Regional Competitiveness in Indonesia: The Incentives of Fiscal Decentralization on State Efficiency and Economic Growth

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DEDICATION

This dissertation is dedicated to my wife Ira and my two wonderful children, Avi and Dhafin who have endlessly loved and supported me.

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ABSTRACT

REGIONAL COMPETITIVENESS IN INDONESIA: THE INCENTIVES OF FISCAL DECENTRALIZATION ON STATE EFFICIENCY AND ECONOMIC GROWTH

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This dissertation examines the implementation of decentralization in Indonesia and measures the incentives of fiscal decentralization on state efficiency and economic growth. Efficiency of state governments in utilizing fiscal resources to support private sector development and accelerate economic growth is consistent with the concept of regional competitiveness. The main goal of this dissertation is to expand existing empirical and theoretical frameworks on fiscal decentralization and economic growth that have traditionally excluded efficiency factors of sub national governments. This dissertation also aims to fill gaps in the way state efficiency is measured as an extension of institutional quality of public sector.

Following a two-stage empirical methodology, the efficiency of Indonesia's 26 states government expenditure over a 10-year period (1996-2005) is constructed using Data

Envelopment Analysis (DEA) and a Tobit panel data model is used to analyze the determinants of state efficiency. In the second stage, panel data analysis is employed to analyze the impact of fiscal decentralization and state government efficiency on regional growth.

This dissertation found that the degree of fiscal decentralization has a positive association with economic growth if there are insignificant imbalances between regions following a disproportionate growth in labor force and population. To a certain degree, regional imbalances, which are a crucial issue in many developing countries, are one of the disincentives in a decentralized system.

Another finding is that although decentralization provides a greater incentive structure for states to become more efficient, this does not always lead to robust growth due to the extent of misallocation of fiscal resources and lack of investment in productive spending. Of several factors that potentially determine state efficiency, the degree of fiscal decentralization, ratio of productive spending, operating costs and revenue independence are significant and these factors differ between leading and lagging states.

Keywords: Regional Competitiveness, Economic Growth, Decentralization, Institutional Development, Public Expenditure, Capital Investments, Indonesia

1. Introduction

The purpose of this dissertation is to shed light on how to measure the relationship between fiscal decentralization, allocative efficiency and economic growth within the framework of regional competitiveness. Those three factors are examined at the state level where only a few empirical studies have been completed. This dissertation will contribute to the growing theoretical and methodological literature on fiscal decentralization and economic growth. Furthermore, the methodology introduced in measuring and incorporating state efficiency levels in the growth model will fill the gap in existing empirical studies on fiscal decentralization and economic growth that traditionally excluded efficiency factors of sub national governments.

There are two differing views on decentralization that influence the discussion on regional competitiveness. Traditional economic theories focus on the sources of benefits of decentralization based on Hayek (1945) and Tiebout (1956). Hayek argued that sub-national governments have better information on the unique conditions and specific needs of their jurisdiction, that enable them to allocate resources more efficiently than the central government through a centralized planning system. Tiebout assumed that citizens are able to sort their preferences of local public goods and have them met because regional competition exists. Hence, traditionalists fail to recognize the relationship between institutions and incentive structures in a decentralized system.

From institutionalists' point of view, the relationship between institutions, markets and firms is crucial. They believe in the importance of incentive structures to motivate institutions, markets and firms to be more productive and efficient following the concept of "Market Preserving Federalism" (Qian and Weingast 1997).[1] Efficient markets require institutions, particularly the rule of law, and governments to provide positive market incentives by rewarding economic successes and punishing economic failures. Government policies to impose high taxes that can reduce future wealth or to bail out unproductive programs or projects are an example of some of the problems that relate to negative incentive structures. These actions discourage firms from taking risks and making investments, which lead to lower competitiveness and economic growth level (North 1995).

Regional competitiveness focuses on the capacity of sub-national governments to stimulate and sustain economic growth and development.[2] Sub-national governments play a key role in supporting the private sector and preserving a market economy, as active agents of development at the regional level. For this to occur, it is necessary to have in place a supportive system of governance, which will allow a sub-national government to have a major role in the process of development. Within the framework of regional competitiveness, decentralization is an avenue to increase the power and

[1] Market Preserving Federalism is an economic concept of a federal system where there is a certain limit on how far the political system of government can intervene the markets.
[2] Sub-national government refers to a state or province and district government. The latter consists of local regencies and municipalities. National government refers to the central government.

capacity of a sub-national government, sustain economic growth and improve standards of living.

Predominant amongst the structure of a decentralized system is fiscal decentralization that expands a state's fiscal capacity since it allows for the transfer of fiscal responsibility to sub-national states. Fiscal capacity relates to the size of funding available in the state budget. A larger fiscal capacity is driven by an argument that state governments have greater capability to allocate fiscal resources efficiently, generate revenues, and maintain budget discipline in a decentralized system (Bird and Wallich 1993, Oates 1993). However, being responsible for a larger fiscal capacity offers both challenges and opportunities for state government in developing countries, which typically lack transparency and accountability.

Since there is a limit to fiscal resources, the ability of state governments to allocate fiscal resources efficiently is important. Allocative efficiency is ultimately a proxy of state government performance as a whole and is often times tied to the quality of state institutions.[3] State governments are the decision-making units responsible for making choices on how and where to spend fiscal resources based on both short and long term development goals and strategies. Similar to the idea that rational individuals will want to maximize their utilities, states will also want to optimize their fiscal resources to better serve their goals and interests. Thus, state government efficiency eventually becomes the determinant factor of competitiveness and growth at the regional level.

[3] The gap in linking the concepts of public sector efficiency and institutional quality is due to the complexity in quantifying the correlation between efficiency and institutional factors.

Although it is widely assumed that the implementation of fiscal decentralization will increase efficiency and economic growth, the empirical evidence that supports this idea is still inconclusive (Martinez-Vasquez and McNab 2003). Earlier studies on the relationship between fiscal decentralization and economic growth have so far shown inconsistent results even within the same country. Some of the studies found a negative relationship between fiscal decentralization and economic growth (Davoodi and Zou 1998, Zhang and Zou 1998), while others reported a positive correlation (Lin and Liu 2000, Jin et. al. 2001) or no relationship at all (Woller and Phillips 1998). These inconclusive outcomes may be caused by several factors, such as unequal wealth distribution, inconsistent national and sub-national policies, and uncoordinated public services provided by government institutions (Prud'homme 1995).

This dissertation argues that part of the inconclusive results of previous empirical studies on the relationship between fiscal decentralization and economic growth are attributed to the exclusion of a measure of state government efficiency in the growth model. The problem of including state efficiency factor in the growth equation is the difficulty in quantifying efficiency factors, specifically efficiency in the allocation of fiscal resources (Rodriguez-Pose 2007). Fiscal decentralization, measured as the share of sub-national spending or revenue over total national spending or revenue, does not merely depict an actual measure of efficiency. To test the hypotheses and prove the key argument of this dissertation, Indonesia is chosen as a case study.

Indonesia experienced a transition to a full-decentralized system following the 1997 financial crisis. The political turmoil that was triggered by the financial crisis

resulted in mounting dissatisfaction towards the central government, potentially leading to regional disintegration. Regions demanded a fair distribution of revenue and an expansion of power, which would allow for more participation in determining the direction of development. A new decentralization law was introduced to change from decades of a central planning system under Suharto's rule, which to a large extent was an adoption of a top-down decentralization process.[4] This reform was supported by the IMF as one of the conditions in the economic rescue package.

After almost eight years since the new law of decentralization was implemented, several challenges persist despite the astonishing outcomes in such a short time period. The swift implementation was a response to a mandate by the legislature, resulting in limited time for extensive policy analysis. Critics have argued that the rapid process of decentralization in Indonesia, also referred to as the "big-bang decentralization", had not been planned to improve the welfare and development at the regional level, but was the result of political compromise due to the internal and external pressures toward the New Order authoritarian rule. Consequently, this transformation of the system of governance has been considered a failure in certain areas.

First, several regions still faced challenges in stimulating their economy despite a larger fiscal capacity. States spent less in public capital investments than what was expected to be necessary to accelerate economic growth. In order to increase revenue

[4] The central government controls the process of decentralization in the top-down process, while the bottom-up process is mostly driven by regional demands. This process affects the transfer of powers that includes administrative and financial responsibilities (Rodriguez-Pose 2007).

and narrow budget deficits, states also introduced additional taxes, fees, and charges that were not conducive to private sector growth.

Second, the undesired rise of rent seeking and corruption at the regional level has diminished the ability of states in Indonesia to efficiently allocate resources. Ultimately, this inefficiency resulted in a drastic decline in Indonesia's level of competitiveness compared to neighboring countries, which continued to improve efficiency, by cutting red-tape bureaucracy and reducing transaction costs (Borner et al. 2004). During the crisis, Indonesia's business climate and corruption index was one of the worst in the South East Asia region and considered as a leading cause for capital flight and further deterioration in the country's economic growth rate.

Third, the implementation of decentralization in Indonesia has not lead to economic convergence, as it was hoped, although there is an indication that relative inequality has declined slightly. In general, the level of regional disparities in Indonesia is still significantly high despite many efforts and policies to address the problem through the process of decentralization. The imbalances in development, economic capacity, and distribution of population between the western and eastern part of Indonesia is an issue.

Due to the limited role of states under the new decentralization laws, there has been lack of studies on decentralization at the state level. States no longer have control over district governments since hierarchically they are the same level. District governments also receive larger autonomy and revenue sharing under the new decentralization law. Yet, it is necessary to redefine the role of states, so that they have a larger responsibility in coordinating and monitoring development at the regional level.

States play a central role to set up and integrate agendas, strategies and priorities of development at the regional level. The ability of states to transform both vision and strategy into development initiatives can put the respective regions in a better position to implement decentralization and compete in a global market.[5] State policies and regulations should also be directed to increase the competitiveness of firms by providing better infrastructure and public services that can help reduce the cost of production. Such strategies help preserve market efficiencies as well as increase the productivity of firms and enterprises in their respective regions.

This dissertation is organized as follows. The first chapter is a review of select literature on competitiveness and regional growth, fiscal decentralization and state government efficiency. The second chapter presents an overview of the case study, Indonesia, depicting the development process at the regional level in a pre- and post-decentralization period. The third chapter provides a literature review of fiscal decentralization in developing countries. This is followed by the fourth chapter, which consists of a compilation of problem statements and the research hypothesis. The fifth chapter discusses an outline of the analytical framework used and a description of the empirical analysis methodology and model. The last chapter evaluates relevant decentralization and development policies and provides a conclusion to this dissertation.

[5] A growing divergence between states, particularly in developing countries is one of the consequences of regional competition. The potential winner (leading state) and loser (lagging state) is an inevitable phenomenon of development that further raises the level of regional disparities (Rodriguez-Pose 2009)

2. Theoretical Review

The literature review covers three main areas: regional competitiveness and economic growth, decentralization, and fiscal allocative efficiency. The discussion in this chapter begins with the concepts of regional competitiveness and economic growth to provide a framework on key development issues that justify the role of states in forming development strategies.[6] Next, the arguments for decentralization and an overview of institutional factors are reviewed to further support the role of states in regional development. In the last part of this chapter, public expenditure and allocative efficiency tied to the concept of fiscal decentralization is discussed.

2.1. Competitiveness and Theory of Regional Growth

Competition between nations or regions is one of the most notable dynamics of an open economy, which are typically associated with economic growth and development. Economic growth is defined as output growth from additional input or factors of production (Kindleberger 1965). This definition of economic growth incorporates the

[6] Development strategies adhere to various theoretical approaches and techniques of economic growth and regional economics in formulating concrete policies. Certain types of policies might work in one region but may not work in another region due to different characteristics of a region. In defining development strategies that fit a region but also align with national policy objectives and constraints, it is important to set priorities and assess causal relationships in the regional economy (OECD 2005).

importance of efficiency and productivity in the production process. It is also recognizes that outputs are also influenced by other intangible factors. The term total factor productivity (TFP) is used to define intangible factors, such as technological growth and efficiency.[7]

In general terms, competition is defined as "*striving or vying with another or others for profit, reward, position, or the necessities of life*" (American Heritage Dictionary 1973). This term is linked to the notion of rational individuals maximizing utilities and firms or industries exploiting scarce resources and market capacity for profits. In the regional development context, the focus of competition between regions is associated with accumulation of wealth and sustainable development.

The literature reviewed reveals a lack of consensus in defining competitiveness at the national and regional level because of the inherent ambiguities in transferring the concept from a micro to macro scale. Several distinctions have been made on macro competitiveness; it is referred to as the capability of nations or regions to produce and distribute goods and services in the international economy, to reach the highest possible growth of productivity, and to increase income per capita, raise standards of living, achieve equal distribution and economic sustainability (Boltho 1996, OECD 2005).

[7] The main distinction between economic development and growth is that growth strictly refers to additional output, while development refers to not only additional output, but also considers other factors such as technological changes and institutional arrangements. Changes in structural output and allocation of inputs are aimed to reposition the structure and expand the capacity of the economy. What distinguishes these terms is also the sequential process in which growth tends to follow a natural process of market competition, while development typically constitutes an acceleration of growth (Rashid 2000).

From a micro perspective, the concept of competitiveness refers to the dynamic of global market forces and the critical aspects of re-structuring firms and industries in order to increase productivity and efficiency.[8] The capability of firms and industries to generate goods and services that are able to compete in international markets is affected by the capacity to exploit available resources at the maximum level with the support of innovation and technological changes (Conti and Giaccaria 2001). Improving competitiveness at the micro level is considered the key to enhance both the national and regional economies at the macro level.

A notable theoretical aspect of competitiveness comes from Porter in 1990 (1996), who defined competitiveness from the concept of competitive advantage. Competitive advantage focuses on the optimum efficiency and productivity of factors of production rather than allocating resources according to opportunity cost as argued in the comparative advantage theory.[9] Porter argued that national competitiveness is linked to productivity and efficiency of firms and industries where capital and resources are utilized to increase wealth. Government's role is significant in aiding industrial policies that support competitive advantage.

The determinants of national (competitive) advantage in Porter's scheme are defined in the "Diamond" model, which illustrates key driving forces of competitiveness.

[8] The focus of competitiveness from a microeconomic perspective is the success of firms and industries over rivals in terms of growth, market share, costs of production and returns on investment.
[9] The shifting from comparative advantage to competitive advantage was derived by the nature of competition and transformation of industries, particularly with the integration among industries, more similarity in levels of factor endowments among nations or regions, and more advanced technology used in the process of production. Transformation of a market economy and geography also affect competitive advantage and market share using both mobile and immobile factor endowments (Myrdal 1957).

The model combines factors (supply) and demand conditions with industrial organization policies. Factor conditions refer to the factor endowments of a nation, which is an application of supply-side economic theory. Given that certain industries require specific inputs for production, it is advantageous from an efficiency standpoint to have sufficient capacity (quantity) and quality of production factors inside the region to support these industries. Market demand is determined by the consumption level of industrial goods and services. Specific industries may gain a competitive advantage when surrounding countries are able to absorb output growth from their production, which is consistent with the concept of externalities.

Governments have the opportunity to create market conditions that allow firms and industries to exploit their competitive advantage (Porter 1996).[10] Governments may attempt to stimulate certain types of investments and employment through incentives that can generate high wages, high rates of return and produce high value added output. Certain policies to diversify industry sectors are also critical to prevent volatility of economic cycles.

By consolidating several key definitions of competitiveness from both a macro and micro standpoint, this dissertation defines regional competitiveness as follows:

"the role of the state government in supporting firms and industries within its territory to gain success in global market competition through specific development policies or

[10] According to Olson (2000), "market-augmenting government" is the type of government that can positively support economic growth, which emphasizes the role of government in securing the legality of market activities.

strategies, which lead to greater capacity to sustain growth and improve standards of living."

Globalization and global trade competition is the major driver for regional competitiveness.[11] International and interregional trade involves mobile resources of factors of production, particularly capital investments, skilled labor and information on new technology (Siebert 1995). Although these mobile resources can move across borders with relatively low costs and few barriers, lagging or remote regions still have limited access to essential resources potentially restricting their ability to compete with larger and integrated global or regional forces.[12] These limitations will continue to widen the gap between lagging and leading states and eventually force states to evaluate their location advantages to develop appropriate growth strategies that serve in their best interests. Geographical location of economic activities provides a reason for regions to compete based on factors in which they have an advantage (Martin 2003).

Both classical and neoclassical models assumed that space is heterogeneous and growth should be treated as non-spatial in the macroeconomics framework (Richardson 1978). Regional economics emerged because neoclassical theory failed to recognize the spatial (geographical) dynamics in the growth theory. The theory of regional economics

[11] National and regional boundaries matter due to the policies related to trade barriers and factor mobility as it may affect the degree of openness and integration of the economy (Krugman 1991).

[12] Per capita income does not necessarily converge over time as argued in the hypothesis of circular and cumulative causation, which states that 'the play of forces in the market normally tends to increase, rather than to decrease, the inequalities between regions' (Myrdal 1957 as described in Richardson 1978). This constitutes that catch-up or convergence between nations or regions is likely to be a long process. Economic development policies and strategies play an important role to achieve a more balanced growth by promoting equity between regions.

was initially adopted from neoclassical premises following the evolution of economic geography theory, which focuses on the causes of growth and where it occurs within a spatial or geographical framework.

Neoclassical theory put a foundation of interregional trade and geographical distribution of factor endowments as the basis of regional development. State government policies are geared to support trade and export that can increase a state's comparative advantage (Martin 2003). These types of policies stimulate competitive advantage to overcome any geographical disadvantage. Referring to the theory of new economic geography, factor mobility could potentially induce spillover effects and increasing returns to scale because of positive externalities from economic agglomeration. Positive externalities enable regions to grow and improve the level of productivity and efficiency. This notion provides a rationale for governments to internalize both externalities and costs associated with economies of scale (Devarajan 1996).[13]

2.2. Decentralization and the Role of Institution

The concept of decentralization began to gain recognition in the late 1960s stemming from criticisms towards central planning systems. One of the major issues related to centralized power of government is the difficulty to maintain regional equity

[13] In the same line of thought, a new approach to competitiveness is introduced through technological changes and innovation that are mainly driven by the human factor. This approach follows the basic premise of endogenous growth theory.

and reduce socio-economic problems that are caused by imbalanced development.[14] Rapid economic growth because of industrialization in several developing countries has only benefited a small (typically exclusive) group in the society. Consequently, income disparities within societies and regions increase as the standards of living of the poorest groups decline (Cheema and Rondinelli 1983). One of the key objectives of decentralization policies is to promote income distribution through district or regional initiatives that would accelerate regional growth.[15]

In an attempt to balance the role of central or national and state and, local district governments, decentralization allows for greater administrative power and fiscal allocation to district governments (Cheema and Rondinelli 1983).[16] Local district governments have an advantage in terms of the planning and execution of policies that include broader citizen participation (Maddick 1963). The inclusion of citizens (grassroots participation) in the development of policies is a key to stimulate the potential capacity of district communities. Another key point of decentralization in supporting democracy is through transparency and accountability in which citizens have a role in

[14] The rational of central planning policy is based on a major economic development theory that focused on capital-intensive industrialization. This theory of economic development believed that central government national policy will be able to allocate public resources to initiate and steer development (Myrdal as noted by Cheema and Rondinelli 1983). Government intervention on investments and production processes is a key requirement. The major criticism towards central planning is derived from the complexity of its implementation and the inability to promote equitable growth.

[15] There were a number of studies that confirmed a wider access to resources and institutions of people living in rural regions because of the implementation of decentralization. This has been the case in most developed countries; while in developing countries, decentralization actually increases regional disparities (Rodriguez-Pose and Ezcurra 2009).

[16] The formal definition of decentralization by Rondinelli, et. al. (1981) is as follow:
" the transfer of responsibility for planning, management, and resource-raising and allocation from the central government to (a) field units of central government ministries or agencies; (b) subordinate units or levels of government; (c) semi-autonomous public authorities or corporations; (d) area-wide regional or functional authorities".

preserving good governance. In a democratic system, state and local district elections provide a mean for citizens to give their opinion. The success of state leaders in providing vision, accommodating aspirations, and delivering public goods will be part of the issues that voters consider in the public election.

Decentralization is also considered more accommodative to ethnic, racial and religious diversity. In a centralized system, national unity is the key objective, which sometime comes at the expense of minority groups of people or even states or regions. Since people from different parts of a region may have different ethnic, cultural, and religious backgrounds, social and political tension may be inevitable.[17] Decentralization may help ensure that local politics and cultures are well preserved (Azis 2003).

There are three types of decentralization according to Rondinelli, et al. (1981):

- *Deconcentration*: the weakest form of decentralization as it only entails a shift of administrative responsibility to state and local district governments with close monitoring by central government.
- *Delegation*: the transfer of decision-making and administrative responsibilities to semi-autonomous institutions, which can be regional bodies or public corporations.
- *Devolution*: the strongest form of decentralization since it allows the transfer of a significant degree of authority for decision-making, finance, and management. State and district governments can also elect their own leaders, raise their own revenue, and make their own investment decisions.

[17] More diversely populated countries that spread on a large geographic area tend to implement decentralization at various degrees to accommodate the aspirations from all diverse regions.

The arguments behind decentralization depart from two bases. The traditional approach focuses on allocative benefits based on the works of Hayek (1945), Tiebout (1956), Musgrave (1959) and Oates (1972). The second view is from the institutionalist perspective that focuses on the market incentive structures (Qian and Weingast 1997). The traditionalist view, argues that state and local district governments have better access and knowledge over the needs of their regions, which enable them to deliver public goods and services more efficiently and innovatively, compared to the central government (Jin, et al. 2001, Azis 2003). Thus, the efficiency gain from decentralization is influenced by the ability of states to strategically mobilize and coordinate fiscal resources.

