry
		4	渔业	Fishery
		5	农，林，牧，渔服务业	Agricultural services
	B		采矿业	Mining and quarrying
relabeled		6	煤炭开采和洗选业	Mining and washing of coal
		7	石油和天然气开采业	Extraction of petroleum and natural gas
		8	黑色金属矿采选业	Mining and processing of ferrous metal ores
		9	有色金属矿采选业	Mining and processing of non-ferrous metal ores
		10	非金属矿采选业	Mining and processing of nonmetal ores
relabeled		11	其他采矿业	Mining of other ores
		12	no entry	no entry
	C		制造业	Manufacturing
reclassified		13	农副食品加工业	Processing of food from agric. products
		14	食品制造业	Manufacture of foods
		15	饮料制造业	Manufacture of beverages
		16	烟草制品业	Manufacture of tobacco
		17	纺织业	Manufacture of textiles
expanded/ relabeled?		18	纺织服装，鞋，帽制造业	Manufacture of textile wearing apparel, footwear, and caps
relabeled		19	皮革，毛皮，羽毛（绒）及其制品业	Manufacture of leather, fur, feather and related products
		20	木材加工及木，竹，藤，棕，草制品业	Processing of timber, manufacture of wood, bamboo, rattan, palm, and straw products
		21	教具制造业	Manufacture of furniture
		22	造纸及纸制品业	Manufacture of paper and paper prod.
		23	印刷业和记录媒介的复制	Printing, reproduction of recording media
		24	文教体育用品制造业	Manufacture of articles for culture, education and sport activity
expanded		25	石油加工，炼焦及核燃料加工业	Processing of petroleum, coking, processing of nuclear fuel
		26	化学原料及化学制品制造业	Manufacture of chemical raw materials and chemical products
		27	医药制造业	Manufacture of medicines
		28	化学纤维制造业	Manufacture of chemical fibers
		29	橡胶制品业	Manufacture of rubber
		30	塑料制品业	Manufacture of plastics
		31	非金属矿物制品业	Manuf. of non-metallic mineral products
		32	黑色金属冶炼及压延加工业	Smelting and processing of ferrous metals
		33	有色金属冶炼及压延加工业	Smelting and processing of non-ferrous metals
		34	金属制品业	Manufacture of metal products
relabeled		35	通用设备制造业	Manufacture of general purpose

				machinery
		36	专用设备制造业	Manufacture of special purpose machinery
		37	交通运输设备制造业	Manufacture of transport equipment
		38	no entry	no entry
		39	电气机械及器材制造业	Manufacture of electrical machinery and equipment
relabeled		40	通信设备，计算机及其他电子设备制造业	Manufacture of communication equipment, computers and other electronic equipment
reclassified		41	仪器仪表及文化，办公用机械制造业	Manufacture of measuring instruments and machinery for cultural activity and office work
expanded, relabeled		42	工艺品及其他制造业	Manufacture of artwork and other manufacturing
new		43	废弃资源和废旧材料回收加工业	Recycling and disposal of waste
	D	电力，燃气及水的生产和供应业		Utilities
new coverage?		44	电力，热力的生产和供应业	Production and distribution of electric power and heat power
		45	煤气生产和供应业	Production and distribution of gas
relabeled, expanded		46	水的生产和供应业	Production and distribution of tap water
	E	建筑业		Construction
reclassified		47	房屋和土木工程建筑业	Construction of buildings, and civil engineering
newly disaggregated		48	建筑安装业	Renovation
newly disaggregated		49	建筑装饰业	Decoration
newly disaggregated		50	其他建筑业	Other construction
reclassified	F	交通运输，仓储和邮政业		Transport, storage, and postal services
		51	铁路运输业	Railway transport
relabeled/ reduced?		52	道路运输业	Road transport
from “public serv.”		53	城市公共交通也	Urban public transport
		54	水上运输业	Water transport
		55	航空运输业	Air transport
		56	管道运输业	Pipeline transport
newly aggregated		57	装卸搬运和其他运输服务业	Loading/unloading, removal, and other transport services
		58	仓储业	Storage
		59	邮政业	Postal services
new	G	信息传输，计算机服务和软件业		Information transfer, computer services, and software
new		60	电信和其他信息传输服务业	Telecommunications and other information transfer services
relocated		61	计算机服务业	Computer services
new		62	软件业	Software
new coverage	H	批发和零售业		Wholesale and retail trade
reclassified		63	批发业	Wholesale trade
not listed		64		
reclassified		65	零售业	Retail trade
new	I	住宿和餐饮业		Accommodation and catering
relocated, relabeled		66	住宿业	Accommodation
relocated		67	餐饮业	Catering
new coverage	J	金融业		Finance
reclassified		68	银行业	Banking
reclassified		69	证券业	Securities

		70	保险业	Insurance
reclassified		71	其他金融活动	Other financial activities
new coverage	K		房地产业	Real estate
newly aggregated		72	房地产业	Real estate
new	L		租赁和商务服务业	Leasing and commercial services
relocated		73	租赁业	Leasing
new		74	商务服务业	Commercial services
expanded coverage	M		科学研究，技术服务和地质勘查业	Scientific research, polytechnic services, and geological prospecting
relabeled		75	研究与实验发展	Research and experimental development
relabeled		76	专业技术服务业	Polytechnic services
new		77	科技交流和推广服务业	Scientific exchange and distribution
relocated		78	地质勘查业	Geological prospecting
new	N		水利，环境和公共设施管理业	Administration of water, environment, and public facilities
relocated		79	水利管理业	Water management (conservancy)
new		80	环境管理业	Environmental management
relabeled, relocated		81	公共设施管理业	Management of public facilities
new	O		居民服务和其他服务业	Resident and other services
relocated, expanded		82	居民服务业	Resident services
relocated, relabeled		83	其他服务业	Other services
new	P		教育	Education
relocated		84	教育	Education
newly disaggregated, reclassified	Q		卫生，社会保障和社会福利业	Health care, social insurance / welfare
relocated		85	卫生	Health care
newly disaggregated		86	社会保障业	Social insurance
newly disaggregated		87	社会福利业	Social welfare
newly disaggregated	R		文化，体育和娱乐业	Culture, sports, and entertainment
new / relabeled		88	新闻出版业	News and publishing
relocated, expanded		89	广播，电视，电影和音像业	Radio, film, television, and (other) audio-visual media
relocated		90	文化艺术业	Culture and arts
relocated		91	体育	Sports
relocated		92	娱乐业	Entertainment
relabeled	S		公共管理和社会组织	Public administration and social organizations
newly disaggregated		93	中国共产党机关	Chinese Communist Party organs
		94	国家机构	State institutions
new		95	人民政协和民主党派	People's Political Consultative Conference and democratic parties
newly disaggregated		96	群众团体，社会团体和宗教组织	Mass and social organizations, and religious organizations
		97	基层群众自治组织	Autonomous grassroots organizations
new	T		国际组织	International organizations
new		98	国际组织	International organizations

Sectors 12 and 38 are omitted in the source, with the numbering scheme indicating the omission. No population or other data following this detailed classification are available.

English language titles are in part from the industry section and from the National Income and Product Accounts section of the *Statistical Yearbook*.

The 2002 classification became effective on 1 Oct. 2002 (National Quality and Technology Supervision Office, 22 July 2002); the classification scheme of 1985 (presumably 1984) was invalidated (NBS, 14 May 2003).

Source: NBS, 14 May 2003. A category-by-category description of the main changes from the GB1994 is provided in the first seven issues of the magazine *Zhongguo tongji* of 2003.

Appendix 5 ISIC Rev. 3.1

A - Agriculture, hunting and forestry
- 01 - Agriculture, hunting and related service activities
- 02 - Forestry, logging and related service activities

B - Fishing
- 05 - Fishing, aquaculture and service activities incidental to fishing

C - Mining and quarrying
- 10 - Mining of coal and lignite; extraction of peat
- 11 - Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying
- 12 - Mining of uranium and thorium ores
- 13 - Mining of metal ores
- 14 - Other mining and quarrying

D - Manufacturing
- 15 - Manufacture of food products and beverages
- 16 - Manufacture of tobacco products
- 17 - Manufacture of textiles
- 18 - Manufacture of wearing apparel; dressing and dyeing of fur
- 19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
- 20 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 21 - Manufacture of paper and paper products
- 22 - Publishing, printing and reproduction of recorded media
- 23 - Manufacture of coke, refined petroleum products and nuclear fuel
- 24 - Manufacture of chemicals and chemical products
- 25 - Manufacture of rubber and plastics products
- 26 - Manufacture of other non-metallic mineral products
- 27 - Manufacture of basic metals
- 28 - Manufacture of fabricated metal products, except machinery and equipment
- 29 - Manufacture of machinery and equipment n.e.c.
- 30 - Manufacture of office, accounting and computing machinery
- 31 - Manufacture of electrical machinery and apparatus n.e.c.
- 32 - Manufacture of radio, television and communication equipment and apparatus
- 33 - Manufacture of medical, precision and optical instruments, watches and clocks
- 34 - Manufacture of motor vehicles, trailers and semi-trailers
- 35 - Manufacture of other transport equipment
- 36 - Manufacture of furniture; manufacturing n.e.c.
- 37 - Recycling

E - Electricity, gas and water supply
- 40 - Electricity, gas, steam and hot water supply
- 41 - Collection, purification and distribution of water

F - Construction
- 45 - Construction

G - Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
- 50 - Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel

51 - Wholesale trade and commission trade, except of motor vehicles and motorcycles
52 - Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
H - Hotels and restaurants
55 - Hotels and restaurants
I - Transport, storage and communications
60 - Land transport; transport via pipelines
61 - Water transport
62 - Air transport
63 - Supporting and auxiliary transport activities; activities of travel agencies
64 - Post and telecommunications
J - Financial intermediation
65 - Financial intermediation, except insurance and pension funding
66 - Insurance and pension funding, except compulsory social security
67 - Activities auxiliary to financial intermediation
K - Real estate, renting and business activities
70 - Real estate activities
71 - Renting of machinery and equipment without operator and of personal and household goods
72 - Computer and related activities
73 - Research and development
74 - Other business activities
L - Public administration and defence; compulsory social security
75 - Public administration and defence; compulsory social security
M - Education
80 - Education
N - Health and social work
85 - Health and social work
O - Other community, social and personal service activities
90 - Sewage and refuse disposal, sanitation and similar activities
91 - Activities of membership organizations n.e.c.
92 - Recreational, cultural and sporting activities
93 - Other service activities
P - Activities of private households as employers and undifferentiated production activities of private households
95 - Activities of private households as employers of domestic staff
96 - Undifferentiated goods-producing activities of private households for own use
97 - Undifferentiated service-producing activities of private households for own use
Q - Extraterritorial organizations and bodies
99 - Extraterritorial organizations and bodies

Source: http://unstats.un.org/UNSD/cr/registry/regcst.asp?Cl=17&Lg=1, accessed 7 June 2006.

Appendix 6 Nominal GDP and Sectoral Value Added (b yuan RMB)

	GDP	Primary sector	Secondary sector	# Industry	# Construction	Tertiary sector	# Transp. & communic.	# Comm. & cater.
1952	67.90	34.29	14.18	11.98	2.20	19.43	2.90	8.03
1953	82.40	37.80	19.25	16.35	2.90	25.35	3.50	11.50
1954	85.90	39.20	21.17	18.47	2.70	25.53	3.80	12.03
1955	91.00	42.10	22.22	19.12	3.10	26.68	3.90	11.98
1956	102.80	44.39	28.07	22.47	5.60	30.34	4.60	13.14
1957	106.80	43.00	31.70	27.10	4.60	32.10	4.90	13.30
1958	130.70	44.59	48.35	41.45	6.90	37.76	7.10	13.66
1959	143.90	38.38	61.55	53.85	7.70	43.97	9.40	14.57
1960	145.70	34.07	64.82	56.82	8.00	46.81	10.40	13.31
1961	122.00	44.11	38.89	36.21	2.68	39.00	6.92	11.08
1962	114.93	45.31	35.93	32.54	3.39	33.69	5.74	8.05
1963	123.33	49.75	40.76	36.56	4.20	32.82	5.50	7.61
1964	145.40	55.90	51.35	46.11	5.24	38.15	5.84	9.40
1965	171.61	65.11	60.22	54.65	5.57	46.28	7.74	11.83
1966	186.80	70.22	70.95	64.86	6.09	45.63	8.51	14.81
1967	177.39	71.42	60.28	54.49	5.79	45.69	7.23	15.35
1968	172.31	72.63	53.73	49.03	4.70	45.95	7.05	13.89
1969	193.79	73.62	68.91	62.61	6.30	51.26	8.49	16.36
1970	225.27	79.33	91.22	82.81	8.41	54.72	10.02	17.81
1971	242.64	82.63	102.28	92.66	9.62	57.73	10.84	17.83
1972	251.81	82.74	108.42	98.99	9.43	60.65	11.80	19.43
1973	272.09	90.75	117.30	107.25	10.05	64.04	12.55	21.10
1974	278.99	94.52	119.20	108.36	10.84	65.27	12.61	20.66
1975	299.73	97.11	137.05	124.49	12.56	65.57	14.16	17.58
1976	294.37	96.70	133.72	120.46	13.26	63.95	13.96	14.72
1977	320.19	94.21	150.91	137.24	13.67	75.07	15.69	21.38
1978	362.41	101.84	174.52	160.70	13.82	86.05	17.28	26.55
1979	403.82	125.89	191.35	176.97	14.38	86.58	18.42	22.02
1980	451.78	135.94	219.20	199.65	19.55	96.64	20.50	21.36
1981	486.24	154.56	225.55	204.84	20.71	106.13	21.11	25.57
1982	529.47	176.16	238.30	216.23	22.07	115.01	23.67	19.86
1983	593.45	196.08	264.62	237.56	27.06	132.75	26.49	23.14
1984	717.10	229.55	310.57	278.90	31.67	176.98	32.71	41.24
1985	896.44	254.16	386.66	344.87	41.79	255.62	40.69	87.84
1986	1020.22	276.39	449.27	396.70	52.57	294.56	47.56	94.32
1987	1196.25	320.43	525.16	458.58	66.58	350.66	54.49	115.93
1988	1492.83	383.10	658.72	577.72	81.00	451.01	66.10	161.80
1989	1690.92	422.80	727.80	648.40	79.40	540.32	78.60	168.70
1990	1854.79	501.70	771.74	685.80	85.94	581.35	114.75	141.97
1991	2161.78	528.86	910.22	808.71	101.51	722.70	140.97	208.70
1992	2663.81	580.00	1169.95	1028.45	141.50	913.86	168.18	273.50
1993	3463.44	688.21	1642.85	1414.38	228.47	1132.38	212.32	309.07
1994	4675.94	945.72	2237.22	1935.96	301.26	1493.00	268.59	405.04
1995	5847.81	1199.30	2853.79	2471.83	381.96	1794.72	305.47	493.23
1996	6788.46	1384.42	3361.29	2908.26	453.05	2042.75	349.40	556.03
1997	7446.26	1421.12	3722.27	3241.21	481.06	2302.87	379.72	615.99
1998	7834.52	1455.24	3861.93	3338.79	523.14	2517.35	412.13	657.91
1999	8206.75	1447.20	4055.78	3508.72	547.06	2703.77	446.03	691.03
2000	8946.81	1462.82	4493.53	3904.73	588.80	2990.46	540.86	731.60

2001	9731.48	1541.18	4875.00	4237.46	637.54	3315.30	596.83	791.88
2002	10517.23	1611.73	5298.02	4597.52	700.50	3607.48	642.03	847.67
2003	11739.02	1692.81	6127.41	5309.29	818.12	3918.80	664.43	923.84
2004	13687.59	2076.81	7238.72	6281.51	957.21	4372.06	769.42	1009.85
Benchmark revisions following 2004 economic census								
1978	364.52	as	as	as	as	88.16	as	as
1979	406.26	above	above	above	above	89.02	above	above
1980	454.56					99.42		
1981	489.16					109.05		
1982	532.34					117.88		
1983	596.27					135.57		
1984	720.81					180.69		
1985	901.60					260.78		
1986	1027.52					301.86		
1987	1205.86					360.27		
1988	1504.28					462.46		
1989	1699.23					548.63		
1990	1866.78					593.34		
1991	2178.15					739.07		
1992	2692.35	---	revised values starting 1993		---	942.40	revised values 1993-	
1993	3533.39	688.73	1645.44	1418.80	226.65	1199.22	220.56	319.87
1994	4819.79	947.14	2244.54	1948.07	296.47	1628.11	289.83	433.84
1995	6079.37	1202.00	2867.95	2495.06	372.88	2009.43	342.41	546.77
1996	7117.66	1388.58	3383.50	2944.76	438.74	2345.58	406.85	637.92
1997	7897.30	1426.46	3754.30	3292.14	462.16	2716.54	459.30	731.41
1998	8440.23	1461.80	3900.42	3401.84	498.58	3078.01	517.84	808.48
1999	8967.71	1454.81	4103.36	3586.15	517.21	3409.53	582.18	878.86
2000	9921.46	1471.62	4555.59	4003.36	552.23	3894.25	733.34	962.97
2001	10965.52	1551.62	4951.23	4358.06	593.17	4462.67	840.61	1078.74
2002	12033.27	1623.86	5389.68	4743.13	646.55	5019.73	939.34	1195.09
2003	13582.28	1706.83	6243.63	5494.55	749.08	5631.81	1009.84	1348.00
2004	15987.83	2095.58	7390.43	6521.00	869.43	6501.82	1214.76	1524.98
2005	18232.06	2271.84	8620.76	7618.96	1001.80	7339.46	1380.48	1711.87

In the top part of the table, data for 1952-1989 supposedly follow the GB1984 (*GDP 1952-95*, preface p. 2), but appear to de facto, except perhaps for the two tertiary sector sub-sectors, follow the GB1994 (see text for details). Values since 1990 follow the GB1994 (see text for details). Data since 2003 could theoretically follow the GB2002, but that is unlikely given the effect of the benchmark revisions on the values of agriculture and construction. The benchmark revision data follow the GB2002 in all years since 1993, but the values on the two tertiary sector sub-sectors are likely to be compiled according to the GB1984 or GB1994 in all years (see text for details); on the classification of the benchmark revision tertiary sector values in 1978-92 (and therefore also the benchmark revision GDP values of these years) see the text; the most likely classification is the GB1994 with an expansion of tertiary sector coverage beyond in the NIPA previously covered economic activities. Sources: 1952-77 values from *GDP 1952-95*, p. 27; 1978-2004 values from *Statistical Yearbook 2005*, p. 51 (*GDP 1952-95* reports identical values for 1978-95); benchmark revisions 1978-92 from the *Statistical Abstract 2006*, pp. 20f., and benchmark revisions 1993-2004 from *Economic Census 2004* (9 Jan. 2006), excluding the two tertiary sector sub-sectors, or, with 2005 values and including the two tertiary sector sub-sectors (and two decimals), from *Statistical Abstract 2006*, pp. 20f.

Appendix 7 GDP and Sectoral Value Added Real Growth (annual, in %)

	GDP	Prim. sector	Sec. sector	# Ind.	# Constr.	Tert. sector	# Tr. & com-mun.	# Com-merce & catering	GDP 1952 =100	GDP 1978 =100	GDP Törnqvist index
1952									100.0		
1953	15.6	1.9	35.8	35.7	36.4	27.3	24.1	38.0	115.6		16.0
1954	4.2	1.7	15.7	19.3	-3.3	-0.6	10.8	1.8	120.5		4.2
1955	6.8	7.9	7.6	6.6	13.8	4.6	2.5	-0.1	128.7		6.8
1956	15.0	4.7	34.5	28.6	70.0	14.1	21.8	8.5	148.1		14.6
1957	5.1	3.1	8.0	11.4	-7.1	4.8	7.2	-1.1	155.6		5.0
1958	21.3	0.4	52.9	53.4	50.0	17.9	46.7	3.6	188.6		21.1
1959	8.8	-15.9	25.8	29.1	5.7	15.2	31.0	5.9	205.3		8.4
1960	-0.3	-16.4	5.6	6.1	1.4	4.8	10.4	-8.8	204.6		-0.6
1961	-27.3	1.4	-42.1	-39.0	-65.4	-25.7	-35.0	-27.0	148.7		-25.9
1962	-5.6	4.5	-10.8	-13.3	23.8	-9.2	-18.9	-4.0	140.4		-4.8
1963	10.2	11.3	14.5	13.3	25.9	4.4	-1.6	8.2	154.7		10.3
1964	18.3	12.9	25.6	25.6	25.6	15.5	5.4	13.2	182.9		17.8
1965	17.0	9.7	24.2	25.8	10.6	15.8	34.5	-0.5	214.1		16.3
1966	10.7	7.2	22.4	23.8	9.4	-1.8	10.3	20.4	237.1		10.0
1967	-5.7	1.9	-14.3	-15.1	-5.0	0.5	-14.0	4.1	223.6		-4.6
1968	-4.1	-1.6	-9.2	-8.2	-18.9	0.6	-2.3	-9.3	214.4		-3.6
1969	16.9	0.8	33.1	33.0	34.5	13.3	22.7	19.2	250.6		14.1
1970	19.4	7.7	34.8	35.2	30.4	7.1	16.8	9.4	299.3		17.1
1971	7.0	1.9	12.3	12.3	12.1	5.8	8.3	-0.1	320.4		7.0
1972	3.8	-0.9	6.7	7.6	-2.1	5.0	9.6	8.8	332.4		3.7
1973	7.9	9.0	8.3	8.8	3.4	5.5	6.3	9.0	358.5		7.9
1974	2.3	4.1	1.4	1.0	6.2	1.6	0.3	-2.0	366.8		2.3
1975	8.7	2.0	15.8	16.0	13.8	4.9	11.4	-0.1	398.7		8.6
1976	-1.6	-1.8	-2.5	-3.1	4.3	0.4	-1.6	-3.7	392.2		-1.6
1977	7.6	-2.2	13.3	14.4	1.7	9.5	12.6	13.4	422.1		7.4
1978	11.7	4.1	15.0	16.4	-0.6	13.7	8.9	23.1	471.4	100.0	11.5
1979	7.6	6.1	8.2	8.7	2.0	7.8	7.7	8.8	507.1	107.6	7.5
1980	7.8	-1.5	13.6	12.7	26.7	5.9	5.7	-1.3	546.8	116.0	7.1
1981	5.2	7.0	1.9	1.7	3.2	10.4	1.9	30.0	575.5	122.1	5.3
1982	9.1	11.5	5.6	5.8	3.4	13.0	11.7	3.9	627.6	133.1	9.1
1983	10.9	8.3	10.4	9.7	17.1	15.2	10.0	21.9	695.8	147.6	10.7
1984	15.2	12.9	14.5	14.9	10.9	19.4	15.0	21.5	801.3	170.0	15.1
1985	13.5	1.8	18.6	18.2	22.2	18.3	13.5	28.9	909.2	192.9	13.2
1986	8.8	3.3	10.2	9.6	15.9	12.1	12.8	10.6	989.7	210.0	8.8
1987	11.6	4.7	13.7	13.2	17.9	14.4	10.0	13.5	1104.3	234.3	11.4
1988	11.3	2.5	14.5	15.3	8.0	13.2	13.3	14.3	1228.9	260.7	10.8
1989	4.1	3.1	3.8	5.1	-8.4	5.4	4.7	-8.3	1278.8	271.3	4.1
1990	3.8	7.3	3.2	3.4	1.2	2.3	8.6	-4.8	1327.9	281.7	4.0
1991	9.2	2.4	13.9	14.4	9.6	8.8	11.2	4.5	1449.8	307.6	9.2
1992	14.2	4.7	21.2	21.2	21.0	12.4	10.5	13.1	1656.3	351.4	14.2
1993	13.5	4.7	19.9	20.1	18.0	10.7	12.4	6.6	1880.0	398.8	13.5
1994	12.6	4.0	18.4	18.9	13.7	9.6	9.5	7.7	2117.8	449.3	12.5
1995	10.5	5.0	13.9	14.0	12.4	8.4	12.0	5.9	2340.5	496.5	10.3
1996	9.6	5.1	12.1	12.5	8.5	7.9	11.4	5.4		544.1	9.4
1997	8.8	3.5	10.5	11.3	2.6	9.1	10.8	8.5		592.2	8.7
1998	7.8	3.5	8.9	8.9	9.0	8.3	10.6	7.7		638.5	7.7
1999	7.1	2.8	8.1	8.5	4.3	7.7	11.3	7.2		684.1	7.0

2000	8.0	2.4	9.4	9.8	5.7	8.1	11.5	8.2	738.8	7.7
2001	7.5	2.8	8.4	8.7	6.8	8.4	9.5	7.5	794.2	7.5
2002	8.3	2.9	9.8	10.0	8.8	8.7	7.9	8.1	860.1	8.3
2003	9.5	2.5	12.7	12.8	12.1	7.8	6.3	9.1	941.8	9.5
2004	9.5	6.3	11.1	11.5	8.1	8.3	14.9	6.3	1031.3	9.5
Benchmark revisions following 2004 economic census (for 1993-2004)										
1978-1992: GDP and all sectors as above										
1993	14.0	4.7	19.9	20.1	18.0	12.1	14.5	8.4	400.4	14.5
1994	13.1	4.0	18.4	18.9	13.7	11.0	11.6	9.5	452.8	12.9
1995	10.9	5.0	13.9	14.0	12.4	9.8	14.1	7.7	502.3	10.7
1996	10.0	5.1	12.1	12.5	8.5	9.4	13.6	7.2	552.6	9.8
1997	9.3	3.5	10.5	11.3	2.6	10.7	12.9	10.4	603.9	9.2
1998	7.8	3.5	8.9	8.9	9.0	8.3	10.6	7.8	651.2	7.7
1999	7.6	2.8	8.1	8.5	4.3	9.3	13.4	9.1	700.9	7.6
2000	8.4	2.4	9.4	9.8	5.7	9.7	13.6	10.1	759.9	8.4
2001	8.3	2.8	8.4	8.7	6.8	10.2	11.6	9.3	823.0	8.3
2002	9.1	2.9	9.8	10.0	8.8	10.4	9.9	10.0	897.8	9.1
2003	10.0	2.5	12.7	12.8	12.1	9.5	8.3	11.0	987.8	10.0
2004	10.1	6.3	11.1	11.5	8.1	10.0	17.1	8.1	1087.4	10.0
2005	9.9	5.2	11.4	11.4	11.9	9.6	11.3	11.4	1195.5	9.9

For the sectoral classification in use in different years see notes to the previous appendix.
Sources: 1952-77 values from *GDP 1952-95*, p. 33; 1978-2004 values from *Statistical Yearbook 2005*, p. 53 (*GDP 1952-95* reports identical values for 1978-95); benchmark revisions from *Economic Census 2004* (9 Jan. 2006), excluding the two tertiary sector sub-sectors, or, with 2005 values and including the two tertiary sector sub-sectors, from *Statistical Abstract 2006*, p. 23. The *Statistical Abstract 2006*, p. 23, also reports real growth rates for 1978-1992 that are identical to those in the top part of the table, from the *Statistical Yearbook 2005*. Growth indices: 1952=100: *GDP 1952-95*, p. 36; 1978=100: *Statistical Yearbook 2005*, p. 54, and *Economic Census 2004* (9 Jan. 2006), with the 2005 value from the *Statistical Abstract 2006*, p. 24. Törnqvist GDP index: own calculations based on primary, secondary, and tertiary sector values.

