Fiscal Decentralization and Economic Growth: A New Look Through the Efficiency Channel and the Market-Preserving Channel

by Qianqian Zhang

B.A. in Public Administration, June 2010, University of International Business and Economics
Master of Public Administration, May 2012, Cornell University

A Dissertation submitted to

The Faculty of
The Columbian College of Arts and Sciences
of The George Washington University
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy

August 31, 2020

Dissertation directed by

Joseph J. Cordes
Professor of Economics, Public Policy and Public Administration, and International Affairs

The Columbian College of Arts and Sciences of The George Washington University certifies that Qianqian Zhang has passed the Final Examination for the degree of Doctor of Philosophy as of July 23, 2020. This is the final and approved form of the dissertation.

Fiscal Decentralization and Economic Growth: A New Look Through the Efficiency Channel and the Market-Preserving Channel

Qianqian Zhang

Dissertation Research Committee:

Joseph J. Cordes, Professor of Economics, Public Policy and Public Administration, and International Affairs, Dissertation Director

Robert D. Ebel, Affiliated Scholar, Andrew Young School of Policy Studies, Georgia State University, Committee Member

Lang (Kate) Yang, Assistant Professor of Public Policy and Public Administration, Committee Member

© Copyright 2020 by Qianqian Zhang
All rights reserved

Dedication

This dissertation is dedicated to my mother and father, Bei Jiang and Lei Zhang, for their love, encouragement, and support.

Acknowledgments

The author wishes to sincerely thank her dissertation committee – Drs. Joseph Cordes, Robert Ebel, and Kate Yang – for their guidance and support throughout the dissertation process. The author would like to thank Dr. Joseph Cordes for being such a great advisor and mentor throughout the PhD program who enlighten the her on public finance and budgeting, to Dr. Robert Ebel for opening the door for her on fiscal decentralization and providing tremendous inspiration, kindness, and friendship for more than eight years, and to Dr. Kate Yang for helping and advising the her with great patience, creativity, acumen, and expertise on subnational finances.

The author is also grateful for and would like to thank Dr. Burt Barnow for chairing the dissertation defense process, and Dr. Gary Young and Dr. Izabella Berati-Stek who served as her Dissertation Examiners for providing very valuable comments and suggestions.

Finally, the author would like to thank her friends and her colleagues at the International Monetary Fund including Paul Cashin, Wei Chen, Jayendu De, Jiri Jonas, Jaewoo Lee, Jianhai Lin, Victor Lledo, Qian Luo, Koshy Mathai, Pablo Lopez Murphy, Guiran Niu, and Ananya Shukla who kindly supported her during the PhD program.

Abstract of Dissertation

Fiscal Decentralization and Economic Growth: A New Look Through the Efficiency Channel and the Market-Preserving Channel

This paper examines the impact of fiscal decentralization on economic growth through the channels of (1) efficiency in allocating resources, and (2) counterbalancing effect between investment and tax competitions brought by capital mobility.

To do so, I construct theoretical models with four scenarios assuming a country's regional disparities in endowment and preferences for public goods and services, and derive the maximization of output based on different utility functions and budget constraints of central and subnational governments. I then examine the relationship through these two channels with empirical analyses using a panel dataset with 67 countries during 1990-2016, and use Difference- and System-GMM as well as Structural Equation Modeling to conduct robustness checks.

Empirically, I find that under fiscal decentralization, when subnational governments allocate functional spending more differently over years, and that when subnational governments allocate functional spending more differently than the central government, they are correlated with higher economic growth. Theoretically, I also find that under fiscal decentralization, endowment effect plays an important role—well-endowed regions will be made better off in the process of investment and tax competitions, while poorly-endowed regions will be made worse off. The magnitude of this difference also depends on average tax rate and the government's elasticity of substitution between public spending and rent-seeking. Though this argument has yet been backed by empirical results.

Table of Contents

Dedication iv

Acknowledgments v

Abstract of Dissertation vi

Table of Contents vii

List of Figures x

List of Tables xi

Chapter 1: Introduction 1

Thesis 1

Motivation 4

Overview of the Dissertation Chapters 7

Chapter 2: Literature Review 9

Introduction 9

Fiscal Decentralization 10

The First Generation Fiscal Decentralization 10

The Second Generation and Market-Preserving Fiscal Decentralization 13

Fiscal Decentralization and Economic Growth 19

The Efficiency Approach 19

The Laboratory Approach 24

The Market-Preserving Approach 28

Rent-Seeking and Fiscal Decentralization 35

Chapter 3: Theoretical Framework 43

Introduction 43
Theoretical Framework 44
Assumptions and Framework 44
The Baseline Scenario Zero: Capital Immobility and No Fiscal Decentralization 49
The Efficiency Scenario: Capital Immobility and Fiscal Decentralization 52
The Investment Competition Scenario: Capital Mobility and Fiscal Decentralization 54
The Tax Competition Scenario: Capital Mobility and Fiscal Decentralization 62
Summary and Link to Empirical Work 64
Chapter 4: Hypotheses, Empirical Methodology, and Data 68
Introduction 68
Measurements and Data 69
Fiscal Decentralization 69
Allocative Efficiency 78
Rent-Seeking 85
Capital Mobility 89
Hypotheses and Empirical Models 90
Baseline Regressions 91
GMM Method Considerations 96
SEM Method Considerations 99
Chapter 5: Empirical Results and Interpretations 105
Introduction 105
The Efficiency Channel 107

Baseline Regressions Results 107
GMM Results 115
SEM Mediation Analysis Results.....117
The Market-Preserving Channel 120
Baseline Regressions Results 120
GMM Results 122
SEM Mediation Analysis Results.....123
Robustness Checks for Rent-Seeking Variables 124
Other Potential Issues.....128
Chapter 6: Policy Implications and Conclusion.....137
Introduction 137
Policy Implications.....140
The Need for Future Research.....143
References.....147

List of Figures

Figure 1.1 OLS Cause Effect Relationship Path Diagram 100

Figure 1.2 SEM Mediation Analysis Path Diagram 101

Figure 2. Scatter Plot of Fiscal Decentralization and Real GDP Growth with Linear and Non-Linear Fitted Trend Lines 107

Figure 3.1 Marginal Effects of Fiscal Decentralization on Real GDP Growth by Different Levels of Total Allocative Efficiency 112

Figure 3.2 Marginal Effects of Fiscal Decentralization on Real GDP Growth by Different Levels of Allocative Efficiency Distance 113

List of Tables

Table 1. Revenue and Expenditure Decentralization versus Fiscal Decentralization 173

Table 2. Variable Definitions and Data Sources.....175

Table 3. Summary of Statistics 177

Table 4.1 Baseline Regressions of the Efficiency Channel (Without Control Variables).....178

Table 5. Marginal Effects of Fiscal Decentralization on Economic Growth by Different Levels of Total Allocative Efficiency and Allocative Efficiency Distance 179

Table 4.2 Baseline Regressions of the Efficiency Channel (Control Variables A) 180

Table 4.3 Baseline Regressions of the Efficiency Channel (Control Variables B) 181

Table 4.4 D-GMM Regressions of the Efficiency Channel (Control Variables A).....183

Table 4.5 D-GMM Regressions of the Efficiency Channel (Control Variables B).....184

Table 4.6 S-GMM Regressions of the Efficiency Channel (Control Variables A) 185

Table 4.7 S-GMM Regressions of the Efficiency Channel (Control Variables B) 186

Table 4.8 SEM Mediation Analysis of the Efficiency Channel (Control Variables A) ..187

Table 4.9 SEM Mediation Analysis of the Efficiency Channel (Control Variables B)...188

Table 6.1 Baseline Regressions of the Market-Preserving Channel (Without Control Variables).....190

Table 6.2 Baseline Regressions of the Market-Preserving Channel (Control Variables A) 191

Table 6.3 Baseline Regressions of the Market-Preserving Channel (Control Variables B).....192

Table 6.4 Difference GMM Regressions of the Market-Preserving Channel (Control Variables A).....194

Table 6.5 Difference GMM Regressions of the Market-Preserving Channel (Control Variables B) 195

Table 6.6 System GMM Regressions of the Market-Preserving Channel (Control Variables A) 197

Table 6.7 System GMM Regressions of the Market-Preserving Channel (Control Variables B) 198

Table 6.8 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables A) 200

Table 6.9 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables B) 201

Table 7.1 Baseline Regressions of the Market-Preserving Channel (Without Control Variables, Different Rent-Seeking) 203

Table 7.2 Baseline Regressions of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking) 204

Table 7.3 Baseline Regressions of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking) 205

Table 7.4 Difference GMM Regressions of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking) 207

Table 7.5 Difference GMM Regressions of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking) 208

Table 7.6 System GMM Regressions of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking) 210

Table 7.7 System GMM Regressions of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking) 211

Table 7.8 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking) 213

Table 7.9 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking) 214

Chapter 1: Introduction

Thesis

The dissertation examines the impact of fiscal decentralization on economic growth through two transmission mechanisms—the efficiency channel and the market-preserving channel. The impact from the two channels are based on (1) efficiency in allocating resources, and (2) counterbalancing effect between investment and tax competitions. The efficiency channel looks at by having fiscal decentralization, whether the allocative efficiency brought by decentralization can improve overall economic development as subnational governments are in a better position in knowing and meeting the heterogenous needs than central government by preference matching. The market-preserving channel intends to look at the counter-balancing effect of two forces—one is investment competition, where regions compete to attract businesses and investments to their jurisdictions to encourage better growth, while the other is tax competition, where investments are financed by racing to the bottom tax competitions.

To examine these two channels, the dissertation develops theoretical models with four scenarios assuming a country's regional disparities in endowment and preference for public goods, and derive the maximization of output based on different utility functions of central and subnational governments, adapted from Barro (1990) and Cai and Treisman (2005). The argument under the theoretical models is that fiscal decentralization will be beneficial for economic well-being by having better allocative efficiency to achieve Pareto improvement. Fiscal decentralization can also affect overall economic performance with the capital mobility it brings, and this in the end will affect economic development through

the investment and endowment effects, which may also be compounded by investment competition and tax competition. Not only working on theoretical models, the dissertation then examines the relationship through these two channels with empirical analyses using a panel dataset with 67 countries during 1990-2016. To empirically test the theoretical arguments built in the theoretical models, I construct measurements for fiscal decentralization, allocative efficiency, rent-seeking and construct testable hypotheses for the empirical analyses. I use OLS regressions to serve as the baseline, and use Difference- and System-GMM as well as Structural Equation Modeling to conduct robustness checks especially on the endogeneity issues. Robustness checks also involve using different measurements for important variables to test for consistency of results, including how to measure government's rent-seeking behavior.

In the empirical results, I find that fiscal decentralization is positively correlated with growth through the efficiency channel, and the relationship is also robust as found in GMM and SEM results. On the other hand, the market-preserving channel has yet to have shown as a significant channel. For the efficiency channel, under fiscal decentralization, when subnational governments allocate functional spending more differently over years, and that when subnational governments allocate functional spending more differently than the central government, they are correlated with higher economic growth. One policy implication from this result is that fiscal decentralization improves economic growth only when it improves allocative efficiency. This means that there is a precondition for fiscal decentralization to take effect: under fiscal decentralization, when subnational governments try to optimize their spending strategy, including the mapping of fiscal resources onto different categories, such as on education, health, culture, etc. and when

subnational resource allocation changes more aggressively over years and is more different than central government resource allocation, it is more correlated with higher growth. However, it does not mean that the more fiscally decentralized the better: this impact is found to be marginally declining when there is more fiscal decentralization, so fiscal decentralization's impact on growth will eventually turn flat as allocative efficiency increases. On the other hand, for the market-preserving channel, though nothing solid can be concluded in the empirical evidence, theoretically, I find that under fiscal decentralization, endowment effect plays an important role—regions with better endowment will be made better off in the process of investment and tax competitions, while regions with worse endowment will be made worse off. The magnitude of this difference will also depend on average tax rate and the government's elasticity of substitution between public spending and rent-seeking. Policy implications from the theoretical market-preserving story is that sometimes policymakers are interested in the overall growth of a country and whether it can benefit from a more fiscally decentralized system, but they overlook the inequality issue inside. When the regions start off with different capacities, fiscal decentralization will bring different effects to them—better-endowed regions will benefit while poorly-endowed regions may lose from a fiscally decentralized system. We need to weigh the importance of policy objectives, whether policy aims at overall growth or addressing inequality, before prescribing the right amount of decentralization to the fiscal policymaking.

This dissertation aims to contribute to the current literature of fiscal decentralization and economic growth. It identifies two particular channels—efficiency and market-preserving—that fiscal decentralization affects economic growth, examines the empirical

relationship between fiscal decentralization and economic growth through the two channels through both theoretical and empirical analyses, and generate findings that would be useful for future research. The dissertation also has its constraints: the empirical measurements of variables including fiscal decentralization and allocative efficiency introduces some measurement biases that could lead to issues in the empirical results. The indicators used as a proxy for rent-seeking behavior also needs to be taken carefully, where the "true" measure of rent-seeking does not necessarily mean corruption or other replacement measures such as government effectiveness, voice and accountability. Data issue is also a problem, where state- and local-level data are not complete and not granular enough to conduct a cluster-free analysis. The dissertation aims to take a small step on gauging the relationship between fiscal decentralization and economic growth, and wishes to provide some insights for future research and further explorations on the topic.

Motivation

The topic of fiscal decentralization and economic growth has spurred a lot of discussion and growing literature, but there is still lack of theoretical models developing the relationship in a well-recognized way, as well as that there is little convergence on the results in empirical analyses. More importantly, the study of fiscal decentralization is often regarded not simply an economic phenomenon but rather a complex decision made out from both economic and political concerns, or some other ethnical and geographical reasons fallen from history. This has increased the difficulty in unraveling its multi-faceted composition and impact. Literature regarding this topic has then evolved and gradually tried to examine the relationship through an indirect than a direct approach—namely, fiscal

decentralization affects economic growth through some specific channels or transmission mechanisms, rather than through a direct or causal effect. The more recent literature has mainly focused on either dissecting the decentralization process into political, administrative, and fiscal aspects and running analyses on fiscal decentralization's impact on economic growth where the three components interact with each other and that one component cannot be analyzed without considering the other two; or specifying the outcome of fiscal decentralization, such as in allocative efficiency, capital flows and tax competition, yardstick competition and local experimentation, and then treating these outcomes as intermediaries to draw a picture of their potential effects on economic growth. This dissertation will focus on the latter approach, while developing both theoretical and empirical linkages mainly through the efficiency and the market-preserving channels of impact.

In the previous theoretical literature, regarding these channels of how fiscal decentralization may affect economic growth, some use theoretical modeling while the others mainly conduct conceptual discussions—pure theoretical pieces are handful, while conceptual pieces are usually in conjunction with some empirical analyses in the end. Especially for individual country studies, case studies and stylized facts are the most common approach of discussing the relationship, since authors tend to examine the issue by means of studying the history and important milestones of the tax laws, budgetary processes, and other historical records related to changes in subnational autonomy over the fiscal decisions in the country. In these cases, usually one or two channels are more justifiably identified according to the country. Empirically, individual country studies seem to have found more robust conclusions than cross-country analyses, though still no less

ambiguous than the other in terms of the results in general. As mentioned, empirical country cases tend to show more granular results because they are based on extensive exploration on the environment, political background, law and regulations, history, and socioeconomic conditions, as well as that fiscal decentralization itself in a specific country is usually particular and it is not studied with a crude measure that is applied in cross-country analyses. For cross-country empirical studies, they usually recognize the importance of singling out the channel or the indirect effect in their literature reviews in gauging the relationship between fiscal decentralization and economic growth, but not many are actually using specifically-identified channels in their empirical specifications—most of them try to vary country and time samples, or apply different methods in the analyses and robustness checks, and the empirical results based on specific channels or transmission mechanisms in fiscal decentralization run scarce. In all, the field is still under exploration, and the importance of identifying the transmission mechanism of fiscal decentralization affecting economic growth has received more attention in both theoretical and empirical analyses. In the future, more granular and specific indirect effects need to be examined to provide more variance and rigidity of analyzing the relationship.

Motivated by the current situation of available literature in this field, as well as very importantly the meta-analysis by Baskaran et al (2014) and other work that has explicitly or implicitly coined one or more channel of how fiscal decentralization affects economic growth, which I will discuss in more details in the next chapter of literature review, this dissertation will continue with the indirect approach of fiscal decentralization's impact on economic growth, and among the three potential channels that are identified by current literature—the efficiency (or sometimes call the heterogeneity) approach, the market-

preserving approach, and the laboratory approach, this dissertation will focus the first two approaches. The current status of fiscal decentralization research has served as important impetus for how this dissertation forms in its theoretical modeling, empirical specifications, and interpretation for future policy recommendations.

Overview of the Dissertation Chapters

In the next chapter Chapter 2 on literature review, I will go through the literature relevant to the dissertation, including the overview of fiscal decentralization theory evolution, the three channels of how fiscal decentralization indirectly affects economic growth—the efficiency channel, the market-preserving channel, and the laboratory decentralization channel, as well as a section specifically on rent-seeking, which is an important element in the market-preserving approach. As followed, there will be Chapter 3 the theoretical framework chapter, which discusses theoretical models built for the dissertation. The chapter will first discuss the general assumptions and framework, and then move on to set up the baseline scenario which is the Scenario Zero for later scenarios to compare. The chapter will then discuss the Efficiency Scenario, the Investment Competition Scenario, and the Tax Competition Scenario, of which the latter two belong to the market-preserving channel. The chapter goes through these individual models and sets the stage for empirical analyses. Chapter 4 on methodology will discuss firstly the important measurements for the empirical analyses, including the data and sample issues. Then the chapter goes on with hypotheses and regressions specifications, and then discusses the baseline Ordinary Least Squared (OLS), General Method of Moments (GMM), and Structural Equation Modeling (SEM) models for empirical analyses,

including potential issues with each model. Chapter 5 will include the result interpretations and comparisons between baseline regressions and robustness checks, with some potential issues discussion in the end. Lastly, I will conclude with Chapter 6 with policy implications and ideas for future research.

Chapter 2: Literature Review

Introduction

This literature review is presented in three sections: an overview of the two generations of fiscal decentralization theories, a categorization of transmission mechanisms or channels of how fiscal decentralization affects economic growth, and a section on rent-seeking, which is important to understand in combination with tax competition under the market-preserving approach.

The literature on the evolvement of fiscal decentralization theories provides a fundamental understanding towards how it is derived from the public finance theories. Then in the interest of analyzing fiscal decentralization's impact on economic growth, three channels—efficiency, laboratory, and market-preserving decentralization—are discussed in how potentially fiscal decentralization affects the overall economic welfare. There are existing theoretical models, though limited, building up the relationship, but the empirical analyses tend to neglect what channels they are taking and the evidence from their results is very mixed. Motivated by the current literature and the need for linking specific theoretical channel to the empirical exercise, this dissertation aims at studying closely the efficiency and market-preserving channels. This includes how allocative efficiency is derived from the first generation fiscal decentralization theory, and how capital mobility brought by market-preserving fiscal decentralization coincides with the literature on tax competition, investment, and rent-seeking. Thus, in the last section of this chapter, rent-seeking literature in the fiscal decentralization realm is also reviewed to provide a

foundation of later discussions on public choice approach in assumptions over the government as an entity.

Fiscal Decentralization

It is appropriate to briefly discuss the first generation fiscal decentralization theories, including the literature about early Musgravian framework, the Decentralization Theorem, and the Tiebout Sorting. Then the discussion on the second generation fiscal decentralization and market-preserving decentralization will follow, including normative and positive arguments.

1. The First Generation Fiscal Decentralization

Before 1990s, the field of fiscal decentralization is dominated by first generation fiscal decentralization theories, and the three branches of public finance identified in Musgrave (1959)—resource allocation, income distribution, and macroeconomic stabilization—have become the benchmarks as well as constraints imposed onto the first generation fiscal decentralization theories. Tracing back to the discussions from Musgrave (1939) and Samuelson (1954), there may not be a "market type" of solution in providing public goods to the society, and when compared with the private sector, a large portion of the public expenditure on public goods and services is non-optimal. And to find out the optimal Pareto efficient levels of providing public goods and services, one important implication from the Musgravian framework is that potentially there will be different levels of government that best fit to undertake different functions. Later Oates (1972) in building the Decentralization Theorem argues that the Pareto-efficient level can be provided in each jurisdiction than by the uniform level maintained by the central government. The normative

framework follows the principles of welfare economics and welfare maximization, where in first generation fiscal decentralization theory's core central government does not have enough information on the diversity of the local preferences to provide the most suitable public goods and services—local governments have better information about the preferences on the local level, and thus are in a better position to provide goods and services catering to local needs (Hayek, 1945, Oates, 1972). This earliest strand focuses on efficient resource allocation and local governments' strengths and advantages in doing so.

However, preference revelation is difficult to obtain for Samuelson's optimal level of public goods provision (Vo, 2010). In response, Tiebout (1956) develops the hypothesis that, with mobility, consumer's demand and preference for public goods will be revealed when they choose jurisdictions which fit their best net benefit. Consumer-voters will eventually move to the place where the local fiscal packages meet their needs, and this sorting will eventually induce an efficient provision of public goods and services. This argument by Tiebout is later reinstated and rephrased by Oates (1999, 2005, 2006) that in a decentralized system, people will effectively sort themselves into homogeneous groups, and as such, decentralized provision of local public goods and services are effective.

Following Tiebout, Olson (1969) raises the concept of "fiscal equivalence", and argues that for every collective good, there is a rule or boundary for which a separate government is needed, and this can match those who need the good and those who can provide the good. Oates (1972) also further stretches Olson's argument that it will always be more efficient for local governments to provide Pareto-efficiency levels of public goods and services for the local people than the central government. Though, there are strong assumptions taken in the Decentralization Theorem that Oates builds, one of which is that

costs are the same for aggregate local provisions and centralization government provision. And another assumption is that there are no externalities between different jurisdictions (Vo, 2010). Though in reality there are externalities, and Oates (1999) does discuss the use of intergovernmental grants and revenue sharing to internalize spillover benefits and improve fiscal equalization across jurisdictions. After all, these assumptions are often criticized as too strong to be applied to any real conditions.

Roughly after the 1990s, there is an emerging focus in the field examining the caveats of decentralization efficiency as mentioned above, with rooting arguments mainly based on public economics theories. These works later generate and are conceptualized and named as the second generation fiscal decentralization theory, and it makes reflections on the structure and implications from the first generation and raises new questions. The thrust for the new initiatives comes partly from the situation that theoretical case for first generation fiscal decentralization is quite straightforward, but the practical cases have not been so easily the same (Oates, 1994; Tanzi, 1995; Bird and Smart, 2002). For instance, Tanzi (1995) tries to identify conditions and institutions that may reduce the benefit of decentralization, in the context of learning tax sharing arrangements, the taxing abilities of local governments, and bureaucracy behavior. Inman and Rubinfeld (1997) argue that most countries may need to mix and match their institutions, such as that problems of pure public goods and interjurisdictional spillovers may be assigned to the central government. Oates (1999) already mentions expanding the scope of analysis on fiscal decentralization, such as involving the extent of political participation, the protection of individual rights, besides the impact of efficiency on resource allocation. He also touches upon the laboratory fiscal decentralization and market-preserving fiscal decentralization in this piece, the two of

which are important study objects in the second generation fiscal decentralization literature.

Most of the early alternative arguments based on the first generation fiscal decentralization theories draw on several key aspects to complement the conclusions from the first generation, including the theory of firm, lack of information, the principal-agent theory, and the theory of the contract in transaction cost economics (Oates, 2005; Vo, 2010). For instance, insufficient information triggers the difficulty in obtaining preference revelation (Levaggi, 1990; Keen, 1998; Oates, 1999). On the other hand, and the theoretical stance in viewing bureaucracy and bureaucrats will significantly affect the line of analysis in fiscal decentralization (Weingast, 1995; Qian and Weingast, 1997). One important prescription is that first generation fiscal decentralization theories need to adapt to the more realistic political environments in which bureaucrats are not always maximizing citizens' welfare. Therefore, more emphasis is put onto recognizing the importance of fiscal incentives for local economic development (Weingast, 2009). In sum, the shift in the research focus incorporating political economy perspective into the picture has therefore driven the emergence of the second generation fiscal decentralization theories.

2. The Second Generation and Market-Preserving Fiscal Decentralization

The second generation fiscal decentralization theory borrows from ideas outside the public finance literature. As Oates (2005) argues, it has two main characteristics: first is that the it focuses more on the political process and bureaucratic behavior. Second is that it cautions the danger of going too far in decentralization in the first generation theory, and advocates for a balance between centralization and decentralization. The second generation regards political agents having goals that often diverge from maximizing citizen welfare,

and positively than normatively describes the decentralized systems (Qian and Weingast, 1997; Garzarelli, 2004; Hatfield, 2015). Though, Weingast (2007) believes that it is too hard-stretched to distinguish too clearly between the two generations, but it is worth noting that the second generation emphasizes the extension of normative fiscal decentralization and systematically considers public officials' incentives. As Vo (2008) mentions, the second generation is characterized in terms of two motivating issues: knowledge and incentives. These two reflect the issues examined in the alternative arguments to the first generation discussed in the previous paragraph—knowledge relates to the economics of information and incentives relates to the lower transaction costs due to decentralization and lower search and information cost. The second generation has a large body of literature, in which the main ones come from the angle of political economy of decentralization (Inman, 1988; Inman and Rubinfeld, 1994). Besides, as Weingast (2007) adds, many other literatures in the second generation focus on the common pool problem, such as the "race to the bottom" phenomenon (Zodrow and Mieszkowski, 1986; Wilson, 1991, 1999), while some other work focuses on the political aspects or political parties' role in the decentralization process (Rodden, 2005; Wibbels, 2005). Also, last but not the least, one prominent strand originates the market-preserving decentralization (Montinola et al, 1995; McKinnon, 1997; Jin et al, 2005).

Barry Weingast's concept of "market-preserving" decentralization has contributed much to the shape of the second generation fiscal decentralization theory. The main idea is that fiscal decentralization can help prevent the government from encroaching the private market—it will instead help protect property rights, enforce contracts, and sustain a common market for everyone (Weingast, 1995; Qian and Weingast, 1997). Originally,

Brennan and Buchanan (1980) revive Thomas Hobbes's notion of the Leviathan in 1660, and describe the government as a monolithic Leviathan that tax heavily its people and intends to maximize its tax revenue and financial resources. Based on Weingast (1995)'s assumptions, the induced economic consequences from the decentralized structure of the central and subnational government will potentially lead to restrictions on both the central government's regulatory power and competition among the subnational governments. In this way, no one will have the absolute control over economic regulation. The decentralization of fiscal power is therefore regarded as making things difficult for any level of government to create monopolies. Weingast (2009) also argues that market-preserving fiscal decentralization helps limit corruption and government predation, as well as rent-seeking to some extent. These characteristics of market-preserving decentralization are especially important in developing countries, as it limits the government's tendency to abuse their policy initiatives and authority, such as predating investments or monopolize over wages. It also helps reduce monopolies or the amount of overshadowing state-owned enterprises, as well as inefficient economic interventions (Wibbels, 2005).

The market-preserving approach of understanding fiscal decentralization mimics the view from the private sector—decentralization helps constrain the expansionary tendency of government. Like competition between companies, competition among different subnational governments helps limit the power of a monopolist, so that the economy's resources are not encroached by the central government while private initiatives can be fulfilled better without distorted central barriers (Oates, 2005). Qian and Weingast (1997) describe this approach as decentralized system and market economy mutually reinforcing each other, and thus that the subnational governments, by means of

jurisdictional fiscal competition, have key regulatory power to secure common market in setting hard budget constraints and removing trade barriers. Weingast (2007) develops five conditions for which a fiscal decentralization system must suffice to be market-preserving: hierarchy with delineated scope of authority, autonomy in subnational governments, common market, hard budget constraints, and institutionalized authority. He believes that once these conditions are met, fiscal competition provides subnational governments with incentives to foster local economic prosperity. Subnational governments, once yielding the authority to adapt policies to local preferences, have the convenience to regulate local markets and tailor public goods provision to local needs. Effective competition also expedites factor mobility across jurisdictions and hence may help build the common market condition. The requirement of hard budget constraint also limits local governments from spending beyond their means and prevents the endless bailout (McKinnon, 1997; Dillinger and Webb, 1999), and therefore helps ensure fiscal discipline (Shah, 1997; Rodden, 2005). The last of the five conditions—institutionalized authority—provides a glue for the decentralized system. A set of rules and regulations must be in place to prevent the central government from altering the decisions made by subnational governments. These constraints over the central government's ability to take over helps deliver balance of power among different layers of government (Stepan, 2004).

Responding to this approach, Oates (2005) believes that one of the contributions from the normative market-preserving approach is that the theory moves beyond a static view of decentralization incentives and performance—it extends the consideration to a dynamic federal structure, in which institutional capacity as well as the derived checks and balances in the decentralization system can sustain the system itself over time in a "self-

enforcing" way. The theoretical underpinning of this approach is often regarded as being inherently political. La Porta et al (1999) describe decentralization as sometimes a game between "grabbing hand" versus "helping hand". The incentive of preserving market in a decentralized system provides policymakers the opportunity to choose a pro-market fiscal system and market-enhancing public goods, which they can use to compete with other jurisdictions (Weingast, 2007). The approach also emphasizes the importance of local revenue generation from fiscal competition, in ways of reducing rent-seeking, responding to local demands, and providing market-enhancing rather than monopolized public goods. Properly structured fiscal decentralization creates competition for factors of product and means of yardstick competition (Besley and Case, 1995). Ideally, the market-preserving incentive also provides a way to address the common-pool problem: when subnational governments have fiscal incentives such as taxation instruments to provide market-enhancing public goods, horizontal equity problem that arises from most transfer systems that intend to solve fiscal imbalances may be alleviated through competition and capital mobility (Weingast, 2007). The market-preserving fiscal decentralization framework provides a comparative lens through which institutional forms are examined and incentives towards fiscal competition are discussed.

Though, there are also opposite theoretical arguments towards market-preserving fiscal decentralization. This includes, for example, tax competition creating economic distortions such as the "racing to the bottom" phenomenon; and that the government is strong enough to protect property rights and preserve market, but may also be too strong and confiscate properties which will not be market-preserving at all. "Racing to the bottom" phenomenon describes the situation where subnational governments reduce tax

rates and compete to attract businesses one after another, which may lead to under-provision of productive public expenditure and public goods (Brueckner, 2004). The hindering the Leviathan argument is also questioned, because the scale of power of government in protecting property rights and reducing rent-seeking activities are hard to judge when investment competition are present. It is a political question sometimes regarding how strong a government should be, and whether an institutionalized system like fiscal decentralization can scale down the power (Cai and Treisman, 2005). There is also other literature that focus on the macroeconomic issues, such as difficulty in fiscal policy coordination (Tanzi, 1995) and failure in exploiting economies of scale (Prud'Homme, 1995) that both do not agree with the market-preserving capability of fiscal decentralization, as these issues may offset or mess up any tax competition or market-preserving related possibilities that fiscal decentralization can bring.

Also, the empirical evidence of market-preserving fiscal decentralization's effects is not always as described by the theoretical predictions. Its impact on economic growth, which is the main interest of this dissertation, will be discussed in the next section together with other approaches. Rodden (2003) argues that what matters should be the form of fiscal decentralization rather than decentralization *per se*. Oates (2005) also believes that political and fiscal institutions in a particular context have traits that are endogenous to the system. Thus, many empirical work on different countries, individually or by means of cross-country analyses, show completely different pictures, and these different empirical conclusions urge advancement in the theoretical diversity of the market-preserving approach. The second generation theory, including the market-preserving approach, is not competing but rather complementary to the first generation theory. The second generation

empirical evidence draws on the theory extending the welfare maximization assumption to include political incentives (Weingast, 2009). These empirical studies also, in various forms and using different variables, emphasize fiscal incentives or fiscal interest component, and discuss if providing correct fiscal incentives and market-enhancing elements helps foster local economic growth. The discussion of market-preserving fiscal decentralization characterizes a particular form of decentralization, and emphasizes the concept of fiscal competition and fiscal incentives in the decentralization literature. Its focus on subnational tax competition and limiting the pervasiveness of economic rent-seeking lends useful hypotheses to my own research.

Fiscal Decentralization and Economic Growth

Turning the discussion from fiscal decentralization to the literature review on its impact on economic growth—the current literature on the impact of fiscal decentralization on economic growth has shown quite inconclusive results. There are several potential effects and the channels through which fiscal decentralization affects economic growth that are identified from previous studies. Below I will go over the theoretical arguments of these channels as well as how empirical analyses have shed light on the intricacy of the theoretical assumptions.

1. The Efficiency Approach

This channel is consistent with the first generation fiscal decentralization theory. There is a widespread understanding towards fiscal decentralization being an effective tool for increasing the allocative efficiency of public spending that better fits the local needs, since subnational governments are usually in a better position than the central government

in knowing the diversity of local preferences over public goods. If subnational governments are able to supply specific levels and types of services in line with the specific demands, the increasing efficiency in the allocation of resources and the flexibility of government service provision brought by fiscal decentralization may provide better matches for diverse preferences (Oates, 1972; Brueckner, 1999; Baskaran et al, 2014). Diversification in government output according to local preferences may help attain higher levels of social welfare, which central policies may fail to do by ignoring those differences (Oates, 1999).

This channel also takes the Tiebout sorting assumption as the starting point. As mentioned in the first section of the literature review on the Tiebout model, the mobility of citizens between different local jurisdictions provide a mechanism for preference revelation (Vo, 2010). Thus, fiscal policies encouraging mobility will serve as a force to improve public spending efficiency, as people sorted by demands expedite higher efficiency in resource allocation. This inference is essentially about efficiency in spatial allocation of productive activities, and it regards sorting as a welfare-maximizing process (Krugman, 1991). Efficient levels of publicly provided outputs based on demand-homogeneous regions further increases the likelihood of economic development (Gemmell et al, 2013).

However, the channel of fiscal decentralization's efficiency in boosting economic growth is not always supported in all theoretical literatures. One stream mainly questions the omnipotence of decentralization. Cremer et al (1995) think that information gathering is endogenous, and therefore in principle there is no reason why central government cannot use different channels to understand local conditions. Seabright (1996) and Oates (1999) argue that centralization is sometimes preferred because it can provide a better mechanism

for policy coordination and can internalize inter-jurisdictional fiscal externalities. Oates (1999, 2005) also mentions that if local demands tend to be homogeneous, central planning may sometimes be more optimal to increase efficiency in resource allocation. Therefore, potential gains from decentralization stemming from inter-jurisdictional differences in demand may sometimes be hard to justify in reality.

Another stream of questioning comes from the stance of the unclear definition of efficiency and whether decentralization efficiency has a direct impact (Prud'Homme, 1995; Tanzi, 1995; Davoodi and Zou, 1998; Martínez-Vázquez et al, 2017). Martínez-Vázquez and McNab (2003) distinguish between the consumer (or allocative) efficiency and producer efficiency, where the former means higher individual welfare from subnational spending than central one, and the latter means the same public goods or services can be provided with a lower cost from subnational than central spending. It is nevertheless unclear which efficiency is functioning in decentralization, if any, and whether efficiency from decentralization poses a direct impact on growth. Largely an endogenous parameter, fiscal decentralization can simply mean public resources more efficiently spent, but this will not necessarily directly affect growth *per se*—it may affect growth indirectly through its impact on or interactions with socioeconomic variables, such as education, health, macroeconomic stability, etc. A more concrete assumption over efficiency, a solution for excluding endogeneity issue, and a theoretical model in building a direct causation from efficiency are yet to be found.

A third questioning stream considers the consequence of subnational government capture and regional disparities due to racing pursuit of local efficiency (Bahl and Linn, 1992; Prud'Homme, 1995; Morgan and Vardy, 2006; Rodríguez-Pose and Krøijer, 2009).

Rodden (2002) argues that decentralization may be harmful especially for emerging and transition countries: catering to the heterogeneous demands incurs risks of local corruption, increasing deficit, and easier capture by interest groups. The resulting inter-jurisdictional disparities due to different fiscal capacity and inequalities may result in lower overall economic growth. Martínez-Vázquez and McNab (2003) also mention that decentralization should be regarded as a superior good, since only with higher income level countries can the benefit of efficiency, including economic growth, in decentralization be realized, in which more sophisticated institutional design and more equal capacities from subnational governments are in place.

Theoretically or conceptually, the understanding towards decentralization efficiency has evolved, shifting away from a monotonic stance in how it affects economic growth. This is, to quite some extent, triggered by mixed results from empirical studies. Most of the current empirical literature does not test for a specific channel when studying fiscal decentralization's impact on economic growth, though this is highly suggested but is compromised given that the theoretical guidance runs comparatively lean (Martínez-Vázquez and McNab, 2003; Baskaran et al, 2014). Nevertheless, the ambiguity of empirical results in return provides insights in examining the accuracy of previous theoretical assumptions on the efficiency channel, and several aspects deserve some highlight, as discussed below.

Firstly, empirical studies show quite inconsistent results, and inconclusive results can be due to different methods, specifications, and conditioning. To name a few, quite some research find positive impact of fiscal decentralization on GDP growth (Yilmaz, 1999; Ebel and Yilmaz, 2002; Iimi, 2005), some show a negative impact (Davoodi and Zou, 1998;

Zhang and Zou, 1998; Xie et al, 1999; Rodríguez-Pose and Krøijer, 2009), and the rest find no significant relationship (Woller and Phillips, 1998; Bodman, 2011), or that the robustness should base on conditions, such as Enikolopov and Zhuravskaya (2007)'s argument on the importance of sound institutions. There are both cross-country and individual country analyses, while neither provides a clear picture of whether there is an effect, though individual country studies tend to be more in depth of country-specific environment. Most studies use OLS, fixed effects regressions, IV regressions, and from the conclusion of Baskaran et al (2014)'s meta-analysis over 449 empirical models there is yet a convergence of what specifications to use, and most of the variable selections follow a general rule-of-thumb based on previous studies but tend to be arbitrary. Many studies use Barro (1990)'s endogenous growth model in linking public investments, financed through income taxes, to economic growth (Akai et al, 2004; Hatfield, 2011). However, the conditioning in many other empirical works are weak, for instance that there are not many of them trying to identify transmission channels of how fiscal decentralization affects economic growth, and there is yet a system in what assumptions to be taken over considering which parameters in revenue or spending decentralization to use, and what to do with transfers, etc. (Feld et al, 2009).

Secondly, relevant studies tend to have different understanding towards efficiency or have different measurements of efficiency, though the assumptions are usually under Oates' initial proposition of fiscal decentralization enhancing economic efficiency and therefore bringing dynamic economic growth. Adam et al (2008) find that the public sector efficiency is higher in fiscal decentralization and transfers affect efficiency negatively, where they measure efficiency in a data envelopment analysis by comparing government

spending inputs and outputs. Gemmel et al (2013) specifically mention to have examined the efficiency gains in fiscal decentralization and its impact on growth using a pooled-mean group panel analysis, while its understanding towards efficiency seems to have combined consumer and producer efficiency. While many other studies do not state a specific efficiency approach. Salmon (2013) mentions that, based on the mixed results, we can see the difficulty in measuring jurisdictional heterogeneity. Martínez-Vázquez and McNab (2003) also argue that more work especially on the indirect effect of efficiency on growth should be done.

Thirdly, endogeneity issue is a main concern, and omitted variable bias is also prevalent given that the number of determinants or control variables of economic growth are vast (Durlauf et al, 2005). Levine and Renelt (1992) argue that the correlation found in many studies are not robust and fragile. In effort of considering these issues, Iimi (2005), Martínez-Vázquez and McNab (2006), Gemmell et al (2013), Ligthart and Oudheusden (2017) and so on use different instrumental variables (IVs) in the regressions to address endogeneity problem. Akai et al (2007) use other maximum likelihood methods than OLS and find that there is a hump-shaped relationship between decentralization and economic growth, rather than a simple positive or negative one. Asatryan and Feld (2015) use a Bayesian model as a methodological refinement to account for parameter uncertainty. Nevertheless, the endogeneity issue, the potential reverse causality between fiscal decentralization and growth, as well as the large literature on growth still pose challenges to the empirical studies in the future.