In relation to public sector development, it has been argued that decentralization increases competitiveness levels among state and local district governments and limits the size of the public sector (Gill 2002). The fundamental concept of competition at the district level concerning public services was introduced by Tiebout (1956) through the "public choice" model. In the Tiebout model, individuals allocate themselves according to the public goods and services provided by various district governments (Bardhan 2002). Tiebout assumes that mobility is costless and individuals have perfect information. In addition, district public services are provided at a minimum average cost, financed with lump-sum taxes and there are no interregional externalities. Public services then become efficient due to market approach solution (Hoyt 1990).[18]

[18] Some of the empirical work on the Tiebout hypotheses has involved examining the efficiency of local public services (Hoyt 1990), which follow certain rigid assumptions and therefore not so convincing.

At the sub-national level, decentralization supports various policy goals, such as poverty reduction, income equality, job creation and new investments. Related to investments, an effective decentralized system will reduce transaction costs and overcome problems of bureaucracy and information sharing (Bardhan 2002, Azis 2003, Borner et al. 2004). Transaction costs in the form of fees or charges at the state level affect the costs of doing business and the level of competitiveness. The problem typically lies on the multiple fees and charges that state and local district government impose on businesses.

The implementation of decentralization has transformed the state government into an active agent of development. Thus, supporting the second argument over decentralization that one of the elements in the framework of decentralization and development are institutions where state governments are a key participant.

Institutions are defined as sets of rules and standards that are reflected in the laws, government, economics, and socio-political setting (North 1981 as discussed in Glaeser 2004). Most of the discussion regarding institutions is related to the quality of institutions that affects growth. Contrary to expectations, institutional and organizational factors were actually excluded in the theoretical framework of the neoclassical growth model. Neoclassical economic theory has been merely focused on factors inputs, productivity and technological changes as the drivers of growth and development. It was not until numerous economic adversities, particularly the fall of the planned economy, economic stagnation in many developing countries, and the occurrence of global financial crises, that institutional issues became the focus of studies on economic growth. The

assumption that the market can allocate all resources efficiently should be thoroughly considered (Hamalainen 2003).

From the institutionalists' view, decentralization is a key theme in development. Decentralization in an institutional framework focuses on the dynamics between policy-making and competing interests, which is a key issue in many developing or transitional countries due to more conflicts of interests attributed to a weak institutional framework. From a neo-institutionalist framework, the right balance of decentralization is determined by policy-making that steers clear from any potential conflict of interests that can harm the process of development and democratization (Hadiz 2003).

Studies on decentralization and democratization suggest that decentralization supports the process of democratization (Maddick 1963).[19] The failure in the implementation of decentralization and democratization in a number of developing countries is considered to be caused by weak institutions, the inappropriate design of decentralization policies, and the lack of commitment among political elites (Hadiz 2003). Institutions that do not function optimally will affect the system of governance and potentially spread further risk of rent seeking, corruption, and moral hazard.[20]

[19] Decentralization provides a mechanism for direct public involvement in the political and democratization process through the voting booth. In the decentralized system, heads of state and district and representatives are selected through public election.

[20] In general, the issuance of external debt at the regional level is restricted because of the potential moral hazard and the risk associated with potential default. In some cases, the issuance of municipal bond is permitted as long as it levied toward public capital investments.

Within the context of decentralization, the quality of institutions at the state level can be evaluated by the degree of transparency, efficiency, and accountability. These affect the following three key roles of state government according to Musgrave (1959):

- *Allocative Role*: correcting market failure through regulation, taxation, subsidies and providing public goods
- *Distributional Role*: achieving a just and fair society by regulating, providing access to the market, progressive taxation and subsidies
- *Stabilization Role*: controlling growth, unemployment, inflation by demand and money management

The varying quality of state institutions could explain why both nation and state grow at different rates and provide a reason for competition between regions (Rodrik, et al 2002, Easterly 2001, Acemoglu, et al 2004). The above-mentioned roles of states emphasize the key relationship between the market, the state and the firm. The Keynesian postulate in particular believes that the government should spend either more, or less, as a means to preserve market stability by reducing the volatility of business cycles that influence the demand side of the economy. Justification of this theory can be observed in both developed and developing countries, which have heavily depended on government intervention in the market based on the assumption that most government intervention is necessary, appropriate, and productive.[21]

[21] Many economists are against government intervention in the market economy and specifically in the allocation of public goods since it may cause the crowding-out of private investment. Mainstream market economists argue that markets are efficient and self-sufficient in correcting its deficiencies. On the same token, monetary economists reject government fiscal policy due to possible inflationary in the economy.

The New Institutional Economics revisits the relationship between institution, market, and firm with a focus on the extent to which property rights, transaction costs, incentives structure and political economy affect the quality of institutions (North 1989, Clague 1997). It argues that the combination of bounded rationality (neoclassical economics), opportunism, and institutional flaws may cause an economy to operate far from its potential (Brock 2003).

Cost efficiency is particularly relevant in the context of decentralization and state efficiency. The New Institutional Economics argues that cost efficiency in the form of low transaction costs is one of the key indicators of economic performance (North 1989).[22] Rational individuals and firms consider imperfect information and uncertainty in the market economy will result in cost occurrence (Clague 1997, Furubotn and Richter 1998). Consequently, both high transaction costs from regulated or unregulated charges and "red tape" bureaucracies are one of the impediments to invest in a certain region.

Decentralization is supposed to reduce costs associated with inefficiency and rent-seeking activities as it focuses on more transparency and accountability. Along with the effort to reduce transaction costs, providing sufficient information and fiscal incentives will also promote a healthier investment climate. Smaller and productive government is also believed to be an indicator of cost efficiency that potentially reduces waste of expenditure and raises income growth (Brennan and Buchanan 1980).

[22] From the perspective of New Public Management, the concept of cost efficiency focuses on how to make public sector more efficient as the private sector. It is argued that greater cost efficiency for the public sector can be achieved if the government has a market orientation in managing the public sector. In other word, the government should act as an entrepreneur and serve the public as its customer.

2.3. Fiscal Decentralization and Efficiency in the Allocation of Fiscal Resources

Fiscal decentralization is associated with the issuance of intergovernmental finance in the form of expenditure and revenue allocation to accommodate district or regional economies, particularly to ensure efficient delivery of public service provisions (Rao 2003). The degree of fiscal decentralization, which is defined as the share of sub-national spending/revenue over total government spending/revenue, is used in various studies as one indicator to measure the extent of decentralization (Oates 1993, Woller and Phillips 1998, Davoodi and Zou 1998, Ebel and Yilmaz 2003)

Most of the early studies conducted on fiscal decentralization based on the neoclassical theory lead to two frameworks. The first approach was the extent of state spending levied by taxes and the second approach is the utilization of debt. State fiscal policies on tax and debt utilization are important to the economy since they influence the level of state spending on public goods.[23]

Musgrave (1959) and Oates (1972) emphasized the utilization of fiscal instruments in particular taxes and expenditures to improve public welfare. Presumably, both support income distribution and narrow the gap between lagging and leading states. State fiscal policies are also directed to benefit the society through poverty reduction

[23] A weak taxation system and ineffective tax collection in many developing countries has been a major issue, particularly since decentralization limits the extent of central government transfers. Most districts and states in developing countries are also restricted in their capability to issue debts. Thus, states were not able to optimize these fiscal instruments as a mean to meet their needs and goals. Debt liabilities and budget shortfalls are a common problem that states face besides the extent of rent seeking and corruption activities that also affect the implementation of fiscal decentralization.

programs (Rao 2002). However, these policies are typically influenced by the political dynamics within state government institutions.

Studies on tax competition found that fiscal decentralization can harm the economy by distorting the taxation system (Tanzi 2000, Brueckner 2004).[24] States are known to engage in tax competition by offering tax incentives to firms and enterprises with the expectation that there will be a boost in investments and job creation. Yet, these incentives may result in the misallocation of resources of both the public and private sectors, which is a recipe for market failure.[25]

Market failure can encourage government intervention in the form of capital investments or through various regulatory and fiscal incentives. Such actions by state governments may augment the inefficiency of resource allocation, reduce the effectiveness of incentive structures and further constrain business enterprises. Many opponents of government intervention argue that markets can work efficiently without government involvement. Interestingly, a number of facts indicate that the "invisible hand" of a market economy has often failed to allocate resources efficiently (Chang 2000). A leading tenet suggests that the private sector is often hesitant to get involved in public capital investments because of the high risks and low returns on investment, and therefore government intervention is unavoidable.

[24] Tax competition also provides an incentive for states to become strategic and efficient in utilizing tax instrument. State's tax regulation is part of the development strategies that aim to stimulate aggregate demand and private sector development.

[25] The development of fiscal decentralization along with the modern theory of public finance has focused on how governments should intervene in the markets and how to maintain a proper role of governments in a market economy since government interventions are also the ingredient for market failure or economic inefficiency (Chang 2000).

Another concern with fiscal decentralization is the potential of higher moral hazard at the state level (Tanzi 2000). Moral hazard may be more apparent in the cases where states lack the ability to manage debt, budget deficits exist, and "good" incentives that encourage the efficient allocation of resources are lacking, offsetting the benefit of fiscal decentralization and increasing the risk to the fiscal and macroeconomic stability of both central and state government.

Most of the current work on fiscal decentralization focuses on the relation between on one hand, fiscal decentralization and the development of the private sector and on the other hand, the establishment of a market economy (Hamalainen 2003). Although there are differences in priorities and strategies of resource allocation, there is a similar goal to support development of firms and enterprises along with a market economy. In a centralized system, the decision to allocate fiscal resources is predominantly in the hands of the central government. Lack of consideration by the central government to address specific needs of a region potentially decreases the efficiency and effectiveness of state resource allocation.

The role of state institutions and organizations on the allocation of resources and its effect on economic growth, has been a subject of discussion both at the national and sub national level. A number of empirical studies have focused on measuring the effect of fiscal decentralization on economic growth related to fiscal resource allocation (Barro 1990, Davoodi and Zou 1998). The results of these studies were rather inconclusive, particularly the cross-country studies of developed and developing countries. One of the earliest cross-country studies by Oates (1972) found that fiscal centralization in a sample

of 58 countries was negatively correlated with per capita income. Most of the subsequent studies found that fiscal decentralization is associated with higher growth in developed countries (Davoodi and Zou 1998, Woller and Phillips1998).

Based on the competitiveness and allocative efficiency concepts, fiscal decentralization supports economic efficiency and intergovernmental competition (Bardhan 2002). An efficient economy is measured by its ability to efficiently allocate or distribute resources. This implies that states should optimize the use of their limited fiscal resources to serve the welfares of both individual citizens and firms, which is consistent with the principles of neoclassical theory.

The theory of efficiency and effectiveness focuses on the relationship between inputs and outputs. This concept is central in measuring the efficiency of allocating fiscal resources. Part of the challenge in measuring allocative efficiency of fiscal resources is attributed to the complex principal agent relationship in economic activities. Neoclassical theory argues that organizations are not always efficient. The theory of X-inefficiency (Liebenstein 1996) explains why organizations do not necessarily operate at the optimum level; or stated differently, why organizations or firms do not utilize their resources to the maximum efficiency (Hamalainen 2003).

The performance of state governments is also measured based on whether resources are allocated to deliver effective or productive results. The term efficiency refers to the minimum resources used to produce the optimum amount, while effectiveness refers to the extent allocated resources produce a positive effect on

economic growth. Both efficiency and effectiveness or productivity of the allocation of fiscal resources is critical for state governments due to limited sources of financing.

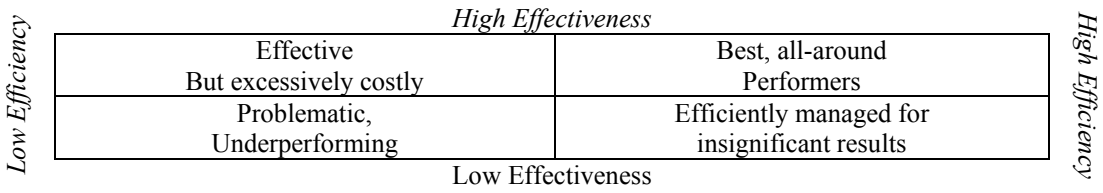

Figure 1. Efficiency and Effectiveness Model

As shown in Figure 1, high efficiency and high effectiveness in the right upper corner is the ideal situation. The lower right box refers to cases where the allocation of resources is efficient, but the types of resources that are being allocated are not productive or effective. For example, building an infrastructure project may be an efficient use of resources, but unproductive if the project is not utilized optimally to support development. The upper left box describes a situation where the allocation of resources produces a highly effective outcome but at a very high cost structure that potentially results in waste spending. The lower left box illustrates circumstances where a state may inefficiently allocate resources in projects or programs that do not support development. The preference over certain types of resource allocation and the decision to limit non-productive allocation ultimately affects competitiveness and economic growth.

2.4. Productivity of Public Capital Expenditure

Following the framework of fiscal decentralization, the allocation of fiscal resources is primarily related to state spending or expenditure. The choices a state government makes through its expenditure can determine the degree of public capital accumulation, which is identified as the key factor of growth and development by both classical and neoclassical theory.

The discussion of public expenditure is part of the modern theory on public finance that originated from the Samuelson (1954) paper titled "*The Pure Theory of Public Expenditure*". Samuelson presented the idea of common public goods that focused on optimal public spending rather than taxation. He argued that public expenditure is a critical element in the economy that put government into a major role. Tiebout (1956) extended Samuelson's concept in his paper "*A Pure Theory of Local Expenditures*" that linked public expenditure and neoclassical theory of capital stock.

Capital stock is assumed to have a key role in determining output levels, and can change over time because of additional investments and depreciation of capital stock. Solow's (2000) growth model emphasizes capital along with the growth of the labor force as the main factors of production. The production function in the Solow model is based on the extent of efficiency or productivity of labor and capital. Despite the lack of initial discussion on the role of public capital, the neoclassical theory provides a foundation to understand the key issues of public capital and output growth. Accumulation of public capital stock provides a rationale for government involvement in

the market economy through public investments as an attempt to support private sector production.[26]

Public expenditure influences economic growth in mainly three areas: aggregate demand, resource allocation and income distribution. The main idea is that public inputs through government expenditure increase production and aggregate demand. The neoclassical theory views public capital stock as a function of the marginal utility theory with respect to consumption (Samuelson 1954, Musgrave 1956, Tiebout 1956). An increase in production is a result of higher productivity as consumers derive utilities from public capital stock (Arrow and Kurz 1970). Thus, it is critical for state governments to provide incentives for the private sector to invest and produce (Aschaeur 1989).

Public capital is considered an input to production and a complement of private capital (Barro 1990). Allocation of state fiscal resources in productive public capital investment potentially reduces the costs of production and increases output of firms due to higher productivity. Thereby, regions compete to support higher return on capital investments to the private sector (Munnel 1992, Siebert 1995).[27]

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[26] A new model of public-private partnership has emerged following the premise that the private sector can better manage and finance public capital investments.

[27] Despite several empirical studies (Aschaeur 1989, Munnel 1990, Eisner 1991, Holtz-Eakin 1994), the effect of public capital on private capital as it relates to economic growth remains inconclusive. Aschaeur's (1989) study suggests that public capital investments are highly productive since they pay for themselves in the form of tax revenues during the operation of the assets. The rate of return of public capital investments is high despite the fact that governments may not always be efficient. Yet, many have criticized the validity of the results pointing to the fact that private capital is mostly utilized in production, while some public capital investments are used in government programs that do not count towards aggregate output (Munnell 1990).

An important element in evaluating the relation between public capital and economic growth is to identify certain types of capital investments that are productive and have a positive impact on growth. The composition of productive and unproductive public capital investments influences whether states should adjust the types and scale of public investments to continuously stimulates growth (Devarajan 1996).

The potential negative impact from increased public expenditure is lower aggregate investment and consumption in the private sector. This condition is typically referred to as "crowding-out", where public capital acts as a substitute to private capital and in doing so hinders incentives for the private sector to invest. Ultimately, the increase in public expenditure may come at the cost of higher taxes to finance public investments. Empirical studies suggest that there should be a balance between investments from public and private capital (Munnell 1992).

Since the government intervention can reduce the optimality of resources allocation, the questions are whether the share of public spending is significantly large compared to the national economy and whether the government should be directly involved in production, which could drive more inefficiencies from waste spending, rent seeking, and corruption practices. All of these issues are important to the implementation of fiscal decentralization in particular in developing countries where the extent of inefficiency is greater than in developed countries, as prior studies have identified.

3. Fiscal Decentralization in Developing Countries

Decentralization has emerged as an important factor discussed in theories and policies on development in the last few decades. The transfer of political, fiscal and administrative powers to sub-national governments is both a global and regional phenomenon, which has influenced the process of democratization and development in developing countries. A study by the World Bank observed that most developing countries have implemented, to varying degrees, a decentralized system (Bird et. al. 1998).

This chapter provides an overview of the relevant literature and the lessons learned on the implementation of fiscal decentralization in several developing countries. Incorporated in this chapter is a discussion of the impact of fiscal decentralization in Brazil, China, and India to better understand the issues and complexities of decentralized systems in developing countries.

3.1. Empirical Studies on Fiscal Decentralization

Previous empirical analysis on fiscal decentralization highlights the relationship between fiscal decentralization and economic growth. These studies gained momentum after the endogenous growth theory was extended to include the dynamics of public expenditure and its correlation with economic growth. From the growth accounting

perspective, the role of state institutions in relation to fiscal decentralization may explain the different rates of economic growth observed in developing countries.

Cross-country research on fiscal decentralization and economic growth typically include case studies of both developed and developing countries. Davoodi and Zou (1998) found a significant negative correlation between the degree of fiscal federalism and the average rate of growth of GDP per capita. Yet, the effect was not significant in the sample of developed countries used.[28] The sample included data from 1970 to 1989 for 46 countries. In the same year, Woller and Phillips (1998) studied the same subject with a sample of 23 developing countries for the period from 1974 to 1991. The results indicated that there was an absence of a robust significant effect from fiscal decentralization on economic growth. In contrast, Enikolopov (2006) demonstrated that fiscal decentralization had a positive relationship on economic growth from the standpoint of political institutions. This latter study used data from 21 developed countries and 70 developing countries between 1975 and 2000.

Several explanations were offered to explain the finding that fiscal decentralization is negatively correlated with economic growth in developing countries. Generally, it is assumed that if the correlation between fiscal decentralization and economic growth is negative, then there is an indication of misallocation of resources that causes lower efficiency. Excessive spending over unproductive activities or a mismatch

[28] A panel data study of 64 countries by Letelier (2005) also found that the positive outcome from fiscal decentralization only applied to countries with high income per capita. Although recent study by Thornton (2006) demonstrated that when the measure of fiscal decentralization is limited to the revenues over which sub-national governments have full autonomy, its effect on economic growth is not statistically significant.

in revenue assignments may lead to negative economic growth (Davoodi and Zou 1998, Devarajan 1998).[29] Misallocation of fiscal resources is also influenced by the extent of rent seeking and corruption activities in developing countries.

Second, developing countries face more challenges in optimizing the efficiency gains from a decentralized system as the role of sub-national governments is still relatively constrained. [30] Davoodi and Zou (1998) pointed out that some revenue collection and expenditure decisions are still determined by the central government hampering states from capitalizing the full benefits of fiscal decentralization. This is a key disincentive factor of decentralization in many developing countries following the top-down process of decentralization

Third, insufficient coordination among different levels of government and inadequate organizational management of governments in developing countries negatively influence state government performance. Several conditions have to be met in order to gain the full benefits from fiscal decentralization, such as sound regulations and tax reforms, sufficient size of regional market and strong macroeconomic coordination (Tanzi's 1996 as discussed in Rao 2000).

Fourth, a high degree of rent seeking and corruption in developing countries in decentralized systems negatively influences economic growth. Decentralization could lead to more corruption (Prud'homme 1995). A study by Treisman (2001) in particular

[29] One of the dangers of decentralization is that an increase in the local share of revenue and expenditure may actually slow growth (Prud'homme 1995). In this respects, the composition of public expenditure is important.

[30] The assumption about efficiency gains from decentralized is attributed to the rationale that state and district governments will be responsive to local needs.

confirmed that there has been an increase in corruption in developing countries after the implementation of decentralization. Tanzi (2000) believed that decentralization and corruption is caused by a deficiency in institutional development, where transparency and accountability (checks and balances) are not practiced.

The last explanation is related to the process of decentralization itself. Decentralized systems in developing countries were mostly introduced through a top-down process in the initial stage where the degree and rule of the game of decentralization was controlled by the central government.[31] Although the central government assigned administrative autonomy to state and district governments, revenue collection and revenue sharing scheme was still determined by the central government. Major expenditures were often times also controlled by the central government.

The top-down process of decentralization is argued to be less effective in providing incentive structures for states and district governments to become more efficient and independent because of interference from the central government in the decision making process. State and district governments are discouraged from coming up with specific initiatives or commitments to develop their respective regions. The desire of the central government to control regional resources forces states and district

[31] A unitary system of government may be more supportive toward the top-down process of decentralization. States in a unitary system may not be as independent as states in a federal system although both systems can still maintain the same rigid government hierarchy to ensure unity within the country. State governments may not be able to fully accommodate the needs of their respective regions since they ought to consider national interests before regional interests.

governments to be dependent on fiscal transfers.[32] Changes of the regime in power can also affect the level of control over regional resources.

The top-down process of decentralization is often associated with lower economic growth as central governments may not be able to match the needs and preferences of regions. State governments may also be unable to accommodate the needs of their respective regions because they are often required to consider national interests before regional interests.