Appendix 8 Implicit Deflators As First Published, and Real Growth Rates Using Revised Nominal Values (GDP and Sectoral Value Added)

	GDP	Primary sector	Secondary sector	# Indust.	# Constr.	Tertiary sector	# Transp. & comm.[a]	# Trade & cater.[a]	Törnqvist GDP index
Implicit deflator as first published (in %)									
1987		10.5	3.8			4.9			
1988		16.6	9.5			11.2			
1989		7.0	7.7			13.8			
1990		10.5	2.1	1.9	5.5	6.9	19.1	-1.8	
1991		3.0	5.3	4.9	8.1	3.3	1.1	2.6	
1992	5.1	4.4	5.2	3.9	15.1	5.5	0.7	5.4	
1993	13.6	10.2	15.3	13.5	29.4	13.1	12.1	14.5	
1994	16.6	31.8	10.2	10.0	13.3	18.0	14.5	21.0	
1995	13.0	20.8	10.3	10.0	12.8	13.2	10.0	15.0	
1996	7.0	10.2	5.1	4.6	9.3	9.0	2.1	7.0	
1997	1.2	-2.5	-1.3	-1.7	2.7	8.7	17.0	4.1	
1998	-1.1	-0.7	-4.8	-5.3	-2.2	5.3	22.6	-0.4	
1999	-2.4	-3.4	-3.2	-3.5	-0.3	-0.1	-1.0	-3.0	
2000	0.9	-4.1	2.3	2.6	1.9	1.9	0.8	-2.5	
2001	0.0	-2.8	0.5	0.2	2.2	0.5	-9.3	-0.9	
2002	-0.3	1.6	0.0	-0.2	1.0	-1.4	-2.9	-2.8	
2003	2.0	3.5	2.6	2.4	4.2	0.5	-2.2	-0.1	
2004	6.5	15.4	6.3	6.1	8.2	3.0	0.8	2.8	
Annual real growth rates with nominal values from Statistical Yearbook 2005 (Appendix 6), in %									
1987		4.9	12.6			13.5			10.7
1988		2.5	14.5			15.7			11.6
1989		3.1	2.6			5.3			3.6
1990		7.4	3.9	3.8	2.6	0.6	22.6	-14.3	3.7
1991		2.3	12.0	12.4	9.3	20.3	21.5	43.3	12.0
1992	17.2	5.0	22.2	22.4	21.1	19.9	18.5	24.3	17.2
1993	14.5	7.7	21.8	21.2	24.8	9.6	12.6	-1.3	14.6
1994	15.8	4.3	23.6	24.4	16.4	11.7	10.5	8.3	15.6
1995	10.7	5.0	15.6	16.1	12.4	6.2	3.4	5.9	10.4
1996	8.5	4.8	12.1	12.5	8.5	4.4	12.0	5.4	8.2
1997	8.4	5.3	12.2	13.4	3.4	3.7	-7.1	6.4	8.2
1998	6.4	3.1	9.0	8.8	11.2	3.8	-11.5	7.2	6.2
1999	7.3	2.9	8.5	8.9	4.9	7.5	9.3	8.3	7.1
2000	8.0	5.4	8.3	8.5	5.6	8.5	20.3	8.6	7.9
2001	8.8	8.4	7.9	8.3	5.9	10.3	21.7	9.2	8.8
2002	8.4	2.9	8.7	8.7	8.8	10.4	10.8	10.1	8.3
2003	9.4	1.5	12.7	12.8	12.1	8.1	5.8	9.1	9.4
2004	9.5	6.3	11.1	11.5	8.1	8.3	14.9	6.3	9.5
Annual real growth rates with nominal values from 2004 economic census (Appendix 6), in %[b]									
1987		4.9	12.6			13.8			10.8
1988		2.5	14.5			15.4			11.6
1989		3.1	2.6			4.2			3.2
1990		7.4	3.9	3.8	2.6	1.2	22.6	-14.3	3.9
1991		2.3	12.0	12.4	9.3	20.6	21.5	43.3	12.1
1992	17.6	5.0	22.2	22.4	21.1	20.9	18.5	24.3	17.6
1993	15.5	7.8	22.0	21.5	23.8	12.5	17.0	2.1	15.6
1994	17.0	4.3	23.8	24.8	15.5	15.1	14.8	12.1	16.8
1995	11.6	5.1	15.8	16.4	11.5	9.0	7.4	9.6	11.4

1996	9.4	4.8	12.3	12.8	7.7	7.1	16.4	9.0	9.0
1997	9.6	5.4	12.4	13.7	2.6	6.5	-3.5	10.1	9.1
1998	8.1	3.2	9.1	9.1	10.3	7.6	-8.0	11.0	7.5
1999	8.9	3.0	8.7	9.2	4.0	10.9	13.6	12.1	8.5
2000	9.6	5.5	8.5	8.8	4.8	12.1	25.0	12.4	9.4
2001	10.5	8.5	8.1	8.6	5.1	14.0	26.4	13.0	10.5
2002	10.1	3.0	8.9	9.1	7.9	14.1	15.1	14.0	10.1
2003	10.7	1.6	12.9	13.1	11.2	11.6	9.9	12.9	10.8
2004	10.5	6.4	11.4	11.9	7.3	12.1	19.3	10.0	11.0

a The implicit deflators of the two tertiary sector sub-sectors, and therefore the real growth rates of these two sub-sectors, should be treated with caution. The tertiary sector census led to revisions of the 1991-93 transport & communication values and of the 1981-93 commerce & catering values. In addition, annual revisions of the previous-year value occur regularly. For example, the *Statistical Yearbook 1999* revised the 1997 transport & communication value down from 452.55b to 379.72b yuan RMB, the *Statistical Yearbook 2000* the value of 1998 down from 502.93b to 412.13b yuan RMB, and the *Statistical Yearbook 2002* and *2003* the values of 2000 and 2001 up from 491.86 to 540.86b yuan RMB and from 522.21b to 596.83b yuan RMB; annual revisions to previous-year commerce & catering values are on a much smaller scale. None of these revisions should lead to a biased implicit deflator, but the scale of the revisions, nevertheless, gives an idea of the overall uncertainty involved in these data. The labels of the two sub-sectors changed from a generic label to the specific GB1994 label in the *Statistical Yearbook 1996*, without this affecting the data of earlier years listed in the same table.

b Nominal values are post-economic census values across all sectors (including GDP) in 1993-2004, as well as for the tertiary sector and GDP in 1987(1978)-1992. These are there benchmark revisions; all other nominal values were not revised, and the earlier published nominal values are used in those instances.

Sources of implicit deflators: *Statistical Yearbook* issue of each year starting with the *1988* volume (the first one to report value added following the System of National Accounts); in each issue, the implicit deflator of one year, the most recent year in the particular issue, is obtained by dividing the growth in the nominal value (compared to the previous year) by the real growth rate, and turning the resulting value into a percent value. The Törnqvist GDP index relies on primary, secondary, and tertiary sector values. For the nominal values see the previous appendix.

Appendix 9 Detailed Tertiary Sector Nominal Value Added and Real Growth Values 1952-95

	Total	Transport & telecom.	Com-merce	(Social) services	Public facilities	Banking & insur.	Real estate	Science etc.	Govern-ment etc.
Nominal value added, b yuan RMB									
1952	19.43	2.90	8.03	1.40	0.20	1.10	1.40	1.40	3.00
1953	25.35	3.50	11.55	1.50	0.20	1.10	1.30	1.60	4.60
1954	25.53	3.80	12.03	1.50	0.30	1.10	1.30	1.70	3.80
1955	26.68	3.90	11.98	1.60	0.30	1.30	1.70	1.80	4.10
1956	30.34	4.60	13.14	1.80	0.40	1.30	1.60	2.40	5.10
1957	32.10	4.90	13.30	2.00	0.40	1.50	1.70	2.90	5.40
1958	37.76	7.10	13.66	3.50	0.50	2.30	1.60	4.10	5.00
1959	43.97	9.40	14.57	4.20	0.70	3.70	1.90	4.40	5.10
1960	46.81	10.40	13.31	4.60	0.90	6.10	1.80	4.60	5.10
1961	39.00	6.92	11.08	2.70	0.80	6.10	2.00	4.10	5.30
1962	33.69	5.74	8.05	2.60	0.80	4.80	2.10	3.90	5.70
1963	32.82	5.50	7.61	2.80	0.91	3.60	2.20	4.20	6.00
1964	38.15	5.84	9.40	2.90	1.11	5.90	2.00	4.70	6.30
1965	46.28	7.74	11.83	3.10	1.01	8.60	2.40	5.20	6.40
1966	45.63	8.51	14.81	3.20	1.11	3.50	2.50	5.30	6.70
1967	45.69	7.23	15.35	3.30	1.01	4.10	2.90	5.30	6.50
1968	45.95	7.05	13.89	3.40	1.01	4.80	3.10	5.60	7.10
1969	51.26	8.49	16.36	3.60	1.01	5.40	3.30	5.60	7.50
1970	54.72	10.02	17.81	3.60	1.11	5.70	3.40	5.60	7.48
1971	57.73	10.84	17.83	3.80	1.21	6.60	3.50	5.80	8.15
1972	60.65	11.80	19.43	4.00	1.21	5.29	3.80	6.60	8.52
1973	64.04	12.55	21.10	4.20	1.22	5.28	3.70	6.90	9.09
1974	65.27	12.61	20.66	4.60	1.32	5.68	3.90	7.10	9.40
1975	65.57	14.16	17.58	4.80	1.43	6.18	4.21	7.20	10.01
1976	63.95	13.96	14.72	5.30	1.43	6.28	4.41	7.50	10.35
1977	75.07	15.69	21.38	5.80	1.53	6.98	4.61	8.30	10.78
1978	86.05	17.28	26.55	6.60	1.73	7.78	4.91	9.50	11.70
1979	86.58	18.42	22.02	7.60	2.04	7.68	5.21	11.00	12.61
1980	96.64	20.50	21.36	8.50	2.64	8.65	5.71	13.80	15.48
1981	106.13	21.11	25.57	9.09	2.85	9.25	5.81	15.10	17.35
1982	115.01	23.67	19.86	10.82	3.23	13.37	6.32	17.80	19.94
1983	132.75	26.49	23.14	12.26	3.49	17.44	6.82	20.30	22.81
1984	176.98	32.71	41.24	14.74	3.82	24.00	8.92	25.40	26.15
1985	255.62	40.69	87.84	19.18	4.09	30.74	11.61	30.70	30.77
1986	294.56	47.56	94.32	22.37	4.41	42.37	15.78	33.60	34.15
1987	350.66	54.49	115.93	26.92	4.91	53.77	19.88	36.78	37.98
1988	451.01	66.10	161.80	32.91	5.59	70.30	24.16	47.00	43.15
1989	540.32	78.60	168.70	38.98	6.22	116.40	28.34	54.30	48.78
1990	581.35	114.75	141.97	40.38	6.91	123.45	32.53	61.43	59.93
1991	722.70	140.97	208.70	54.34	7.62	128.81	36.82	72.57	72.87
1992	913.86	168.18	273.50	72.42	9.85	160.10	52.11	87.83	89.87
1993	1132.38	212.32	309.07	103.35	14.77	205.70	64.07	112.44	110.66
1994	1493.00	268.59	405.04	139.56	19.72	276.72	87.03	152.51	143.84
1995	1794.72	305.47	493.23	179.10	25.40	348.28	105.86	175.53	161.85
Annual real growth rates, in %									
1952									
1953	27.3	24.1	38.0	3.6	0.0	-2.7	-5.0	10.7	48.7
1954	-0.6	10.8	1.8	-2.1	45.0	-1.9	0.0	4.5	-18.8

1955	4.6	2.5	-0.1	5.6	-3.4	17.1	33.8	4.9	6.9
1956	14.1	21.8	8.5	12.7	39.3	0.0	-2.2	34.1	24.0
1957	4.8	7.2	-1.1	8.9	0.0	15.4	10.3	19.3	4.6
1958	17.9	46.7	3.6	74.5	25.0	50.0	-7.6	40.7	-8.0
1959	15.2	31.0	5.9	18.9	36.0	60.1	12.7	6.4	1.2
1960	4.8	10.4	-8.8	6.5	26.5	60.3	-9.0	1.2	-2.8
1961	-25.7	-35.0	-27.0	-49.5	-22.1	-13.7	9.9	-22.6	-10.2
1962	-9.2	-18.9	-4.0	-7.2	-3.0	-24.2	3.4	-7.9	3.6
1963	4.4	-1.6	8.2	14.5	18.5	-21.4	7.1	14.1	11.6
1964	15.5	5.4	13.2	7.6	26.0	71.1	-8.2	15.7	8.9
1965	15.8	34.5	-0.5	9.8	-6.2	50.5	21.1	13.6	4.3
1966	-1.8	10.3	20.4	3.6	11.0	-59.2	4.6	2.3	5.0
1967	0.5	-14.0	4.1	3.8	-8.9	17.4	16.7	0.8	-2.3
1968	0.6	-2.3	-9.3	3.0	0.0	16.7	8.6	5.6	9.3
1969	13.3	22.7	19.2	7.1	2.2	14.5	8.0	1.4	6.8
1970	7.1	16.8	9.4	0.0	10.6	6.0	3.5	0.2	0.1
1971	5.8	8.3	-0.1	6.4	9.9	17.0	2.1	4.1	9.6
1972	5.0	9.6	8.8	5.5	7.4	-19.2	7.2	13.7	2.9
1973	5.5	6.3	9.0	4.2	-0.8	-2.6	-2.4	4.1	7.8
1974	1.6	0.3	-2.0	9.0	0.8	7.4	5.5	2.5	2.6
1975	4.9	11.4	-0.1	4.4	8.4	9.1	6.8	1.1	6.3
1976	0.4	-1.6	-3.7	10.0	-0.7	1.8	3.4	3.8	2.6
1977	9.5	12.6	13.4	7.2	5.0	9.6	3.8	8.6	2.1
1978	13.7	8.9	23.1	13.1	12.2	9.8	5.7	13.0	7.7
1979	7.8	7.7	8.8	12.7	15.1	-2.8	4.1	14.2	5.4
1980	5.9	5.7	-1.3	1.4	12.0	6.6	7.9	19.2	13.7
1981	10.4	1.9	30.0	3.8	3.0	4.3	-3.5	6.5	10.7
1982	13.0	11.7	3.9	17.7	8.8	44.6	9.1	15.6	10.4
1983	15.2	10.0	21.9	11.5	4.1	27.0	5.2	12.4	12.6
1984	19.4	15.0	21.5	15.9	5.2	31.1	27.7	22.0	11.1
1985	18.3	13.5	28.9	21.9	4.9	16.9	25.0	12.0	9.2
1986	12.1	12.8	10.6	8.6	2.4	31.6	25.9	1.7	3.9
1987	14.4	10.0	13.5	18.6	8.0	23.3	29.3	7.0	10.0
1988	13.2	13.3	14.3	11.2	5.3	19.5	12.7	10.9	6.7
1989	5.4	4.7	-8.3	2.0	3.0	25.9	15.9	6.9	5.1
1990	2.3	8.6	-4.8	-0.5	2.0	1.9	6.2	3.7	8.0
1991	8.8	11.2	4.5	25.3	2.5	2.3	12.0	10.2	14.5
1992	12.4	10.5	13.1	18.9	15.0	8.0	34.7	8.4	9.6
1993	10.7	12.4	6.6	15.3	18.9	10.9	10.8	13.4	8.7
1994	9.6	9.5	7.7	10.2	8.3	9.4	12.0	13.2	8.5
1995	8.4	12.0	5.9	6.4	5.8	8.5	12.4	7.7	6.3

The source follows the GB1984, with some adjustments (*GDP 1952-95*, preface p. 2). These are:

The 'farming, forestry, husbandry, fishery and water conservancy services' are included in 'science etc.'

'Geological investigation and prospecting' is also included in 'science etc.'

'Real estate administration, public facilities, resident services, and consulting services' is split into 'real estate,' 'public facilities,' and (social) 'services.'

Otherwise, the individual categories stand for:

Transport & telecom.: transport & telecommunications (*jiaotong yunshu youdian tongxinye*).

Commerce: Trade, public catering, material supply and marketing cooperatives, and storage.

Science etc.: Science, education, culture, health care, sports, and social welfare (plus the agricultural services as noted above, and the geological investigation and prospecting).

Government etc.: Government and Party agencies, social organizations, and others.

The 1989-90 change in the nominal values of transport & telecommunications and of commerce suggests that the pre-1990 values follow the GB1984 and the later values the GB1994 (see text).

The 1966 real growth rate of banking & insurance seems low, but applying 1965 nominal weights to tertiary sector sub-sector real growth rates yields approximately the official tertiary sector real growth rate (i.e., any significant change in the banking & insurance real growth rate would be inconsistent with the official tertiary sector real growth rate), and the official tertiary sector real growth rate—combined with the official primary and secondary sector real growth rates—is in line with the official GDP real growth rate.

Source: *GDP 1952-95*, pp. 27f, 33f.

Appendix 10 Detailed Tertiary Sector Nominal Value Added and Real Growth Values 1990-2003

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Nominal values in b yuan RMB									
Total	581.35	722.70	913.86	1132.38	1493.00	1794.72	2042.75	2302.87	2517.35
Farming, forestry, animal husbandry, and fishery	4.50	5.36	6.66	7.65	10.13	11.58	12.96	17.73	19.96
Geological prospecting and water conservancy	6.50	7.68	9.80	13.45	19.12	25.33	28.02	30.23	30.21
Transport, storage, post, and telecommunications	114.75	140.97	168.18	212.32	268.59	305.47	349.40	379.72	412.13
# Transport and storage	103.83	126.17	148.80	182.35	220.43	237.80	262.66	268.96	288.62
# Post and telecommunications	10.92	14.80	19.38	29.97	48.16	67.67	86.74	110.76	123.51
Wholesale and retail trade and catering services	141.97	208.70	273.50	309.07	405.04	493.23	556.03	615.99	657.91
Banking and insurance	123.45	128.81	160.10	205.70	276.72	348.28	401.74	453.46	467.26
Real estate	32.53	36.82	52.11	64.07	87.03	105.86	114.93	125.88	145.26
Social services	32.79	44.73	59.97	89.92	120.05	154.64	171.77	217.79	264.93
Health care, sports and social welfare	17.40	21.52	26.40	33.37	43.38	48.32	56.42	61.71	68.72
Education, culture and arts, radio, film and television	39.38	45.49	54.77	70.99	97.76	112.45	135.49	157.32	182.39
Scientific research and polytechnic services	8.15	9.75	12.50	15.18	21.34	27.71	33.57	43.41	47.08
Government agencies, Parties and social organizations	54.53	66.21	80.97	98.64	127.91	143.80	161.53	176.39	196.91
Others	5.40	6.66	8.90	12.02	15.93	18.05	20.89	23.24	24.59
Annual real growth rates in %									
Total		8.8	12.4	10.7	9.6	8.4	7.9	9.1	8.3
Farming, forestry, animal husbandry, and fishery		10.7	10.4	2.2	10.3	8.7	5.8	32.5	13.4
Geological prospecting and water conservancy		10.9	15.1	11.2	16.3	5.4	5.1	4.3	0.7
Transport, storage, post, and telecommunications		11.2	10.5	12.4	9.5	12.1	11.4	10.8	10.6
# Transport and storage		8.6	7.9	5.9	7.1	5.0	3.8	5.3	2.0
# Post and telecommunications		35.5	30.3	53.3	20.1	39.0	34.0	23.1	27.4
Wholesale and retail trade and catering services		4.5	13.1	6.6	7.7	5.9	5.4	8.5	7.7
Banking and insurance		2.3	8.0	10.9	9.4	8.5	7.5	8.5	4.9
Real estate		12.0	34.7	10.8	12.0	12.4	4.0	4.1	7.7
Social services		26.8	19.3	18.9	8.3	5.8	5.0	7.9	10.6
Health care, sports and social welfare		14.9	9.4	11.8	8.2	6.4	10.3	8.1	7.8
Education, culture and arts, radio, film and television		7.8	8.0	14.9	15.0	8.0	13.9	14.8	10.2
Scientific research and polytechnic services		12.0	15.3	6.9	17.9	10.5	14.0	12.1	10.8
Government agencies, Parties and social organizations		14.5	8.6	7.7	8.3	6.0	6.2	7.0	8.3
Others		14.8	19.5	17.9	10.6	8.6	9.5	10.2	8.1
Total, Törnqvist index (excl. transport subsectors)		8.7	12.4	10.4	9.4	8.1	7.6	9.0	8.2

	1999	2000	*2000*	2001	2002	2003
Nominal values in b yuan RMB						
Total	2703.77	2987.87	*2990.46*	3315.30	3607.49	3918.80
Farming, forestry, animal husbandry, and fishery	22.19	22.85	*22.85*	26.51	29.85	31.34
Geological prospecting and water conservancy	31.62	32.86	*32.86*	34.31	35.68	34.88
Transport, storage, post, and telecommunications	446.03	540.86	*540.86*	596.83	642.03	664.43
# Transport and storage	305.81	341.33	*341.33*	359.79	370.55	343.15
# Post and telecommunications	140.22	199.53	*199.53*	237.04	271.48	321.28
Wholesale and retail trade and catering services	691.03	731.60	*731.60*	791.88	847.67	923.84
Banking and insurance	484.73	521.70	*521.70*	558.59	594.89	646.73
Real estate	152.84	166.45	*169.04*	188.54	209.82	237.76
Social services	289.37	324.98	*324.98*	385.57	436.64	487.96
Health care, sports and social welfare	74.27	82.61	*82.61*	98.63	106.84	115.88
Education, culture and arts, radio, film and television	209.80	239.12	*239.12*	276.87	309.05	341.51
Scientific research and polytechnic services	55.66	62.61	*62.61*	70.27	80.21	88.42
Government agencies, Parties and social organizations	220.12	234.78	*234.78*	258.46	284.45	313.85
Others	26.12	27.45	*27.45*	28.84	30.38	32.20
Annual real growth rates in %						
Total	7.7	8.1	*8.1*	8.4	8.7	7.8
Farming, forestry, animal husbandry, and fishery	6.3	3.0	*3.0*	11.7	12.0	3.2
Geological prospecting and water conservancy	6.2	4.1	*4.1*	3.7	4.8	-3.4
Transport, storage, post, and telecommunications	11.3	11.5	*11.5*	9.5	7.9	6.3
# Transport and storage	5.6	5.0	*5.0*	4.8	4.5	1.6
# Post and telecommunications	20.1	20.4	*20.4*	17.5	12.9	12.9
Wholesale and retail trade and catering services	7.2	8.2	*8.2*	7.5	8.1	9.1
Banking and insurance	4.8	6.5	*6.5*	6.4	6.9	7.0
Real estate	5.9	7.1	*7.1*	11.0	9.9	9.8
Social services	8.1	8.7	*8.7*	10.9	11.2	9.3
Health care, sports and social welfare	4.6	6.3	*6.3*	11.6	9.2	7.2
Education, culture and arts, radio, film and television	7.2	5.3	*5.3*	8.6	11.0	7.5
Scientific research and polytechnic services	10.5	6.9	*6.9*	7.4	12.1	7.8
Government agencies, Parties and social organizations	8.6	7.7	*7.7*	7.3	8.4	7.9
Others	6.5	5.6	*5.6*	4.4	5.7	4.5
Total, Törnqvist index (excl. transport subsectors)	7.5	8.0	*8.0*	8.4	8.7	7.8

The sectoral classification with near-certainty follows the GB 1994 (see text).

Sources: nominal values: *Statistical Yearbook 1998* (first issue reporting detailed tertiary sector data), p. 59, *2005*, p. 55; first column of year 2000 values (with different real estate nominal value only) from *2002*, p. 55; real values: *Statistical Yearbook 1998*, p. 61, *2005*, p. 56; identical real growth rates for 2000 in *2002*, p. 57. The year 2000 real estate nominal value is the only value that was ever retrospectively revised in a later published *Statistical Yearbook*.