2. The Laboratory Approach

This channel, also named as experimental decentralization, takes the assumption that if decentralization can increase the quality of governance, it may help increase intergovernmental competition and policy innovation (Oates, 1997). The concept of yardstick competition (Shleifer, 1985) is applied in this approach, where diverse subnational governments each search for new solutions to economic development experiments and compare the results. Salmon (1987) raises the idea of evaluating cross-jurisdictional performance and decentralization serving as an incentive scheme, and Besley and Case (1995) extend it to the research on the behavior of learning neighboring successful economic models. This channel has ever since been studied further, that fiscal decentralization, in which parallel small-scale experiments undertaken by subnational governments, can encourage creativity and fiscal competition can induce policy innovation, and there may be information spillovers from one jurisdiction to another that can benefit development (Kee, 2003; Oates, 2006; Schnellenbach et al, 2009). For citizen voters, they judge a governor from benchmarking neighboring performance and fiscal choices, and this inference about the government's level of competence may indirectly and potentially positively affect subnational governments' behavior (Dincer, 2010; Harvey et al, 2014). There may also be strategic interactions among local decision-makers such as forming strategic complements and creating positive externalities from one jurisdiction to another (Caldeira et al, 2015). This channel draws on the principal-agent framework, arguing that laboratory fiscal decentralization helps reduce information asymmetry between voters and politicians, and therefore may in turn increase effectiveness of government policymaking and also economic development (Besley and Case, 1995; Besley and Smart, 2007; Schnellenbach et al, 2009).

However, the positive causal link between laboratory decentralization and economic growth is not yet fully agreed upon. Firstly, there may be free-rider phenomenon for those jurisdictions that tend to be more risk-averse to policy innovation. This risk aversion not only comes from the pure anxiety over new policies and institutional stickiness, but also from the consideration of stability in keeping office from the usual tax and spending combination before any substantial benefits are verified for the new policies (Rose-Ackerman, 1980; Vanberg and Kerber, 1994). Secondly, from a political economy stand point, this channel can intrigue more rent-seeking behavior because bureaucrats can nominally use policy innovations to extract more rents from businesses while voters are usually not sure what these new policies entail (Kotsogiannis and Schwager, 2006). Thirdly, Strumpf (2002) argues that as long as jurisdictions in a country are heterogeneous enough, the policy innovation is not useful anymore for knowledge transmission since different regions may need completely different policy packages. A special condition is needed for any specific policy innovation to be implemented, and therefore learning from other practices may not be as helpful for local development. To sum, fiscal decentralization is not a sufficient condition in bringing more policy innovation, and even if there is local policy innovation, there is not always reference value in it for all jurisdictions to learn from and thus increasing overall economic growth for the country. Only when policy is proven to be effective at reaching its goal, neighbor learning and parallel experiment can be worth considering for testing and application.

The theory of laboratory decentralization has been initiated for decades, but there are not many theoretical or conceptual models that can support empirical work to examine the impact of this transmission channel on economic growth. Rauscher (2005) and Rauscher

(2007) have separately analyzed endogenous growth models in evaluating regional competition's impact on political innovation and further on economic growth. By assuming either constant or accumulative private capital stock, the two papers have come to opposite conclusions. The empirical studies unfortunately do not have much to show either in showing the impact of laboratory decentralization on economic growth. Previous empirical literatures have shown just little evidence of inter-jurisdictional mimicking behavior, such as from Bivand and Szymanski (1997), Heyndels and Vuchelen (1998), and Arze del Granado et al (2008). Bodignon et al (2004) argue that the concept of yardstick competition is too weak to yield substantive empirical predictions on jurisdictions learning from neighboring regions. They also suggest that more efforts need to be spent on studying the institutional characteristics of a country in order to isolate the yardstick competition effects, which now tend to be unclear. Capuno et al (2015) find that for Philippines, yardstick competition has decreased local revenue while does not have a significant impact on local spending. They argue that yardstick competition expands people's access to information and comparisons over different local performances, and that these will affect subnational governments response to the needs of their constituents. However, the impact on overall economic performance still depends on public service provision performance than how much government spends. Yang and Chen (2018) find that yardstick competition resulted from fiscal decentralization in China has promoted short-term economic growth but has resulted in large land sale and leasing, which poses challenge for future economic development. Wu et al (2019) show that fiscal decentralization and jurisdictional fiscal competition in China have brought infrastructure overinvestment and tax erosion, and will harm economic growth sustainability.

The difficulty for building empirical links also comes from confusions in the concept. Some literatures try to distinguish between yardstick competition and fiscal mimicking behavior. Madiès and Dethier (2010) mention that whether authorities behave strategically with each other does not always follow the assumptions from yardstick competition. Sometimes it is just fiscal mimicking behavior from local governments that will not necessarily be good for overall economic development. Besley et al (2010) suggest that one way to check this is to study the fiscal reaction function, which tests for fiscal interdependence between jurisdictions' policies and efficiency. Though, one can argue that this may be a different research question than how laboratory fiscal decentralization affect economic growth, since the direction is more towards tax incentives and "racing to the bottom" phenomenon, rather than the policy innovation and experimentation perspective that this channel carries. Nevertheless, for future explorations, yardstick competition can still be a point of penetration of how laboratory decentralization affects economic growth, and we need more empirical evidence to back the assumption that laboratory decentralization indeed has a relationship with economic growth.

3. The Market-Preserving Approach

The third channel, usually called the market-preserving or the market preservation approach, originates from the public choice theory. Echoing the first part of the literature review on the overview of the second generation and market-preserving decentralization, the idea is marked by Brennan and Buchanan (1980), who depict government as a revenue-maximizing Leviathan. They argue that in order to control the Leviathan's over-taxation, governments need to be constrained through constitutions that decentralize political and fiscal authority. Based on the Tiebout assumption, a fiscally decentralized system, in which

people and firms are mobile, can force the subnational governments to engage in tax competition and reduce the tendency of massive growth of governments. To put it another way, fiscal decentralization can hinder the Leviathan's control and monopoly on taxing people as it wishes—it helps prevent the government from encroaching too much on the common tax base and thus provide a common market for private initiatives to fulfill better (Weingast, 1995, 2009; Qian and Weingast, 1997; Vo, 2010). Fiscal decentralization, under the public choice theoretical framework, is helpful in resolving the inherent agency problem between the people and the government (Rodden, 2003) and inducing economic development and increasing social welfare.

This emerging approach is consistent with the second generation fiscal decentralization theory, as highlighted by Oates (2005), that government is no longer viewed as a "black box" but viewed learning from the angle or theory of the firm: bureaucratic behavior and government policymaking process are studied, and there are other considerations being added in, such as the principal-agent problem, the issue of property rights, government enforcing contracts, and the transaction economics perspective on information (Qian and Weingast, 1997; Vo, 2008, 2010). Therefore, regarding the incentives that market-preserving fiscal decentralization can create, Weingast (1995) argues that when there are inter-jurisdictional competitions, it will bring down transaction cost when subnational governments can create and preserve a common market where capital can flow across regions, trade of goods and services is facilitated, and that subnational governments have hard budget constraints. He further argues that decentralization can reduce domestic barriers to business mobility and encourage new economic activities to emerge, as well as reducing rent-seeking behavior and activities.

These arguments serve as foundation using public choice theory's assumptions in self-interested bureaucrats and Leviathan government and apply them into a fiscally decentralized system, and explore how fiscal decentralization's created tax competition and capital mobility may trigger growth.

However, the relationship is not always positive as argued from some market-preserving approach literatures. Bliss and Tella (1997) argue that fiscal competition does not necessarily lead to lower corruption and they do not believe that competition is an exogenous variable that can be singled out to evaluate its effect on corruption. If Romer (1994)'s point of corruption introducing large welfare costs by driving firms out of the market stands, it is nevertheless uncertain whether fiscal competition can bring down welfare cost and further increase economic development. Sato (2003), using a theoretical model, argues that rent-seeking activities are political distortions that can be mitigated by decentralization, but tax competition can bring economic distortions. Therefore, welfare evaluation should be based on the balance between the gains and pains resulted from the two. Blanchard and Shleifer (2001) point out that fiscal competition may lead to "racing to the bottom" phenomenon and that subnational governments are more easily captured by local interest groups. Cai and Treisman (2004) extend this argument and predict a "state-corroding decentralization" as a result of fiscal competition. They think that due to the competition mindset, subnational governments tend to protect jurisdictional businesses from being investigated for corruption or shielding businesses from central law enforcement. These lines of arguments beg the question of whether fiscal decentralization can be truly market-preserving to increase economic welfare, and the worry is that a government strong enough to secure common market and protect property rights may also

be strong enough to confiscate the wealth of its citizens (Weingast, 1995). Also, there is little evidence that institutions will have the commitment of lowering market transactions costs, as expected from the basic assumption of fiscal decentralization that intends to increase efficiency and lower redistributive costs. The political and institutional foundations and the market specifications of "getting prices right" are both important conditions to make the decentralized system self-enforcing to promote economic development. They even need to be at place at the same time (North, 1981; Weingast, 1995).

Descriptively, in country-specific case studies, given that the political and economic profiles are quite different for countries, fiscal decentralization shows different effects depending specific institutional design (Shah, 1999; Litvak et al, 1998; Weingast, 2007). China has been one of the main research subjects regarding a potential successful story utilizing market-preserving decentralization. The country is fiscal decentralized with an authoritarian regime (Montinola et al, 1995; Jin et al, 2005; Shen et al, 2012). For subnational governments, they are given political protection from the central government as well as economic freedom and opportunities that seek incentives to foster competition and secure market for competition. Weingast (1995) argues that this has been strikingly similar to the 18th century England, where subnational governments have strong incentives to boost local prosperity by encouraging introducing and developing new firms. Both England and United States' previous successful stories echo North (1993)'s point of necessary condition of a mix of institutions and complementary informal norms—they both have constitutional constraints promoting rule of law as well as a social consensus of the limits of the state. Weingast (1995, 2007) also argues that the market-preserving decentralization in these countries are a product of a historical process that conform to a

strong consensus supporting the limits on the central or federal government. Other emerging and developing countries such as India, Russia, Argentina, Mexico suggest that economic and political institutions should be redesigned simultaneous, again reflecting North (1993)'s view. Weingast (2007) argues that these *de jure* federal countries but their systems are not market-preserving. There is not much autonomy given to the local authorities, and for instance, India allows for internal trade barriers, Russia restrict labor and capital mobility, while Argentina and Brazil both have experienced hyper-inflation because their subnational government have soft budget constraints. All of these conditions fail to suffice the five requirements of market-preserving decentralization developed by Weingast (1995), therefore appropriate economic policymaking roles are not provided for these local political institutions to secure a market-preserving *de facto* decentralization system. Singh (2008) also compares China and India in the market-preserving approach. He describes China as having local hard budget constraints and inter-jurisdictional competition through the strong intra-party incentives, while argues that India does not have enough devolution of fiscal power to the local level, and that both countries will have stronger economic development benefited from having greater local autonomy.

There are some theoretical or conceptual models built to understand the relationship between tax competition and economic growth, which can be a proxy in gauging the theoretical, other than descriptive, relationship between market-preserving fiscal decentralization and economic growth. Koethenbuerger and Lockwood (2010), in an endogenous growth model, examines the relationship between tax competition and growth with stochastic shocks to productivity. They find that if absent of shocks, decentralized tax system increases growth, while with productivity shocks, growth can be lower with

decentralization. This is because they find that when constant returns to scale is assumed in an endogenous growth model, tax competition becomes a Bertrand tax competition which is an extreme version that increases growth. And when shocks are present, they dampen down tax competition and raise taxes above the level of those in a centralized system, and growth can be lower. Chu and Yang (2012), also using an endogenous growth model with Leviathan taxation and capital mobility, analyze the merits of fiscal centralization and decentralization respectively on economic welfare. They find a hump-shaped relationship between the different of centralization versus decentralization and capital mobility. They therefore argue that there shall be an optimal level of tax competition—some competition is beneficial while too much is harmful. Similarly, in a design of an economy with vertically integrated final goods, intermediate goods, and research sectors, Yilmaz and Guner (2013) finds that the resources from capital taxation has a U-shaped relationship with growth. Becker and Rauscher (2013), again using an endogenous growth model, find that the detrimental "race to the bottom" capital tax rate is only one possibility—the relationship between capital mobility and capital tax rate is not monotonic, and that growth has an unambiguous positive relationship with capital mobility. Conclusions from these theoretical pieces are also not convergent, and they also base on very specific assumptions over the setting of the economy, external shocks, political institutions, and the proxies used to measure tax competition and decentralization.

The empirical evidence of market-preserving fiscal decentralization's impact on economic growth is however scarce. There are not many literatures directly using the market-preserving approach in fiscal decentralization *per se* gauging its effect on economic growth. In some quasi-market-preserving approach work, for instance, Enikolopov and

Zhuravskaya (2007) analyze the strength of national political parties and administrative subordination, and find that the former improves economic outcome while the latter has no significant impact. Hatfield (2015) models the incentives of elected officials and assumes capital mobility, and finds that decentralizing tax and spending power will enhance economic growth. Most related literatures discuss this relationship by means of examining issues potentially resulting from fiscal decentralization such as rent-seeking, corruption, tax competition, capital mobility, protecting property rights to evaluate an indirect effect on economic growth. The mechanism of fiscal decentralization is not always mentioned as a presumption in the analyses. These literatures usually assume either a malevolent Leviathan government with high tax rates and self-interested bureaucrats captured by lobbying groups, or a scenario with capital mobility across jurisdictions using an endogenous growth model. For example, Iqbal and Daly (2014) use a GMM model based on 52 middle-income economies to evaluate the relationship between rent-seeking and economic growth, and find that rent-seeking activities and corruption are detrimental to growth, and well-established democratic institutions are growth-enhancing. For individual country analyses, Hatfield and Kosec (2012) examine the causal impact of inter-jurisdictional competition on income growth in the United States, and find that it will increase local taxes, spending, and debt, while doubling the number of county governments increases annual growth of employees. Gaitan et al (2001) examines the rent-seeking phenomenon in Bulgaria, and find that, using a general equilibrium model where producers of public goods finance a rent-seeking system, there will be no significant welfare gains from free trade and rent-seeking will impede economic growth.

It is therefore important to build an empirical link of how market-preserving decentralization affects economic growth, whether it shall be a causal effect, or there is a transmission mechanism or second-round effect existing between the relationship. As discussed above, there are some theoretical models trying to bridge the effect by deductions, however, similar to the efficiency approach discussed in the first channel, most empirical literatures do not specify the channel through which fiscal decentralization affects economic growth. While market-preserving decentralization could have different patterns of manifestation, for instance, in how it may have reduced rent-seeking through creating tax competition and capital mobility, or how it can make the central government strong enough to protect property rights and enforce laws but weak enough to not have seized exorbitant taxes and encroached in the common tax base. This dissertation will try to understand the potential effect from fiscal decentralization on bringing domestic capital mobility, and how this as an intermediary effect affects public investment and its balancing effect with inter-jurisdictional tax competition and government rent-seeking activities, and how this will affect economic growth. Below, thus, I will present a review over the rent-seeking literature in the fiscal decentralization and economic development background, since it is important to understand rent-seeking as a partial feature of the government under the public choice assumption.

Rent-Seeking and Fiscal Decentralization

Rent-seeking in the fiscal decentralization literature mainly takes the stance of public choice theory and some components in neoclassical economics theory, that this is an activity where governments attempt to gain benefit and increase their share in existing

wealth without creating new wealth in the policy processes. This is usually done in extracting extra value by engaging in a mutually beneficial transaction (Schenk, 2006). As discussed in the previous section, the flow of analysis is that tax competition triggered by market-preserving fiscal decentralization will help reduce rent-seeking activities, while reduced rent-seeking behavior will have potential positive consequences to the society including economic growth. Though, this view is not always supported based on the limited literatures, and below are some separate reviews over the relationships.

On the relationship of tax competition resulting in fewer rent-seeking activities, the source for theoretical or conceptual literature review is lean. Some studies directly analyze decentralization's impact on inducing less rent-seeking, backing the classical Leviathan hypothesis that decentralization represses rent-seeking behavior (Weingast, 1995; Qian and Weingast, 1997; Oates, 2007). Other studies provide some nuanced but detailed approaches in gauging this issue and find a roughly negative relationship. For instance, Edwards and Keen (1996) assumes a government in the middle point between the two extreme of a Leviathan government and a benevolent citizen welfare maximizer. They argue that whether tax competition is beneficial depends on whether it serves as a useful constraint on the policymakers when it is a Leviathan or it is a source of inefficiency when the government is completely benevolent. They find that some level of tax coordination is needed when the efficiency gain from tax competition outweighs the policymaker's tendency to behave wastefully. Sato (2003) argues that decentralization is a device for limiting the public sector to acquire and distribute political rents. However, he regards tax competition brought by decentralization as wasteful than useful. This is because he finds that tax competition can result in economic distortions, such as when tax competition

brings down tax revenue, this shrinkage in revenue may stimulate political activities, and this depends on the price elasticity of demand of rent-seeking behavior. Arikan (2004) uses a theoretical model assuming rent-seeking behavior exists under a tax competition condition, and finds that fiscal decentralization leads to lower level of corruption. Eggert and Sørensen (2004) set up a probabilistic voting model and find that tax competition can reduce rents. However, they mention that tax competition cannot be taken too far since it will reduce welfare by causing an under-provision of public goods. Cheikbossian (2008) models lobbying as an agency game and adopt a public choice school stance to argue that rent-seeking under a centralized regime is like a prisoner's dilemma, and it is too costly relative to the free-riding incentives under a decentralized regime. They argue that when there are inter-jurisdictional spillovers, free-riding costs associated with decentralization can still be lower than the rent-seeking-related costs posed under centralization. This is because centralized provision of public goods implies cost sharing and may generate conflict of interest between regions, and is reflected in rent-seeking activities. The prisoner's dilemma of rent-seeking, if put into a decentralized system, may be slightly alleviated, according to their model, when jurisdictions tend to internalize spillovers.

However, not every theoretical piece finds a negative relationship of tax competition and rent-seeking. competition For instance, Rauscher (2005) builds a theoretical model assuming a Leviathan government that sets tax rate and provides a productive input for public goods. He finds that whether tax competition and capital mobility affect economic growth rate depends on the elasticity of intertemporal substitution, which is also the elasticity between the Leviathan government's short-term goal of rent-seeking and its long-term goal of gaining political support. In his conclusion, he finds that if the elasticity is

greater than one, which means that when the Leviathan government would like to substitute more efforts in gaining political support with more rent-seeking, more tax competition will cause higher economic growth. This is also contrary to the normal wisdom that tax competition makes rent-seeking more difficult because it poses a higher opportunity cost and there will be less rent-seeking. His model demonstrates the opposite which is that when there is more rent-seeking, decentralization and the accompanying tax competition will incur more economic growth. Gadenne and Singhal (2014), on the other hand, come from the conceptual view of intergovernmental transfers will bring opportunities for rent-seeking behavior, which always happens as a result of decentralization in developing countries.

The empirical evidence for the relationship of tax competition resulted from fiscal decentralization and rent-seeking is quite mixed. For instance, Arikan (2004), besides using a theoretical model, also tests empirically for the model's conclusion of fiscal decentralization leading to lower level of corruption and rent-seeking, but he finds that this relationship is not very strong in a cross-country dataset. Matsui (2005) finds that in Indonesia, after decentralization was institutionally introduced in 2001, local governments have become more extensive economic actors in regional economies. However, this has made local governments rent-seekers who serve as regional economies "watchdogs". Matsui argues that they should instead be promoters for private sector growth for fair entry opportunities. In his findings, competition between jurisdictions exacerbates rent-seeking behavior. Alfano et al (2014) find that, in empirical terms, decentralization and corruption as well as rent-seeking activities serve a U-shaped relationship. Local bureaucrats have incentives to perform in the voters' interests when they yield enough decentralized

autonomy, while the autonomy is not too large and local bureaucrats do not have too many local resources to distort for personal use. However, too much decentralization is not appropriate either as it will increase the amount of rent-seeking activities. Overall, unlike the theoretical discussions, the empirical pieces regarding this relationship do not necessarily have strong enough arguments stemming from the story of tax competition and the Leviathan approach to back their analyses.

On the relationship of fewer rent-seeking activities resulting in higher economic growth, Murphy et al (1993) in their seminal piece argue that this is true by two means. Firstly, the more rent-seeking activities there are, the more attractive they make themselves than productive activities, and this will lead to adverse effect to increase productivity and therefore growth. This argument is based on the theoretical projection that rent-seeking systems are subject to very natural increasing returns, making the activities very self-sustaining. By making itself attractive, rent-seeking will also potentially induce bribes and corruption and seeking special economic privileges will open the possibility of exploiting the consumers (Dauderstädt, 2006). These in turn will likely increase the cost of production of public goods and sometimes induce tax revenue loss in the public exchequer (Niskanen, 1971; Chowdhury, 2006). Secondly, rent-seeking activities will likely reduce tendency towards innovative activities, which are important for economic advancement. When firms seek profits and win over their competitors, one way to accomplish this is through innovation and R&D, and these innovative activities will be beneficial to economic development. However, there are also other less productive ways where firms seek and advantage, and Baumol (1990) describes this as “unproductive entrepreneurship” which in one form is rent-seeking. Rent-seeking activities will have an important effect on the rate

of innovation and creative activities, the normal function of the economic market, and also eventually on the economic growth (Brou and Ruta, 2007).

Literatures like Brou and Ruta (2007) study this relationship in a setting that firms compete in both economic and political markets, where they compete through cost-reducing technological innovation and influence over the government through rent-seeking. Assuming that rent-seeking and market structure are determined endogenously, they find that rent-seeking activities make companies ignore economic competition and result in less innovation, which will affect the rate of economic growth. Carson (2016) argues that government either create wealth or create and seek rents to gain support, and sometimes rent-seeking dominates the growth effects while also crowds out innovation and R&D. In general, the theoretical arguments over the relationship emphasize that rent-seeking activities create effect of a shrinking market caused by reducing innovation and lack of competition, as well as slack caused by gaining political profits.

However, there is no convergence over what political institutions best describe the mechanism of competition for rents, and it must vary case by case (Bardhan, 1997; Bardhan and Mookherjee, 2005; Brou and Ruta, 2007). Therefore, as argued by some theoretical studies, whether rent-seeking necessarily causes lower growth is not substantiated in every situation. For instance, Krueger (1974) computes the social cost of rent-seeking in a theoretical general equilibrium model, and finds that if competition for rents is allowed, income distribution may be less unequal. Competitive rent-seeking also results in divergence between private and social costs of certain activities, and it therefore varies which one is greater than the other to determine the overall effect on economic growth. Bardhan and Mookherjee (1999, 2000) use a model of electoral competition with special

interest capture to argue that the extent of capture depends on context and tends to be ambiguous in effect. Sonin (2003) echoes this point and further mentions that if the political centralization is strong, the equilibrium capture may be controlled or even eliminated, leaving the effect on other variables such as economic development uncertain, depending on the fiscal and political regimes of the country.

Empirical evidence, though limited, shows quite some consistency in the negative impact from rent-seeking to economic growth. Laband and Sophocleus (1988) find that rent-seeking has decreased total income in the United States by 45%. Brumm (1999), using a cross-sectional sample of 48 states in the United States and assuming that rent-seeking is exogenous to the growth process, also shows that rent-seeking is harmful to economic growth. Cole and Chawdry (2002) base their analysis on Brumm's results and try to understand the relationship through multiple channels. Brumm's single-equation model, as argued by Cole and Chawdry, is too simplified to capture the indirect effects that rent-seeking may affect growth, such as human and capital investment. It also ignores the lag structure of the variables, if rent-seeking activities are indeed self-perpetuating. Cole and Chawdry thus use a VAR model using panel data to have found that rent-seeking activities are exogenous to growth and are indeed detrimental to growth. Rent-seeking can also affect growth indirectly through the effect on public physical investment and public services. If ignoring these indirect effects, we may have underestimated the impact of rent-seeking activities on economic growth. Del Rosal (2011) uses a survey method to measure the social cost of rent-seeking and finds that it lowers economic growth. Schwab and Werker (2018) use an industry-country-year level sample data and also find that rent-seeking has a significantly negative relationship with economic growth, mainly driven by poorer

countries. Though, there are opposing views from other empirical analyses that emphasize the role of political economy, which are important control variables and sometimes determining effects of long-term growth, such as policymaking processes, technology, capital, etc. (Gray and Lowery, 1996; Bardhan, 1997; Mohtadi and Toe, 1998). For instance, Mohtadi and Toe (1998) find that there will be spillovers from rent-seeking activities to others in the process that exceed the social cost of rent-seeking activities. Nevertheless, contrary to the theoretical pieces, most empirical studies argue that there is an obvious negative relationship observed in either individual or cross-country analyses on the impact of rent-seeking activities on economic growth.

The literature review above on rent-seeking provides an important motivation for the next chapter on the theoretical modeling, especially on the latter section on the modeling of the market-preserving channel. Fiscal decentralization, as argued by the roughly grouped two schools in the market-preserving field, can either create tax competition and minimize bureaucratic rent-seeking, or can also engender "racing to the bottom" phenomenon. These two consequences drive the effect of market-preserving fiscal decentralization in two opposite directions regarding its effect on economic growth, and this is probably why we do not see convergence on empirical results. Thus, in the next chapter of theoretical modeling, I will firstly show how the efficiency channel works, and then show, in the market-preserving channel, how capital mobility brought by fiscal decentralization attracts public investment competition, as well as its counterbalancing movement with tax competition brought by fiscal decentralization too. Inside the theoretical modeling, government's utility function will also be considered, which includes the discussion of rent-seeking and its tradeoff with government's other missions.

Chapter 3: Theoretical Framework

Introduction

In the previous chapter, I examined the current pool of literature on fiscal decentralization theory evolvement as well as three theoretical channels of how fiscal decentralization can possibly affect economic growth—the efficiency, laboratory, and market-preserving channels. To the interest of this dissertation, I would like to examine the channel of efficiency as the Efficiency Scenario, and the channel of market-preserving as the Market-Preserving Scenario, which includes two sub-scenarios—the Investment Competition Scenario and the Tax Competition Scenario. The laboratory channel will not be examined in this dissertation due to the lack of mature theoretical guidance, as well as the scarcity of data and measurements of knowledge spillover, fiscal mimicking behavior, and structural change due to creativity and experimentation.

As mentioned in the previous chapter, empirically, most studies have not identified a specific channel of impact from fiscal decentralization to economic growth, which may be one of the reasons why there is little consensus over what the relationship is. Besides setting the tone of developing two specific channels of how this dissertation explores the relationship, the objective of this chapter is to present theoretical arguments for framing the question over fiscal decentralization's impact on economic growth through (1) more efficiency in government resource allocation by means of better preference matching, and (2) capital mobility's impact on public investment and the counterbalance of tax competition and public investment. Through the line of these two arguments, I will first set up the framework by introducing the assumptions, the endogenous growth model, the

utility functions, and government budget constraint adapted from Barro (1990) and Cai and Treisman (2005). Then, I will introduce a baseline scenario with capital immobility and no fiscal decentralization that sets the foundation as the Scenario Zero, which can serve as the comparison scenario. I will then discuss the framework of the efficiency channel assuming capital immobility and fiscal decentralization in the Efficiency Scenario. After this, I will discuss two market-preserving scenarios assuming capital mobility and fiscal decentralization as the Investment Competition Scenario and the Tax Competition Scenario, with the latter scenario being an extension of the former scenario. In the end, I will conclude this chapter and discuss its link and implications for further empirical work.

Theoretical Framework

1. Assumptions and Framework

In setting up the theoretical framework for my dissertation, it is important to define the government's role in the economy. One of the most important theoretical literature regarding this topic comes from Barro (1990). Barro (1990)'s model in incorporating a government sector into the existing endogenous economic growth model defines the production function with the classical Cobb-Douglas function in a slightly extensive way: he models the production as not only attributed to private capital but also to public inputs and services, assuming with a constant return to scale in both of these two factors. The public services are financed by a flat-rate tax on output, and the economy's growth rate first rises with the ratio of productive government expenditure, but then eventually reaches a peak and subsequently declines. This is an essential assumption that is vital for my dissertation's theoretical model—Barro believes that including such a public services input

into the framework is because that the private capital (recall the three elements of the AK model—the simplest form of the Cobb-Douglas function: labor, capital, and technology or knowledge) is not a close substitute of public inputs, and previous endogenous growth models have not taken into consideration the differential effects productive public investment and private investment can incur to affect production and economic growth. For instance, public inputs into infrastructures such as roads, and other public services that citizens consume such as national defense and parks, are not products that can be produced by private capital, and the two capital of public and private are often complementary and have exponential effects. It is important to distinguish the capital into separate factors in the growth model, as private investment and public investment rely on different spending entities, and their behavior tends to differ a lot.

Further, Barro mentions the distinction inside the government's role, which is more meticulously explored by Cai and Treisman (2005). Since government's public input is an essential element to economic growth, we need to understand the government as an entity and its utility function in order to extract the right amount of productive public inputs or expenditure to the economy. There are essentially three types of government expenditure: (1) on public investment that expects productive returns and increases the productivity of public or private capital use, such as physical infrastructure, healthcare system, transportation, and education; (2) on public spending that mainly for citizen consumption, such as national defense, pension system, and parks; and (3) on rent-seeking or can be called on the government's own private consumption. Note that the distinction between the first two types of public expenditure is useful for later discussion on capital mobility triggered by fiscal decentralization. Cai and Treisman (2005) use this distinction on public

spending towards investment versus spending because investment is capital-sensitive, and government's investment behavior needs to be separated from its other spending behavior, because capital and infrastructure investment are complementary—the productivity of capital, which is important for estimating economic growth, is dependent on the government's infrastructure investment, and public investment itself will also benefit from capital inflows. Public investment and other public spending on public goods and services provided to the society need to be studied separately based on their different properties. This is also an important assumption for the later discussion on the theoretical model.

Moreover, regarding the government's spending part, which includes the latter two types of government expenditure as Cai and Treisman (2005) argue, they should be on the two sides of the substitution of government's spending behavior. If a government is a completely benevolent citizen welfare-maximizer, it will devote all of its public spending to the citizens (note that we do not include public investment here). If a government is a completely malevolent Leviathan whose main goal is to maximize its own revenue, it will be completely predatory and devote all the spending into its own consumption—seeking rents. The elasticity of substituting the two will be the government's preference for public spending to its own consumption. Thus, similar to Barro (1990) and Cai and Treisman (2005), for simplicity throughout the whole theoretical chapter, I will call the public investment expenditure as infrastructure investment, the public expenditure for purely the people's good as public spending, and the public expenditure for purely the government's own good as rent-seeking.

By having above assumptions and explanations over the different factors, my theoretical model will have the following settings. I assume that both central and

subnational governments are partially benevolent and partially self-interested—it does not matter where they exactly are in between the benevolence and the malevolency, as long as they are not on either side of the extremes, and this more or less captures the reality in most countries the world that we seldom see a complete citizen welfare-maximizer or a completely predatory government. I further assume that the government in general provides a mix of two productive infrastructure investments g_1 and g_2, for simplicity of discussion and modeling, especially for the explanation on the efficiency approach that will be discussed later. These infrastructure investments can be either through both central and local governments or through local governments only (i.e., central government transfer block grants to local governments). However, central government is limited in its capacity to understand all local preferences and can only institute a uniform policy for the nation, whereas subnational government can respond to its local needs.

Adapted from Barro (1990) and Cai and Treisman (2005), I also assume the aggregate production function of local jurisdictions $F_i = f(g_{i1}, g_{i2}, k_i, A_i)$ follows a standard Cobb-Douglas production function:

$$(1)\ F_i = A_i k_i^{\alpha} (g_{i1}^{\beta_{i1}} g_{i2}^{\beta_{i2}})$$

where F_i stands for the total production value for each subnational government, k_i^{α}stands for private capital input for each subnational government, and the term A_i measures the exogenous endowment effect of a subnational jurisdiction, meaning the inherited features that affect the marginal productivity of capital invested in the region, such as natural resources, geographical advantages, inherited human capital, etc. The productivity of capital k in a unit depends on both of its exogenous endowment effect A as well as its endogenous government infrastructure investment g_1 and g_2. α and β are constant output

elasticities of capital and infrastructure investment, respectively, and they measure the responsiveness of output to a change in levels of either capital or infrastructure investment. $\alpha > 0, \beta_{i1} > 0, \beta_{i2} > 0, \beta = \beta_{i1} + \beta_{i2}, \alpha + \beta < 1$. Consistent with the assumption used in Barro (1990) and Cai and Treisman (2005), $\alpha + \beta < 1$ captures that there are some other factors are held fixed in this simple model (e.g., land or labor), and they will not be included into the discussion for cleanness of the model. The other output elasticities other than α and β are set as having constant returns to scale, which gives the sum of all output elasticities as equal to 1; so another fixed factor such as land and labor being latent will thus give $\alpha + \beta < 1$. Given the elaborate literature on efficiency of fiscal decentralization that subnational governments will cater to different needs and preferences of people in different jurisdictions, I further assume there will be two types of jurisdictions—well-endowed ones and poorly endowed ones. Thus, $A_i = A_n$ is for the well-endowed jurisdictions, and $A_i = A_m$ is for the poorly endowed jurisdiction. β_{n1} and β_{n2} are the elasticities of infrastructure investments g_1 and g_2 in well-endowed jurisdictions, and β_{m1} and β_{m2} are the elasticities of infrastructure investments g_1 and g_2 in poorly-endowed jurisdictions. There are N well-endowed jurisdiction and M poorly-endowed jurisdiction. It is obvious that the best mix of g_1 and g_2 is when $\frac{g_{i1}}{g_{i2}} = \frac{\beta_{i1}}{\beta_{i2}}$, which means that the jurisdiction's infrastructure investment mix meets the elasticity of preferences over the spending mix. For convenience of later discussion on the efficiency approach, let's assume that $\frac{\beta_{n1}}{\beta_{n2}} > \frac{\beta_{m1}}{\beta_{m2}}$ (it can be the other way around—the point is to assume that the mix of preferences for two regions are different).

I need to further specify the objectives and utility functions of the government. For the central government (superscripted as C),

$$(2.a)\ U^C = \Sigma(1 - t^C - t_i^L)F_i + \lambda c^C$$

For subnational governments (superscripted as L):

$$(2.b)\ U_i^L = (1 - t^C - t_i^L)F_i + \lambda c_i^L$$

where t^C is central government's flat-rate tax on output, t_i^L is the local jurisdictional flat-rate tax on output, c^C and c_i^L are central and local government public spending, $\lambda > 0$ is the government preference of public spending versus rent-seeking (I assume this is the same for both central and local government).

The budget constraint for central government is:

$$(3.a)\ (M + N) * (g_1^C + g_2^C + T) + c^C = \Sigma t^C F_i$$

The budget constraint for local governments is:

$$(3.b)\ g_{i1}^L + g_{i2}^L + c_i^L = t_i^L F_i + T$$

where g_1^C and g_2^C are central government expenditure on infrastructure investment g_1 and g_2, g_{i1}^L and g_{i2}^L are the local government expenditure on infrastructure investment g_1 and g_2, and T is central to local transfers. As can be seen, for both central government and subnational governments, $(3.a)$ and $(3.b)$ shows the budget constraints by having public expenditure on the left-hand side of the equation, and the government revenue on the right-hand side of the equation. So far I have went through all the basic assumptions and framework for scenario analyses. I will start from the next section on the baseline Scenario Zero, and then will discuss the Efficiency Scenario, the Investment Competition Scenario, and the Tax Competition Scenario.

2. The Baseline Scenario Zero: Capital Immobility and No Fiscal Decentralization

The Scenario Zero sets a baseline for later scenario comparisons. Assuming no fiscal decentralization in the country, there will be minimal capital mobility as there will be no

subnational competition over resources—all public goods will be financed and distributed by the central government and subnational governments will take whatever as given. Therefore, if central government chooses to provide only direct infrastructure investments, capital cannot move between jurisdictions, and there will be no local tax and no transfers from the central government to the subnational governments. Central government will be choosing over the mix of (g_1^C, g_2^C) to maximize its objective or utility function, subject to its budget constraint. Subnational governments only deliver the infrastructure investments as central government prescribes.

$$(4)\ max.\ U^C = \Sigma(1 - t^C)F_i + \lambda c^C \quad st.\ (M + N) * (g_1^C + g_2^C) = \Sigma t^C F_i - c^C$$

By substituting the condition in, we will have:

$$(5)\ \frac{\partial F}{\partial g_1^C} = \frac{\partial F}{\partial g_2^C} = \frac{\lambda}{[1 + (\lambda - 1)t]} = \tau$$

As mentioned before, F is the average district's production function (β_1, β_2 are the elasticity of an average jurisdiction). τ can be interpreted as the opportunity cost of public infrastructure investment, as it measures the instantaneous rate of change of production in response of the change in infrastructure investment. So the equation means that the marginal benefit of infrastructure investment on the left-hand side must equal its marginal cost on the right-hand side. As mentioned before that λ is the government's preference of public spending versus rent-seeking, and thus according to equation (5), when the government's preference for rent-seeking becomes larger, the opportunity cost of infrastructure investment becomes larger simultaneously.

Then, by plugging in the production function of an average jurisdiction—since I assumed only two types of jurisdictions: the well-endowed ones and the poorly endowed ones, and this average jurisdiction does not exist but should be the average of the two

different types of jurisdictions—we can get the central government's single preferred mix of provision of public goods, which are:

$$(6.a)\ \bar{g}_1^C = \left(\frac{1}{\tau} A_i\ \bar{k}_i^{\alpha} \beta_1 \left(\frac{\beta_2}{\beta_1}\right)^{\beta_2}\right)^{\frac{1}{1-\beta_1-\beta_2}}$$

$$(6.b)\ \bar{g}_2^C = \left(\frac{1}{\tau} A_i\ \bar{k}_i^{\alpha} \beta_2 \left(\frac{\beta_1}{\beta_2}\right)^{\beta_1}\right)^{\frac{1}{1-\beta_1-\beta_2}}$$

It is obvious that the $\frac{\beta_{n1}}{\beta_{n2}} > \frac{\bar{g}_1^C}{\bar{g}_2^C} = \frac{\beta_1}{\beta_2} > \frac{\beta_{m1}}{\beta_{m2}}$ because the average mix of infrastructure investment for the central government is equal to the average preferences over these two public goods, and this average must lie in between the only two types of jurisdictions' preferences—$\frac{\beta_{n1}}{\beta_{n2}}$ and $\frac{\beta_{m1}}{\beta_{m2}}$. This result is apparently not optimal for those two types of jurisdictions. To explain this result in a more conceptual way, it shows that when central government is the only entity to provide public investment to meet local needs, it can only succumb to provide a broadly average package of public goods, which will not be exactly the same as what each local jurisdiction requires, assuming jurisdictions have heterogeneous preferences. Here one can thus see that why I previously mention that it does not matter whether $\frac{\beta_{n1}}{\beta_{n2}} > \frac{\beta_{m1}}{\beta_{m2}}$ or $\frac{\beta_{n1}}{\beta_{n2}} < \frac{\beta_{m1}}{\beta_{m2}}$ because they are only representative of different preferences of the mix of public goods of their own jurisdiction (well-endowed regions may prefer to have more public investment $g_1$and less g_2 than poorly endowed regions, or the other way around). For simplicity without losing generality, I assume $\frac{\beta_{n1}}{\beta_{n2}} > \frac{\beta_{m1}}{\beta_{m2}}$. In sum, in the theoretical framework for the baseline Scenario Zero, where there is no fiscal decentralization and no capital mobility within a country, the public goods provision

is not Pareto optimal and cannot meet the local needs. This serves as a foundation for later scenarios to compare.

3. The Efficiency Scenario: Capital Immobility and Fiscal Decentralization

After setting up the Scenario Zero, I will talk about the Efficiency Scenario, which argues that under fiscal decentralization, subnational governments are in a better position than the central government to allocate resources more efficiently and respond to local demand and preferences, thus beneficial to the total output of the economy. Before getting into the theoretical model specifics, I will talk about the conceptual framework of this scenario or the efficiency approach of how fiscal decentralization affects economic growth.

As also mentioned in the literature review, fiscal decentralization is a condition that is generally believed to have transferred the power to lower tiers of government; and in the spirit of increasing the likelihood of better matching of policies and public goods and service provision to the heterogeneous local needs, it will help improve resource allocation and further in the efficiency of government spending and regional economic performance (Hayek, 1945; Musgrave, 1959; Oates, 1972). The efficiency in this context is much of a response from the subnational governments to the different needs of local people when they are in a better position than the central government to have had better information, and therefore it is regarded as a consumer efficiency (Martínez-Vázquez and McNab, 2003). If Tiebout (1956)'s model stands where people are rational consumer-voters and reveal their true preferences, they are sorted according to their demands and preferences for public goods to jurisdictions that fit their highest net benefit. Consumer efficiency can therefore be enhanced when bottom-up regional demands are concerned and realized through the decentralization process, in which tailored public goods and services provision

is in place. Oates (1996) also highlights that given the high price inelasticity of demand for public goods, all other things equal, the potential welfare gain of such preference matching can be relatively large.

Following the first generation fiscal decentralization theory, when citizens are rational consumer-voters who disclose their true preferences on public goods and services, subnational government is assumed in this scenario to be able to carry out policies and provide public goods and services to meet people's heterogeneous needs. Under this assumption, with informational advantages, subnational governments are in a better position than the central government in preference matching, therefore increasing the efficiency of resource allocation by regional heterogeneity. This will in turn increase regional total welfare, following the neoclassical growth reasoning, by having optimal public expenditure on and providing Pareto efficient levels of public goods and services. In this scenario, the public expenditure throughout the different levels of government should reflect the optimal amount of public goods and services that citizens need, as well as the most efficient combination of public expenditure being allocated to the different spending areas and functions.