Critics argue that the bottom-up process is more effective in supporting economic growth because states and district governments receive the support of their constituents. This will give them the bargaining power and legitimacy to demand adequate fiscal resources and negotiate fair revenue sharing schemes associated with the exploitation of natural resources in their respective region. A deepening democracy triggers a bottom-up process of decentralization that is driven by regional demand. A stronger voice and weight from local citizens also tends to result in a stronger commitment from state and district governments, and provides a bigger incentive for states to shape policies that satisfy the needs of their regions (Rodriguez-Pose et. al. 2007). Not only the interests of citizens of the state are represented through this bottom-up process of decentralization, but there should be a mechanism for checks and balances to further support the process of democratization.[33]

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[32] China was more flexible in following the top-down model of decentralization since it allowed some autonomy at the state and district levels in order to stimulate development and reduce regional disparities.

[33] In a democratic environment, a multi-party system protects the public's interests through checks and balances. This encompasses the monitoring over the process of decentralization to ensure the efficient

3.2. Case Studies of Fiscal Decentralization in Developing Countries

Developing countries have been the subject of many studies in the areas of fiscal decentralization, allocative efficiency and economic growth. A major debate in the context of fiscal decentralization and growth in developing countries is whether the implementation of fiscal decentralization has a negative or positive effect on economic growth. A further concern for many developing countries is on how far they should decentralize to generate incentive structures that support a market economy, and what are the key factors associated with economic growth.

Several studies have been conducted on the implementation of decentralization in the following developing countries: Brazil, China, and India. Each of these countries is considered one of the fastest growing economies in the world; each is following a different path of development one which is tied to a set of unique characteristics, such as the dynamics of political institutions, and organizational structure within central and state governments.[34] These countries are also greatly influenced by globalization where the economic links between regions are not only within the same country, but also with other

allocation of resources. On the other hand, differing interests and ideological views from multiple political parties can also generate competition and increase conflicts of interest between the central and regional governments. This can potentially trigger serious regional conflict and disintegration. Hence, there is a need to balance the interests of the different political parties, levels of government and regions to maintain unity within the country.

[34] BRICs (Brazil, Russia, India, and China) refer to the fast-growing developing economies. The four countries, combined, currently account for more than a quarter of the world's land area and more than 40% of the world's population Based on the rank of world's biggest economy in 2008, China was in the third place, Brazil in the tenth place, and India in the twelfth place. Nevertheless, the degree of fiscal decentralization in Brazil, China, and India was relatively at the same level based on the allocation of tax collection in 2003.

countries. As income per capita increases, decentralized systems may become more desirable and more conducive since regions demand more role.

Brazil

Brazil follows a federal system where the autonomy of the federal government, states and districts or municipalities on budgetary matters is regulated by the constitution. The decentralization policy in regard to expenditure and taxation has been inconsistent following the changes in political regimes (Mora and Varsano 2001). An authoritarian rule has limited the sub-national government's role in the decision-making process affecting provisions assigned to public services. The federal government dictates most of the decisions on where the private sectors should invest.

As a result of fiscal restrictions and cuts in federal government transfers, states had to finance most of their expenditure through external borrowing mechanisms that relied on state banks. The excessive issuance of state loans put the macroeconomic stability of the country at risk and created a major catastrophe during the recession that hit Brazil in the 1980s. To avoid a major loan default that would have exacerbated the crisis, the federal government decided to bailout the states by repaying their debts.

In 1988, the Brazilian government altered the decentralization policy, restricting the borrowing capacity of states and at the same time attempting to satisfy the demands of state and district governments to generate more revenue. The tax base of states was expanded to include taxes on goods and services that were previously only subjected to

federal taxes. Yet, this effort was not quite successful since state debts remained large and continued to pose a risk to the macroeconomic stability of the country.

Another issue with the implementation of decentralization in Brazil was overestimating the strength of the existing institutional and financial frameworks. The federal government created a provision to transfer programs and services to the sub-national governments in order to decrease the national deficit, while simultaneously shifting the responsibility of funding these programs and services to the sub-national governments. Unfortunately, the states' limited financial capacity made it difficult to fund the additional amount of expenditure to provide the goods and services that were now the responsibility of each respective state. Limited financial capacity has also been credited as one of the factors that hampered regional development in Brazil in the 1990s.

China

In 1958, following the end of the first five-year development plan under a rigid central planning system, China began decentralizing its regions to overcome the growing imbalance between its industrial and agricultural economies. The central government achieved decentralization by transferring decision making to the provincial or state and district levels through several fiscal reforms.[35] The reforms also allowed taxes and other revenues, including profits from State Owned Enterprises (SOE), to be collected by state governments based on tax rates and bases determined by the central government.

[35] To this day, China has kept the unitary system of government with a one-party system. Yet, this considerably rigid institutional arrangement has allowed for larger economic authority at different levels of government to carry out China's development strategy.

As a continuation of the economic reform in the 1980s, a new fiscal decentralization policy was implemented in 1994, altering the dynamics of the revenue sharing scheme between the central government and states. Changes in tax collection and adjustments to the revenue sharing formula were introduced as an attempt to address the issue of inequality between coastal and inland states. These changes have been viewed by rich resource regions as a policy that could eventually reduce their wealth and compel redistribution of wealth to other regions (Singh 2006).

Implementation of the budget reform in 1994 also enhanced the fundamentals of fiscal operation. State and district governments were not required to first obtain central government approval on their budgets. However, they did have to maintain a balanced budget, prohibiting them from financing deficits through local bond issuance, private sector borrowing, or grants from the central government.

In China, a higher level of state and district fiscal decentralization was considered as pat of a movement towards a federal structure.[36] Based on a 2003 estimate, total expenditure at the sub national level reached 70 percent, which is very significant for a country under an authoritarian rule (Martinez-Vazquez and Rider 2005). This increase in expenditure is believed to be one of the contributing factors that spurred rapid growth in the regions in the late 1990s and up to now, despite criticism that the implementation of fiscal decentralization in China is thought to have moved too quickly, where public investment at the national level has been crowded out by sub-national public spending.

[36] Federalism is seen as a larger distribution of power to sub national governments, which include non-fiscal aspects such as the control over public resources.

The studies on fiscal decentralization and economic growth in China showed inconclusive results since there are two opposite opinions on this subject. Studies by Zhang and Zou (1998) and Zou and Jin (1999) reported a significant negative relationship between fiscal decentralization and economic growth in Chinese states. While studies by Lin and Liu (2000) and Jin, et. al. (2001), found a significant positive correlation between regional decentralization and economic growth.

India

The decentralized system in India goes further back to a period when India was still under British rule. In 1907, a commission that was assigned to investigate the existing financial and administrative relationship between the central government and states, or the provincial governments in India, recommended that some measure of decentralization should be allowed. India's wide geographic spread was also a consideration.

Contrary to China, India is a constitutional democracy with an explicit federal system. Indian federalism has evolved as a two-tier structure (federal and state government) as mandated by the constitution. Before the constitutional reform in 1992 that provided more autonomy to district governments, states were tasked to provide oversight over district budgets. A problem with decentralization in India before the reform was structural imbalances between states, where one state may have had more power to raise revenues and allocate expenditures compared to another state (Martinez-

Vazquez and Rider 2005). States were highly dependent on fiscal transfers and loans from the federal government.

The 1992 reform in India provided a stronger legitimacy for district governments to be more autonomous, allowing state governments to have some control over economic policies that affected the amount of private investment (Singh and Srinivasan, 2006). However, a significant transfer of funds did not accompany this higher level of fiscal decentralization. This unfunded mandate created problems for several district governments, which then had difficulties in providing adequate public services. Despite these challenges, India has still managed to increase its economic performance since the late 1990s until now, mirroring the same period where China experienced similar rapid growth. In the case of India, the effects of fiscal decentralization on economic growth remain unclear because of the hidden risk to macroeconomic stability from state government debt.

To summarize, the process and results of decentralization may differ between developing countries, but in general, decentralization is seen as one of the development policies that can expand the role of state and district governments and accelerate economic growth.[37]

[37] The inconclusive results of the empirical analysis on the relationship between fiscal decentralization and economic growth at the country level could be caused by the dissimilar definitions of fiscal expenditures and revenues among different countries. These differences could also occur as a result of different sources and formulation in determining those expenditures and revenues.

4. Regional Development and Decentralization Policy in Indonesia

Just recently, Indonesia experienced one of the most significant institutional changes in its history following the economic shock of the Asian financial crisis. A number of studies describe the rapid process of Indonesia's "Reformation" as extraordinary due to the timeframe and magnitude of the institutional changes and structural adjustments in the economy. For more than three decades, the country was under authoritarian rule with a centralized system of government. State governments mostly functioned as regional administrators with a limited role in coordinating development and in the decision making process.

The 1997 financial crisis was a turning point for the central planning system as regions demanded full autonomy and insisted on being able to fully take advantage of their own resources.[38] The fall of the ruling authoritarian power (Suharto) in Indonesia, lead to broad institutional reforms, including constitutional amendments, implementation of good governance policies, and a move from a central planning system to a decentralized system. From a regional development standpoint, the transfer from a centralized to a decentralized system was a significant change that affected not only the

[38] The 19987 Asian financial crisis provides a new precedent in economic growth. One of the most important lessons is that high economic growth as postulated by neoclassical economics does not guarantee sustainability of the economy. Other fundamental aspects in the economic structure at the macro and micro level are key in determining the strength and vulnerability of the economy.

structure of the regional economies but also more importantly the process and outcome of development at the regional level.

4.1. Governance System and Economic Development in a Pre-Decentralized Era

The Indonesian Constitution establishes the legal foundation of a unitary state even though the country consists of a large number of islands. The Constitution states that the central government has the power to determine the regional division and sub-national system of governance. There are three-tiers of government (central-provinces-districts) in Indonesia, based on Law 22/1948. This law granted administrative autonomy to two levels of government in this top-down process of decentralization: the state or province as Region Level I, and the *kabupaten* (district) or *kotamadya* (city) as Region Level II.

Figure 2. States/Provinces in Indonesia

In order to preserve national unity in a fragile country, the New Order (1966-1997) followed the doctrine of strong nationalism and used the central planning system as the most feasible system of governance. The central planning system was also used to coordinate a national development-planning program that aimed to lift Indonesia from poverty and promote development.[39] For a young and inexperienced country, this central planning model was also intended to ensure political and economic stability, allowing the country to focus on achieving its development goals via a planned strategy for development, yet also maintaining equity amongst its people through fair distribution.

During the New Order era, the 26 states and 330 local district governments managed the administrative tasks of governance and basic public services. However, all activities were still coordinated by the Ministry of Home Affairs. State and district leaders were selected by the central government. They were responsible to submit a budget to justify the transfers from central government, but they had limited influence in the decision making process over specific programs that were intended to support development at their respective region.

The concept of a central planning system was implemented through a government body that was set up to study and establish a foundation for development policies. The National Development Planning Council (Bappenas) introduced five-year development plans as part of the strategy to transform the agricultural economy to an industrial

[39] At the beginning of the New Order, the government inherited large debt and a weak economic system, which can be attributed to the large number of mega projects, firm nationalization and military build-up. Other issues with the economic system during the New Order were an existing isolation policy and the ineffectiveness of the preceding Sukarno administration in implementing strategic policies for development.

economy. Similar to Rostow's concept on stages of economic development (1960), a five-year development-phasing plan known as *Repelita* was created.[40]

During the implementation of *Repelita*, the central government focused on basic infrastructure (water and electricity), transportation, health and education, all essential for development. The first Repelita occurred in fiscal year (FY) 1969-73 with a focus on the production of staple foods and the development of key infrastructure. Repelita II (FY 1974-78) emphasized agriculture, employment, and equitable development at the regional level; Repelita III (FY 1979-83) concentrated on the development of an agriculture-related industry; Repelita IV (FY 1984-88) targeted basic industries; Repelita V (FY 1989-93) focused on transportation and communications; and Repelita VI (FY 1994-1999) was considered as the take-off period where the nation embraced advanced industrialization.

The success of the New Order was attributed in particular to the steady improvement in the country's economic condition as the government demonstrated its capacity to lead. Growth at the regional level was a result of new capital investment as shown in Table 1. Funding from international donors and development agencies was also directed towards critical public capital investments, such as infrastructure, energy, and educational projects both at the national and regional level.

[40] Development can be classified into five stages: traditional, transitional, take-off, maturity, and high-mass consumption, in which each of the stage has a set of criteria and requirement that at some extent followed the transition from agriculture economy to industrial economy (Rostow 1960 as discussed in Riedel 1977).

Table 1. Regional Account during the New Order Era in Indonesia

	Cumulative 1994-1997* (in Millions USD)		Real GRDP (in Billions Rupiah)**		
States/Provinces	Domestic Investment	FDI	1971	1983	1996
DI Aceh	2997.2	3,972.7	56.3	3,470.5	14,636.9
North Sumatra	8266.8	5,014.1	305.7	3,645.7	28,173.1
West Sumatra	11326.5	302.6	72.6	1,251.6	9,514.8
Riau	28492.8	12,924.4	315.6	8,687.9	23,854.8
Jambi	12520.3	72.3	44.0	423.8	4,023.8
South Sumatra	10776.1	3,311.6	212.9	3,189.1	16,986.1
Bengkulu	1222.7	92.6	13.7	236.2	2,206.5
Lampung	3093.4	623.3	74.0	999.2	9,239.2
DKI Jakarta	40565.1	15,701.8	329.0	7,192.5	82,587.3
West Java	91843.4	32,638.4	550.1	9,185.9	89,405.2
Central Java	20347.2	6,264.0	470.4	6,740.9	52,505.4
DI Yogyakarta	920.7	163.2	54.7	713.1	6,393.3
East Java	31923.9	18,861.7	656.8	10,347.8	76,566.6
Bali	4449.2	712.0	62.8	904.9	8,621.5
West Nusa Tenggara	583.8	1,381.1	33.6	525.4	3,986.5
East Nusa Tenggara	1157.5	125.8	31.8	509.7	3,332.8
West Kalimantan	15125.5	748.2	59.5	759.9	8,454.5
Central Kalimantan	6599.8	213.5	23.8	483.6	5,205.7
South Kalimantan	7603.8	2,493.8	54.7	842.1	7,293.6
East Kalimantan	15562.0	4,165.8	58.4	3,880.3	24,118.3
North Sulawesi	2253.5	636.1	61.2	715.3	4,790.7
Central Sulawesi	4902.6	979.9	15.0	341.0	3,023.9
South Sulawesi	5527.2	5,925.3	119.7	1,684.5	11,833.1
Southeast Sulawesi	2091.4	13.0	20.6	315.1	2,101.9
Maluku	3144.6	267.3	33.8	536.1	3,634.4
Papua	9621.7	3,660.4	26.6	892.4	8,264.1

Source: * Bank of Indonesia, data compilation from the Indonesia Investment Coordinating Board (BKPM)
** Central Bureau of Statistics (BPS)

Note : Real GRDP (Gross Regional Domestic Product) is a measure of a state's real income and output for a given state's economy, which accounts for the total value of all final goods and services produced in a particular economy. It represents a measure of economic performance of public and private economic activities at the regional level.

During the first two decades of the New Order, real GDP was relatively flat, encumbered by high levels of indebtedness that the country had to repay and investments that the government had to make to provide the necessary infrastructure to support

industrialization. A steep rise in real GDP took place in the last 20 years of the New Order era as strategic industries were established along with a significant improvement in human capital development.

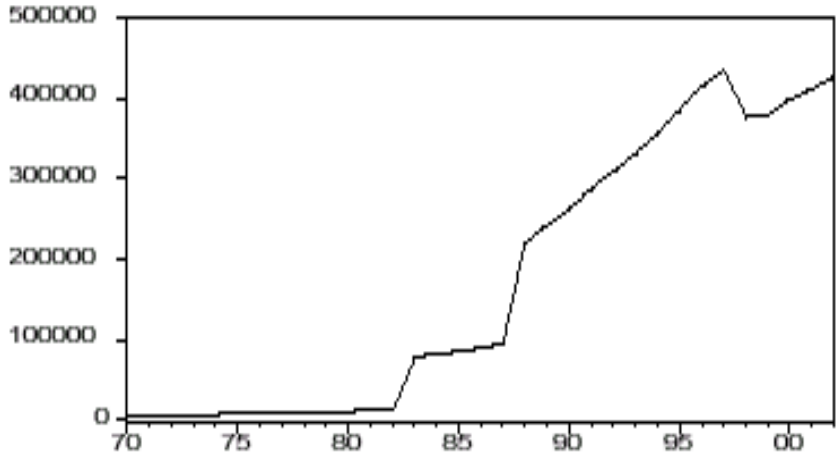

Figure 3. Real Gross Domestic Product (GDP) in Indonesia, 1970-2002
Source: Central Bureau of Statistics (BPS) as reported by Tambunan (2005)

One of the key aspects that contributed to higher GDP in Indonesia were exports of energy. Indonesia has an abundance of natural resources including minerals, oil and gas. During the oil boom in the 1970s, the country received a significant amount of revenue from gas and oil exports. High oil prices increased fiscal capacity and the ability of the government to spend on many development projects. Central government revenue almost double compared to the previous period, which resulted in a larger fiscal capacity in the national budget. Yet, this also marked the beginning of many rent-seeking activities by government bureaucrats and private enterprises.

As the oil boom faded, the government began to realize the risk of depending on its energy sector as the main export commodity. Consequently, the government began to introduce a number of initiatives and policies to support exports from sectors other than energy. States put more effort into identifying other potential exports in their region. To help small businesses and home industries expand, states offered a number of development grants and aid to the regions in the form of micro financing. This was a starting point for state governments to build a framework that would support strategic industrialization as planned in the *Repelita*.

Table 2 provides a picture of the incremental growth and decline in key sectors of Indonesia's economy. The contribution of agriculture to real GDP gradually declined at the beginning of the New Order, although it increased sharply during the 1997 financial crisis. Rapid urbanization in several regions, particularly in Java, decelerated the growth and sustainability of the agricultural sector. Nevertheless, the agricultural sector is important since it employs more labor than other sectors of the economy.

The contribution of the mining sector to real GDP reached the highest level during the first term of the New Order. Its gradual decline reflects a fall in production capacity.[41] Consequently, states that were dependent on the export of natural resources as their main revenue were also affected by the declining profit sharing. Revenue from natural resources has always been a sensitive issue for regions because a large share of

[41] Indonesia became a net oil importer in 2004 due to declining production and a lack of new exploration and investment. Consequently, Indonesia did not reap the benefits of high global oil prices and the cost of domestic fuel subsidies went up drastically. This eventually put a stress on both national and state budgets.

the revenues was not enjoyed by the producer regions, but instead went to the central government and a select group of people in power.

Table 2. Sectoral Contribution to GDP Growth in Indonesia, 1960-2000

Sector	1960-1967 Sukarno Era	1968-1973 Recovery Era	1973-1981 Oil Boom	1982-1986 Recession	1987-1996 Export Growth	1997-2000 Financial Crisis
Agriculture	47.36	31.07	18.05	22.98	8.2	17.88
Mining	6.65	18.72	6.53	-23.12	5.74	-2.84
Manufacturing	6.77	12.47	21.55	35.06	31.18	59.9
Utilities	1.32	0.41	1.08	2.28	1.56	6.09
Construction	3.06	6.82	8.52	4.42	10.2	4.91
Trade	13.38	16.85	16.86	20	15.16*	8.27
Transport	1.64	2.9	7.4	6.72	7.61	5.05
Finance	0.34	0.98	2.61	9.34	6.42	-9.69
Housing	1.69	3.5	4.23	3.01	1.91	-4.49
Public Admin.	10.42	4.86	12.04	12.54	4.22	5.63
Other Services	7.37	1.42	1.13	6.77	7.81	9.29
Total Annual	100	100	100	100	100	100
% Average Growth	2.02	9.2	7.94	4.37	6.69	-2.48

* The contribution of the trade sector to GDP decreased, but inter-regional trade actually increased.
Source: Marks (2006)

The manufacturing sector has expanded along with the service sector, which is typical for developing countries where rapid industrialization has occurred. The strategy of deregulation and privatization of a number of industries in the 1980s and early 1990s was designed to spur private capital investment and provide a greater role for the private sector in development.

The transformation from an agricultural to an industrial economy has been the model for regional development in Indonesia. Consequently, regions compete for resources or factors of production to accelerate industrialization. States in Java have a greater economic agglomeration and economies of scale that can facilitate rapid industrialization. A high concentration of Indonesia's population on Java affects the decision to locate manufacturing on this island. The level of infrastructure in Java also supported the development of various industries in particular industries that required advanced technology. A survey of economics and industry in 1996 in Indonesia revealed the significant gap in industrialization between states in Java and states in Indonesia's eastern region (Fig.4). An agricultural economy was still dominant in regions outside of Java.

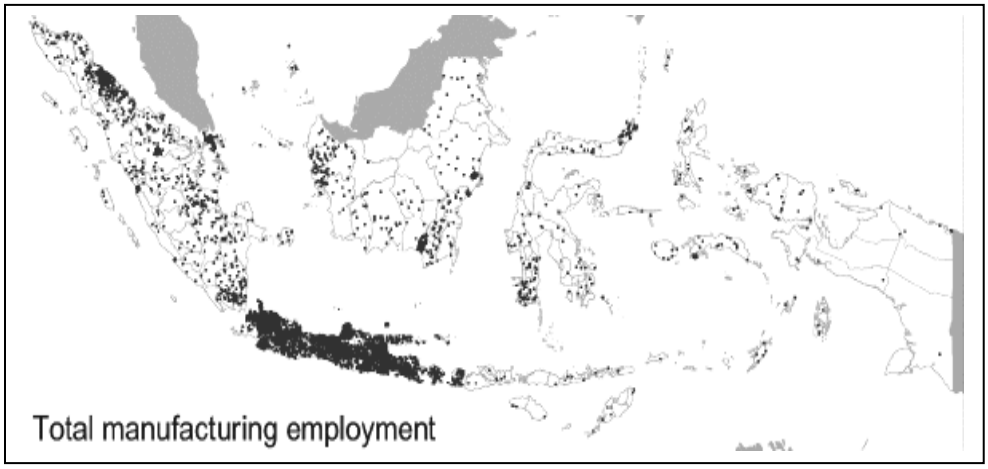

Figure 4. Distribution of Manufacturing Employment in Indonesia, 1996

Legend: Each dot is randomly placed within a district and represents 500 employees
Source: Economic Census and Survey of Industry, 1996 (Lall, et al. 2005)

Demography also influences the shape of regional development in Indonesia where migration and urbanization is the key issue. Low mobility between regions is a result of high transportation costs and insufficient infrastructure, which has resulted in low population growth in certain regions. Growth deficiency beyond Java, in particular in the eastern region, was considered a key barrier for migration. Most urbanization or migration to Java was motivated by the pursuit of more job opportunities, higher wages and better standards of living.