Appendix 11 Directly Reporting Industrial Enterprise Output Measures 1993-2002 (b yuan RMB)

	1993	1994	1995	1995	1996	1997	1998	1999	2000	2001	2002
Gross output value in 1990 prices	according to old regulations			according to new regulations…							
Total	3404.841	4097.078	4688.338	4463.864	5071.147	5671.814	n.a.	6477.675	7571.069	8677.270	10256.884
Coal mining and dressing	60.111	65.642	68.643	67.657	80.360	86.103	for this	68.862	72.405	82.340	100.270
Petroleum and natural gas extraction	48.589	49.448	53.342	53.305	57.760	61.882	year	65.780	61.981	70.225	64.481
Ferrous metals mining and dressing	6.950	8.297	8.360	8.167	10.694	12.138		10.629	12.093	14.172	16.538
Nonferrous metals mining and dressing	16.874	21.001	22.778	22.343	24.934	28.904		29.347	32.269	34.235	37.857
Nonmetal minerals mining and dressing	26.785	33.217	33.437	32.505	39.584	45.520		29.970	32.014	33.601	37.583
Logging and transport of timber and bamboo	11.750	12.409	12.668	12.765	13.931	13.815		11.081	9.909	9.068	8.661
Food processing	150.636	181.683	213.636	202.146	232.488	266.458		271.132	307.474	340.171	399.528
Food production	58.993	70.109	83.576	80.114	92.589	108.628		109.651	127.606	145.753	178.995
Beverage production	67.107	79.025	87.073	85.653	101.792	118.926		128.889	140.202	146.034	162.582
Tobacco processing	66.130	73.169	81.084	81.700	87.782	90.196		92.353	91.933	95.845	102.194
Textile industry	369.981	434.372	450.537	386.188	407.355	420.789		429.570	481.694	530.973	614.197
Garments and other fiber products	97.781	133.757	148.742	130.315	155.823	162.530		183.940	209.183	237.167	268.573
Leather, furs, down and related products	55.287	75.922	91.363	85.562	96.055	102.544		109.357	121.157	141.506	163.341
Timber processing, bamboo, cane, palm etc.	24.420	2.816	37.486	35.886	44.614	55.090		52.709	62.123	70.387	79.147
Furniture manufacturing	14.701	20.042	21.729	20.577	24.801	28.333		28.839	33.829	40.107	47.883
Papermaking and paper products	60.535	70.008	85.462	83.292	97.057	104.080		118.639	138.966	160.329	188.200
Printing and record medium reproduction	32.960	38.405	42.940	38.501	46.818	51.536		53.762	56.949	69.475	80.735
Cultural, educational and sports goods	20.477	28.526	37.124	35.197	39.112	45.369		51.031	56.702	62.645	73.232
Petroleum processing and coking	80.217	85.105	96.127	93.438	103.579	118.160		136.891	179.447	200.781	213.271
Raw chemical materials and chemical prod.	233.028	281.265	329.287	320.963	371.995	409.584		470.252	541.511	615.648	721.297
Medical and pharmaceutical products	74.384	88.716	106.833	103.083	124.416	141.265		178.375	221.752	264.630	316.717
Chemical fiber	47.823	59.124	67.884	66.489	80.690	95.442		114.214	132.296	126.306	147.276
Rubber products	51.754	58.157	65.424	63.787	73.547	76.808		82.301	87.016	95.050	110.583
Plastic products	75.472	93.101	112.182	107.764	125.561	139.674		161.794	186.636	211.437	247.821
Nonmetal mineral products	183.375	233.296	251.477	244.796	286.958	317.934		297.147	327.071	361.492	413.640
Smelting and pressing of ferrous metals	200.696	219.150	238.934	228.185	236.626	249.780		296.757	346.671	419.671	486.393
Smelting and pressing of nonferrous metals	84.204	94.722	118.210	104.070	114.174	122.161		158.924	182.966	212.056	241.537
Metal products	115.816	151.184	162.212	153.215	176.568	191.409		210.151	240.923	269.906	316.019
Ordinary machinery manufacturing	172.323	203.883	225.119	217.893	243.025	261.941		260.337	297.569	342.273	420.158
Special purpose equipment manufacturing	134.828	154.952	167.254	161.704	177.560	192.322		190.049	213.026	225.833	272.109

Transport equipment manufacturing	219.104	259.656	311.244	304.306	349.788	395.624		471.274	550.588	673.056	886.589
Electric equipment and machinery	180.958	222.873	275.194	266.211	305.659	344.255		427.132	522.861	608.841	699.067
Electronic and telecommunications equipm.	154.094	221.839	317.249	307.781	363.864	492.330		818.888	1079.125	1316.910	1638.980
Instruments, meters, cultural and off. mach.	36.770	41.832	44.952	44.836	52.466	64.245		74.160	89.909	104.021	117.007
Prod./supply of electric power, steam etc.	86.320	97.097	108.351	108.597	116.877	131.547		153.395	187.577	197.556	219.435
Production and supply of gas	4.316	4.560	7.337	4.298	5.090	5.497		8.645	11.106	11.986	14.196
Production and supply of tap water	7.667	8.619	9.477	9.356	10.852	11.547		11.003	11.412	11.164	12.490
Other extraction	0.232										
Other manufacturing	57.414	72.359									
Implicit residual	13.979	47.740	93.611	91.219	98.303	107.448		110.445	113.118	124.620	138.302
Gross output value in current prices	according to old regulations			according to new regulations…							
Total	3969.300	5135.303	6424.671	5494.686	6274.016	6835.268	6773.714	7270.704	8567.366	9544.898	11077.648
Coal mining and dressing	83.019	103.648	127.619	115.516	142.882	153.863	129.965	123.597	127.681	153.128	198.076
Petroleum and natural gas extraction	96.809	136.039	165.294	142.846	163.929	187.510	179.632	208.489	213.011	278.005	275.659
Ferrous metals mining and dressing	8.553	11.511	12.428	11.193	14.578	16.538	15.089	14.713	16.486	19.103	22.546
Nonferrous metals mining and dressing	19.126	27.754	35.219	32.217	34.783	38.956	33.902	36.152	40.536	41.915	46.390
Nonmetal minerals mining and dressing	27.893	36.348	40.782	36.492	46.412	53.158	32.826	34.166	35.694	37.352	41.921
Logging and transport of timber and bamboo	15.192	16.750	17.027	16.493	17.766	17.485	16.127	13.626	12.109	11.212	11.163
Food processing	172.683	250.901	348.442	304.510	347.162	379.247	351.600	351.700	372.270	409.788	477.696
Food production	62.989	82.607	112.859	99.507	115.409	130.255	121.397	126.219	144.252	162.770	196.731
Beverage production	76.734	101.007	132.035	115.568	142.277	161.960	157.986	165.870	175.237	182.434	199.626
Tobacco processing	76.610	96.885	115.106	100.423	120.219	129.603	137.473	139.077	145.129	169.472	203.749
Textile industry	352.074	494.993	600.508	460.400	472.229	476.028	437.627	452.982	514.930	562.156	637.079
Garments and other fiber products	99.358	144.148	180.666	147.015	177.666	184.528	201.807	203.859	229.116	259.626	291.491
Leather, furs, down and related products	57.073	84.341	112.391	97.441	111.220	118.636	119.193	119.793	134.517	157.263	180.146
Timber processing, bamboo, cane, palm etc.	27.861	36.642	46.226	40.553	51.324	62.636	49.213	56.058	65.677	74.122	82.806
Furniture manufacturing	15.364	21.878	26.002	22.603	28.165	32.020	29.471	31.838	37.018	43.485	52.421
Papermaking and paper products	61.122	75.870	116.287	101.446	121.533	124.443	124.397	132.773	159.036	180.428	208.154
Printing and record medium reproduction	33.852	40.459	50.843	41.159	53.147	57.441	54.419	57.876	61.671	72.603	82.556
Cultural, educational and sports goods	20.833	30.007	42.651	37.106	43.124	49.022	55.247	55.574	61.794	68.072	78.208
Petroleum processing and coking	144.610	188.037	238.503	202.812	221.210	256.900	232.944	270.558	442.919	458.776	478.498
Raw chemical materials and chemical prod.	237.700	316.533	435.533	381.979	447.136	472.237	462.783	492.478	574.902	630.366	722.005
Medical and pharmaceutical products	68.983	87.456	111.776	96.126	115.110	126.224	137.273	149.722	178.137	204.086	237.844
Chemical fiber	45.380	63.725	94.865	80.994	80.247	86.198	82.652	97.528	124.307	102.249	112.182
Rubber products	44.795	55.013	72.792	61.988	74.920	78.177	76.558	78.030	81.270	89.382	106.460

Plastic products	71.200	92.664	130.965	112.765	133.793	144.247	149.783	162.341	189.970	213.660	248.792
Nonmetal mineral products	233.292	299.715	342.906	301.836	355.969	382.753	320.448	339.464	369.285	402.602	455.704
Smelting and pressing of ferrous metals	393.118	416.542	436.052	366.022	374.584	385.632	388.319	409.736	473.290	570.731	649.236
Smelting and pressing of nonferrous metals	97.445	120.236	178.672	137.229	142.455	147.000	162.873	179.314	218.023	236.917	259.998
Metal products	130.205	170.799	192.764	165.072	194.378	207.810	215.068	221.509	253.976	285.227	329.438
Ordinary machinery manufacturing	196.555	239.175	274.708	236.569	268.092	281.335	257.980	269.390	304.695	350.533	424.796
Special purpose equipment manufacturing	149.933	179.190	204.081	175.654	198.814	207.102	192.027	198.071	219.263	235.225	281.890
Transport equipment manufacturing	259.928	318.580	380.995	330.328	378.501	412.310	421.201	465.931	536.483	647.495	835.927
Electric equipment and machinery	185.093	232.704	302.493	259.430	305.976	336.609	362.858	402.155	483.468	548.107	614.200
Electronic and telecommunications equipm.	129.912	199.986	281.568	253.048	305.109	392.103	489.356	583.096	754.958	899.025	1128.864
Instruments, meters, cultural and off. mach.	36.574	42.445	48.033	42.570	52.873	59.995	69.275	70.573	86.791	93.767	108.962
Prod./supply of electric power, steam etc.	144.551	201.761	275.406	244.055	280.544	332.007	361.681	399.691	461.139	508.770	588.905
Production and supply of gas	5.284	6.307	7.929	7.616	8.059	9.584	10.325	13.127	17.030	18.487	22.460
Production and supply of tap water	11.413	15.250	19.697	18.244	23.234	27.008	26.969	31.495	32.553	34.448	37.757
Other extraction	0.192										
Other manufacturing	58.110	75.323									
Implicit residual	17.882	22.074	112.548	97.861	109.187	116.708	105.970	112.133	118.743	132.111	147.312
Value added in current prices											
Total	1284.263	1470.006	same	1544.613	1802.611	1983.518	1942.193	2156.474	2539.480	2832.937	3299.475
Coal mining and dressing	38.598	43.816	as on	59.863	68.490	71.210	60.155	56.502	58.309	69.865	91.906
Petroleum and natural gas extraction	56.514	75.120	right	93.932	99.281	115.587	118.641	143.845	220.902	201.879	193.705
Ferrous metals mining and dressing	3.685	4.020		4.106	5.636	5.877	5.421	5.304	6.231	7.228	8.625
Nonferrous metals mining and dressing	7.916	8.949		11.355	12.101	13.311	11.127	12.605	13.977	14.178	15.080
Nonmetal minerals mining and dressing	13.516	13.532		13.392	16.472	17.887	11.074	11.836	12.264	12.542	14.248
Logging and transport of timber and bamboo	8.598	8.408		9.080	8.985	8.757	8.236	6.650	6.149	5.541	5.571
Food processing	49.560	61.611		49.675	71.218	78.099	68.154	76.186	83.529	94.470	111.269
Food production	18.737	21.796		21.112	29.007	35.255	32.495	34.455	41.581	45.187	55.301
Beverage production	27.773	33.043		35.360	45.741	55.708	54.361	58.578	61.890	64.256	70.964
Tobacco processing	42.192	55.250		61.260	75.743	82.318	88.616	89.205	93.580	109.307	135.963
Textile industry	95.086	111.731		89.845	103.996	111.667	101.730	111.712	127.284	138.752	156.910
Garments and other fiber products	32.523	35.512		34.729	44.706	46.379	48.193	50.597	59.202	68.812	74.608
Leather, furs, down and related products	15.181	20.226		20.147	27.845	29.078	27.325	28.361	32.362	39.176	45.796
Timber processing, bamboo, cane, palm etc.	9.535	9.953		9.508	14.333	16.997	11.257	13.289	15.753	19.291	21.392
Furniture manufacturing	4.829	5.874		5.643	7.958	8.897	7.666	7.796	9.486	11.758	13.934
Papermaking and paper products	15.106	19.182		23.235	32.921	33.889	31.892	35.556	41.262	47.487	57.088

Printing and record medium reproduction	12.388	12.440	12.317	17.017	18.757	18.271	19.794	20.139	24.398	27.953
Cultural, educational and sports goods	6.527	7.831	9.118	12.120	13.076	14.114	14.020	15.530	17.987	20.452
Petroleum processing and coking	34.583	43.415	56.133	55.947	60.247	52.858	59.024	78.799	88.330	100.392
Raw chemical materials and chemical prod.	68.359	79.280	94.272	118.862	118.985	110.344	121.688	141.581	160.127	186.264
Medical and pharmaceutical products	22.868	25.155	26.467	35.693	41.151	43.291	51.486	63.388	72.243	83.465
Chemical fiber	14.582	17.159	20.299	19.497	20.952	18.462	25.255	29.578	22.210	24.892
Rubber products	12.563	13.835	13.837	18.846	20.967	20.310	20.261	21.898	24.829	29.255
Plastic products	20.864	22.168	22.506	32.438	35.810	35.428	38.780	46.443	54.502	64.684
Nonmetal mineral products	89.782	94.212	89.991	105.520	110.677	90.914	100.460	112.672	121.188	136.516
Smelting and pressing of ferrous metals	128.507	129.037	105.324	99.876	102.541	98.266	108.115	129.929	153.015	179.949
Smelting and pressing of nonferrous metals	26.087	26.346	30.209	30.653	31.125	33.233	40.504	51.269	59.118	62.614
Metal products	39.839	44.008	38.394	49.086	51.671	50.429	54.072	60.946	71.328	84.123
Ordinary machinery manufacturing	61.297	68.333	66.977	72.669	79.480	69.694	74.361	84.075	97.163	115.303
Special purpose equipment manufacturing	43.585	49.088	44.939	52.027	54.535	48.540	51.573	58.097	63.688	78.175
Transport equipment manufacturing	69.795	75.536	80.512	92.881	100.592	108.028	119.314	132.361	163.369	217.717
Electric equipment and machinery	53.058	58.170	60.382	74.098	81.962	87.957	100.257	123.150	137.844	158.473
Electronic and telecommunications equipm.	35.514	48.427	63.500	66.331	90.237	112.096	134.795	182.431	203.503	252.092
Instruments, meters, cultural and off. mach.	12.226	12.917	12.255	14.430	14.861	16.847	18.046	21.436	23.790	26.854
Prod./supply of electric power, steam etc.	62.790	81.870	122.109	131.728	162.710	187.519	216.182	232.862	269.630	316.574
Production and supply of gas	0.887	0.345	0.312	-1.150	1.065	1.413	3.664	3.474	4.614	5.310
Production and supply of tap water	5.434	6.436	8.382	10.040	11.314	12.386	14.632	15.088	16.196	17.098
Other extraction	0.056									
Other manufacturing	19.459	20.498								
Implicit residual	3.864	5.477	24.136	29.569	29.887	25.450	27.714	30.573	34.136	38.960

Abbreviations: Raw chemical materials and chemical prod. = Raw chemical materials and chemical products; Electronic and telecommunications equipm. = Electronic and telecommunications equipment; Timber processing, bamboo, cane, palm etc. = Timber processing, bamboo, cane, palm fiber and straw products; Instruments, meters, cultural and off. mach. = Instruments, meters, cultural and office machinery; Prod./supply of electric power, steam etc. = Production and supply of electric power, steam and hot water.

Year 2000 GOV in current prices in the sector "petroleum and natural gas extraction" was adjusted down by 100b yuan RMB (to the value reported in the table) in order for the series of this sector to be consistent over time and in order for the implicit residual to be consistent over time.

The definition of the directly reporting industrial enterprises changed in 1998, from the previous "all industrial enterprises with independent accounting system at township level and above" to "all industrial SOEs plus all industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB.

Sources: *Industrial Yearbook 1994*, numerous pages; *1995*, numerous pages; *1998*, p. 77 (for 1996 and 1997 data); *2001*, p. 49 (for 1999 and 2000 data); *2002*, p. 68; *2003*, p. 68; *Industrial Census 1995*, numerous pages (for 1995 data); *Statistical Yearbook 1999*, p. 432 (for 1998 data).

Appendix 12 Directly Reporting Industrial Enterprise Output Measures 2003 (b yuan RMB)

	GOV in		Value added
	1990 prices	current prices	in current prices
Total	12871.625	14227.122	4199.023
Mining and washing of coal	117.164	245.938	115.204
Extraction of petroleum and natural gas	88.649	347.902	238.822
Mining and processing of ferrous metal ores	23.287	35.093	14.619
Mining and processing of non-ferrous metal ores	44.129	57.328	17.765
Mining and processing of nonmetal ores	42.786	48.675	16.288
Mining of other ores	0.690	0.746	0.236
Processing of food from agricultural products	492.294	615.232	146.642
Manufacture of foods	204.453	229.007	66.709
Manufacture of beverages	183.161	223.322	79.597
Manufacture of tobacco	107.107	223.581	157.348
Manufacture of textiles	698.933	772.520	190.670
Manufacture of textile wearing apparel, footwear, and caps	311.441	342.602	91.654
Manufacture of leather, fur, feather and related products	202.840	227.405	59.135
Processing of timber, manufacture of wood, bamboo, etc.	93.814	99.279	26.572
Manufacture of furniture	64.350	71.997	18.296
Manufacture of paper and paper products	222.315	252.605	68.142
Printing, reproduction of recording media	99.774	102.722	33.446
Manufacture of articles for culture, education and sport activity	89.371	96.590	24.993
Processing of petroleum, coking, processing of nuclear fuel	243.814	623.526	128.745
Manufacture of raw chemical materials and chemical products	873.260	924.486	246.488
Manufacture of medicines	389.563	288.998	102.474
Manufacture of chemical fibers	174.387	144.840	29.525
Manufacture of rubber	134.199	131.290	36.995
Manufacture of plastics	301.757	306.383	76.320
Manufacture of non-metallic mineral products	503.192	565.325	174.908
Smelting and processing of ferrous metals	651.489	1000.737	282.401
Smelting and processing of non-ferrous metals	309.539	356.407	90.213
Manufacture of metal products	360.621	385.740	97.100
Manufacture of general purpose machinery	563.686	571.121	159.039
Manufacture of special purpose machinery	364.531	383.165	100.819
Manufacture of transport equipment	1193.514	1121.405	289.697
Manufacture of electrical machinery and equipment	902.620	791.619	202.348
Manufacture of communication equipment, computers, etc.	2238.586	1583.976	348.250
Manufacture of measuring instruments and machinery etc.	165.460	163.672	44.503
Manufacture of artwork and other manufacturing	122.092	130.662	34.774
Recycling and disposal of waste	4.157	4.994	1.067
Production and distribution of electric power and heat power	258.849	685.860	360.613
Production and distribution of gas	15.893	27.264	7.534
Production and distribution of water	13.862	43.109	19.074
Implicit residual	-0.004	-0.001	-0.002

Abbreviations: Processing of timber, manufacture of wood, bamboo, etc. = Processing of timber, manufacture of wood, bamboo, rattan, palm, and straw products; Manufacture of communication equipment, computers, etc. = Manufacture of communication equipment, computers and other electronic equipment; Manufacture of measuring instruments and machinery etc. = Manufacture of measuring instruments and machinery for cultural activity and office work.

Source: *Industrial Yearbook 2004*, pp. 64f.; a more recent issue is not available, and the *Statistical Yearbook 2005* does not report sectoral output data.

Appendix 13 Revised Employment Values (end-year, million laborers)

	Total employment			Primary sector		Secondary sector		Tertiary sector	
	Official	Pop. census	Adjusted pre-1990	Official	Adjusted pre-1990	Official	Adjusted pre-1990	Official	Adjusted pre-1990
1978	401.52		468.43	283.18	330.36	69.45	81.02	48.90	57.05
1979	410.24		479.67	286.34	334.79	72.14	84.35	51.77	60.53
1980	423.61		493.97	291.22	339.59	77.07	89.87	55.32	64.51
1981	437.25		510.39	297.77	347.58	80.03	93.42	59.45	69.39
1982	452.95	518.95	526.18	308.59	358.48	83.46	96.95	60.90	70.75
1983	464.36		541.17	311.51	363.04	86.79	101.15	66.06	76.99
1984	481.97		558.10	308.68	357.43	95.90	111.05	77.39	89.61
1985	498.73		575.51	311.30	359.22	103.84	119.83	83.59	96.46
1986	512.82		591.51	312.54	360.51	112.16	129.37	88.11	101.63
1987	527.83		607.44	316.63	364.38	117.26	134.94	93.95	108.12
1988	543.34		622.40	322.49	369.39	121.52	139.19	99.33	113.81
1989	553.29		635.61	332.25	381.68	119.76	137.58	101.29	116.36
1990	647.49	642.03	continue	389.14	continue	138.56	continue	119.79	continue
1991	654.91		with	390.98	with	140.15	with	123.78	with
1992	661.52		data	386.99	data	143.55	data	130.98	data
1993	668.08		from	376.80	from	149.65	from	141.63	from
1994	674.55		left	366.28	left	153.12	left	155.15	left
1995	680.65			355.30		156.55		168.80	
1996	689.50			348.20		162.03		179.27	
1997	698.20			348.40		165.47		184.32	
1998	706.37			351.77		166.00		188.60	
1999	713.94			357.68		164.21		192.05	
2000	720.85			360.43		162.19		198.23	
2001	730.25			365.13		162.84		202.28	
2002	737.40			368.70		157.80		210.90	
2003	744.32			365.46		160.77		218.09	
2004	752.00			352.69		169.20		230.11	
2005	758.25			339.18		180.92		238.15	

Population census employment values of 1982 and 1990 are midyear values, include military personnel, and exclude the 15-year age group. Employment values exclude the 15-year age cohort and are always end-year values.

Adjusted pre-1990 total employment value are obtained by first turning the sum (16) sectoral employment values of 1978-1990 into midyear values (where the sum sectoral employment values equal the official total employment value in 1978-89, before the official value becomes the revised one in 1990); midyear values equal the arithmetic average of the two relevant end-year values. In a second step, in each year, the share of the distance between the 1982 and 1990 sum sectoral employment values covered is applied to the distance between the 1982 and 1990 population census employment values, and then added to the 1982 population census employment value; i.e., the adjusted pre-1990 series is made to cover the distance between 1982 and 1990 at the same pace as the report form sum sectoral series. Pre-1982 values are obtained by applying sum sectoral annual growth rates to the 1982 population census employment value. In a third step, the adjusted pre-1990 series is turned into end-year values. This procedure assumes that the 1990 population census employment value presents a mid-year value that is consistent with the revised official end-year 1990 employment value in the *Statistical Yearbook*; as shown in the text above, this is plausible.

Adjusted pre-1990 sectoral employment values for 1978-1989 are obtained by applying the shares of the individual sectors in official total employment to the adjusted pre-1990 total employment values. This is plausible for the following reason. Official pre-1990 employment values for the three sectors are report form values; official post-1989 values are the revised values, but report form values

can be pieced together from the 16-sector classification. Taking each of the three sectors at a time, a comparison of the share according to the report form value vs. the revised value for the years 1990-95 shows these shares to be identical through at least the second decimal, often the third decimal (after 1995 the differences are slightly larger). The sectoral classification is likely to follow the GB1994 in all years (see text for details).

Sources:

Official values: *Labor Yearbook 2005*, p. 8; *Statistical Abstract 2006*, p. 44, for 2005.

Population census values: see Figure 15; values include military personnel and *exclude* the 15-year age group. Lacking a breakdown of the 1982 population census employment value by individual years, the proportion of 15-year olds in total employment in 1990 is applied to the 1982 population census employment value in order to obtain a value for the 15-year age group in 1982. The original employment values in the two population censuses, including military personnel and the 15-year age group, are 525.74m in 1982 and 650.44m in 1990.