Therefore, following the same setting in previous sections in Assumptions and Frameworks and Scenario Zero, but changing one factor—now in a circumstance where there is fiscal decentralization, the model changes in the following way: assuming with full fiscal decentralization there is no central government tax and local governments each decides a flat-rate tax on output. Local governments also determine the mix of public investments. Central government is no longer a player in this scenario, since it does not have any leverage in taxing or spending. For subnational governments, they will have:

$$(7)\ max.\ U_i^L = (1 - t_i^L)F_i + \lambda C^L \quad st.\ \ g_{i1}^L + g_{i2}^L = t_i^L F_i - c_i^L$$

Similarly, equations can be derived to the following:

$$(8.a)\ \bar{g}_{i1}^L = \left(\frac{1}{\tau} A_i\ \bar{k}_i^{\alpha} \beta_{i1} \left(\frac{\beta_{i2}}{\beta_{i1}}\right)^{\beta_{i2}}\right)^{\frac{1}{1-\beta_{i1}-\beta_{i2}}}$$

$$(8.b)\ \bar{g}_{i2}^L = \left(\frac{1}{\tau} A_i\ \bar{k}_i^{\alpha} \beta_{i2} \left(\frac{\beta_{i1}}{\beta_{i2}}\right)^{\beta_{i1}}\right)^{\frac{1}{1-\beta_{i1}-\beta_{i2}}}$$

We can see, in the case of fiscal decentralization, local jurisdictions can reach their best public investment mix with fitted local needs ($\bar{g}_{i1}^L / \bar{g}_{i2}^L = \beta_{i1}/\beta_{i2}$). This means that the average mix of infrastructure investment for a particular region, either it being a well-endowed or a poorly endowed one, will be equal to its own particular mix of preferences. For example, for well-endowed regions, $\bar{g}_{n1}^L / \bar{g}_{n2}^L = \beta_{n1}/\beta_{n2}$; and for poorly-endowed regions, $\bar{g}_{m1}^L / \bar{g}_{m2}^L = \beta_{m1}/\beta_{m2}$. Conceptually speaking, the results of the model shows a well-demonstrated explanation over the efficiency approach—be there heterogeneous regions, differently endowed and having different needs and preferences for public goods, with fiscal decentralization and holding capital immobility as constant comparing to Scenario Zero with fiscal centralization, the final infrastructure investment or the public goods provision to the local jurisdictions meets the heterogeneous demands. Capital immobility is held constant here to extract out the allocative efficiency effect, and will be relaxed in the next two scenarios with market-preserving channels of which main factor of discussion is what will happen if capital becomes mobile.

4. The Investment Competition Scenario: Capital Mobility and Fiscal Decentralization

This and next sections will discuss two separate theoretical models in the market-preserving approach—the Investment Competition Scenario and the Tax Competition

Scenario, with the latter an extension of the former. Before getting into the model specifics, I will also go over the conceptual framework of the market-preserving channel of how fiscal decentralization affect economic output. This will also show why we need two separate scenarios for the market-preserving approach.

The effect from fiscal decentralization on economic growth does not necessarily only depends on the allocative efficiency channel: fiscal decentralization, in the second generation theories, is believed to create tax competition between different regions in the country, and this will help businesses and capital flow as private initiatives shall fulfill at its highest benefit, in turn bringing down the rent-seeking activities since this imposes higher opportunity costs for bureaucrats to be corrupt. The market-preserving approach takes into account the public choice perspective and believes that fiscal decentralization can potentially increase economic growth because by incurring inter-jurisdictional tax competition and increasing capital mobility, fiscal decentralization can help bring down the pervasiveness of economic rent-seeking activities and limit the degree that the country's political system encroaches upon its market. More tax competition poses a higher opportunity cost for self-interested bureaucrats to seek rents, and less rent extraction essentially reduces the cost per unit of public goods that taxpayers enjoy. More productive public goods provision and less distortionary tax will thus potentially help retain economic growth.

This concept of "hindering the Leviathan" is consistent with the public choice theory that studies positively political theories that contain self-interested bureaucrats, voters, politicians, as well as their interactions (Tullock, 1987). Buchanan and Tullock (1965) in their famous *Calculus of Consent* bring to the table the assumption of "homo economicus",

that humans are fully rational, primarily self-interested utility maximizers, no matter in the market or in the public arena. They believe that the political sphere is also a system of exchange, where "equal" individuals "exchange" inputs in securing of the commonly shared output (pp. 18). The only difference between the market behavior and the political sphere behavior is that in the political sphere, individual choices are aggregated through the rules for decision making. Their arguments are taken further by Downs (1957, 1967). Downs echoes Buchanan and Tullock and takes it one step further by arguing that democratic governments act rationally to maximize political support. He keeps the same assumption that in political sphere people are rational, and their actions are non-random. To be more specific, Downs believes that political parties are single, self-interested, rational actors, and party members are motivated by personal ends so they act to attain income, prestige, and power that keeps them in office. Besides, Niskanen (1971) also argues that bureaus enjoy monopoly bargaining power over political sponsors, and senior bureaucrats are budget maximizers; thus, as a result, bureaus will be inefficient and produce outputs and obtain budgets that are larger than optimal, and they are continuously expanding. He suggests increasing competition among bureaus providing the same services, and believes that this can generate a competitive supply of public services.

However, does fiscal decentralization and capital mobility indeed discipline governments? Opposite voices are raised arguing that capital mobility can prompt the phenomenon of "racing to the bottom" and capital outflows can restrict governments from providing sounds infrastructure investments and other nonproductive public goods as needed (Zodrow and Mieszkowski, 1986; Wilson, 1991, 1999). Cai and Treisman (2005) note this discrepancy in the understanding of whether "market" is actually "preserved"

under fiscal decentralization and capital mobility, and they start their own analysis in order to see if a theoretical model can take both sides of the story into consideration and come up with a conclusion. They notice a serious defect in both schools—the hindering the Leviathan school and the "racing to the bottom" school—they both have a strong assumption that regions or subnational governments in a country are identical, and this is unlikely to hold in most real cases. Both schools also only focus on symmetric equilibria that regions will eventually converge on the same policies or tax rates, and Cai and Treisman refute these arguments. Regions in a country usually differ in their endowments as described in the previous section, including natural resources, geographical advantages, and human capital, and under fiscal decentralization, there will be a tendency of where capital usually flows to, depending on this endowment effect, how well the infrastructure investment is placed in each region that can complement the impact of capital inflows, as well as the fiscal packages including tax rates set by each subnational government. The fiscal decentralization effect on economic growth through this overall market-preserving channel, in Cai and Treisman's opinion, is not exactly "linear" as described by either the hindering the Leviathan school and the "racing to the bottom" school. There is something more to sort out before reaching a conclusion of whether there is an upward or downward effect of capital mobility under fiscal decentralization.

Therefore, adapted from Cai and Treisman (2005)'s argument but again redesigned to consider two types of infrastructure investment and separating the investment and tax competition effects, the dissertation's theoretical model will firstly examine a version only looking at the investment competition effect under the market-preserving channel, and then will examine another version considering tax competition as an add-on effect next. The

assumption now, compared to Scenario Zero and the Efficiency Scenario, is with fiscal decentralization as well as capital mobility. When capital is mobile across different jurisdictions in a country, if the government makes public investments in order to attract more capital, capital will flow from regions with lower after-tax return on capital to regions with higher after-tax return on capital. One important thing to keep in mind is that at the end of the day, the capital movement stops when, and only when the after-tax return on capital is equal across all jurisdictions, reaching an equilibrium where capital will no longer flow because there is nowhere else that it can seek higher return. Let's denotate this equilibrium after-tax return on capital as r. In other words, the capital inflow due to a jurisdiction's investment is given by:

$$(9)\ (1-t_i)\frac{\partial F_i}{\partial k_i} = r$$

This, comparing with equation (5), means similarly that on the right-hand side r represents the marginal benefit of infrastructure investment, while the left-hand side part represents the marginal cost of infrastructure investment. From the above equation combining with the production function discussed in previous sections, we will have:

$$(10)\ k_i = \left(\frac{1}{r}(1-t)\alpha A_i g_{i1}^{\beta_{i1}} g_{i2}^{\beta_{i2}}\right)^{\frac{1}{1-\alpha}}$$

Thus, again, if we combine the government's objective/utility function, its budget constraint, and the above capital allocation rule in equation (10), we will have:

$$(11.a)\ \frac{\partial F_i}{\partial g_{i1}} + \frac{\partial F_i}{\partial k_i}\frac{\partial k_i}{\partial g_{i1}} = \tau_1$$

$$(11.b)\ \frac{\partial F_i}{\partial g_{i2}} + \frac{\partial F_i}{\partial k_i}\frac{\partial k_i}{\partial g_{i2}} = \tau_2$$

Comparing with equation (5), we can see there is an additional term on the left-hand side for each function—$\frac{\partial F_i}{\partial k_i}\frac{\partial k_i}{\partial g_{i1}}$ and $\frac{\partial F_i}{\partial k_i}\frac{\partial k_i}{\partial g_{i2}}$. This is because for equation (5), under the fiscal decentralization but no capital mobility effect, the marginal benefit of infrastructure investment is only by this much—$\frac{\partial F_i}{\partial g_{i1}}$ for investment g_1 and $\frac{\partial F_i}{\partial g_{i2}}$ for investment g_2. However, in equations $(11.a)$ and $(11.b)$ under fiscal decentralization as well as capital mobility, the marginal benefit of infrastructure investment now comes with an additional indirect effect due to the capital it attracts to the region. Conceptually speaking, this means that capital flows into those districts with more infrastructure investments, because better infrastructure, such as better highways, healthcare systems, transportation, telecommunication, will complement capital and make capital investment incur better returns and outputs. With this investment competition effect, regions will try to do more infrastructure investment in their own region to attract capital.

However, there will be different rates of return on capital from these different regions—to simplify the picture, well-endowed regions are assumed to have more ability and more willingness to invest, while poorly-endowed regions are assumed to be on the opposite, that they will spend less effort in infrastructure investment. This assumption is actually testified by Cai and Treisman in their model: they argue that the investment competition effect will make regions invest more in infrastructure to attract capital, however, poorly endowed regions will invest less because when the endowment gap between the well- and poorly-endowed regions is too large, poorly endowed regions will have little incentive to compete with the well-endowed regions. These poorly-endowed regions start out with disadvantage, and given that A_i is an endogenous factor that affects

k_i, while $\frac{\mathrm{A}_n}{\mathrm{A}_m}$ is big, the subnational governments in poorly-endowed regions will tend to spend a larger share of their budget on nonproductive public goods or rent-seeking, namely on c_i rather than on g_i. Therefore, the investment competition effect of fiscal decentralization will also have polarization effect because poorly-endowed regions invest less in infrastructure when capital is mobile.

Now to solve equations $(11.a)$ and $(11.b)$, given the production function and capital allocation rule, we will get the mix of infrastructure investment portfolio as below:

$$(12.a)\ \bar{g}_{i1}^{L} = (1-\alpha)^{\frac{1}{\beta_{i1}+\beta_{i2}-1}} \left(\frac{1}{\tau} A_i\, \bar{k}_i^{\alpha} \beta_{i1} \left(\frac{\beta_{i2}}{\beta_{i1}}\right)^{\beta_{i2}}\right)^{\frac{1}{1-\beta_{i1}-\beta_{i2}}}$$

$$(12.b)\ \bar{g}_{i2}^{L} = (1-\alpha)^{\frac{1}{\beta_{i1}+\beta_{i2}-1}} \left(\frac{1}{\tau} A_i\, \bar{k}_i^{\alpha} \beta_{i2} \left(\frac{\beta_{i1}}{\beta_{i2}}\right)^{\beta_{i1}}\right)^{\frac{1}{1-\beta_{i1}-\beta_{i2}}}$$

Comparing this Investment Competition scenario to the previous Efficiency Scenario, we can find that infrastructure investment for both g_{i1} and g_{i2} are bigger with a multiplying $(1-\alpha)^{\frac{1}{\beta_{i1}+\beta_{i2}-1}}$. And given in the assumptions that $\alpha > 0, \beta_{i1} > 0, \beta_{i2} > 0, \beta = \beta_{i1} + \beta_{i2}, \alpha + \beta < 1$, $(1-\alpha)^{\frac{1}{\beta_{i1}+\beta_{i2}-1}} > 1$. This means that if we are keeping the capital fixed at the same level when capital is immobile in the country, as in the Efficiency Scenario, once we relax the assumption to make capital mobile under fiscal decentralization, regions will starts to compete and increase their infrastructure investment, with the multiplying effect of $(1-\alpha)^{\frac{1}{\beta_{i1}+\beta_{i2}-1}}$. However, due to different endowment from different regions, we will for sure have different $\bar{g}_{i1}^{L}$ and $\bar{g}_{i2}^{L}$ in equations $(12.a)$ and $(12.b)$ due to different A_i.

To explain the results in the Investment Scenario, and this is one of the important conclusions from the model and same as Cai and Treisman argue, that capital mobility has a multiplying effect on infrastructure investments due to the investment competition effect—fiscal decentralization can indeed affect economic growth through the channel of market, and in this case, through capital mobility and investment. And to dissect this multiplying effect, we need to understand the endowment effect from heterogeneous regions. Depending on the level of the endowment, or how big the endowment gaps are between regions, infrastructure investment will have polarizing effects: those that are really well-endowed will spend even more on their investment, while those that are really poorly endowed will spend minimal on their investment but instead spending on nonproductive public goods or rent-seeking. As seen in equations $(12.a)$ and $(12.b)$, polarization happens because there is a multiplying factor. Governments in well-endowed regions will eventually invest more in infrastructure, attracts more capital, and have higher output F_i or economic growth, while governments in poor-endowed regions, knowing that they cannot compete with the well-endowed regions in the beginning, will give up on competing for capital and focus instead on providing only nonproductive public goods and more so in rent-seeking activities for their own good. Certainly, in this scenario I have not yet taken into consideration the factor of local tax rate setting, and this will be discussed in the next section. So far, based on this section's result, we can see that fiscal decentralization can affect economic growth through capital mobility and infrastructure investment, but whether this can be "market-preserving" or not depends on the endogenous endowment of different regions. As Cai and Treisman also argue, capital competition can exacerbate initial inequalities, and may hurt the economy in the poorly-endowed regions while

boosting growth in their well-endowed competitor regions. It leaves an interesting and useful examination to be done in the empirical analysis in my later chapters.

5. The Tax Competition Scenario: Capital Mobility and Fiscal Decentralization

Finally, in the last scenario to be examined in this dissertation, I will build the theoretical model for the Tax Competition Scenario. This scenario is based on the previous Investment Competition Scenario, while extending it to incorporate the endogenous tax competition condition. This is still under the umbrella of the market-preserving channel, and intends to model the channel more granularly because the investment competition effect could be complicated by the government's budget constraint and tax settings. In the previous section, tax rate is not discussed in detail and is assumed to be exogenous, since I would like to isolate the investment competition effect from capital mobility for differently-endowed regions. However, in real cases, investing in infrastructure can become very costly and sometimes governments raise higher tax rates to raise revenue in order to finance the infrastructure investment, and this, as Cai and Treisman also argue, can discourage investors. Thus, in the government's standpoint, its utility function also reflects the consideration of the tradeoff between attracting more infrastructure investment and setting tax rates.

Therefore, using equations $(11.a)$ and $(11.b)$ and applying the government's utility function into the equations, the conditions will be reduced to:

$$(13.a)\ \frac{\partial F_i}{\partial g_{i1}} + \frac{\partial F_i}{\partial k_i}\frac{\partial k_i}{\partial g_{i1}} = 1 - \frac{(1-t_i)(\partial F_i/\partial k_i)(\partial k_i/\partial t_i)}{F_i}$$

$$(13.b)\ \frac{\partial F_i}{\partial g_{i2}} + \frac{\partial F_i}{\partial k_i}\frac{\partial k_i}{\partial g_{i2}} = 1 - \frac{(1-t_i)(\partial F_i/\partial k_i)(\partial k_i/\partial t_i)}{F_i}$$

Similarly, the second term on the left-hand side provides the investment competition effect, whereas on the right-hand side, the second term shows the fact that higher public investments on the left-hand side has to be financed from higher tax rates on the right-hand side, and this deters capital from coming into the jurisdiction. When tax rates are endogenously determined and in competition, the infrastructure investment level is likely to be lower than when the tax rates are exogenously determined as described in the Investment Competition Scenario. The right-hand side term shows the loss of investment from raising more and reflects the capital outflows because of the higher taxes. This can in turn lower the total output that is predicted in the previous scenario for well-endowed regions while increase slightly the one for the poorly-endowed regions, namely narrowing the gap between the two types of regions.

This result can be seen as shrinking the "market-preserving" capacity of fiscal decentralization when considering the dual effects from investment and tax competitions. Since there will be a counter-balancing effect between these two competitions, the impact from fiscal decentralization through the market-preserving channel is, firstly, not necessarily always "Leviathan-hindering" because infrastructure investment resulted from capital mobility will not only depend on the heterogeneously-determined endowments of different regions, but also affected by how much taxes need to be raised to fund the investment. Secondly, the impact is also not necessarily always "racing to the bottom", because government's utility function still includes self-interested elements such as on rent-seeking, as well as that lower tax rates cannot fund the necessary infrastructure investment that is so important to attract capital inflows. These two sides of the story need to be considered jointly, and therefore in examining the market-preserving channel of how

fiscal decentralization affects economic growth, we should consider the inherent balancing effect of both investment competition and tax competition.

Summary and Link to Empirical Work

This chapter constructs four scenarios and theoretical models to discuss the impact of fiscal decentralization on economic growth using the AK model and based on three types of government expenditure and different utility functions and budget constraints from central and subnational governments. The Scenario Zero discusses consequences when central government is the only entity in providing public goods and services and there is no fiscal decentralization or capital mobility. The model shows that this is not Pareto-optimal because central government can only provide a broadly average of public goods and services which are not efficient resource reallocation or preference-matching. If the assumption is being relaxed for having fiscal decentralization but capital immobility, to extract the pure impact of Efficiency Channel, the Efficiency Channel models show that now when subnational governments are providing public goods and services according to the heterogeneous needs of local people, it is more efficient because the average mix of provision will now be equal to the local particular mix of preferences. In the Market-Preserving Channel, in the Investment Competition results show that when the assumption is being relaxed further to have both fiscal decentralization and capital mobility, the consequence on total output growth will differ based on the endowment effect of different regions. Under the market-preserving effect, regions under capital mobility will compete with each other in attracting investment to promote economic growth. Well-endowed regions may be made better off since they start off with better endowment which facilitates

and incentivize them to compete, while poorly-endowed regions may be made worse off since they lose comparative advantage and may fail to compete with the well-endowed regions and benefit from capital mobility. However, the gap between the well- and poorly-endowed regions will not be as large since it will be affected by an endogenous tax competition, as discussed in the Tax Competition Scenario. Regions may also compete to lower tax rates in order to attract investments, and if this endogenous tax variable is considered and added into the government's utility function and the output function, the gap between the well- and poorly-endowed regions will be smaller than what is found in the Investment Competition Scenario. In all, the market-preserving effect shows that both endowment and endogenous tax rates matter for one to determine the impact of fiscal decentralization on different regions.

To link the conclusion from the theoretical models to the next chapter on empirical work, there are several things that remain interesting and important to be tested in empirical analysis. First, the efficiency as a transmission mechanism as used in the theoretical models focuses on the government expenditure aspect. Following the literature on the First Generation Fiscal Decentralization theories, the efficiency in resource reallocation brought by subnational government is achieved under a fiscally decentralized system, which in general is a government spending story. Not so much on how the government raises taxes or receives intergovernmental transfers, the argument mainly focuses on how government spending from central versus subnational government fits a Pareto-efficient provision of public goods and services. And thus how to best fit the local needs becomes the core question of how to reach allocative efficiency. Therefore, to be worked on further in the empirical analysis, allocative efficiency shall be treated with emphasis especially how it

should be measured to reflect government spending variations, and how the variation changes over time and over functions. Moreover, not only the overall allocative efficiency should be looked at, but also more importantly, how subnational government can do better than central government in providing preference-matching public goods and service by government expenditure should be discussed.

Second, the implication from the theoretical models show that gross output increase will depend on either efficiency in the Efficiency Channel or capital mobility in the Market-Preserving Channel. Fiscal decentralization affects economic output differently depending on different levels of efficiency and capital mobility. On one hand, subnational government and central government will have different resource reallocation towards local public goods provision, thus the efficiency they have based on their different utility functions and budget constraints will be different. On the other hand, capital mobility brought by fiscal decentralization will trigger investment competition and tax competition, which fall differently onto well- and poorly-endowed regions, since regions will attract different amount of capital based on the counter-balancing effect of the two competitions. Both channels show that there is a mechanism that serves as the other factor for which fiscal decentralization bases on to affect economic output. To shed light on the empirical analysis, these two variables—allocative efficiency and capital mobility—should be put into the regressions as interaction terms with fiscal decentralization to test how it affects economic growth through the two channels. This shows that the effect of fiscal decentralization on economic growth will depend on the value or level of allocative efficiency and capital mobility.

Lastly, particularly in the Market-Preserving Channel, several factors prove to be important to affect economic output based on the theoretical model. These include government's elasticity of substitution between maximizing citizen welfare and seeking rents, and the endogenous tax rate. Also, since the assumption taken in the Investment Competition and Tax Competition also contains allocative efficiency as in the Efficiency Channel, allocative efficiency is one variable that needs to be added as well. On the elasticity of substitution, since maximizing citizen welfare and seeking rents are on the two sides, sorting out how to measure one of them would be helpful enough to run the empirical regressions. One task that the theoretical results requests for empirical testing is therefore how to measure rent-seeking and add it into the market-preserving specifications. Endogenous tax rate should be relevant to a country's tax rate imposed on corporations and business. This shows and is consistent with the discussion on investment competition and an endogenous tax rate will induce tax competitions which affects the amount of businesses attracted to a region. Corporate income tax, for instance, or related should be the vector in representing the endogenous tax rate under the Market-Preserving Channel.

Chapter 4: Hypotheses, Empirical Methodology, and Data

Introduction

In the previous chapter, I developed three models of linkages of how fiscal decentralization affects economic growth: one model through the efficiency channel and two models through the market-preserving channel considering investment competition and tax competition. Now the dissertation turns to the task of developing empirical methodology with which I can investigate the influence of fiscal decentralization under different scenarios.

The objective of this chapter is to develop important measurements for the empirical analyses, as well as discussing methodological models to test the empirical hypotheses. As developed in the previous theoretical chapter, fiscal decentralization can positively affect economic growth through providing more efficient allocation of resources in response to heterogeneous needs. It can also affect economic growth through triggering capital mobility, generating a counterbalancing effect between jurisdictions on infrastructure investment and tax competition—eventually the effect magnitude will depend on the average tax rates, the functional spending on investment from the government, government's own utility function of trading between rent-seeking and maximizing citizen welfare, through the transmission mechanism of capital mobility. In order to empirically test these arguments, the dissertation will need to measure some of the important variables, such as allocative efficiency, rent-seeking, as well as develop testable hypotheses for empirical modeling. Regarding the modeling, the indirect effects of fiscal decentralization through the two channels—efficiency and market-preserving—also see the need for

different specifications and model assumptions, especially given the core of analyzing this intermediary or "mediating" effect. I will use baseline analysis with Ordinary Least Squares (OLS) regressions, and then move on to investigate the Generalized Methods of Moments (GMM) method to concern the endogeneity issues as well as the Structural Equation Model (SEM) to specifically use the mediation analysis to serve as another robustness check.

Thus, the chapter will firstly discuss how important concepts such as fiscal decentralization, allocative efficiency, and rent-seeking are measured. Once measures are constructed and data issues are discussed, I will develop hypotheses that can be tested in the empirical analyses. I will then specify estimation equations and empirical models, used in the empirical analyses. Econometric problems that may arise and affect the estimation and interpretations of the results will be discussed within the discussion of models. In the end, I will discuss selective robustness checks methods and conclude the chapter.

Measurements and Data

1. Fiscal Decentralization

The measurements for fiscal decentralization have seen a long-time trials and errors, where scholars have been trying different ways and approaches that boil down to include some main concepts: those that consider the level or share of locally-raised revenues, locally-spent spending, locally-decided or earmarked grants, and locally-borrowed debt. Most measurements serve as dependent or independent variables in empirical analyses, and they take the functional forms of additive, multiplicative, exponential, or other combinations (Matinez-Vazquez and Timofeev, 2010). Based on the current literature, a

perfect measure of fiscal decentralization that captures all of these components is hard to find. Moreover, often we indeed need a single indicator of fiscal decentralization, such as in this dissertation as used in empirical analysis, where one indicator can show a trend by focusing on a particular aspect, or is useful to conduct cross-context comparisons, or it contains more information such as multidimensionality and is more telling and inclusive than others. It is therefore important to understand what the criteria are in choosing or developing a measurement for fiscal decentralization, and what the constraints there are in these measurements.

Despite the difficulty in finding one such measurement, in principle, the measurement of fiscal decentralization, regardless of data availability and empirical feasibility, should contain two aspects of information: degree of autonomy and the scope of authority (Matinez-Vazquez and Timofeev, 2010; Kim et al, 2013; Blöchliger, 2015; Liu et al, 2017). The degree of autonomy takes a vertical approach on the extent to which subnational governments are fiscally self-governing, while the scope of authority takes a horizontal approach on the diversity of power or functions being delegated to subnational governments. Ideally, a measurement of fiscal decentralization should be as comprehensive, if not looking at one specific aspect, as encompassing both the degree of autonomy and the scope of authority. There are some papers in the measurement literature trying to build a comprehensive indicator that captures both aspects as discussed above. For instance, Matinez-Vazquez and Timofeev (2010) construct a composite indicator that combines multiple measures into one, which includes expenditure ratio, revenue ratio, own-sourced revenue, and vertical imbalances. Also, Vo (2010) uses a similar concept and renames the two dimensions as fiscal autonomy and fiscal importance. Fiscal autonomy is basically the

degree of autonomy that measures the vertical fiscal imbalances between central and subnational governments, while fiscal importance measures how much of the fiscal spending function is being delegated to the subnational governments. He then constructs an index as the geometric means of the two elements into a single measurement of fiscal decentralization.

Other quantitative measurements of fiscal decentralization do not aim for building a one-size-fits-all indicator, but instead focus on one specific area, such as from the taxing power or spending power perspectives that largely determine the extent of decentralization. Under the taxing power category, most studies focus on the taxonomy of taxing power, and they put a generous discussion over the importance of tax base, tax rate, tax legislation, and tax administration. Most papers end up using revenue assignment, own-sourced revenue ratio, and adding earmarked and unearmarked grants into the measurements (Davoodi and Zou, 1998; Xie et al, 1999; Akai and Sakata, 2002; Habibi et al, 2003; Jha, 2015). Under the spending power category, scholars are interested in dissecting spending into different functions, or construct measures based on earmarked spending versus self-financed spending (Davoodi and Zou, 1998; Stegarescu, 2005; Kim et al, 2013; Torrisi, 2011; Gemmell et al, 2013). Most of them falls into the discussion of the feasibility of using non-earmarked grants as the symbol of spending autonomy.

For both single indicator measurements that try to encompass as much information and those that focus on one specific area of fiscal authority, there are several limitations in these measurements, especially to apply them into empirical analysis. First of all, composite indicators such as from Matinez-Vazquez and Timofeev (2010) show that they perform less informative than single relevant dimensions because they add too much noise

to the decentralization measure. In their paper, they find that different dimensions are responsive to different outcomes, such as that expenditure ratio has higher explanatory power for human development index while revenue ratio has for life expectancy, when the authors try several different dependent variables to test the measurements of fiscal decentralization as independent variables. That remains one limitation since if four dimensions of decentralization ratios are combined together, there is a loss of explanatory power from using a single indicator: either the indicator does not show a clear picture of the multidimensionality or due to lack of data some aspects are omitted without being seen. Second, data limitation in cross-country analysis has made composite index hard to choose. Vo (2016)'s composite indicator of fiscal autonomy and fiscal importance uses Australia as the one single country to conduct the empirical testing. Since this dissertation aims to conduct a cross-country panel analysis that requires multi-tier data for not only OECD countries that usually have a better data coverage and quality but also developing and emerging economies, Vo's measurement of fiscal decentralization faces difficulty in being applied with enough data points. Data coverage is therefore one of the key criteria in selecting the indicator because of the risk where countries are omitted due to lack of data. The biases in the results thus makes it difficult to generate a proper policy implication.

In this dissertation, as a compromise, despite the constraints and that multidimensionality is hard to achieve in one indicator, the measurement should at least be comprehensive to include both sides of the fiscal decisions, for which both revenue and expenditure aspects of the power should be examined. Some countries are decentralized through the dimension of spending power while not being delegated much on having autonomous taxing power or generating revenues; while others are decentralized in both

dimensions. An indicator that only focuses on one dimension may not be a sound proxy of fiscal decentralization, unless the goal is to only look at one specific area. This dissertation thinks it is important to document while also being able to generate a composite index that shows the scope (both revenue and expenditure) as well as the extent (how much each of revenue and expenditure) to which a country's subnational governments have fiscal autonomy.

I would raise several country examples to illustrate the importance of looking at both spectrums of revenue and expenditure decentralization. For instance, China has gone through a time of complete centralization of fiscal policy during the central planning period, and then a decentralized time where more authority is delegated to the local level during the 1980s and early 1990s. The decentralized period creates problems for the central government being in deficit for a long time, and it leads to the 1994 tax-sharing reform, of which the legacy has been still quite prevalent as of today. Currently, China is seen as having a fiscal federalism system, but with more centralization on the tax side while very strong decentralization on the expenditure side. Krug et al (2004) points out that China's fiscal system has *de facto* federalism traits. Subnational governments are forbidden to introduce tax breaks or exemptions without central approval, and they have limited power in setting tax rates. The 1994 tax-sharing reform also aims to raise the ratio of the revenue of central government to the total revenue. On the other hand, subnational governments have strong autonomy in their spending power, even to the extent where there is not enough revenue to be spent that subnational governments have to impose user fees and charges that are accrued to the local extrabudegtary fund (Jin and Zou, 2003; Wong and Bird, 2008; Wong, 2011; Shen et al, 2012; Feng et al, 2013; Wang and Ma, 2014).

On the other hand, Nordic countries such as Sweden and Finland have a high degree to revenue decentralization, where their subnational tax revenue takes a large share in the general government tax revenue. Subnational governments have large discretion and strong administrative capacity in choosing their own tax rates and exercising taxing power. For instance in Finland, a key reform on local government financing occurred in 1993, and by 1998, the intergovernmental transfers were delinked from actual outlays and were tied to certain socioeconomic indicators such as population, age and demographics, and unemployment rate. As a result, local government financing became mainly dependent on direct taxes, and local governments then have greater autonomy in raising revenues and discretionary actions in financing. Also, these Nordic countries also have a high discretion over their spending power. The assignments to subnational governments of major functions such as education, healthy, social safety nets are in line with their financing responsibilities, so subnational governments are autonomous in their expenditure decisions (Drummond and Mansoor, 2002; Thiessen, 2003; Blöchliger, 2013; Junghun et al; 2013). United States also have a decentralized system along both revenue and expenditure dimensions. Over the past 50 years, federal direct spending has declined while state and local spending has increased proportionally. Total state spending including intergovernmental grants to localities has also increased over time. On the other hand, federal own-sourced revenue declined while state and local own-sourced revenue almost doubled, and state-raised revenue has also almost doubled. Subnational funds are raised and programs on which funds are spent largely come from social insurance programs, especially after the introduction of Medicare and Medicaid. Education remains the largest component of local budgets, while defense spending being the one of the biggest federal spending has declined.

The financing for these spending has also gone more decentralized: while there is a movement from corporate income taxes to payroll taxes for local governments, state governments increased their reliance on individual income taxes and less on sales taxes. State has also increased their miscellaneous charges. Intergovernmental transfers from federal to subnational governments have increased, in which the largest component is increase in income security, including Medicaid (Bayoumi and Masson, 1995; Akai and Sakata, 2002; Baicker, et al, 2011; Braun, 2018). In this regard, United States is a prominent case of decentralization on both revenue and expenditure dimensions.

The dissertation thus proposes to use the following measurement of fiscal decentralization:

$$(14)\ \mathrm{FD}_n^t = \frac{(|R_{ns+nl}^t| + |EXP_{ns+nl}^t|)}{(|R_{ng}^t| + |EXP_{ng}^t|)}$$

where t represents time and n represents the country; ns represents the state government in country n, nl represents the local government in country n, and ng represents the general government in country n; R is the total government revenue while EXP is the total government expenditure. This measure uses the shares of subnational government levels in public revenues and expenditure in percentage of the general government levels. The overall idea of this measure is that the level of fiscal decentralization in time t for country n is equal to the sum of the absolute levels of the country's state and local government's total revenue and total expenditure divided by the sum of the absolute levels of the country's general government's total revenue and total expenditure. This measure captures in *de facto* the two aspects in local public finances—revenue and expenditure—and the advantage is that this measure reflects the actual degree of decentralization of both dimensions but also is most feasible to apply in the empirical analysis based on data

availability. Table 1 at the back of the dissertation compares the revenue and expenditure decentralization versus the fiscal decentralization index measured by this method. Countries such as China, Denmark, United States reflect what was discussed above regarding countries either focusing on one or on both dimensions of revenue and expenditure decentralization.

This, however, is not a perfect measure, as it firstly does not cater to the empirical links between fiscal decentralization and various outcome variables to be examined, for example as some channels may specifically affect the revenue decentralization side or the spending decentralization side. A single indicator containing both revenue and expenditure may cause loss of information. For instance, the Efficiency Scenario concerns the allocative efficiency, which mainly is a story about how the composition of public spending changes and whether this will be an indirect effect from fiscal decentralization to economic growth. Decentralization in revenue and in expenditure may mean quite differently in this scenario—it could be that more revenue collection in the subnational level brings about more autonomy in allocating resources for local needs, or it could be that the change in the share of subnational spending tells a story about whether spending more necessarily means knowing how to spend optimally.

Secondly, the measure has not taken into consideration other factors in fiscal decentralization, such as whether revenue is own-sourced, whether the grants received from the central government are earmarked and spent in own discretion, and whether subnational governments are allowed to borrow and hold debt. For instance, in the market-preserving scenarios, when the focus shifts to fiscal decentralization's capacity in creating investment and tax competition between different regions and preventing local

bureaucratic rent-seeking, fiscal decentralization in terms of the subnational government's transfer dependency, such as the ratio of net transfers to its own revenue, will potentially provide a picture of whether weaker dependence on the central government or other subnational governments will set the base for more tax competition and less rent-seeking behavior.

Thirdly, this measure being used in a cross-country empirical analysis runs the disadvantage of missing country-specific information, especially those that are non-numeric. Countries that are *de jure* federal countries can be *de facto* less fiscally decentralized than other countries if relying on the results of this measure, such as those countries having a low turnout of fiscal decentralization index can be institutionally decentralized (e.g. some OECD countries). Other countries are missing information on the structure and workability of the decentralized system, demographic, socio-economic factors. For instance, Argentina is one of the most decentralized countries but it has a very poor tax sharing system. There is a huge vertical fiscal imbalance, and with its federal tax-sharing arrangement, taxes, once collected nationally, are allocated between national and subnational governments across provinces. This results in perverse incentives for a common pool problem, and especially Argentina's districts are so unusually disparate in size and wealth, some smaller and less populous districts are incentivized to overestimate their local budget to redirect federal funding to their region. There is overspending and overexploiting from the common pool of national taxation. This one single index of fiscal decentralization would not show the story as well as that tax is collected nationally, which could well be interpreted as administratively centralized.

In all, based on the several disadvantages of using this fiscal decentralization measurement as discussed above, including loss of information on either revenue or expenditure dimension, missing detailed subnational information such as transfers, local debt and borrowing, as well as loss of country-specific details, there are indeed measurement biases. However, this measurement serves the ease and flexibility of one index used in empirical analyses, covers both revenue and expenditure dimensions without biasing towards one side, is widely used in current empirical literature of fiscal decentralization as dependent or independent variables, and has the most feasibility in obtaining data and being applied in cross-country panel regressions. According to the database that I will be using in my empirical analyses—the International Monetary Fund *Government Finance Statistics* (IMF *GFS*), which is so far the most comprehensive dataset for public finance data covering most countries—total revenue includes tax revenue, social contributions, transfer and grants revenue, and others such as property income, sales of goods and services, fines and penalties, and other transfers. On the expenditure side, it contains ten functional spending, including on general public services, defense, public order and safety, economic affairs, environment protection, housing and community amenities, health, culture and religion, education, and social protection. The measure of fiscal decentralization in this dissertation is not a perfect measure, and requires a lot refinement particularly if the analysis is being done in a single country case and if the subnational level data are with better quality. But it is a feasible and reasonable measure as used in this dissertation's cross-country comparison context.

2. Allocative Efficiency

As discussed in the theoretical model, for the Efficiency Scenario, where the research question is about how fiscal decentralization will affect economic growth through the allocative efficiency in resource allocation, namely the efficiency approach, the concept of allocative efficiency is the core of the question. For this efficiency channel through which fiscal decentralization affects economic growth, it is consistent with the first generation fiscal decentralization theory that fiscal decentralization is an effective tool for increasing the allocative efficiency of public spending that better fits the local needs, since subnational governments are usually in a better position than the central government in knowing the diversity of local preferences over public goods. When power is transferred to lower tiers of government, and if subnational governments are able to supply specific levels and types of services in line with the specific demands, which is reflected in the theoretical model for the efficiency channel, the increasing efficiency in the allocation of resources and the flexibility of government service provision brought by fiscal decentralization may provide better matches for diverse preferences (Oates, 1972; Brueckner, 1999; Baskaran et al, 2014). Better preference matching by means of devolution of power will help improve resource allocation and further in the efficiency of government spending and regional economic performance (Hayek, 1945; Musgrave, 1959; Oates, 1972). Eventually, the allocative efficiency brought by fiscal decentralization and higher performance in government output according to local preferences may help gain higher levels of social and economic welfare, for which a centralized policy may fall short to provide (Oates, 1999).

Allocative efficiency in this context is thus the response from the subnational governments to the different needs of local people when they are in a better position than the central government to have had better information (Martínez-Vázquez and McNab,

2003). And to capture this allocative efficiency brought by fiscal decentralization, the measure needs to capture the local variation in the provision of local public goods. The "true" measure of the degree of allocative efficiency would thus be the gain in economic welfare from fiscal decentralization. Following the neoclassical argument, the public expenditure throughout the different levels of government should reflect the optimal amount of public goods and services that citizens need, as well as the most efficient combination of public expenditure being allocated to the different spending areas and functions. This will in turn increase regional total welfare, by having optimal public expenditure on and providing Pareto efficient levels of public goods and services. Oates (1996) also highlights that given the high price inelasticity of demand for public goods, all other things equal, the potential welfare gain of such preference matching can be relatively large.

The challenge here certainly is the difficulty in measuring allocative efficiency in practice. By and large, using the variation in public spending implicitly means that it can approximately show how subnational governments vary in response to local preferences assuming that preference revelation is there by Tiebout Sorting, which is also reflected in the theoretical mode. To put it more mechanically, in order to measure allocative efficiency, we need to understand how different levels of government allocate their respective spending into different functions to cater the differential needs from various areas. For instance, local government A may need more educational funding than local government B, while local government B may need more healthcare funding than local government A. And the spending towards these two different kinds of functions in government A and B will reflect the differential resource allocated to the needs. Each of

these differences in functional spending reflects preference revelation and how governments respond to these preferences. The changes in functional spending thus shows the level of efficiency in decentralizing some fiscal functions while not the others, relatively speaking, in order meeting the heterogenous needs from people.

