# Introduction of My Ph.D. Dissertation

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## 1 Goal and Scope

Broadly speaking, my dissertation studies how the macroeconomic performance of a developing economy, which may or may not be democratic, is affected by the economic policies that are endogenously generated in specific economic and political institutions and how the institutions themselves might evolve endogenously. My focus will be on the political-economic process of technology adoption, diffusion, and choice as well as their impact on the economic growth.

More concretely, the main question is what sociopolitical and economic forces prevent some poor countries from taking the full advantage of backwardness by adopting the available foreign better technologies, exploiting the learning externality in foreign human capital, and choosing the appropriate technology. It seems to me that they are the most fundamental forces that hamper the economic growth of most poor countries.

Although a comprehensive literature review is beyond the scope of my thesis, it may be most efficient to explain the main theme of my dissertation in the context of growth and development literature. One of the most essential findings in modern growth theory is that the huge cross-country income difference is mainly driven by the difference in productivities (see for example, Solow 1956; Hall and Jones 1998; Barro and Sala-I-Martin, 2003, etc.).

Recent research strives to explain why productivities can be persistently different across countries. One strand of literature emphasizes the importance of human capital, externality, and learning by doing (See for exam-

ple, Romer, 1986, 1990; Lucas 1988, 1993; Stokey, 1988, 1991; Klenow and Rodriguez-Clare, 2004, etc.); Another strand of literature examines the efficiency of resource allocations and financial intermediation (See for example, Rajam and Zingales, 1998; Hsieh and Klenow, 2007, etc.); A third stand is to focus on technology *per se*. Within this third category, efforts are divided into at least the following three classes. One is to study R&D, innovation and imitation (See for example, Krugman, 1978; Aghion and Howitt, 1992; Grossman and Helpman, 1991); The second class is to explore the purely economic process of technology transfer through trade and foreign direct investment (FDI henceforth), (see for example, Grossman and Helpman, 1991; Eaton and Kortum, 2002; Melitz 2003; Helpman, Melitz and Yeaple, 2004); The third class is trying to answer what prevents the poor countries from adopting foreign better technology or from choosing the most appropriate technology, which can be dated back at least to Mokyr (1990) and Parente and Prescott (1994).

My thesis is most closely related with this strand of literature, and it's also very closely connected with the other two strands. In fact, Chapter 2 and Chapter 3 of my thesis study FDI and trade while human capital externality will be explicitly studied in Chapter 4. Within this third class, some examine the international protection of the intellectual property right (see for example, Grossman and Lai, 2004); some argue that better technology may not be adopted because the expertise(or human capital) developed for the current technology will become useless (Parente, 1994; Krusell and Rios-Rull, 1996); some argue that the incumbent firm owners resist better technology because their economic monopoly right will be threatened (Parente and Prescott, 1999 and 2000), which is later challenged by Acemoglu and Robinson(2000): If the incumbent is politically strong enough, why not just let people adopt foreign better technology and tax them afterwards? Alternatively, they propose a "political loser" explanation: foreign better technologies are resisted because that might undermine the incumbent's political power. Subsequently, Acemoglu and his coauthors wrote a series of papers addressing the political-economic process and institutions about technology adoption and economic development (see, Acemoglu and Robinson 2006, 2008; Acemoglu and Johnson, 2005, 2007; Acemoglu, Helpman and Antras 2007; etc.).

Also within this third class, some economists argue that foreign technology, although superior, are not necessarily appropriate for direct use in the developing countries (for example, Basu and Weil, 1998). Lin (2008) emphasizes that the technology choice (industrial policies) of a developing econ-

omy should be consistent with the endowment structure. In other words, it would cause tremendous distortions and hamper economic development if the government leaders prematurely choose to develop the seemingly more advanced but economically too capital-intensive industries for the current development stage. He attributes the bad performance of many developing economies mainly to the wrong development strategies adopted by the government leaders. Chapter 6 of this thesis follows this line of thinking and is actually part of my joint work with Justin Lin and Jiandong Ju.

Obviously, in order to address these issues in a fruitful manner, we will need to take a political-economy approach to analyze the endogeneity of the economic policies in the context of economic development. Economic policies are determined in the political and economic institutions. In that sense, I agree with many of the aforementioned economists, together with many others, about North's notion that institutions are the most fundamental causes of long-run growth: the accumulation of production factors and productivity improvement are growth itself instead of the causes of growth.

Of course, institution is a very vague and broad term, which means much more than just the property rights and corruption. To make the analysis sharp and concrete, in this dissertation I will try to build mathematical models to capture some of the institutional features that I think are crucial for the economic growth of the developing economy.