Report form 16-sector values (to split the adjusted pre-1990 total employment values into adjusted pre-1990 3-sector values): *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Appendix 14 Report Form Employment (end-year, million laborers)

	Total	Primary sector	Secondary sector	# Industry	# Con-struction	Tertiary sector	# Prod. services	# Non-prod. s.
1952	207.29	173.17	15.31	12.46	2.85	18.81	11.62	7.19
1953	213.64	177.47	17.15	13.73	3.42	19.02	11.48	7.54
1954	218.32	181.51	18.82	15.01	3.81	17.99	10.37	7.62
1955	223.28	185.92	19.13	14.00	5.13	18.23	10.35	7.88
1956	230.18	185.44	24.68	13.75	10.93	20.06	10.58	9.48
1957	237.71	193.09	21.42	14.01	7.41	23.20	12.29	10.91
1958	266.00	154.90	70.76	44.16	26.60	40.34	15.44	24.90
1959	261.73	162.71	54.02	28.81	25.21	45.00	14.67	30.33
1960	258.80	170.16	41.12	29.79	11.33	47.52	14.82	32.70
1961	255.90	197.47	28.56	22.24	6.32	29.87	12.77	17.10
1962	259.10	212.76	20.59	17.05	3.54	25.75	11.95	13.80
1963	266.40	219.66	20.38	16.32	4.06	26.36	11.99	14.37
1964	277.36	228.01	21.83	16.95	4.88	27.52	12.21	15.31
1965	286.70	233.96	24.08	18.28	5.80	28.66	12.41	16.25
1966	298.05	242.97	26.00	19.74	6.26	29.08	12.72	16.36
1967	308.14	251.65	26.61	20.32	6.29	29.88	13.17	16.71
1968	319.15	260.63	27.43	20.92	6.51	31.09	13.93	17.16
1969	332.25	271.17	30.30	23.65	6.65	30.78	13.74	17.04
1970	344.32	278.11	35.18	28.09	7.09	31.03	14.11	16.92
1971	356.20	283.97	39.90	32.33	7.57	32.33	14.84	17.49
1972	358.54	282.83	42.76	34.96	7.80	32.95	14.97	17.98
1973	366.52	288.57	44.92	37.04	7.88	33.03	14.88	18.15
1974	373.69	292.18	47.12	39.00	8.12	34.39	15.55	18.84
1975	381.68	294.56	51.52	42.84	8.68	35.60	16.57	19.03
1976	388.34	294.43	56.11	46.92	9.19	37.80	17.42	20.38
1977	393.77	293.40	58.31	48.09	10.22	42.06	18.35	23.71
1978	401.52	283.18	69.45	60.91	8.54	48.90	20.68	28.22
1979	410.24	286.34	72.14	62.98	9.16	51.77	21.98	29.79
1980	423.61	291.22	77.07	67.14	9.93	55.32	23.56	31.76
1981	437.25	297.77	80.03	69.75	10.28	59.45	25.23	34.22
1982	452.95	308.59	83.46	72.04	11.42	60.90	26.45	34.45
1983	464.36	311.51	86.79	73.97	12.82	66.06	28.61	37.45
1984	481.97	308.68	95.90	79.30	16.60	77.39	33.13	44.26
1985	498.73	311.30	103.84	83.49	20.35	83.59	37.82	45.77
1986	512.81	312.54	112.16	89.80	22.36	88.11	39.86	48.25
1987	527.84	316.63	117.26	93.42	23.84	93.95	42.29	51.66
1988	543.37	322.49	121.52	96.61	24.91	99.36	44.68	54.68
1989	553.30	332.25	119.76	95.69	24.07	101.29	44.91	56.38
1990	567.40	341.17	121.22	96.98	24.24	105.01	46.02	58.99
1991	583.60	349.56	124.29	99.47	24.82	109.75	48.14	61.61
1992	594.33	347.95	128.79	102.19	26.60	117.59	50.85	66.74
1993	602.22	339.66	135.17	104.67	30.50	127.39	52.91	74.48
1994	614.72	333.86	139.62	107.74	31.88	141.24	59.24	82.00
1995	623.89	330.18	143.15	109.93	33.22	150.56	63.69	86.87
1996	628.42	329.10	143.46	109.38	34.08	155.86	66.53	89.33
1997	636.67	330.95	142.12	107.63	34.49	163.60	69.86	93.74
1998	623.63	332.32	126.50	93.23	33.27	164.81	67.61	97.20
1999	624.91	334.93	124.73	90.61	34.12	165.25	68.84	96.41
2000	629.77	333.55	124.75	89.24	35.52	171.47	68.25	103.22

2001	630.53	329.74	126.01	89.32	36.69	174.78	68.79	105.99
2002	637.80	324.87	130.48	91.55	38.93	182.44	71.51	110.93

Since 1998, the data do not include those staff and workers who are not on their post; prior to 1998, they do.

All data follow the GB1994 sectoral classification.

Prod. services = Productive services: Transport, storage, post & telecommunication services; wholesale and retail trade & catering services; geological prospecting and water conservancy.

Non-prod. s. = Non-productive services: all tertiary sector sub-sectors not included in "productive services," i.e., finance and insurance; real estate; social services; health care, sports, and social welfare; education, culture and arts, radio, film and television; scientific research and polytechnic services; government agencies, Party agencies, and social organizations; and "others."

Sources:

Total employment, and primary/ secondary/ tertiary sector employment: 1952-1977 (or -1989): *Labor Yearbook 2005*, pp. 7f.; 1978-2002: sum sectoral values, and sectoral values in 3-sector aggregates from *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Industry: 1952-77 (or -1989): *Labor Yearbook 1996*, p. 12; 1978-2002: aggregate of 3 industrial subsectors from *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Construction: 1952-77: difference of secondary sector and industry employment; 1978-2002: *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Productive services: 1952-77: difference of tertiary sector and non-productive service employment; 1978-2002: aggregate of corresponding tertiary sector subsectors from *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Non-productive services: 1952-77 (or -1989): *Statistical Yearbook 1993*, p. 100; 1978-2002: aggregate of corresponding tertiary sector subsectors from *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Appendix 15 Sectoral (Report Form) Employment (end-year, million laborers)

	Total	Agric.	Mining	Manuf.	Util.	Constr.	Geol.	Transp.	Trade	Finance	Real est.	Social s.	Health	Educ.	Science	Gov.	Others
1978	401.52	283.18	6.52	53.32	1.07	8.54	1.78	7.50	11.40	0.76	0.31	1.79	3.63	10.93	0.92	4.67	5.21
1979	410.24	286.34	6.70	55.16	1.12	9.16	1.85	7.81	12.32	0.86	0.34	2.10	3.86	11.31	1.00	5.05	5.27
1980	423.61	291.22	6.97	58.99	1.18	9.93	1.88	8.05	13.63	0.99	0.37	2.76	3.89	11.47	1.13	5.27	5.88
1981	437.25	297.77	7.28	61.22	1.25	10.28	1.88	8.44	14.91	1.07	0.38	3.05	3.75	10.95	1.27	5.56	8.19
1982	452.95	308.59	7.47	63.29	1.28	11.42	1.91	8.78	15.76	1.13	0.38	3.22	3.99	11.28	1.32	6.11	7.02
1983	464.36	311.51	7.58	65.08	1.31	12.82	1.93	9.36	17.32	1.17	0.37	3.67	4.15	11.51	1.33	6.46	8.79
1984	481.97	308.68	7.67	70.29	1.34	16.60	1.97	11.22	19.94	1.27	0.36	4.39	4.35	12.04	1.37	7.43	13.05
1985	498.73	311.30	7.95	74.12	1.42	20.35	1.97	12.79	23.06	1.38	0.36	4.01	4.67	12.73	1.44	7.99	13.19
1986	512.82	312.54	8.09	80.19	1.52	22.36	1.97	13.76	24.13	1.52	0.38	4.66	4.82	13.24	1.52	8.73	13.38
1987	527.83	316.63	8.19	83.59	1.64	23.84	2.00	14.53	25.76	1.70	0.39	5.01	4.96	13.75	1.58	9.25	15.02
1988	543.34	322.49	8.32	86.52	1.77	24.91	2.04	15.21	27.43	1.94	0.42	5.34	5.08	14.03	1.61	9.71	16.55
1989	553.29	332.25	8.42	85.47	1.80	24.07	1.99	15.22	27.70	2.05	0.43	5.50	5.18	14.26	1.65	10.22	17.09
1990	567.40	341.17	8.82	86.24	1.92	24.24	1.97	15.66	28.39	2.18	0.44	5.94	5.36	14.57	1.73	10.79	17.98
1991	583.60	349.56	9.05	88.39	2.03	24.82	1.99	16.17	29.98	2.34	0.48	6.04	5.53	14.97	1.79	11.36	19.10
1992	594.33	347.95	8.98	91.06	2.15	26.60	2.02	16.74	32.09	2.48	0.54	6.43	5.65	15.20	1.83	11.48	23.13
1993	602.22	339.66	9.32	92.95	2.40	30.50	1.44	16.88	34.59	2.70	0.66	5.43	4.16	12.10	1.73	10.30	37.40
1994	614.72	333.86	9.15	96.13	2.46	31.88	1.39	18.64	39.21	2.64	0.74	6.26	4.34	14.36	1.78	10.33	41.55
1995	623.89	330.18	9.32	98.03	2.58	33.22	1.35	19.42	42.92	2.76	0.80	7.03	4.44	14.76	1.82	10.42	44.84
1996	628.42	329.10	9.02	97.63	2.73	34.08	1.29	20.13	45.11	2.92	0.84	7.47	4.58	15.13	1.83	10.93	45.63
1997	636.67	330.95	8.68	96.12	2.83	34.49	1.29	20.62	47.95	3.08	0.87	8.10	4.71	15.57	1.86	10.93	48.62
1998	623.63	332.32	7.21	83.19	2.83	33.27	1.16	20.00	46.45	3.14	0.94	8.68	4.78	15.73	1.78	10.97	51.18
1999	624.91	334.93	6.67	81.09	2.85	34.12	1.11	20.22	47.51	3.28	0.96	9.23	4.82	15.68	1.73	11.02	49.69
2000	629.77	333.55	5.97	80.43	2.84	35.52	1.10	20.29	46.86	3.27	1.00	9.21	4.88	15.65	1.74	11.04	56.43
2001	630.53	329.74	5.61	80.83	2.88	36.69	1.05	20.37	47.37	3.36	1.07	9.76	4.93	15.68	1.65	11.01	58.52
2002	637.80	324.87	5.58	83.07	2.90	38.93	0.98	20.84	49.69	3.40	1.18	10.94	4.93	15.65	1.63	10.75	62.45

Since 1990, the total is the sum across sectors; the published total since 1990, in contrast, equals total employment in the previous appendix table (i.e., is adjusted following the 1990 and 2000 population censuses, while the individual sectoral values are not). All data follow the GB1994 sectoral classification.

Since 1998, the data do not include those staff and workers who are not on their post; prior to 1998, they do.

Agric. = agriculture = farming, forestry, animal husbandry, and fishery.

Mining = mining and quarrying.

Manuf. = manufacturing.

Util. = utilities = production and supply of electricity, gas and water.
Const. = construction.
Geol. = geological prospecting and water conservancy.
Transp. = transport, storage, post and telecommunications.
Trade = wholesale and retail trade & catering services.
Finance = finance (banking) and insurance.
Real est. = real estate.
Social s. = social services
Health = health care, sports, and social welfare.
Educ. = education, culture and arts, radio, film and television.
Science = scientific research and polytechnic services.
Gov. = government agencies, Party agencies, and social organizations (presumably incl. military personnel, see Xu, 1999a, p. 12.)
Sources: *Labor Yearbook 1996*, pp. 13f., *Statistical Yearbook 2005*, p. 125.

Appendix 16 Directly Reporting Industrial Enterprise Midyear Employment (in thousand laborers)

	1993	1994	1995	1995[a]	1996	1997	1998[b]	1999	2000	2001	2002
Total	82998.6	83295.4	84355.2	83597.2	81870.4	78727.5	61958.1	58050.5	55593.6	54414.3	55206.6
Coal mining and dressing	6311.9	5954.2	6007.1	5981.3	5797.7	5686.8	4642.2	4269.1	3992.7	3753.1	3797.1
Petroleum and natural gas extraction	1186.4	1156.7	1471.9	1444.6	1202.0	1199.4	1137.7	1107.1	577.5	598.9	560.1
Ferrous metals mining and dressing	332.6	358.0	342.2	338.0	353.6	331.7	295.4	241.5	243.7	243.7	246.6
Nonferrous metals mining and dressing	769.9	753.7	792.5	784.8	746.0	709.6	551.8	527.3	485.7	451.3	430.2
Nonmetal minerals mining and dressing	1199.7	1250.8	1201.5	1193.0	1197.8	1119.1	630.5	601.5	551.6	516.4	487.0
Logging and transport of timber and bamboo	1042.6	840.8	1113.2	1104.7	1083.9	2052.9	969.1	861.1	739.6	657.5	580.1
Food processing	2349.3	2418.2	2422.6	2402.0	2457.4	2464.8	2005.0	1805.9	1679.0	1669.1	1735.2
Food production	1547.3	1517.2	1549.9	1533.3	1405.5	1408.9	1025.5	966.7	917.7	900.5	984.8
Beverage production	1497.2	1434.4	1491.0	1482.6	1469.3	1447.2	1151.4	1062.7	1022.2	949.8	910.0
Tobacco processing	328.3	302.6	321.4	320.8	308.7	309.8	291.8	281.0	258.9	247.4	232.1
Textile industry	9035.8	8940.0	8726.8	8680.3	8104.6	7302.4	5780.1	5108.7	4828.8	4775.1	4791.5
Garments and other fiber products	2566.8	2698.3	2706.5	2679.8	2609.8	2438.5	2117.2	2026.8	2156.3	2370.7	2657.5
Leather, furs, down and related products	1289.9	1466.1	1515.2	1502.2	1401.4	1371.9	1110.7	1098.4	1127.5	1270.4	1412.9
Timber processing, bamboo, cane, palm etc.	999.9	1043.7	1040.2	1030.6	985.8	943.7	502.6	479.9	500.4	512.9	517.1
Furniture manufacturing	515.5	513.5	500.1	492.0	497.2	458.3	250.6	254.6	270.4	298.3	339.7
Papermaking and paper products	1733.3	1769.7	1816.7	1802.1	1857.6	1675.9	1293.4	1192.4	1134.1	1138.1	1149.9
Printing and record medium reproduction	1128.0	1127.1	1091.1	1076.9	1100.0	1007.2	674.1	604.0	558.2	546.7	554.6
Cultural, educational and sports goods	662.5	714.4	717.7	708.4	681.2	722.2	614.4	640.8	652.6	669.1	755.6
Petroleum processing and coking	687.1	729.3	792.9	784.1	766.2	775.8	779.8	716.2	636.9	592.0	558.5
Raw chemical materials and chemical prod.	4771.7	4620.4	4824.0	4781.4	4809.0	4664.3	3903.6	3709.9	3466.1	3185.7	3101.3
Medical and pharmaceutical products	1026.0	1176.2	1157.4	1146.7	1186.5	1157.3	1037.4	998.8	995.6	1029.9	1055.0
Chemical fiber	502.8	523.6	561.9	559.0	573.7	601.1	481.3	462.4	429.4	402.7	377.3
Rubber products	951.3	951.9	980.6	968.6	943.4	925.2	771.8	712.6	665.7	616.0	620.8
Plastic products	1515.0	1514.5	1604.8	1585.2	1591.9	1553.4	1103.3	1111.1	1114.4	1171.4	1295.6
Nonmetal mineral products	7574.3	8019.3	7994.4	7924.5	7764.5	7411.0	4553.3	4340.0	4106.7	3926.1	3882.4
Smelting and pressing of ferrous metals	3879.0	3750.3	3883.7	3858.7	3609.5	3417.3	2986.0	2769.4	2617.0	2493.4	2392.9
Smelting and pressing of nonferrous metals	1151.5	1111.5	1231.9	1210.9	1251.5	1182.2	1123.2	1083.2	1057.1	1092.9	1023.4
Metal products	2928.0	3007.4	2833.8	2798.6	2744.4	2577.5	1758.0	1660.4	1624.4	1651.6	1740.2
Ordinary machinery manufacturing	5008.5	4911.7	4864.0	4814.9	4838.8	4657.4	3400.6	3023.6	2850.2	2719.9	2644.2
Special purpose equipment manufacturing	3788.8	3637.1	3584.0	3552.7	3489.6	3333.3	2520.9	2184.7	2067.9	1856.1	1781.1

Transport equipment manufacturing	4007.9	3923.8	4221.9	4163.8	4312.7	4099.9	3375.2	3173.3	3061.6	2962.2	2967.2
Electric equipment and machinery	3117.7	3451.0	3114.4	3075.3	3088.6	3004.3	2390.9	2285.6	2291.5	2255.5	2389.8
Electronic and telecommunications equipm.	1809.4	1833.5	1953.5	1934.2	1916.1	1886.1	1854.8	1862.1	1963.1	2050.0	2294.1
Instruments, meters, cultural and off. mach.	1067.2	973.0	961.2	949.8	940.6	889.0	643.5	578.4	562.4	554.5	572.1
Prod./supply of electric power, steam etc.	1933.9	1879.6	2086.9	2079.6	2092.8	2212.3	2152.4	2229.9	2332.2	2295.1	2332.5
Production and supply of gas	154.2	145.0	164.0	163.0	157.0	200.0	164.8	159.6	159.5	147.1	147.1
Production and supply of tap water	340.1	354.8	401.8	400.2	433.4	459.2	417.8	444.1	448.3	451.6	453.9
Other extraction	7.8										
Other manufacturing	1783.2	1815.1									
Implicit residual	496.4	707.0	2310.5	2288.6	2100.7	1070.6	1496.2	1415.7	1446.7	1391.6	1435.2

a The second set of 1995 values refers to "staff and workers" (*zhigong*). The first set refers to "laborers" (*congye renyuan*). In the sources, the values since 1999 and the first value of 1995 are labeled laborers, while the values of 1993, 1994, 1996, and 1997 are labeled staff and workers; however, as explained in the text, the values of 1993, 1994, 1996, and 1997 in all likelihood are laborer values.

b 1998 values are obtained as current price value added divided by labor productivity (where labor productivity is defined as value added per midyear number of laborers). The definition of labor productivity is ambiguous about whether value added is at current or at 1990 prices; a double check of 1997 values in the *Statistical Yearbook 1998* suggests that labor productivity in these tables on industrial sectors is at current prices.

The definition of the directly reporting industrial enterprises changed in 1998, from the previous "all industrial enterprises with independent accounting system at township level and above" to "all industrial SOEs plus all industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB.

Since 1998, the data do not include those staff and workers who are not on their post; prior to 1998, they do.

The data follow the GB1994 sectoral classification.

Abbreviations: see Appendix 11.

Sources: *Industrial Yearbook 1994*, numerous pages; *1995*, numerous pages; *1998*, p. 81 (for 1996 and 1997 data); *2001*, p. 53 (for 1999 and 2000 data); *2002*, p. 75; *2003*, p. 75; *Industrial Census 1995*, numerous pages (for 1995 data); *Statistical Yearbook 1999*, pp. 432 (value added), 437 (labor productivity), 449f. (definition of labor productivity).

Appendix 17 Directly Reporting Industrial Enterprise Midyear Employment 2003 and 2004 (in thousand laborers)

	2003	2004
Total	57485.7	60986.2
Mining and washing of coal	3766.0	3881.9
Extraction of petroleum and natural gas	726.8	760.7
Mining and processing of ferrous metal ores	273.9	292.4
Mining and processing of non-ferrous metal ores	413.7	396.4
Mining and processing of nonmetal ores	456.1	454.8
Mining of other ores	17.4	2.0
Processing of food from agricultural products	1816.6	1908.7
Manufacture of foods	1010.7	1069.6
Manufacture of beverages	890.0	890.6
Manufacture of tobacco	212.2	201.7
Manufacture of textiles	4991.6	5191.6
Manufacture of textile wearing apparel, footwear, and caps	2891.9	3202.6
Manufacture of leather, fur, feather and related products	1653.7	1819.0
Processing of timber, manufacture of wood, bamboo, etc.	638.3	699.6
Manufacture of furniture	433.9	527.9
Manufacture of paper and paper products	1139.5	1180.3
Printing, reproduction of recording media	594.1	618.2
Manufacture of articles for culture, education and sport activity	871.4	937.9
Processing of petroleum, coking, processing of nuclear fuel	596.6	627.3
Manufacture of raw chemical materials and chemical products	3113.3	3156.6
Manufacture of medicines	1154.0	1185.1
Manufacture of chemical fibers	342.2	386.7
Manufacture of rubber	622.4	647.4
Manufacture of plastics	1409.1	1522.0
Manufacture of non-metallic mineral products	3962.2	4071.9
Smelting and processing of ferrous metals	2559.1	2613.9
Smelting and processing of non-ferrous metals	1066.0	1155.8
Manufacture of metal products	1712.4	1915.9
Manufacture of general purpose machinery	2834.9	3083.6
Manufacture of special purpose machinery	2053.1	2091.3
Manufacture of transport equipment	3117.7	3274.8
Manufacture of electrical machinery and equipment	2651.2	2985.7
Manufacture of communication equipment, computers, etc.	2734.6	3334.0
Manufacture of measuring instruments and machinery etc.	719.6	783.3
Manufacture of artwork and other manufacturing	1032.2	1094.2
Recycling and disposal of waste	13.6	18.3
Production and distribution of electric power and heat power	2384.1	2392.8
Production and distribution of gas	146.7	144.9
Production and distribution of water	462.7	464.9
Implicit residual	0.2	-0.1

Abbreviations: Processing of timber, manufacture of wood, bamboo, etc. = Processing of timber, manufacture of wood, bamboo, rattan, palm, and straw products; Manufacture of communication equipment, computers, etc. = Manufacture of communication equipment, computers and other electronic equipment; Manufacture of measuring instruments and machinery etc. = Manufacture of measuring instruments and machinery for cultural activity and office work.

The data follow the GB2002 sectoral classification.

Source: 2003: *Industrial Yearbook 2004*, p. 71; 2004: *Statistical Yearbook 2005*, p. 491.

Appendix 18 Average Wage of Staff and Workers, 1978-2002 (in yuan RMB per staff/worker-year)

	Total	Agric.	Mining	Manu-facturing	Utilities	Cons-truction	Geolog. prosp.	Trans-port	Com-merce	Finance	Real estate	Social serv.	Health	Edu-cation	Science	Gov-ernm.	Others	Urban CPI
Nominal average wage (yuan RMB per staff/worker-year)																		
1978	605	470	676	597	850	714	708	694	551	610	548	392	573	545	669	655		
1979	668	528	755	664	941	769	782	760	610	652	606	421	598	584	717	684		
1980	762	616	854	752	1035	855	895	832	692	720	694	475	718	700	851	800		
1981	772	637	855	758	1045	869	926	842	704	750	632	478	750	716	850	815		
1982	798	661	869	773	1067	912	955	877	709	768	684	484	833	811	857	821		
1983	826	691	880	789	1104	954	1016	895	724	779	737	508	867	836	990	923		
1984	974	770	1066	955	1321	1154	1179	1082	859	973	919	588	948	920	1072	989		
1985	1148	878	1324	1112	1239	1362	1406	1275	1007	1154	1028	777	1124	1166	1272	1127		
1986	1329	1048	1569	1275	1497	1536	1604	1476	1148	1353	1216	980	1343	1330	1492	1356		
1987	1459	1143	1663	1418	1677	1684	1768	1621	1270	1458	1327	1085	1446	1409	1620	1468		
1988	1747	1280	1964	1710	1971	1959	2025	1941	1556	1739	1715	1719	1752	1747	1931	1707		
1989	1935	1389	2378	1900	2241	2166	2199	2197	1660	1867	1925	1926	1959	1883	2118	1874		
1990	2140	1541	2718	2073	2656	2384	2465	2426	1818	2097	2243	2170	2209	2117	2403	2113		
1991	2340	1652	2942	2289	2922	2649	2707	2686	1981	2255	2507	2431	2370	2243	2573	2275		
1992	2711	1828	3209	2635	3392	3066	3222	3114	2204	2829	3106	2844	2812	2715	3115	2768		
1993	3371	2042	3711	3348	4319	3779	3717	4273	2679	3740	4320	3588	3413	3278	3904	3505	3371	
1994	4538	2819	4679	4283	6155	4894	5450	5690	3537	6712	6288	5026	5126	4923	6162	4962	5213	
1995	5500	3522	5757	5169	7843	5785	5962	6948	4248	7376	7330	5982	5860	5435	6846	5526	6295	
1996	6210	4050	6482	5642	8816	6249	6581	7870	4661	8406	8337	6778	6790	6144	8048	6340	7184	
1997	6470	4311	6833	5933	9649	6655	7160	8600	4845	9734	9190	7553	7599	6759	9049	6981	6838	
1998	7479	4528	7242	7064	10478	7456	7951	9808	5865	10633	10302	8333	8493	7474	10241	7773	8481	
1999	8346	4832	7521	7794	11513	7982	8821	10991	6417	12046	11505	9263	9664	8510	11601	8978	10068	
2000	9371	5184	8340	8750	12830	8735	9622	12319	7190	13478	12616	10339	10930	9482	13620	10043	11098	
2001	10870	5741	9586	9774	14590	9484	10957	14167	8192	16277	14096	11869	12933	11452	16437	12142	12590	
2002	12422	6398	11017	11001	16440	10279	12303	16044	9398	19135	15501	13499	14795	13290	19113	13975	14215	
2002/78	20.53	13.61	16.30	18.43	19.34	14.40	17.38	23.12	17.06	31.37	28.29	34.44	25.82	24.39	28.57	21.34		
Real growth in average wage (previous year = 100)																		
1979	106.6	110.3	109.5	109.1	108.5	105.7	108.5	107.5	108.6	104.9	108.5	105.4	102.4	105.2	105.2	102.5		
1980	106.1	108.6	105.3	105.4	102.3	103.4	106.5	101.8	105.5	102.7	106.5	105.0	111.7	111.5	110.4	108.8		