Thus, the relative allocative efficiency would be measured as, taking the local level government as an example:

$$(15.a)\ AE_{nl}^{t} = \sqrt{\frac{1}{m}\sum_{i=1}^{m}\left(\Delta EXP_{i,nl,t}\% - \Delta EXP_{nl,t}\%\right)^2}$$

where t represents year, n represents country, i indexes spending categories, and m is the number of functional spending categories, and let us assume that there are multiple spending functions, such as on education, on healthcare, on national defense, etc. $\Delta EXP_{i,nl,t}\%$ is the percentage change in total local government spending in category i in country n at time t compared to the previous time period $t-1$. For example, this can mean the percentage change in total local government spending in education in China in year 2000 compared to year 1999. Lastly, $\Delta EXP_{nl,t}\%$ is percentage change in total local government spending. Similarly, for state government and central government, the measurements for their respective allocative efficiency are:

$$(15.b)\ AE_{ns}^{t} = \sqrt{\frac{1}{m}\sum_{i=1}^{m}\left(\Delta EXP_{i,ns,t}\% - \Delta EXP_{ns,t}\%\right)^2}$$

$$(15.c)\ AE_{nc}^{t} = \sqrt{\frac{1}{m}\sum_{i=1}^{m}\left(\Delta EXP_{i,nc,t}\% - \Delta EXP_{nc,t}\%\right)^2}$$

The idea of using this measurement is to standardize the changes in the allocation of resources and make calculations across countries consistent. The idea of subtracting from the percentage change in functional spending the percentage change in total spending is to include the consideration of the overall spending increase or decrease, besides the changes in the change of each functional spending. This accounts for the overall spending picture and makes horizontal comparison of functional spending changes possible. Also, the squared difference and roots calculate the standard deviation which accounts for the level of dispersion, which helps consider the importance of relativity and make the measurement scale free. The part to divide the number of functions is to account for those governments in certain countries that do not have some of the functions in their spending, again so as to make of the measurement consistent across countries and across different levels of government.

In the end, the allocative efficiency for a particular country for the cross-country empirical analysis will calculated and put into empirical specifications as two measures. One would be the sum of the allocative efficiency of the three levels of government:

$$(16)\ AE_n^t = AE_{nc}^t + AE_{ns}^t + AE_{nl}^t$$

While the other one would be the difference between subnational and central government allocative efficiency:

$$(17)\ AE_n^t = (AE_{ns}^t + AE_{nl}^t) - AE_{nc}^t$$

The first allocative efficiency measure is an aggregate of the local, state, and central government allocative efficiency. It shows the overall resource reallocation and the benefit in efficiency brought by all levels of government. The second measure is the distance between subnational and central government allocative efficiency. This one on the other

hand shows how subnational allocative efficiency differs from the central government. As previously argued in the literature review, efficiency in resource reallocation can be brought by subnational governments when they provide diverse packages of public goods and services, often time different from what a central government can do. When central government is the only entity in an economy to provide public goods, it can only provide a broadly average package which cannot reach a Pareto-efficient and preference-matching result. This measure of allocative efficiency distance intends to capture what subnational governments can do when they are there to efficiently provide local public goods and services, and how it is different from what a central government can do. It is different from the first measure which intends to capture the total and overall efficiency for the general government in an economy.

So these two measurements of allocative efficiency aim to use different approaches to check and reflect the variation in public spending in different functions over the years and how much fiscal decentralization increases the efficiency in meeting people's heterogeneous needs. These measurements try to consider three levels of government—central, state, and local, and covers ten functional spending based on data availability across countries. These data are gathered again from *GFS,* including expenditures on general public services, defense, public order and safety, economic affairs, environment protection, housing and community amenities, health, culture and religion, education, and social protection. These will serve as the different spending categories i. The measurement allocative efficiency itself also takes care of the scale and potential problems created by missing values and zeros to make sure that countries are comparable to each other. Given data availability, this is a feasible approach to measuring allocative efficiency.

Certainly, the measurement of allocative efficiency also has its measurement errors and limitations. First and foremost is its treatment to subnational data—if detailed provincial/state and municipal/local data are available for each country, rather than having state or local data serving as one data point, better measurements can be built to capture the granularity and accuracy in subnational spending. Measurement biases such as due to clustering can therefore be reduced. Secondly, it is still arguably true that whether public spending variations reflects fully allocative efficiency. This stays as one of the core questions that this dissertation aims to answer, and it will be an ongoing one that future research needs to explore on. The dissertation draws on previous literature on fiscal decentralization and elaborates the first generation theory on efficiency and Pareto improvement, as well as its relationship with economic growth. Later the dissertation builds on Cai and Treisman (2005) and tries to test whether subnational governments have higher efficiency in meeting local needs, also factored in the government's value of being a benevolent for social welfare entity or a malevolent Leviathan. Once the theoretical model works in this efficiency channel, it sets the foundation for the empirical measure to be built on the assumption that, once subnational governments are aware better of the local needs and preferences, they will adjust their spending functions to meet those changing needs across the functions horizontally and across the years vertically. This is a strong assumption, which is why this measurement introduces biases by holding that public spending can reflect governments' reactions to preference revelation and the "true" efficiency brought by fiscal decentralization. The dissertation intends to make this clear and admits the limitations. While since the theoretical model demonstrates that government's utility function already takes into account the elasticity of substitution

between increasing social welfare (benevolent) and rent-seeking (malevolent), it is a bold but still defensible assumption that governments change their spending over time and across functions based on their total utility functions. Thirdly, it lies in the data source's discretion in managing the categorization of functional spending, and the ten functional spending can introduce some biases due to different definitions of spending from different countries. Some prominent spending such as defense, education, and healthcare can be made consistent more easily, while the others such as general public services, economic affairs can be a bit more difficult. Some countries may also move spending in certain functions into a different category due to administrative issues. These can introduce small biases into whether public spending variations in this dissertation truly reflects the efficiency in fiscal decentralization.

3. Rent-seeking

Rent-seeking activities, on the other hand of the government's utility function besides providing public goods to enhance citizen welfare, can be understood as the self-interested part or the predatory element of the government. As described in the literature review on rent-seeking behavior's characteristics and harm, as well as in the theoretical framework the discussion on the origin of public choice theory and self-interested Leviathan, in this dissertation rent-seeking is regarded as the malevolent behavior that the government or its self-interested bureaucrats try to obtain economic gains without bringing benefits to the society through any wealth creation. It is the opposite of the government's benevolent behavior or intention to maximize citizen welfare or the society's overall good.

The way to measure rent-seeking empirically has seen progress, and the concept of rent-seeking has already naturally been included into the economics sphere. The main goal

is to measure this "waste" in the process of the government seeks to obtain non-reciprocating benefits for its own good. Del Rosal (2009) has provided a nice survey over the measurements for rent-seeking, and together with other relevant literature, there can be several approaches in measuring this concept. Firstly, particularly for individual country analyses, there is an approach directly applying the famous "Tullock rectangle" into the calculation, which is basically calculating the country's resources allocated away from productive to unproductive activities. This is usually calculated the sum of the social cost brought by regulations plus the deadweight loss from this rise of prices and social cost. However, this approach requires detailed data for individual countries and it will be more like a case study that goes over the regulations, budget laws, and situational background of each country, which may not be ideal for the dissertation's aim for a cross-country study. Secondly, there is one stream of approach called the account measures to gauge the impact of rent-seeking, which usually is included in the advanced economy's studies, such as in the United States. The characteristics of this approach are that it is usually through evaluating the effect of rent-seeking, or the various signs of rent-seeking reflected in the budgetary process. For instance, Katz and Rosenberg (1989) and Scully (1991) use the changes in public budget allocation in the United States to measure rent-seeking, and both sides have debated in the field in whether this method can capture the true value of rent-seeking, since the method holds a too strong assumption of excluding external shocks. Mixon et al (1994) and Mixon and McKenzie (1996) use the several expenses in restaurants, public golf courses, and other services to capture rent-seeking activities, which is deemed as somewhat narrow as a measurement. Sobel and Garrett (2002) use the excess size of some activities that are regarded as *ad hoc*. They study the allocation of resources in capital

cities in the United States and compare this with that of the non-capital cities in the country, and then calculate the relative presence of several ad hoc activities that are regarded as "suspicious" or rent-seeking oriented. Again, this accounting approach is currently only prevalent in advanced country studies, and it yet to be demonstrated as a rigorous way of measuring rent-seeking since it has not taken into consideration of various control variables in obtaining the right scale or "amount" of rent-seeking behavior.

Thirdly and lastly, there is an aggregate approach in measuring rent-seeking, and will be used in this dissertation. In this approach, rent-seeking is gauged with proxies, and the idea is to measure the number of rent-seeking related behavior, personnel, or building up indices that is related to corruption and lobbying activities. For instance, Laband and Sophocleus (1988) and Magee et al (1989) use the number of lawyers or number of law firms as proxies. Mauro (1995) uses corruption and bureaucratic efficiency indices, while Brumm (1999) and Cole and Chawdhry (2002) use indices on lobbying law, state government employment, and size of government as proxies. Del Rosal (2009) also mentions that this approach is usually used to study effects of rent-seeking on aggregate economic performances rather than to provide specific numbers of social waste, which coincides with this dissertation's goal. He mentions that this approach intends to measure the resources being allocated away from productive activities and further the impact on growth or economic development, because rent-seeking in this approach is assumed to be costly to growth and it represents the will of the government in increasing returns for their own good when this becomes more attractive than them providing productive input for the people. Moreover, most of the cross-country panel analyses, due to data limitation, use this proxy of measurement, and they include it into the model with other regressors in a growth

equation, assuming it is a variable that will negatively affect economic performance. Therefore, based on relevance, data availability, and the rationale of usage in evaluating impact rather than a specific number on rent-seeking itself, the dissertation will use this last approach to measure rent-seeking. Based on data availability to cover as many as country samples, given that not every country has lobbying laws, as well as that government sizes will not always represent the amount of rent-seeking activities, the dissertation will use corruption index as a proxy, and use other variables such as bureaucratic efficiency indices to do robustness checks, as similar with Mauro (1995).

The bureaucratic efficiency indices are a series of indicators constructed by the World Bank Worldwide Governance Indicators (previously named as Indicators of Governance and Institutional Quality), including variables such as control of corruption, government effectiveness, regulatory quality, voice and accountability, rule of law, and political stability and absence of violence. I will use control of corruption, which captures the extent to which public power is used for private gain, as the headline indicator to be run in the baseline regressions. Also, since corruption is not a perfect proxy for rent-seeking, as some countries may have a broader-based definition of rent-seeking such as lobbying activities but not with a high level of corruption compared to other countries, I will use other indicators including government effectives, regulatory quality, voice and accountability to reflect more aspects of bureaucratic efficiency to do robustness checks. The dissertation also admits the limitation of using these indicators as proxies of rent-seeking—corruption can only be one aspect of rent-seeking behavior, other measures such as government effectiveness and regulatory quality often tend to touch upon the unobservable nature of the "true" level of governance in a country, and they become even weaker in capturing the

nuanced difference in country-specific conditions in terms of how bureaucratic rent-seeking activities take place. Nevertheless, due to constraint in data and the cross-country analysis purpose in this dissertation, these measures serve as close proxies to rent-seeking. And in order to have observations through various aspects, in the actual regressions, specifications will vary to have only control of corruption (tendency to control corruption, the higher the index the less corrupt) to see if it is positively correlated with economic growth, or only government effectives, regulatory quality, and voice and accountability as independent variables (tendency to reduce rent-seeking, the higher the index the higher effectiveness, quality, and accountability) to see if they are positively correlated with economic growth, or having both sets to show a combination (tendency to be both corrupt and seek rents) to see whether their correlations with economic growth would change.

4. Capital Mobility

As seen in the theoretical chapter, capital mobility is an important variable to consider. It is the distinction between the efficiency channel and the market-preserving channel, and will be included into the regressions as an explanatory variable for the market-preserving approach to concern the intermediary effect of fiscal decentralization that incurs investment competition and tax competition. There is a variety of measurement for international capital inflows and outflows, however, there are not many that measure a country's domestic capital mobility. An imperfect measure may be used in this context to proxy the extent of capital mobility in a country. Chinn and Ito (2006, 2008) in their seminal pieces develop an index to measure the extent of openness in capital account transactions. This measure, as argued by them, takes into account the intensity of capital controls and has a wider coverage than previous measurements (more than 100 countries for the period of 1970-

2016). This measure is a combination of considerations over current account transactions, capital account transactions, and it focuses on the effect of financial openness. The idea of using this index to proxy the measurement of domestic capital mobility in a country in a cross-country context is that the more mobile the capital is in a country, the higher it is of its financial openness. Given the complexity of constructing measurements for capital mobility as well as the limited data available, this Chinn-Ito index will be used in the baseline analyses of the empirical regressions.

Hypotheses and Empirical Models

I now turn to the task of developing empirical hypotheses and specifications that will be tested in the next chapter. Following the three theoretical models built in the previous section, I will develop testable hypotheses with respect to the two channels—the efficiency channel and the market-preserving channel—of how fiscal decentralization affects economic growth. In the market-preserving channel, I will consider both the investment competition and the tax competition scenarios jointly and gauging their tradeoffs will provide a more accurate and comprehensive framework in evaluating the market-preserving channel. For both channels, analyses will be done based on a cross-country panel dataset including 67 countries (initially included 199 countries, but based on availability of major variables, results attend to 67 countries), ranging from advanced, emerging, and low-income countries, from 1990 to 2016 as a result of data availability. For the empirical analyses, the baseline will be using Ordinary Least Squares (OLS) regression, and the dissertation will also investigate Generalized Methods of Moments (GMM) method to concern the endogeneity issue as well as the Structural Equation Model (SEM) to

concern the mediating effect more granularly. Below I will first discuss the OLS specifications and hypotheses for the Efficiency Scenario and the Market-Preserving Scenario. Then I will discuss the advantages of GMM and SEM method separately.

1. Baseline Regressions

Assuming a linear least square method with the country and time specific effects are controlled for. The estimation specification of fiscal decentralization's effect on economic growth through the efficiency channel is modeled as:

$$(18)\ Y_{n,t} = \alpha_0 + \alpha_1 FD_{n,t} + \alpha_2 AE_{n,t} + \alpha_3 FD_{n,t} * AE_{n,t} + \gamma X_{n,t} + \epsilon_n + \delta_t + \varepsilon_{n,t}$$

where n denotes countries and t denotes time. $Y_{n,t}$ is the economic growth measured as real GDP percentage growth. $FD_{n,t}$is fiscal decentralization as measured before using the ratio of the sum of the absolute levels of the country's state and local government's total revenue and total expenditure divided by the sum of the absolute levels of the country's general government's total revenue and total expenditure. $AE_{n,t}$ is the allocative efficiency as measured before using the sum of the local, state, central levels of governmental allocative efficiency in a country, as well as another measure of using the difference between subnational and central allocative efficiency. α_3 will be the coefficient of interest showing the intermediary effect of fiscal decentralization on economic growth through allocative efficiency, and ε_1 is the error term. Country and time fixed effects will be added into the regressions to control for those country-specific endowment effects as well as external shocks that affect all countries in a particular time period, denoted by ϵ_n and δ_t. In this scenario, control variables, denoted by $X_{n,t}$, include those covariates that cannot be captured by the fixed effects, including the lagged dependent variable—lagged real GDP growth, and other political, macroeconomic, socioeconomic variables.

These being determined, I will examine the channeled effect of fiscal decentralization on economic growth by observing the coefficient of the interaction term of fiscal decentralization and allocative efficiency. Controlling for other factors, I should observe that a change in the level of this interactions will influence the change in economic growth. More specifically, I will develop the hypothesis as:

Hypothesis One: All else being equal, an increase in the level of the interactions of fiscal decentralization and allocative efficiency ($FD_{n,t} * AE_{n,t} - FD_{n,t-1} * AE_{n,t-1} > 0$) may lead to an increase in the economic growth ($Y_{n,t} - Y_{n,t-1} \neq> 0$).

Similarly, assuming a linear least square method with the country and time specific effects are controlled for. The estimation specification of fiscal decentralization's effect on economic growth through the market-preserving channel is modeled as:

$$(19)\ Y_{n,t} = \beta_0 + \beta_1 FD_{n,t} + \beta_2 CM_{n,t} + \beta_3 FD_{n,t} * CM_{n,t} + \beta_4 AE_{n,t} + \beta_5 tax_{n,t} + \beta_6 rent_{n,t} + X_{n,t} + \epsilon_n + \delta_t + \varepsilon_2$$

where n, t, $Y_{n,t}$, $FD_{n,t}$, and $AE_{n,t}$ denote the variables exactly the same as in the Efficiency Channel discussed above. $CM_{n,t}$ is the capital mobility level of the country and β_3 will be the coefficient of interest showing the intermediary effect of fiscal decentralization on economic growth through capital mobility, which triggers the market-preserving effect from investment competition and tax competition. $tax_{n,t}$ denotes the country's average tax rate, $rent_{n,t}$ denotes rent-seeking as measured by the corruption index, and ε_2 is the error term. Fixed effects will be added into the regressions to control for those country-specific endowment effects as well as external shocks that affect all countries in a particular time

period, denoted by ϵ_n and δ_t. In this scenario, control variables $X_{n,t}$ stay the same as the Efficiency Channel.

These being determined, I will examine the channeled effect of fiscal decentralization on economic growth by observing the coefficient of the interaction term of fiscal decentralization and capital mobility. Controlling for other factors, I should observe that a change in the level of this interactions will influence the change in economic growth. More specifically, I will develop the hypothesis as:

Hypothesis Two: All else being equal, an increase in the level of the interactions of fiscal decentralization and capital mobility ($FD_{n,t} * CM_{n,t} - FD_{n,t-1} * CM_{n,t-1} \neq 0$) may lead to an increase in the economic growth ($Y_{n,t} - Y_{n,t-1} \neq 0$).

After discussing these two specifications under the OLS framework, I will now discuss some of the statistical issues that may arise within this framework. The use of panel dataset in this empirical analysis presents a number of econometric problems, including serial correlation, heteroscedasticity, and endogeneity issue. I will go over them and provide suggestions on how to address these issues.

The panel dataset runs the risk of having disturbances serially correlated across time, and if serial correlation is present, the fixed effects within estimator is inefficient. Especially working on the dependent variable of economic growth, first-order autocorrelation may be observed where the error term is influenced by the one immediately preceding in time, namely the one from the previous year in this case. Also, economic cycles are present and serial correlation may be seasonal as the error term may be related to the one from the same quarter in the previous year. Moreover, correlation due to

clustering in multi-level models may happen too in this case, because explanatory variables such as allocative efficiency are calculated using multi-tiers of the government, and error terms of observations within each state are probably correlated with each other. In order to detect serial correlation problems, I will plot residuals against variables such as allocative efficiency and capital mobility, and compute Durbin-Watson statistic for any first-order autocorrelation. If present, correlation-robust standard error regressions will be run to compare with original results.

After testing for serial correlation, heteroscedasticity issue will be examined. If the variance in economic growth differs depending upon fiscal decentralization, then the regression may run into heteroscedasticity problem since the variance in the error terms will also differ. This can also happen when the variance in economic growth differs depending upon allocative efficiency or capital mobility, and heteroscedasticity can lead to an underestimate of standard errors. I will use Breusch and Pagan test to determine whether I can reject of the null hypothesis of heteroscedasticity—the logic is that if the error terms are homoscedastic, then their variance should not correlate with any of the explanatory variables of interest. If heteroscedasticity issue is proven to be present, I will estimate using the heteroscedasticity-robust standard errors or the Huber-White standard errors regressions.

Endogeneity issue is one of the most difficult problems to be addressed in the fiscal decentralization literature. Sizable literature has tried to bring this issue to attention, while few can truly address the issues that the level of fiscal decentralization is endogenous in the economic growth equation. Endogeneity primarily arises from four sources: omitted variables, measurement error, simultaneity, and dynamic panels. In this study, I am

primarily concerned with the omitted variable bias that arises from unobserved country-specific characteristics that might affect both fiscal decentralization and economic growth. The Durbin-Wu-Hausman test (augmented regression test) will help to examine existence of potential endogeneity in the study. But since the dependent variable is real GDP growth and that one of the covariates is lagged dependent variable, endogeneity issue has more complication in this regard.

To explain this complication, let's take the Efficiency Channel as an example: in equation (16), such endogeneity is manifested in the correlation between variable FD and country characteristics ϵ_n ($cov(FD, \epsilon_n) \neq 0$). And thus by having a fixed effects model, the fixed effects will take the first difference of equation (16), giving us:

$$(20)\ \Delta Y_{n,t} = \alpha_1 \Delta FD_{n,t} + \alpha_2 \Delta AE_{n,t} + \alpha_3 \Delta FD_{n,t} * \Delta AE_{n,t} + \gamma \Delta X_{n,t} + \delta_t + (\varepsilon_{n,t} - \varepsilon_{n,t-1})$$

where the country-specific fixed effect (ϵ_n) is eliminated from the error term. Thus, the concern of such endogeneity is alleviated. However, while fixed effects models eliminated some concerns of endogeneity in equation (16), economic literature recognizes that the real GDP growth is a dynamic process in which the current value of real GDP growth is dependent on the past realization of real GDP growth, and that the lagged term can be used as a means of capturing dynamic effects and ridding the model of autocorrelation (Champernowne, 1961; Judson, 1996; Keele and Kelly, 2006). Therefore, given that the dependent variable being real GDP growth is a dynamic variable, and if I follow the literature on employing a dynamic panel model, I will introduce another type of endogeneity into the model. The following equation is a dynamic panel model version of equation (16):

$$(21)\ Y_{n,t} = \alpha_1 FD_{n,t} + \alpha_2 AE_{n,t} + \alpha_3 FD_{n,t} * AE_{n,t} + \alpha_4 Y_{n,t-1} + \gamma X_{n,t} + \epsilon_n + (\delta_t - \delta_{t-1}) + \varepsilon_{n,t}$$

And by taking the first difference, I have the following equation:

$$(22)\ \Delta Y_{n,t} = \alpha_1 \Delta FD_{n,t} + \alpha_2 \Delta AE_{n,t} + \alpha_3 \Delta FD_{n,t} * \Delta AE_{n,t} + \alpha_4 \Delta Y_{n,t-1} + \gamma \Delta X_{n,t} + (\delta_t - \delta_{t-1}) + (\varepsilon_{n,t} - \varepsilon_{n,t-1})$$

where the error term $(\varepsilon_{n,t} - \varepsilon_{n,t-1})$ is now correlated with the regressor $\Delta Y_{n,t-1}$, introducing the new endogeneity into the model. This problem is described in Staiger et al (1997), Blundell and Bond (1998), and Alonso-Borrego and Arellano (1999). This problem is not caused by serially correlation or omitted variable bias—rather, it is caused by the differencing procedure when estimating the fixed effects model. It is hard to find variables that are correlated with past economic growth while uncorrelated with current economic growth, while also available across countries and time that can be used as instrumental variables in the fiscal decentralization literature (Martínez-Vázquez and McNab, 2003). To solve this issue, one method is to use the dynamic panel estimator GMM, while the other is to simply jump out of the scene and use SEM to gauge a mechanical relationship. On the former, the dynamic panel estimators (Difference and System GMMs—S-GMM and D-GMM) proposed by Arellano-Bond use the instrumental variables that available within the dataset to solve the endogeneity problem. On the latter, SEM models that explore the indirect relationship between the two and analyze the transmission mechanisms of how fiscal decentralization affects growth help lower the risk of regressing directly on one another that brings in endogeneity problem. These two will be discussed in more details below.

2. GMM Method Considerations

As mentioned earlier, besides the baseline regressions, I will also consider other models to address some statistical issues with the OLS specifications. Using the Arellano and Bond (1991) GMM estimation technique, I aim at addressing the potential endogeneity of the explanatory variables and the correlation between the unobserved country-specific effects and the explanatory variables. While also, given the disadvantage of first-difference GMM in generating weak instruments by using lags as described above, system GMM may be preferred in estimating the relationship in my dissertation's context (Arellano and Bover, 1995; Staiger et al, 1997; Blundell and Bond, 1998).

To solve the endogenity issue, Two-Stage Least Squared (2SLS) techniques can be used, in the beginning. As seen in equation (20), the coefficient of prior real GDP growth is biased due to the fact that the regressor $\Delta Y_{n,t-1}\ is$ correlated with the error term $\varepsilon_{n,t} - \varepsilon_{n,t-1}$. To solve this problem, the Anderson-Hsiao estimator proposes to use the twice or more times lagged level or lagged difference term of the dependent variable is used to instrument. For instance, the twice lagged level variable of the dependent variable is

$$(23)\ Y_{n,t-2} = \alpha_1 FD_{n,t-2} + \alpha_2 AE_{n,t-2} + \alpha_3 FD_{n,t-2} * AE_{n,t-2} + \alpha_4 Y_{n,t-3} + \gamma X_{n,t-2} + \epsilon_n + \varepsilon_{n,t-2}$$

and the variable in question ($\Delta Y_{n,t-1}$) is given as:

$$(24)\ \Delta Y_{n,t-1} = \alpha_1 \Delta FD_{n,t-1} + \alpha_2 \Delta AE_{n,t-1} + \alpha_3 \Delta FD_{n,t-1} * \Delta AE_{n,t-1} + \alpha_4 \Delta Y_{n,t-2} + \gamma \Delta X_{n,t-2} + (\varepsilon_{n,t-1} - \varepsilon_{n,t-2})$$

$Y_{n,t-2}$ is thus correlated with the $\Delta Y_{n,t-1}$ term through the term $\varepsilon_{n,t-2}$ but it was not correlated with the error term in the original equation (20), satisfying the requirement of an IV. Thus, the twice lagged level of dependent variable is a valid instrument, so as the third or more times lagged level of the dependent variables.

However, as Arellano and Bond (1991) also point out, this standard 2SLS instrumental variable approach may lead to a loss of degree of freedom. This problem is particularly significant when the panel is a large n (country) small t (year) panel, as my data are. Therefore, alternative estimators—D-GMM and S-GMM can be used. Instead of traditional lagged dependent variable as IV, the GMM method creates a set of IVs using the second lag of the dependent variable, pertaining to each time period. This will prevent further loss of degree of freedom, so that all observations from t=2 onward can now be included in the estimation. According to the GMM's assumption of moment conditions, the expected value of the vector-valued function is equal to zero, and the GMM method will minimize the norm of the sample averages of the observations into moment conditions. As mentioned in the above section that it is difficult to find a proper IV to run a two-stage least squares regression over the baseline specifications to solve endogeneity issues in the fiscal decentralization literature, so GMM—the alternative model that I consider here will be regarded as another way of mimicking the two-stage least squares using a generalized IV. However, since my panel data is unbalanced, some country has as many as 20 years of data and some other countries only had a few years of data, it is not practical to use all available instruments as the number of instrument variable is increase in quadratic of time period t. Thus, I limit the instrument variable to be lagged for 2 periods (years) to lagged 10 periods (years) when available. The S-GMM uses both lagged level of dependent variable and lagged difference of dependent variable as instruments, whereas D-GMM only uses lagged level of the dependent variable as instruments. Given that lagged levels are often rather poor instruments for first differenced variables, especially when variables are close to a random walk, the result of S-GMM in my analysis will be more preferred. Last

but not the least, I will use the Sargan-Hansen J-test to do the overidentification test, to see if the number of moment conditions is greater than the dimension of the parameter vectors, and whether the model's moment conditions match the data well or not.

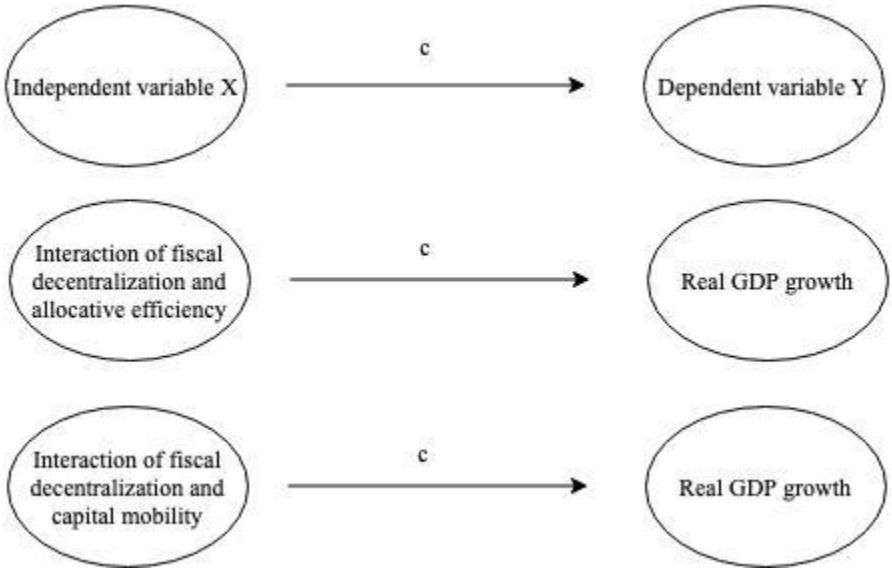
3. SEM Method Considerations

Another model to consider in the empirical analyses will be the SEM method that is often used to assess unobservable latent constructs and gauge mediating effect. The dissertation is interested in the indirect effect through the efficiency and the market-preserving channels, and SEM can provide estimations showing the penetration and transmission of effects from fiscal decentralization. SEM as a general statistical approach has many analysis tools such as factor analysis, path analysis, multivariate regressions, etc. And in this dissertation, I use the mediation analysis in the SEM framework by using a general mediation model to explain how or why an explanatory variable affects the outcome through a mediator, which is how does allocative efficiency or the market-preserving effect mediates fiscal decentralization to affect economic growth. By constructing a conceptual model and a system of web-linked observed and unobserved variables, mediation analysis assumes causality and a temporal ordering (Gunzler et al, 2013) among the explanatory variable, the mediator, and the dependent variable. This addresses the reverse causality issue present in using the standard linear analysis such as using the OLS. The mediation analysis provides a more appropriate inference framework for analyzing the impact of fiscal decentralization on economic growth also because it can provide model fit information about whether the hypothesized efficiency channel and the market-preserving channel are consistent to their observations for any causal inferences. This serves as a sound ratification over the theoretical logic behind the model.

To explain the SEM mediation analysis more visually, here below are a set of path diagrams by comparing OLS and SEM analyses and their logic in this dissertation. The diagrams are designed based on Carrión et al (2017)'s path diagrams.

In OLS regressions, as in Figure 1.1, coefficient c is generated as how much of dependent variable Y is being explained by independent variable X. By implication, GMM method also follows this line of cause effect relationship. Therefore, fitting into this dissertation, the coefficients of interaction terms of fiscal decentralization and allocative efficiency and capital mobility are of interest to explain how fiscal decentralization affects economic growth based on the efficiency effect and the market-preserving effect.

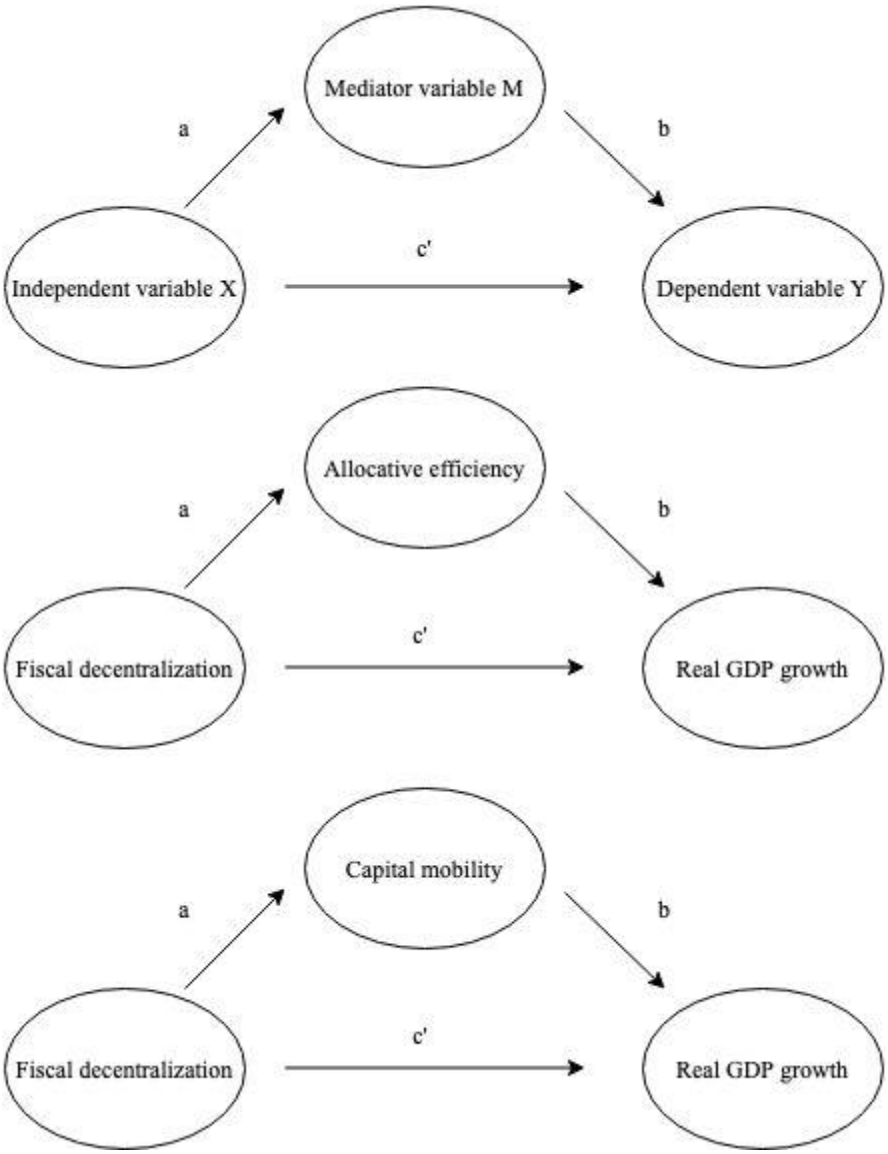
Figure 1.1 OLS Cause Effect Relationship Path Diagram



On the other hand, in the SEM mediation analysis, the process as in Figure 1.2 is to look at a mediating effect or an indirect effect that involves a third variable called the mediator variable. This variable plays an intermediate role in the relationship between the dependent and the independent variables. The effect of the independent variable on the dependent variable is mediated by this mediator variable. In the end, what we are interested

in is how much more or less would the mediator affect the magnitude of the independent's impact on the dependent variable. Therefore, fitting this into the dissertation, allocative efficiency and capital mobility will each serve as the mediator variable for fiscal decentralization's impact on real GDP growth through the Efficiency Channel and the Market-Preserving Channel. The strength of the indirect effect by these two mediator variables should be $a * b$, which can also be called the size of the mediation. While also, there is c' which still gauges a direct effect that fiscal decentralization has on economic growth without considering the mediation. The results may show whether fiscal decentralization's impact on economic growth gets larger or smaller as allocative efficiency or capital mobility increases. Thus in the end, the total effect of fiscal decentralization on economic growth should depend on both a, b, and c' rather than c alone as in the OLS regressions.

Figure 1.2 SEM Mediation Analysis Path Diagram



To explain things in an econometric stance, what is important of the SEM mediation analysis in this dissertation is based on the different assumption it takes compared to the standard regressions in above OLS and GMM. OLS and GMM methods assume a statistical relationship to exist based on a conditional expected value, while SEM assumes, on the other hand, a functional relationship through mathematical computations. In this way, through a hypothesized mediation process, as well as setting the efficiency and the market-preserving channels as having dual roles of being both the cause for economic growth and

the effect of the intervention from fiscal decentralization, the relationship is more clearly defined and expressed through this structural equation than using OLS or GMM methods. Thus, the SEM for this mediation model for the allocative efficiency scenario is given by:

$$(25.a)\ AE_{n,t} = \gamma_0 + \gamma_{FD,AE} FD_{n,t} + \varepsilon_3$$

$$(25.b)\ Y_{n,t} = \delta_0 + \delta_{AE,Y} AE_{n,t} + \delta_{FD,Y} FD_{n,t} + \varepsilon_4$$

assuming the error terms (ε_3, ε_4) are uncorrelated. The inferences for equations $(25.a)$ and $(25.b)$ are simultaneous and the mediation analysis also assumes multivariate normality for the error terms. Above we can see two effects: one is the direct effect from fiscal decentralization on economic growth while controlling for the mediator allocative efficiency, as denoted by $\delta_{FD,Y}$. Another is the indirect effect from fiscal decentralization on economic growth through the mediator allocative efficiency, as denoted by through the product of $\gamma_{FD,AE}$ and $\delta_{AE,Y}$. In total, therefore, the effect is the sum of both the direct and the indirect effects, which is $\delta_{FD,Y}$+$\gamma_{FD,AE}$*$\delta_{AE,Y}$.

Similarly, for the market-preserving channel, the SEM for this mediation model can be given by:

$$(26.a)\ CM_{n,t} = \mu_0 + \mu_{FD,CM} FD_{n,t} + \varepsilon_5$$

$$(26.b)\ Y_{n,t} = \theta_0 + \theta_{CM,Y} CM_{n,t} + \theta_{FD,Y} FD_{n,t} + \varepsilon_6$$

controlling for other factors concerning investment competition and tax competition. The total effect for fiscal decentralization on economic growth through capital mobility is therefore $\theta_{FD,Y}$+$\mu_{FD,CM}$*$\theta_{CM,Y}$.

In all, the idea of using SEM mediation analysis is to run a robustness check and compare with OLS to see whether the effect of fiscal decentralization on economic growth can be mediated and explained by a change in the allocative efficiency or capital mobility.

According to previous studies using mediation analysis, partial mediation is more common. This means that the effect is not always 100 percent mediated by the mediator, which in this case meaning fiscal decentralization's effect on economic growth is not completely through allocative efficiency or capital mobility. This also means that even after introducing the mediator, there is still some direct impact from the explanatory variable, as shown in the path diagrams the c'. In this case, fiscal decentralization can directly affect economic growth, not through any channels, too, which makes sense according to previous empirical results. Analyses are done using the SEM framework to make a comparison with the OLS and GMM methods, with the same sets of data and variables.

Chapter 5: Empirical Results and Interpretations

Introduction

In the previous chapter, I talked about the empirical methodologies and important measurements for the use of panel regressions based on OLS as the baseline, and GMM and SEM as robustness checks. In this chapter, I will go through the main results of findings through these different methods. The chapter will firstly go over the results of the Efficiency Channel, and then go over the results of the Market-Preserving Channel. Each channel will be presented with result tables shown in the appendix, following the order of baseline OLS regressions without control variables, baseline OLS regressions with two sets of control variables A and B, Difference-GMM regressions with two sets of control variables A and B, System-GMM regressions with two sets of control variables A and B, and SEM mediation analysis regressions with two sets of control variables A and B. Each channel will also be concluded with some main findings. The Market-Preserving Channel also contains a section on the robustness check for the rent-seeking variables. In the end, there is a section on some of the other potential variables or factors that may be of interest when discussing fiscal decentralization in general and its relationship with economic growth, which this dissertation does not intend to put too much emphasis on but still are worth a brief discussion.

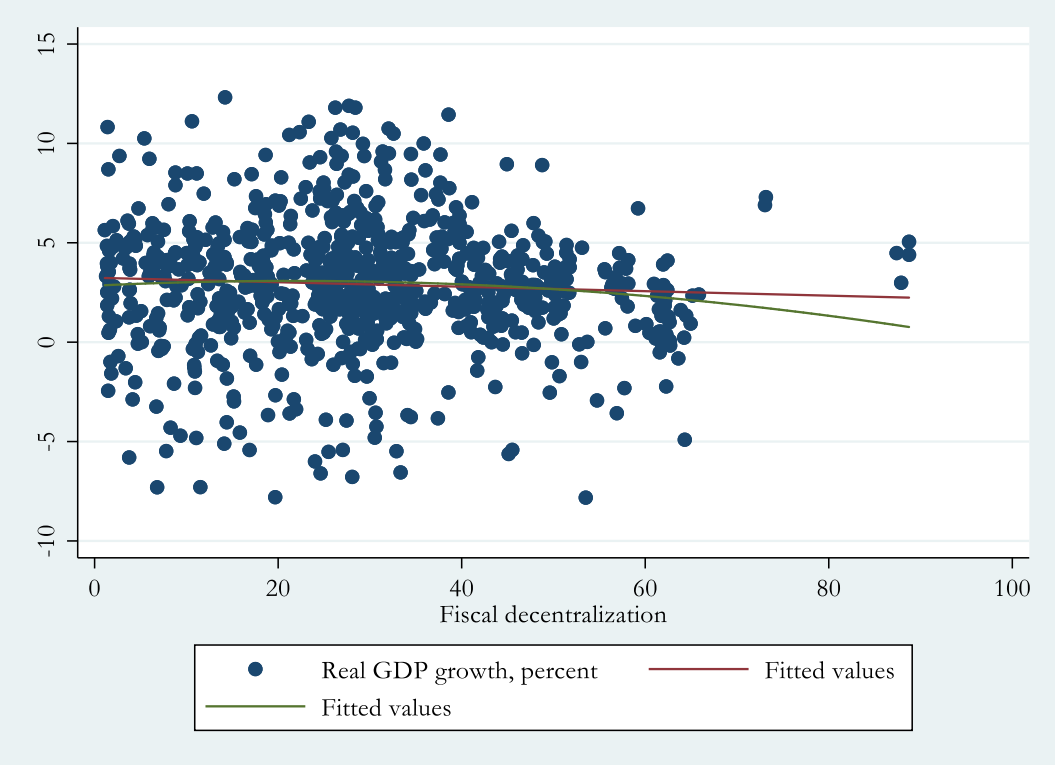
To summarize briefly, the empirical results show that there are statistically significant findings in the Efficiency Channel, that fiscal decentralization positively affects economic growth through allocative efficiency. However, there is yet any evidence of the validity of the Market-Preserving Channel, that the argument of fiscal decentralization affecting

economic growth through capital mobility is not found in the analyses. In the robustness checks, the Efficiency Channel is backed by some results while not the others, depending on which method is used, which allocative efficiency measure is used, and which control variables are used. In the SEM results, fiscal decentralization is also found to be negatively correlated with allocative efficiency, rendering another finding that fiscal decentralization positively correlates with economic growth, but in a marginally declining rate as allocative efficiency increases. For the control variables, some variables are significantly correlated with economic growth, including real investment, secondary school enrollment, party of chief executive length of time in office, government fractionalization index, and voice and accountability, which confirms some findings of similar literature. However, some of these control variables lose their significance when conducting the GMM robustness checks which has high standard errors, and puts into question of whether these variables are in the beginning exogenous or whether they are correlated with the endogenous variable fiscal decentralization. There is also a finding that corporate income tax rate becomes significantly correlated with economic growth when total allocative efficiency is in the regression. In all, some interesting findings are generated and they leave potential for further research in the future.