In an attempt to overcome the problem of poverty and an uneven population distribution between Java and other major islands (Sumatra, Kalimantan, Sulawesi, and Papua), the government launched a transmigration program. The policy was designed to increase the population of sparsely populated regions and ease the problem of urbanization in Java. The program was also intended to create more jobs and diversify the economy outside of Java. Almost 2.5 million people migrated between the early 1980s until the time when the program ended due to lack of government funding.[42]

Rapid population growth coupled with urbanization was a contributing factor to increased poverty and inequality during the New Order era (Hill 1989). Despite the record growth rate and the reduction of poverty rate from 40% of the population in 1976 to 11% in 1996, the poverty rate in the eastern region was by far remain the highest compared to Sumatra and Java in the western region. It is apparent in Figure 5, that

[42] The unprecedented social tension was caused by a demographic shift as transmigration triggered greater ethnic and religious diversity. A lack of clear government policies to address the issues of disintegration and other socio-economic challenges posed a risk to growth and stability both at the national and regional levels.

poverty levels in the eastern and western regions (particularly Java and Bali) were not that much different from they were in 1995. Beginning in 1996, the number of people living in poverty in the eastern region increased significantly. At the peak of the Asian financial crisis, the incidence of poverty in all regions increased as a result of negative GDP growth and employment.

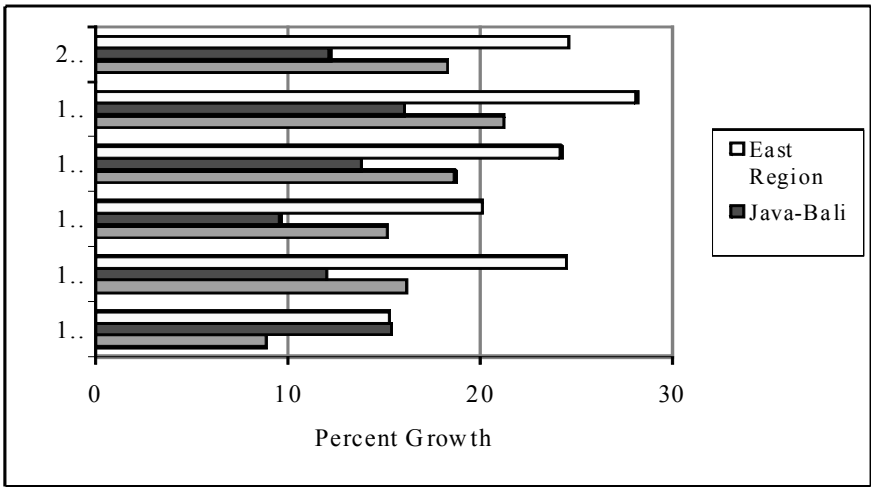

Figure 5. Percentage Growth of Poverty Incidence, 1995–2000
Source: Asian Development Bank

At the regional level, the issue of inequality was a result of decades of imbalanced development between the eastern and western regions in Indonesia. For many years, inequality has been a concern, highlighted by the lag in development in Indonesia's eastern region. Socio-economic divergence in Indonesia accelerated during the financial crisis, making the process of catching-up even more challenging.

The economy of Indonesia's eastern region, which consists of Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Papua, is dominated by agriculture. Agriculture employs approximately 18% of Indonesia's total population. Insufficient infrastructure and investment characterize the majority of remote areas within the region as well as small populations. High growth areas in the eastern region are concentrated in states that have natural resources and commodity products, such as oil, gas, minerals, and agro business. East Kalimantan has the highest income per capita due to oil and gas exploitation in that state.

Another obstacle that has limited growth in Indonesia's eastern region is its smaller market economy and limitation on access to capital, which has hindered the expansion of domestic trade and investment except for some modest commodity exports. Inadequate access to capital and deficiency in economic integration in the eastern region has affected the feasibility of economic activities to take place. Looking at table 1 above, almost 80% of both domestic and foreign investments took place in the western region. The volume of exports accounted for by the eastern and western regions is also far from balanced. Except for exports of natural resources, the majority of exports is concentrated in the western region.

Starting in the 1990s, the central government began to support development initiatives in Indonesia's eastern region. In order to spur investment and growth in the eastern region, the central government put together several programs with assistance from international donors. Nevertheless, lack of commitment from the government to provide an incentive structure and weak infrastructure in the eastern regions have made these

efforts less effective, triggering more dissatisfaction towards the centralized system. This situation has also been one of the reasons that have hindered private sector investment in the eastern region.[43]

To respond to the growing demand for more autonomy and fair resource allocation, the government launched a two-year pilot project of district autonomy in 1995. In its initial phase, the program transferred the major functions of central and state levels to 26 selected districts. The program included several transfers of responsibilities and personnel reassignment. Yet without any substantial adjustments to the financial condition of state governments, this program did not produce the expected results.

The main criticism towards the New Order in the pre-decentralized era was nepotism and cronyism within Suharto's inner circle, which encouraged the spread of rent-seeking activities and corruption. By centralizing the system of governance, the regime had ensured the power to control and monitor all economic activities. Despite economic stability during the New Order, the fundamentals of the economic system were weakened by illegitimate practices in many economic activities, creating more inefficiency in the economy, social inequality, and political suppression.

[43] Public resentment toward government concessions in exploring natural resources in the eastern region to benefit foreign investors and a crony group in power was growing, in particular since eastern regions felt that they had limited opportunities to prosper and enjoy the outcomes of development.

4.2. Financial Crisis and Decentralization Policy

The 1997 financial crisis began when the collapse of the Rupiah triggered a massive banking rush that eventually bankrupted many local financial institutions. Lack of trust and oversight were some of the reasons behind the banking crisis that crippled the financial system. Macroeconomic stability was at risk because of both external and internal forces in the economy as credits dried up, capital investments flew out of the country, and the real sector of the economy could not sustain itself. Part of the problem were the limited resources that the Indonesian government had, which did not allow the government to intervene in the financial markets and inject sufficient capital. The country faced strained fiscal conditions that forced the government to accept conditional IMF loans that were not fully in the interest of the country. These factors together, resulted in a rapid spiral downturn in the economy and the crisis soon became the worst in Indonesia's history since the 1960s.

Competitiveness levels in Indonesia dropped because of the financial crisis, which delayed most major infrastructure development and investments projects. Dependency on natural resources and foreign investment without significant advancement in technology, infrastructure and human capital development were also key factors that reduced Indonesia's competitiveness following the financial crisis. Despite the high growth rates in the 1970s and 1980s, the government did not give much attention to the advancement of R&D and high value exports, which would have triggered technological

change and economic growth. The existing incentive structure did not encourage the private sector to invest in R&D, which resulted in limited technological changes.[44]

Table 3. Rank of High-Technology and Manufactured Exports in East Asia

Country	High-Technology Exports (Millions of USD)	Share of Manufactured Exports to Total Exports (%)
Indonesia	4,580	14
Malaysia	47,042	58
Singapore	71,421	59
Thailand	18,203	30
China	107,543	27
Republic of Korea	57,161	32

Source: Wie (2006)

At the peak of the crisis in 1998, the drastic depreciation of the Indonesian currency caused inflation to skyrocket from about 11% to 77%. National GDP growth contracted by more than 13 percent compared to the growth rate before the crisis took place.[45] Poverty rate climbed to almost 25 percent in 1999 as high unemployment rates started to rattle the Indonesian economy.[46] The World Bank predicted that there were about 14-15 million people unemployed in Indonesia in 1999. Yet, many of the

[44] FDI in Indonesia has focused on certain types of industries that require skilled workers or more advance technology, such as mining, biochemical, and auto industry. Yet, not all of these industries were given incentives to allow for transfer of technology. Lack of protection of property rights also hinders efforts to invent even to this day.

[45] Repelita VI (FY1994–99) expected an annual average GDP growth rate of 6.2. Those goals were met by 1997, which ironically took place right before the financial crisis that hit several Asian countries including Indonesia.

[46] Despite the continuing upward trend of poverty and unemployment rate in the coming years following the crisis, the informal sector of the economy was able to absorb some of the unemployed labor force.

unemployed moved into low-paying urban or rural informal sectors that could not be properly identified and measured clearly. Real wages dropped significantly in 1998, which contributed to lower aggregate demand.

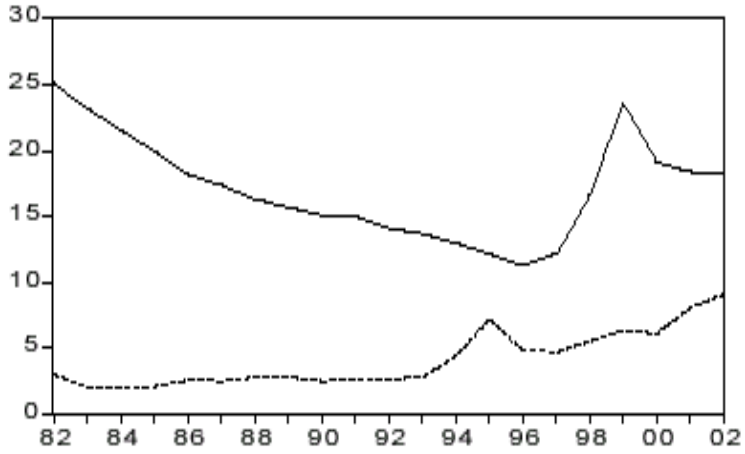

Figure 6. Poverty Rate and Unemployment Rate in Indonesia, 1982-2002

Legend: —— Poverty Rate ------ Unemployment
Source: Central Bureau of Statistics (BPS) as reported by Tambunan (2005)

Table 4 shows growth rates at the regional level during the period of crisis.[47] The process of economic recovery took quite some time due to a lack of trust on the government and the private sector in Indonesia, which further deteriorated macroeconomic stability.

[47] The graph in Appendix F.1 shows the extent of rapid decline in the growth rates during the peak of the financial crisis. Another key indicator of regional growth is private investment that also drastically declined during the period of the financial crisis as shown in the chart in Appendix F.2.

Table 4. Rate of Growth of Indonesian States, 1996-2000

Provinces/States	GDP Growth		
	1996	1998	2000
DI Aceh	2.47	-9.3	-8.3
North Sumatra	9.01	-10.9	4.8
West Sumatra	7.87	-6.8	3.8
Riau	5.46	-3.9	6.5
Jambi	8.81	-5.4	5.4
South Sumatra	8.03	-6.8	3.3
Bengkulu	5.72	-6.3	3.9
Lampung	7.95	-7.0	3.4
DKI Jakarta	9.1	-17.5	4.3
West Java	9.21	-17.8	4.2
Central Java	7.3	-11.7	3.9
DI Yogyakarta	7.79	-11.2	4.0
East Java	8.26	-16.1	3.3
Bali	8.16	-4.0	3.1
West Nusa Tenggara	8.11	-3.1	8.8
East Nusa Tenggara	8.22	-2.7	4.2
West Kalimantan	10.75	-4.7	3.0
Central Kalimantan	11.85	-6.9	1.5
South Kalimantan	9.95	-5.5	4.3
East Kalimantan	8.29	-0.8	4.0
North Sulawesi	9.25	-2.4	6.1
Central Sulawesi	8.33	-4.0	4.2
South Sulawesi	8.31	-5.3	4.9
Southeast Sulawesi	6.01	-5.8	5.3
Maluku	7.14	-5.9	-2.9
Papua	13.87	12.7	2.2

Source: Central Bureau of Statistics (BPS)

States in Java were hit most by double-digit negative growth. Rich states with abundant natural resources, such as Riau and East Kalimantan also experienced slower growth, but the impact of the crisis was less compared to other states. Most states in the eastern region were also less impacted by the crisis compared to states in the western

region. Except for Aceh and Maluku, which were disrupted by conflict and ethnic tensions, most of the states experienced growth in 2000.[48]

Table 5. Poverty Rate and Gini Index of Indonesian States, 1996-2002

States/Provinces	Poverty Rate*		Gini Index**		Pop. Growth*
	1996	1999	1996	1999	1990 – 2000
DI Aceh	12.72	14.75	0.26	0.27	1.46
North Sumatra	13.22	16.74	0.3	0.27	1.32
West Sumatra	9.84	13.24	0.28	0.25	0.63
Riau	12.62	14	0.3	0.27	4.35
Jambi	14.84	26.64	0.25	0.26	1.84
South Sumatra	15.89	23.53	0.3	0.27	2.39
Bengkulu	16.69	19.79	0.27	0.28	2.97
Lampung	25.59	29.11	0.28	0.29	1.17
DKI Jakarta	2.35	3.99	0.36	0.46	0.17
West Java	11.06	19.78	0.36	0.29	2.03
Central Java	21.61	28.46	0.29	0.27	0.94
DI Yogyakarta	18.43	26.1	0.38	0.34	0.72
East Java	22.13	29.47	0.31	0.29	0.7
Bali	7.81	8.53	0.31	0.28	1.31
West Nusa Tenggara	31.97	32.96	0.29	0.25	1.82
East Nusa Tenggara	38.89	46.73	0.3	0.28	1.64
West Kalimantan	24.21	26.17	0.3	0.27	2.29
Central Kalimantan	13.5	15.06	0.27	0.27	2.99
South Kalimantan	8.53	14.37	0.29	0.27	1.45
East Kalimantan	9.73	20.16	0.32	0.29	2.81
North Sulawesi	17.94	18.19	0.34	0.28	1.33
Central Sulawesi	22.31	28.69	0.3	0.3	2.57
South Sulawesi	16.71	18.32	0.32	0.28	1.49
Southeast Sulawesi	29.23	29.51	0.31	0.28	3.15
Maluku	44.57	46.14	0.27	0.29	0.08
Papua	42.26	54.75	0.39	0.44	3.22

Source: * Central Bureau of Statistics (BPS)
** Figures represent Gini coefficient for household expenditure based on Susenas data.

[48] The tsunami disaster in Aceh in 2001 has significantly affected the state's economy and many public services were not function properly until the recovery task started.

Poverty rates at the regional level significantly increased during the peak of the crisis particularly states in Java that experienced a significant economic decline (see Table 5 below). To some extent, the epicenter of the crisis was in the urban areas because of high inflation, food shortage, and a lack of jobs. The crisis also put pressure on urban areas more than in rural areas because of the vast social issues in particular the wide gap between the rich and poor.

The ripple effect from the financial crisis was irreversible as high uncertainty and increased risk both from an economic and political standpoint crippled economic activities. The political crisis and the accumulation of distrust and dissatisfaction towards the government have prolonged the crisis and created a negative sentiment towards the economy. The crisis escalated the degree of tension and unrest indicating that there was a much larger issue than the crisis in the financial sector. All of these issues finally forced Suharto to step down and transfer power to Habibie in 1998.[49]

The end of the New Order was marked by a staggering crisis that had begun as a financial crisis and spread into an economic and socio-political crisis. Democratization and reformation were critical elements in fixing the multi-dimensional problems during the crisis. A free election with multiple parties and freedom of press were the first signs of a democratization process that went underway during Habibie's administration. The regions demanded decentralization in order to gain access to larger shares of revenue in general, and regional resources in specific. This bottom-up process finally gained

[49] The end of the Suharto rul was triggered by bloody demonstration and major riot that took place in May 1998. Pressures from the international community also influenced the decision to transfer power. Yet, this sparked further political fragmentation and friction with the multi party system.

momentum with the introduction of two laws that became the foundation and legal framework of a decentralization policy in Indonesia. Hence as observed, the process of decentralization in Indonesia was not designed for economic purposes but was rather a political compromise to prevent regional disintegration.

The Law 22/1999 on District Governance and the Law 25/1999 on the Fiscal Balance between central and regional governments were the basis for the implementation of decentralization in Indonesia.[50] Law No. 22/1999 transferred functions, personnel and assets from the central government to the states, local districts and city or municipal governments. This law corresponds to the devolution of authority, which was a step forward from *deconcentration* of government during the New Order era. In the new scheme, district governments receive full autonomy while central and state governments maintain a hierarchical relationship with the main responsibility for national defense, international trade, and the judicial system (Bahl and Alm 1999).

Following the enactment of a law on decentralization, the central government decided that implementation of decentralization would be effective within two years. Critics of the implementation of decentralization in Indonesia believe that the policy did not examine thoroughly the capacity of states and district governments to carry out the new functions required for successful implementation of decentralization. The

[50] The laws of decentralization in Indonesia are based on five principles: (1) democracy, (2) community participation and empowerment, (3) equity and justice, (4) recognition of potential and diversity within regions and (5) the need to strengthen local legislatures.

government should have implemented decentralization in phases, so that state governments had the necessary regulations and directives in place.[51]

The process of transferring administrative functions, personnel, and assets was part of the restructuring the institutional framework of state and local district governments. One of the problems with transferring central government personnel was the rigidness of existing organizational structures, making it difficult to restructure or downsize sub-national governments. Consequently, inefficiencies existed in state and district governments, stemming from unnecessary administrative structures.

In the public finance sector, decentralization of state and district budgetary systems occurred mainly on the expenditure side based on Law 25/1999. The impact was less severe on the revenue side since states and districts could not obtain financing through debt issuance as a way to tap public financing. The central government still has doubts on how to control sub-national debt and is concerned with potential defaults or mismanagement at the regional level. Regions were allowed to collect local taxes, fees, proceeds from public services, and profit sharing from joint ventures with private enterprises.[52] In the case of natural resource exploitation and property taxes, there was a revenue sharing scheme that regulated the portion for each central, state, and district government (see Table 6 below).

[51] In many situations, state and district governments have lacked the necessary training and tools to develop their institutional frameworks sine only few technical assistance and development aid provided.
[52] All new taxes, charges, and fees should follow certain criteria and must obtain approval from the central government to prevent abuse of taxing power by state and district governments. The central government also has the power to negotiate the percentage of profit sharing of large public investments.

Table 6. Revenue Sharing Scheme (in percent)

Revenue Sharing Category	Regional/District Government (%)					
	Central Government	State/Provincial Government	District/ Municipal Government	Other District/ Municipal in the Province	Collection Cost	Intensifying Cost
Property Tax	10	16.2	64.8	6.5	9	3.5
Property Fee	10	16	64	20		
Forestry	20	16	32	32		
General Mining	20	16	32	32		
Fishery	20			80		
Oil Mining	85	3	6	6		
Gas Mining	70	6	12	12		

Source: Pratikno, 'Local Autonomy and Democracy in Indonesia, 1999-2001' in Erb (ed) (2005), *Regionalism in Post-Suharto Indonesia*.

Because of limited funding capacity through revenue generation, most regions still depend on transfers from the central government through two primary mechanisms. First, is the discretionary grant or known as DAU (*Dana Alokasi Umum),* previously known as INPRES in the New Order, which is a combination of subsidies and direct transfers. DAU serves as a means to equalize the regions' fiscal capacity. The second mechanism is the special allocation fund known as DAK (*Dana Alokasi Khusus*), which is considered to be an earmarked fund.

The slow economic recovery has further limited the amount transferred by the central government and put stress on state and district budgets. With a weak local taxing power and an inability to propose many alternative taxes, charges or fees, states have to impose new tax rates, charges, and fees as a medium to generate additional revenue. These actions had a negative impact on the investment climate in the regions and encouraged collusion between state officials and the private sector.

Corruption and rent-seeking activities at the regional level have been considered the major impediment to economic growth as they potentially affect state government efficiency in the implementation of decentralization in Indonesia. These illegal practices are possible since state and district governments have the power to make decisions on where and when to invest and to negotiate taxes, charges, and fees that apply to certain firms.

The issue of fiscal equality was raised with the introduction of the new transfer mechanism. A fair distribution of DAU and DAK was a challenge for the central government, particularly with the current allocation method and the presence of political interventions. Although states with large natural resource endowments should receive a significant increase in their revenue from an increase in profit sharing, it has not fully been the case since the central governments have tried to equalize the transfer of funds to the states.

With larger fiscal capacity, rich states are potentially able to diversify their economic activities, and provide more infrastructure and public services. These efforts will eventually raise their income per capita and standard of living. Most of these states are in the western region except for East Kalimantan. This state has the highest income per capita in Indonesia, which is attributed to the natural resources revenues.

The per capita income of states in both the western and eastern regions exhibited a steady increase from 2001 to 2005 as shown in Table 7. This increase is an indication that decentralization has improved the standards of living of the people in both regions. The gap in the level of income per capita between the western and eastern regions also

decreased from the beginning of decentralization in 2001. Nevertheless, rich states that reside mainly in the western region still have the advantage over poor states due to higher public capital spending and larger fiscal capacity.