1981	98.8	100.9	97.6	98.3	98.5	99.2	100.8	98.7	99.3	101.6	88.8	98.2	101.9	99.8	97.4	99.4		
1982	101.3	101.7	99.7	100.0	100.1	102.9	101.2	102.1	98.7	100.4	106.1	99.3	108.9	111.0	98.8	98.8		
1983	101.5	102.4	99.2	100.1	101.4	102.6	104.2	100.1	100.1	99.4	105.6	102.9	102.0	101.1	113.3	110.2		
1984	114.8	108.5	118.0	117.7	116.5	117.8	113.1	117.7	115.5	121.6	121.4	112.7	106.5	107.2	105.4	104.3		
1985	105.3	102.0	111.0	104.1	83.8	105.5	106.5	105.3	104.8	106.0	100.0	118.1	106.0	113.3	106.0	101.8		
1986	108.3	111.5	110.7	107.1	112.9	105.4	106.6	108.2	106.5	109.6	110.5	117.9	111.7	106.6	109.6	112.4		
1987	101.0	100.3	97.5	102.2	103.0	100.8	101.3	100.9	101.7	99.0	100.3	101.8	99.0	97.4	99.8	99.5		
1988	99.2	92.8	97.8	99.9	97.3	96.4	94.9	99.2	101.5	98.8	107.1	131.3	100.4	102.7	98.8	96.3		
1989	95.2	93.3	104.1	95.5	97.8	95.1	93.4	97.3	91.7	92.3	96.5	96.3	96.1	92.7	94.3	94.4		
1990	109.2	109.5	112.9	107.7	117.0	108.7	110.7	109.0	108.1	110.9	115.0	111.2	111.3	111.0	112.0	111.3		
1991	104.0	102.0	103.0	105.1	104.7	105.7	104.5	105.3	103.7	102.3	106.3	106.6	102.1	100.8	101.9	102.4		
1992	106.7	101.9	100.4	106.0	106.9	106.6	109.6	106.8	102.4	115.5	114.1	107.7	109.3	111.5	111.5	112.0		
1993	107.1	96.2	99.6	109.4	109.7	106.2	99.4	118.2	104.7	113.9	119.8	108.7	104.5	104.0	108.0	109.1		
1994	107.7	110.6	100.8	102.3	113.9	103.6	117.3	106.6	105.6	143.7	116.1	112.0	120.2	120.1	126.3	113.1	123.3	
1995	103.8	107.0	105.3	103.3	109.1	101.2	93.7	104.5	102.8	94.1	99.8	101.9	97.9	94.5	95.1	95.3	103.4	
1996	103.8	105.7	103.5	100.3	103.3	99.3	101.5	104.1	100.8	104.7	104.5	104.1	106.5	103.9	108.0	105.5	104.9	
1997	101.1	103.2	102.2	102.0	106.1	103.3	105.5	106.0	100.8	112.3	106.9	108.1	108.5	106.7	109.0	106.8	92.3	
1998	107.2	102.7	99.4	105.1	108.0	103.7	106.0	107.0	104.3	109.8	109.4	107.1	112.1	111.0	112.7	111.7	112.8	
1999	113.1	108.1	105.2	111.8	111.3	108.5	112.4	113.5	110.9	114.8	113.1	112.6	115.3	115.4	114.8	117.0	120.3	
2000	111.4	106.4	110.0	111.4	110.6	108.6	108.2	111.2	111.2	111.0	108.8	110.7	112.2	110.5	116.5	111.0	109.4	
2001	115.2	110.0	114.1	110.9	112.9	107.8	113.1	114.2	113.1	119.9	111.0	114.0	117.5	119.9	119.8	120.1	112.7	
2002	115.5	112.6	116.1	113.7	113.8	109.5	113.4	114.4	115.9	118.7	111.1	114.9	115.6	117.2	117.5	116.3	114.0	
2002/78	3.93	2.79	3.19	3.39	4.01	2.80	3.47	4.53	3.07	6.58	5.74	6.99	5.42	5.12	5.94	4.46		
Implicit deflator (previous year = 100)																		U.CPI
1979	103.6	101.8	102.0	101.9	102.0	101.9	101.8	101.9	101.9	101.9	101.9	101.9	101.9	101.9	101.9	101.9		101.9
1980	107.5	107.4	107.4	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5		107.5
1981	102.5	102.5	102.6	102.5	102.5	102.5	102.6	102.5	102.5	102.5	102.6	102.5	102.5	102.5	102.5	102.5		102.5
1982	102.0	102.0	101.9	102.0	102.0	102.0	101.9	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0		102.0
1983	102.0	102.1	102.1	102.0	102.0	102.0	102.1	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0	102.0		102.0
1984	102.7	102.7	102.7	102.8	102.7	102.7	102.6	102.7	102.7	102.7	102.7	102.7	102.7	102.7	102.7	102.7		102.7
1985	111.9	111.8	111.9	111.9	111.9	111.9	112.0	111.9	111.9	111.9	111.9	111.9	111.9	111.9	111.9	111.9		111.9
1986	106.9	107.1	107.1	107.1	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0	107.0		107.0
1987	108.7	108.7	108.7	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8		108.8
1988	120.7	120.7	120.8	120.7	120.8	120.7	120.7	120.7	120.7	120.7	120.7	120.7	120.7	120.7	120.6	120.7		120.7
1989	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.3	116.4	116.3	116.3	116.3		116.3

1990	101.3	101.3	101.2	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3	101.3		101.3
1991	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1	105.1		105.1
1992	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6	108.6		108.6
1993	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.1	116.0	116.1		116.1
1994	125.0	124.8	125.1	125.1	125.1	125.0	125.0	124.9	125.0	124.9	125.4	125.1	125.0	125.0	125.0	125.2	125.4	125.0
1995	116.8	116.8	116.8	116.8	116.8	116.8	116.7	116.9	116.8	116.8	116.8	116.8	116.8	116.8	116.8	116.9	116.8	116.8
1996	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.8	108.9	108.8	108.8	108.8	108.8	108.8	108.8	108.7	108.8	108.8
1997	103.1	103.1	103.1	103.1	103.2	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.1	103.2	103.1	103.1	103.1
1998	107.8	102.3	106.6	113.3	100.5	108.0	104.8	106.6	116.1	99.5	102.5	103.0	99.7	99.6	100.4	99.7	110.0	99.4
1999	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7	98.7
2000	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8
2001	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7
2002	98.9	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
2002/78	5.23	4.88	5.11	5.43	4.83	5.15	5.00	5.10	5.56	4.77	4.93	4.93	4.76	4.76	4.81	4.78	5.23	4.75
Average wage in 2000 prices (year 2000 yuan RMB per end-year staff/worker-year)																		
1978	3176	2302	3467	3254	4114	3688	3554	3553	3074	2914	2710	1937	2738	2602	3225	3142		
1979	3386	2539	3796	3550	4464	3898	3856	3819	3339	3057	2941	2042	2804	2737	3393	3220		
1980	3592	2758	3997	3741	4567	4031	4106	3888	3522	3139	3132	2144	3132	3052	3746	3504		
1981	3549	2782	3901	3678	4498	3999	4139	3837	3498	3189	2781	2105	3192	3046	3649	3483		
1982	3595	2830	3890	3678	4503	4115	4189	3918	3452	3202	2951	2091	3476	3381	3605	3441		
1983	3649	2898	3859	3681	4566	4222	4365	3922	3456	3183	3116	2151	3545	3418	4084	3792		
1984	4189	3144	4553	4333	5319	4973	4937	4616	3991	3870	3783	2425	3776	3664	4305	3955		
1985	4411	3207	5054	4511	4457	5247	5257	4860	4183	4103	3783	2863	4002	4151	4563	4026		
1986	4778	3576	5595	4831	5032	5530	5604	5259	4455	4497	4180	3376	4471	4425	5001	4525		
1987	4825	3586	5455	4937	5183	5574	5677	5306	4530	4452	4192	3437	4426	4310	4991	4503		
1988	4787	3328	5335	4932	5044	5374	5388	5264	4598	4398	4490	4512	4444	4427	4931	4336		
1989	4557	3105	5554	4710	4933	5110	5032	5122	4217	4059	4333	4345	4270	4104	4650	4093		
1990	4976	3400	6270	5073	5771	5555	5571	5583	4558	4502	4983	4832	4753	4555	5208	4556		
1991	5175	3468	6458	5332	6042	5872	5821	5879	4727	4606	5297	5151	4853	4591	5307	4665		
1992	5522	3534	6484	5652	6459	6259	6380	6278	4840	5319	6044	5548	5304	5119	5917	5225		
1993	5914	3400	6458	6183	7086	6647	6342	7421	5068	6059	7240	6030	5543	5324	6391	5701	6056	
1994	6369	3760	6510	6325	8071	6886	7439	7911	5352	8706	8406	6754	6662	6394	8072	6447	7467	
1995	6611	4023	6855	6534	8805	6969	6970	8267	5502	8193	8389	6882	6522	6043	7676	6144	7721	
1996	6863	4253	7094	6554	9096	6920	7075	8606	5546	8578	8767	7164	6946	6278	8290	6482	8099	
1997	6938	4389	7251	6685	9651	7149	7464	9122	5590	9633	9372	7745	7537	6699	9036	6923	7476	

1998	7438	4507	7207	7026	10423	7413	7912	9761	5830	10577	10253	8295	8449	7436	10184	7733	8433
1999	8412	4872	7582	7855	11600	8043	8893	11078	6466	12142	11596	9340	9742	8581	11691	9048	10144
2000	9371	5184	8340	8750	12830	8735	9622	12319	7190	13478	12616	10339	10930	9482	13620	10043	11098
2001	10795	5702	9516	9704	14485	9416	10882	14068	8132	16160	14004	11786	12843	11369	16317	12062	12507
2002	12469	6421	11048	11033	16484	10311	12341	16094	9425	19182	15558	13543	14846	13324	19172	14028	14258
2002/78	3.93	2.79	3.19	3.39	4.01	2.80	3.47	4.53	3.07	6.58	5.74	6.99	5.42	5.12	5.94	4.46	

The first two blocks of data are official data; the second two blocks of data are calculated.

The implicit deflator of the total series equals the urban CPI except in 1979 and in 1998. Separate data on nominal growth rates are available, with a 8.6% value in 1979 and a 6.6% value in 1998; if these values are combined with the real growth rates, the resulting implicit deflator equals the urban CPI (in 1979 there is a 0.1 percentage point difference). This suggests that the nominal total series—which implies higher nominal growth rates than the published nominal growth rates in 1979 and 1998s—experiences some form of statistical break in 1979 and 1998.

Data on the wage bill are also available. (Wage bill values of 1995 and 1996 come with a 2-3% implicit residual; the total is larger than the sum across sectors.) Dividing the total wage bill by the number of total *end-year* staff and workers yields average wages that in 1978-2002 are maximally 3% different from the published average wages. Dividing the total wage bill by the number of total *midyear* (arithmetic mean of previous-year and current-year number of) staff and workers yields average wages that in 1978-2002 are maximally 2% different except in 1998, when the calculated value is 8% lower. Across the various individual sectors, using end-year values and ignoring 1998 tends to yield a slightly better fit. While the official "average wage" is defined as the wage bill divided by the average (annual) number of staff and workers (*Labor Yearbook 2005*, p. 648), this average number of staff and workers seems to not be the arithmetic mean of previous-year and current-year value. Perhaps most changes in employment happen around Chinese New Year (usually around February), in which case the end-year values as an approximation of average employment are likely to be more appropriate than the average of the previous-year and current year value.

The classification follows the GB1994.

Abbreviated categories, in full, are as follows.

Mining: mining and quarrying.

Geolog. props.: Geological prospecting and water conservancy.

Transport: transport, storage, post and telecommunications.

Commerce = wholesale and retail trade & catering services.

Finance = finance (banking) and insurance.

Health = health care, sports, and social welfare.

Education = education, culture and arts, radio, film and television.

Science = scientific research and polytechnic services.

Gov. = government agencies, Party agencies, and social organizations (presumably incl. military personnel, see Xu, 1999a, p. 12).

Sources: nominal series: 1978-85 from *Labor Yearbook 1996*, p. 44, 1986-2002 from *Labor Yearbook 2005*, p. 44; real wage increases: 1978-85 from *Labor Yearbook 1996*, pp. 47f., 1986-2002 from *Labor Yearbook 2005*, p. 46; urban CPI: *Statistical Yearbook 1994*, p. 230, *2005*, p. 301; staff and workers: *Labor Yearbook 1996*, p. 19f., *2005*, p. 25.

Appendix 19 Average Wage of Staff and Workers, 2003-04 (in yuan RMB per staff/worker-year)

	Nominal		In 2000 prices[a]	
	2003	2004	2003	2004
Total	14040	16024	13958	15421
Farming, forestry, animal husbandry and fishery	6969	7611	6928	7325
Mining and quarrying	13682	16874	13602	16239
Manufacturing	12496	14033	12423	13505
Utilities	18752	21805	18642	20985
Construction	11478	12770	11411	12290
Transport, storage, and postal services	15973	18381	15879	17689
Information transmission, computer services and software	32244	34988	32055	33672
Wholesale and retail trade	10939	12923	10875	12437
Accommodation and catering	11083	12535	11018	12063
Finance	22457	26982	22325	25967
Real estate	17182	18712	17081	18008
Leasing and commercial services	16501	18131	16404	17449
Scientific research, polytechnic services, and geol. prosp.	20636	23593	20515	22705
Administration of water, environm., and public facilities	12095	13336	12024	12834
Resident and other services	12900	14152	12824	13620
Education	14399	16277	14315	15665
Public health, social insurance, and social welfare	16352	18617	16256	17917
Culture, sports, and entertainment	17268	20730	17167	19950
Public administration and social organizations	15533	17609	15442	16946

a Average wage in year 2000 prices is calculated by applying the urban CPI uniformly to all individual sectors; the urban CPI, with previous year equal to 100, in 2001-04 is 100.7, 99.0, 100.9, and 103.3.

Sources: average wage from *Labor Yearbook 2005*, p. 56; urban CPI from *Statistical Yearbook 2005*, p. 301.

Appendix 20 Average Wage of Staff and Workers, Second-Level Classification GB1994, 1993-2002 (yuan RMB, current prices)

		1993[a]	1994	1995	1996	1997	1998	1999	2000	2001	2002	2002/ 1994[b] real growth	2002/ 1993[b] real growth
	National value	**3371**	**4538**	**5500**	**6210**	**6470**	**7479**	**8346**	**9371**	**10870**	**12422**	2.12	2.28
I	**Agriculture**	**2042**	**2819**	**3522**	**4050**	**4311**	**4528**	**4832**	**5184**	**5741**	**6398**	1.76	1.94
1	Farming	1870	2543	3277	3898	4186	4289	4383	4665	4919	5383	1.64	1.78
2	Forestry	2024	2885	3768	3851	3918	4132	4580	4771	5297	6001	1.61	1.84
3	Animal husbandry	2179	2917	3338	3837	4035	4187	4651	5093	5647	6063	1.61	1.72
4	Fishery	2579	3819	5129	5164	5416	6001	6542	7131	7266	8077	1.64	1.94
5	Agricultural services	2593	3636	4177	4645	4989	5470	6114	6673	8020	9079	1.93	2.17
II	**Mining and quarrying**	**3711**	**4679**	**5757**	**6482**	**6833**	**7242**	**7521**	**8340**	**9586**	**11017**	1.82	1.84
6	Coal mining and dressing	3806	4541	5607	6401	6652	*6603*	*6546*	*7329*	*8695*	*10194*	1.74	1.66
7	Petroleum and natural gas extraction	5007	7507	9238	10727	12127	*12707*	*14318*	*16614*	*18695*	*20663*	2.13	2.56
8	Ferrous metals mining and dressing	3701	4995	6004	6289	6421	*7328*	*7768*	*8188*	*9226*	*10763*	1.67	1.80
9	Nonferrous metals mining and dressing	3166	4197	5203	5568	5741	*6401*	*6910*	*7610*	*8185*	*9307*	1.72	1.82
10	Nonmetal minerals mining and dressing	3254	3825	4482	4812	4989	*5687*	*6123*	*6551*	*7403*	*8104*	1.64	1.54
11	Other minerals mining and dressing	2835	3157	5071	4437	4276	*4785*	*5899*	*6885*	*6547*	*7922*	1.94	1.73
12	Logging and transport of timber and bamboo	2522	3044				*4224*	*4311*	*4560*	*4675*	*4904*	1.25	1.20
III	**Manufacturing**	**3348**	**4283**	**5169**	**5642**	**5933**	**7064**	**7794**	**8750**	**9774**	**11001**	1.99	2.04
13	Food processing	2672	3639	4470	4786	5031	*5714*	*5987*	*6457*	*7172*	*7965*	1.69	1.85
14	Food manufacturing	2723	3399	4157	4710	5021	*6645*	*7466*	*8338*	*9125*	*10064*	2.29	2.29
15	Beverage manufacturing	2828	3550	4467	4997	5384	*6532*	*7393*	*7907*	*8919*	*9619*	2.10	2.11
16	Tobacco processing	4232	6479	8816	10342	11412	*12812*	*13831*	*16591*	*20269*	*23744*	2.84	3.47
17	Textile industry	2800	3516	4122	4329	4545	*5280*	*5753*	*6398*	*6681*	*7268*	1.60	1.61
18	Garments and other fiber products	3086	3846	4478	4947	5300	*6416*	*7084*	*7787*	*8367*	*9066*	1.82	1.82
19	Leather, furs, down and related products	3021	3596	4311	4885	5266	*6785*	*7333*	*8005*	*8217*	*9108*	1.96	1.87
20	Timber proc., bamboo, cane, palm f.; straw products	2280	2727	3180	3250	3497	*4719*	*5410*	*6003*	*6318*	*7339*	2.08	1.99
21	Furniture manufacturing	2530	2982	3884	4163	4347	*5751*	*6306*	*6884*	*7721*	*8881*	2.31	2.17
22	Papermaking and paper products	2667	3333	4290	4817	4811	*5776*	*6360*	*7081*	*7730*	*8668*	2.01	2.01
23	Printing industry	2796	3492	4321	4941	5450	*6711*	*7486*	*8301*	*9616*	*10863*	2.41	2.41
24	Cultural, educational and sports goods	3467	4323	5286	6085	6243	*7443*	*8016*	*8839*	*9492*	*10390*	1.86	1.86
25	Petroleum processing and coking	4563	6538	8426	9153	9657	*11094*	*12917*	*15335*	*15854*	*17357*	2.06	2.36

26	Raw chemical materials and chemical products	3269	4234	5449	6016	6200	*7080*	*7542*	*8338*	*9288*	*10359*	1.89	1.96
27	Medical and pharmaceutical products	3518	4496	5491	6071	6496	*8243*	*9187*	*10259*	*11626*	*13207*	2.27	2.33
28	Chemical fiber	4254	5902	7125	7740	7466	*8495*	*9524*	*10447*	*10826*	*11404*	1.50	1.66
29	Rubber products	3359	4138	4878	5367	5799	*7203*	*7664*	*8070*	*9089*	*10055*	1.88	1.85
30	Plastic products	2875	3544	4387	4853	5137	*6717*	*7377*	*8230*	*8990*	*10131*	2.21	2.18
31	Nonmetal mineral products	3223	3997	4616	4914	5022	*5909*	*6390*	*6877*	*7359*	*8123*	1.57	1.56
32	Smelting and pressing of ferrous metals	5032	6646	7523	8242	8444	*9236*	*10074*	*11549*	*13266*	*15032*	1.75	1.85
33	Smelting and pressing of nonferrous metals	4061	5430	6731	7259	7711	*8357*	*9202*	*11164*	*11950*	*12491*	1.78	1.91
34	Metal products	2985	3753	4394	4778	5020	*6301*	*7132*	*7928*	*8880*	*10075*	2.08	2.09
35	Ordinary machinery	3460	4359	5218	5445	5608	*6774*	*7455*	*8230*	*9343*	*10668*	1.89	1.91
36	Special purpose equipment	3453	4249	5119	5498	5696	*6462*	*7103*	*7720*	*9004*	*10406*	1.90	1.87
37	Transport equipment	4034	5116	6174	6928	7399	*8626*	*9460*	*10669*	*12141*	*14409*	2.18	2.21
38	Weapons and ammunition manufacturing	3183	4113	4750									
39	Electric equipment and machinery	3677	4574	5460	6055	6385	*7847*	*8635*	*9583*	*10740*	*12405*	2.10	2.09
40	Electronic and telecommunications equipment	3852	5189	6387	7032	7915	*10474*	*12249*	*14138*	*16350*	*17636*	2.63	2.84
41	Instruments, meters, cultural and office equipment	3494	4328	5240	5615	6174	*8023*	*9135*	*9594*	*11091*	*12720*	2.28	2.25
42	Other manufacturing	2774	3541	4313	4575	4603	*5590*	*6319*	*7252*	*7423*	*8781*	1.92	1.96
IV	**Utilities**	**4319**	**6155**	**7843**	**8816**	**9649**	**10478**	**11513**	**12830**	**14590**	**16440**	2.07	2.36
43	Prod./supply of electric power, steam, hot water	4385	6330	8151	9169	10037	*10825*	*11919*	*13325*	*15207*	*17237*	2.11	2.43
44	Production and supply of gas	4389	5640	6887	8185	8823	*9930*	*11049*	*11866*	*13203*	*14141*	1.94	2.00
45	Production and supply of tap water	3940	5468				*8833*	*9559*	*10635*	*11456*	*12679*	1.80	1.99
V	**Construction**	**3779**	**4894**	**5785**	**6249**	**6655**	**7456**	**7982**	**8735**	**9484**	**10279**	1.63	1.68
46	Building projects	3681	4735	5560	5973	6298	7092	7585	8271	9003	9737	1.59	1.64
47	Installation of lines, pipelines, and equipment	4630	6235	7573	8386	9330	10162	10844	12011	12931	14410	1.79	1.93
48	Renovation and decoration	4350	5032	5909	6738	7207	8011	8557	9499	10271	11208	1.72	1.60
VI	**Geological prospecting and water management**	**3717**	**5450**	**5962**	**6581**	**7160**	**7951**	**8821**	**9622**	**10957**	**12303**	1.75	2.05
49	Geological prospecting	4212	6229	6866	7656	8360	9611	10613	11534	13085	14966	1.86	2.20
50	Water management (conservancy)	2834	4281	4723	5301	5769	6380	7155	7836	9133	10204	1.85	2.23
VII	**Transport, storage, post and telecomm. services**	**4273**	**5690**	**6948**	**7870**	**8600**	**9808**	**10991**	**12319**	**14167**	**16044**	2.18	2.33
51	Railway transport	5242	7196	9098	10322	11152	11516	12639	13920	15136	16613	1.79	1.96
52	Road transport	2729	3221	3718	4043	4354	5522	6210	6832	7704	8585	2.06	1.95
53	Pipeline transport	4951	6671	9099	10225	11004	12894	15051	15672	18496	27338	3.17	3.42
54	Water transport	4666	6103	7208	7393	7737	9636	10880	12347	14350	15535	1.97	2.06
55	Air transport	6798	9618	12686	14378	16865	17395	19726	23454	27365	30641	2.47	2.79
56	Subsidiary transport business	4014	5622	6585	7668	8256	9240	10465	11657	13420	14874	2.05	2.29

57	Other transport	3664	4547	5260	5209	5534	8808	9297	10006	11046	11570	1.97	1.96
58	Storage	3893	4582	5330	6046	6437	7262	7899	8685	9418	10312	1.74	1.64
59	Post and telecommunications	5486	7537	9201	10569	12056	13017	14424	16359	19991	23582	2.42	2.66
VIII	**Wholesale and retail trade, and catering services**	**2679**	**3537**	**4248**	**4661**	**4845**	**5865**	**6417**	**7190**	**8192**	**9398**	2.06	2.17
60	Wh. of foods, beverages, tobacco, consumer goods	2711	3541	4319	4743	4982	5983	6464	7333	8199	9381	2.05	2.14
61	Wh. of energy, raw mat., mach., electronic equipm.	3412	4363	4978	5365	5522	7083	7953	9096	10441	12038	2.14	2.19
62	Other wholesale	2431	3771	4570	4806	4917	5781	6367	7082	7995	9265	1.90	2.36
63	Retail trade	2408	3153	3826	4232	4362	5229	5746	6326	7297	8177	2.01	2.10
64	Commission trade	3740	5755	6767	8095	8865	11400	13194	16087	20678	28776	3.87	4.77
65	Catering services	3019	3841	4580	5153	5576	6772	7167	7791	8759	9336	1.88	1.92
IX	**Finance and insurance**	**3740**	**6712**	**7376**	**8406**	**9734**	**10633**	**12046**	**13478**	**16277**	**19135**	2.21	3.17
66	Finance	3721	6711	7357	8395	9718	10630	12028	13446	16172	18931	2.18	3.15
67	Insurance	4024	6729	7724	8598	9982	10676	12288	13884	17498	21121	2.43	3.25
X	**Real estate**	**4320**	**6288**	**7330**	**8337**	**9190**	**10302**	**11505**	**12616**	**14096**	**15501**	1.91	2.22
68	Real estate development	4696	6893	8178	9069	9935	11083	12249	13342	14591	16422	1.84	2.17
69	Real estate administration	4014	5727	6545	7578	8409	9595	10865	11995	13634	14643	1.98	2.26
70	Real estate agencies	3827	6355	6426	7302	8120	8962	10121	11989	14060	15690	1.91	2.54
XI	**Social services**	**3588**	**5026**	**5982**	**6778**	**7553**	**8333**	**9263**	**10339**	**11869**	**13499**	2.08	2.33
71	Public services	3674	5153	6091	6767	7530	8395	9413	10156	11558	12588	1.89	2.12
72	Resident services	2927	3805	4812	5387	6149	6940	7126	8453	9574	11410	2.32	2.41
73	Hotels	3787	5215	6160	6884	7275	7984	8560	9201	10226	11010	1.63	1.80
74	Leasing	4180	5118	7310	7661	7755	8415	9406	9810	11401	12265	1.86	1.82
75	Tourism	4158	5950	6737	7727	8884	8995	9739	10736	12004	12878	1.68	1.92
76	Entertainment	4171	6098	6804	7761	8527	9177	9692	10109	11159	11400	1.45	1.69
77	News and consulting	4103	5622	6766	8370	9539	11741	13979	15409	19314	23056	3.17	3.48
78	Computer applications	4631	6840	8689	13930	17416	15385	19150	28333	30146	38810	4.39	5.19
79	Other social services	3170	4369	5137	5762	6998	7210	8135	9614	10694	11546	2.05	2.26
XII	**Health care, sports, and social welfare**	**3413**	**5126**	**5860**	**6790**	**7599**	**8493**	**9664**	**10930**	**12933**	**14795**	2.23	2.68
80	Health care	3415	5126	5862	6789	7598	8471	9648	10910	12912	14772	2.23	2.68
81	Sports	3822	5744	6512	7846	8973	10448	11540	13380	15756	17911	2.41	2.90
82	Social welfare and insurance	3347	4793	5485	6325	7003	8152	9244	10343	12243	14082	2.27	2.61
XIII	**Education, culture and arts, radio, film, and TV**	**3278**	**4923**	**5435**	**6144**	**6759**	**7474**	**8510**	**9482**	**11452**	**13290**	2.09	2.51
83	Education	3291	4917	5418	6099	6694	7377	8392	9336	11269	13095	2.06	2.46
84	Culture and arts	3352	5194	5841	7006	7947	9231	10658	12159	14735	16709	2.49	3.09
85	Radio, film, and television	3273	4695	5347	6199	7008	7999	9188	10388	12669	14577	2.40	2.76

XIV	**Scientific research and polytechnic services**	**3904**	**6162**	**6846**	**8048**	**9049**	**10241**	**11601**	**13620**	**16437**	**19113**	2.40	3.03
86	Scientific research	4057	6201	6770	7870	9066	10249	11784	13602	17066	20065	2.51	3.06
87	Polytechnic services	3679	6112	6930	8230	9031	10233	11448	13634	16007	18485	2.34	3.11
XV	**Government agencies, Party agencies, social org.**	**3505**	**4962**	**5526**	**6340**	**6981**	**7773**	**8978**	**10043**	**12142**	**13975**	2.18	2.47
88	Government agencies	3408	4958	5527	6341	6987	7760	8965	10024	12097	13932	2.18	2.53
89	Party agencies	3379	5213	5641	6340	6931	7825	8932	10125	12389	14323	2.13	2.63
90	Social organizations												
91	Autonomous grassroots organizations												
XVI	**Others**	**3371**	**5213**	**6295**	**7184**	**6838**	**8481**	**10068**	**11098**	**12590**	**14215**	2.11	2.61
	Urban CPI (previous year = 100)	116.1	125.0	116.8	108.8	103.1	99.4	98.7	100.8	100.7	99.0		
	Urban CPI (year 2000 = 1)	0.617	0.772	0.901	0.981	1.011	1.005	0.992	1.000	1.007	0.997		

a The 1993 data come with a note that the second-level values do not include Yunnan Province; the second-level data on mining and quarrying, manufacturing, and public utilities are from a different table which does not come with such a note.

b Real growth is obtained across all first- and second-level sectors by applying the urban CPI to nominal values.