To assist the readers, Table 2 is a summary of all the variables being used in the regressions, including the variable name, their descriptions, and their sources. Table 3 shows the summary statistics of the main variables, which are useful in some results interpretations later. And before delving into the regressions results, we can see as an entry check of a scatter plot based on the sample to see the relationship between fiscal decentralization and real GDP growth: in Figure 2 we can see that there seems to be no

apparent relationship between the two if using a linear fitted trend (the red line), while there seems to be an inversed-U shaped relationship between the two if using a quadratic or nonlinear fitted trend (the green line). This only gives us a flavor of what might the relationship look like using my data sample, and from the next section I will begin discussing the regression results of the relationship through different transmission mechanisms—the Efficiency Channel and the Market-Preserving Channel.

Figure 2 Scatter plot of fiscal decentralization and real GDP growth with linear and non-linear fitted trend lines



The Efficiency Channel

1. Baseline Regressions Results

In Tables 4.1 to 4.3, I summarize the empirical estimation results for investigating the Efficiency Channel of how fiscal decentralization affects economic growth by using standard OLS panel regressions. The order and flow of these tables imply that I start from

the baseline regressions in Table 4.1, showing the main variables of interest without having the control variables; then in Table 4.2 and 4.3, estimations are shown with control variables that help refine the explanatory power of the specifications. Time and country fixed effects are added to control for shocks that are constant across countries but vary over time, as well as unobserved cross-country heterogeneity. Only the regression results that are heteroscedasticity-robust are shown, as the regressions show heteroscedasticity problem after running the Breusch and Pagan test and it needs to be addressed. The power of specifications explaining the variance of real GDP growth, or the R square, stays around 40-50% based on different specifications. Due to data availability, the sample includes roughly 60 countries with in total around 650-800 observations again depending on the specifications.

Looking at the results from Table 4.1 first, if running a bivariate regression of GDP growth on fiscal decentralization, it shows a positive relationship in column (1), though not statistically significant, meaning higher level of fiscal decentralization (more subnational revenue and expenditure in percent of total government revenue and expenditure) may correlate with higher GDP growth but we do not find this statistically significant. The coefficients of fiscal decentralization stay similar when adding into the allocative efficiency measures, as seen in column (2) and (3), and still nothing is statistically significant. Though, the situation changes after the regressions take into consideration of adding the lagged dependent variable as one of the explanatory variables. As empirical economic growth literature entails, the strong correlation of time series GDP growth with previous period necessitates the inclusion of the lagged GDP growth variable. Now we see that still the bivariate regression in column (6) still sees no significant relationship between

fiscal decentralization and GDP growth, but in column (7) the relationship becomes significant, while also that total allocative efficiency, measured as the sum of the subnational and central government allocative efficiency, is significantly positively correlated with GDP growth. And similarly, in column (8), though fiscal decentralization again loses its significant relationship with GDP growth, the allocative efficiency distance, measured as the distance of subnational to central government allocative efficiency, is significantly correlated with GDP growth. The results in column (7) and (8) show a nuanced implication that using two different measures of allocative efficiency—one is the total allocative efficiency and the other is the distance of allocative efficiency from subnational government to central government—we see both have a positive correlation with GDP growth with the statistical significance with at least the 90% level. These mean that, not only that higher total allocative efficiency is good for GDP growth, but also that if subnational government's resource allocation is more different from that of the central government, it shows correlation with a better GDP growth. Overall, the fit of the regressions after including the lagged dependent variable also increases, while the signs of the correlation remain unchanged.

And moving onto the interpretations of the coefficients of interest—the ones of the interaction terms in column (4), (5), (9), (10), we need to use some caution. This is because when we interpret the coefficient of these interactions terms, there is an extreme case of having fiscal decentralization as zero, which then makes the concept of allocative efficiency unmeaningful. If fiscal decentralization is zero, which means there is full centralization, there is no theoretical meaning of allocative efficiency because there will be no subnational undertaking under this context. The assumption that this dissertation's

theoretical argument bases on is that subnational government, given more decentralized autonomy on fiscal decisions, will generate allocative efficiency which is beneficial for economic development. And thus the extreme case of centralization makes the interpretation of coefficient of allocative efficiency invalid. This is also the reason why in above interpretations I did not mention the exact coefficients of the two measures of allocative efficiency, because the case when fiscal decentralization equals zero invalidates the coefficient's value. Nonetheless, we can still make an interpretation that allocative efficiency seems to be positively correlated with economic growth, and it is very statistically significant in some specifications. However, we should not interpret the relationship using the value of the coefficient.

And by looking at the results of the interaction terms, there are also some stories to tell. Firstly, the coefficient of the interaction term should be interpreted as: when based on different levels of allocative efficiency, how marginal change of fiscal decentralization affects economic growth. Secondly, again as mentioned above, if fiscal decentralization is zero, which means full centralization, there is no theoretical meaning of allocative efficiency, thus the specifications of interest column (4), (5), (9), (10) do not include allocative efficiency alone as an explanatory variable. Thirdly, that being said, when interpreting the coefficient of the interaction term, the fiscal decentralization's impact on economic growth will now depend on the level of allocative efficiency. This is consistent with the argument of this dissertation that fiscal decentralization does not affect economic growth through a direct impact (thus I do not overinterpret the value of the coefficient of fiscal decentralization), but through a channel by allocative efficiency (thus the coefficient of the interaction term is the coefficient of interest). In column (4) and (5), the two

interaction terms bear no significant relationship with GDP growth, while after adding the lagged GDP growth into the picture, in column (9) and (10) the relationships become statistically significant. When fiscal decentralization is zero, interaction term will also become zero, and thus the specification will have no meaning. When fiscal decentralization is not zero and when allocative efficiency is zero, we can interpret, for example in column (9), that one unit of increase in fiscal decentration is correlated with a 0.0398% growth in GDP, though not statistically significant. While with the increase of allocative efficiency, let's say when allocative efficiency equals 1, one unit of increase in fiscal decentralization through the channel of total allocative efficiency is correlated with 0.000133% increase in GDP growth, and is a 0.000136% increase through the channel of allocative efficiency distance. And given the summary statistics of the two measures of allocative efficiency, as seen in Table 4.1, that the sample mean of total allocative efficiency is around 57, and the sample mean of allocative efficiency distance of subnational government to central government is around 37. We can then infer that, on statistical averages, if total allocative efficiency serves as the transmission mechanism, one level of fiscal decentralization increase will lead to roughly 0.0076% increase of GDP growth; and if allocative efficiency distance serves as the transmission mechanism, one level of fiscal decentralization increase will lead to roughly 0.0049% increase of GDP growth. Moreover, to push this estimation further, if we take the sample mean of fiscal decentralization value of around 29, the statistical inference of this sample's fiscal decentralization's average impact on economic growth through the channel of allocative efficiency is around 0.22% by using total allocative efficiency and 0.14% by using allocative efficiency distance.

Further, not only to estimate the mean value of effect of fiscal decentralization on GDP growth through allocative efficiency, I also examine the marginal effects based on different levels of allocative efficiency, as in Table 5. Table 5 shows the marginal effect based on the total allocative efficiency measure and the allocative efficiency distance measure. As seen in the table, it shows the coefficient of impact of fiscal decentralization on GDP growth based on different percentile of allocative efficiency measures. For instance, one unit increase of fiscal decentralization has an impact on GDP growth of 0.041% if total allocative efficiency is at the 5% percentile range in the sample. And this impact increases to 0.063% as total allocative efficiency moves gradually from the 5% to the 95% percentile range in the sample. And as the total allocative efficiency rises, the impact of fiscal decentralization on economic growth through allocative efficiency becomes more statistically significant. This observation holds using the allocative efficiency distance measure as well—the impact of fiscal decentralization on GDP growth becomes stronger as allocative efficiency distance grows, from 0.038% to 0.053% and the impact is more statistically significant. These results can also be seen in Figures 3.1 and 3.2, where I visualize the increasing marginal impact of fiscal decentralization on GDP growth. The figures show the impact with also the 95% confidence interval included.

Figure 3.1 Marginal Effects of Fiscal Decentralization on Real GDP Growth by Different Levels of Total Allocative Efficiency

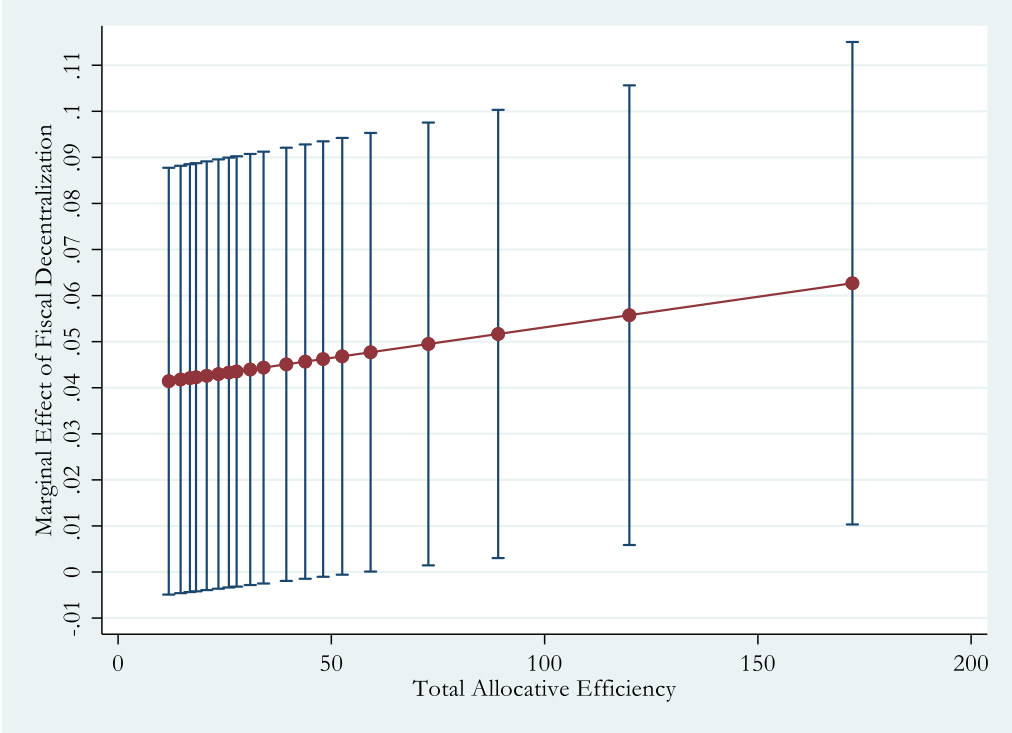
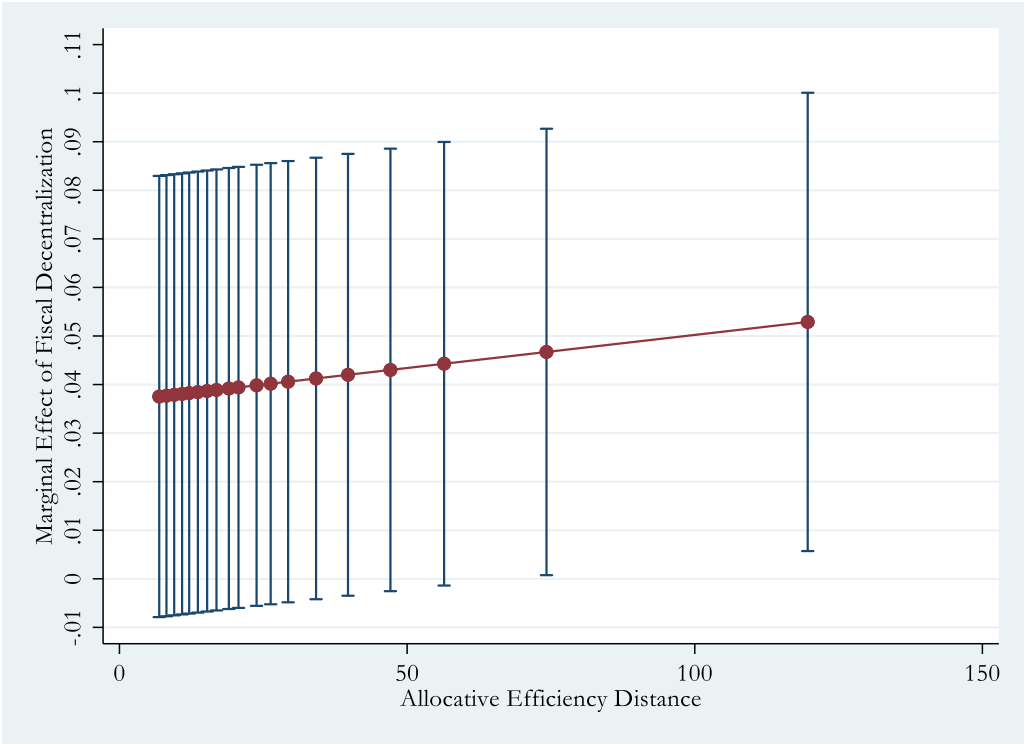


Figure 3.2 Marginal Effects of Fiscal Decentralization on Real GDP Growth by Different Levels of Allocative Efficiency Distance



Turning to Table 4.2 and 4.3, where I add in control variables to increase the explanatory power of the specifications, as well as controlling for things that both time and country fixed effects cannot cover. Based on the empirical literature, there is no final consensus of choice of covariates in the specifications of fiscal decentralization and economic growth. In Table 4.2, taking the neoclassical and endogenous growth theories into account (Baskaran and Feld, 2013; Asatryan and Feld, 2014), one standard control variable is the lagged GDP growth, which is already added. Others would be population growth, real investment as an indication of growth of physical capital, secondary education enrollment as an indication of human capital, and terms of trade to show the trade openness and the extent of integration into the world economy. In Table 4.3, more nuanced and detailed control variables are added including macroeconomic variables, political variables, demographic and socioeconomic variables that are mostly used in previous empirical literature. As one can see, adding more control variables improve the explanatory power of the specifications to economic growth—R squared increase in most results. Some variables such as investment, secondary school enrollment rate, population growth, foreign direct investment, party of chief executive length of time in office, government fractionization index, and voice and accountability stand out as being statistically significant in correlating with economic growth. Though some of them show counter-intuitive signs in their correlations, including that population growth is very significantly negatively correlated with GDP growth, and that the coefficient of foreign direct investment flips the sign when using different measures of allocative efficiency. Otherwise the regression results show that more investment growth, higher secondary school enrollment, more time of party of chief executive length of time in office, less

fractionalized government, and better voice and accountability correlate with higher GDP growth, which are intuitive and important findings in the results.

Though, on the other hand, once more covariates are being added, explanatory power from the variables of interest—interaction terms of fiscal decentralization and allocative efficiency—decline and is absorbed by these variables. Interaction term of fiscal decentralization and total allocative efficiency still is statistically significant in column (3) in Table 4.2, otherwise the significance of correlation is gone. As the degree of freedom decreases, and country available data decrease, the results, though showing higher R squares in column (3) and (4) in Table 4.3, are showing no correlation between fiscal decentralization and economic growth through either interaction term. This result is also foreseeable as initially the correlation is already very small-scale, though being statistically significant. In the bigger question of what would affect economic growth, fiscal decentralization as through the channel of allocative efficiency is admittedly small, especially when having other covariates that are empirically tested from previous economic growth literature as affecting economic growth. It does not come as a surprise as the explanatory power of the specification increase with more control variables.

2. GMM Results

Tables 4.4 to 4.7 show the results comparing Difference and System GMM regression results. As argued in the previous chapter, for my particular dissertation sample, D-GMM may be biased due to sample problem and may lead to low accuracy, and the use of lag levels generates weak instruments. Thus, S-GMM, by using both lagged differences and lagged levels as instruments, will be more preferred.

By comparing Table 4.4 and 4.6 with control variables A, the results show that the coefficients of interest (the interaction terms of fiscal decentralization and two measures of allocative efficiency) bear no significant relationships in the D-GMM results; however, in the S-GMM results, the ones using the interaction based on total allocative efficiency show some strong significant correlation with economic growth. Serving as one of the robustness checks, the results from GMM here, particularly the S-GMM, show similar patterns compared to the baseline regressions in Table 4.1—more significant correlations exist between interaction term based on the total allocative efficiency, while less so based on the allocative efficiency distance. The coefficient values remain small still. Also, by comparing the GMM and baseline results using control variables B in Table 4.5 and 4.7, we see again a similar pattern—the significant relationships between the interaction terms and GDP growth are gone when adding more control variables, hinting the very small and marginal impact of fiscal decentralization on economic growth through allocative efficiency. This coincides the assumption that GDP growth is such a large item that too many factors will have an impact, with fiscal decentralization through the allocative efficiency channel being a small one. Though, so far the results do show some small but significant effect by using different measurements of allocative efficiency, different control variables, and different regression methods. Also, the results of Hansen overidentification test by checking the validity of IVs of all regressions in D-GMM and S-GMM show that it does not reject the null (all instruments as a group are exogenous), which means that the IVs satisfy the regression requirements. Though, the Hansen test specifically say that the results are robust but will be weakened by many instruments.

In terms of the results of the control variables, the GMM methods, including both D-GMM and S-GMM, seem to have triggered the lost of significance in many variables compared to the baseline results, such as real investment growth, foreign direct investment, party of chief executive length of time in office, and government fractionalization index. The only one that is consistent and stands significant is the voice and accountability index, showing very significant and robust positive relationship with economic growth in both the baseline and D-GMM results. The loss of significance in these results compared to the OLS baseline regressions could be due to that these variables are not at first exogenous or they are correlated with the endogenous variable being added into the equations when using fixed effect. One explanation if that countries with these factors could have made them have either higher or lower GDP growth, and thus when instrumenting the regression variables, these significant correlations are gone if we are gauging a causal effect.

To sum, what the GMM results show is that if S-GMM as assumed has addressed the endogeneity issue, and its results being more preferred than the OLS and D-GMM ones, the conclusion is that fiscal decentralization has a significant positive impact on real GDP growth through total allocative efficiency, while this impact has gradually lost its significance by adding more control variables into the picture, showing that the impact of fiscal decentralization on economic growth through total allocative efficiency could be very small when other bigger factors are considered altogether in an economy.

3. SEM Mediation Analysis Results

As a second set of robustness checks, what the SEM mediation analysis's results in Tables 4.8 and 4.9 show adds some more color to that of the panel regressions. Using total allocative efficiency as a mediating tool, SEM tries to see whether fiscal decentralization

affects economic growth through a mechanical relationship. The results come in as pairs—for instance, column (1) and (2) in Table 4.8, it shows that fiscal decentralization has a positive direct impact on economic growth, though not statistically significant. The interaction term based on total allocative efficiency, on the other hand, is statistically significant and positively correlated with GDP growth. On the other hand, the correlation between fiscal decentralization and total allocative efficiency is negative and statistically significant. This means that, even though fiscal decentralization has a positive correlation with economic growth through the channel of total allocative efficiency, the marginal impact of fiscal decentralization on economic growth declines with the increase of allocative efficiency. This finding is actually consistent with the OLS regressions and the marginal effect figures—the effect has a marginally declining trend with the increase of total allocative efficiency. Similarly, in column (3) and (4), it shows the same trend that with allocative efficiency distance as the channel, fiscal decentralization's impact on GDP growth is positive but marginally decreasing with the increase of allocative efficiency distance. This conclusion still stands and is still statistically significant when adding control variables A into the regression. When adding into more control variables B, the conclusion stands but it loses the significance.

Overall, the finding from the SEM mediation analysis is that fiscal decentralization is positively correlated with economic growth through the channel of allocative efficiency, however, the marginal impact declines as allocative efficiency increases. By examining a mechanically presumed set-up relationship between fiscal decentralization and GDP growth as being mediated by allocative efficiency, the SEM model goes about the endogeneity issue in another way than the GMM, and the results echo what is found in the

OLS baseline regressions, and are also statistically significant in some selective regression specifications. The control variables basically stay similar in their performance in the specifications compared with the OLS baseline regressions as well.

To sum up and interpret the results from the regressions on the Efficiency Channel, I have several key observations: (1) fiscal decentralization does not seem to have a direct statistically significant correlation with real GDP growth; (2) two allocative efficiency measures—total allocative efficiency and allocative efficiency distance—after adding the lagged real GDP growth into the specifications, show quite strong positive correlations with real GDP growth, showing that both higher total allocative efficiency of subnational and central government and bigger distance between subnational and central government allocative efficiency are correlated with higher economic growth; (3) for the relationship of interest in this dissertation, the interaction term of fiscal decentralization and two measures of allocative efficiency both also show significant positive correlation with real GDP growth when the lagged dependent variable is in the equation. These results confirm the theoretical argument that fiscal decentralization may not directly affect economic growth, but has an impact through the channel of allocative efficiency; (4) this conclusion is still valid when adding the first set of control variables A using the endogenous growth model assumptions, while it loses the significance when adding the second set of control variables B similar to many other economic growth and fiscal decentralization literature; (5) this conclusion is further evaluated using a marginal effect table, showing that fiscal decentralization has a positive but marginally declining correlation with economic growth, as allocative efficiency increases; (6) this finding on marginal decline is reaffirmed by the results from SEM mediation analysis, also showing that fiscal decentralization is positively

correlated with economic growth, but negatively correlated with allocative efficiency, and thus the relationship is positive but marginally declining; (7) besides SEM, GMM as another robustness check show that given the sample issue and the thus preferred S-GMM model, there is still strong significant evidence that fiscal decentralization positively correlates with economic growth through the channel of total allocative efficiency, but not anymore through the channel of allocative efficiency distance. Again, after adding into the equation of control variables A the results still hold but not with the control variables B; (8) among the control variables, both the OLS and SEM regressions see some prominent significant correlations with economic growth, including real investment, secondary school enrollment rate, population growth, foreign direct investment, party of chief executive length of time in office, government fractionization index, and voice and accountability index. However, when using the GMM models after instrumenting the equations, many of them lose significance showing that they may not be exogenous variables or they are correlated with the endogenous variables fiscal decentralization.

The Market-Preserving Channel

1. Baseline Regressions Results

Tables 6.1 to 6.3 summarize the main results for the market-preserving channel OLS panel regressions. Again, similar to the Efficiency Channel, the regressions start out in Table 6.1 with baseline regressions with fiscal decentralization and capital mobility, and then add in the interaction term and lagged dependent variable into the specifications. And then in Tables 6.2 and 6.3 control variables are added to help refine the explanatory power. In the outset, in Table 6.1, capital mobility is positively correlated with economic

growth, though the strong significance goes away when I add in the other important variables implied by the theoretical argument—investment, tax rate, and rent-seeking. Real investment growth is significantly positively related to economic growth, while both the correlations of tax rate and control of corruption index are not significant. The significance further goes away when the lagged dependent variables is added and absorbs the explanatory power. On the interaction term of capital mobility and fiscal decentralization, we see that none of the specifications hold a significant result. And actually when the interaction terms based on the Efficiency Channel—the interaction term of fiscal decentralization and total allocative efficiency and allocative efficiency distance—are added in column (8) and (9), these two are holding significant correlations with GDP growth, consistent with the previous conclusion while also overshadowing the effect, if any, of the Market-Preserving Channel. These results leave a question mark of whether there is a significant correlation between fiscal decentralization and economic growth through the impact of capital mobility, or through the market-preserving channel. When combining the allocative efficiency and capital mobility variables—the two channels together, the results show statistical significance of the Efficiency Channel, while not the Market-Preserving Channel.

Turning to Table 6.2 and 6.3, where I add in control variables to increase the explanatory power of the specifications. The covariates are the same with the Efficiency Channel, and as seen in the tables, the results on the coefficients of interest—the interaction term of fiscal decentralization and capital mobility is still statistically insignificant in all regressions. The interaction terms of those with the Efficiency Channel still stay significant in Table 6.2 but not in Table 6.3 with control variables added. Among the control variables,

the coefficients of real investment growth, population growth, party of chief executive length of time in office, government fractionalization index, and voice and accountability remain statistically significant, similar to what is seen in the Efficiency Channel results. And as the number of control variables increases, the explanatory power of the specifications increases, however, there are fewer countries in the sample and the degree of freedom declines. These specifications confirm the same situation with covariates in the Efficiency Channel, while also reaffirming the unseen correlation between fiscal decentralization and economic growth through the Market-Preserving Channel.

2. GMM Results

Tables 6.4 to 6.7 show the results comparing Difference and System GMM regressions for the market-preserving channel. Again, S-GMM, by using both lagged differences and lagged levels as instruments, will be more preferred. The results show basically no statistical significance of any specifications for the coefficients of interest (the interaction term of fiscal decentralization and capital mobility) in either the D-GMM or S-GMM results. And the interaction terms with allocative efficiency now have lost their significance as well, compared to their overshadowing significance in the baseline regressions. In the D-GMM results, some specifications show a slight significance of the variables corporate income tax rate and real investment growth, while in the S-GMM results, nothing show significance even for the control variables. This is somewhat similar to what happened in using GMM in the Efficiency channel, that when more control variables are being added into the regressions in GMM, significant correlations are lost compared with the baseline results. Though, to check the validity of IVs, the results of overidentification test shows that it does not reject the null (all instruments as a group are

exogenous), which shows that the IVs satisfy the regression requirements. To sum, if S-GMM is assumed to have addressed the endogeneity issue and serves as a preferred robustness checks for the OLS regressions, it has shown basically no significant correlation between fiscal decentralization and economic growth through the Market-Preserving Channel, and the effect of allocative efficiency as in the Efficiency Channel is eliminated when more factors that affect real GDP are concerned in the picture.

3. SEM Mediation Analysis Results

In Tables 6.8 and 6.9, the results from SEM on the Market-Preserving Channel again show no significant correlation between the interaction term on capital mobility and GDP growth, leaving a question mark of the validity of the assumption of the Market-Preserving Channel. Fiscal decentralization has a positive direct impact on economic growth, though not statistically significant, while capital mobility is significantly correlated with economic growth. And the correlation between capital mobility and fiscal decentralization also seems marginally positive, though not significant. The interaction terms of the Efficiency Channel still stand out as being quite significant, again confirming with the inconclusive results from the OLS panel regressions that so far there is no clear evidence that fiscal decentralization affects economic growth through the channel of capital mobility, not even through this mechanically presumed mediation effect by the SEM results, but the effects through allocative efficiency seems to be pretty robust. This can due to not only the theoretical argument not working, but also the data availability—if individual subnational data based on different state and local governments are available, the regressions can be more granular in analyzing the investment and tax competition effects and where capital flows to based on the two competition effects. Currently since the subnational government

data are as a whole (one country one subnational fiscal data point), the results can yet provide a clear picture of the Market-Preserving Channel.

Among the control variables, interestingly, we see some significant correlations between corporate income tax rate and GDP growth, as long as the interaction term based on allocative efficiency is present in the regressions. This is new compared with the previous OLS and GMM results, which could indicate some effect from corporate income tax rate when fiscal decentralization's impact on GDP growth through allocative efficiency is at play. What comes also new is that interest rate becomes significantly correlated with GDP growth when the interaction term of total allocative efficiency is present. One possible explanation is that OLS and SEM are quite different methods, and SEM tends to have smaller standard error estimations in the regressions. The significance consistently arises from corporate income tax rate when Efficiency Channel allocative efficiency interaction terms are added could be noticed as one important finding, in need of further research. Otherwise, real investment growth, foreign direct investment, population growth, party of chief executive length of time in office, government fractionalization index, and voice and accountability stay strongly significant in the correlation.

4. Robustness Checks for Rent-Seeking Variables

Tables 7.1 to 7.9 show the results for running different rent-seeking variables in the same sets of regressions for the Market-Preserving Channel—from Baseline OLS to D-and S-GMM to SEM. Instead of using the variable of control of corruption, these regression specifications use three other rent-seeking variables: voice and accountability, government effectiveness, and regulatory quality. As mentioned in the previous chapter on measurements, these specifications will serve as robustness checks for testing the proxy

for measuring rent-seeking behavior, and are used to be compared with those using the corruption index. Note that both sets of rent-seeking variables—control of corruption versus the three government effectiveness variables—when the regressions run specifications with control variables B, they also serve as each other's control variables. This will cover the checks on when countries have both measures of corruption and other three variables, and can be used to compare with the results with those that either only have corruption or those only have government effectiveness indicators.

The robustness check of regressions shows pretty much similar results compared with the ones using the corruption index. Control of corruption, serving as the baseline rent-seeking measure, shows no significant relationship with real GDP growth in basically all regression specifications. This warrants and makes it important to do the robustness checks using other variables and measures. For regressions using these three measures—voice and accountability, government effectiveness, and regulatory quality, some specifications such as in the Bassline OLS without control variables, the S-GMM with control variables A, and SEM with control variables A, show that government effectiveness is negatively correlated with real GDP growth and they are statistically significant. The regressions also look at those situations where both corruption index and the other three government effectiveness indices are in the equation, and in these regressions, voice and accountability sometimes shows a positive and statistical significant correlation with real GDP growth, such as in Baseline OLS and in SEM with corruption index as one of the control variables. Other times voice and accountability remains insignificant in its correlations. Also, in these regressions with both sets of rent-seeking measures, government effective, which used to be significantly correlated with real GDP growth, becomes insignificant after corruption

index is included in the regression. Another observation is that corruption index changes sign, from negative to positive, when the regressions add in the three government effectiveness indices.

It is a bit difficult to unravel and give a conclusion from the comparison between regressions for different rent-seeking measures, since there is not a clear trend of where things go. That said, there are some observations that can be used for future research. Firstly, the measure control of corruption, which is used as the baseline for measuring rent-seeking, does not show any significance in correlating with the dependent variable real GDP growth. This is quite surprising and maybe data quality is one concern. Also, even without statistical significance, it shows a negative correlation with real GDP growth, and this is counter-intuitive as people may think that the less a country is corrupt, the more economic growth it tends to have. However, this negative correlation becomes positive when the regression specifications are added in with the other three bureaucratic variables—voice and accountability, government effectiveness, and regulatory quality. The regressions also show higher R-square that the explanatory power of the regression increases and now the sign of corruption index becomes more intuitive, though this conclusion cannot be drawn since it is still insignificant. But at least it shows that the specification is more refined, and we should consider other aspects of the bureaucratic behavior and performance other than corruption when we explore a more comprehensive picture of a country's governance level and rent-seeking behavior. Secondly, government effectiveness shows a negative and significant correlation with real GDP growth in some specifications. While this is hard to understand, most of these significance goes away when, again, the regressions are added in with the corruption index. The robustness checks show that when these indices serve as

each other's control variables, they refine the specifications and increase explanatory power of the regressions. now that even government effectiveness shows a negative correlation with real GDP growth, it is no longer statistically significant. Thirdly, voice and accountability is mostly positively correlated with real GDP growth when corruption index is in the regression, and is statically significant. This confirms that corruption index should be interpreted together with other bureaucratic and governance indices. Though, one observation is that government effectiveness and voice and accountability never occur to be both statistically significant in one regression specification—they are significant when the other is not.

To sum up and interpret the results from the regressions on the Market-Preserving Channel, I have several key observations: (1) capital mobility is positively correlated with real GDP growth, but as a transmission mechanism of fiscal decentralization affecting economic growth through the market-preserving channel. It loses its significance when interaction term is added; (2) none of the coefficient of interest—the one for the interaction of fiscal decentralization and capital mobility—is found statistically significant in any of the OLS baseline regressions; (3) the interaction terms for the Efficiency Channel—the ones of allocative efficiency measures are found significant, again confirming the robustness of the Efficiency Channel argument; (4) the SEM results find similar patterns with the OLS regressions, showing only significance of the Efficiency Channel, while the GMM results do not show any significance in the correlations; (5) among the control variables, similar to the Efficiency Channel findings, real investment growth, foreign direct investment, population growth, party of chief executive length of time in office, government fractionalization index, and voice and accountability show significance in their

correlations with economic growth in the OLS and SEM regressions. Interestingly, the results show that there is a significant correlation between corporate income tax rate and economic growth, as long as the interaction term based on allocative efficiency is present in the regressions. This issue is new to this dissertation and may be explored in the future; (6) robustness checks of rent-seeking measures do not show much concrete results yet, but they show that different variables of rent-seeking and governance indicators should be considered together rather than using one variable, such as only using corruption index to serve as the only rent-seeking behavior. No concrete conclusions can be made about the correlation of rent-seeking and economic growth, but having more variables to describe rent-seeking behavior can refine the specification and increase explanatory power of the regression. Corruption is one aspect of rent-seeking, and other aspects on bureaucratic governance should also be looked at.

Other Potential Issues

There are some other issues that this dissertation does not engage in deep explorations either due to lack of data or the issue is too expansive and significant that deserves another paper or theoretical model to have a closer look. These issues are important to understand especially in the context of fiscal decentralization in a political economy perspective, and also especially when economic growth is the dependent variable being examined. So the dissertation will have a brief discussion on their implications either using current literature review and conceptual arguments or using what can be concluded from the empirical analyses from a methodological standpoint.

First and foremost is on the relationship between fiscal decentralization and political decentralization. Sometimes the latter will be referred to as whether the country has a federal system, is a federal country, or has a *de jure* federalism. As discussed in the beginning of this dissertation, decentralization is often a complex decision made out from both economic and political concerns. Though the dissertation intends to look at the fiscal decentralization in a political economy perspective, it does not mean that the dissertation focuses on the approach of how political decentralization affects the process. Rather, the dissertation is more interested in dissecting the government's bureaucratic behavior when the central government fiscally devolves its functions to subnational governments, and when subnational governments engage in investment and tax competitions. These therefore entail work in looking at the government's utility function and its rent-seeking behavior. It is nevertheless another research question of how political decentralization affects fiscal decentralization because it is a research area on political institutions rather than a public choice approach that bases on bureaucratic bounded rationality. Still, the dissertation thinks it is a question deserves some brief discussion as it is an important area for future research.

Political decentralization is when central government devolves its decision-making power to locally elected officials based on local political representation (Conyers 1983). This type of decentralization and often requires Constitutional or statutory reforms, pluralistic political parties, stronger legislatures, new local political units, and effective public interest groups (Bird and Vaillancourt, 2006; Bird and Ebel, 2007). Regarding its relationship with fiscal decentralization, there are some literature discussing the multidimensionality of decentralization. Schneider (2003) argues that fiscal decentralization is about how much central governments cede fiscal impact to non-central

government entities, while political decentralization is the degree to which central governments allow non-central government entities to undertake the political functions of governance, such as representation. To go further, Bird and Vaillancourt (1998) and Sato (2004) discuss deconcentration, delegation, and devolution as levels of decentralization, where deconcentration is the dispersion of responsibilities within a central government to regional branches; delegation is where local governments act as agents for the central government, executing certain functions on its behalf; and devolution is not only about implementation but also the authority is delegated into the hands of local governments. However, Sato (2004) particularly mentions that deconcentration, delegation, and devolution each represents fiscal, administrative, and political decentralization. He also argues that fiscal is the lowest level of decentralization (deconcentration), and then to administrative (delegation), and to political (devolution) as the highest level of decentralization. Most other literature takes the stance of Bird and Vaillancourt (1998), that fiscal decentralization itself already has scope and degree differences (Ter-Minassian, 1997; Bahl and Martinez-Vazquez, 2006; Bosch and Duran, 2008), and that fiscal decentralization reflects political outcomes and there are political, administrative, and economic accountabilities to be considered in the decision of fiscal decentralization (Qian and Weingast, 1997; Bird and Vaillancourt, 1998; Oates, 1999).

Bird and Vaillancourt (1998) also argues that it remains an interesting question of how political aspects are incorporated into the issue of fiscal decentralization, or how politically decentralized a country is can it achieve its political and economic accountabilities. Bosch and Duran (2008) understand this issue in the same line—they argue that in the history, countries were developed into unitary or federal systems of organizations, and for both

structures no matter how politically decentralized the country is, the key issue is to find an appropriate financing system for the central and regional governments. Political decentralization may trigger various forms and levels of fiscal decentralization, and thus finding a well-designed financing system to sustain the systems of the organization is important. Rodden and Rose-Ackerman (1997) think that politically induced local competitions may result in vicious cycles and growing inter-jurisdictional inequality, and they endorse the importance of reconsidering the political and economic impacts of fiscal decentralization. Inman and Rubinfeld (1997) also suggests that fiscal decentralization is not isolated from political structures in a country, since sometimes the impact of fiscal decentralization needs to be covered by political agreements or restructuring. In all, no matter what the aim is for a country that decides to be fiscal decentralized, whether it is for economic efficiency, political participation, or liberties and freedom, political aspects are an important aspect in consideration to evaluate the consequences of fiscal decentralization and whether it really delivers its goal.

Coming back to this dissertation, political decentralization to be incorporated into the discussion needs several prerequisites: firstly, it needs to fit somewhere in the theoretical model to link to the empirical analyses. Political institutions have not been a factor in the endogenous growth model as there has not been found a particular political setting has an instantaneous impact on potential output growth. Given this limitation, political decentralization is yet to be incorporated into the theoretical framework in this dissertation and it needs more theoretical guidance. Secondly, how to measure political decentralization remains a debatable question. One would argue that whether a country is a federal country can be a dummy variable to be put into the specifications. This may nevertheless be narrow,

since there are also countries such as some developing countries whose subnational governments hold discretionary power but have a history of a command-and-control political system and colonialism, which typically involves a systematic transferring of authority from the center to local governments (Conyers 1983; Smith 1985). They each has its own feature and conditions for success, and they may not be necessarily federal. So measuring political decentralization becomes an important task to be done. Thirdly, it remains a question whether political decentralization interact with fiscal decentralization in a way that affects economic growth, or it correlates with the interaction of fiscal decentralization and allocative efficiency and capital mobility to affect economic growth. In all, these are all interesting questions, and deserve a more detailed look into the literature, theoretical model, measurement, and empirical work.

After discussing the relationship between fiscal decentralization and political decentralization, there are some other issues that are pertinent to fiscal decentralization, especially when the context is on its impact on economic growth. Two prominent issues are subnational debt levels and external economic shocks such as the Great Recession during 2007-2009 in the empirical sample's timeframe of 1990-2016, which may pose their particular impact on economic growth. First of all, on subnational debt levels, most current macroeconomic literature has argued about general government or public debt and its impact on economic growth that can provide theoretical linkages, while those disaggregating to subnational levels are very much conceptually based and are discussed in country case studies. Both approaches contain rich empirical analyses. To name a few, following the 1990s there are quite some country cases where subnational debt stress or crises contribute to the macroeconomic deterioration such as in Argentina, Brazil, and India

(Dillinger and Webb, 1999; Remmer and Wibbels, 2000; Martinez-Vazquez and Rider, 2006; Canuto and Liu, 2010). With rapid urbanization and continuing demand of infrastructure investment, the scale and sustainability of subnational debt have been questioned, and local fiscal sustainability and fiscal space are vital to call for countries to engage in better structural reforms in tax systems and expenditure efficiency which will eventually be helpful to economic welfare (Giugale et al, 2000; Ahmad et al, 2006). On the other hand, there are also arguments that subnational governments are encouraged to have some level of fiscal autonomy in accumulating debt and make the budgetary process less rigid, which will help subnational governments more resilient and flexible when facing crises (Canuto and Liu, 2010).