# 2 Economic Approach

Most of the existing political-macroeconomic literature focuses on the democratic economies in which voting is the main mechanism for the policy determination (see for example, Alesina and Rodrik, 1994; Drazen, 2000; Persson and Tabellini, 2002, etc.). However, in many developing economies such as China, voting is clearly not the most crucial mechanism for the determination of the de facto policies. Instead, the government in those economies often plays a very different and perhaps also more important role than many democratic and developed economies. Therefore, my dissertation not only highlights the endogeneity of macroeconomic policies but also the explicit roles played by the government.

The standard approach in neoclassical macroeconomics is to take government policies as exogenous and then construct the dynamic general equi-

librium models as laboratories to explore the consequences of these policies qualitatively and quantitatively (see, Chari and Kehoe, 1999; Ljungqvist and Sargent, 2004, etc.). Those policies can thus be ranked according to certain welfare criteria, based on which the normative implications and policy suggestions are provided. Although this normative approach has generated very rich and useful economic insights, many policy implications derived from these models may often prove wrong in the real world, especially in developing economies. One standard critique is that institutions in those developing economies are very different and typically less efficient than those mature developed economies, hence the policy implications are simply irrelevant if they are based on the models which implicitly assume complete and free markets with rules of law. Another skeptical view on the applicability of these neoclassical policy suggestions, which I think is somewhat deeper and more critical, is that the normative approach ignores the endogeneity of the economic policies.

The failure to recognize the endogeneity of economic policies may lead to very misleading conclusions. Economic policies are often blamed as the cause of the bad performance in many poor economies, thus economists and policy makers are trying to advocate the policy reforms to introduce "better" policies according to the standard models. However, those existing polices are endogenous to the political and economic institutions as well as the economy itself, and they actually often have already achieved the constrained optimality. Not surprisingly, the text-book policies often find themselves creating even more distortions than the existing ones if they are implemented doctrinally in those developing economies. This may be one of the most important lessons we can learn from the unexpected inadequacy of the so-called "Washington Consensus" in the practice of the economic reforms in many transitional economies (World Bank, 2008).

Another typical feature in the neoclassical macroeconomic models is that the role of the government is addressed too little. In those models, the government is either not existing or simply performing some destructive roles such as imposing distorting taxes and wasting resources, so the implication is that the scope of the government activities should be as limited as possible. I strongly believe that, in most cases, the market is indeed the most efficient mechanism to coordinate people's economic activities and hence should play the most fundamental role in the resource allocations. I also believe that the government often makes mistakes and frequently affects the economy in a

negative way. However, from the positive analysis point of view, government is one of the most important institutions that not only determine the *de jure* policies but also often affect the *de facto* economic policies directly. This is particularly true for many developing and transitional economies like China and India. We can't throw the government out of our analysis simply because it is not lovely. Instead, it seems indispensable to study the incentives of the government if we try to have a genuine understanding of many real world policies and the macroeconomic behaviors.

Based on all the above reasons, I will take the positive approach, whenever possible, to investigate how the relevant macroeconomic policies are endogenously determined in the political-economy process and how the sociopolitical forces affect the macroeconomic performance. I will also address the role of the government explicitly. This approach not only allows us to examine how the policies affect the economy but also how the economy feeds back on the policies, therefore it may give us a more complete view about the whole process of economic development and institutional changes in those developing economies.

# 3 Analytical Methodology

From a methodological point of view, it seems necessary to have both the micro and macro perspectives in order to analyze these issues fruitfully.

By the "micro" perspective, I refer to the incentives and behaviors of the political players such as the government officials, special interest groups, and the general public in the political game, as well as the standard economic players such as firms and households in the market. In many developing economies, policies are often determined through interactions between the hierarchically-structured bureaucracies and various special interest groups, in which the government serves as a common agency with its own objective function. The incentives of different special interest groups, social groups, and government officials are shaped by the economic consequences of these policies in the market activities. In addition, the policy-making process and the interaction between the government and markets are often plagued by asymmetric and incomplete information. My research therefore draws extensively on the microeconomic literature of common agency, global game, and incentive theories (See Dixit, 1996; Myerson, 1995, 1997; Laffont, 2000;

Grossman and Helpman, 2001; Chamley, Morris and Shin, 2002; Chamley 2004, etc.).

By the "macro" perspective, I mainly refer to the analysis of various macroeconomic fiscal and trade policies as well as the evaluations of the policy-induced macroeconomic performance in the standard general equilibrium for both the static and dynamic settings.