Table 7. Per capita Income of Indonesian States, 2001-2005 (in Rupiah)

States/Provinces	2001	2003	2005
DI Aceh	8,402	9,642	8,649
North Sumatra	6,637	7,919	7,047
West Sumatra	5,932	7,368	6,619
Riau	11,544	13,007	29,308
Jambi	4,569	5,971	8,442
South Sumatera	6,078	7,303	10,529
Bengkulu	3,470	4,398	6,172
Lampung	3,708	4,350	5,453
DKI Jakarta	26,064	33,118	50,104
West Java	4,312	5,027	7,987
Central Java	4,338	5,533	7,349
DI Yogyakarta	4,618	5,851	7,688
East Java	5,602	7,214	11,341
Bali	5,925	7,297	10,031
West Nusa Tenggara	3,460	3,959	5,898
East Nusa Tenggara	1,929	2,398	3,532
West Kalimantan	4,746	5,445	7,662
Central Kalimantan	6,424	7,810	9,796
South Kalimantan	6,014	7,122	8,955
East Kalimantan	33,983	36,754	62,024
North Sulawesi	3,517	4,301	5,902
Central Sulawesi	4,487	5,317	7,091
South Sulawesi	3,937	4,807	6,117
Southeast Sulawesi	3,647	4,483	6,202
Maluku	1,466	1,729	2,115
Papua	10,756	11,945	17,275

Source: Central Bureau of Statistics (BPS)

Table 8. Fiscal Decentralization and Growth Rate of Indonesian States, 2001-2005

States/Provinces	Fiscal Decentralization			Percent Growth Rate		
	2001	2003	2005	2001	2003	2005
DI Aceh	1.56	4.66	6.48	1.2	3.4	1.6
North Sumatra	2.90	4.43	5.47	3.7	4.4	5.5
West Sumatra	1.23	1.87	2.23	3.6	4.5	5.7
Riau	3.58	6.28	7.28	4.3	4.7	5.4
Jambi	0.72	1.64	1.92	5.9	4.5	5.6
South Sumatra	1.80	2.85	3.28	2.4	4.5	4.8
Bengkulu	0.56	1.05	1.07	4.0	5.1	5.8
Lampung	1.13	2.16	2.58	3.6	5.7	4.0
DKI Jakarta	21.67	34.05	37.18	3.6	4.4	6.0
West Java	7.01	10.27	12.87	4.8	4.3	5.6
Central Java	4.77	8.55	8.77	3.3	4.2	5.4
DI Yogyakarta	1.04	1.98	2.02	3.4	4.1	4.7
East Java	5.83	11.39	12.08	3.3	4.1	5.8
Bali	1.80	2.22	2.51	3.4	3.7	5.6
West Nusa Tenggara	0.99	1.41	1.55	9.0	3.1	1.7
East Nusa Tenggara	0.68	1.53	1.33	5.1	5.9	3.5
West Kalimantan	1.11	1.64	2.05	1.9	3.0	4.7
Central Kalimantan	1.05	1.44	1.61	2.7	4.9	5.9
South Kalimantan	1.32	2.25	2.38	3.7	4.9	5.1
East Kalimantan	4.32	8.18	6.25	5.1	2.4	3.2
North Sulawesi	0.81	1.35	1.39	4.3	5.2	4.9
Central Sulawesi	0.71	1.20	1.37	5.2	6.3	7.6
South Sulawesi	1.61	2.69	3.48	5.0	5.4	2.3
Southeast Sulawesi	0.56	1.15	1.12	5.6	7.2	7.3
Maluku	0.74	1.26	1.53	-1.6	3.5	5.1
Papua	2.26	7.89	7.95	-1.6	3.0	4.6

Note: *States in italics are part of the western region from geographical standpoint.*
Source: Central Bureau of Statistics (BPS)

Since the implementation of decentralization in 2001, the degree of fiscal decentralization has increased continuously except in East Kalimantan and East Nusa

Tenggara after both reached the highest level of fiscal decentralization in 2003.[53] The degree of fiscal decentralization was relatively high in most states in Java and states that were endowed with rich natural resources, including Aceh, Riau, East Kalimantan, and Papua as shown in Table 8 above. DKI Jakarta, West Java and East Java were among the richest states in Java that also had a higher degree of fiscal decentralization. The spending of these three states combined represented more than half of total state spending in Indonesia, which made Java the most prosperous region.

The regional growth rate increased in most states after a 3-year period of negative growth during the financial crisis (1997-1999). Yet, the growth rate after decentralization was lower than in the pre-crisis period during the New Order. In general, most states in the western region except for Aceh experienced a relatively higher growth rate after the implementation of decentralization. Growth rates in most of the lagging states in the eastern region also gradually increased with the expansion of the economy.

Public capital investment is essential for growth and state spending in Indonesia, supporting job generation and triggering positive externalities. The 1997 financial crisis significantly affected the fiscal capacity of both central and state governments, which resulted in a major decrease in public capital expenditure.[54] The delay in many critical

[53] Following the measurement of fiscal decentralization in other studies that has been discussed in the previous chapter, the degree of fiscal decentralization is defined as the share of sub-national spending and revenue over total government spending.

[54] Inability to utilize limited fiscal resources coupled with the instability of the economy encouraged state governments to invest the majority of their funds in government bonds that had marginal yield but were guaranteed by the central government.

public investment projects had caused further deterioration of public services in Indonesia, not only reducing regional competitiveness but also slowing the pace of economic recovery. Annual infrastructure investment in Indonesia was only around 3.4 percent of GDP during the course of the crisis, which was low compared to most developing countries that invested between 4 to 7 percent of GDP.[55]

Other basic public services, such as education and health care are critical to eradicate poverty and to improve standards of living. The World Bank's reports on public expenditure in Indonesia also outlined the critical role of the public sector in Indonesia's economic recovery and the importance of catching up with neighboring regions that continue to be more competitive.[56]

[55]The political and economic uncertainty followed the financial crisis in 1997 as Indonesia struggled to restructure its financial sector and economy, resulting in a delay in the infrastructure projects.
[56] In 2004, the Indonesia's government introduced a number of initiatives, regulations, and incentive structure to attract Public Private Partnership (PPP) in key infrastructure projects. PPP scheme has been a critical factor in state finance since it enables state governments to share risks and overcome budgets constraint in large-scale public investment projects.

5. Problem Statement and Research Hypotheses

The relationship between fiscal decentralization, state efficiency and economic growth is centered around the belief that decentralization provides an incentive for state governments to be efficient, which will eventually lead to economic growth. This relationship is linked to the framework of regional competitiveness where the role of states in supporting the private sector and the market economy is important. States ought to allocate fiscal resources efficiently through productive spending or investment in order to support firms in their respective regions. In reviewing this concept, a few questions arise: How can the efficiency and effectiveness or productivity of state governments be measured? Also, how can this measure be integrated into the growth model?

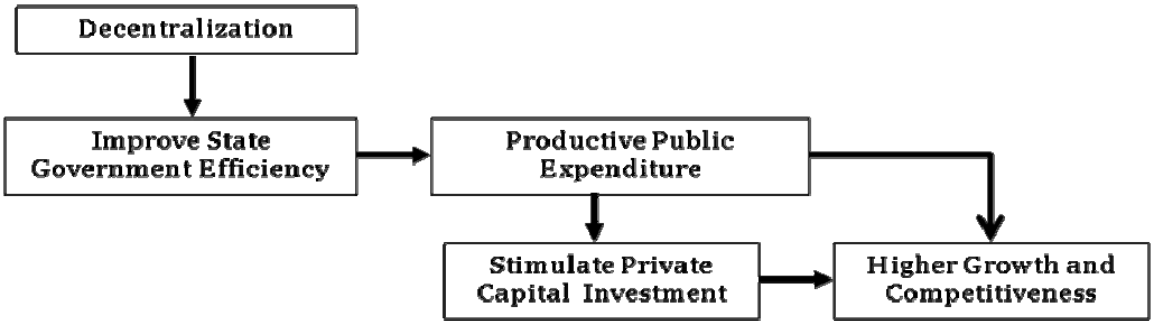

Figure 7. Framework of Regional Competitiveness

Brennan and Buchanan (1980) introduced a way to measure the efficiency of state governments, by correlating efficiency levels with the size of government. They believe that the bigger the state governments, the less efficient they are. Opponents of "big government" have used this argument to encourage smaller and efficient government organizations.

The efficiency of state governments can also be measured by the magnitude of transaction costs associated with the delivery of public goods. This cost benefit approach focuses on the quality of services against costs, which to some extent indicates the choices of state governments in allocating public goods. Following the theory introduced by Tiebout, people choose where to live based on the net benefits that states offer, in particular the quality and cost of public services delivered.

Evaluating the effectiveness of laws or regulations that support local and regional economic development may not fully measure state efficiency, but it can certainly indicate the performance of state governments. Unfortunately, this evaluation method has a challenge because of the inconsistencies in political institutions in each state. In addition, it is difficult to pinpoint which policies contribute to specific results, making it even more difficult to compare the performance of state governments across the board.

Another way to measure state efficiency is by analyzing the efficiency of states in allocating fiscal resources. This is reflected in the policies, strategies and decisions on how to allocate public expenditure. The ability of states to efficiently allocated spending or expenditure demonstrates their performance levels and to some extent indicates the quality of state institutions in general (Borner et al. 2004). Here, it is assumed that state

governments will optimize the allocation of their scarce fiscal resources to serve the needs of their state effectively. Decisions and strategies made by the states which influence how public expenditure is allocated, can affect the efficiency of factors of production and the market economy, even though state governments are not typically involved in real production.[57]

Of the several methods that can be used to measure state efficiency levels, the last option is the most commonly used in current studies because the choices or preferences made by state governments in allocating public expenditure depict a measurable role of states in supporting development and public welfare goals. Measuring state performance through efficiency of public expenditure is also viable since all states follow the same standardized structure and assessment method.

Previous empirical studies of fiscal decentralization have excluded an efficiency measure in the extended growth model with public spending. Most of these studies have used the level of fiscal decentralization as the key explanatory variable for economic growth (Davoodi 1998, Woller 1998, Brueckner 2005). Surprisingly, the results from those studies were inconclusive, although it is generally acknowledged that fiscal decentralization has a negative relationship with economic growth in developing countries or regions, contradicting conventional wisdom that a decentralized system provides incentives for governments to become more efficient. Because of this finding, it

[57] In some circumstances, states have a major stake in delivering public goods. It is common for state owned enterprises to run public utilities or energy companies in many developing countries. The question is how should state governments be involved and what should the appropriate role, scope and size of the state government be? A reason to have control of a critical public good rather than relying on a market mechanism is so that the public goods are affordable and all citizens have fair access to them.

would be critical for this dissertation to incorporate a measure of state efficiency in the growth model.

There are four possible outcomes from analyzing the relationship between fiscal decentralization, state efficiency and regional growth. The first possible result is that the implementation of fiscal decentralization is expected to have a positive correlation with state efficiency levels and regional growth. The second possible outcome is the exact opposite in which fiscal decentralization is actually associated with lower efficiency and lower growth.

The remaining two potential outcomes are where fiscal decentralization supports state efficiency, but do not have an impact on regional growth and may even be associated with lower regional growth. On the contrary, fiscal decentralization does not increase state efficiency, but has a positive correlation with regional growth. Stated differently, an efficient allocation of fiscal resources does not always mean higher economic growth, and a greater degree of fiscal decentralization does not always correspond to a more efficient state government.

When this analysis is applied to developing countries, it potentially explains a paradox where a higher degree of fiscal decentralization does not necessarily increase government efficiency levels, but the country still experiences robust growth. A number of studies have supported the rationale of why developing countries experienced strong economic growth over several decades despite deterioration in the performance of their governments. One explanation is that growth can occur simultaneously with growing corruption and rent seeking. Another explanation is that growth is particularly influenced

by factors that are independent of decentralization policies, such as an expansion of the global market economy, a growing capital market and private investment, and an increase in domestic demand due to population growth.

In order to determine whether the effects of fiscal decentralization on economic growth differ in lagging and leading states, it is important to examine the different structure and characteristic of each state and how these affect government efficiency and regional competitiveness. Differences in fiscal and human resources as well as technology may result in inequalities between these two clusters of states. State government organizations may have dissimilar preferences, priorities, and strategies on public expenditure utilization, tax revenue collection, and factor cost determination.[58] The effect of these factors, in addition to other factors unique to a region, on regional growth has been a subject of continuous debate in the regional economics field.

The dynamic relation between institutions, markets and firms in the context of decentralization and regional competitiveness in developing countries is the key reason to conduct the current research. As one of the largest and most diverse developing countries in the world, Indonesia is chosen as the case study. The key challenge in Indonesia's decentralization is related to the extent of regional disparities, corruption, rent seeking and revenue sharing for certain types of resources between the central and state

[58] In some developing countries, aids, grants or loans from multilateral agencies are a key source of financing for development. Since revenue collection through taxes is limited in developing countries, states face many obstacles in obtaining financing to fund development. One of the challenges for developing countries is to expand its revenue base by integrating the informal market into the economic system.

governments. Yet, the implementation of a decentralized system in Indonesia also opens a window of opportunity to improve state governments' performance.

5.1. Research Questions

This dissertation attempts to provide answers to the questions that pertain to the implementation of decentralization in Indonesia. The key question is whether fiscal decentralization provides suitable incentive structures to make state governments more efficient in allocating resources, eventually leading to growth that is more robust. More specifically, what is the effect of the implementation of fiscal decentralization on economic growth and what role does the efficiency of state allocation play?

This dissertation attempts to determine whether the implementation of fiscal decentralization triggers different results in lagging and leading states taking into account the differences in fiscal capacity. In addition, this study also aims to reveal whether factors that support state efficiency differ in a pre-decentralization and post-decentralization period.

The following subset of questions is also relevant when discussing fiscal decentralization, state government efficiency and regional growth in Indonesia:

(1) What factors influence state fiscal efficiency in the pre-decentralization and post-decentralization period?

(2) Do capital and current expenditure, tax rates, and cost structure have a significant effect on regional growth?

(3) How different are the effects of allocative efficiencies, public expenditure, and tax rates on economic growth in the eastern and western regions, lagging and leading states respectively, in Indonesia?

(4) What are the policy implications on competition between regions as it relates to state government efficiency, productivity of public capital expenditure, and regional growth? Does Indonesia's decentralization policy play an important role in reducing disparities between regions?

5.2. Hypotheses

The primary hypothesis (H-P) is that the decentralization policies in Indonesia do provide incentives to support state government efficiency and regional growth.

H-P1: *Fiscal Decentralization has a positive relationship with economic growth since decentralization provides positive incentive structures to improve the level of state efficiency. Yet, the outcomes from the implementation of fiscal decentralization differ between lagging and leading states.*

The first hypothesis assumes that fiscal decentralization improves the efficiency of states, which will then lead to higher economic growth. As indicated in previous studies, the relationship between fiscal decentralization and economic growth differs

between developed and developing countries; similar results may occur at a smaller scale between leading and lagging states in Indonesia.

H-P2: *The level of state efficiency is neither determined by the level of a state's economy nor its fiscal capacity.*

Similar to the first hypothesis, the second hypothesis in this set of primary hypotheses presumes that the level of state efficiency has a positive relationship with economic growth. State efficiency implies that states will allocate expenditure and resources to productive investments, which can contribute to the growth of the private sector and the market economy at the regional level.

Leading states are assumed to have an advantage over lagging states in utilizing their fiscal capacity to support regional development for a number of reasons: First, leading states may have a larger supply of skilled and trained staff and more advanced technological resources than lagging states. Second, the productivity of public capital investments is typically higher in leading states because of economies of scale and positive externalities that are driven by capital investments.

In this context, despite lower fiscal capacity and challenges in managing fiscal decentralization, it is still possible for lagging states to be more efficient if the state government is committed to improving its capability to allocate resources efficiently. In contrast, a larger fiscal capacity in leading states may not guarantee higher inefficiency levels, because of possible increases in waste spending.

The set of secondary hypotheses (H-S) focuses on several factors of fiscal decentralization that can affect state government efficiency and economic growth.

H-S1: *A higher ratio of productive spending and revenue independence indicates a higher level of state efficiency.*

The first secondary hypothesis assumes that the level of state government efficiency is affected by the ratio of productive spending and revenue independence. States are supposed to be more efficient if they assign their fiscal resources to productive spending and can generate sources of revenue independently.

H-S2: *Higher state tax rates and factor costs are correlated with lower growth, which can add to the financial burden of firms.*

The next secondary hypothesis assumes that with a higher level of state efficiency, some other factor costs may decrease.[59] A lower cost structure is expected to promote economic growth and increase the competitiveness level of a state.

A decentralized system also allows states to manage their own sources of revenue. States may need to raise taxes, increase fees and charges to avoid budget deficits or revenue shortfalls as transfers from the central government decline. Higher taxes,

[59] Operating costs and staff wages and allowances are some of the costs of managing administration and organization of state governments. Those costs are part of the current expenditure in the state budget.

charges, and fees are expected to improve public services not support corruption. Unfortunately, corruption often takes place and can impede the growth and competitiveness of a region, as firms become more reluctant to invest. With globalization and growing competition between regions, this can be problematic because firms can easily move their capital to other regions. However, it can also encourage regions to be more competitive to retain capital and investments in their respective regions.[60]

H-S3: *Productive public capital expenditure is correlated with higher growth. Despite a larger fiscal capacity, capital expenditures in the leading states are not always more productive, because higher spending may result in more inefficiency.*

The third secondary hypothesis assumes that public capital expenditure can increase the capacity of the private sector to succeed in a market economy in both the short and long term. Leading states are assumed to have a stronger ability to finance public capital investments using their own resources as well as external resources. Yet, this larger financial capacity does not guarantee higher growth if resources are not allocated in an efficient manner.

[60] Higher factor mobility of capital and the existence of alternate locations for production can force states to seriously reconsider any policies that are not conducive to the private sector investments. One exception is in states endowed with a surplus of natural resources where the private sector is more likely to invest. In that situation, the private sector may be more tolerant of government inefficiency and red tape bureaucracy. The private sector is also more willing to provide infrastructure or financial resources to support the investment of a project.

6. Analytical Framework and Empirical Analysis

The dissertation employs a two-stage method to determine the relationship between efficiency factors at the state government level, fiscal decentralization and economic growth. The first stage is the application of the Data Envelopment Analysis (DEA) to construct a measure of technical efficiency of state governments. As an extension to the analysis of state efficiency levels using DEA, this study applies a tobit panel data regression to reveal factors that influence technical efficiency. The second stage adopts an extension of the endogenous growth model within a public spending framework. Panel data analysis is utilized in the growth model to determine the effect of fiscal decentralization and state efficiency on economic growth.

Despite a number of constraints in this study, the methodology and data analysis used will be a valuable foundation for future research that aims to validate the relationship between fiscal decentralization, state efficiency, and economic growth at either the regional or the national level.

6.1. State Performance and Efficiency Analysis Using Data Envelopment Analysis

Two basic analytical methods are generally used to measure comparative performance or efficiency: the parametric model and the non-parametric model. The

parametric technique with a statistical regression has been used in single input-multiple outputs or single output-multiple inputs analysis. Ordinary Least Square (OLS) regression is typically used to estimate performance levels in the parametric models. The major limitation of the parametric model is the risk of it being inaccurately specified since it is necessary to hypothesize the type of model before running OLS regression (Thanassoulis 2001). In addition, there have been unsatisfactory results when confidence intervals take into account statistical noise. In addition, the parametric method does not allow inefficiency to be measured.

In response to the limitation of the standard OLS regression in measuring efficiency, the Stochastic Frontier (SF) model was introduced. Instead of focusing on central tendency, the SF model is oriented towards the efficiency frontier. Unlike the parametric method, this model allows for inefficiency. The standard error is composed of two parts: the normally distributed random error and an inefficiency parameter. The SF model measures the average efficiency rather than the efficient level of input for a given output. However, one of the issues with the SF model is the inaccuracy of the efficiency ratio because of the unknown size of the random error within the observed output.

The non-parametric method of comparative performance measurement has the ability to run multiple inputs and outputs. This method can also estimate the efficiency model based on the relationship between inputs and outputs. The model constructs an efficient production frontier from the observed inputs and outputs. In constructing the efficient production of the non-parametric method, it is assumed that every input and output correspondence can be observed based on their interpolation; thus, all observed

inputs and outputs essentially operate at the same production function. The efficient production frontier represents the optimum capacity of the efficiency model rather than the average profile of the parameters in the regression analysis. All units on the frontier or "envelope" are assumed to be fully efficient.[61]

Data Envelopment Analysis is the main category of the non-parametric method that measures the relative performance of certain Decision Making Units (DMU). Performance is measured in terms of efficiency when it references a set of units that are being compared to each other.

Figure 8. DEA Research Framework

Although DEA measures relative efficiency, it is assumed that each DMU includes a sufficient number of units that have absolute technical efficiency and therefore the DEA analysis is capable of continuously improving their performance (Thanassoulis 2001).[62] The main criterion of a DMU is homogeneity since it uses the same input

[61] It is feasible to obtain an inefficient production frontier where the model produces slacks from input excess and output shortfall. The theory of inefficiency by Leibenstein (1966) argued that firms do not always maximize production as postulated by neoclassical economics.

[62] DEA was introduced by Charnes, et al. in 1978 and intended to measure the efficiency of an organization unit. The DEA concept is an extension of the linear production function that was initially put together in the economic concept of empirical efficiency by Farrell in 1957 (Thanassoulis 2001). Farrell attempted to measure the efficiency of a unit of production in a single input-single output case, which involved the measurement of price and technical efficiencies and the derivation of the efficient production function.

resources to produce output. Yet, each unit of assessment has a "decision" control mechanism to convert inputs into outputs. This decision control instrument is a key concept that applies to this research as each state government is considered as a DMU that makes decisions on the allocation of input resources to generate maximum output.

Following Farrell (1957), technical efficiency refers to a condition when, given a set of inputs, a maximum quantity of outputs are produced or when given a set of outputs, a minimum quantity of inputs are required.[63] The technical efficiency of a DMU is computed as the ratio of output produced to input consumed as shown below.