If we look at a general government debt issue, an increase in the public debt in the short-term based on fiscal expansion is believed to have a positive impact to boost aggregate demand and help with economic growth (Delong et al; 2012; Panizza and Presbitero; 2014). However, in the long-run, macroeconomists are still debating whether debt holding and economic growth have a relationship or not, or simply there is a negative correlation between the two because countries unable to pay back debt will face serious default and exchange rate problems, which will also in turn affect the country's current account balance and aggregate demand. Most of the literature argues for the latter where consistent with the endogenous growth models (Diamond, 1965; Saint-Paul, 1992), and high level debt could exacerbate economic wellness if it also affects the productivity of public expenditure, increases sovereign risks, and increases interest rate crowd out private investments (Tanzi and Chalk, 2000; Codogno et al, 2003; Teles and Cesar Mussolini, 2014). On the empirical side, many papers have found that there is a negative non-linear

relationship between public debt and economic growth, especially in advanced and emerging markets (Reinhart and Rogoff, 2009; Cecchetti et al, 2011; Furceri and Zdzienicka, 2012). However, negative correlation does not necessarily mean negative causation, and it can be explained that some low-income countries already have high levels of debt (Panizza and Presbitero, 2014). Thus more papers have moved the discussion even further to explore whether government debt has a causal link with economic growth, not only correlation. Panizza and Presbitero (2014) produce one important and profound literature in this field and find that the answer is uncertain, since they find no significant causal relationship between the two in the medium-term, especially that high level of public debt does not necessarily hurt economic growth for advanced economies. Therefore, they argue that high debt levels do not guarantee a conclusion that governments need to do fiscal consolidations in order to boost economic growth. This does not mean that government can hold any level of debt without affecting economic growth, but there is no evidence shown in the analysis where how much level of debt is reasonable that will benefit economic growth the most.

In this dissertation, unfortunately due to data unavailability, the dissertation has yet to find high quality data on state or local level debt given the current country sample coverage, especially that when the previous setup on subnational revenue and expenditure data are given by one data point each year each country on the state and local level. Therefore instead, the dissertation uses the general government debt as a higher level data to serve as a proxy control variables and puts it into the regressions specifications that contain control variables B. As seen in the result tables, none of the results show a significant relationship between government debt and economic growth. It has coincided with some of the previous

discussions on there might not be a link between government debt and economic growth. Particularly in this dissertation with the context of fiscal decentralization, public debt needs to be systematically correlated with the variables of interest such as fiscal decentralization, and its interactions with allocative efficiency and capital mobility to make it a valid variable to affect economic growth in the specifications. This is yet to be found significant and therefore needs further research to be proved as an important factor with potentially different specifications or methods than this dissertation.

Lastly on external economic shocks such as the Great Recession, technically it has been addressed in my regressions by the fixed effect if it has similar impact on all sample countries. If external shocks do not hold similar impact on these countries, such as that some countries are affected more strongly and detrimentally than the others, then again it is a matter of determining whether these economic shocks are systematically correlated with my main variables of interest such as fiscal decentralization, and its interactions with allocative efficiency and capital mobility in the specifications. If they are not systematically correlated, then not adding these variables will not bias my results. Economic shocks are firstly indeed correlated with the dependent variable economic growth, and it has been a continuing topic for macroeconomist to dissect in order to provide better policy suggestions on how countries can better build resilience to face these challenges. The economic recession has brought scarring to the economy which has long-lasting damages to individuals and a country's economic situations. It has brought falling income, unemployment, significantly less private investment, depressed consumer spending and domestic demand, frozen credit markets, less capital spending from the government, which all will contribute to an economic downturn. The economy suffers and some of the effects

may be very hard to revert in a short period of time, recovery will also take time. On the other hand, based on limited literature on the relationship between fiscal decentralization and the Great Recession, some papers find that no systemic changes in decentralization have taken place after the shock, and there also seems to be not much change either in the architecture of local and regional authorities (Hansjörg and Kim, 2016; Lago et al, 2020). Other papers have conceptually argued that though these financial crises or external shocks will not bring much impact on the level of fiscal decentralization, but they reinforces the importance of managing the financing and liquidity risks in subnational governments, which in turn can affect subnational government's economic activities and allocative ability (Canuto and Liu, 2010; Beramendi and Rogers, 2019). Though, these arguments are hardly substantiated with enough literature and they also do not necessarily pose a correlation between the economic shock and fiscal decentralization. In all, whether the Great Recession correlates with fiscal decentralization or subnational allocative efficiency and capital mobility deserves a further look and needs more literature to support. Only a positive answer can validate it to be put into the regressions, and also there are other tasks to be made sure such as a variable that measures the different impact of the Great Recession on different countries, or else either it has been taken care of by the fixed effect or it will be a dummy variable assuming that surely some countries have not been affect by it. Before more literature can support these arguments on the systematic correlation with fiscal decentralization and the Great Recession, this dissertation has decided not to add this external shock variable into deeper discussion and its regression specifications.

Chapter 6: Policy Implications and Conclusions

Introduction

In this dissertation, I have accomplished several items worth noting. First, I have developed theoretical models specifically for the arguments that previous first and second generation fiscal decentralization literature has mentioned: fiscal decentralization may be beneficial for economic well-being by having better allocative efficiency to achieve Pareto improvement, as well as that capital mobility brought by fiscal decentralization may affect economic development through the investment and endowment effects, which may also be compounded by investment competition and tax competition. The theoretical models identify clearly these two transmission mechanisms that fiscal decentralization affects economic growth, and develop assumptions and hypothetical arguments towards deducing towards these two channels. Second, according to these theoretical arguments and borrowing from previous literature, I have developed measurements particularly for allocative efficiency. A specific level of government's allocative efficiency is measured as the total percentage difference of each category of spending and total spending, taken with square root and controlled for number of categories. This measurement is further being used in the empirical analyses by either summing all levels of government to a total allocative efficiency, or calculated as the distance from subnational to central government allocative efficiency. These two particular measurements of allocative efficiency are used in the regressions serving as the variables of interest in the Efficiency Channel, showing slightly different angles of allocative efficiency. Third, I have run empirical analyses to examine these two channels of how fiscal decentralization affects economic growth,

linking theoretical and empirical studies together in specifically gauging whether the theoretical arguments of the two channels stand in the empirical examinations, which is not often seen in literature exploring indirect impact of fiscal decentralization on economic growth. And last but not the least, the empirical analyses use OLS regressions as baseline and use Difference-GMM, System-GMM, and SEM mediation analysis as robustness checks to explore the two channels, and the results show that most specifications show validity in the Efficiency Channel, while nothing stands yet for the Market-Preserving Channel. These are interesting findings and the topic deserves further research in the future.

In Chapter Two of this dissertation, I reviewed the fiscal decentralization literature, from first to second generation, as well as the three channels that fiscal decentralization can possibly affects economic growth—the efficiency, the laboratory, and the market-preserving channel. I then also, for the purpose of better understand the market-preserving channel, review the literature on rent-seeking, which serves as an important component of this channel as well as the foundation for the theoretical models I develop later.

In Chapter Three of this dissertation, I develop four theoretical models: Baseline Zero as the comparison group with no fiscal decentralization and no capital mobility, and then one model for the Efficiency Channel with fiscal decentralization but no capital mobility, as well as two models for the Market-Preserving Channel that entail investment competition and tax competition with fiscal decentralization and capital mobility. The theoretical models aim to demonstrate how fiscal decentralization affects economic growth through subnational public goods provision efficiency, as well as based on different endowment effects how capital mobility brings investments to different extents to regions with different endowments, and further how tax competition complicates the situation.

In Chapter Four of this dissertation, I introduce measurements to some main variables, including fiscal decentralization and allocative efficiency, as well as discuss what workable data proxies can be used for variables such as capital mobility and rent-seeking. Then I turn the task to develop empirical testable hypotheses for these two channels, and set up the baseline OLS regression specifications for them. I also talk about the potential econometric issues these regressions may face, including autocorrelation, heteroscedasticity, and endogeneity issues. I then propose using GMM (D-GMM and S-GMM) and SEM mediation analysis to work as robustness checks for the baseline regressions, as well as in details discuss why and how these two methods shall be used.

In Chapter Five of this dissertation, I talk about the empirical results from these regressions. I go through the OLS baseline regressions without and with two sets of control variables, followed by D-GMM and S-GMM results, and SEM results with the two sets of control variables. This is done for firstly the Efficiency Channel and then the Market-Preserving Channel. The results show that many specifications confirm the validity of the Efficiency Channel, while nothing yet on the Market-Preserving Channel. There are also some granular findings such as on the increasing but marginally declining effect of fiscal decentralization on economic growth as allocative efficiency increases, as well as that some control variables lose significance in GMM methods that put into question of their exogeneity in the beginning, or that the corporate income tax rate becomes significantly correlated with economic growth when total allocative efficiency is put into the regression, which is still in question of why and deserves further research.

In the following text, I will discuss briefly some policy implications generated from this dissertation and light for future research.

Policy Implications

In the literature of fiscal decentralization and economic growth, often people argue that one of the main objectives of fiscal decentralization is to foster and enhance economic growth, and this can be through that fiscal decentralization is an effective tool for increasing allocative efficiency, or as Martinez-Vazquez and Mcnab (2003) put it, to react to the failures over large centralized bureaucracies and to respond as a way to break the central government's grip on the economy by shifting fiscal authorities to lower levels of government, which in reality often comes to the market-preserving argument including "hindering the Leviathan". As Taillant (1994) also says, the issue is usually "how best to" decentralize in a situation of an ever-complicating economic and political context. This dissertation aims to answer, at least to try to answer, the question of whether through efficiency and through the public choice point of view fiscal decentralization does improve economic growth, and if possible, the extent to which the impact exists. The issue of "how best to" is a tempting normative question, and the dissertation's theoretical models intend to contribute slightly on this, while on the other hand, the dissertation's empirical work mostly is focusing on the positive side of the story.

The first policy implication from this dissertation revolves around the findings on the Efficiency Channel. Under the assumption that fiscal decentralization brings more efficient public goods provision to meet heterogenous needs from the local people, subnational government will try to optimize their spending strategy, including the mapping of fiscal resources onto different categories, such as on education, health, culture, etc. This acts vertically comparing subnational and central governments. While horizontally, if we look

at things over time, both central and subnational governments will adjust their fiscal decisions every year, based on the performance before as well as according to each other's responsibilities and this is reflected in their behavior in changing spending strategies on different categories as well. Both vertical and horizontal behavior is captured in the two measurements for allocative efficiency in this dissertation—the total subnational and central government allocative efficiency and the distance between subnational and central government allocative efficiency, while they provide some nuanced differences.

In the results, we see that through higher allocative efficiency, fiscal decentralization positively affects economic growth. If the total change of classified spending weighted by total spending over the year is higher, which could mean that governments serve to strive for providing better-matched public goods to the people by adjusting their spending to better pursue an improving overall wellness, the effect of a more fiscally decentralization system based on this channel will have a greater positive impact on economic growth. On the other hand, if we look at the distance of subnational to central government allocative efficiency, the results could mean that if the change of classified spending by the subnational government is larger than the change of classified spending by the central government, subnational government takes a more aggressive stance in changing their fiscal policy decisions on the basis of knowing the local needs better. And following this logic, the impact of fiscal decentralization through this channel again affects economic growth in a greater positive amount. Again, as stated already in the Theoretical Chapter, the assumption is that government is neither completely benevolent or completely malevolent—it is an institution that serves probably floating somewhere in between, depending on its rationale in weighing for serving the society and seeking rents. The

empirical results reflect quite some robust significance over the total allocative efficiency route, while somewhat robust significance over the allocative efficiency distance route. These show that changes in classified spending over the years as well as a bigger difference between subnational and central government changes in classified spending indeed serve as an important channel for fiscal decentralization to affect economic growth. This is an interesting observation, and I could be very bold to predict that subnational spending decisions can be made to cater better to local needs when they have similarly sufficient capacity relative to the central government. Fiscal decentralization brings subnational governments opportunities to make spending decisions in a better "fit", and they can improve overall economic well-being by sometimes making more aggressive moves in their resource allocations than the central government. Nevertheless, one caveat is that this effect from increasing changes in the spending decisions is not forever good—the effect is marginally declining as allocative efficiency increases. At a certain point fiscal decentralization's impact on growth will turn flat as allocative efficiency increases. Another caveat is that this is still a positive finding, rather than a normative suggestion. It is still a question whether we can suggest subnational governments straight-ahead make spending decisions far different from the central government, and given that subnational governments are multi-tier and heterogenous, it remains a problem of how to coordinate between these governments to generate an "optimal" allocative efficiency even if we were to suggest for such a rule.

Turning to the Market-Preserving Channel, it seems that nothing solid can be concluded from the results so far. Though, I would derive part of the results that we cannot unravel the counterbalancing effect of investment competition and tax competition in the

regressions to data limitations—we yet to have found data on subnational level details to support explorations over capital flows over regions, based on different endowment effects of different regions, as well as their investment attraction and tax rate adjustments. The interaction term of fiscal decentralization and capital mobility seems to be insensitive to economic growth in any of the specifications, and this could be that fiscal decentralization does not through the channel of capital account openness affects economic growth, or that the Chinn-Ito index is not the best variable to capture capital mobility is the theoretical argument of Market-Preserving Channel stands. The robustness checks of rent-seeking measures also show that corruption index may be too narrow to describe the comprehensiveness of rent-seeking behavior. Though no concrete conclusions can be made about the correlation between rent-seeking and economic growth yet, it is nevertheless important to consider a more well-rounded understanding towards rent-seeking: countries can be non-corrupt, but they have other rent-seeking activities and governance issues that will affect bureaucratic behavior and economic welfare. In all, the results are at best inconclusive. In the Market-Preserving Channel, there are too many factors at play, and of these effects brought by fiscal decentralization some can link decentralization to a higher economic growth rate while some may work against it. And given the complication in the Market-Preserving Channel where institutional framework, bureaucratic behavior, and regional endowment are often hard to measure and predict, this channel deserves more careful further research.

The Need for Future Research

While the process and results have accomplished some objectives that are set forth in the beginning of the dissertation, I believe that this course of research has also highlighted some areas for future research on the relationship between fiscal decentralization and economic growth. First of all, due to lack of literature, data, and theoretical linkage, this dissertation does not delve into the exploration of the laboratory channel. However, as more progress is made in the discussion of yardstick competition as well as that cross-regional mimicking behavior raises more attention towards studying the pattern out of these experiments by subnational governments, this channel is worth more exploration in the future. Second, work on the Market-Preserving Channel could be improved, for instance, on the tradeoff between investment competition and tax competition effects. This section has further implications on the empirical work: given data limitation, this tradeoff effect cannot be examined fully in the empirical regressions because I do not have subnational government level data—what I have from the IMF *GFS* database is that there is one data point for each country's subnational government for each year. In the future, maybe more likely in a single-country analysis where subnational government data are more granular, investment competition and tax competition effects can be better looked at since the data are on each region, and it becomes possible to identify investment and tax rate changes due to capital mobility as well as comparing them across regions. If this can be done, the theoretical model can be more fully applied in the empirical analyses. Third, mentioning the data limitations, again, if subnational level data can be obtained, the measurement on allocative efficiency can also be improved. Currently I can only treat subnational governments in a country as a whole to make calculations, and if data available, more details can be discerned from subnational level data and the allocative efficiency

measurement can be even more accurate in including the cross-regional differences. Fourth, the endogeneity issue of fiscal decentralization and economic growth is still not yet fully solved. In the GMM results, we can see that when some control variables lose their statistical significance compared to the baseline OLS results, more work is entailed in the future on using some other models to gauge this issue to see if the results are still robust. Finally, this study can also be taken further to apply to different samples, to see if the results are still robust in certain context. When the sample is smaller or limited to a more homogeneous groups of countries, maybe we can see some more robustness results.

I would like to conclude by quoting Johnathan A. Rodden who so accurately summarizes the issue that we are facing today in current literature as well as the interest of what this dissertation pursues, in his chapter "Federalism" in the Oxford Handbook of Political Economy (2006):

"[T]he political science literature often comes from a normative starting point that federalism is beneficial or—in large or divided societies—simply necessary, and seeks to establish conditions under which it is stable. …The new wave of positive literature that reintroduces politics and institutions still has strong normative content. It has moved beyond simple questions about whether federalism is good or bad, but much of the literature is still motivated by a normative question about the conditions under which federalism and other forms of multitiered government work well or fail. This is certainly appropriate, given the importance of questions related to federal design for peace, political stability, and economic well-being around the world. The new literature shows that federalism can have a wide variety of effects, depending upon its design and the institutions and social structures with which it is combined. Above all, the new literature is beginning

to establish trade-offs. …But better answers are needed to a more basic, purely positive set of questions—how is it that federations come to be structured the way they are? Can institutions be tweaked and outcomes changed, or are they epiphenomenal? …Hopefully the next generation of research on federalism will not shy away from them" (p. 368).

References

Adam, A., Delis, M. D., & Kammas, P. (2008). Fiscal decentralization and public sector efficiency: evidence from OECD countries.

Ahmad, E., Albino-War, M., & Singh, R. (2006). Subnational public financial management: Institutions and macroeconomic considerations. *Handbook of fiscal federalism*, 405-27.

Akai, N., & Sakata, M. (2002). Fiscal decentralization contributes to economic growth: evidence from state-level cross-section data for the United States. *Journal of urban economics*, *52*(1), 93-108.

Akai, N., Nishimura, Y., & Sakata, M. (2004). Fiscal decentralization, economic growth and economic volatility–theory and evidence from state-level cross-section data for the United States. *The Centre for International Trade Studies Discussion Paper Series*, *3*.

----------. (2007). Complementarity, fiscal decentralization and economic growth. *Economics of Governance*, *8*(4), 339-362.

Alfano, M. R., Baraldi, A. L., & Cantabene, C. (2014). *The Effect of the Decentralization Degree on Corruption: A New Interpretation* (No. 10/2014). EERI Research Paper Series.

Alonso-Borrego, C., & Arellano, M. (1999). Symmetrically normalized instrumental-variable estimation using panel data. *Journal of Business & Economic Statistics*, *17*(1), 36-49.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, *68*(1), 29-51.

Arikan, G. G. (2004). Fiscal decentralization: A remedy for corruption?. *International Tax and Public Finance*, *11*(2), 175-195.

Arze del Granado, F. J., Martinez-Vazquez, J., & Simatupang, R. R. (2008). Local government fiscal competition in developing countries: The case of Indonesia.

Asatryan, Z., & Feld, L. P. (2015). Revisiting the link between growth and federalism: A Bayesian model averaging approach. *Journal of Comparative Economics*, *43*(3), 772-781.

Bahl, R. W., & Linn, J. F. (1992). *Urban public finance in developing countries* (No. 10597, p. 1). The World Bank.

Bahl, R., & Martinez-Vazquez, J. (2006). *Sequencing fiscal decentralization*. The World Bank.

Baicker, K., Clemens, J., & Singhal, M. (2012). The rise of the states: US fiscal decentralization in the postwar period. *Journal of public Economics*, *96*(11-12), 1079-1091.

Baskaran, T., Feld, L. P., & Schnellenbach, J. (2014). Fiscal federalism, decentralization and economic growth: Survey and meta-analysis.

Bardhan, P. (1997). Corruption and development: a review of issues. *Journal of economic literature*, *35*(3), 1320-1346.

Bardhan, P., & Mookherjee, D. (1999). *Relative capture of local and central governments: An essay in the political economy of decentralization* (No. 1554-2016-132556).

----------. (2000). Capture and governance at local and national levels. *American economic review*, *90*(2), 135-139.

----------. (2005). Decentralizing antipoverty program delivery in developing countries. *Journal of public economics*, *89*(4), 675-704.

Barro, R. J. (1990). Government spending in a simple model of endogeneous growth. *Journal of political economy*, *98*(5, Part 2), S103-S125.

Baumol, W. J. (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of business venturing*, *11*(1), 3-22.

Bayoumi, T., & Masson, P. R. (1995). Fiscal flows in the United States and Canada: Lessons for monetary union in Europe. *European Economic Review*, *39*(2), 253-274.

Becker, D., & Rauscher, M. (2013). Fiscal competition and growth when capital is imperfectly mobile. *The Scandinavian Journal of Economics*, *115*(1), 211-233.

Beramendi, P., & Rogers, M. (2019). Fiscal decentralization and the distributive incidence of the Great Recession. *Regional Studies*, 1-16.

Besley, T., & Case, A. (1995). Does electoral accountability affect economic policy choices? Evidence from gubernatorial term limits. *The Quarterly Journal of Economics*, *110*(3), 769-798.

Besley, T., & Smart, M. (2007). Fiscal restraints and voter welfare. *Journal of public Economics*, *91*(3-4), 755-773.

Besley, T., Persson, T., & Sturm, D. M. (2010). Political competition, policy and growth: theory and evidence from the US. *The Review of Economic Studies*, *77*(4), 1329-1352.

Bird, Richard M., and Ebel, Robert D., (2007). *Fiscal Fragmentation in Decentralized Countries: Subsidiarity, Solidarity and Asymmetry*. Edward Elgar Publishing, Cheltenham.

Bird, R. M., & Smart, M. (2002). Intergovernmental fiscal transfers: International lessons for developing countries. *World Development*, *30*(6), 899-912.

Bird, Richard M., and Vaillancourt, Francois, (2006). *Perspectives on Fiscal Federalism*. World Bank Publications, Washington, DC.

Bivand, R., & Szymanski, S. (1997). Spatial dependence through local yardstick competition:: theory and testing. *Economics Letters*, *55*(2), 257-265.

Blanchard, O., & Shleifer, A. (2001). Federalism with and without political centralization: China versus Russia. *IMF staff papers*, *48*(1), 171-179.

Bliss, C., & Tella, R. D. (1997). Does competition kill corruption?. *Journal of Political Economy*, *105*(5), 1001-1023.

Blöchliger, H. (2015). The challenge of measuring fiscal decentralization. In *Handbook of Multilevel Finance*. Edward Elgar Publishing.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, *87*(1), 115-143.

Bodman, P. (2011). Fiscal decentralization and economic growth in the OECD. *Applied Economics*, *43*(23), 3021-3035.

Bordignon, M., Cerniglia, F., & Revelli, F. (2004). Yardstick competition in intergovernmental relationships: theory and empirical predictions. *Economics letters*, *83*(3), 325-333.

Bosch, N., & Durán, J. M. (Eds.). (2008). *Fiscal federalism and political decentralization: Lessons from Spain, Germany and Canada*. Edward Elgar Publishing.

Braun, D. (2018). *Fiscal policies in federal states*. Routledge.

Brennan, G., & Buchanan, J. M. (1980). *The power to tax: Analytic foundations of a fiscal constitution*. Cambridge University Press.

Brou, D., & Ruta, M. (2007). Rent Seeking, Market Structure and Growth.

Brueckner, J. K. (1999). Fiscal federalism and capital accumulation. *Journal of Public Economic Theory*, *1*(2), 205-224.

----------. (2004). Fiscal decentralization with distortionary taxation: Tiebout vs. tax competition. *International Tax and Public Finance, 11*(2), 133-153.

Brumm, H. J. (1999). Rent seeking and economic growth: Evidence from the States. *Cato J.*, *19*, 7.

Buchanan, J. M., & Tullock, G. (1965). Public and private interaction under reciprocal externality. *The public economy of urban communities*, 52-73.

Cai, H., & Treisman, D. (2004). State corroding federalism. *Journal of Public Economics*, *88*(3-4), 819-843.

----------. (2005). Does competition for capital discipline governments? Decentralization, globalization, and public policy. *American Economic Review*, *95*(3), 817-830.

Caldeira, E., Foucault, M., & Rota-Graziosi, G. (2015). Decentralization in Africa and the nature of local governments' competition: Evidence from Benin. *International Tax and Public Finance, 22*(6), 1048-1076.

Canuto, O., & Liu, L. (2010). Subnational debt finance: Make it sustainable. *AFTER*, *219*.

----------. (2010). Subnational debt finance and the global financial crisis.

Capuno, J. J., Quimbo, S. A., Kraft, A. D., Tan Jr, C. A. R., & Fabella, V. M. B. (2015). Does yardstick competition influence local government fiscal behaviour in the Philippines?. *IS DECENTRALIZATION GOOD FOR DEVELOPMENT? Perspectives From Academics and Policymakers*, 40.

Carrión, G. C., Nitzl, C., & Roldán, J. L. (2017). Mediation analyses in partial least squares structural equation modeling: Guidelines and empirical examples. In *Partial least squares path modeling* (pp. 173-195). Springer, Cham.

Carson, R. L. (2016). *Rent Seeking and Inclusiveness* (No. 09-05). Carleton University, Department of Economics.

Cecchetti, S. G., Mohanty, M. S., & Zampolli, F. (2011). The real effects of debt.

Champernowne, D. (1961). A dynamic growth model involving a production function. In *The Theory of Capital* (pp. 223-244). Palgrave Macmillan, London.

Cheikbossian, G. (2008). Rent-seeking, spillovers and the benefits of decentralization. *Journal of Urban Economics*, *63*(1), 217-228.

Chinn, M. D., & Ito, H. (2006). What matters for financial development? Capital controls, institutions, and interactions. *Journal of development economics*, *81*(1), 163-192.

----------. (2008). A new measure of financial openness. *Journal of comparative policy analysis*, *10*(3), 309-322.

Chowdhury, F. L. (2006). *Corrupt bureaucracy and privatization of tax enforcement in Bangladesh*. Pathak Shamabesh.

Chu, A. C., & Yang, C. C. (2012). Fiscal centralization versus decentralization: Growth and welfare effects of spillovers, Leviathan taxation, and capital mobility. *Journal of Urban Economics*, *71*(2), 177-188.

Codogno, L., Favero, C., & Missale, A. (2003). Yield spreads on EMU government bonds. *Economic Policy*, *18*(37), 503-532.

Cole, I. M., & Chawdry, M. A. (2002). Rent seeking and economic growth: Evidence from a panel of US States. *Cato J.*, *22*, 211.

Conyers, Diana, 1983. "Decentralization: The Latest Fashion in Development Administration." *Public Administration and Development*, 3 (2), 91 -110.

Cremer, J., Estache A., & Seabright P. (1995). The Decentralization of Public Services: Lessons from the Theory of the Firm. *Decentralizing Infrastructure: Advantages and Limitations*. Washington, D.C.: World Bank.

Dauderstädt, M. (2006). *Dead ends of transition: Rentier economies and protectorates*. Campus Verlag.

Davoodi, H., & Zou, H. F. (1998). Fiscal decentralization and economic growth: A cross-country study. *Journal of Urban economics*, *43*(2), 244-257.

Del Rosal, I. (2011). The empirical measurement of rent-seeking costs. *Journal of Economic Surveys*, *25*(2), 298-325.

DeLong, J. B., Summers, L. H., Feldstein, M., & Ramey, V. A. (2012). Fiscal policy in a depressed economy [with comments and discussion]. *Brookings Papers on Economic Activity*, 233-297.

Dillinger, W. R., & Webb, S. B. (1999). *Fiscal management in federal democracies: Argentina and Brazil* (Vol. 2121). World Bank Publications.

Diamond, P. A. (1965). National debt in a neoclassical growth model. *The American Economic Review*, *55*(5), 1126-1150.

Dincer, O. (2010). Fiscal decentralization and trust. *Public Finance Review*, *38*(2), 178-192.

Downs, A. (1957). *An economic theory of democracy*. Harper.

Downs, A. (1967). *Inside bureaucracy*. Waveland Pr Inc.

Drummond, P. F. N., & Mansoor, A. M. (2002). *Macroeconomic management and the devolution of fiscal powers* (Vol. 2). International Monetary Fund.

Durlauf, S. N., Johnson, P. A., & Temple, J. R. (2005). Growth econometrics. *Handbook of economic growth*, *1*, 555-677.

Ebel, R. D., & Yilmaz, S. (2002). *On the measurement and impact of fiscal decentralization*. The World Bank.

Edwards, J., & Keen, M. (1996). Tax competition and Leviathan. *European Economic Review*, *40*(1), 113-134.

Eggert, W., & Sørensen, P. B. (2008). The effects of tax competition when politicians create rents to buy political support. *Journal of Public Economics*, *92*(5-6), 1142-1163.

Enikolopov, R., & Zhuravskaya, E. (2007). Decentralization and political institutions. *Journal of public economics*, *91*(11-12), 2261-2290.

Feng, X., Ljungwall, C., Guo, S., & Wu, A. M. (2013). Fiscal federalism: A refined theory and its application in the Chinese context. *Journal of Contemporary China*, *22*(82), 573-593.

Furceri, D., & Zdzienicka, A. (2012). How costly are debt crises?. *Journal of International Money and Finance*, *31*(4), 726-742.

Gadenne, L., & Singhal, M. (2014). Decentralization in developing economies. *Annu. Rev. Econ.*, *6*(1), 581-604.

Gaitan, B., & Roe, T. (2001). Do Rent Seeking and Corruption Impede Economic Growth? Evidence from an Application to Bulgaria.

Garzarelli, G. (2004). Old and new theories of fiscal federalism, organizational design problems, and Tiebout. *Journal of Public Finance and Public Choice*, *22*(1-2), 91-104.

Gemmell, N., Kneller, R., & Sanz, I. (2013). Fiscal decentralization and economic growth: spending versus revenue decentralization. *Economic Inquiry*, *51*(4), 1915-1931.

Giugale, M., Trillo, F. H., & Oliveira, J. C. (2000). Subnational borrowing and debt management. *Achievements and Challenges of Fiscal Decentralization: Lessons from Mexico*, 237-270.

Gray, V., & Lowery, D. (1996). A niche theory of interest representation. *The Journal of Politics*, *58*(1), 91-111.

Gunzler, D., Chen, T., Wu, P., & Zhang, H. (2013). Introduction to mediation analysis with structural equation modeling. *Shanghai archives of psychiatry*, *25*(6), 390.

Habibi, N., Huang, C., Miranda, D., Murillo, V., Ranis, G., Sarkar, M., & Stewart, F. (2003). Decentralization and human development in Argentina. *Journal of Human Development*, *4*(1), 73-101.

Hansjörg, B., & Junghun, K. (Eds.). (2016). *Fiscal federalism 2016 making decentralisation work: Making decentralisation work*. OECD Publishing.

Harvey S.. Rosen, Gayer, T., & Civan, A. (2014). *Public finance*. McGraw-Hill Education.

Hatfield, J. W. (2011). The Tax Sections Ethics Debate-Historical Reflections. *Tax Notes, September*, *5*.

----------. (2015). Federalism, taxation, and economic growth. *Journal of Urban Economics*, *87*, 114-125.

Hatfield, J. W., & Kosec, K. (2013). Federal competition and economic growth. *Journal of Public Economics, 97*, 144-159.

Hayek, F. A. (1945). The use of knowledge in society. *The American economic review*, *35*(4), 519-530.

Heyndels, B., & Vuchelen, J. (1998). Tax mimicking among Belgian municipalities. *National Tax Journal*, 89-101.

Iimi, A. (2005). Decentralization and economic growth revisited: an empirical note. *Journal of Urban economics*, *57*(3), 449-461.

Inman, R. P. (1988). Federal Assistance and Local Services in the United States: The Evolution of a New Federalist Fiscal Order. Fiscal Federalism: Quantitative Studies. Edited by H. Rosen.

----------. (1994). *The political economy of federalism*. Robert D. Burch Center for Tax Policy and Public Finance.

Inman, R. P., & Rubinfeld, D. L. (1997). Rethinking federalism. *Journal of economic perspectives*, *11*(4), 43-64.

Iqbal, N., & Daly, V. (2014). Rent seeking opportunities and economic growth in transitional economies. *Economic Modelling*, *37*, 16-22.

Jin, J., & Zou, H. F. (2003). *Soft budget constraints and local government in China* (pp. 289-324). Cambridge, MA.

Jin, H., Qian, Y., & Weingast, B. R. (2005). Regional decentralization and fiscal incentives: Federalism, Chinese style. *Journal of public economics*, *89*(9-10), 1719-1742.

Jha, P. C. (2015). Theory of fiscal federalism: an analysis. *Journal of Social and Economic Development*, *17*(2), 241-259.

Judson, R. (1996). *Do Low Human Capital Coefficients Make Sense?: A Puzzle and Some Answers*. Division of Research and Statistics, Division of Monetary Affairs, Federal Reserve Board.

Junghun, K., Jorgen, L., & Hansjörg, B. (Eds.). (2013). *OECD Fiscal Federalism Studies Measuring Fiscal Decentralisation Concepts and Policies: Concepts and Policies*. OECD Publishing.

Katz, E., & Rosenberg, J. (1989). Rent-seeking for budgetary allocation: Preliminary results for 20 countries. *Public Choice*, *60*(2), 133-144.

Kee, J. E. (2003). Fiscal decentralization: theory as reform. *VIII International*.

Keele, L., & Kelly, N. J. (2006). Dynamic models for dynamic theories: The ins and outs of lagged dependent variables. *Political analysis*, 186-205.

Keen, M. (1998). Vertical tax externalities in the theory of fiscal federalism. *Staff Papers*, *45*(3), 454-485.

Kim, J., J. Lotz and H. Blöchliger (eds.) (2013), *Measuring Fiscal Decentralisation: Concepts and Policies*, OECD Fiscal Federalism Studies, OECD Publishing, Paris.

Koethenbuerger, M., & Lockwood, B. (2010). Does tax competition really promote growth?. *Journal of Economic Dynamics and Control*, *34*(2), 191-206.

Kotsogiannis, C., & Schwager, R. (2006). On the incentives to experiment in federations. *Journal of Urban Economics*, *60*(3), 484-497.

Krug, B., Zhu, Z., & Hendrischke, H. (2004). China's emerging tax regime: Devolution, fiscal federalism, or tax farming?. *ERIM Report Series Reference No. ERS-2004-113-ORG*.

Krugman, P. (1991). Increasing returns and economic geography. *Journal of political economy*, *99*(3), 483-499.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1999). The quality of government. *The Journal of Law, Economics, and Organization*, *15*(1), 222-279.

Lago, I., Lago-Peñas, S., & Martinez-Vazquez, J. (2020). Decentralization after the Great Recession: fine-tuning or paradigm change?.

Laband, D. N., & Sophocleus, J. P. (1988). The social cost of rent-seeking: First estimates. *Public Choice*, *58*(3), 269-275.

Levaggi, R. (1990). An incremental flypaper model for English local government expenditure decisions. *Economia Internazionale/International Economics*, *43*(4), 328-341.

Levine, R., & Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *The American economic review*, 942-963.

Ligthart, J. E., & Van Oudheusden, P. (2017). The fiscal decentralisation and economic growth nexus revisited. *Fiscal Studies*, *38*(1), 141-171.

Litvack, J., Ahmad, J., & Bird, R. (1998). Rethinking decentralization at the World Bank. *Washington, DC: World Bank*.

Liu, Y., Martinez-Vazquez, J., & Wu, A. M. (2017). Fiscal decentralization, equalization, and intra-provincial inequality in China. *International Tax and Public Finance*, *24*(2), 248-281.

Madiès, T., & Dethier, J. J. (2010). *Fiscal competition in developing countries: a survey of the theoretical and empirical literature*. The World Bank.

Magee, S. P., Brock, W. A., & Young, L. (1989). *Black hole tariffs and endogenous policy theory: Political economy in general equilibrium*. Cambridge University Press.

Martinez-Vazquez, J., & McNab, R. M. (2003). Fiscal decentralization and economic growth. *World development*, *31*(9), 1597-1616.

Martinez-Vazquez, J., & Rider, M. (2006). Fiscal decentralization and economic growth: a comparative study of China and India. *Indian Journal of Economics and Business*, 29-46.

Martinez-Vazquez, J., & Timofeev, A. (2010). Decentralization measures revisited. *Public Finance and Management*, *10*(1), 13-47.

Martinez-Vazquez, J., Lago-Peñas, S., & Sacchi, A. (2017). The impact of fiscal decentralization: A survey. *Journal of Economic Surveys*, *31*(4), 1095-1129.

Matsui, K. (2005). Post-decentralization regional economies and actors: Putting the capacity of local governments to the test. *The Developing Economies*, *43*(1), 171-189.

Mauro, P. (1995). Corruption and growth. *The quarterly journal of economics*, *110*(3), 681-712.

McKinnon, R. I. (1997). Market-preserving fiscal federalism in the American monetary union. *Macroeconomic dimensions of public finance: Essays in honour of Vito Tanzi*, *5*, 73.

Mixon, F. G., & McKenzie, R. W. (1996). Learning to rent–seek: collective action and in–kind benefits in the public sector. *Applied Economics Letters*, *3*(12), 755-757.

Mixon, F. G., Laband, D. N., & Ekelund, R. B. (1994). Rent seeking and hidden in-kind resource distortion: Some empirical evidence. *Public Choice*, *78*(2), 171-185.

Mohtadi, H., & Roe, T. (1998). Growth, lobbying and public goods. *European Journal of Political Economy*, *14*(3), 453-473.

Montinola, G., Qian, Y., & Weingast, B. R. (1995). Federalism, Chinese style: the political basis for economic success in China. *World politics*, 50-81.

Morgan, J., & Vardy, F. J. (2006). *Corruption, Competition, and Contracts: A Model of Vote Buying* (No. 2006-2011). International Monetary Fund.

Murphy, K. M., Shleifer, A., & Vishny, R. W. (1993). Why is rent-seeking so costly to growth?. *The American Economic Review*, *83*(2), 409-414.

Musgrave, R. A. (1939). The voluntary exchange theory of public economy. *The quarterly journal of economics*, *53*(2), 213-237.

----------. (1959). Theory of public finance; a study in public economy.

Niskanen, W. A. (1971). *Bureaucracy and representative government*. Transaction Publishers.

North, D. C. (1981). *Structure and change in economic history*. Norton.

----------. (1993). Institutions and credible commitment. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 11-23.

Oates, Wallace E. (1972). *Fiscal Federalism*. New York: Harcourt Brace Jovanovich.

----------. (1994). The Potential and Perils of Fiscal Decentralization. *University of Maryland*.

----------. (1997). On the welfare gains from fiscal decentralization. *Journal of Public Finance and Public Choice*, *15*(2-3), 83-92.

----------. (1999). An Essay on Fiscal Federalism. *Journal of Economic Literature*, *37*(3), 1120–1149.

----------. (2005). Toward a second-generation theory of fiscal federalism. *International tax and public finance*, *12*(4), 349-373.

----------. (2006). On the theory and practice of fiscal decentralization.

Olson, M. (1969). The principle of" fiscal equivalence": the division of responsibilities among different levels of government. *The American economic review*, *59*(2), 479-487.

Panizza, U., & Presbitero, A. F. (2014). Public debt and economic growth: is there a causal effect?. *Journal of Macroeconomics*, *41*, 21-41.

Prud'Homme, R. (1995). The dangers of decentralization. *The world bank research observer*, *10*(2), 201-220.

Qian, Y., & Weingast, B. R. (1997). Federalism as a commitment to reserving market incentives. *Journal of Economic perspectives*, *11*(4), 83-92.

Rauscher, M. (2005). Economic growth and tax-competing leviathans. *International Tax and Public Finance, 12*(4), 457-474.

----------. (2007). Tax competition, capital mobility and innovation in the public sector. *German Economic Review*, *8*(1), 28-40.

Reinhart, C. M., & Rogoff, K. S. (2009). *This time is different: Eight centuries of financial folly*. princeton university press.

Remmer, K. L., & Wibbels, E. (2000). The subnational politics of economic adjustment: Provincial politics and fiscal performance in Argentina. *Comparative political studies, 33*(4), 419-451.

Rodden, J. (2002). The dilemma of fiscal federalism: Grants and fiscal performance around the world. *American Journal of Political Science*, 670-687.

----------. (2003). Reviving Leviathan: Fiscal Federalism and the Growth of Government. *International Organization*, *57*(4), 695–729.

----------. (2005). And the last shall be first: federalism and soft budget constraints in Germany. *Unpublished paper. Department of Political Science, Massachusetts Institute of Technology*.

----------. (2006). Federalism. In *The Oxford Handbook of Political Economy*.

Rodden, J., & Rose-Ackerman, S. (1997). Does federalism preserve markets? *Virginia La w Review, ,* 1521-1572.

Rodríguez-Pose, A., & Krøijer, A. (2009). Fiscal decentralization and economic growth in Central and Eastern Europe. *Growth and change*, *40*(3), 387-417.

Romer, P. (1994). New Goods, Old Theory, and the Welfare Costs of Trade Restrictions. *Journal of Development Economics*. 43, 5-38.

Rose-Ackerman, S. (1980). Risk taking and reelection: Does federalism promote innovation?. *The Journal of Legal Studies*, *9*(3), 593-616.

Saint-Paul, G. (1992). Fiscal policy in an endogenous growth model. *The Quarterly Journal of Economics*, *107*(4), 1243-1259.

Salmon, P. (1987). Decentralisation as an incentive scheme. *Oxford review of economic policy*, *3*(2), 24-43.

----------. (2013). Decentralization and growth: what if the cross-jurisdiction approach had met a dead end?. *Constitutional Political Economy*, *24*(2), 87-107.

Samuelson, P. A. (1954). The pure theory of public expenditure. *The review of economics and statistics*, 387-389.

Sato, M. (2003). Tax competition, rent-seeking and fiscal decentralization. *European Economic Review*, *47*(1), 19-40.

----------. (2004). Fiscal decentralization in Asia: Revisited. *Hitotsubashi University, Ja pan,*

Schenk, R. (2006). Rent Seeking. *CyberEconomics. Archived from the original on January*, *3*.

Schneider, A. (2003). Decentralization: Conceptualization and measurement. *Studies in C omparative International Development*, *38*(3), 32.