Methodologically, I feel that political economy of macro and development is a very promising field, one where a rapprochement between micro and macro theories may be possible. The bulk of my thesis mainly deals with qualitative mathematical modeling, but I also conduct quantitative calibrations and simulations with the real data.

# 4 Content Overview and Organization Structure

Chapter 2 mainly explores the impact of fiscal decentralization on FDI inflows through the endogenous macroeconomic policies determined in the political games. This chapter is the core part of my job market paper. Chapter 3 collects two extensions to the models in Chapter 2. One extension is to relax the assumption that the entry cost is common knowledge for all potential foreign investors and a simple global game model is established to explore how the precision of policy signals affects FDI. The second extension is to introduce export-oriented FDI and heterogeneity across different provinces to explain the regional distribution of FDI within a country. Chapter 4 studies how the Ramsey government of a developing economy should optimally adjust its institutional barrier variable that affects the spillover of human capital from abroad. This chapter is revised from my second-year paper at the University of Chicago. Chapter 5 examines how the distribution of political power and productivities determines the coalition formation among different social groups and how the endogenous social infrastructure affects the macroeconomic behaviors. Chapter 6 shows that the optimal technology for an economy should be consistent with the endowment structure. This chapter is adapted from part of the joint research work with Justin Lin and Jiandong Ju. Chapter 7 is the concluding chapter. Chapter 2 and Chapter 4 are both self-contained and complete papers. Chapters 5 and 6 are both

abridged versions, where the emphasis is to convey the main ideas and discuss possible future works instead of striving for analytical completeness.[1]

In Chapter 2, I try to explain why two developing economies with the same economic fundamentals might have different *de facto* policies toward adopting foreign better technologies, with inward FDI as a particular example, and how that might result in tremendously different FDI inflows. A political-economy model is developed, in which the policies are endogenously determined through the interaction between the central and local (provincial) governments influenced by special interest groups while all the economic activities are coordinated by the market-clearing prices. I show how fiscal decentralization, which is defined as the revenue share obtained by the sub-national government, can have a non-monotonic and dramatic impact on policies and FDI inflows. Too much fiscal decentralization may hurt the central government's incentives so that it chooses the policy profiles of the tariff rate and the profit tax rate to induce local governments to block FDI. Too little fiscal decentralization may render the local government vulnerable to pressures of domestic protectionist special interest groups. Therefore, FDI policies would be sufficiently favorable only when fiscal decentralization lies within some middle range.

Moreover, the equilibrium might bifurcate, namely, a small increase in fiscal centralization might lead to a dramatic change in *de facto* policies toward FDI, leading the economy to shift from the null-FDI equilibrium to the high-FDI equilibrium. The amplification mechanism is that the local government's induced preference for FDI can be endogenously polarized, so that a small change in fiscal decentralization could result in a diametric shift in the *de facto* institutional entry cost that the local government imposes on FDI. Foreseeing this bimodal outcome, the central government will then implement its more favored equilibrium by choosing an incentive-compatible policy profile to induce the local government(s) to either compete for or block FDI. These results remain valid for mutiple-province economies. Calibration and simulation outcomes closely match the macro and policy data including GDP, FDI, labor allocation, firm profits as well as the tariff rate and profit tax rates. Counterfactual experiments suggest that the difference in fiscal decentralization can explain the differences in policy taken up by China and India with respect to FDI and why China's FDI per capita is nine times

[1]Interested readers are encouraged to contact the author via email if they want to read the more complete versions of the papers.

larger than that of India although they are currently at similar development stages.

Chapter 3 includes two direct extensions to the models presented in the previous two chapters. Section 3.1 extends the FDI model in Chapter 2 by relaxing the assumption that the entry cost is common knowledge among the foreign investors. When the information is asymmetric and incomplete, the FDI decision and hence the technology transfer process may be quite different. I construct a simple global game model to address this issue. I argue that, from a purely information point of view, my model can generate two main predictions that are well consistent with the data: (1) Why a disproportionately large fraction of the FDI into mainland China is from Hong Kong and/or invested by ethnic oversea Chinese? (2) Why China's FDI surged immediately after Deng Xiaoping's speech in 1992? This model highlights the impact of heterogeneous beliefs on the macro policy implications.

Section 3.2 revisits the multiple-province model in Chapter 2 and tries to explore the implications of the provincial heterogeneity for the regional distributions of FDI within a country. The two main deviations are the following: (1) We will examine what happens when the provinces are heterogeneous instead of homogeneous; (2) We will explore the export-oriented FDI while the model in Chapter 2 mainly deals with the FDI that targets the market of the host country. We argue that the exogenous heterogeneity in the domestic firms' productivity may explain the stark difference in FDI inflows for two similar neighboring provinces, Jiangsu and Zhejiang, in China because of the political competition.