Technical Efficiency = Σ weighted outputs / Σ weighted inputs

In measuring efficiency, DEA allows discretion under certain conditions in which the model should control inputs or outputs in the analysis. The concept of Pareto efficiency has three orientations based on whether inputs or outputs are controllable. An input-oriented model (inputs are controllable) is where DMUs are deemed to generate a given amount of outputs with the smallest possible amount of inputs. Alternatively, for an output-oriented model, efficiency is measured based on a given amount of inputs to generate the maximum outputs. The third orientation is the base-oriented model where DMUs produce the optimal combination of inputs and outputs controlling for both inputs and outputs. The DEA model in this research is based on input orientation as it pertains to

[63] Efficiency is generally an economic terminology. Other fields may refer it to performance, which is a broader term to explain the quality of state government organization.

the capability of state governments in maximizing a limited amount of public spending as input.

The DEA model allows each DMU to maximize the weight multipliers. The weights of inputs and outputs for each DMU vary until the model reaches the best possible combination. The resulting efficiency score is relative to the DMU's sample observed and the set of weights have to be accounted for other units of assessment in which none of them have an efficiency score greater than one.

Figure 9 exhibits the graphical representation of the efficiency measurement of the DEA model with a single-input (x) and single-output (y). The model produces two frontier efficiency lines: first is a linear line (0ICM) that correlates with constant returns to scale (CRS); and the other is a convex line (GABCDF) with variable returns to scale (VRS).

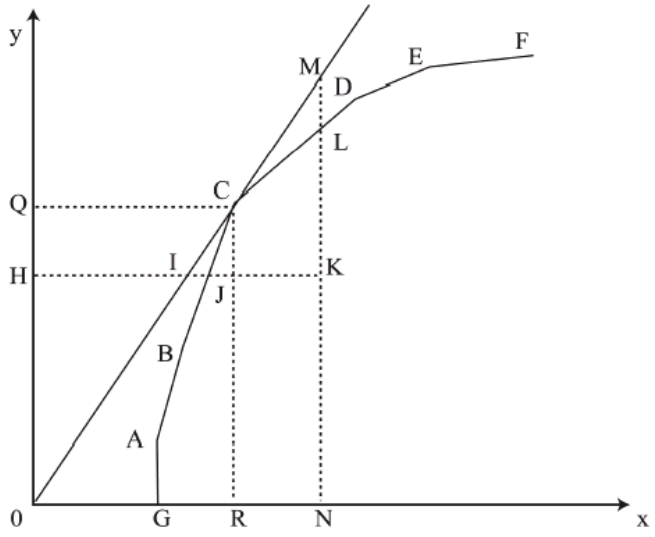

Figure 9. Measurement of Technical Efficiency

K represents an inefficient DMU that is located outside of the envelope boundary. The technical efficiency of K is hi/hk in the CRS and hj/hk in the VRS. The scale efficiency K refers to the ratio of hi/hj.

The standard DEA model proposed by Charnes, Cooper, and Rhodes (1978) is expressed by the following ratio:

(1) $Max\left\{\rho_0 = \frac{\sum_i \mu_i y_{i0}}{\sum_j v_j x_{j0}}\right\}$

Subject to:

(2) $\frac{\sum_i \mu_i y_{ik}}{\sum_j v_j x_{j0}} \leq 1$ for all DMUs k=1,2,….,n

(3) $\mu_i \geq 0$

(4) $v_j \geq 0$

The parameters used in this input-oriented model are:

θ_0 : the efficiency score of the DMU_0 under analysis;

n : number of DMUs under analysis;

i : number of outputs;

j : number of inputs;

Y_k { y_{1k}, y_{2k}, …y_{ik}} : vector of outputs for DMU k with y_{ik} being the value of output i for DMU k;

X_k { x_{1k}, x_{2k}, ..,x_{jk}} : vector of inputs for DMU k with x_{ik} being the value of input j for DMU k;

μ and ν: vector on multipliers respectively set on Y_k and X_k where μ_i, ν_j = the respective weights for output *i* and for input *j*.

The model determines that for each DMU_0 the optimal set of input weights $\{v_{i0}\}_{i-1}$ and output weights $\{\mu_{r0}\}_{r-1}$ that maximize its efficiency score is θ_0.

Charnes, Cooper and Rhodes define efficiency by referencing the orientation of inputs and outputs. In the input-oriented model, a DMU is not efficient if it is possible to decrease any input without augmenting any other input and without decreasing any output and vice verse for the output-oriented model.

The traditional Charnes, Cooper and Rhodes model is built under the constant return to scale (CRS) assumption in which an increase in inputs consumed would lead to a proportional increase in the outputs produced (Cooper et al. 2007). The CRS structure is more restrictive than the variable return to scale (VRS), which lowers the number of efficient units and efficiency. The issue with the CRS assumption is that it is required for all DMUs to operate at an optimal scale. In this research, there are a number of factors that can prevent DMUs from operating optimally, such as limited resources, imperfect competition, and institutional issues.

Banker, Charnes, and Cooper (1984) were the first to introduce the VRS structure that is commonly used. In the BCC model, the outputs produced can increase more or less than proportionally to the increase in inputs. Parameter *w* relaxes the constant return to scale by allowing the frontier set to go through the origin. The Banker, Charnes, and Cooper input-oriented model is considered more appropriate for this research. The linear programming of BCC model is written as follows:

(1) $\underset{\mu,w,v}{Max}\theta_0 = \sum_i \mu_{\Sigma 0} y_{i0} + w$

Subject to:

(2) $\sum_j v_j x_{j0} = 1$

(3) $\sum_i \mu_i y_{ik} - \sum_j v_j x_{jk} + w \leq 1$ for all k-1,2,….n
(4) $\mu_{i0} \geq \varepsilon$
(5) $v_{j0} \geq \varepsilon$
(6) w free

6.1.1. Descriptive Analysis of Input and Output Data

This study includes all the 26 states in Indonesia.[64] Table 9 exhibits the descriptive statistics of the variables used in the input-output analysis. In determining the input and output variables, a Granger causality test is performed to identify a stronger causal relationship between the input and output variables. Following a number of previous studies, the input to measure efficiency of states is the public expenditure (Afonso et al. 2003, Herrera and Pang 2005). Thus, technical efficiency is an analysis of spending or expenditure efficiency.

Technical efficiency scores are calculated in the DEA model with state revenue and private investment as the outputs of the model.[65] Appendix B.2 and B.3 show the result of the Granger causality tests to confirm the causality direction from the level of state spending on private investment and state revenue.

[64] During the course of the study, several new provinces were created. Currently there are 33 states or provinces in Indonesia; however, this study consistently uses data from 26 states in the empirical model by merging the data of the newly created states into their original jurisdiction before the current formation.
[65] State spending potentially affects output growth or GRDP from a theoretical standpoint; however, the Granger test in Appendix B.1 shows a significant F-statistic, which means that the assumption that state spending directly affects growth cannot be retained. State spending was a small fraction of GRDP and its effects on regional growth might come through private sector production driven by the multiplier effect of government spending.

In this study, the input variables consist of two types of state spending: Capital Expenditure and Current Expenditure. The first input variable, capital expenditure includes spending on various public investments, such as infrastructure, public housing, health and education. Because of the nature of typical public capital investments where there is a time lag for a project or program to be fully operated, the data used has a one-year lag.[66] The second input variable, state current expenditure is spending that covers all operating costs of state governments including rent, wages, expenses and subsidies.

The two output variables in the DEA model are state revenue and private investment.[67] State revenue includes taxes, fees, and charges, but it excludes transfers from the central government. Some of the state revenue also comes from profits generated by State Owned Enterprises (SOE), such as state local banks and public utilities. Spending on capital investment projects or services generate revenue for states either directly though fees or charges, or indirectly through tax collections driven by private sector development.

The level of private investment is also affected by state decisions to invest particularly in capital projects in connection to public service deliveries. The availability of infrastructure, such as transportation networks, telecommunication, and electricity

[66] Limitation on data availability has precluded the use of data with more than one-year lag. Yet, a number of studies found that public infrastructure investment affects private sector investment within a year after being implemented (Murty and Soumya 2006). In fact, during the period of economic crisis, public capital investments have been scaled back because of budget constraints. Consequently, states can only invest in a relatively modest scale of programs and services or in capital improvement projects. Thus, a one-year lag is considered sufficient to measure the effects from public capital investments.

[67] A number of studies have used a couple different variations of outputs in the efficiency analysis, such as education, health, infrastructure development, income inequality, institutional quality, and growth (Afonso et al. 2003, Herrera and Pang 2005).

would be part of the consideration when making a decision to invest in a region. The expansion of state expenditure will also boost government consumption, expand market demand, and potentially induce private investment in the region. This resembles the concept of the multiplier effect from government spending that can lead to higher economic growth.

Table 9. Descriptive Analysis of Input-Output Variables

Variable	Pre-Decentralization (1996-2000), n=130				Post-Decentralization (2001-2005), n=130			
	Mean	St. D.	Min	Max	Mean	St. D.	Min	Max
Capital Expenditure	149,159	192,605	36,907	1,229,105	504,412	1,470,387	14,432	15,800,000
Current Expenditure	301,708	540,725	27,850	3,826,516	971,035	1,462,443	61,741	9,041,520
Revenue	175,441	386,940	9,841	2,668,535	678,847	1,210,385	15,667	7,597,868
Investments	403,230	693,075	100	45,395	217,005	385,942	1,200	2,928,370

Note: In Million Rupiah (*Indonesian currency*)

6.1.2. Technical Efficiency Analysis of State Government using DEA

In this first stage analysis, DEA is used under a dynamic rather than a static condition. The issue with a dynamic or time dependent setting in DEA is the risk of an excessive use of resources that are intended to produce future outputs. To overcome this problem, a time dependent method of DEA known as window analysis is used. Window analysis is a temporal evolution of efficiency scores that evaluates how consistent these scores are overtime. Illustrated below are the properties of the window analysis:

n : number of Decision Making Unit (DMUs) under analysis. Each state or province in Indonesia is considered one DMU following the structure of the DEA model;

k : number of periods;

p : length of window ($p \leq k$);

w : number of windows

With 26 DMUs (n) and 10 years of observation (k), this study uses a 3 year window length (p) to examine the consistency of the scores. The numerical illustration that defines the application of window analysis is:

	Formula	Application
No. of windows	$w = k - p + 1$	$w = 10 - 3 + 1 = 8$
No. of DMUs in each window	$np/2$	26 x 3 / 2 = 39
No. of different DMUs	$n(k - p + 1)p$	26 x 8 x 3 = 624

Table 10 presents a compilation of the results of the window analysis where the technical efficiency score is calculated as the average efficiency score in each window year. A higher technical efficiency score represents a higher spending efficiency level or to some extent also a more efficient allocation of fiscal resources by state governments.

As a whole, technical efficiency levels seem to improve after the implementation of decentralization, as shown in Table 11. The technical efficiency bounced back following a rapid decline during the financial crisis. The technical efficiency of states in the post-decentralization period was lower compared to the pre-crisis period. Prior to decentralization, most states were dependent on central government transfers as other sources of revenue were subject to budget constraint. Consequently, state governments had to manage their expenditures to balance their budget. By default, this would increase

the fiscal efficiency levels of state governments. For this same reason, there is less fiscal leakages and corruption.

Table 10. Technical Efficiency of 26 States in Indonesia between 1996-2005

INPUT Indicators: (1) Capital Expenditure, (2) Current Expenditure
OUTPUT Indicators: (1) State Government Revenue (2) Private Investments

DMUs (States/Provinces)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
DI Aceh	0.787	0.747	0.740	0.718	0.765	0.650	0.586	0.568	0.579	0.583
North Sumatra	0.795	0.749	0.702	0.736	0.837	0.838	0.910	0.991	0.894	0.702
West Sumatra	1	0.879	0.857	0.819	0.870	0.794	0.839	0.836	0.834	0.830
Riau	0.951	1	0.832	0.782	1	0.719	0.725	0.756	0.687	0.664
Jambi	1	1	0.930	0.928	0.909	0.971	0.818	0.805	0.769	0.779
South Sumatra	0.894	0.819	0.803	0.741	0.807	0.733	0.774	0.840	0.724	0.749
Bengkulu	1	0.958	0.943	0.903	0.988	1	0.978	0.745	0.898	0.992
Lampung	0.904	0.851	0.861	0.795	0.813	0.833	0.798	0.797	0.827	0.831
DKI Jakarta	1	1	1	1	0.995	1	1	0.888	0.969	1
West Java	0.864	1	0.830	1	0.877	0.960	0.969	0.868	0.978	1
Central Java	1	0.764	0.768	0.751	0.734	0.975	0.899	0.862	0.960	1
DI Yogyakarta	1	0.980	0.981	1	0.907	0.956	0.955	0.849	0.827	0.829
East Java	0.823	0.814	0.785	0.968	0.943	1	0.996	1	0.967	1
Bali	1	0.858	0.835	0.774	0.810	0.798	0.788	0.905	0.777	0.843
West Nusa Tenggara	0.958	0.692	0.695	0.718	0.812	0.716	0.751	0.685	0.622	0.683
East Nusa Tenggara	0.891	0.834	0.856	0.725	0.776	0.769	0.789	0.805	0.822	0.836
West Kalimantan	0.947	0.754	0.729	0.635	0.660	0.598	0.682	0.658	0.628	0.693
Central Kalimantan	0.710	0.872	1	0.824	0.868	1	0.745	0.790	1	0.951
South Kalimantan	0.854	0.779	0.744	0.826	0.864	0.912	0.923	0.853	0.852	0.831
East Kalimantan	0.791	0.899	0.819	0.751	0.698	0.797	0.846	0.844	0.830	0.767
North Sulawesi	0.882	0.963	0.937	0.849	0.877	0.989	0.805	0.735	1	0.818
Central Sulawesi	0.776	1	0.930	1	1	0.738	0.918	0.915	1	1
South Sulawesi	0.938	0.969	1	0.857	1	0.955	0.758	1	0.885	0.805
Southeast Sulawesi	1	0.884	0.868	0.794	0.852	0.912	0.773	0.780	0.868	0.819
Maluku	0.872	0.877	0.844	0.837	0.824	0.794	0.788	0.661	0.792	0.720
Papua	0.750	0.661	0.679	0.654	0.627	0.684	0.542	0.537	0.551	0.562

Note: Efficiency scores are within the range of 0 to 1 with 1 being the most efficient.

During the financial crisis, there were greater constraints on fiscal resources due to lower revenue and limited transfers from the central government. At the same time that the need for spending kept increasing. This caused a cut in capital expenditure that was supposed to be allocated to support critical infrastructure. Consequently, private sector investments and state revenues declined as regions became less competitive.[68]

Table 11. Average Technical Efficiency Scores and Slacks between 1996-2005

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
No. of DMUs with Excess Current Exp.	3	4	5	2	2	0	0	0	0	0
No. of DMUs with Shortage Revenue	3	4	4	6	3	1	1	3	5	3
Average Efficiency Score	0.9	0.87	0.84	0.79	0.78	0.82	0.85	0.85	0.76	0.85

Table 11 exhibits the number of slacks, reflecting the number of states that fell below the model benchmark. The two indicators used in identifying the inefficiency or slacks are excess current expenditure and revenue shortage. The number of states that had excess current expenditure grew during the peak of the financial crisis (1997-1999), indicating that there was a larger transfer from capital expenditure to current expenditure as states faced budget constraints. This did not seem to be the case in the post-decentralization period. As expected, the number of states that fell short in generating

[68] Private investment also declined drastically following the collapse of the economy. The uncertainty in the macro economy and lack of trust and confidence in the government also influenced the decision not to invest.

their own revenue increased during the financial crisis. Surprisingly, after decentralization, the number also went up largely due to the persistent deterioration of the country's economy as a whole and the slower pace of economic recovery.

To give a snapshot of state technical efficiency levels before and after the implementation of decentralization, the average technical efficiency score of Indonesia's 26 states has been calculated for the period of observation between 1996-2000 and 2001-2005. The results are presented in Table 12. A high and a low technical efficiency score threshold have been established for purposes of analysis in this dissertation. An upper bound has been designated for average efficiency scores greater than 0.95, while a lower bound has been assigned to average efficiency scores lower than 0.75. In general, only few states fall under the low benchmark category.

One of the findings, as shown in Table 12, is that most states in Java have a relatively higher degree of technical efficiency after the implementation of decentralization compared to other states in Indonesia. As the most developed region in Indonesia, the higher level of technical efficiency of state governments in Java can be attributed to a higher level of organizational capability in managing fiscal decentralization. The rapid growth during the central planning era contributed to the competency of state governments in Java when reforming and restructuring their organizations and management to better serve the public.

In the western region, only North Sumatra was able to improve its technical efficiency levels significantly, while Riau, the only major oil exporter state in the western region, experienced a sharp decline. The contrast between these two states provides

evidence that supports the hypothesis that states that are rich in resources are not always more efficient. This is because these states have a tendency to spend more in proportion to their large fiscal capacity. Unfortunately, the higher levels of state spending may actually lead to higher levels of inefficiency.

Table 12. Average Technical Efficiency Scores, 1996-2000 and 2001-2005

DMUs (States/Provinces)	5-year Average 1996-2000	5-year Average 2001-2005
DI Aceh	0.751	0.593
North Sumatra	0.764	0.843
West Sumatra	0.885	0.827
Riau	0.913	0.710
Jambi	0.953	0.828
South Sumatra	0.813	0.764
Bengkulu	0.958	0.923
Lampung	0.845	0.817
DKI Jakarta	0.999	*0.971*
West Java	0.914	*0.955*
Central Java	0.803	*0.939*
DI Yogyakarta	0.974	0.883
East Java	0.867	*0.992*
Bali	0.855	0.822
West Nusa Tenggara	0.775	0.691
East Nusa Tenggara	0.816	0.804
West Kalimantan	0.745	0.652
Central Kalimantan	0.855	0.897
South Kalimantan	0.813	0.874
East Kalimantan	0.792	0.817
North Sulawesi	0.902	0.869
Central Sulawesi	0.941	0.914
South Sulawesi	0.953	0.880
Southeast Sulawesi	0.880	0.830
Maluku	0.851	0.751
Papua	0.674	0.575

Some states have not been able to improve their technical efficiency levels after the implementation of decentralization because of endless conflict and instability within their borders. This is particularly the case of Aceh, Papua, and Maluku, which have been plagued by separatist and ethnic conflicts that have disrupted the function of state governments, including the ability to deliver basic public services and maintain state assets. The tsunami disaster that hit part of Aceh's coastal area in 2004 was also the cause for low fiscal efficiency level, following the state government's inability to function properly for a period of time. Without a functioning state government coupled with uncertainties and security concerns, growth has been stagnant as private investment and employment level declined drastically.

As shown in Table 13 that provides a side-by-side comparison between state technical efficiency levels and real GRDP over the 10-year period of analysis, certain states with low real GRDP had high effiiency level, such as Bengkulu and Jambi. On the other hand, certain rich states had low effciency level, such Papua, North Sumatra and East Kalimantan. One explanation is the state government's inability to utilize the state's abundant fiscal resources that were previously under the control of the central government during the New Order. Widespread corruption is also a contributing factor. This proves that more developed states do not always capable to plan an effective strategy and priority to utilize their fiscal resources to support development.

Table 13. 10-Year Average Technical Efficiency and Real GRDP

States/Provinces	Technical Efficiency Score	Rank	States/Provinces	Real GRDP (in Billion Rupiah)	Rank
DKI Jakarta	0.985	1	*DKI Jakarta*	*224036.9*	1
Bengkulu	0.941	2	*East Java*	*204965.8*	2
West Java	0.935	3	*West Java*	*199794.9*	3
East Java	0.930	4	*Central Java*	*131222.9*	4
DI Yogyakarta	0.929	5	*East Kalimantan*	81667.9	5
Central Sulawesi	0.928	6	*Riau*	69287.9	6
South Sulawesi	0.917	7	*North Sumatra*	67658.2	7
Jambi	0.891	8	*South Sumatra*	43926.0	8
North Sulawesi	0.886	9	*South Sulawesi*	30856.3	9
Central Kalimantan	0.876	10	Nanggroe Aceh	26217.2	10
Central Java	0.872	11	Lampung	24337.8	11
West Sumatra	0.856	12	West Sumatra	22416.1	12
Southeast Sulawesi	0.855	13	Papua	22080.9	13
South Kalimantan	0.844	14	West Kalimantan	19520.0	14
Bali	0.839	15	*Bali*	19109.0	15
Lampung	0.831	16	South Kalimantan	17470.1	16
Riau	0.812	17	*DI Yogyakarta*	14561.8	17
East Nusa Tenggara	0.811	18	West Nusa Tenggara	13033.5	18
East Kalimantan	0.805	19	Central Kalimantan	12148.1	19
North Sumatra	0.804	20	Jambi	11401.2	20
Maluku	0.801	21	North Sulawesi	10707.7	21
South Sumatra	0.789	22	Central Sulawesi	*9391.4*	22
West Nusa Tenggara	0.734	23	East Nusa Tenggara	*7756.1*	23
West Kalimantan	0.699	24	Southeast Sulawesi	*6636.7*	24
Nanggroe Aceh	0.673	25	Bengkulu	*5299.5*	25
Papua	0.625	26	Maluku	*3846.4*	26

For purposes of this research, the determination of lagging and leading states is based on a state's economic capacity, which is measured using real GRDP figures. The differences in the scale and structure of economy between regions are also considered

since these can affect the allocation of resources and either constrain or stimulate growth.[69]

Based on this criterion, the following eleven states are identified as leading states: DKI Jakarta, East Java, West Java, Central Java, East Kalimantan, Riau, North Sumatra, South Sumatra, South Sulawesi, Bali, and Yogyakarta.[70] Aceh, Papua, Riau and East Kalimantan are not included as leading states despite large revenue from natural resources. Yogyakarta and Bali are considered leading states due to geographic adjacency and economic integration with other states in Java.

Fifteen states are designated as lagging states in this dissertation for purposes of constructing a separate panel data model. An independent growth model for each lagging and leading state is constructed to test the hypotheses.