Schnellenbach, J., Baskaran, T., & Feld, L. P. (2009). *Creative destruction and fiscal institutions: A long-run case study of three regions* (No. 0908). Papers on economics and evolution.

Schwab, D., & Werker, E. (2018). Are economic rents good for development? Evidence from the manufacturing sector. *World Development*, *112*, 33-45.

Scully, G. W. (1991). Rent-seeking in US government budgets, 1900–88. *Public Choice*, *70*(1), 99-106.

Seabright, P. (1996). Accountability and decentralisation in government: An incomplete contracts model. *European economic review*, *40*(1), 61-89.

Shah, A. (1999). *Fiscal federalism and macroeconomic governance: For better or for worse?*. The World Bank.

Shen, C., Jin, J., & Zou, H. F. (2012). Fiscal decentralization in China: history, impact, challenges and next steps. *Annals of economics and finance*, *13*(1), 1-51.

Shleifer, A. (1985). A theory of yardstick competition. *The RAND journal of Economics*, 319-327.

Singh, S. (2008). India–China Relations: Perception, Problems, Potential. *South Asian Survey*, *15*(1), 83-98.

Smith, Brian C., 1985. *Decentralization: The Territorial Dimension of the State*. Unpim, London, UK.

Sobel, R. S., & Garrett, T. A. (2002). On the measurement of rent seeking and its social opportunity cost. *Public Choice*, *112*(1-2), 115-136.

Sonin, K. (2003). Why the rich may favor poor protection of property rights. *Journal of comparative economics*, *31*(4), 715-731.

Staiger, D., Stock, J. H., & Watson, M. W. (1997). The NAIRU, unemployment and monetary policy. *Journal of economic perspectives*, *11*(1), 33-49.

Stegarescu, D. (2005). Public sector decentralisation: Measurement concepts and recent international trends. *Fiscal studies*, *26*(3), 301-333.

Stepan, A. (2001). Toward a new comparative politics of federalism,(multi) nationalism, and democracy: Beyond rikerian federalism. *Arguing comparative politics*, 315-61.

Strumpf, K. S. (2002). Does government decentralization increase policy innovation?. *Journal of Public Economic Theory*, *4*(2), 207-241.

Taillant, D. (1994). Decentralization: Local and regional government development. A literature review. *World Bank, Washington, DC*.

Tanzi, V. (1995). *Fiscal federalism and decentralization: A review of some efficiency and macroeconomic aspects* (pp. 295-316). Washington DC: World Bank.

Tanzi, V., Chalk, N., (2000). Impact of large public debt on growth in the EU: a discussion of potential channels. *Eur. Econ*. 2, 23–43.

Teles, V. K., & Mussolini, C. C. (2014). Public debt and the limits of fiscal policy to increase economic growth. *European Economic Review*, *66*, 1-15.

Ter-Minassian, M. T. (1997). *Fiscal federalism in theory and practice* International Mon etary Fund.

Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of political economy*, *64*(5), 416-424.

Thiessen, U. (2003). Fiscal decentralisation and economic growth in high-income OECD Countries. *Fiscal studies*, *24*(3), 237-274.

Torrisi, G. (2011). Decentralisation outcomes: A review of evidence and analysis of international data.

Tullock, G. (1987). Public choice. *The new Palgrave: a dictionary of economics*, *3*, 1040-1044.

Vanberg, V., & Kerber, W. (1994). Institutional competition among jurisdictions: An evolutionary approach. *Constitutional Political Economy*, *5*(2), 193-219.

Vo, D. H. (2008). *The economics of measuring fiscal decentralisation*. University of Western Australia.

----------. (2010). The economics of fiscal decentralization. *Journal of Economic Surveys*, *24*(4), 657-679.

Weingast, B. R. (1995). The economic role of political institutions: Market-preserving federalism and economic development. *Journal of Law, Economics, & Organization*, 1-31.

----------. (2007). Second Generation Fiscal Federalism: Implications for Development. *CA, Palo Alto: Stanford University*.

----------. (2009). Second generation fiscal federalism: The implications of fiscal incentives. *Journal of Urban Economics*, *65*(3), 279-293.

Wibbels, E. (2005). *Federalism and the market: Intergovernmental conflict and economic reform in the developing world*. Cambridge University Press.

Wilson, J. D. (1991). Tax competition with interregional differences in factor endowments. *Regional science and urban economics*, *21*(3), 423-451.

----------. (1999). Theories of tax competition. *National tax journal*, 269-304.

Wang, Z., & Ma, L. (2014). Fiscal decentralization in China: A literature review. *Annals of Economics and Finance*, *15*(2), 305-324.

Woller, G. M., & Phillips, K. (1998). Fiscal decentralisation and IDC economic growth: An empirical investigation. *The journal of development studies*, *34*(4), 139-148.

Wong, C. (2011). The fiscal stimulus programme and public governance issues in China. *OECD Journal on Budgeting*, *11*(3), 1-22.

Wong, C. P., & Richard, M. Bird. 2008."China's fiscal system: a work in progress.". *China's Great Economic Transformation*, 429-66.

Wu, L., Lou, B., & Hitt, L. (2019). Data analytics supports decentralized innovation. *Management Science*, *65*(10), 4863-4877.

Xie, D., Zou, H. F., & Davoodi, H. (1999). Fiscal decentralization and economic growth in the United States. *Journal of Urban economics*, *45*(2), 228-239.

Yang, W., & Chen, Y. (2018). Fiscal Decentralization, Yardstick Competition in Determining Chinese Local Governments' Land Conveyance Behavior. In *The State of China's State Capitalism* (pp. 3-30). Palgrave Macmillan, Singapore.

Yilmaz, S. (1999). The impact of fiscal decentralization on macroeconomic performance. In *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association* (Vol. 92, pp. 251-260). National Tax Association.

Yilmaz, S., & Guner, A. (2013). Local government discretion and accountability in Turkey. *Public Administration and development*, *33*(2), 125-142.

Zhang, T., & Zou, H. F. (1998). Fiscal decentralization, public spending, and economic growth in China. *Journal of public economics*, *67*(2), 221-240.

Zodrow, G. R., & Mieszkowski, P. (1986). Pigou, Tiebout, property taxation, and the underprovision of local public goods. *Journal of urban economics*, *19*(3), 356-370.

Table 1 Revenue and Expenditure Decentralization versus Fiscal Decentralization

Country	Subnational Revenue/General Government Revenue	Subnational Expenditure/General Government Expenditure	Fiscal Decentralization Index
Malta	1.1	1.5	1.5
Azerbaijan	1.4	3.5	2.1
Kiribati	2.0	3.8	2.9
Cyprus	3.7	3.9	3.9
Iran	5.4	4.3	5.2
Mauritius	6.2	6.2	6.3
Greece	7.7	9.1	7.7
El Salvador	5.9	9.0	8.7
Turkey	10.6	10.4	10.4
Cabo Verde	10.7	11.2	10.9
Croatia	11.2	10.5	11.0
Luxembourg	11.4	10.6	11.1
Kyrgyz Republic	11.1	11.6	11.1
Myanmar	8.6	13.6	12.0
Slovak Republic	6.5	18.1	13.7
Israel	13.5	13.5	13.7
Portugal	13.7	14.1	13.8
Albania	14.8	14.1	14.6
Serbia	16.2	15.4	16.0
Thailand	19.3	13.3	16.6
Slovenia	19.1	18.0	18.7
France	19.2	20.2	19.8
Bulgaria	16.0	23.7	20.1
Georgia	20.0	30.9	21.8
Romania	12.1	24.2	22.3
Moldova	24.0	23.9	24.0
Ireland	8.6	38.7	24.0
Hungary	14.1	27.0	24.5
Estonia	22.3	29.0	25.2
Lithuania	22.1	28.7	25.6
Iceland	21.5	29.8	26.3
Latvia	25.5	29.8	27.2
United Kingdom	25.2	28.7	28.4
Czech Republic	25.7	32.2	29.2
Norway	20.3	38.0	29.4
Italy	27.9	31.2	29.9
Poland	20.6	31.6	30.4
Ukraine	28.1	34.3	31.9
Netherlands	30.6	34.2	32.9
Austria	34.0	35.9	34.4
Mongolia	17.1	45.9	36.0
Uzbekistan	29.0	43.0	36.6
Finland	32.4	41.6	37.9

Belarus	34.6	39.3	38.4
Kazakhstan	33.7	42.0	39.3
Indonesia	39.5	42.0	40.5
Belgium	39.7	49.4	42.6
Japan	44.9	40.8	43.6
Sweden	40.0	50.6	44.8
Germany	43.1	48.3	45.3
Argentina	48.6	46.2	46.8
Australia	44.5	49.7	47.4
Spain	41.0	53.7	48.7
United States	48.0	58.3	51.3
South Africa	46.1	55.5	51.4
Russia	46.3	60.6	55.7
Denmark	56.3	65.9	61.3
Switzerland	61.2	63.7	62.1
China	44.5	73.1	68.5
United Arab Emirates	86.9	89.2	88.2

Table 2 Variable Definitions and Data Sources

Variable Name	Description	Source
Main Variables		
Economic growth	Real GDP percent growth rate	IMF *World Economic Outlook*
Fiscal decentralization	Calculated as the ratio of the sum of the absolute levels of the country's state and local government's total revenue and total	IMF *Government Finance Statistics*
Total allocative efficiency	Calculated as the sum of the subnational and central levels of governmental allocative efficiency in a country. Detailed measurement please see the Methodology chapter	IMF *Government Finance Statistics*
Allocative efficiency distance	Calculated as the difference of the subnational to the central levels of governmental allocative efficiency in a country. Detailed measurement please see the Methodology chapter	IMF *Government Finance Statistics*
Capital mobility	The Chinn-Ito Index	Chinn and Ito (2006)
Real investment	Real total public and private investment	IMF *World Economic Outlook*
Corporate income tax rate	Corporate income tax rate, statutory top central	IMF Tax Rate Database
Control of corruption	Extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Bank *Worldwide Governance Indicators*
Control Variables		
Population	Population	IMF *World Economic Outlook*
Secondary school enrollment	Secondary school enrollment	World Bank *Worldwide Development Indicators*
Terms of trade	The relative price of exports in terms of imports, showing how much imports an economy can get for a unit of exported goods.	IMF *World Economic Outlook*
Government debt	General government gross debt	IMF *World Economic Outlook*

Foreign direct investment	Foreign direct investment	IMF *World Economic Outlook*
Interest rate	Interest rate	IMF *World Economic Outlook*
President years left in current term	President years left in current term	World Bank Database of Political Institutions
President percentage of votes	President got what percentage of votes in the final round	World Bank Database of Political Institutions
Party of chief executive length of time in office	Party of chief executive has been how long in office	World Bank Database of Political Institutions
Government fractionalization index	Chance that two random draws will produce legislators from different parties	World Bank Database of Political Institutions
Voice and accountability	Extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Bank *Worldwide Governance Indicators*
Political stability and absence of violence/terrorism	Likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	World Bank *Worldwide Governance Indicators*
Government effectiveness	The quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Bank *Worldwide Governance Indicators*
Regulatory quality	The ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Bank *Worldwide Governance Indicators*

Table 3 Summary of Statistics of Main Variables

	Observations	Mean	Standard deviation	Minimum	Maximum
Real GDP growth (%)	820	2.958	3.176	-7.82	12.32
Fiscal decentralization (index)	808	28.68	16.398	1.5	88.2
Total allocative efficiency (index)	820	56.868	60.418	8.201	398.811
Allocative efficiency distance (index)	774	36.766	44.131	3.537	375.022
Capital mobility (index)	803	0.772	0.319	0	1
Real investment growth (%)	793	4.817	2.67	-0.192	14.929
Corporate income tax rate (%)	754	25.41	8.402	7.5	54
Control of corruption (index)	688	0.799	0.994	-1.302	2.47
Government effectiveness (index)	688	0.909	0.855	-1.497	2.354
Regulatory quality (index)	688	0.876	0.826	-1.769	2.098
Voice and accountability (index)	688	0.785	0.839	-2.034	1.801
Terms of trade growth (%)	814	4.602	0.119	3.898	5.226
Population growth (%)	820	2.24	1.601	-2.246	7.232
Secondary school enrollment (%)	732	1.013	0.056	0.829	1.356
Government debt (% GDP)	793	53.55	33.173	4.404	236.069
Foreign direct investment (% GDP)	809	-2.867	26.76	-564.213	171.213
Interest rate (%)	649	4.13	3.929	-0.783	31.131
President years left in current term (years)	608	1.781	1.261	0	6
President percentage of votes (%)	611	56.517	8.847	48.95	82.2
Party of chief executive length of time in office (years)	611	5.931	5.074	1	21
Government fractionalization index (index)	610	0.413	0.241	0	0.728
Political stability and absence of violence/terrorism (index)	688	0.551	0.727	-2.021	1.760

Table 4.1 Baseline Regressions of the Efficiency Channel (Without Control Variables)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth	(7) Real GDP growth	(8) Real GDP growth	(9) Real GDP growth	(10) Real GDP growth
Lagged real GDP growth						0.325***	0.332***	0.334***	0.325***	0.328***
						(0.0645)	(0.0647)	(0.0662)	(0.0655)	(0.0674)
Fiscal decentralization (FD)	0.0518	0.0546	0.0522	0.0483	0.0457	0.0447	0.0517*	0.0453	0.0398	0.0366
	(0.0570)	(0.0579)	(0.0565)	(0.0578)	(0.0575)	(0.0277)	(0.0295)	(0.0286)	(0.0280)	(0.0276)
Total allocative efficiency (Total AE)		0.00279					0.00576**			
		(0.00241)					(0.00258)			
Allocative efficiency distance (AE distance)			0.00440					0.00712*		
			(0.00300)					(0.00381)		
Interaction of FD and total AE				7.08e-05					0.000133**	
				(6.53e-05)					(6.18e-05)	
Interaction of FD and AE distance					0.000124					0.000136*
					(8.39e-05)					(7.63e-05)
Constant	-1.696	-1.930	-1.972	-1.701	-1.744	-0.179	-0.652	-0.519	-0.186	-0.137
	(1.664)	(1.685)	(1.639)	(1.689)	(1.669)	(1.479)	(1.537)	(1.512)	(1.493)	(1.480)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	808	808	763	808	763	683	683	646	683	646
R-squared	0.389	0.391	0.399	0.390	0.398	0.492	0.501	0.509	0.496	0.505
Number of countries	60	60	60	60	60	58	58	57	58	57

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5 Marginal Effects of Fiscal Decentralization on Economic Growth by Different Levels of Total Allocative Efficiency and Allocative Efficiency Distance

Total AE	(1) Real GDP growth	AE distance	(1) Real GDP growth
FD_at_TotalAE_5	0.0414	FD_at_AEdistance_5	0.0375
	(0.0282)		(0.0276)
FD_at_TotalAE_10	0.0418	FD_at_AEdistance_10	0.0377
	(0.0282)		(0.0276)
FD_at_TotalAE_15	0.0421	FD_at_AEdistance_15	0.0379
	(0.0282)		(0.0276)
FD_at_TotalAE_20	0.0423	FD_at_AEdistance_20	0.0381
	(0.0282)		(0.0276)
FD_at_TotalAE_25	0.0426	FD_at_AEdistance_25	0.0382
	(0.0283)		(0.0276)
FD_at_TotalAE_30	0.0430	FD_at_AEdistance_30	0.0385
	(0.0283)		(0.0276)
FD_at_TotalAE_35	0.0433	FD_at_AEdistance_35	0.0387
	(0.0284)		(0.0276)
FD_at_TotalAE_40	0.0435	FD_at_AEdistance_40	0.0389
	(0.0284)		(0.0276)
FD_at_TotalAE_45	0.0440	FD_at_AEdistance_45	0.0392
	(0.0284)		(0.0276)
FD_at_TotalAE_50	0.0444	FD_at_AEdistance_50	0.0394
	(0.0285)		(0.0276)
FD_at_TotalAE_55	0.0451	FD_at_AEdistance_55	0.0398
	(0.0286)		(0.0276)
FD_at_TotalAE_60	0.0457	FD_at_AEdistance_60	0.0402
	(0.0287)		(0.0276)
FD_at_TotalAE_65	0.0462	FD_at_AEdistance_65	0.0406
	(0.0287)		(0.0276)
FD_at_TotalAE_70	0.0468	FD_at_AEdistance_70	0.0413
	(0.0288)		(0.0276)
FD_at_TotalAE_75	0.0477*	FD_at_AEdistance_75	0.0420
	(0.0289)		(0.0277)
FD_at_TotalAE_80	0.0495*	FD_at_AEdistance_80	0.0430
	(0.0292)		(0.0277)
FD_at_TotalAE_85	0.0517*	FD_at_AEdistance_85	0.0443
	(0.0296)		(0.0278)
FD_at_TotalAE_90	0.0557*	FD_at_AEdistance_90	0.0467*
	(0.0303)		(0.0279)
FD_at_TotalAE_95	0.0627**	FD_at_AEdistance_95	0.0529*
	(0.0318)		(0.0287)
Observations	683	Observations	646

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.2 Baseline Regressions of the Efficiency Channel (With Control Variables A)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth
Lagged real GDP growth	0.325***	0.328***	0.258***	0.258***
	(0.0655)	(0.0674)	(0.0735)	(0.0761)
Fiscal decentralization	0.0398	0.0366	0.0387	0.0328
	(0.0280)	(0.0276)	(0.0341)	(0.0348)
Interaction of FD and total AE	0.000133**		0.000127*	
	(6.18e-05)		(7.45e-05)	
Interaction of FD and AE distance		0.000136*		0.000145
		(7.63e-05)		(9.46e-05)
Population growth			1.258	1.958
			(3.686)	(4.338)
Real investment growth			2.081**	2.290***
			(0.835)	(0.851)
Secondary school enrollment			7.742*	7.193
			(4.547)	(4.599)
Terms of trade growth			-0.253	-0.125
			(1.396)	(1.431)
Constant	-0.186	-0.137	-19.87*	-22.47*
	(1.493)	(1.480)	(10.90)	(11.96)
Time and country fixed effects	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes
Observations	683	646	600	567
R-squared	0.496	0.505	0.520	0.534
Number of countries	58	57	50	49

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.3 Baseline Regressions of the Efficiency Channel (With Control Variables B)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth
Lagged real GDP growth	0.325***	0.328***	0.00532	5.44e-05
	(0.0655)	(0.0674)	(0.0783)	(0.0773)
Fiscal decentralization	0.0398	0.0366	0.00960	0.0119
	(0.0280)	(0.0276)	(0.0373)	(0.0362)
Interaction of FD and total AE	0.000133**		7.61e-05	
	(6.18e-05)		(9.99e-05)	
Interaction of FD and AE distance		0.000136*		8.02e-05
		(7.63e-05)		(0.000113)
Macroeconomic variables				
Real investment growth			6.015***	6.028***
			(1.451)	(1.416)
Government debt in percent of GDP			-0.0135	-0.0115
			(0.0163)	(0.0161)
Foreign direct investment in percent of GDP			-0.0146**	-0.0152***
			(0.00558)	(0.00531)
Interest rate			-0.0522	-0.0377
			(0.0893)	(0.0898)
Terms of trade growth			0.343	0.451
			(1.425)	(1.434)
Socioeconomic variables				
Population growth			-14.94**	-16.38**
			(6.868)	(6.450)
Secondary school enrollment			5.924*	5.402*
			(3.003)	(2.977)
Political variables				
President years left in current term			-0.0777	-0.0840
			(0.0930)	(0.0939)
President percentage of votes			-0.000399	-0.000390
			(0.000389)	(0.000401)
Party of chief executive length of time in office			0.00182***	0.00194***
			(0.000587)	(0.000678)
Government fractionalization index			2.867**	2.911***
			(1.070)	(1.064)
Voice and accountability			3.915**	4.236***
			(1.465)	(1.530)
Political stability and absence of violence/terrorism			0.0509	0.155
			(0.718)	(0.750)
Government effectiveness			-1.211	-1.293
			(1.181)	(1.170)
Regulatory quality			-1.373	-1.494
			(1.034)	(1.095)
Control of corruption			1.010	1.038
			(1.031)	(1.014)
Constant	-0.186	-0.137	-3.178	-0.488
	(1.493)	(1.480)	(13.95)	(13.20)

Time and country fixed effects	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes
Observations	683	646	316	307
R-squared	0.496	0.505	0.710	0.714
Number of countries	58	57	39	39

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.4 D-GMM Regressions of the Efficiency Channel (Control Variables A)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth
Lagged real GDP growth	0.230***	0.239***	0.138*	0.126
	(0.0610)	(0.0644)	(0.0745)	(0.0863)
Fiscal decentralization (FD)	0.0383	0.0214	-0.0288	-0.0171
	(0.0708)	(0.0685)	(0.109)	(0.0855)
Interaction of FD and total AE	9.83e-05		0.000142	
	(7.46e-05)		(9.45e-05)	
Interaction of FD and AE distance		8.28e-05		0.000141
		(0.000109)		(0.000126)
Real investment growth			1.564	2.362
			(1.591)	(1.753)
Terms of trade growth			-1.106	-0.0147
			(4.071)	(2.570)
Population growth			-13.51	-24.21*
			(19.67)	(14.66)
Secondary school enrollment			-2.459	3.705
			(11.68)	(7.757)
Observations	578	537	502	464
Number of countries	55	54	48	46

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.5 D-GMM Regressions of the Efficiency Channel (Control Variables B)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth
Lagged real GDP growth	0.230***	0.239***	0.428***	0.503***
	(0.0610)	(0.0644)	(0.137)	(0.0870)
Fiscal decentralization (FD)	0.0383	0.0214	-0.303	-0.579***
	(0.0708)	(0.0685)	(0.229)	(0.160)
Interaction of FD and total AE	9.83e-05		-7.40e-05	
	(7.46e-05)		(0.000377)	
Interaction of FD and AE distance		8.28e-05		-6.54e-05
		(0.000109)		(0.000260)
Macroeconomic variables				
Real investment growth			5.585	12.96
			(7.530)	(9.611)
Government debt in percent of GDP			-0.320	-0.126
			(0.203)	(0.153)
Foreign direct investment in percent of GDP			0.0853	0.0782
			(0.108)	(0.176)
Interest rate			-0.275	-0.364
			(0.589)	(0.430)
Terms of trade growth			-25.11	-28.67
			(23.00)	(21.81)
Socioeconomic variables				
Population growth			63.37	-17.28
			(75.35)	(60.14)
Secondary school enrollment			7.775	27.77
			(67.37)	(52.99)
Political variables				
President years left in current term			1.115	1.469**
			(0.764)	(0.684)
President percentage of votes			-0.00481	-0.0106
			(0.0107)	(0.0107)
Party of chief executive length of time in office			0.00440	-0.0695
			(0.0110)	(0.433)
Government fractionalization index			-0.0354	0.812
			(7.690)	(7.499)
Voice and accountability			9.824*	12.45***
			(5.073)	(1.821)
Political stability and absence of violence/terrorism			5.643	5.801*
			(4.210)	(3.347)
Government effectiveness			1.974	-6.972
			(10.37)	(7.433)
Regulatory quality			-5.298	-1.404
			(14.39)	(13.37)
Control of corruption			4.631	5.005
			(7.868)	(5.559)
Observations	578	537	218	206
Number of countries	55	54	35	34

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.6 S-GMM Regressions of the Efficiency Channel (Control Variables A)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth
Lagged real GDP growth	0.440***	0.462***	0.468***	0.471***
	(0.0572)	(0.0583)	(0.0609)	(0.0533)
Fiscal decentralization (FD)	-0.0285**	-0.0132	-0.0160	-0.0205
	(0.0123)	(0.00957)	(0.0140)	(0.0168)
Interaction of FD and total AE	0.000197***		0.000142*	
	(6.89e-05)		(8.00e-05)	
Interaction of FD and AE distance		8.28e-05		0.000141
		(0.000109)		(0.000126)
Real investment growth			-0.0108	-0.0351
			(0.146)	(0.190)
Terms of trade growth			1.831	-0.696
			(3.812)	(3.536)
Population growth			-0.0143	0.0804
			(0.301)	(0.482)
Secondary school enrollment			6.611	1.195
			(6.346)	(6.878)
Observations	683	646	600	567
Number of countries	58	57	50	49

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.7 S-GMM Regressions of the Efficiency Channel (Control Variables B)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth
Lagged real GDP growth	0.440***	0.462***	0.0267	-0.0259
	(0.0572)	(0.0583)	(0.260)	(0.243)
Fiscal decentralization (FD)	-0.0285**	-0.0132	0.116	-0.0975
	(0.0123)	(0.00957)	(0.329)	(0.110)
Interaction of FD and total AE	0.000197***		-0.000209	
	(6.89e-05)		(0.000446)	
Interaction of FD and AE distance		8.28e-05		-0.000108
		(0.000109)		(0.000294)
Macroeconomic variables				
Real investment growth			-0.450	0.147
			(0.873)	(0.974)
Government debt in percent of GDP			-0.0443	-0.0895
			(0.0599)	(0.0590)
Foreign direct investment in percent of GDP			-0.0176	-0.0639
			(0.0741)	(0.0986)
Interest rate			-0.0914	0.0154
			(0.466)	(0.423)
Terms of trade growth			27.81	-1.952
			(32.09)	(4.493)
Socioeconomic variables				
Population growth			4.695	0.140
			(6.478)	(1.841)
Secondary school enrollment			-41.38	14.28
			(41.46)	(26.59)
Political variables				
President years left in current term			1.177	0.325
			(1.118)	(0.491)
President percentage of votes			-0.000582	-0.000844
			(0.00493)	(0.00437)
Party of chief executive length of time in office			0.000940	-0.00914*
			(0.00570)	(0.00548)
Government fractionalization index			-7.974	0.370
			(13.20)	(4.552)
Voice and accountability			7.371	6.411
			(5.028)	(7.007)
Political stability and absence of violence/terrorism			6.022	1.747
			(6.581)	(3.396)
Government effectiveness			-4.363	-1.021
			(7.238)	(5.993)
Regulatory quality			0.382	-4.575
			(5.598)	(5.675)
Control of corruption			1.177	0.325
			(1.118)	(0.491)
Observations	578	537	316	307
Number of countries	55	54	39	39

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.8 SEM Mediation Analysis of the Efficiency Channel (Control Variables A)

	(1) Real GDP growth	(2) Total allocative efficiency	(3) Real GDP growth	(4) Allocative efficiency distance	(5) Real GDP growth	(6) Total allocative efficiency	(7) Real GDP growth	(8) Allocative efficiency distance
Lagged real GDP growth	0.332***	-1.199	0.334***	-0.831	0.264***	-0.926	0.263***	-0.392
	(0.0358)	(0.797)	(0.0367)	(0.612)	(0.0412)	(0.914)	(0.0420)	(0.735)
Fiscal decentralization	0.0517**	-1.218**	0.0453*	-0.817*	0.0519*	-1.553**	0.0428	-1.120**
	(0.0258)	(0.575)	(0.0263)	(0.438)	(0.0275)	(0.608)	(0.0280)	(0.488)
Total allocative efficiency	0.00576***				0.00615***			
	(0.00172)				(0.00184)			
Allocative efficiency distance			0.00712***				0.00733***	
			(0.00236)				(0.00240)	
Population growth					0.629	131.9***	1.418	101.5**
					(2.181)	(48.16)	(2.454)	(42.70)
Real investment growth					2.074***	-1.365	2.289***	-2.611
					(0.540)	(11.99)	(0.566)	(9.903)
Secondary school enrollment					7.932**	0.112	7.379**	-22.61
					(3.261)	(72.46)	(3.284)	(57.42)
Terms of trade growth					-0.173	8.917	-0.0828	8.251
					(1.134)	(25.19)	(1.144)	(20.00)
Constant	-1.357	85.45***	-1.009	50.33**	-29.02**	-669.5**	-34.53**	-502.2*
	(1.446)	(32.10)	(1.468)	(24.45)	(14.51)	(321.1)	(15.98)	(278.6)
Observations	683	683	646	646	600	600	567	567

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.9 SEM Mediation Analysis of the Efficiency Channel (Control Variables B)

	(1) Real GDP growth	(2) Total allocative efficiency	(3) Real GDP growth	(4) Allocative efficiency distance	(5) Real GDP growth	(6) Total allocative efficiency	(7) Real GDP growth	(8) Allocative efficiency distance
Lagged real GDP growth	0.332***	-1.199	0.334***	-0.831	0.0196	-1.736	0.0199	-2.034*
	(0.0358)	(0.797)	(0.0367)	(0.612)	(0.0551)	(1.280)	(0.0559)	(1.095)
Fiscal decentralization	0.0517**	-1.218**	0.0453*	-0.817*	0.0243	-1.560*	0.0269	-1.419*
	(0.0258)	(0.575)	(0.0263)	(0.438)	(0.0382)	(0.885)	(0.0384)	(0.751)
Total allocative efficiency	0.00576***				0.00898***			
	(0.00172)				(0.00241)			
Allocative efficiency distance			0.00712***				0.0106***	
			(0.00236)				(0.00290)	
Macroeconomic variables								
Real investment growth					5.504***	66.28***	5.456***	61.83***
					(1.107)	(25.51)	(1.113)	(21.64)
Government debt in percent of GDP					-0.0171	0.522*	-0.0133	0.229
					(0.0116)	(0.269)	(0.0117)	(0.229)
Foreign direct investment in percent of GDP					-0.0126*	-0.255*	-0.0136**	-0.172
					(0.00656)	(0.152)	(0.00662)	(0.130)
Interest rate					-0.0543	0.358	-0.0423	0.533
					(0.0608)	(1.417)	(0.0612)	(1.206)
Terms of trade growth					0.703	-40.47	0.836	-36.93
					(1.497)	(34.80)	(1.508)	(29.63)
Socioeconomic variables								
Population growth					-14.55***	-47.98	-16.03***	-36.45
					(4.459)	(103.9)	(4.516)	(88.92)
Secondary school enrollment					5.617*	70.69	4.963	64.74
					(3.388)	(78.84)	(3.418)	(67.22)
Political variables								
President years left in current term					-0.0865	1.551	-0.0945	1.544
					(0.0712)	(1.656)	(0.0723)	(1.421)
President percentage of votes					-0.000466	0.00917	-0.000450	0.00664
					(0.000442)	(0.0103)	(0.000444)	(0.00874)
Party of chief executive length of					0.00160**	0.0344**	0.00175**	0.0260*

time in office								
					(0.000742)	(0.0172)	(0.000801)	(0.0157)
Government fractionalization index					2.634***	33.76*	2.742***	20.58
					(0.854)	(19.80)	(0.858)	(16.86)
Voice and accountability					3.770***	11.94	4.241***	-6.889
					(1.277)	(29.74)	(1.290)	(25.39)
Political stability and absence of violence/terrorism					0.177	-10.37	0.259	-5.374
					(0.538)	(12.53)	(0.544)	(10.72)
Government effectiveness					-0.956	-31.48*	-1.079	-22.42
					(0.767)	(17.79)	(0.789)	(15.48)
Regulatory quality					-1.140	-34.92*	-1.226	-32.72*
					(0.874)	(20.28)	(0.896)	(17.54)
Control of corruption					0.700	39.86**	0.796	26.94*
					(0.805)	(18.62)	(0.821)	(16.10)
Constant	-1.357	85.45***	-1.009	50.33**	27.36	-54.42	-0.0945	1.544
	(1.446)	(32.10)	(1.468)	(24.45)	(26.52)	(617.9)	(0.0723)	(1.421)
Observations	683	683	646	646	316	316	307	307

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.1 Baseline Regressions of the Market-Preserving Channel (Without Control Variables)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth	(7) Real GDP growth	(8) Real GDP growth	(9) Real GDP growth
Lagged real GDP growth				0.322***			0.324***	0.324***	0.317***
				(0.0789)			(0.0805)	(0.0816)	(0.0852)
Fiscal decentralization (FD)	0.0518	0.0455	0.0406	-0.00407	0.00876	0.0214	0.0266	0.0136	0.0239
	(0.0570)	(0.0524)	(0.0334)	(0.0306)	(0.0699)	(0.0755)	(0.0766)	(0.0782)	(0.0788)
Capital mobility (CM)		2.348***	1.735	1.540	1.627	1.402	2.027	1.997	2.124
		(0.824)	(1.242)	(1.210)	(1.488)	(1.891)	(1.703)	(1.718)	(1.682)
Interaction of FD and CM					0.0448	0.0227	-0.0353	-0.0238	-0.0337
					(0.0557)	(0.0806)	(0.0814)	(0.0815)	(0.0822)
Interaction of FD and total AE								0.000134**	
								(5.40e-05)	
Interaction of FD and AE distance									0.000192**
									(8.05e-05)
Corporate income tax rate			0.0449	0.0531		0.0442	0.0547	0.0543	0.0610
			(0.0557)	(0.0539)		(0.0561)	(0.0537)	(0.0539)	(0.0554)
Control of corruption			-0.729	-0.818		-0.677	-0.884	-0.929	-0.960
			(0.851)	(0.781)		(0.820)	(0.748)	(0.746)	(0.747)
Real investment growth			2.258**	0.899		2.212**	0.944	0.937	0.949
			(0.897)	(1.025)		(0.947)	(1.054)	(1.050)	(1.136)
Constant	-1.696	-3.440**	-9.487**	-2.959	-2.951	-9.008	-3.553	-3.487	-3.952
	(1.664)	(1.680)	(4.687)	(5.024)	(1.881)	(5.498)	(5.400)	(5.423)	(5.824)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	808	791	595	504	791	595	504	504	481
R-squared	0.389	0.404	0.502	0.555	0.405	0.502	0.556	0.559	0.565
Number of countries	60	57	53	50	57	53	50	50	49

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.2 Baseline Regressions of the Market-Preserving Channel (Control Variables A)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth
Lagged real GDP growth	0.324***	0.324***	0.317***	0.276***	0.275***	0.268***
	(0.0805)	(0.0816)	(0.0852)	(0.0758)	(0.0747)	(0.0780)
Fiscal decentralization (FD)	0.0266	0.0136	0.0239	0.0578	0.0465	0.0524
	(0.0766)	(0.0782)	(0.0788)	(0.0763)	(0.0756)	(0.0772)
Capital mobility (CM)	2.027	1.997	2.124	2.261	2.261	2.279
	(1.703)	(1.718)	(1.682)	(1.439)	(1.453)	(1.396)
Interaction of FD and CM	-0.0353	-0.0238	-0.0337	-0.0573	-0.0457	-0.0497
	(0.0814)	(0.0815)	(0.0822)	(0.0775)	(0.0760)	(0.0783)
Interaction of FD and total AE		0.000134**			0.000151**	
		(5.40e-05)			(7.36e-05)	
Interaction of FD and AE distance			0.000192**			0.000215**
			(8.05e-05)			(0.000104)
Corporate income tax rate	0.0547	0.0543	0.0610	0.0579	0.0572	0.0648
	(0.0537)	(0.0539)	(0.0554)	(0.0563)	(0.0565)	(0.0582)
Control of corruption	-0.884	-0.929	-0.960	-0.945	-0.979	-0.962
	(0.748)	(0.746)	(0.747)	(0.760)	(0.763)	(0.814)
Real investment growth	0.944	0.937	0.949	2.253**	2.263**	2.346**
	(1.054)	(1.050)	(1.136)	(0.917)	(0.905)	(0.899)
Population growth				2.301	2.313	2.356
				(4.308)	(4.330)	(5.437)
Secondary school enrollment				6.664	6.237	6.379
				(5.011)	(5.066)	(5.082)
Terms of trade growth				-1.392	-1.496	-1.286
				(2.490)	(2.413)	(2.490)
Constant	-3.553	-3.487	-3.952	-14.89	-14.10	-16.20
	(5.400)	(5.423)	(5.824)	(14.88)	(14.80)	(16.11)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes
Observations	504	504	481	472	472	449
R-squared	0.556	0.559	0.565	0.566	0.570	0.577
Number of countries	50	50	49	48	48	47

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.3 Baseline Regressions of the Market-Preserving Channel (Control Variables B)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth
Lagged real GDP growth	0.324***	0.324***	0.317***	0.0602	0.0621	0.0556
	(0.0805)	(0.0816)	(0.0852)	(0.0677)	(0.0674)	(0.0679)
Fiscal decentralization (FD)	0.0266	0.0136	0.0239	0.0750	0.0742	0.0873
	(0.0766)	(0.0782)	(0.0788)	(0.0732)	(0.0737)	(0.0718)
Capital mobility (CM)	2.027	1.997	2.124	0.799	0.832	0.954
	(1.703)	(1.718)	(1.682)	(1.265)	(1.273)	(1.223)
Interaction of FD and CM	-0.0353	-0.0238	-0.0337	-0.0770	-0.0772	-0.0895
	(0.0814)	(0.0815)	(0.0822)	(0.0750)	(0.0763)	(0.0742)
Interaction of FD and total AE		0.000134**			9.44e-05	
		(5.40e-05)			(9.64e-05)	
Interaction of FD and AE distance			0.000192**			0.000104
			(8.05e-05)			(0.000111)
Corporate income tax rate	0.0547	0.0543	0.0610	-0.00169	-0.00219	0.00198
	(0.0537)	(0.0539)	(0.0554)	(0.0550)	(0.0543)	(0.0548)
Control of corruption	-0.884	-0.929	-0.960	0.897	0.841	0.837
	(0.748)	(0.746)	(0.747)	(0.991)	(0.987)	(0.981)
Real investment growth	0.944	0.937	0.949	5.346***	5.232***	5.305***
	(1.054)	(1.050)	(1.136)	(1.430)	(1.419)	(1.399)
Macroeconomic variables						
Government debt in percent of GDP				-0.0136	-0.0150	-0.0129
				(0.0164)	(0.0166)	(0.0164)
Foreign direct investment in percent of GDP				-0.0122	-0.0118	-0.0121
				(0.00777)	(0.00776)	(0.00751)
Interest rate				-0.109	-0.110	-0.0957
				(0.0872)	(0.0876)	(0.0891)
Terms of trade growth				0.595	0.599	0.700
				(1.361)	(1.358)	(1.367)
Socioeconomic variables						
Population growth				-14.82**	-14.75**	-16.47**
				(6.776)	(6.784)	(6.281)
Secondary school enrollment				5.920*	5.505	5.083
				(3.331)	(3.401)	(3.428)
Political variables						
President years left in current term				-0.0617	-0.0681	-0.0744
				(0.0931)	(0.0932)	(0.0944)
President percentage of votes				-0.000403	-0.000420	-0.000416
				(0.000389)	(0.000402)	(0.000408)
Party of chief executive length of time in office				0.00151***	0.00140**	0.00151**
				(0.000553)	(0.000586)	(0.000684)

Government fractionalization index				2.526**	2.446**	2.499**
				(1.111)	(1.124)	(1.123)
Voice and accountability				3.834**	3.895**	4.194**
				(1.543)	(1.571)	(1.639)
Political stability and absence of violence/terrorism				0.163	0.117	0.248
				(0.781)	(0.781)	(0.804)
Government effectiveness				-1.168	-1.139	-1.232
				(1.139)	(1.151)	(1.133)
Regulatory quality				-1.432	-1.338	-1.448
				(0.964)	(0.968)	(1.031)
Constant	-3.553	-3.487	-3.952	-1.549	-0.786	1.952
	(5.400)	(5.423)	(5.824)	(13.37)	(13.41)	(12.70)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes
Observations	504	504	481	313	313	304
R-squared	0.556	0.559	0.565	0.713	0.714	0.717
Number of countries	50	50	49	39	39	39

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.4 D-GMM Regressions of the Market-Preserving Channel (Control Variables A)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.226***	0.128*	0.135	0.104	0.0820
	(0.0623)	(0.0690)	(0.0844)	(0.0883)	(0.0932)
Fiscal decentralization (FD)	0.000497	-0.0156	-0.0773	-0.238	-0.407
	(0.0484)	(0.334)	(0.209)	(0.416)	(0.741)
Capital mobility (CM)	0.804	-0.717	0.570	-2.747	-11.75
	(2.608)	(5.969)	(4.960)	(15.31)	(32.72)
Interaction of FD and CM	0.0328	0.0577	0.0456	0.298	0.569
	(0.105)	(0.314)	(0.195)	(0.480)	(0.933)
Interaction of FD and total AE		7.37e-05		0.000174	
		(0.000131)		(0.000183)	
Interaction of FD and AE distance			0.000168		0.000166
			(0.000125)		(0.000235)
Corporate income tax rate		0.193*	0.189	0.153	0.0347
		(0.109)	(0.165)	(0.347)	(0.246)
Control of corruption		0.0856	0.713	-0.754	-2.373
		(3.528)	(4.336)	(5.562)	(4.241)
Real investment growth		3.084*	2.893	3.395	6.574
		(1.611)	(2.084)	(3.254)	(4.598)
Terms of trade growth				-6.477	-7.293
				(13.34)	(16.21)
Population growth				-1.351	-39.98
				(34.91)	(40.28)
Secondary school enrollment				3.584	-0.213
				(15.18)	(14.39)
Observations	570	370	344	339	313
Number of countries	53	46	45	43	42