Values in italics—sub-sectors of mining and quarrying, manufacturing, and public utilities, in 1998-2002—are average wages of *all employees* in urban units, not only of the staff and workers. In each of the three sectors, the number of (end-year) employees across all sub-sectors in 1998-2000 is always less than one percent higher than the aggregate number of (end-year) staff and workers in each of the three sectors (the sectoral values reported here are staff and worker numbers), and in 2001/02 always less than two percent higher.

The first year for which the data on staff and workers in second-level sectors are available is 1993. For earlier years, the corresponding *Labor Yearbook* issues (going back to the 1989 issue, with data on 1988) only report data on staff and workers in state-owned units and in collective-owned units (separately) at the second level. Staff and workers in "other urban units" in 1993 accounted for 3.6% of all staff and workers, i.e., by adding up staff and workers in state-owned units and in collective-owned units, second level sector data could be approximated for 1988-1992 (using employment values as weights to obtain the overall average wage).

The (end-year) employment data available in the same source suggest that the second-level sectors of "government agencies, Party agencies, and social organization" are not exhaustive.

Sources: *Labor Yearbook 1994*, pp. 109f., 195-224; *1995*, pp. 121f., 209-38; *1996*, pp. 139f., 185-95; *1997*, pp. 137f., 183-93; *1998*, pp. 148f., 200-10; *1999*, pp. 139f., 184-94; *2000*, pp. 107f., 152-62; *2001*, pp. 93f., 138-48; *2002*, pp. 157f., 202-12; *2003*, pp. 171f., 216-26. Urban CPI: *Statistical Abstract 2006*, p. 93.

Appendix 21 Average Wage of Staff and Workers, Second-Level Classification GB2002, 2003 and 2004 (yuan RMB, current prices)

	2003	2004	Match with GB'94	2004/ 1994[a] real growth	2004/ 1993[a] real growth
National	**14040**	**16024**		2.62	2.82
Agriculture	**6969**	**7611**	I	2.01	2.21
Farming	6360	6875	1	2.01	2.18
Forestry	6139	6718	2	1.73	1.97
Animal husbandry	6585	7279	3	1.85	1.98
Fishing	9489	9980	4	1.94	2.30
Agricultural services	9453	10565	5	2.16	2.42
Mining and quarrying	**13682**	**16874**	II	2.68	2.70
Mining and washing of coal	11926	15255	6	2.50	2.38
Extraction of petroleum and natural gas	23388	26782	7	2.65	3.18
Mining and processing of ferrous metal ores	12254	14696	8	2.19	2.36
Mining and processing of non-ferrous metal ores	10457	12479	9	2.21	2.34
Mining and processing of nonmetal ores	9005	10651	10	2.07	1.94
Mining of other ores n.e.c	7592	14061	11	3.31	2.95
Manufacturing	**12496**	**14033**	III	2.43	2.49
Processing of food from agricultural products	8663	9577	13	1.95	2.13
Manufacture of foods	10870	12139	14	2.65	2.65
Manufacture of beverages	10696	12059	15	2.52	2.53
Manufacture of tobacco	27335	34943	16	4.01	4.91
Manufacture of textiles	7993	8947	17	1.89	1.90
Manuf. of textile wearing apparel, footwear, and caps	9903	11191	18	2.16	2.15
Manufacture of leather, fur, feather and related products	9641	10727	19	2.22	2.11
Processing of timber, manufacture of wood, bamboo, rattan, palm, and straw products	7761	8681	20	2.36	2.26
Manufacture of furniture	9282	10445	21	2.60	2.45
Manufacture of paper and paper products	9781	10900	22	2.43	2.43
Printing, reproduction of recording media	11673	13325	23	2.83	2.83
Manufacture of articles for culture, educ. and sports activity	11088	11805	24	2.03	2.02
Proc. of petroleum , coking, processing of nuclear fuel	20865	23174	25	2.63	3.02
Manufacture of chemical raw materials and chemical prod.	12073	13626	26	2.39	2.48
Manufacture of medicines	14458	15572	27	2.57	2.63
Manufacture of chemical fibers	12266	13526	28	1.70	1.89
Manufacture of rubber	10757	12142	29	2.18	2.15
Manufacture of plastics	10882	12170	30	2.55	2.52
Manufacture of non-metallic mineral products	9118	10341	31	1.92	1.91
Smelting and processing of ferrous metals	18052	21156	32	2.36	2.50
Smelting and processing of non-ferrous metals	13689	15344	33	2.10	2.25
Manufacture of metal products	10861	12192	34	2.41	2.43
Manufacture of general purpose machinery	12639	14398	35	2.45	2.47
Manufacture of special purpose machinery	11911	13746	36	2.40	2.37
Manufacture of transport equipment	16114	18054	37	2.62	2.66
Manufacture of electrical machinery and equipment	13055	14438	39	2.34	2.33
Manufacture of communication equipment, computers and other electronic equipment	18117	19562	40	2.80	3.02
Manufacture of measuring instruments and machinery for cultural activity and office work	14564	15909	41	2.73	2.71

Manufacture of artwork and other manufacturing n.e.c	9827	11027			
Recycling and disposal of waste	12296	14616			
Prod. and distribution of electricity, gas and water	**18752**	**21805**	IV	2.63	3.00
Production and supply of electric power and heat power	20013	23420	43	2.75	3.17
Production and distribution of gas	15700	17956	44	2.36	2.43
Production and distribution of water	14200	15971	45	2.17	2.41
Construction	**11478**	**12770**	V	1.94	2.01
Construction of buildings, and civil engineering	11036	12217	46	1.92	1.97
Renovation	15253	17437			
Decoration	12282	13623			
Other construction	13214	13647			
Transport, storage and postal services	**15973**	**18381**	VII	2.40	2.56
Railway transport	18140	20717	51	2.14	2.35
Road transport	11157	12756	52	2.94	2.78
Urban public transport	13977	15346			
Water transport	22506	26496	54	3.22	3.37
Air transport	33377	39961	55	3.09	3.49
Pipeline transport	25761	28357	53	3.16	3.40
Loading/ unloading, removal, and other transport serv.	14695	18712			
Storage	10359	11577	58	1.88	1.77
Postal service	18907	20858	59	2.06	2.26
Information transfer, computer services, and software	**32244**	**34988**			
Telecomm. and other information transfer services	30481	32264			
Computer services	41722	47725	78	5.18	6.12
Software	36873	42835			
Wholesale and retail trade	**10939**	**12923**	(VIII)	2.71	2.87
Wholesale trade	12295	14922			
Retail trade	9277	10567			
Accommodation and catering	**11083**	**12535**			
Accommodation	11524	13065	73	1.86	2.05
Catering	10200	11491	65	2.22	2.26
Finance	**22457**	**26982**	IX	2.99	4.29
Banking	21783	26349			
Securities	42582	50529			
Insurance	22576	25185	67	2.78	3.72
Other financial activities	31651	41795			
Real estate	**17182**	**18712**	X	2.21	2.57
Real estate development management	17514	19840	68	2.14	2.51
Real estate management	16799	17073	69	2.21	2.53
Real estate agency services	19242	21190	70	2.48	3.29
Leasing and commercial services	**16501**	**18131**			
Leasing	13196	15222	74	2.21	2.16
Commercial services	16566	18193			
Scientific research, polytechnic services, geol. prosp.	**20636**	**23593**	(XIV)	2.84	3.59
Research and experimental development	22391	25052	86	3.00	3.67
Polytechnic services	22046	25349	87	3.08	4.09
Scientific exchange and distribution	16877	19923			
Geological prospecting	15277	18458	49	2.20	2.60
Admin. of water, environment, and public facilities	**12095**	**13336**			
Water management (conservancy)	11322	12627	50	2.19	2.65
Environmental management	11255	12259			
Management of public facilities	13885	15356			
Resident and other Services	**12900**	**14152**			
Resident services	13009	14713	72	2.87	2.99
Other services	12806	13626			

Education	**14399**	**16277**	83	2.46	2.94
Primary education	12223	13747			
Secondary education	14415	16299			
Higher education	23639	26263			
Health care, social insurance / welfare	**16352**	**18617**			
Health care	16389	18702	80	2.71	3.25
Social insurance	15729	16959			
Social welfare	15396	16795			
Culture, sports and entertainment	**17268**	**20730**			
News and publishing	26917	29932	(77)	3.95	4.33
Radio, film, television, and (other) audio-visual media	15098	18446	85	2.92	3.35
Culture and arts	14919	18751	84	2.68	3.32
Sports	18934	21308	81	2.76	3.31
Entertainment	12875	13725	76	1.67	1.96
Public administration and social organizations	**15533**	**17609**	XV	2.64	2.99
Chinese Communist Party organs	15456	17760	89	2.66	3.10
State institutions	15517	17623	88	2.51	3.10
People's Political Consultative Conf., democratic parties	17327	19883			
Mass and social organizations, and religious organizations	17481	19674			
Urban CPI (previous year = 100)	100.9	103.3			
Urban CPI (year 2000 = 1)	1.006	1.039			

a Real growth is obtained across all first- and second-level sectors by applying the urban CPI to nominal values. 1993 and 1994 values follow the GB1994, 2003 and 2004 values the GB2002. A match of some sectors and sub-sectors across the two classification systems is attempted in this table, but it may not be perfect, especially in the tertiary sector.

The (average annual) employment data available in the same source suggest that the second-level sectors of real estate, education, and public administration and social organizations are not exhaustive. Sources: *Labor Yearbook 2004*, pp. 183-6; *2005*, pp. 195-8. Urban CPI: *Statistical Abstract 2006*, p. 93. 1993 and 1994 values from Appendix 20 (with values adjusted using the urban CPI to be in constant year 2000 prices).

Appendix 22 Labor Remuneration, 1978-95 (b yuan RMB)

	1978	1979	1980	1981	1982	1983	1984	1985	1986
Economy-wide	170.841	201.306	223.406	250.751	283.451	318.040	379.765	453.751	507.630
Primary sector	86.464	106.467	114.143	134.220	154.321	174.435	201.972	226.473	244.179
Secondary sector	55.701	62.483	70.723	72.787	78.753	87.595	108.555	139.636	156.117
Industry	43.183	48.235	54.912	56.160	60.344	66.979	82.653	105.477	117.753
Construction	12.517	14.248	15.811	16.627	18.408	20.616	25.905	33.900	38.199
Tertiary sector	28.677	32.355	38.540	43.744	50.378	56.010	69.238	87.635	107.332
Transport, post and telecommunications	4.742	5.298	6.030	6.424	7.554	8.477	11.329	14.550	18.576
Commerce and catering (and storage)	9.067	10.333	12.186	13.992	16.138	17.333	21.480	27.406	32.235
Banking and insurance	0.676	0.808	1.092	1.339	1.636	2.037	2.342	3.137	4.400
Real estate	0.168	0.244	0.264	0.353	0.405	0.381	0.418	0.654	0.760
Social services	1.937	2.206	2.739	3.047	3.537	4.001	5.206	6.343	7.984
Health, sports, and (social) welfare	1.692	1.897	2.269	2.692	3.139	3.557	4.379	5.183	6.461
Education, culture and arts, radio, film and television	4.425	4.947	6.001	6.785	7.744	8.572	10.401	13.049	15.551
Scientific research and polytechnic services	1.214	1.401	1.810	2.141	2.354	2.682	3.231	4.019	4.832
Government, Party, and social organizations	3.012	3.401	4.103	4.704	5.330	6.205	7.576	9.480	12.162
Others	1.746	1.824	2.047	2.266	2.540	2.765	2.877	3.225	3.722
Economywide less primary, secondary, and tert. sector	-0.001	0.001	0.000	0.000	-0.001	0.000	0.000	0.007	0.002
Secondary sector less industry, construction	0.001	0.000	0.000	0.000	0.001	0.000	-0.003	0.259	0.165
Tertiary sector less sum tertiary sector sub-sectors	-0.002	-0.004	-0.001	0.001	0.001	0.000	-0.001	0.589	0.649
CPI[a] (previous year = 100)	*100.7*	*101.9*	*107.5*	*102.5*	*102.0*	*102.0*	*102.7*	109.3	106.5
CPI[a] (year 2000 = 1)	0.230	0.235	0.252	0.259	0.264	0.269	0.276	0.302	0.322

	1987	1988	1989	1990	1991	1992	1993	1994	1995
Economy-wide	592.986	743.996	839.156	980.086	1102.782	1297.355	1733.782	2323.582	3045.377
Primary sector	277.539	334.189	363.453	433.696	456.515	498.754	580.397	777.621	1009.373
Secondary sector	187.701	237.361	272.899	300.803	350.701	433.401	657.204	870.796	1149.335
Industry	142.933	181.740	217.602	239.256	279.658	338.982	522.785	700.588	937.466
Construction	44.590	55.435	55.050	61.300	70.759	94.101	134.065	170.208	211.869
Tertiary sector	127.746	172.448	202.804	245.588	295.566	365.200	496.180	675.162	886.669
Transport, post and telecommunications	21.630	27.730	32.458	36.954	41.830	54.627	83.390	112.610	158.690
Commerce and catering (and storage)	38.728	54.086	60.420	71.585	88.763	113.420	155.799	206.544	273.830
Banking and insurance	5.618	8.281	10.949	12.814	16.142	18.234	24.843	41.403	48.654

Real estate	0.772	1.173	1.346	1.766	2.463	3.605	6.608	8.554	12.319
Social services	10.206	14.048	15.544	18.566	21.216	27.287	37.569	54.603	76.649
Health, sports, and (social) welfare	7.662	9.910	11.953	14.420	17.769	20.650	26.336	34.731	45.456
Education, culture and arts, radio, film and television	18.139	23.844	27.536	31.524	35.812	42.609	55.229	73.367	94.579
Scientific research and polytechnic services	6.022	7.780	9.691	11.738	13.399	16.727	22.597	31.364	39.568
Government, Party, and social organizations	14.478	20.886	27.294	39.301	50.323	58.804	70.650	96.045	117.113
Others	3.831	4.130	5.077	6.086	6.908	8.270	12.529	15.944	19.811
Economywide less primary, secondary, and tert. sector	0.000	-0.002	0.000	-0.001	0.000	0.000	0.001	0.003	0.000
Secondary sector less industry, construction	0.178	0.186	0.247	0.247	0.284	0.318	0.354	0.000	0.000
Tertiary sector less sum tertiary sector sub-sectors	0.660	0.580	0.536	0.834	0.941	0.967	0.630	-0.003	0.000
CPI[a] (previous year = 100)	107.3	118.8	118.0	103.1	103.4	106.4	114.7	124.1	117.1
CPI[a] (year 2000 = 1)	0.345	0.410	0.484	0.499	0.516	0.549	0.630	0.781	0.915

a The CPI prior to 1985 is the urban CPI. No (total) CPI values are available for 1978-84. The series with year 2000 value equal to unity is based on the published series with 1985=100 for the years 1985-95 (and 2000), and uses the annual growth rates for the years 1978-94.

Lacking national data, all values are sum provincial values. All values are pre-economic census values; revised values have so far not been released, and are unlikely to be forthcoming. Since the sum provincial pre-economic census value added comes very close to the post-economic census national value added, these provincial pre-economic census values may be quite accurate.

Numerous obvious typos in the source have been corrected. Some errors did not come with a cue as to how to correct them, and were therefore retained. Values for Hainan begin only in 1990; values for Guangdong for the years prior to 1990 most likely *exclude* Hainan. Values for Tibet only begin in 1985, and then cover the three main economic sectors only; since 1994 data on Tibet are available on all sectors (and sub-sectors). No attempt has been made to correct for the incompleteness of the data. Given the size of these two provinces, the missing values should not be larger than 1% of total labor remuneration in any one year.

The sectoral classification is the same as that of the output data in the source used (presumably the GB1994, with questions about the use of the GB1984 at least for some sub-sectors, and except for the inclusion of agricultural services in the tertiary sector rather than in the primary sector)).

Transport, post and telecommunications does not include "storage," unlike in the following appendix.

Commerce and catering (and storage) refers to commerce, catering, material supply, and storage (unlike in the following appendix, where commerce excludes storage).

Agricultural services (which here includes water conservancy) as well as geological investigation and prospecting are all included in scientific research and polytechnic services.

Sources: *GDP 1952-95*, numerous pages of individual provinces, with category definitions on p. 2. CPI: *Statistical Yearbook 1998*, pp. 301f., *2005*, p. 301.

Appendix 23 Labor Remuneration, 1995-2002 (b yuan RMB)

	1995	1996	1997	1998	1999	2000	2001	2002
Economy-wide	3016.065	3590.989	4045.762	4374.973	4589.451	5006.109	5494.768	6009.685
Primary sector	994.190	1168.063	1227.794	1257.737	1233.560	1237.860	1288.296	1323.232
Secondary sector	1123.672	1328.421	1523.308	1670.348	1760.374	1926.620	2106.799	2325.937
Industry	915.943	1083.277	1241.337	1334.661	1408.685	1532.670	1673.506	1848.272
Construction	207.729	245.144	281.971	335.692	351.689	393.960	433.293	477.665
Tertiary sector	898.173	1094.505	1294.660	1446.883	1595.517	1841.629	2099.673	2360.515
Agricultural services	8.554	10.357	11.911	13.377	15.127	17.128	19.924	21.565
Geological prospecting and water conservancy	11.017	14.011	15.114	16.728	18.575	21.182	23.682	25.652
Transport & storage, post & telecommunications	163.712	206.476	253.286	277.244	298.246	334.446	366.392	399.710
Wholesale and retail trade, catering services	282.131	336.754	397.157	426.704	451.242	507.065	564.338	612.127
Banking and insurance	46.945	62.483	76.202	88.648	92.240	120.184	137.642	156.948
Real estate	12.595	16.918	19.339	24.764	31.387	40.244	48.141	57.797
Social services	77.838	97.305	116.325	136.564	159.356	189.076	220.226	258.787
Health care, sports and social welfare	45.778	55.085	63.906	73.212	82.647	96.150	112.103	127.961
Education, culture and arts, radio, film and television	92.645	110.959	129.056	152.457	176.788	208.250	250.142	294.848
Scientific research and polytechnic services	20.668	22.363	25.955	29.369	34.467	39.048	47.774	53.142
Government, Party and social organizations	117.071	137.926	157.649	175.271	199.497	227.953	271.021	309.352
Others	20.231	23.868	28.760	32.545	35.945	40.903	38.289	42.626
Economywide less primary, secondary, and tert. sector	0.030	0.000	0.000	0.005	0.000	0.000	0.000	0.000
Secondary sector less industry, construction	0.000	0.000	0.000	-0.005	0.000	-0.010	0.000	0.000
Tertiary sector less sum tertiary sector sub-sectors	-1.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CPI (previous year = 100)	117.1	108.3	102.8	99.2	98.6	100.4	100.7	99.2
CPI (year 2000 = 1)	0.915	0.991	1.018	1.010	0.996	1.000	1.007	0.999

Lacking national data, all values are sum provincial values. All values are pre-economic census values; revised values have so far not been released, and are unlikely to be forthcoming. Since the sum provincial pre-economic census value added comes very close to the post-economic census national value added, these provincial pre-economic census values may be quite accurate.

The sectoral classification is the same as that of the output data in the source used (to judge by the sub-sector labels, the GB1994, except for the inclusion of agricultural services in the tertiary sector rather than in the primary sector).

The CPI series with year 2000 value equal to unity is based on the published series with 1985=100; using annual growth rates yields identical results in all years at the number of decimals reported.

Source: *GDP 1996-2002*, numerous pages of individual provinces. CPI: *Statistical Yearbook 2005*, p. 301.

Appendix 24 Investment in Fixed Assets Price Index / GFCF Deflator

	Previous year = 100					Year 2000 = 1					
	GFCF	Inv. in fixed asset price index				GFCF	Inv. in fixed asset price index				Mixed
		Total	Constr.	Equipm.	Other		Total	Constr.	Equipm.	Other	
1952						0.2811					0.2639
1953	98.8					0.2777					0.2607
1954	99.4					0.2759					0.2590
1955	95.7					0.2641					0.2479
1956	99.7					0.2633					0.2471
1957	95.8					0.2522					0.2367
1958	100.4					0.2531					0.2376
1959	108.4					0.2744					0.2576
1960	99.7					0.2735					0.2568
1961	98.2					0.2686					0.2521
1962	107.3					0.2882					0.2706
1963	104.8					0.3021					0.2836
1964	97.9					0.2959					0.2777
1965	96.7					0.2861					0.2686
1966	98.1					0.2806					0.2633
1967	100.3					0.2815					0.2643
1968	96.6					0.2720					0.2553
1969	97.7					0.2658					0.2495
1970	100.0					0.2657					0.2494
1971	101.1					0.2685					0.2520
1972	101.2					0.2719					0.2552
1973	100.1					0.2721					0.2555
1974	100.2					0.2726					0.2559
1975	101.2					0.2758					0.2589
1976	100.7					0.2777					0.2607
1977	101.5					0.2818					0.2645
1978	100.6					0.2834					0.2660
1979	102.2					0.2896					0.2718
1980	103.1					0.2984					0.2801
1981	103.2					0.3080					0.2891
1982	102.3					0.3151					0.2958
1983	102.5					0.3229					0.3030
1984	104.1					0.3360					0.3154
1985	107.2					0.3602					0.3381
1986	106.4					0.3835					0.3599
1987	105.2					0.4035					0.3787
1988	113.5					0.4578					0.4297
1989	108.5					0.4966	0.466	0.431	0.614	0.373	0.4662
1990	105.5	108.0	106.9	109.1	112.4	0.5238	0.503	0.461	0.670	0.419	0.5035
1991	108.5	109.5	109.7	106.1	116.8	0.5683	0.551	0.505	0.711	0.489	0.5513
1992	113.0	115.3	116.8	109.4	120.9	0.6422	0.636	0.590	0.778	0.592	0.6356
1993	125.1	126.6	131.3	119.7	123.4	0.8031	0.805	0.775	0.931	0.730	0.8047
1994	110.3	110.4	110.4	109.5	112.1	0.8861	0.888	0.856	1.019	0.818	0.8884
1995	106.0	105.9	104.7	106.3	112.4	0.9394	0.941	0.896	1.084	0.920	0.9408
1996	103.9	104.0	105.1	101.6	104.3	0.9764	0.978	0.941	1.101	0.959	0.9784
1997	101.7	101.7	102.9	98.1	102.9	0.9929	0.995	0.969	1.080	0.987	0.9951
1998	98.1	99.8	100.5	97.5	100.4	0.9738	0.993	0.974	1.053	0.991	0.9931
1999	101.6	99.6	100.3	97.5	99.9	0.9893	0.989	0.977	1.027	0.990	0.9891

2000	101.1	101.1	102.4	97.4	101.0	1.0000	1.000	1.000	1.000	1.000	1.0000
2001	100.4	100.4	101.4	97.0	101.0	1.0039	1.004	1.014	0.970	1.010	1.0040
2002	100.2	100.2	101.0	97.0	101.2	1.0061	1.006	1.024	0.941	1.022	1.0060
2003		102.2	104.2	97.0	101.6		1.028	1.067	0.913	1.038	1.0281
2004		105.6	108.2	99.4	103.5		1.086	1.155	0.907	1.075	1.0857
2005		101.6	101.8	99.4	103.2		1.103	1.175	0.902	1.109	1.1031

Constr.: construction and installation.