Most states in the eastern region have lower real GRDP compared to states in the western region, except for East Kalimantan and Papua. This was caused by the lag of development and the fact that states in Indonesia's eastern region are geographically disadvantage. This has resulted in lower factor mobility and higher cost structures compared to states in the western region. Lower factor mobility in the eastern region has

[69] States in Java will have a lower real GRDP per capita due to the higher concentration of population in this region and therefore the rank of state's economic capacity will be biased since real GRDP per capita does not accurately depict the actual level of economy and development in those states.

[70] To validate the division between leading and lagging states, a Chow statistical test was performed. The test aims to identify the presence of a threshold or a break in statistical data. The assumption is that the coefficients in two linear regressions of different data sets are equal. In this study, the basic growth model with capital (K) and labor (L) is used to test two subsamples, the leading and lagging states. The result of the Chow test in Stata is included in Appendix C. Referring to the F-significance level, the null hypothesis is rejected and therefore the two data sets are distinct from each other. Using a variation of different subsets assigned to leading and lagging states showed a lower level of significance.

contributed to lower production, less private investment and a smaller market economy.[71] Although cost of labor is typically lower in the eastern region, it is not low enough to offset the high costs of other factors of production.[72]

The imbalance in regional development is evident among states inside and outside of Java. Most of the development in Indonesia during the New Order was concentrated in Java and a handful of urban centers on the other major islands. A cluster of economic activities also developed along major ports and other transportation networks. This created a situation where resources were not distributed equally and certain regions were left with less productive resources, making it even more difficult to achieve levels of efficiency and competitiveness already attained by regions such as Java.

6.1.3. Determinants of State Technical Efficiency in a Tobit Panel Data Model

This section is an extension of the first stage empirical analysis that examines factors that influence technical efficiency levels of state governments in Indonesia. Some of the factors that are identified as the possible determinants of state government efficiency are used to construct a weighted variable that will adjusts technical efficiency

[71] Low factor mobility puts a limit on the level of business and industrial integration in the eastern region. This might hamper positive externalities or spillover effects that are the key growth factors in the endogenous growth model.

[72] A low labor cost in the eastern region is mainly associated with lower quality of workers. A lack of educational facilities, particularly for higher education, has led many productive workers to leave lagging states to obtain a higher education, better skill sets, and eventually pursue higher paying jobs, which are mostly located in Java.

levels in the panel growth model. This adjustment made is instrumental to create a more appropriate state efficiency factor.

Due to the skewed distribution of technical efficiency scores from the DEA analysis, a tobit panel data regression is used to reveal these determinants. In a normal panel data regression, the estimates of the parameter are biased and inconsistent with scores, causing the estimates to lean towards the higher bound. The tobit panel data model is essentially a maximum-likelihood random effect model that has the ability to censor the dependent variable. The tobit model is used because the technical efficiency scores are constrained within the range of 0 and 1. A right-censored tobit model is constructed in this study as the observed efficiency scores lean towards 1.

The technical efficiency scores are considered as latent variables because the efficiency of states is not directly observed but rather inferred through other variables in the DEA model. The mathematic expression of a tobit censored panel data regression can be explained as the level of y_{it} (efficiency scores as the dependent variable) in terms of an underlying latent variable y_{it}*:

$$y_{it}^* = \beta_0 + \beta_1 x_{it} + \varepsilon_{it} \tag{6}$$

$$y_{it} = \beta_0 + \beta_1 x_{it} + \varepsilon_{it} \quad \text{if } y_{it}^* > 0, \text{ and} \tag{7}$$

$$y_{it} = 0 \quad \text{if } y_{it}^* \leq 1$$

The error term (ε_{it}) in the efficiency distribution of the tobit panel data model where y_{it}* is a latent variable is assumed to be normally distributed as a function of $N(0,\sigma^2)$. $\varepsilon_{it,}$ x_{it}

and β are vectors of explanatory variables and unknown parameters respectively. Both β and σ are estimated using maximum likelihood estimation (MLE).

The standard estimation using a maximization of likelihood function (L), where F is the standard normal cumulative distribution function is as follows:

$$log\ \ L = \sum_{y_{it}>0} -\frac{1}{2}\left[log(2\pi) + log\sigma^2 \frac{(y_{it} - (y_{it} - \beta x_{it})^2}{\sigma^2}\right] + \sum_{y_{it}=0} \left[1 - F\left(\frac{\beta x_{it}}{\sigma}\right)\right] \quad (8)$$

The estimated coefficients in the tobit panel data model are represented by the marginal effect of x_{it} on y_{it}*. In order to achieve the expected rather than desired marginal effect of x_{it} on y_{it}, the following equation is implemented in the tobit panel data model:

$$E\ \left[y_{it} \mid y_{it} > 0\ \right] = \beta_0 + \beta_1 x_{it} + \sigma\left[\frac{\phi(\beta_0 + \beta_1 x_{it})/\sigma}{\Phi(\beta_0 + \beta_1 x_{it})/\sigma}\right] \quad (9)$$

The following factors are analyzed to establish the likelihood that they influence state technical efficiency levels. These factor are the explanatory variables in the tobit panel data model:

- *Fiscal Decentralization*: share of state spending over total government spending; a higher share of state spending represents a higher degree of fiscal decentralization.
- *Ratio of Productive Spending*: share of state capital expenditure over total state spending. Capital expenditures are either existing capital improvements or new capital investment projects and are considered productive spending.

- *Ratio of Operating Costs*: share of state operating costs over total state spending. It is also considered a ratio of overhead costs, which are costs associated with the operation and management of a state government, excluding expenditure that is allocated for human capital expenses.
- *Ratio of Revenue independence*: share of taxes, charges and fees generated independently by states over transfers from the central government. A higher ratio of revenue independence indicates either an increase in a state's own revenue or a decrease in central government transfers.

The results of the tobit panel data regression over the 10-year period of analysis (1996-2005) are shown in Table 14. The dependent variable is the average efficiency score of 26 states in Indonesia for each year between 1996 and 2005. In the tobit model, the magnitude of likelihood for each factor determinant is indicated by the marginal effect of each factor.

Several factors were identified as determinants of state efficiecy scores based on the degree of significance (*z-ratio*). Fiscal decentralization is the factor with the highest marginal effect. This indicates that fiscal decentralization has the most effect on the levels of technical efficiency compared to other factors and to some extent, it also supports the primary hypothesis H-P1 that fiscal decentralization provides incentives for states to become more efficient in allocating fiscal resources.[73]

[73] Other factors that influence state efficiency should also be considered. In measuring the technical efficiency of states, not all factors are observed and consequently a modification is needed to ensure the appropriate level of state efficiency beyond technical efficiency is observed in the next stage.

Table 14. Determinant of State Technical Efficiency in Indonesia, 1996-2005

Dependent Var: State Efficiency n = 260 Obs (26 States) Independent Var.	Coefficients	z-ratio	Marginal
Fiscal Decentralization	0.79	2.94*	0.72
Ratio of Productive Spending	-0.07	-2.64*	-0.06
Ratio of Operating Costs	-0.09	-2.82*	-0.08
Ratio of Revenue Independence	0.04	2.96*	0.04
Lagging states Dummy	0.01	1.00	0.01
Per capita Income	0.002	1.14	0.001
Per capita Spending	-0.20	-2.77*	-0.19
Constant	0.86	36.39*	
Log-Likehood	139.78		
R-squared	0.21		
Wald chi2	74.20		

Note: * The point estimate is significant at the 1% level.
*** The point estimate is significant at the 10% level.

The results from the tobit panel model show that a higher ratio of productive spending and level of per capita spending are likely to reduce the levels of technical efficiency. Productive spending that is generally assumed to be an indicator of a state's ability to allocate resources efficiently to support public welfare and long-term development, shows an unexpected inverse correlation than what the hypothesis H-S1 is assumed. This may be a reflection of inefficiencies in the allocation of capital expenditure. Along similar lines, an increase in the level of per-capita spending could more likely result in less efficiency when there is larger waste spending.

As expected, the model demonstrates that a higher ratio of state operating costs is associated with lower technical efficiency levels (H-S2). The ability of states to cut or limit costs is one of the crucial determinants of technical efficiency. State operations can be more efficient by implementing cost reduction programs such as increasing energy efficiency or utilizing technology to automate certain public services. Efficiencies are more likely to occur under budget constraint, such as in the period of financial crisis.

The tobit model suggests that the degree of states independence to collect own revenues has a significant positive influence on technical efficiency levels, which is in agreement with hypothesis H-S1. States that are not dependent on central government transfers due to their capability to generate their own revenue are also more likely to be efficient in managing fiscal decentralization.[74] A higher revenue independence implies that state administrators have more responsibility in generating revenues to close fiscal gap in their budget. Yet, it is also possible that state excessively increase or introduce new taxes and fees, which will hinder growth through its impact on the private sector.

The lagging state dummy variable is not significant, indicating that technical efficiency levels do not differ between leading and lagging states. This supports he primary hypothesis H-P2 that leading or lagging states can be either more or less efficient, despite variances in the capability and capacity of states to manage fiscal decentralization and public capital investment. Thus, a separate panel model for lagging states and one for leading states is not needed in this analysis.

[74] Low revenue independence could also be the result of high revenue sharing of profits generated by the exploitation of natural resources. This is typically the case with rich resource states such as Riau, East Kalimantan, Aceh and Papua.

Table 15 and 16 show the results of the tobit panel data regression in a pre-decentralization and post-decentralization period where each period covers a 5-year observation timeframe. The objective of this analysis is to evaluate the differences in the determinants of technical efficiency in a pre-decentralization and post-decentralization period. In addition, the analysis is used to check the robustness of the preceding 10-year observation model.

Table 15. Determinant of State Technical Efficiency in Indonesia, 1996-2000

Dependent Var: State Efficiency n = 130 Obs (26 States)			
Independent Var.	Coefficients	z-ratio	Marginal
Fiscal Decentralization	0.35	2.09**	0.22
Ratio of Productive Spending	0.34	3.96*	0.31
Ratio of Operating Cost	-0.09	-0.89	-0.08
Ratio of Revenue Independence	0.06	2.75*	0.05
Lagging states Dummy	-0.03	-1.37	-0.03
Per capita Income	-0.005	-1.78***	-0.005
Per capita Spending	0.06	0.20	0.05
Constant	0.71	13.01*	
Log-Likehood	77.19		
R-squared	0.21		
Wald chi2	37.79		

Table 16. Determinant of State Technical Efficiency in Indonesia, 2000-2005

Dependent Var: State Efficiency n = 130 Obs (26 States) Independent Var.	Coefficients	z-ratio	Marginal
Fiscal Decentralization	0.86	2.87*	0.82
Ratio of Productive Spending	-0.10	-3.96*	-0.09
Ratio of Operating Cost	-0.06	-1.83***	-0.05
Ratio of Revenue Independence	0.04	1.95**	0.03
Lagging states Dummy	0.02	0.86	0.02
Per capita Income	0.004	2.85*	0.004
Per capita Spending	-0.25	-3.24*	-0.24
Constant	0.74	21.28*	
Log-Likehood	88.26		
R-squared	0.46		
Wald chi2	99.93		

Note: * The point estimate is significant at 1% level.
** The point estimate is significant at 5% level.
*** The point estimate is significant at 10% level.

The post-decentralization tobit panel model results in a better model with a significantly higher R-square of 0.46 compared to 0.21 in the pre-decentralization model. All of the independent variables in the post-decentralization model are significant except for the regional dummy variable. This confirms the robustness of the 10-year observation model (Table 14) in revealing factors that determine technical efficiency.

Fiscal decentralization, the key determinant of technical efficiency, is significant in both 5-year observation models. Nevertheless, fiscal decentralization had a bigger influence on efficiency levels in the post-decentralization period. This again supports the

argument that fiscal decentralization provides an incentive for state governments to become more efficient (H-P1).

The likelihood that the ratio of productive spending is correlated with technical efficiency is significant in both 5-year observation models. However, the direction and magnitude of the relationship in the pre-decentralization are the reverse of those in the post-decentralization period. The ratio of productive spending has a significant positive association with efficiency in the pre-decentralization period and a negative association with efficiency in the post-decentralization period. This finding raises a concern over the negative impact of increased public capital expenditure on efficiency because of larger fiscal capacity of state governments after the implementation of decentralization.[75] This finding provides the basis to reject the secondary hypothesis H-S1 that states that a higher ratio of productive spending indicates higher technical efficiency.

The relationship and significance of the operating cost ratio and technical efficiency in both the pre-decentralization and post-decentralization models are the same except in terms of marginal effects. The model indicates that an increase in state operating costs negatively affects efficiency levels, and to a lesser degree in the post-decentralization period.

The results of the model indicate that the ratio of revenue independence is more likely to increase technical efficiency, which supports the secondary hypothesis H-S1 that a higher ratio of revenue independence is associated with higher technical efficiency.

[75] Rich states with a higher fiscal capacity for spending tend to have lower efficiency levels if a lack of control results in waste spending, rent seeking and corruption in their regions.

The per capita income variable has a negative relationship with technical efficiency in the pre-decentralization period. However, this association becomes positive in the post-decentralization model. There is a small probability that per capita income influences technical efficiency levels in both models as indicated by the low marginal effects, which again support the primary hypothesis H-P2.

From the empirical analysis, it can be concluded that the implementation of fiscal decentralization in Indonesia has provided an incentive for state governments to become more efficient. The level of fiscal decentralization is a key factor that influences state efficiency.

6.2. Regional Growth Model Using Fixed-Effects Panel Data Analysis

This classic work of Arrow and Kurz in 1970 offers an argument that private production benefits from the service of public investments. Arrow and Kurz expanded the standard neoclassical concept by incorporating public investment in the analysis of fiscal policy and the growth rate of the economy. Their model was based on the assumption that consumers derive utility from both private consumption and public capital stock. Yet, public capital investment does not affect the steady-state growth rate in the neo-classical view and therefore the effects of public capital investment are transitional. The neoclassical theory in general also assumes that public spending that adds to the stock of capital is productive; although a number of later studies confirmed that not all public spending is productive (Landau 1983, Aschaeur 1989, Devarajan 1998).

The public expenditure model that was introduced by Aschaeur (1989) in his seminal paper formally conceptualizes the analytical framework of public investment productivity. The introduction of endogenous growth theory that focuses on long-term growth rates has changed the dynamics on the issue of public capital investment. Targeted public capital investment is considered more effective in sustaining long-term growth since it supports the process of technological change and encourages higher productivity levels, eventually generating multiplier and spillover effects.

The basic expression of the neoclassical model that incorporates public capital is:

$$y = f(k, k^g) \quad (1)$$

where y = private sector output, k = private capital, and k^g = public capital ("g" refers to government). A generation of neoclassical economists both in developed and developing countries have followed this extension of the Solow model. International institutions that support economic development, such as the World Bank have been proponents of the utilization of public capital investment in promoting growth and private sector development. However, not all public capital investment is productive and effectively promotes growth, and reduces poverty and income inequality in developing countries. This has become one of the key puzzles in development economics and it is such a critical issue considering the increasing gap between lagging and leading states or developed and developing countries over a period of time.

Modification of the production function to measure the productivity of public capital in Aschaeur's model is influenced by the birth of endogenous growth theory that

explains long-term growth variables. Barro (1990) introduced the extension of the endogenous model that incorporates public capital in the production function. He assumed that all government spending is productive and the utility function maximizes both private consumption and public capital stock

A basic endogenous model of the production function is written as:

$$y = A.\, f(k,g) = k.\, A(g/k) \qquad (2)$$

where y = real aggregate output of goods and services, k = aggregate stock of private capital, and variable g represents aggregate stock of public capital, which is a flow of services from the government sector (Aschaeur 1987). In the endogenous growth model, A represents a multifactor productivity. It is defined by the neo-classical model as technological progress that could change over time, exogenous from the production decision and part of the Solow residual that could not be explained within the model.

It is assumed that government finances its services through a flat rate income tax (τ). Aggregate government expenditure (g) is equal to aggregate government revenue (t), which can be expressed by the following relation:[76]

$$g = t = \tau y = \tau.\, k.\, A(g/k) \qquad (3)$$

The model optimization uses derivatives of the production function in equation (2) to yield the marginal product of capital as follows:

[76] It is also assumed that the government implements a balanced budget policy, which means that the government has to issue debt to cover deficits and does not run a budget surplus (Barro 1990).

$$\partial y/\partial k = A(g/k).(1 - A'.g/y)$$
$$= A(g/k).(1 - \eta) \quad (4)$$

Marginal product $\partial y/\partial k$ has variable k, while holding g constant. η ($0< \eta <1$), represents the elasticity of y leaving k adjustable and g fixed. This indicates that although the private sector shifts the amount of capital and output, this does not lead to any changes in the consumption of public capital (Barro 1990). The endogenous model assumes a constant marginal product of capital over a return to scale condition where $A>0$. However, Barro (1990) also argued that the production function that incorporates public capital should allow diminishing returns to scale as in the neoclassical concept, where production experiences a constant return in k and g together and diminishing returns in k separately. Based on the concept of complementarity between public and private capital, a decreasing return to private inputs takes place if public capital inputs do not effectively support private inputs as expected. On the other hand, an increasing return to scale, one of the most prominent characteristics of the endogenous growth model, would emerge due to the spillover effect of productive capital investments.

In the public expenditure model, A is a function of productive activities provided by governments to support long-term growth and development, as indicated in the concept of regional competitiveness. It is also a representation of the role of state institutions in providing good incentive structures. In this study, A is considered a measure of state government efficiency and of the degree of fiscal decentralization. Higher efficiency scores imply that higher efficiencies in financial allocation of state

budgets exist. They are also an indication of state government quality in supporting growth through its resource strategies. In theory, fiscal decentralization is correlated with higher efficiency of public service, which also translates into higher productivity in the private sector. These would affect output growth and the level of competitiveness in the region.

One of the key issues related to accumulation of public capital is productive and unproductive public investment. The hypothesis in this dissertation (H-S1) follows the neoclassical assumption that all public capital investments are productive.[77] Yet, the growth model accounts for two types of government spending, the productive spending (g1) and non-productive spending (g2). Productive spending is spending that is allocated to capital investments, while unproductive spending is routine government expenditure that covers the costs of running the government. Incorporating those aspects in the production function and expanding the aggregate production function to include aggregate employment of labor services (L) will result in rewriting the model as follows:

$$y = A * f(k, l, g1, g2) \tag{5}$$

Assume the production function is Cobb-Douglass and a panel data structure with i ($=1, \ldots, I$) and t ($=1, \ldots, N$) refer to state i at time t, I denotes the number of states and N denotes the number of time periods:

[77] This dissertation does not further identify which types of public capital investments are productive and support private sector growth. In many cases, several studies have determined that infrastructure and human capital development are crucial. Accordingly, physical infrastructure, such as road, electricity, water and sanitation, along with education are still the priority in development strategies.

$$y_{it} = A_{it}^{\alpha}.k_{it}^{ß}.\ l_{it}^{\gamma}.\ g1_{\mathrm{it}}{}^{\zeta 1}.g2_{\mathrm{it}}{}^{\zeta 2} \qquad (6)$$

The production elasticity of each factor in the model holds a constant return to scale that corresponds to the following rules: $1<\alpha<0$, $1<\beta<0$, $1<\gamma<0$, $1<\zeta 1<0$, $1<\zeta 2<0$, and $\alpha + \beta + \gamma + \zeta 1 + \zeta 2 = 1$. In the case where public capital investment exhibits increasing returns to scale and private capital is estimated based on its marginal product, the estimation of sum production elasticity is higher than 1.

The empirical analysis of the panel data regression is built based on the transformation into natural logarithms of equation (6):

$$\ln y_{it} = \alpha \ln A_{it} + ß \ln k_{it} + \gamma \ln l_{it} + \zeta 1 \ln g_{it} + \zeta 2 \ln g_{it} \qquad (7)$$

6.2.1. Descriptive Analysis of the Panel Data Regression

The panel data model in this second stage of empirical analysis consists of aggregate data from 26 states in Indonesia. The time frame of the data spans from 1996 to 2005, which represents a 5-year period before and after the implementation of decentralization. This provides an opportunity to study the impact of decentralization on state economic growth and public capital investment. The data were collected from several Indonesian government agencies among others the Fiscal Balance Directorate of the Finance Ministry, the Central Bureau of Statistics, and the Central Bank of Indonesia. Table 17 provides a descriptive analysis of the variables used in the panel data. The panel data models include a 10-year and 5-year period of observation along with several

iterations of the model. Each iteration of the model, adds an additional variable to test the robustness of the model. In addition, two independent 5-year observation models were constructed to account for regional differences between lagging and leading states.

The dependent variable is real GRDP, which is a measure of a state's real income or output. It accounts for the total value of all final goods and services produced in a given economy and represents a measure of economic performance of public and private economic activities at the regional level.

The key explanatory variables are state efficiency and fiscal decentralization. State efficiency is a variable that is constructed using the technical efficiency score from the first stage DEA model adjusted by an interaction term of two factors that significantly influence technical efficiency as identified in the Tobit model: ratio of productive spending and ratio of operating cost. These two instrumental variables indicate the preferences or choices of state government in allocating fiscal resources and controlling costs. To a certain degree, this indicates state institutional quality that influences the level of performance and competitiveness of a state.

The underlying assumption is that state leaders act rationally to serve the interests of their respective region by focusing on public welfare, which includes high levels of employment, income per capita, education and health care. Thus, the decision to maximize state spending through the allocation of capital expenditure and to minimize operating or overhead costs is assumed to be driven by the goal to improve public welfare. In this framework, state efficiency refers to choices and preferences of states to use minimum fiscal inputs as minimum as possible to gain the maximum productive

outputs. A higher ratio of productive spending and lower operating costs is considered a positive indicator of state efficiency.