In Chapter 4, I develop a theoretical growth model is to explain the mechanics of a developing country's catching-up behavior with endogenous institutional change. Like the standard open economy growth model, the developing economy manages to catch up thanks to the human capital externality from the developed economy. The main twist is that I assume the effectiveness of the learning externality depends on the developing economy's institutional barrier variable, which may measure its openness and policies that affect the technology diffusion process. When the GDP gap between these two economies shrinks to some threshold value, the catching up stops unless the institutional barrier variable is adjusted downward. After the adjustment, the catching up resumes until the learning constraint is binding again. The adjustment cost depends on the size of the adjustment.

I characterize the Ramsey government's optimal institutional adjustment scheme and how it may affect the growth experience both in the transitional dynamics and in the long run. I show that: (1) The optimal adjustment scheme is independent of the initial GDP gap once the initial institutional barrier is given; (2) The optimal minimum number of institutional adjustments is finite and each adjustment occurs precisely when the learning constraint just becomes binding; (3) When there is no fixed adjustment cost, the adjustment size is strictly monotonic or constant over time. My model implies that the economy keeps catching up with the developed economy until the last learning constraint is binding and no further institution adjustment is made. Permanent GDP level difference may or may not exist on the balanced growth path, depending on the last adjustment. Implications for the transitional economy's optimal economic reforms are discussed.

Although it's mainly a dynamic planning problem, it also addresses the interaction between the market and the institutions/policies. This is because that paper mainly studies the following two issues: (1) How does the accumulation of production factors trigger institutional change? (2) How does the institutional change affect the patterns of factor accumulation and growth dynamics?

Chapter 2 and Chapter 4 are intrinsically related. Chapter 4 appears to take a purely normative approach to study some abstract policies and institutions. The cost function for the institutional adjustment might also appear *ad hoc*. However, the FDI model in Chapter 2 may serve as a good concrete micro-foundation for the abstract dynamic model in Chapter 4. For instance, in Chapter 2, the determination and the changes in the profit tax rate, tariff rate and the *de facto* fixed entry cost will all lead to conflicts between different groups of political and economic agents and also involve lobby, therefore, the policy determination is indeed very costly from the social perspective. This may well justify the adjustment cost function assumed in Chapter 4. On the other hand, Chapter 4 can also be viewed as a dynamic version for Chapter 2 in a coarse sense.

When thinking about growth and development, it is essential to understand the social infrastructure, therefore in Chapter 5, I explore how the distribution of political power and productivity determines coalition formation between various social groups, and how the endogenous social infrastructure affects the economic growth rate and consumption inequality. By focusing on the Markov-Nash perfect equilibria with full commitment, I obtain the close-form solutions. Numerical examples are provided to show that: (1) The social

infrastructure of a meritocracy can be fully characterized on a simplex, which indicates that a more equal distribution of the political power and labor productivity will lead to more coalitions and hence a higher growth rate; (2) A small change in the distribution of labor productivities, which may be interpreted as the adoption of a different technology, could result in a dramatic and non-monotonic change in the coalition structure and the macroeconomic performance; (3) The self-interested ruling class in a non-democracy might voluntarily relegate some political powers to the other social groups, leading to growth maximization incidentally.

In Chapter 6, we return to an ideal world without any market incompleteness and government interventions. We construct a general equilibrium model to explore the optimal technology (industry) choice and its dynamics in a closed developing economy. We show how the optimal industrial structure (technology choice) is determined by the endowment (capital/labor ratio) of the economy. The optimal industrial structure may remain stagnant or be upgraded at various rates, depending on the accumulation speed of the physical capital, which in turns relies on industrial structure. It implies that any attempt to establish a too-advanced industry (i.e. adopting too-capital-intensive technology) inconsistent with the endowment structure would cause large welfare losses in the long run. We also show how a finite-period limit cycle in both consumption and growth rates may arise as the industrial structure evolves endogenously.

# 5 Concluding Remarks

In summary, for many developing economies, it is only when the incentives of government and other important political agents are right that the *de facto* economic policies work properly; only then can we have the right incentives for market agents, and ultimately for macroeconomic performance. I think we must study the political institutions and the policy-making process in order to understand the macroeconomic performance of a society. I am trying to build both the normative and positive models of macroeconomic policies and explore their impact on the growth and development. My research highlights the fundamental relationship between sociopolitical forces and the macroeconomic behavior, especially for developing economies such as China and India.

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