Equipm.: purchase of equipment, tools, and appliances.

Mixed: investment in fixed asset price index starting 1990, implicit GFCF deflator through 1989.

A regression (without intercept) of the total investment in fixed asset price index of 1990-2005 on its three components yields the three shares 0.6101, 0.2733, and 0.1171 (all significant at below the 0.1% level).

Sources: investment in fixed asset price index: *Statistical Abstract 2006*, p. 104; GFCF (nominal values and real growth rates): *GDP 1952-95*, pp. 50f., *GDP 1996-2002*, pp. 27f.

Appendix 25 Effective Investment in Fixed Assets, and Effective GFCF

	Effective investment			Inv. expenditures		SOU	GOV	Total	GFCF	
	Total	SOUs	Non-SOUs	Total	SOUs	transf. rate	ratio	transf. rate	expendit.	effective
	1	2	3	4	5	6=2/5	7	8	9	10=8*9
53*	40.295									54.949
1952									8.070	6.941
1953	7.762	7.508	0.254		9.159	0.8198	0.0899	0.8602	11.530	9.918
1954	8.752	8.347	0.404		10.268	0.8130	0.1131	0.8556	14.090	12.055
1955	9.648	9.067	0.581		10.524	0.8616	0.1478	0.8940	14.550	13.008
1956	13.801	12.130	1.671		16.084	0.7542	0.3129	0.8162	21.960	17.924
1957	16.120	14.131	1.989		15.123	0.9344	0.3539	0.9561	18.700	17.880
1958	22.627	20.869	1.758		27.906	0.7478	0.1215	0.8057	33.300	26.830
1959	28.215	25.474	2.741		36.802	0.6922	0.1293	0.7631	43.570	33.248
1960	31.150	28.655	2.494		41.658	0.6879	0.1038	0.7590	47.300	35.902
1961	13.472	11.622	1.850		15.606	0.7447	0.1298	0.8035	22.760	18.289
1962	8.657	6.898	1.759		8.728	0.7903	0.1390	0.8389	17.510	14.690
1963	11.308	9.559	1.750		11.666	0.8194	0.1194	0.8607	21.530	18.531
1964	15.738	13.729	2.009		16.589	0.8276	0.1168	0.8669	29.030	25.167
1965	22.630	20.299	2.331		21.690	0.9359	0.1102	0.9501	35.010	33.263
1966	20.671	17.938	2.733		25.480	0.7040	0.1089	0.7716	40.680	31.388
1967	12.275	9.498	2.778		18.772	0.5060	0.1305	0.6198	32.370	20.062
1968	9.515	6.958	2.557		15.157	0.4590	0.1310	0.5837	30.020	17.522
1969	16.284	13.013	3.271		24.692	0.5270	0.1273	0.6359	40.690	25.875
1970	28.789	24.029	4.759		36.808	0.6528	0.1414	0.7332	54.590	40.023
1971	28.988	22.713	6.275		41.731	0.5443	0.1640	0.6503	60.300	39.211
1972	30.268	22.979	7.289		41.281	0.5566	0.1781	0.6602	62.210	41.071
1973	38.541	30.097	8.444		43.812	0.6870	0.1902	0.7609	66.450	50.559
1974	38.710	29.348	9.362		46.319	0.6336	0.2134	0.7205	74.810	53.899
1975	46.607	34.840	11.767		54.494	0.6393	0.2332	0.7255	88.030	63.862
1976	44.771	30.871	13.900		52.394	0.5892	0.2766	0.6882	86.510	59.532
1977	56.302	39.166	17.137		54.830	0.7143	0.2982	0.7851	91.110	71.529
1978	68.741	49.694	19.047		66.872	0.7431	0.2882	0.8070	107.390	86.661
1979	78.889	58.519	20.370		69.936	0.8367	0.2743	0.8786	115.120	101.148
1980	82.895	57.275	25.620	91.090	74.590	0.7679	0.3163	0.8268	131.800	108.977
1981	82.453	54.862	28.955	96.100	66.751	0.8219	0.3375	0.8580	125.300	107.506
1982	99.247	63.129	32.337	123.040	84.531	0.7468	0.3433	0.8066	149.320	120.445
1983	118.723	72.574	38.410	143.010	95.196	0.7624	0.3631	0.8302	170.900	141.877
1984	149.096	87.469	53.931	183.290	118.518	0.7380	0.4474	0.8134	212.560	172.905
1985	195.003	116.467	79.770	254.320	168.051	0.6930	0.5418	0.7668	264.100	202.502
1986	263.352	161.569	101.783	312.060	207.940	0.7770	0.6058	0.8439	309.800	261.445
1987	310.073	179.497	130.576	379.170	244.880	0.7330	0.6743	0.8178	374.200	306.009
1988	380.864	212.910	167.954	475.380	302.000	0.7050	0.7606	0.8012	462.400	370.465
1989	375.843	216.793	159.050	441.040	280.820	0.7720	0.7838	0.8522	433.900	369.758
1990	399.534	246.369	153.165	451.700	298.630	0.8250	0.8314	0.8845	473.200	418.551
1991	464.980	280.020	184.960	559.450	371.380	0.7540	0.8889	0.8311	594.000	493.696
1992	625.437	376.111	249.326	808.010	549.870	0.6840	1.0795	0.7740	831.700	643.774
1993	927.863	498.539	429.324	1307.230	792.590	0.6290		0.7098	1298.000	921.312
1994	1191.150	610.603	580.547	1704.210	961.500	0.6351		0.6989	1685.630	1178.164
1995	1452.172	738.986	713.186	2001.930	1089.820	0.6781		0.7254	2030.050	1472.570
1996	1848.499	907.953	940.546	2297.400	1205.620	0.7531		0.8046	2333.610	1877.634
1997	2070.671	1042.060	1028.611	2494.110	1309.170	0.7960		0.8302	2515.420	2088.363

1998	2262.919	1147.131	1115.788	2840.620	1536.930	0.7464	0.7966	2763.080	2201.148
1999	2463.409	1225.269	1238.140	2985.470	1594.780	0.7683	0.8251	2947.550	2432.120
2000	2684.219	1292.463	1391.756	3291.770	1650.440	0.7831	0.8154	3262.380	2660.253
2001	2818.488	1251.263	1567.225	3721.350	1760.700	0.7107	0.7574	3681.330	2788.178
2002	3230.420	1301.440	1928.980	4349.991	1887.740	0.6894	0.7426	4191.830	3112.965
2003	3773.201	1383.042	2390.159	5556.661	2166.100	0.6385	0.6790	5130.390	3483.745
2004	4578.390			7047.740	2502.760		0.6496	6511.770	4230.210
2005	5362.600			8860.430			0.6052	7817.640	4731.472

53* denotes an estimate of the 1953 original fixed asset value using the perpetual inventory method. It is obtained as the 1953 effective investment (or effective GFCF) value multiplied by (1+g)/g, where g is the average annual (nominal) growth rate of 1953-58 in form of the percentage divided by 100; i.e., if the average annual growth rate is 15%, g=0.15.

Sources and explanations:

Economy-wide (total) effective investment: 1981-05: *Investment 1950-2000*, p. 77; *Investment Yearbook 2003*, p. 3, *2004*, p. 27, *Statistical Abstract 2006*, p. 52; pre-1981 values are sum SOU and non-SOU values.

SOU effective investment: 1981-05: *Investment 1950-2000*, p. 77; *Statistical Yearbook 2002*, p. 180, *2004*, p. 192 (more recent data than 2003 are not available); pre-1981 values are derived from capital construction and technological updating and transformation data, using both investment expenditures and effective investment as explained in the text (with *Investment 1950-2000* as source of these data).

Non-SOU effective investment: 1986-05: difference of total and SOU effective investment; pre-1986 values are derived using industrial gross output value data as explained in the text (with the *Industrial Yearbook 1993*, p. 35, as the source of these data).

Economy-wide investment expenditures: *Investment 1950-2000*, p. 15, *Statistical Yearbook 2004*, p. 188, *2005*, p. 185, *Statistical Abstract 2006*, p. 52.

SOU investment expenditures: 1980-05: *Investment 1950-2000*, p. 15, *Statistical Yearbook 2004*, p. 188, *2005*, p. 185 (the *Statistical Abstract 2006* does not report on the SOU category, but combines it with "others"); pre-1980 values: "source of funds" table in *Investment 1950-2000*, p. 25, with identical values for 1980-1993 as the plain SOU investment expenditure data (and slightly different data in 1994-00.

SOU transfer rate: ratio of SOU investment expenditures to SOU effective investment.

GOV ratio, i.e., ratio of non-SOE to SOE industrial gross output value: *Industrial Yearbook 1993*, p. 35. Non-SOEs does not include the values of individual-owned industry and "other" industry in 1953-57 (after 1957, no more data are reported on these two categories, and reporting resumes again with data at a very low level in 1980).

Economy-wide transfer rate = 0.226504 + 0.769739 * SOU transfer rate + 0.029341 * GOV ratio, with the coefficients estimated for the period 1981-92 when the necessary data are available (also see text).

GFCF (gross fixed capital formation): *GDP 1952-95*, p. 50, *GDP 1996-2002*, p. 27, *Statistical Abstract 2006*, p. 35; 2004 and 05 values are post-economic census values, with no revisions available for the earlier years (the statistical break in 2004 consists of a 4.4% increase in the GFCF value).

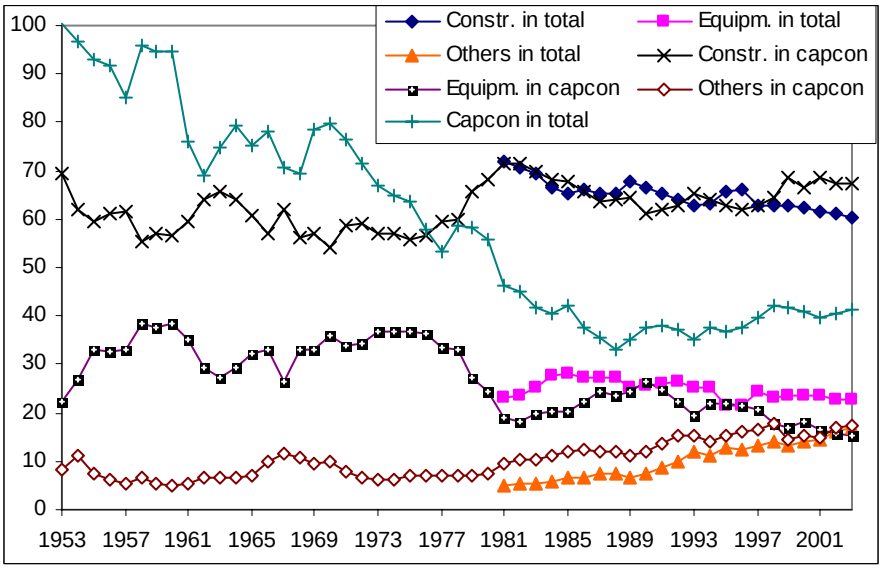
Effective GFCF: GFCF times the economy-wide transfer rate.

Appendix 26 Structural Shares in Investment Expenditures and Capital Construction (in %)

	Investment expenditures			Capital construction (expenditures)		
	Construction & installation	Purchase of equipment, tools, and appliances	Others	Construction & installation	Purchase of equipment, tools, and appliances	Others
1953				69.44	22.16	8.40
1954				61.92	26.79	11.30
1955				59.44	33.20	7.36
1956				61.06	32.61	6.32
1957				61.51	33.16	5.34
1958				55.23	38.25	6.52
1959				57.20	37.50	5.30
1960				56.63	38.36	5.01
1961				59.51	35.25	5.23
1962				64.23	29.29	6.48
1963				65.87	27.42	6.70
1964				64.10	29.24	6.66
1965				60.79	32.23	6.99
1966				57.00	33.10	9.90
1967				61.80	26.60	11.60
1968				56.40	33.00	10.60
1969				57.10	33.20	9.70
1970				53.96	35.92	10.12
1971				58.58	33.75	7.66
1972				59.15	34.41	6.44
1973				57.21	36.74	6.05
1974				56.83	36.77	6.40
1975				55.88	36.91	7.21
1976				56.56	36.23	7.21
1977				59.39	33.44	7.17
1978				60.05	33.09	6.86
1979				65.68	27.44	6.88
1980				68.18	24.43	7.39
1981	71.78	23.27	4.95	71.64	19.02	9.34
1982	70.80	23.68	5.52	71.53	18.30	10.17
1983	69.46	25.05	5.48	69.85	19.71	10.44
1984	66.43	27.78	5.79	68.32	20.44	11.24
1985	65.09	28.24	6.67	67.64	20.23	12.13
1986	66.00	27.30	6.70	65.52	22.14	12.34
1987	65.29	27.40	7.31	63.79	24.21	12.00
1988	65.20	27.46	7.34	64.16	23.67	12.17
1989	67.90	25.29	6.80	64.36	24.55	11.09
1990	66.61	25.80	7.59	61.35	26.63	12.01
1991	65.20	26.10	8.70	61.86	24.63	13.51
1992	63.90	26.30	9.80	62.72	22.15	15.13
1993	62.74	25.37	11.90	65.40	19.49	15.11
1994	63.29	25.40	11.31	64.07	21.79	14.14
1995	65.80	21.29	12.90	62.69	22.08	15.23
1996	65.96	21.51	12.54	62.08	21.61	16.31
1997	62.60	24.24	13.16	62.67	20.78	16.55

1998	62.92	22.98	14.09	64.58	17.64	17.78
1999	62.96	23.62	13.42	68.59	17.12	14.29
2000	62.39	23.65	13.96	66.56	18.31	15.14
2001	61.68	23.74	14.58	68.52	16.69	14.79
2002	61.10	22.72	16.18	67.17	15.74	17.10
2003	60.19	22.82	16.98	67.34	15.26	17.40
2004	60.73	23.45	15.82			
2005	60.46	23.89	15.64			

In some of the post-1980 years the percentages do not always perfectly add up to 100%. This seems a matter of rounding, except in the case of investment expenditures in 1994, when there is a very minor discrepancy (at a small fraction of 1%).
Sources: 1953-2000: *Investment 1950-2000*, pp. 15, 28, 29, *Statistical Yearbook 2004*, p. 188, *2005*, p. 185, *Statistical Abstract 2006*, p. 52 (all: total by structure); *Investment 1950-2000*, pp. 87, 110, *Statistical Yearbook 2004*, p. 195 (all: capital construction by structure).



Sources: see Appendix 26. Economy-wide investment expenditures in years prior to 1981 are obtained as (estimated) total effective investment divided by the (estimated) transfer rate (with both data series reported in Appendix 25).

Figure 42. Structural Shares in Investment in Fixed Assets and in GFCF

Appendix 27 Survival (Mortality) and Age-Efficiency Profiles

Year	Survival				Age-efficiency				Survival * age-efficiency			
	1953-85		1986 -		1953-85		1986 -		1953-85		1986 -	
	Equ.	Con.	Equ.	Con.	Equ.	Con.	Equ.	Con.	Equ.	Con.	Equ.	Con.
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00
5	0.99	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.97	1.00
6	0.98	1.00	0.94	1.00	1.00	1.00	0.99	1.00	0.98	1.00	0.93	1.00
7	0.97	1.00	0.89	1.00	1.00	1.00	0.98	1.00	0.96	1.00	0.88	1.00
8	0.94	1.00	0.83	1.00	0.99	1.00	0.97	1.00	0.93	1.00	0.81	1.00
9	0.91	1.00	0.77	1.00	0.99	1.00	0.95	1.00	0.90	1.00	0.73	1.00
10	0.87	1.00	0.70	1.00	0.98	1.00	0.91	1.00	0.85	1.00	0.63	1.00
11	0.83	1.00	0.63	1.00	0.96	1.00	0.86	1.00	0.80	1.00	0.54	0.99
12	0.78	1.00	0.56	0.99	0.95	1.00	0.79	1.00	0.73	1.00	0.44	0.99
13	0.72	0.99	0.49	0.99	0.92	1.00	0.70	1.00	0.67	0.99	0.35	0.99
14	0.67	0.99	0.43	0.98	0.88	1.00	0.61	1.00	0.59	0.99	0.26	0.98
15	0.62	0.99	0.38	0.98	0.84	1.00	0.50	1.00	0.52	0.99	0.19	0.97
16	0.57	0.98	0.33	0.97	0.79	1.00	0.39	1.00	0.45	0.98	0.13	0.97
17	0.52	0.98	0.29	0.96	0.73	1.00	0.30	0.99	0.38	0.97	0.09	0.95
18	0.47	0.97	0.25	0.95	0.66	0.99	0.21	0.99	0.31	0.96	0.05	0.94
19	0.43	0.96	0.21	0.94	0.58	0.99	0.14	0.99	0.25	0.95	0.03	0.93
20	0.39	0.95	0.18	0.92	0.50	0.99	0.09	0.99	0.19	0.94	0.02	0.91
21	0.35	0.94	0.16	0.91	0.42	0.99	0.05	0.98	0.15	0.93	0.01	0.89
22	0.31	0.93	0.14	0.89	0.34	0.99	0.03	0.98	0.11	0.92	0.00	0.87
23	0.28	0.91	0.12	0.87	0.27	0.98	0.02	0.97	0.08	0.90	0.00	0.85
24	0.25	0.90	0.10	0.85	0.21	0.98	0.01	0.97	0.05	0.88	0.00	0.83
25	0.23	0.88	0.09	0.83	0.16	0.98	0.00	0.96	0.04	0.86	0.00	0.80
26	0.20	0.87	0.07	0.81	0.12	0.97	0.00	0.95	0.02	0.84	0.00	0.77
27	0.18	0.85	0.06	0.79	0.08	0.97	0.00	0.95	0.01	0.82	0.00	0.75
28	0.16	0.83	0.06	0.77	0.05	0.96	0.00	0.93	0.01	0.80	0.00	0.72
29	0.14	0.81	0.05	0.74	0.04	0.95	0.00	0.92	0.01	0.77	0.00	0.69
30	0.13	0.79	0.04	0.72	0.02	0.95	0.00	0.91	0.00	0.75	0.00	0.66
31	0.12	0.77	0.04	0.70	0.01	0.94	0.00	0.89	0.00	0.72	0.00	0.62
32	0.10	0.75	0.03	0.67	0.01	0.93	0.00	0.88	0.00	0.69	0.00	0.59
33	0.09	0.73	0.03	0.65	0.00	0.91	0.00	0.86	0.00	0.67	0.00	0.56
34	0.08	0.71	0.02	0.63	0.00	0.90	0.00	0.84	0.00	0.64	0.00	0.52
35	0.07	0.69	0.02	0.60	0.00	0.88	0.00	0.81	0.00	0.61	0.00	0.49
36	0.07	0.67	0.02	0.58	0.00	0.87	0.00	0.79	0.00	0.58	0.00	0.46
37	0.06	0.65	0.01	0.56	0.00	0.85	0.00	0.76	0.00	0.55	0.00	0.43
38	0.05	0.62	0.01	0.54	0.00	0.83	0.00	0.73	0.00	0.52	0.00	0.39
39	0.05	0.60	0.01	0.52	0.00	0.81	0.00	0.70	0.00	0.49	0.00	0.36
40	0.04	0.58	0.01	0.49	0.00	0.79	0.00	0.67	0.00	0.46	0.00	0.33
41	0.04	0.56	0.01	0.47	0.00	0.76	0.00	0.64	0.00	0.43	0.00	0.30
42	0.03	0.54	0.01	0.45	0.00	0.74	0.00	0.61	0.00	0.40	0.00	0.27
43	0.03	0.52	0.01	0.43	0.00	0.71	0.00	0.57	0.00	0.37	0.00	0.25
44	0.03	0.50	0.01	0.42	0.00	0.68	0.00	0.54	0.00	0.35	0.00	0.22
45	0.02	0.49	0.00	0.40	0.00	0.66	0.00	0.50	0.00	0.32	0.00	0.20
46	0.02	0.47	0.00	0.38	0.00	0.63	0.00	0.46	0.00	0.29	0.00	0.18
47	0.02	0.45	0.00	0.36	0.00	0.59	0.00	0.43	0.00	0.27	0.00	0.16
48	0.02	0.43	0.00	0.35	0.00	0.56	0.00	0.39	0.00	0.24	0.00	0.14

49	0.02	0.41	0.00	0.33	0.00	0.53	0.00	0.36	0.00	0.22	0.00	0.12
50	0.01	0.40	0.00	0.32	0.00	0.50	0.00	0.33	0.00	0.20	0.00	0.10
51	0.01	0.38	0.00	0.30	0.00	0.47	0.00	0.30	0.00	0.18	0.00	0.09
52	0.01	0.37	0.00	0.29	0.00	0.44	0.00	0.27	0.00	0.16	0.00	0.08
53	0.01	0.35	0.00	0.27	0.00	0.41	0.00	0.24	0.00	0.14	0.00	0.07
54	0.01	0.34	0.00	0.26	0.00	0.37	0.00	0.21	0.00	0.13	0.00	0.06
55	0.01	0.32	0.00	0.25	0.00	0.34	0.00	0.19	0.00	0.11	0.00	0.05
56	0.01	0.31	0.00	0.24	0.00	0.32	0.00	0.16	0.00	0.10	0.00	0.04
57	0.01	0.30	0.00	0.23	0.00	0.29	0.00	0.14	0.00	0.09	0.00	0.03
58	0.01	0.28	0.00	0.21	0.00	0.26	0.00	0.12	0.00	0.07	0.00	0.03
59	0.01	0.27	0.00	0.20	0.00	0.24	0.00	0.11	0.00	0.06	0.00	0.02
60	0.00	0.26	0.00	0.19	0.00	0.21	0.00	0.09	0.00	0.06	0.00	0.02
61	0.00	0.25	0.00	0.18	0.00	0.19	0.00	0.08	0.00	0.05	0.00	0.01
62	0.00	0.24	0.00	0.18	0.00	0.17	0.00	0.07	0.00	0.04	0.00	0.01
63	0.00	0.23	0.00	0.17	0.00	0.15	0.00	0.05	0.00	0.03	0.00	0.01
64	0.00	0.22	0.00	0.16	0.00	0.13	0.00	0.05	0.00	0.03	0.00	0.01
65	0.00	0.21	0.00	0.15	0.00	0.12	0.00	0.04	0.00	0.02	0.00	0.01
66	0.00	0.20	0.00	0.14	0.00	0.10	0.00	0.03	0.00	0.02	0.00	0.00
67	0.00	0.19	0.00	0.14	0.00	0.09	0.00	0.03	0.00	0.02	0.00	0.00
68	0.00	0.18	0.00	0.13	0.00	0.07	0.00	0.02	0.00	0.01	0.00	0.00
69	0.00	0.18	0.00	0.12	0.00	0.06	0.00	0.02	0.00	0.01	0.00	0.00
70	0.00	0.17	0.00	0.12	0.00	0.05	0.00	0.01	0.00	0.01	0.00	0.00

Equ. (machinery): purchase of equipment, tools, and appliances.

Con. (building construction): construction & installation.

1953-85: average service life of equ. is assumed to be 20 years, and of con. 50 years.

1986-: average service life of equ. is assumed to be 15 years, and of con. 45 years.

Survival: one minus cumulative lognormal distribution. (The parameter choice follows OECD, 2001b, pp. 57f.)

Age-efficiency: one minus cumulative normal distribution, with as mean the average service life, and a standard deviation equal to one-quarter of average service life.

Survival * age-efficiency: multiplication of survival value and age-efficiency value.