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.5 D-GMM Regressions of the Market-Preserving Channel (Control Variables B)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.226***	0.128*	0.135	-0.273	-0.393*
	(0.0623)	(0.0690)	(0.0844)	(0.353)	(0.213)
Fiscal decentralization (FD)	0.000497	-0.0156	-0.0773	-0.628	-0.953
	(0.0484)	(0.334)	(0.209)	(0.975)	(0.958)
Capital mobility (CM)	0.804	-0.717	0.570	-2.449	-38.22
	(2.608)	(5.969)	(4.960)	(46.86)	(41.27)
Interaction of FD and CM	0.0328	0.0577	0.0456	0.537	0.887
	(0.105)	(0.314)	(0.195)	(1.048)	(1.125)
Interaction of FD and total AE		7.37e-05		0.000553	
		(0.000131)		(0.00135)	
Interaction of FD and AE distance			0.000168		-0.000135
			(0.000125)		(0.00104)
Corporate income tax rate		0.193*	0.189	1.006	-1.224
		(0.109)	(0.165)	(1.070)	(1.811)
Control of corruption		0.0856	0.713	6.172	-0.785
		(3.528)	(4.336)	(14.55)	(7.356)
Real investment growth		3.084*	2.893	12.61	28.59**
		(1.611)	(2.084)	(14.63)	(13.98)
Macroeconomic variables					
Government debt in percent of GDP				-0.226	-0.178
				(0.307)	(0.258)
Foreign direct investment in percent of GDP				-0.0667	0.0906
				(0.222)	(0.233)
Interest rate				-0.116	-0.999
				(1.215)	(1.408)
Terms of trade growth				-52.69	-81.05
				(68.76)	(86.76)
Socioeconomic variables					
Population growth				60.19	-108.2
				(105.2)	(132.9)
Secondary school enrollment				-34.76	80.43
				(111.9)	(72.25)
Political variables					
President years left in current term				0.272	0.121
				(0.744)	(0.623)
President percentage of votes				0.00490**	0.0111
				(0.00191)	(0.00779)
Party of chief executive length of time in office				-0.00319	-0.00163
				(0.00575)	(0.0200)
Government fractionalization index				3.439	7.202
				(23.20)	(16.67)
Voice and accountability				2.028	10.63
				(15.58)	(8.451)
Political stability and absence of violence/terrorism				-1.224	3.133
				(6.420)	(5.467)
Government effectiveness				0.353	5.305

				(18.69)	(6.185)
Regulatory quality				-2.713	-6.458
				(16.64)	(13.90)
Observations	570	370	344	215	203
Number of countries	53	46	45	34	33

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.6 S-GMM Regressions of the Market-Preserving Channel (Control Variables A)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.493***	0.519***	0.533***	0.501***	0.503***
	(0.0573)	(0.0491)	(0.0517)	(0.0566)	(0.0382)
Fiscal decentralization (FD)	0.0342	0.0189	0.00464	-0.0281	-0.0431
	(0.0270)	(0.0476)	(0.0914)	(0.117)	(0.115)
Capital mobility (CM)	-0.571	-0.380	-1.437	-0.539	-1.737
	(1.989)	(2.155)	(2.714)	(3.499)	(4.193)
Interaction of FD and CM	-0.0285	-0.0279	0.0165	0.0467	0.0205
	(0.0429)	(0.0738)	(0.106)	(0.150)	(0.169)
Interaction of FD and total AE		9.51e-05		7.10e-05	
		(6.56e-05)		(8.72e-05)	
Interaction of FD and AE distance			8.48e-05		-1.96e-05
			(9.76e-05)		(0.000144)
Corporate income tax rate		0.0312	0.0258	0.0795	0.0708
		(0.0331)	(0.0489)	(0.137)	(0.0529)
Control of corruption		-0.321	-0.310	-0.822	-0.491
		(0.385)	(0.350)	(1.191)	(0.472)
Real investment growth		-0.122	-0.150	0.0820	0.0982
		(0.211)	(0.235)	(0.258)	(0.274)
Terms of trade growth				-0.210	1.405
				(4.475)	(4.396)
Population growth				-0.487	-0.374
				(0.825)	(0.801)
Secondary school enrollment				3.601	10.67
				(11.39)	(10.68)
Observations	672	504	481	472	449
Number of countries	55	50	49	48	47

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.7 S-GMM Regressions of the Market-Preserving Channel (Control Variables B)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.493***	0.519***	0.533***	0.127	0.0594
	(0.0573)	(0.0491)	(0.0517)	(0.350)	(0.209)
Fiscal decentralization (FD)	0.0342	0.0189	0.00464	0.0305	-0.696
	(0.0270)	(0.0476)	(0.0914)	(0.798)	(1.148)
Capital mobility (CM)	-0.571	-0.380	-1.437	14.98	-8.216
	(1.989)	(2.155)	(2.714)	(21.43)	(16.26)
Interaction of FD and CM	-0.0285	-0.0279	0.0165	-0.142	0.746
	(0.0429)	(0.0738)	(0.106)	(0.734)	(1.164)
Interaction of FD and total AE		9.51e-05		-0.000154	
		(6.56e-05)		(0.000683)	
Interaction of FD and AE distance			8.48e-05		0.000291
			(9.76e-05)		(0.000688)
Corporate income tax rate		0.0312	0.0258	0.946	0.0379
		(0.0331)	(0.0489)	(1.422)	(0.632)
Control of corruption		-0.321	-0.310	-2.463	3.898
		(0.385)	(0.350)	(9.700)	(7.548)
Real investment growth		-0.122	-0.150	0.113	-0.227
		(0.211)	(0.235)	(5.465)	(1.742)
Macroeconomic variables					
Government debt in percent of GDP				0.0151	-0.0631
				(0.151)	(0.117)
Foreign direct investment in percent of GDP				0.0739	-0.0544
				(0.0701)	(0.0907)
Interest rate				0.281	0.346
				(0.807)	(0.763)
Terms of trade growth				-7.098	7.357
				(40.67)	(33.23)
Socioeconomic variables					
Population growth				2.915	0.589
				(11.92)	(3.896)
Secondary school enrollment				-16.49	18.12
				(57.76)	(48.03)
Political variables					
President years left in current term				-0.0350	0.372
				(0.737)	(0.937)
President percentage of votes				0.00353	-0.000259
				(0.00339)	(0.00246)
Party of chief executive length of time in office				-0.00113	0.0131
				(0.0112)	(0.0172)
Government fractionalization index				-10.20	-2.910
				(10.08)	(9.984)
Voice and accountability				1.147	2.551
				(8.661)	(4.913)
Political stability and absence of violence/terrorism				3.187	-2.784
				(8.993)	(9.691)
Government effectiveness				-0.755	-9.308

				(14.68)	(11.48)
Regulatory quality				-4.222	-0.914
				(18.35)	(13.21)
Observations	570	370	344	313	304
Number of countries	53	46	45	39	39

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.8 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables A)

	(1) Real GDP growth	(2) Capital mobility	(3) Real GDP growth	(4) Capital mobility	(5) Real GDP growth	(6) Capital mobility	(7) Real GDP growth	(8) Capital mobility	(9) Real GDP growth	(10) Capital mobility
Lagged real GDP growth	0.313***	0.00834***	0.322***	0.00264	0.315***	0.00314	0.274***	-0.00111	0.267***	-0.000731
	(0.0365)	(0.00240)	(0.0453)	(0.00289)	(0.0468)	(0.00296)	(0.0482)	(0.00311)	(0.0499)	(0.00319)
Fiscal decentralization (FD)	0.0405	0.00278	-0.00711	0.00120	-0.00519	0.000622	0.00721	0.00204	0.0106	0.000777
	(0.0261)	(0.00173)	(0.0310)	(0.00198)	(0.0313)	(0.00199)	(0.0320)	(0.00206)	(0.0325)	(0.00208)
Capital mobility	1.314**		1.674**		1.674**		1.654**		1.650**	
	(0.580)		(0.697)		(0.719)		(0.714)		(0.740)	
Interaction of FD and total AE			0.000138**	-8.98e-06**			0.000156**	-9.80e-06**		
			(6.72e-05)	(4.27e-06)			(6.98e-05)	(4.48e-06)		
Interaction of FD and AE distance					0.000196**	-9.35e-06*			0.000220**	-9.37e-06*
					(8.66e-05)	(5.48e-06)			(8.82e-05)	(5.61e-06)
Corporate income tax rate			0.0532*	0.000753	0.0593*	0.00115	0.0563*	0.00114	0.0633*	0.00193
			(0.0309)	(0.00197)	(0.0317)	(0.00201)	(0.0313)	(0.00202)	(0.0323)	(0.00206)
Control of corruption			-0.886	-0.0373	-0.894	-0.0414	-0.887	-0.0275	-0.847	-0.0444
			(0.638)	(0.0407)	(0.652)	(0.0413)	(0.646)	(0.0416)	(0.662)	(0.0422)
Real investment growth			0.907	0.0985***	0.899	0.122***	2.186***	0.140***	2.243***	0.171***
			(0.573)	(0.0363)	(0.593)	(0.0372)	(0.679)	(0.0433)	(0.708)	(0.0444)
Terms of trade growth							-1.504	4.18e-05	-1.296	0.000902
							(1.382)	(0.0891)	(1.407)	(0.0898)
Population growth							2.645	0.0867	2.970	-0.271
							(2.532)	(0.163)	(2.865)	(0.182)
Secondary school enrollment							6.406*	0.302	6.530*	0.362
							(3.583)	(0.231)	(3.636)	(0.231)
Constant	-2.045	0.911***	-8.034*	0.194	-8.131	0.0241	-33.58**	-1.007	-37.29**	0.788
	(1.545)	(0.0965)	(4.839)	(0.309)	(4.956)	(0.314)	(16.55)	(1.066)	(18.17)	(1.159)
Observations	672	672	504	504	481	481	472	472	449	449

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.9 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables B)

	(1) Real GDP growth	(2) Capital mobility	(3) Real GDP growth	(4) Capital mobility	(5) Real GDP growth	(6) Capital mobility	(7) Real GDP growth	(8) Capital mobility	(9) Real GDP growth	(10) Capital mobility
Lagged real GDP growth	0.313***	0.00834***	0.322***	0.00264	0.315***	0.00314	0.0586	-0.00726*	0.0518	-0.00703*
	(0.0365)	(0.00240)	(0.0453)	(0.00289)	(0.0468)	(0.00296)	(0.0580)	(0.00387)	(0.0588)	(0.00396)
Fiscal decentralization (FD)	0.0405	0.00278	-0.00711	0.00120	-0.00519	0.000622	0.00988	-0.000164	0.0126	-0.000272
	(0.0261)	(0.00173)	(0.0310)	(0.00198)	(0.0313)	(0.00199)	(0.0380)	(0.00255)	(0.0382)	(0.00259)
Capital mobility	1.314**		1.674**		1.674**		0.0950		0.0961	
	(0.580)		(0.697)		(0.719)		(0.842)		(0.847)	
Interaction of FD and total AE			0.000138**	-8.98e-06**			9.42e-05	-4.13e-06		
			(6.72e-05)	(4.27e-06)			(9.40e-05)	(6.31e-06)		
Interaction of FD and AE distance					0.000196**	-9.35e-06**			9.86e-05	-4.63e-06
					(8.66e-05)	(5.48e-06)			(0.000105)	(7.13e-06)
Corporate income tax rate			0.0532*	0.000753	0.0593*	0.00115	-0.00980	0.00370	-0.00687	0.00355
			(0.0309)	(0.00197)	(0.0317)	(0.00201)	(0.0337)	(0.00225)	(0.0339)	(0.00229)
Control of corruption			-0.886	-0.0373	-0.894	-0.0414	0.938	-0.00103	0.954	-0.00559
			(0.638)	(0.0407)	(0.652)	(0.0413)	(0.798)	(0.0536)	(0.817)	(0.0553)
Real investment growth			0.907	0.0985***	0.899	0.122***	5.174***	0.144*	5.242***	0.142*
			(0.573)	(0.0363)	(0.593)	(0.0372)	(1.135)	(0.0758)	(1.141)	(0.0768)
Macroeconomic variables										
Government debt in percent of GDP							-0.0137	-0.000250	-0.0115	-0.000300
							(0.0116)	(0.000782)	(0.0117)	(0.000792)
Foreign direct investment in percent of GDP							-0.0135**	-0.00197***	-0.0141**	-0.00200***
							(0.00681)	(0.000443)	(0.00688)	(0.000452)
Interest rate							-0.0954	-0.0195***	-0.0789	-0.0197***
							(0.0646)	(0.00420)	(0.0652)	(0.00427)
Terms of trade growth							0.539	0.116	0.630	0.120
							(1.502)	(0.101)	(1.514)	(0.102)
Socioeconomic variables										

Population growth							-13.09***	-0.199	-14.49***	-0.178
							(4.457)	(0.299)	(4.521)	(0.306)
Secondary school enrollment							5.342	0.139	4.936	0.122
							(3.500)	(0.235)	(3.528)	(0.239)
Political variables										
President years left in current term							-0.0727	0.00518	-0.0789	0.00512
							(0.0711)	(0.00477)	(0.0724)	(0.00489)
President percentage of votes							-0.000402	-4.91e-05*	-0.000395	-5.10e-05*
							(0.000442)	(2.96e-05)	(0.000444)	(3.00e-05)
Party of chief executive length of time in office							0.00157**	2.70e-06	0.00171**	2.78e-06
							(0.000746)	(5.01e-05)	(0.000805)	(5.45e-05)
Government fractionalization index							2.506***	0.114*	2.573***	0.113*
							(0.934)	(0.0624)	(0.940)	(0.0633)
Voice and accountability							3.928***	-0.257***	4.215***	-0.262***
							(1.298)	(0.0859)	(1.315)	(0.0878)
Political stability and absence of violence/terrorism							0.0235	0.0939***	0.141	0.0990***
							(0.548)	(0.0364)	(0.557)	(0.0373)
Government effectiveness							-0.972	0.237***	-1.037	0.251***
							(0.790)	(0.0513)	(0.817)	(0.0534)
Regulatory quality							-1.398	0.0413	-1.524*	0.0345
							(0.896)	(0.0601)	(0.916)	(0.0620)
Constant	-2.045	0.911***	-8.034*	0.194	-8.131	0.0241	23.23	0.0554	30.27	-0.0401
	(1.545)	(0.0965)	(4.839)	(0.309)	(4.956)	(0.314)	(26.39)	(1.772)	(26.72)	(1.810)
Observations	672	672	504	504	481	481	313	313	304	304

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.1 Baseline Regressions of the Market-Preserving Channel (Without Control Variables, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth	(7) Real GDP growth	(8) Real GDP growth	(9) Real GDP growth
Lagged real GDP growth				0.316***			0.318***	0.318***	0.308***
				(0.0795)			(0.0816)	(0.0825)	(0.0852)
Fiscal decentralization (FD)	0.0518	0.0455	0.0383	-0.00215	0.00876	0.0329	0.0402	0.0277	0.0359
	(0.0570)	(0.0524)	(0.0400)	(0.0354)	(0.0699)	(0.0761)	(0.0767)	(0.0780)	(0.0784)
Capital mobility (CM)		2.348***	1.872	1.750	1.627	1.777	2.426	2.391	2.613
		(0.824)	(1.261)	(1.279)	(1.488)	(1.820)	(1.728)	(1.737)	(1.712)
Interaction of FD and CM					0.0448	0.00636	-0.0484	-0.0369	-0.0431
					(0.0557)	(0.0800)	(0.0801)	(0.0803)	(0.0803)
Interaction of FD and total AE								0.000127**	
								(5.25e-05)	
Interaction of FD and AE distance									0.000178**
									(7.57e-05)
Corporate income tax rate			0.0458	0.0496		0.0457	0.0514	0.0507	0.0590
			(0.0531)	(0.0526)		(0.0535)	(0.0523)	(0.0523)	(0.0533)
Voice and accountability			-1.007	0.486		-0.990	0.393	0.341	0.579
			(1.450)	(1.703)		(1.448)	(1.678)	(1.666)	(1.762)
Government effectiveness			-1.896*	-1.674		-1.885*	-1.775*	-1.748*	-1.976*
			(0.989)	(1.000)		(0.992)	(1.004)	(0.995)	(1.090)
Regulatory quality			1.239	0.254		1.234	0.279	0.256	0.323
			(0.993)	(1.043)		(0.992)	(1.056)	(1.046)	(1.081)
Real investment growth			2.226**	0.925		2.214**	0.994	0.985	0.917
			(0.910)	(1.060)		(0.969)	(1.098)	(1.081)	(1.159)
Constant	-1.696	-3.440**	-8.424*	-2.755	-2.951	-8.301	-3.516	-3.430	-3.755
	(1.664)	(1.680)	(4.785)	(4.930)	(1.881)	(5.506)	(5.353)	(5.372)	(5.710)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	808	791	595	504	791	595	504	504	481
R-squared	0.389	0.404	0.510	0.560	0.405	0.510	0.560	0.564	0.570
Number of countries	60	57	53	50	57	53	50	50	49

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.2 Baseline Regressions of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth
Lagged real GDP growth	0.318***	0.318***	0.308***	0.276***	0.276***	0.265***
	(0.0816)	(0.0825)	(0.0852)	(0.0774)	(0.0765)	(0.0796)
Fiscal decentralization (FD)	0.0402	0.0277	0.0359	0.0696	0.0581	0.0629
	(0.0767)	(0.0780)	(0.0784)	(0.0771)	(0.0763)	(0.0785)
Capital mobility (CM)	2.426	2.391	2.613	2.698*	2.693*	2.775*
	(1.728)	(1.737)	(1.712)	(1.490)	(1.495)	(1.448)
Interaction of FD and CM	-0.0484	-0.0369	-0.0431	-0.0705	-0.0586	-0.0612
	(0.0801)	(0.0803)	(0.0803)	(0.0793)	(0.0776)	(0.0798)
Interaction of FD and total AE		0.000127**			0.000148**	
		(5.25e-05)			(7.16e-05)	
Interaction of FD and AE distance			0.000178**			0.000208**
			(7.57e-05)			(9.96e-05)
Corporate income tax rate	0.0514	0.0507	0.0590	0.0522	0.0513	0.0613
	(0.0523)	(0.0523)	(0.0533)	(0.0565)	(0.0568)	(0.0579)
Voice and accountability	0.393	0.341	0.579	0.271	0.293	0.467
	(1.678)	(1.666)	(1.762)	(1.809)	(1.790)	(1.883)
Government effectiveness	-1.775*	-1.748*	-1.976*	-1.455	-1.447	-1.634
	(1.004)	(0.995)	(1.090)	(1.276)	(1.270)	(1.333)
Regulatory quality	0.279	0.256	0.323	-0.147	-0.167	-0.0938
	(1.056)	(1.046)	(1.081)	(1.075)	(1.065)	(1.088)
Real investment growth	0.994	0.985	0.917	2.350**	2.350**	2.399**
	(1.098)	(1.081)	(1.159)	(0.919)	(0.905)	(0.903)
Population growth				0.366	0.405	0.479
				(5.030)	(5.039)	(5.967)
Secondary school enrollment				6.350	5.925	6.078
				(5.160)	(5.208)	(5.249)
Terms of trade growth				-1.322	-1.424	-1.320
				(2.373)	(2.289)	(2.347)
Constant	-3.516	-3.430	-3.755	-10.77	-10.04	-11.69
	(5.353)	(5.372)	(5.710)	(15.30)	(15.23)	(16.64)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes
Observations	504	504	481	472	472	449
R-squared	0.560	0.564	0.570	0.568	0.572	0.580
Number of countries	50	50	49	48	48	47

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.3 Baseline Regressions of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth	(6) Real GDP growth
Lagged real GDP growth	0.318***	0.318***	0.308***	0.0602	0.0621	0.0556
	(0.0816)	(0.0825)	(0.0852)	(0.0677)	(0.0674)	(0.0679)
Fiscal decentralization (FD)	0.0402	0.0277	0.0359	0.0750	0.0742	0.0873
	(0.0767)	(0.0780)	(0.0784)	(0.0732)	(0.0737)	(0.0718)
Capital mobility (CM)	2.426	2.391	2.613	0.799	0.832	0.954
	(1.728)	(1.737)	(1.712)	(1.265)	(1.273)	(1.223)
Interaction of FD and CM	-0.0484	-0.0369	-0.0431	-0.0770	-0.0772	-0.0895
	(0.0801)	(0.0803)	(0.0803)	(0.0750)	(0.0763)	(0.0742)
Interaction of FD and total AE		0.000127**			9.44e-05	
		(5.25e-05)			(9.64e-05)	
Interaction of FD and AE distance			0.000178**			0.000104
			(7.57e-05)			(0.000111)
Corporate income tax rate	0.0514	0.0507	0.0590	-0.00169	-0.00219	0.00198
	(0.0523)	(0.0523)	(0.0533)	(0.0550)	(0.0543)	(0.0548)
Voice and accountability	0.393	0.341	0.579	3.834**	3.895**	4.194**
	(1.678)	(1.666)	(1.762)	(1.543)	(1.571)	(1.639)
Government effectiveness	-1.775*	-1.748*	-1.976*	-1.168	-1.139	-1.232
	(1.004)	(0.995)	(1.090)	(1.139)	(1.151)	(1.133)
Regulatory quality	0.279	0.256	0.323	-1.432	-1.338	-1.448
	(1.056)	(1.046)	(1.081)	(0.964)	(0.968)	(1.031)
Real investment growth	0.994	0.985	0.917	5.346***	5.232***	5.305***
	(1.098)	(1.081)	(1.159)	(1.430)	(1.419)	(1.399)
Macroeconomic variables						
Government debt in percent of GDP				-0.0136	-0.0150	-0.0129
				(0.0164)	(0.0166)	(0.0164)
Foreign direct investment in percent of GDP				-0.0122	-0.0118	-0.0121
				(0.00777)	(0.00776)	(0.00751)
Interest rate				-0.109	-0.110	-0.0957
				(0.0872)	(0.0876)	(0.0891)
Terms of trade growth				0.595	0.599	0.700
				(1.361)	(1.358)	(1.367)
Socioeconomic variables						
Population growth				-14.82**	-14.75**	-16.47**
				(6.776)	(6.784)	(6.281)
Secondary school enrollment				5.920*	5.505	5.083
				(3.331)	(3.401)	(3.428)
Political variables						
President years left in current term				-0.0617	-0.0681	-0.0744
				(0.0931)	(0.0932)	(0.0944)
President percentage of votes				-0.000403	-0.000420	-0.000416
				(0.000389)	(0.000402)	(0.000408)
Party of chief executive length of time in office				0.00151***	0.00140**	0.00151**

				(0.000553)	(0.000586)	(0.000684)
Government fractionalization index				2.526**	2.446**	2.499**
				(1.111)	(1.124)	(1.123)
Political stability and absence of violence/terrorism				0.163	0.117	0.248
				(0.781)	(0.781)	(0.804)
Control of corruption				0.897	0.841	0.837
				(0.991)	(0.987)	(0.981)
Constant	-3.516	-3.430	-3.755	-1.549	-0.786	1.952
	(5.353)	(5.372)	(5.710)	(13.37)	(13.41)	(12.70)
Time and country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Heteroscedasticity robust	Yes	Yes	Yes	Yes	Yes	Yes
Observations	504	504	481	313	313	304
R-squared	0.560	0.564	0.570	0.713	0.714	0.717
Number of countries	50	50	49	39	39	39

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.4 D-GMM Regressions of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.226***	0.132*	0.138*	0.0440	0.0182
	(0.0623)	(0.0682)	(0.0748)	(0.111)	(0.136)
Fiscal decentralization (FD)	0.000497	-0.0112	0.118	0.314	-0.379
	(0.0484)	(0.276)	(0.650)	(0.459)	(0.917)
Capital mobility (CM)	0.804	3.022	4.841	4.226	-10.10
	(2.608)	(6.664)	(9.666)	(13.56)	(20.00)
Interaction of FD and CM	0.0328	0.0172	-0.0982	-0.249	0.304
	(0.105)	(0.318)	(0.618)	(0.441)	(1.053)
Interaction of FD and total AE		8.90e-05		7.37e-05	
		(0.000130)		(0.000160)	
Interaction of FD and AE distance			0.000169		0.000113
			(0.000177)		(0.000134)
Corporate income tax rate		0.317	0.342	0.387	0.462*
		(0.221)	(0.263)	(0.332)	(0.250)
Voice and accountability		6.912**	6.876**	7.145**	6.901**
		(2.971)	(3.321)	(3.342)	(3.267)
Government effectiveness		-2.264	-1.918	-1.764	-1.851
		(2.276)	(2.323)	(1.892)	(4.588)
Regulatory quality		0.800	0.136	-3.160	-3.098
		(3.576)	(2.980)	(4.249)	(6.060)
Real investment growth		3.658*	3.861	6.624	8.766*
		(2.185)	(3.370)	(4.577)	(4.944)
Terms of trade growth				0.760	1.356
				(9.473)	(9.093)
Population growth				-12.44	-16.33
				(33.64)	(48.96)
Secondary school enrollment				4.929	13.67
				(16.78)	(13.86)
Observations	570	370	344	339	313
Number of countries	53	46	45	43	42

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.5 D-GMM Regressions of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.226***	0.132*	0.138*	-0.273	-0.393*
	(0.0623)	(0.0682)	(0.0748)	(0.353)	(0.213)
Fiscal decentralization (FD)	0.000497	-0.0112	0.118	-0.628	-0.953
	(0.0484)	(0.276)	(0.650)	(0.975)	(0.958)
Capital mobility (CM)	0.804	3.022	4.841	-2.449	-38.22
	(2.608)	(6.664)	(9.666)	(46.86)	(41.27)
Interaction of FD and CM	0.0328	0.0172	-0.0982	0.537	0.887
	(0.105)	(0.318)	(0.618)	(1.048)	(1.125)
Interaction of FD and total AE		8.90e-05		0.000553	
		(0.000130)		(0.00135)	
Interaction of FD and AE distance			0.000169		-0.000135
			(0.000177)		(0.00104)
Corporate income tax rate		0.317	0.342	1.006	-1.224
		(0.221)	(0.263)	(1.070)	(1.811)
Voice and accountability		6.912**	6.876**	2.028	10.63
		(2.971)	(3.321)	(15.58)	(8.451)
Government effectiveness		-2.264	-1.918	0.353	5.305
		(2.276)	(2.323)	(18.69)	(6.185)
Regulatory quality		0.800	0.136	-2.713	-6.458
		(3.576)	(2.980)	(16.64)	(13.90)
Real investment growth		3.658*	3.861	12.61	28.59**
		(2.185)	(3.370)	(14.63)	(13.98)
Macroeconomic variables					
Government debt in percent of GDP				-0.226	-0.178
				(0.307)	(0.258)
Foreign direct investment in percent of GDP				-0.0667	0.0906
				(0.222)	(0.233)
Interest rate				-0.116	-0.999
				(1.215)	(1.408)
Terms of trade growth				-52.69	-81.05
				(68.76)	(86.76)
Socioeconomic variables					
Population growth				60.19	-108.2
				(105.2)	(132.9)
Secondary school enrollment				-34.76	80.43
				(111.9)	(72.25)
Political variables					
President years left in current term				0.272	0.121
				(0.744)	(0.623)
President percentage of votes				0.00490**	0.0111
				(0.00191)	(0.00779)
Party of chief executive length of time in office				-0.00319	-0.00163
				(0.00575)	(0.0200)
Government fractionalization index				3.439	7.202
				(23.20)	(16.67)
Political stability and absence of				-1.224	-1.224

violence/terrorism					
				(6.420)	(5.467)
Control of corruption				6.172	-0.785
				(14.55)	(7.356)
Observations	570	370	344	215	203
Number of countries	53	46	45	34	33

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.6 S-GMM Regressions of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.493***	0.506***	0.522***	0.460***	0.511***
	(0.0573)	(0.0540)	(0.0569)	(0.0503)	(0.0529)
Fiscal decentralization (FD)	0.0342	0.0603	0.00977	0.173	0.0216
	(0.0270)	(0.110)	(0.0892)	(0.247)	(0.127)
Capital mobility (CM)	-0.571	0.826	-0.773	2.578	-1.272
	(1.989)	(3.249)	(3.396)	(4.028)	(3.782)
Interaction of FD and CM	-0.0285	-0.0639	-0.00246	-0.192	-0.0311
	(0.0429)	(0.135)	(0.132)	(0.241)	(0.179)
Interaction of FD and total AE		6.83e-05		4.88e-05	
		(8.86e-05)		(7.53e-05)	
Interaction of FD and AE distance			4.46e-05		-2.18e-05
			(0.000107)		(0.000129)
Corporate income tax rate		0.0441	0.0509	0.176	0.113
		(0.0546)	(0.0744)	(0.120)	(0.0706)
Voice and accountability		-0.564	-0.368	-0.763	0.208
		(0.996)	(0.796)	(1.328)	(1.092)
Government effectiveness		-0.993	-0.961	-2.319**	-1.627*
		(1.216)	(0.770)	(1.074)	(0.989)
Regulatory quality		1.343	0.926	3.196	2.588*
		(1.281)	(0.969)	(2.076)	(1.569)
Real investment growth		-0.118	-0.0724	0.685	-0.0301
		(0.214)	(0.445)	(0.711)	(0.236)
Terms of trade growth				-2.617	3.368
				(5.248)	(5.770)
Population growth				-1.635	0.330
				(2.286)	(0.721)
Secondary school enrollment				-10.59	1.218
				(14.54)	(7.888)
Observations	672	504	481	472	449
Number of countries	55	50	49	48	47

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.7 S-GMM Regressions of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking)

	(1) Real GDP growth	(2) Real GDP growth	(3) Real GDP growth	(4) Real GDP growth	(5) Real GDP growth
Lagged real GDP growth	0.493***	0.506***	0.522***	0.127	0.0521
	(0.0573)	(0.0540)	(0.0569)	(0.350)	(0.242)
Fiscal decentralization (FD)	0.0342	0.0603	0.00977	0.0305	-0.593
	(0.0270)	(0.110)	(0.0892)	(0.798)	(0.835)
Capital mobility (CM)	-0.571	0.826	-0.773	14.98	-6.645
	(1.989)	(3.249)	(3.396)	(21.43)	(14.97)
Interaction of FD and CM	-0.0285	-0.0639	-0.00246	-0.142	0.664
	(0.0429)	(0.135)	(0.132)	(0.734)	(0.994)
Interaction of FD and total AE		6.83e-05		-0.000154	
		(8.86e-05)		(0.000683)	
Interaction of FD and AE distance			4.46e-05		0.000286
			(0.000107)		(0.000725)
Corporate income tax rate		0.0441	0.0509	0.946	0.0951
		(0.0546)	(0.0744)	(1.422)	(0.618)
Voice and accountability		-0.564	-0.368	1.147	2.714
		(0.996)	(0.796)	(8.661)	(6.821)
Government effectiveness		-0.993	-0.961	-0.755	-10.09
		(1.216)	(0.770)	(14.68)	(11.33)
Regulatory quality		1.343	0.926	-4.222	0.183
		(1.281)	(0.969)	(18.35)	(12.16)
Real investment growth		-0.118	-0.0724	0.113	-0.157
		(0.214)	(0.445)	(5.465)	(1.837)
Macroeconomic variables					
Government debt in percent of GDP				0.0151	-0.0512
				(0.151)	(0.104)
Foreign direct investment in percent of GDP				0.0739	-0.0577
				(0.0701)	(0.0890)
Interest rate				0.281	0.360
				(0.807)	(0.678)
Terms of trade growth				-7.098	7.924
				(40.67)	(33.25)
Socioeconomic variables					
Population growth				2.915	0.320
				(11.92)	(3.922)
Secondary school enrollment				-16.49	12.60
				(57.77)	(36.55)
Political variables					
President years left in current term				-0.0350	0.389
				(0.737)	(0.806)
President percentage of votes				0.00353	-0.000409
				(0.00339)	(0.00242)
Party of chief executive length of time in office				-0.00113	0.0126
				(0.0112)	(0.0190)
Government fractionalization index				-10.20	-2.876
				(10.08)	(10.29)
Political stability and absence of				3.187	3.187

violence/terrorism					
				(8.993)	(9.682)
Control of corruption				-2.463	3.489
				(9.700)	(6.872)
Observations	672	504	481	313	304
Number of countries	55	50	49	39	39

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.8 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables A, Different Rent-Seeking)

	(1) Real GDP growth	(2) Capital mobility	(3) Real GDP growth	(4) Capital mobility	(5) Real GDP growth	(6) Capital mobility	(7) Real GDP growth	(8) Capital mobility	(9) Real GDP growth	(10) Capital mobility
Lagged real GDP growth	0.313***	0.00834***	0.316***	0.00215	0.306***	0.00310	0.274***	-0.00177	0.264***	-0.000913
	(0.0365)	(0.00240)	(0.0453)	(0.00288)	(0.0469)	(0.00293)	(0.0484)	(0.00307)	(0.0501)	(0.00314)
Fiscal decentralization (FD)	0.0405	0.00278	-0.00472	0.00121	-0.00173	0.000595	0.00754	0.00246	0.0109	0.00135
	(0.0261)	(0.00173)	(0.0308)	(0.00195)	(0.0311)	(0.00195)	(0.0319)	(0.00202)	(0.0323)	(0.00202)
Capital mobility	1.314**		1.881***		2.026***		1.894***		1.973***	
	(0.580)		(0.702)		(0.728)		(0.725)		(0.753)	
Interaction of FD and total AE			0.000133**	-8.87e-06**			0.000155**	-9.93e-06**		
			(6.68e-05)	(4.22e-06)			(6.96e-05)	(4.39e-06)		
Interaction of FD and AE distance					0.000184**	-8.88e-06*			0.000215**	-9.28e-06*
					(8.60e-05)	(5.37e-06)			(8.79e-05)	(5.49e-06)
Corporate income tax rate			0.0493	0.00153	0.0572*	0.00175	0.0508	0.00210	0.0601*	0.00251
			(0.0313)	(0.00198)	(0.0321)	(0.00201)	(0.0320)	(0.00203)	(0.0329)	(0.00206)
Voice and accountability			0.409	-0.159**	0.665	-0.188***	0.357	-0.179***	0.548	-0.206***
			(1.061)	(0.0670)	(1.085)	(0.0674)	(1.078)	(0.0679)	(1.105)	(0.0685)
Government effectiveness			-1.671***	0.0636	-1.895***	0.121***	-1.297*	0.0998**	-1.484**	0.129***
			(0.649)	(0.0411)	(0.690)	(0.0429)	(0.713)	(0.0450)	(0.745)	(0.0462)
Regulatory quality			0.237	0.116**	0.303	0.102**	-0.170	0.129**	-0.0929	0.118**
			(0.815)	(0.0514)	(0.829)	(0.0517)	(0.843)	(0.0532)	(0.858)	(0.0535)
Real investment growth			0.933	0.0502	0.852	0.0696*	2.241***	0.0801*	2.268***	0.108**
			(0.613)	(0.0388)	(0.629)	(0.0392)	(0.712)	(0.0450)	(0.738)	(0.0459)
Terms of trade growth							-1.454	0.0317	-1.348	0.0455
							(1.384)	(0.0878)	(1.411)	(0.0884)
Population growth							1.016	0.287*	1.382	-0.0237
							(2.717)	(0.172)	(3.001)	(0.188)
Secondary school enrollment							6.156*	0.351	6.275*	0.407*
							(3.585)	(0.227)	(3.634)	(0.227)
Constant	-2.045	0.911***	-7.968	0.418	-7.807	0.250	-24.19	-2.099*	-27.57	-0.613
	(1.545)	(0.0965)	(4.927)	(0.312)	(5.035)	(0.315)	(17.49)	(1.106)	(18.93)	(1.185)
Observations	672	672	504	504	481	481	472	472	449	449

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7.9 SEM Mediation Analysis of the Market-Preserving Channel (Control Variables B, Different Rent-Seeking)

	(1) Real GDP growth	(2) Capital mobility	(3) Real GDP growth	(4) Capital mobility	(5) Real GDP growth	(6) Capital mobility	(7) Real GDP growth	(8) Capital mobility	(9) Real GDP growth	(10) Capital mobility
Lagged real GDP growth	0.313***	0.00834***	0.316***	0.00215	0.306***	0.00310	0.0586	-0.00726*	0.0518	-0.00703*
	(0.0365)	(0.00240)	(0.0453)	(0.00288)	(0.0469)	(0.00293)	(0.0580)	(0.00387)	(0.0588)	(0.00396)
Fiscal decentralization (FD)	0.0405	0.00278	-0.00472	0.00121	-0.00173	0.000595	0.00988	-0.000164	0.0126	-0.000272
	(0.0261)	(0.00173)	(0.0308)	(0.00195)	(0.0311)	(0.00195)	(0.0380)	(0.00255)	(0.0382)	(0.00259)
Capital mobility	1.314**		1.881***		2.026***		0.0950		0.0961	
	(0.580)		(0.702)		(0.728)		(0.842)		(0.847)	
Interaction of FD and total AE			0.000133**	-8.87e-06**			9.42e-05	-4.13e-06		
			(6.68e-05)	(4.22e-06)			(9.40e-05)	(6.31e-06)		
Interaction of FD and AE distance					0.000184**	-8.88e-06*			9.86e-05	-4.63e-06
					(8.60e-05)	(5.37e-06)			(0.000105)	(7.13e-06)
Corporate income tax rate			0.0493	0.00153	0.0572*	0.00175	-0.00980	0.00370	-0.00687	0.00355
			(0.0313)	(0.00198)	(0.0321)	(0.00201)	(0.0337)	(0.00225)	(0.0339)	(0.00229)
Voice and accountability			0.409	-0.159**	0.665	-0.188***	3.928***	-0.257***	4.215***	-0.262***
			(1.061)	(0.0670)	(1.085)	(0.0674)	(1.298)	(0.0859)	(1.315)	(0.0878)
Government effectiveness			-1.671***	0.0636	-1.895***	0.121***	-0.972	0.237***	-1.037	0.251***
			(0.649)	(0.0411)	(0.690)	(0.0429)	(0.790)	(0.0513)	(0.817)	(0.0534)
Regulatory quality			0.237	0.116**	0.303	0.102**	-1.398	0.0413	-1.524*	0.0345
			(0.815)	(0.0514)	(0.829)	(0.0517)	(0.896)	(0.0601)	(0.916)	(0.0620)
Real investment growth			0.933	0.0502	0.852	0.0696*	5.174***	0.144*	5.242***	0.142*
			(0.613)	(0.0388)	(0.629)	(0.0392)	(1.135)	(0.0758)	(1.141)	(0.0768)
Macroeconomic variables										
Government debt in percent of GDP							-0.0137	-0.000250	-0.0115	-0.000300
							(0.0116)	(0.000782)	(0.0117)	(0.000792)
Foreign direct investment in percent of GDP							-0.0135**	-0.00197***	-0.0141**	-0.00200***
							(0.00681)	(0.000443)	(0.00688)	(0.000452)
Interest rate							-0.0954	-0.0195***	-0.0789	-0.0197***
							(0.0646)	(0.00420)	(0.0652)	(0.00427)

Terms of trade growth							0.539	0.116	0.630	0.120
							(1.502)	(0.101)	(1.514)	(0.102)
Socioeconomic variables										
Population growth							-13.09***	-0.199	-14.49***	-0.178
							(4.457)	(0.299)	(4.521)	(0.306)
Secondary school enrollment							5.342	0.139	4.936	0.122
							(3.500)	(0.235)	(3.528)	(0.239)
Political variables										
President years left in current term							-0.0727	0.00518	-0.0789	0.00512
							(0.0711)	(0.00477)	(0.0724)	(0.00489)
President percentage of votes							-0.000402	-4.91e-05*	-0.000395	-5.10e-05*
							(0.000442)	(2.96e-05)	(0.000444)	(3.00e-05)
Party of chief executive length of time in office							0.00157**	2.70e-06	0.00171**	2.78e-06
							(0.000746)	(5.01e-05)	(0.000805)	(5.45e-05)
Government fractionalization index							2.506***	0.114*	2.573***	0.113*
							(0.934)	(0.0624)	(0.940)	(0.0633)
Political stability and absence of violence/terrorism							0.0235	0.0939***	0.141	0.0990***
							(0.548)	(0.0364)	(0.557)	(0.0373)
Control of corruption							0.938	-0.00103	0.954	-0.00559
							(0.798)	(0.0536)	(0.817)	(0.0553)
Constant	-2.045	0.911***	-7.968	0.418	-7.807	0.250	23.23	0.0554	30.27	-0.0401
	(1.545)	(0.0965)	(4.927)	(0.312)	(5.035)	(0.315)	(26.39)	(1.772)	(26.72)	(1.810)
Observations	672	672	504	504	481	481	313	313	304	304

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1