Appendix 28 Depreciation, 1978-95 (b yuan RMB)

	1978	1979	1980	1981	1982	1983	1984	1985	1986
Economy-wide	33.394	37.679	42.883	47.464	53.004	60.131	70.828	85.331	100.813
Primary sector	3.162	3.986	4.200	4.719	5.511	6.207	7.055	7.310	9.151
Secondary sector	19.522	21.592	24.458	26.586	29.006	32.601	38.138	45.655	52.242
Industry	18.314	20.287	22.814	24.878	27.122	30.400	35.491	42.135	48.236
Construction	1.208	1.305	1.644	1.708	1.884	2.201	2.647	3.499	3.986
Tertiary sector	10.710	12.101	14.225	16.159	18.487	21.323	25.635	32.366	39.420
Transport, post and telecommunications	2.615	2.846	3.284	3.686	4.081	4.903	6.052	7.405	9.404
Commerce and catering (and storage)	1.460	1.696	1.954	2.217	2.547	2.928	3.425	4.394	5.366
Banking and insurance	0.131	0.146	0.175	0.200	0.251	0.311	0.409	0.504	0.684
Real estate	3.989	4.565	5.383	6.122	7.001	7.897	9.465	12.204	14.309
Social services	0.510	0.577	0.783	0.895	1.080	1.285	1.268	1.482	1.976
Health, sports, and (social) welfare	0.356	0.354	0.405	0.485	0.542	0.638	0.791	0.953	1.160
Education, culture and arts, radio, film and television	0.765	0.917	1.052	1.194	1.343	1.573	1.958	2.591	3.064
Scientific research and polytechnic services	0.313	0.339	0.421	0.481	0.535	0.632	0.791	0.938	1.084
Government, Party, and social organizations	0.534	0.613	0.709	0.806	0.998	1.122	1.378	1.659	2.088
Others	0.037	0.047	0.057	0.073	0.108	0.114	0.097	0.163	0.193
Economywide less primary, secondary, and tert. sector	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Secondary sector less industry, construction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.020
Tertiary sector less sum tertiary sector sub-sectors	0.000	0.001	0.002	0.000	0.001	-0.080	0.001	0.073	0.092
Average economy-wide depreciation rate	3.7	3.8	3.8	3.9	3.9	4.0	4.1	4.4	4.5

	1987	1988	1989	1990	1991	1992	1993	1994	1995
Economy-wide	122.525	153.734	184.556	214.644	260.904	333.173	397.812	540.689	711.633
Primary sector	10.849	13.202	14.689	16.368	16.963	19.674	25.136	33.030	41.971
Secondary sector	64.207	80.600	96.994	110.107	133.800	177.805	208.888	283.767	367.570
Industry	59.333	74.337	89.708	102.188	124.382	164.592	191.567	263.035	343.685
Construction	4.849	6.233	7.265	7.853	9.349	13.178	17.281	20.732	23.885
Tertiary sector	47.469	59.933	72.873	88.169	110.141	135.694	163.788	223.884	302.092
Transport, post and telecommunications	11.546	14.889	19.080	23.374	29.765	36.174	44.963	63.304	86.910
Commerce and catering (and storage)	6.342	8.872	10.950	13.104	16.503	21.578	25.799	33.566	47.020
Banking and insurance	0.972	1.437	2.032	2.623	3.784	5.165	6.625	11.670	15.898
Real estate	17.187	19.701	22.779	26.264	30.033	36.293	47.061	61.131	83.544

Social services	2.431	3.456	3.723	4.607	5.521	6.966	8.563	13.186	16.923
Health, sports, and (social) welfare	1.328	1.654	1.927	2.524	2.716	3.422	3.644	4.794	6.606
Education, culture and arts, radio, film and television	3.365	3.891	4.630	5.539	7.419	8.666	9.253	11.507	14.669
Scientific research and polytechnic services	1.350	1.917	2.505	3.353	4.255	5.378	5.349	8.594	9.666
Government, Party, and social organizations	2.603	3.426	4.193	5.770	8.755	10.187	10.322	14.697	18.438
Others	0.225	0.280	0.506	0.901	1.281	1.738	2.114	1.435	2.418
Economywide less primary, secondary, and tert. sector	0.000	-0.001	0.000	0.000	0.000	0.000	0.000	0.008	0.000
Secondary sector less industry, construction	0.025	0.030	0.021	0.066	0.069	0.035	0.040	0.000	0.000
Tertiary sector less sum tertiary sector sub-sectors	0.120	0.410	0.548	0.110	0.109	0.127	0.095	0.000	0.000
Average economy-wide depreciation rate	4.5	4.6	4.6	4.4	4.6	4.7	5.5	5.9	5.8

Lacking national data, all values are sum provincial values. All values are pre-economic census values; revised values have so far not been released, and are unlikely to be forthcoming. Since the sum provincial pre-economic census value added comes very close to the post-economic census national value added, these provincial pre-economic census values may be quite accurate.

Numerous obvious typos in the source have been corrected. Some errors did not come with a cue as to how to correct them, and were therefore retained. Values for Hainan begin only in 1990; values for Guangdong for the years prior to 1990 most likely *exclude* Hainan. Values for Tibet only begin in 1985, and then cover the three main economic sectors only; since 1994 data on Tibet are available on all sectors (and sub-sectors). No attempt has been made to correct for the incompleteness of the data. Given the size of these two provinces, the missing values should not be larger than 1% of total labor remuneration in any one year.

The sectoral classification is the same as that of the output data in the source used (presumably the GB1994, with questions about the use of the GB1984 at least for some sub-sectors, and except for the inclusion of agricultural services in the tertiary sector rather than in the primary sector)).

Transport, post and telecommunications does not include "storage," unlike in the following appendix.

Commerce and catering (and storage) refers to commerce, catering, material supply, and storage (unlike in the following appendix, where commerce excludes storage).

Agricultural services (which here includes water conservancy) as well as geological investigation and prospecting are all included in scientific research and polytechnic services.

Sources: *GDP 1952-95*, numerous pages of individual provinces, with category definitions on p. 2. Average economy-wide depreciation rates from Holz (2006c), p. 158.

Appendix 29 Depreciation, 1995-2002 (b yuan RMB)

	1995	1996	1997	1998	1999	2000	2001	2002
Economy-wide	705.375	874.489	1051.694	1191.069	1316.410	1500.915	1679.306	1849.574
Primary sector	41.012	49.499	53.426	55.137	55.330	60.236	64.744	70.949
Secondary sector	354.184	435.215	525.171	590.107	641.031	712.570	786.269	866.943
Industry	330.958	405.033	491.173	548.457	594.514	664.960	728.805	799.221
Construction	23.226	30.182	33.948	41.650	46.517	47.606	57.464	67.721
Tertiary sector	310.179	389.775	473.097	545.825	620.049	728.113	828.293	911.682
Agricultural services	1.659	2.004	2.299	2.518	2.688	3.007	3.486	3.689
Geological prospecting and water conservancy	3.375	4.268	4.548	4.936	5.672	6.562	7.091	8.124
Transport & storage, post & telecommunications	88.656	111.446	133.898	156.971	175.051	200.282	241.060	260.091
Wholesale and retail trade, catering services	47.621	60.761	70.969	82.946	97.662	114.735	121.308	130.176
Banking and insurance	16.087	21.032	26.218	31.737	35.960	43.076	48.946	56.083
Real estate	89.429	115.261	141.601	157.296	178.094	215.783	241.473	266.988
Social services	16.443	20.446	26.881	34.651	39.295	48.114	54.201	63.415
Health care, sports and social welfare	6.469	6.429	7.966	9.330	11.983	13.435	16.088	17.350
Education, culture and arts, radio, film and television	14.687	17.116	21.688	24.083	27.972	31.800	37.721	41.957
Scientific research and polytechnic services	4.885	5.654	6.588	7.995	8.710	9.271	10.446	11.408
Government, Party and social organizations	18.593	21.783	26.322	28.262	31.391	35.920	40.827	44.753
Others	2.454	3.575	4.119	5.100	5.571	6.228	5.646	7.648
Economywide less primary, secondary, and tert. sector	0.000	0.000	0.000	0.000	0.000	-0.004	0.000	0.001
Secondary sector less industry, construction	0.000	0.000	0.050	0.000	0.000	0.004	0.000	0.000
Tertiary sector less sum tertiary sector sub-sectors	-0.179	0.000	0.000	0.000	0.000	-0.100	0.000	0.000
Average economy-wide depreciation rate	5.8	5.0	4.8	4.2	4.5	4.7	5.2	5.1

Lacking national data, all values are sum provincial values. All values are pre-economic census values; revised values have so far not been released, and are unlikely to be forthcoming. Since the sum provincial pre-economic census value added comes very close to the post-economic census national value added, these provincial pre-economic census values may be quite accurate.

The sectoral classification is the same as that of the output data in the source used (to judge by the sub-sector labels, the GB1994, except for the inclusion of agricultural services in the tertiary sector rather than in the primary sector).

Source: *GDP 1996-2002*, numerous pages of individual provinces. Average economy-wide depreciation rates from Holz (2006c), p. 158.

Appendix 30 Directly Reporting Industrial Enterprise Productive Original Fixed Assets (in b yuan RMB at historic/revalued prices)

	1993	1994	1995	1996	1997	1998[a]	1999	2000	2001	2002
Total	2125.354	2752.889	3703.461	4374.712	5008.978	5451.467	6041.334	6613.052	7408.467	8062.518
Coal mining and dressing	96.453	107.142	145.446	173.044	191.021	192.341	211.314	216.891	257.561	296.286
Petroleum and natural gas extraction	159.743	183.288	224.825	263.668	297.730	313.728	402.525	463.089	571.832	608.727
Ferrous metals mining and dressing	4.729	7.003	8.417	10.186	10.608	13.042	11.131	12.163	13.000	17.427
Nonferrous metals mining and dressing	16.417	20.080	23.935	27.236	29.342	26.319	27.727	28.716	30.796	31.717
Nonmetal minerals mining and dressing	17.572	18.994	24.353	24.205	26.476	24.202	25.870	31.376	30.329	32.638
Logging and transport of timber and bamboo	10.219	11.936	13.607	15.243	14.942	14.911	14.465	14.338	12.956	14.151
Food processing	54.975	71.886	101.922	120.966	132.870	134.046	136.850	135.710	139.117	148.049
Food production	26.983	34.779	51.977	60.571	67.982	69.347	72.611	76.964	81.678	92.601
Beverage production	38.322	51.248	68.505	81.023	94.754	105.223	115.648	121.199	126.681	138.449
Tobacco processing	18.083	25.137	36.018	44.428	54.115	62.476	71.834	77.015	81.311	88.538
Textile industry	141.166	184.620	229.247	257.662	275.002	279.332	285.985	287.478	309.040	330.172
Garments and other fiber products	22.054	30.190	38.570	46.431	51.783	54.459	55.646	58.897	65.500	71.397
Leather, furs, down and related products	14.285	18.849	25.341	28.377	30.572	30.000	31.207	31.759	35.159	36.470
Timber processing, bamboo, cane, palm etc.	11.662	14.764	20.438	23.378	29.134	27.794	29.601	32.563	35.490	38.885
Furniture manufacturing	5.075	6.606	8.692	10.259	11.898	10.974	11.987	13.565	15.264	17.199
Papermaking and paper products	33.037	40.039	57.736	68.878	81.491	90.362	99.420	120.232	140.790	154.030
Printing and record medium reproduction	17.453	22.423	31.060	35.698	40.504	42.893	47.769	50.754	61.238	61.819
Cultural, educational and sports goods	6.145	8.667	11.558	13.369	15.500	16.703	17.337	18.602	20.764	23.387
Petroleum processing and coking	62.000	93.736	122.904	155.117	179.521	210.582	259.409	287.323	322.963	342.205
Raw chemical materials and chemical prod.	138.752	177.960	245.250	299.271	361.858	394.055	438.470	471.509	528.627	565.200
Medical and pharmaceutical products	31.805	41.301	55.170	60.382	72.088	80.164	87.259	98.016	104.114	118.820
Chemical fiber	52.043	65.680	79.048	92.027	102.930	119.402	136.380	135.736	104.251	111.239
Rubber products	14.199	18.812	25.746	32.718	38.434	42.933	47.379	47.924	55.538	57.472
Plastic products	31.714	40.779	56.117	65.319	75.718	79.255	86.401	94.226	104.721	116.108
Nonmetal mineral products	117.130	162.263	226.412	270.320	296.795	303.712	314.356	324.934	335.156	366.087
Smelting and pressing of ferrous metals	185.546	249.112	340.387	381.339	415.899	458.992	508.804	547.097	586.188	630.247
Smelting and pressing of nonferrous metals	49.326	52.729	79.482	96.414	108.505	130.176	137.888	145.229	153.823	180.856
Metal products	36.923	52.263	66.933	78.500	89.142	91.395	94.893	100.049	110.432	116.718
Ordinary machinery manufacturing	73.962	91.248	123.978	151.609	163.517	164.433	169.200	176.958	188.972	206.995
Special purpose equipment manufacturing	53.249	66.232	88.743	103.546	108.903	109.607	111.612	112.939	118.792	124.917

Transport equipment manufacturing	77.085	101.436	144.907	190.424	223.009	245.361	264.863	287.798	324.832	350.613
Electric equipment and machinery	52.989	73.082	97.747	119.954	140.030	154.398	164.686	174.649	196.463	208.583
Electronic and telecommunications equipm.	46.422	67.489	90.541	111.342	132.839	160.025	183.768	216.522	262.845	290.717
Instruments, meters, cultural and off. mach.	14.863	18.367	23.773	28.352	30.348	32.023	32.044	32.287	35.922	39.173
Prod./supply of electric power, steam etc.	345.355	465.266	612.705	683.974	856.656	1009.770	1173.376	1413.841	1625.385	1803.172
Production and supply of gas	10.614	15.447	20.622	23.814	27.732	32.159	35.623	37.986	39.082	42.324
Production and supply of tap water	24.034	35.460	52.633	65.541	77.163	85.395	101.585	108.534	122.138	127.514
Implicit residual	13.0	6.6	28.7	60.1	52.2	39.5	24.4	8.2	59.7	61.6

The definition of the directly reporting industrial enterprises changed in 1998, from the previous "all industrial enterprises with independent accounting system at township level and above" to "all industrial SOEs plus all industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB.

The data follow the GB1994 sectoral classification.

Values of *productive* original fixed assets in "other extraction" and in "other manufacturing," the two residual second-level sectors, are not available.

Abbreviations: see Appendix 11.

Separate data on *productive* original fixed assets are available for 1995 and 2001-04. For each specific industrial sector, the 1995 share of productive in all original fixed assets is applied to the 1993 and 1994 original fixed asset values. For the years 1996-00, the mean of the shares of 1995 and 2001 is used.
Sources: Productive original fixed assets, 1995, 2001, 2002: *Industrial Census 1995*, pp. 46-197, *Industrial Yearbook 2002*, p. 71, *2003*, p. 71; (total) original fixed assets in other years: *Statistical Yearbook 1994*, p. 379, and *1995*, p. 389 (or numerous pages in the *Industrial Yearbook 1994* and *1995*), *Industrial Yearbook 1998*, p. 79, *Statistical Yearbook 1999*, p. 433, *Industrial Yearbook 2001*, p. 51.

Appendix 31 Directly Reporting Industrial Enterprise Productive Original Fixed Assets 2003 and 2004 (in b yuan RMB at historic/revalued prices)

	2003	2004
Total	9028.566	11177.239
Mining and washing of coal	325.509	399.913
Extraction of petroleum and natural gas	562.845	824.528
Mining and processing of ferrous metal ores	21.398	30.062
Mining and processing of non-ferrous metal ores	32.047	36.916
Mining and processing of nonmetal ores	36.399	36.163
Mining of other ores	1.552	0.310
Processing of food from agricultural products	166.477	206.195
Manufacture of foods	96.680	124.681
Manufacture of beverages	148.415	154.387
Manufacture of tobacco	93.546	95.678
Manufacture of textiles	372.853	445.001
Manufacture of textile wearing apparel, footwear, and caps	79.729	93.961
Manufacture of leather, fur, feather and related products	42.770	52.455
Processing of timber, manufacture of wood, bamboo, etc.	42.684	55.766
Manufacture of furniture	22.379	30.151
Manufacture of paper and paper products	177.684	218.921
Printing, reproduction of recording media	74.384	89.014
Manufacture of articles for culture, education and sport activity	26.172	34.011
Processing of petroleum, coking, processing of nuclear fuel	354.254	404.999
Manufacture of raw chemical materials and chemical products	625.195	710.290
Manufacture of medicines	141.146	174.079
Manufacture of chemical fibers	110.223	132.277
Manufacture of rubber	66.237	85.302
Manufacture of plastics	132.618	177.937
Manufacture of non-metallic mineral products	402.914	506.853
Smelting and processing of ferrous metals	739.225	867.715
Smelting and processing of non-ferrous metals	200.735	269.657
Manufacture of metal products	117.758	145.857
Manufacture of general purpose machinery	226.765	284.577
Manufacture of special purpose machinery	162.761	184.831
Manufacture of transport equipment	407.524	482.808
Manufacture of electrical machinery and equipment	229.752	275.143
Manufacture of communication equipment, computers, etc.	339.373	512.094
Manufacture of measuring instruments and machinery etc.	47.613	59.747
Manufacture of artwork and other manufacturing	30.011	49.774
Recycling and disposal of waste	0.514	1.875
Production and distribution of electric power and heat power	2170.098	2655.627
Production and distribution of gas	50.150	65.202
Production and distribution of water	150.179	202.481
Implicit residual	-0.002	0.001

Abbreviations: Processing of timber, manufacture of wood, bamboo, etc. = Processing of timber, manufacture of wood, bamboo, rattan, palm, and straw products; Manufacture of communication equipment, computers, etc. = Manufacture of communication equipment, computers and other electronic equipment; Manufacture of measuring instruments and machinery etc. = Manufacture of measuring instruments and machinery for cultural activity and office work.

The data follow the GB2002 sectoral classification.

Source: 2003: *Industrial Yearbook 2004*, p. 67; 2004: *Economic Census 2004*, Vol. 2, pp. 40-69.

Appendix 32 Labor Share, 1978-95

	1978	1979	1980	1981	1982	1983	1984	1985	1986
Economy-wide	0.5695	0.5853	0.5821	0.5980	0.6061	0.6056	0.6086	0.6015	0.6037
Primary sector	0.8942	0.8909	0.8938	0.9075	0.9012	0.9077	0.9106	0.9168	0.9061
Secondary sector	0.3891	0.3961	0.3995	0.3997	0.4060	0.4079	0.4220	0.4351	0.4476
Industry	0.3425	0.3487	0.3546	0.3537	0.3596	0.3619	0.3740	0.3855	0.3963
Construction	0.7335	0.7345	0.7139	0.7123	0.7033	0.6945	0.7150	0.7215	0.7414
Tertiary sector	0.4769	0.4852	0.4873	0.4898	0.4917	0.4737	0.4776	0.4701	0.4823
Transport, post and telecommunications	0.3633	0.3732	0.3703	0.3646	0.3799	0.3664	0.3919	0.3942	0.4193
Commerce and catering (and storage)	0.5033	0.5077	0.5133	0.5152	0.5568	0.5157	0.5234	0.5037	0.5307
Banking and insurance	0.0965	0.1104	0.1191	0.1337	0.1151	0.1208	0.1096	0.1123	0.1222
Real estate	0.0400	0.0502	0.0461	0.0538	0.0541	0.0455	0.0416	0.0502	0.0497
Social services	0.6357	0.6402	0.6398	0.6130	0.6135	0.6020	0.6365	0.6225	0.6355
Health, sports, and (social) welfare	0.7769	0.7951	0.7961	0.7894	0.7961	0.7850	0.7921	0.7924	0.7854
Education, culture and arts, radio, film and television	0.8157	0.8091	0.8161	0.8054	0.8042	0.7945	0.7992	0.7972	0.7994
Scientific research and polytechnic services	0.7021	0.7119	0.7163	0.7173	0.7223	0.7249	0.7190	0.7395	0.7475
Government, Party, and social organizations	0.8205	0.8183	0.8175	0.8143	0.8118	0.8140	0.8082	0.8153	0.8195
Others	0.9630	0.9625	0.9543	0.9533	0.9366	0.9376	0.9483	0.9332	0.9303
Reference: government etc. & others	*0.8728*	*0.8687*	*0.8630*	*0.8595*	*0.8520*	*0.8521*	*0.8467*	*0.8452*	*0.8455*

	1987	1988	1989	1990	1991	1992	1993	1994	1995
Economy-wide	0.5944	0.5947	0.5938	0.6140	0.6013	0.5784	0.5882	0.5928	0.6063
Primary sector	0.8960	0.8925	0.8866	0.8857	0.8892	0.8869	0.8714	0.8607	0.8669
Secondary sector	0.4531	0.4644	0.4786	0.5058	0.5166	0.4898	0.5188	0.5165	0.5334
Industry	0.4049	0.4169	0.4397	0.4663	0.4780	0.4495	0.4863	0.4864	0.5059
Construction	0.7306	0.7392	0.7335	0.7539	0.7569	0.7225	0.7010	0.6934	0.7026
Tertiary sector	0.4668	0.4719	0.4683	0.4799	0.4606	0.4589	0.4890	0.5074	0.5205
Transport, post and telecommunications	0.3982	0.4014	0.3996	0.3875	0.3453	0.3761	0.4513	0.4765	0.5167
Commerce and catering (and storage)	0.5215	0.5252	0.5669	0.5978	0.5353	0.5283	0.5709	0.5703	0.5899
Banking and insurance	0.1190	0.1258	0.1199	0.1251	0.1364	0.1253	0.1336	0.1725	0.1655
Real estate	0.0418	0.0538	0.0525	0.0583	0.0685	0.0766	0.0989	0.0988	0.1057
Social services	0.6294	0.6316	0.6274	0.5870	0.5421	0.5487	0.5701	0.6156	0.6194
Health, sports, and (social) welfare	0.8007	0.8016	0.7987	0.7690	0.8103	0.7754	0.7828	0.7758	0.7727
Education, culture and arts, radio, film and television	0.8051	0.8228	0.8104	0.7985	0.7834	0.7757	0.7935	0.7994	0.8063

Scientific research and polytechnic services	0.7255	0.7167	0.7033	0.6707	0.6346	0.6528	0.7075	0.6827	0.7082
Government, Party, and social organizations	0.8120	0.8247	0.8253	0.8278	0.8258	0.8177	0.8340	0.8394	0.8312
Others	0.9059	0.8273	0.7841	0.7416	0.6493	0.6222	0.7241	0.8059	0.7920
Reference: government etc. & others	*0.8317*	*0.8251*	*0.8189*	*0.8163*	*0.8045*	*0.7936*	*0.8175*	*0.8346*	*0.8256*

The labor share is calculated as the share of labor remuneration in the sum of labor remuneration, depreciation, and operating surplus. I.e., net taxes on production are split proportionally between labor and capital (where capital is represented by depreciation and the operating surplus).

Lacking national data, all shares are based on sum provincial values. All values are pre-economic census values; revised values have so far not been released, and are unlikely to be forthcoming. Since the sum provincial pre-economic census value added comes very close to the post-economic census national value added, these provincial pre-economic census values may be quite accurate.

The reference item "government, Party, and social organization & others" comprises the last two tertiary sector sub-sectors, with the two individual labor shares weighted using labor remuneration.

Numerous obvious typos in the source have been corrected. Some errors did not come with a cue as to how to correct them, and were therefore retained. Values for Hainan begin only in 1990; values for Guangdong for the years prior to 1990 most likely *exclude* Hainan. Values for Tibet only begin in 1985, and then cover the three main economic sectors only; since 1994 data on Tibet are available on all sectors (and sub-sectors). No attempt has been made to correct for the incompleteness of the data. Given the size of these two provinces, the missing values should not be larger than 1% of total labor remuneration in any one year.

The sectoral classification is the same as that of the output data in the source used (presumably the GB1994, with questions about the use of the GB1984 at least for some sub-sectors, and except for the inclusion of agricultural services in the tertiary sector rather than in the primary sector)).

Transport, post and telecommunications does not include "storage," unlike in the following appendix.

Commerce and catering (and storage) refers to commerce, catering, material supply, and storage (unlike in the following appendix, where commerce excludes storage).

Agricultural services (which here includes water conservancy) as well as geological investigation and prospecting are all included in scientific research and polytechnic services.

Sources: *GDP 1952-95*, numerous pages of individual provinces, with category definitions on p. 2.

Appendix 33 Labor Share, 1995-2002

	1995	1996	1997	1998	1999	2000	2001	2002
Economy-wide	0.6035	0.6048	0.6089	0.6127	0.6059	0.5996	0.5990	0.5924
Primary sector	0.8685	0.8709	0.8700	0.8711	0.8662	0.8582	0.8544	0.8451
Secondary sector	0.5277	0.5263	0.5329	0.5439	0.5391	0.5233	0.5253	0.5183
Industry	0.4996	0.4984	0.5049	0.5121	0.5096	0.4895	0.4911	0.4862
Construction	0.7016	0.6998	0.7048	0.7225	0.7019	0.7153	0.7179	0.6959
Tertiary sector	0.5211	0.5282	0.5452	0.5511	0.5531	0.5710	0.5745	0.5770
Agricultural services	0.7089	0.7206	0.7199	0.7398	0.7390	0.7488	0.7507	0.7576
Geological prospecting and water conservancy	0.6849	0.6966	0.6969	0.6881	0.6918	0.7018	0.7178	0.7060
Transport & storage, post & telecommunications	0.5134	0.5305	0.5435	0.5330	0.5158	0.5039	0.4797	0.4795
Wholesale and retail trade, catering services	0.5872	0.5859	0.6119	0.6172	0.6142	0.6225	0.6390	0.6288
Banking and insurance	0.1703	0.1955	0.2301	0.2580	0.2603	0.3533	0.3738	0.3863
Real estate	0.1015	0.1078	0.1045	0.1136	0.1278	0.1400	0.1460	0.1551
Social services	0.6182	0.6220	0.6106	0.6065	0.6151	0.6266	0.6134	0.6152
Health care, sports and social welfare	0.7813	0.7685	0.7593	0.7663	0.7594	0.7631	0.7616	0.7685
Education, culture and arts, radio, film and television	0.7949	0.8014	0.7846	0.7910	0.7980	0.8029	0.8083	0.8162
Scientific research and polytechnic services	0.7051	0.6791	0.6650	0.6591	0.6747	0.6830	0.7109	0.6949
Government, Party and social organizations	0.8246	0.8244	0.8248	0.8315	0.8365	0.8410	0.8473	0.8572
Others	0.7964	0.7873	0.7989	0.7904	0.7874	0.8056	0.8021	0.7836
Reference: agric. serv. & geolog. prosp. & science	*0.7051*	*0.6812*	*0.6675*	*0.6633*	*0.6930*	*0.7032*	*0.7218*	*0.7121*
Reference: government etc. & others	*0.8092*	*0.8122*	*0.8190*	*0.8260*	*0.8293*	*0.8358*	*0.8404*	*0.8457*

The labor share is calculated as the share of labor remuneration in the sum of labor remuneration, depreciation, and operating surplus. I.e., net taxes on production are split proportionally between labor and capital (where capital is represented by depreciation and the operating surplus).

Lacking national data, all shares are based on sum provincial values. All values are pre-economic census values; revised values have so far not been released, and are unlikely to be forthcoming. Since the sum provincial pre-economic census value added comes very close to the post-economic census national value added, these provincial pre-economic census values may be quite accurate.

The two reference items reflect the weighted average of the stated three/two individual categories (using abbreviated labels), with labor remuneration as weight.

The sectoral classification is the same as that of the output data in the source used (to judge by the sub-sector labels, the GB1994, except for the inclusion of agricultural services in the tertiary sector rather than in the primary sector).

Source: *GDP 1996-2002*, numerous pages of individual provinces.