The variable fiscal decentralization is weighted per 1 million population of the respective state to equalize the large expenditures gap between the utmost lagging and leading states. This method is appropriate considering the significant disparity between states in terms of geographic area and population size. [78]

Table 17. Descriptive Analysis of Growth Panel Data Variables

Variable	Pre-Decentralization (1996-2000), n=130				Post-Decentralization (2001-2005), n=130			
	Mean	St. D.	Min	Max	Mean	St. D.	Min	Max
Real GRDP*	319,000	428,000	210,000	18,900,000	683,000	938,000	295,000	43,600,000
State Efficiency	0.856	0.101	0.627	1	0.831	0.118	0.538	1
Fiscal Decentralization	0.018	0.027	0.004	0.147	0.045	0.064	0.006	0.372
Tax Rate	0.005	0.005	0.001	0.032	0.010	0.008	0.015	0.435
Labor Force**	3.33	4.53	6.57	17.00	3.40	4.61	4.41	17.40
Population**	7.44	9.91	1.45	43.80	8.23	11.21	1.49	48.50

Note: * Million Rupiah (*Indonesian currency*).
** Million

The independent variables capital expenditure and current expenditure are the same as the ones used in the DEA and Tobit models (see Table 9 and definition of explanatory variables in Section 6.1.3). The tax rate variable in this study refers to the ratio of revenue that is independently generated by states through the collection of taxes

[78] For the same reason, the Zhang and Zou (1998) studyon fiscal decentralization in China also adjusted the degree of fiscal decentralization by population size and relative to a state's income.

as a percentage of GRDP. The extension of the endogenous growth model for public capital expenditure uses a variable tax rate to explain the effects of fiscal decentralization on economic growth (Barro 1990, Davoodi and Zou 1998).[79]

The control variables in the panel data model for a robustness test include private investment, labor force and population. A number of empirical analyses have validated the positive role of private investment on economic growth. Both domestic and Foreign Direct Investments (FDI) are argued to have significant effects on growth, supporting the genesis of the growth theory from a neoclassical perspective. The effect of private investment has also been proven more significant than that of public investment in developing countries (Khan and Reinhart 1990). Labor force growth generally corresponds to population growth, which can be the driver of economic growth in regions.

In addition, the model also incorporates spatial dummy variables to analyze particular growth effects in the eastern region and lagging states. Most of the lagging states are located in the eastern region, except for East Kalimantan and South Sulawesi. The panel data also controls for time dependency in the model, in particular for the period during the financial crisis (1997-1999).

[79] The Granger test in Appendix B.4 shows that the direction of the causality is from state revenue to real GRDP and there is no indication of reverse causality.

6.2.2. Growth Model Using Fixed Effect Panel Data Regression

Panel data analysis encompasses a form of longitudinal data analysis across time and subjects; and therefore suits the purpose and structure of this study, where multiple subject data elements are analyzed over a specific time frame. The cross sectional panel data regression in this model has the following equation:

$$\ln y_{it} = \delta_1 + \delta_2 \ln\lambda_{it} + \delta_3 \ln\theta_{it} + \delta_4 t_{it} + \delta_5 \ln g1_{it} + \delta_6 \ln g2_{it} + + \delta_9 \ln X_{it} + \varepsilon \quad (8)$$

All variables except for dummy variables are expressed in the form of percentage growth rate (log format). The following variables are used in the regression:

λ : Fiscal Efficiency of State Government

θ : Measure of Fiscal Decentralization per Capita

t : Measure of Tax Rate

$g1$: Public Capital Expenditure[80]

$g2$: Current Government Expenditure

X : Control Variables

y_{it} is Regional Growth (measured as growth of Real GRDP)

[80] Considering the size and scope of the projects that were handled by each state, it is assumed that most of the public capital investments could be fully operated within a year and therefore variable $g1$ is assigned to use 1-year lag. Mega public investment projects were typically managed by the central government since state financial resources typically could not provide an adequate amount of funding for this type of projects.

This study considered using either a fixed effect or a random effect model in the empirical analysis of the growth model. The fixed effect panel has constant slopes but different intercept points according to the cross-sectional group. Although it is assumed that there are no significant temporal effects, major differences among states are allowed in this type of model. The intercept is based on cross-sectional specific data that are different between states, and may or may not differ over time. In the fixed effect model, this unobserved effect is assumed stable (fixed) over time. The random effect panel model has a random constant term in which the intercept is a random outcome variable. The random effect model is generally used if unobserved effects, which are not correlated with independent variables, are expected.

One problem with panel data analysis is autocorrelation, which is when there is a correlation between variables observed in the model due to the nature of time series modeling. Another problem with panel data is related to heteroskedasticity where the biased outliers affect the regression slope. In deciding which type of panel model to use, the main objective is to minimize these problems. In statistical terms, the analysis should include a test to estimate the unobserved heterogeneity as a parameter of the model (*fixed effects*) or as an outcome of a random variable (*random effects*).

The Hausman specification test is utilized to verify whether the fixed or random effects model should be used.[81] This test would compare an efficient model against a consistent model to ensure that the more efficient model also gives consistent results. In

[81] If there is no significant correlation between unobserved effects and explanatory variables (*regressors*), then the random effects model is more appropriate. But, if there is such a correlation, the parameters of the random effects model would be inconsistent and therefore fixed effects model should be used.

general, fixed effect models always give consistent results, but may not be the most efficient models to conduct estimates. The result of the Hausman test in Appendix D confirms that the coefficients estimated by the efficient random effect estimator are the same as the coefficients estimated by the consistent fixed effect estimator. Accordingly, the time fixed effect model should be used.

Panel Data Regression with Observations from 26 States

Table 18 exhibits the outcome of the panel data analysis with all 26 states. The growth model uses a log function as expressed in equation (8) for the dependent variable and several of the independent variables. The baseline regression includes the following explanatory variables: State Efficiency, Fiscal Decentralization, Tax Rate, Capital and Current Expenditures. For each key explanatory variable, an interaction term with post-decentralization time dummy is constructed to measure the impact of the respective variable on regional growth after decentralization.

The sign of the coefficients and their significance levels are mostly consistent as control variables are added in the model, which supports the robustness of the model. The variable state efficiency is chosen in lieu of technical efficiency based on the results of the regression analysis in Appendix E. State efficiency has a lower impact on growth than technical efficiency, although the coefficients of both variables are insignificant due to the exclusion of other growth factors. Since state efficiency accounts for adjustments that are proven to have a lesser impact on growth, this study will use the adjusted value as a more conservative efficiency measurement of state government.

Table 18. Growth Panel Model with 26 States (1996-2005)

Dep. Var (Log GRDP): n = 260 Obs (26 States)	Regional Growth		
Indep. Var.	(1)	(2)	(3)
Constant	-3.83	-1.92	-1.31
	(-3.89)*	(-2.01)**	(-1.65)***
State Efficiency	0.55	0.41	0.53
	(5.15)*	(4.07)*	(6.33)*
State Efficiency (D)	-0.61	-0.48	-0.55
	(-5.44)*	(-4.60)*	(-6.34)*
Log Fiscal	-0.40	-0.36	0.45
Decentralization	(-5.56)*	(-5.34)*	(4.67)*
Log Fiscal	0.13	0.12	0.01
Decentralization (D)	(1.38)	(1.46)	(0.16)
Log Tax Rate	-0.58	-0.47	-0.51
	(-8.69)*	(-7.32)*	(-9.60)*
Log Tax Rate (D)	0.03	-0.002	0.27
	(0.32)	(-0.02)	(3.45)*
Log Capital	0.32	0.27	0.04
Expenditure	(2.68)*	(2.48)**	(0.39)
Log Capital	-0.29	-0.22	-0.58
Expenditure (D)	(-2.26)**	(-1.87)**	(-0.57)**
Log Current	0.91	0.81	0.28
Expenditure	(10.37)*	(9.80)*	(3.31)*
Log Current	0.24	0.18	0.05
Expenditure (D)	(2.10)**	(1.69)**	(0.59)
Eastern Region	-0.16	-0.16	-0.13
Dummy	(-1.81)**	(-2.01)**	(-1.99)**
Eastern Region	-0.16	-0.18	0.03
Dummy (D)	(-1.35)	(-1.63)***	(0.30)
Crisis Period	-0.59	-0.57	-0.47
	(-2.68)*	(-4.24)*	(-5.00)*
Log Investment		0.10	0.08
		(6.57)*	(6.35)*
Log Labor Force			0.84
			(10.33)*
Adj. R-square	0.88	0.90	0.93
F-value	89.74	102.80	146.87
Prob > F	0.00	0.00	0.00

Note: *t*-statistics are in parentheses. All regressions are controlled for time specific dummies.

* The point estimate is significant at the 1% level.

** The point estimate is significant at the 5% level.

*** The point estimate is significant at the 10% level.

(D) Interaction Term between selected explanatory variable and the post-decentralization time dummy

The first finding from the model is that an increase in state efficiency is associated with higher regional growth. A 0.1-point increase in the level of state efficiency is associated with a 0.053 percent higher growth. The result is significant at a one percent level. However, in the post-decentralization period, state efficiency is associated with lower regional growth. This is evidence that the implementation of decentralization has not improved state efficiency in support of growth, which is contrary to the main hypothesis. Although decentralization may provide incentive structures for states to be independent in allocating their fiscal resources, it may not necessarily affect the capability of a state to allocate resources into productive spending, which is one of the key factors of economic growth at the regional level.

Assuming that there are no significant changes in investment and labor force in the states, the degree of fiscal decentralization has a positive association with growth. With a one percent increase in the degree of fiscal decentralization, regional growth is expected to increase by a 0.45 percent. This finding supports the primary hypothesis H-P1 where decentralization is argued to provide incentive structures to regions to grow. Yet if there are greater imbalances within regions following a disproportionate growth in labor force and population, then a higher degree of fiscal decentralization is associated with lower economic growth. This proves that regional imbalances, which are a crucial issue in many developing countries, are one of the disincentives or disadvantages in the decentralized system.

The coefficients of fiscal decentralization in the post-decentralization period are not significant. Although the sign of the coefficients are positive, there is an indication

that the effect of an increase in the degree of fiscal decentralization on regional growth is insignificant or marginal. This result is consistent with recent observations of the implementation of decentralization in Indonesia that determine decentralization is the cause of increased inefficiency, rent seeking and corruption at the regional level.

State tax rates are associated with lower regional growth rates, where a one percent increase in tax rates causes a 0.51 percent decline in the growth rate. This correlation is expected and significant at the one percent level in a one-tail test. In the post-decentralization period, the tax rate coefficient is positive after controlling for investment and labor force growth, indicating that the negative impact from higher tax rates on regional growth is less. This finding provides evidence that decentralization may actually increase tax competition between regions that aims to spur development. Furthermore, this finding also confirms the expected outcome from the secondary hypothesis H-S2 where a higher ratio of state tax revenue hurts regional growth.

Although the negative impact of higher tax rates on growth is significantly less after the implementation of decentralization, this does not necessarily mean that state taxes, charges, and fees were lower in the post-decentralization period, as shown in Table 17. This may indicate that states have more control in assigning taxes, charges, and fees that potentially have less negative impact on economic growth.

Both public capital expenditure and current expenditure have a positive relationship with regional growth. The coefficients of these two variables are statistically significant. A one percent increase in capital expenditure boosts regional growth by a 0.04 percent, while a one percent increase in current expenditure is associated with a 0.28

percent increase in growth holding the growth of investments and labor force constant among regions.

The effect of current expenditure on growth is greater than the effect of capital expenditure on growth although it is generally assumed that current expenditure is less productive than capital expenditure. Current expenditure is routine or concurrent expenditure that covers state operating costs and is not directly aimed to improving public welfare through public capital projects. However, it is also important to put into perspective the drastic increase in the size of current expenditure that can be attributed to the transfer in government employees and programs from the central government to the state level. In the descriptive analysis that is presented in Table 9, the size of spending in current expenditure is almost twice the spending in capital expenditure, which could be the cause for a greater effect on growth. A significantly larger current expenditure will also have an immediate impact on the economy compared to inadequate spending on capital investments that do not necessarily bear a significant impact on the economy.

The impact of capital expenditure on growth is significantly lower after decentralization. A one percent increase in capital expenditure is associated with a 0.58 percent decline in growth compared to the period before the implementation of decentralization. This indicates the possibility of misallocation of resources that is driven by corruption and rent seeking at the regional level. Laws and regulatory oversight have not been responsibly implemented to overcome these types of illegal activities. Another reason for this finding is that capital expenditure actually declined after decentralization due to budget constraints and increase in risks associated with economic uncertainty. The

financial crisis put many public capital investment projects on hold as the costs of the projects drastically increased. Unfortunately, many of these projects were critical infrastructure projects that can accelerate growth and development in the regions.

On the contrary, the effect of state current expenditure on growth is higher in the post-decentralization period compared to the pre-decentralization period. This result is consistent with a sharp increase in the level of current expenditure in the post-decentralization period, which may be a factor that boosts regional growth.

The control variable, private investment, is significantly correlated with higher regional growth where a one percent increase in private investment leads to a 0.08 percent growth controlling for growth of labor force at the regional level. The size of the labor force is another factor that significantly affects regional growth. To a certain degree, the population and demographic distribution, as well as factor mobility influence the growth of the labor force. Thus, regional imbalances are a critical factor for regional growth particularly in a decentralized system.

Based on the sign and level of significance of the spatial dummy variables, being in the eastern region decreases growth rates by almost 0.11 percent and being a lagging state will decrease growth rates further. These results are as expected, considering the extent of disparities between the eastern and western regions in Indonesia. Looking further at the coefficient of the dummy variables for the eastern region, lagging states are actually better off after the implementation of decentralization. Yet, it is not obvious that

the implementation of decentralization has helped to reduce the level of inequality between regions and to support long-term regional convergence.[82]

The crisis period variable is a time dummy variable that includes the period of the financial crisis from 1997-1999. In aggregate, during the 3-year period of the financial crisis the growth rate contracted by about 0.59 percent.[83]

Panel Data Regression with Observation from Lagging and Leading States

This last section of the empirical analysis examines whether the effects of the explanatory variables on growth rates differ for lagging and leading states. It can be determined that regional imbalances are one of the key factors that influence the success or the net benefits of a decentralization policy. This further emphasizes the need to determine the extent of the different impacts of state efficiency levels and the degree of fiscal decentralization in particular on regional growth for lagging and leading states.

Table 19 and 20 present the result of growth panel data regression for lagging states and leading states independently. As previously identified, lagging states consist of fifteen states and leading states consist of eleven states

[82] One of the expected roles of a decentralized system is to allow more distribution of wealth or opportunity in order to accumulate wealth through better public sector. Yet in many cases, a decentralized system benefits only certain regions due to the imbalanced revenue sharing system. Current studies on regional disparities in Indonesia also argue that decentralization has not been successful in overcoming inequality, although there have been tremendous growth and development in lagging regions (Aritenang 2008).
[83] Nationally, the growth rate stood at 8 percent in 1996 before declining to 4.7 percent in 1997. At the peak of the crisis, growth rate declined by more than 13.1 percent compared to the rate of growth in 1996 (see Appendix F.1).

Table 19. Growth Panel Model in Lagging States (1996-2005)

Dep. Var (Log GRDP): n = 150 Obs (15 States)	Regional Growth		
Indep. Var.	(1)	(2)	(3)
Constant	-1.22	-0.87	-0.79
	(-0.59)	(-0.46)	(-0.50)
State Efficiency	0.55	0.49	0.50
	(3.83)	(3.65)*	(4.51)*
State Efficiency (D)	-0.57	-0.52	-0.53
	(-3.84)*	(-3.82)*	(-4.63)*
Log Fiscal	-0.52	-0.52	0.22
Decentralization	(-4.53)*	(-4.96)*	(1.68)***
Log Fiscal	0.09	0.12	-0.07
Decentralization (D)	0.62)	(0.90)	(-0.57)
Log Tax Rate	-0.51	-0.45	-0.45
	(-7.42)*	(-7.00)*	(-8.42)*
Log Tax Rate (D)	0.07	0.05	0.21
	(0.68)	(0.53)	(2.64)*
Log Capital	0.06	0.05	-0.13
Expenditure	(0.32)	(0.27)	(-0.82)
Log Capital	-0.09	-0.05	-0.58
Expenditure (D)	(-0.43)	(-0.26)	(-0.57)
Log Current	0.89	0.86	0.39
Expenditure	(9.41)*	(9.73)*	(4.04)*
Log Current	0.04	0.03	0.06
Expenditure (D)	(0.28)	(0.24)	(0.61)
Eastern Region	-0.10	-0.07	-0.09
Dummy	(-1.04)**	(-0.86)	(-1.26)
Eastern Region	-0.17	-0.23	-0.02
Dummy (D)	(-1.36)	(-1.97)***	(-0.24)
Crisis Period	-0.59	-0.57	-0.47
	(-2.68)*	(-4.24)*	(-5.00)*
Log Investment		0.07	0.07
		(4.71)*	(5.62)*
Log Labor Force			0.79
			(7.60)*
Adj. R-squared	0.81	0.83	0.88
F-value	29.86	34.23	49.89
Prob > F	0.00	0.00	0.00

Note: *t*-statistics are in parentheses. All regressions are controlled for time specific dummies.

* The point estimate is significant at the 1% level.

** The point estimate is significant at the 5% level.

*** The point estimate is significant at the 10% level.

(D) Interaction Term between selected explanatory variable and the post-decentralization time dummy

Table 20. Growth Panel Model in Leading States (1996-2005)

Dep. Var (Log GRDP): n = 110 Obs (11 States)	Regional Growth		
Indep. Var.	(1)	(2)	(3)
Constant	-1.16	-2.01	-0.93
	(-0.97)	(-1.33)	(-0.72)
State Efficiency	0.23	0.29	0.36
	(1.84)***	(2.06)**	(3.01)*
State Efficiency (D)	-0.06	-0.11	-0.10
	(-0.32)	(-0.55)	(-0.58)
Log Fiscal	-0.14	-0.15	0.41
Decentralization	(-2.04)**	(-2.16)**	(3.66)*
Log Fiscal	0.01	0.02	-0.01
Decentralization (D)	(0.10)	(0.20)	(0.13)
Log Tax Rate	-0.65	-0.72	-0.65
	(-4.92)*	(-4.77)*	(-5.04)*
Log Tax Rate (D)	0.06	0.08	0.02
	(0.29)	(0.38)	(0.12)
Log Capital	0.54	0.53	0.35
Expenditure	(3.89)*	(3.84)*	(2.92)*
Log Capital	-0.28	-0.27	-0.22
Expenditure (D)	(-1.78)***	(-1.68)***	(-1.63)***
Log Current	0.61	0.66	0.26
Expenditure	(4.83)*	(4.76)*	(1.92)***
Log Current	0.21	0.19	0.22
Expenditure (D)	(1.40)	(1.23)	(1.64)***
Eastern Region	0.10	0.11	0.21
Dummy	(0.78)	(0.81)	(1.79)***
Eastern Region	0.13	0.14	-0.05
Dummy (D)	(0.52)	(0.53)	(-0.23)
Crisis Period	-0.59	-0.57	-0.47
	(-2.68)*	(-4.24)*	(-5.00)*
Log Investment		-0.03	-0.02
		(-0.93)	(-0.73)
Log Labor Force			0.60
			(5.88)*
Adj. R-squared	0.92	0.92	0.94
F-value	61.69	58.85	79.54
Prob > F	0.00	0.00	0.00

Note: *t*-statistics are in parentheses. All regressions are controlled for time specific dummies.

* The point estimate is significant at the 1% level.

** The point estimate is significant at the 5% level.

*** The point estimate is significant at the 10% level.

(D) Interaction Term between selected explanatory variable and the post-decentralization time dummy

The result shows that an increase in the level of state efficiency is associated with higher regional growth in both lagging and leading states. A 0.1-point increase in the level of state efficiency is associated with a 0.050 percent growth in lagging states and a 0.036 percent growth in leading states. Both coefficients of state efficiency are significant at a one percent level.

After the implementation of decentralization, the impact of state efficiency levels on economic growth was lower since the net effect of the interaction coefficient is negative. Although this finding is consistent with the previous panel data regression using 26 state observations, the net effect of the state efficiency levels on regional growth differs between lagging and leading states. Leading states seem more capable in efficiently allocating fiscal resources to support growth after decentralization. This result satisfies the primary hypothesis H-P1, which argues that the impact from decentralization on economic growth differs for lagging and leading states.

Part of the problem with a declining level of state efficiency is attributed to the challenges that lagging states faced in managing fiscal decentralization. A rapid rise in fiscal resources after decentralization meant that state government had a greater capacity to spend, although some may not have had adequate resources and strategic plans in place to allocate spending appropriately. In many cases, this also became a cause for corruption and rent-seeking activities where state leaders allocated resources to benefit certain group or people that had provided political support. Hence, this study cannot confirm whether these practices were more common in lagging or in leading states.

Consistent with the results in the previous panel data regression with 26 state observations, the relationship between fiscal decentralization and economic growth turns positive with the inclusion of control variables population and labor force. A one percent increase in the degree of fiscal decentralization is associated with a 0.22 percent higher growth in lagging states and a 0.41 percent in leading states. There is a significant reverse correlation between fiscal decentralization and regional growth when the model does not control the growth of investment and labor force.

After the implementation of decentralization, the impact from an increase in the degree of fiscal decentralization on regional growth is less than in the period prior to decentralization, holding the control variable constant. The sign of the coefficient for fiscal decentralization is negative in both lagging and leading states, but the impact is less for leading states than for lagging states. A one percent increase in the degree of fiscal decentralization is associated with a 0.07 percent lower growth in lagging states and only a 0.01 percent lower growth in leading states assuming that there is no significant change in the growth of investment and labor force among regions. The fact that a larger degree of fiscal decentralization is associated with lower regional growth provides an indication of misallocation of fiscal resources. This finding also confirms that the implementation of decentralization had more detrimental effect on lagging states compared to leading states.

The panel data regression finds that a one percent increase in tax rates was associated with a 0.45 percent lower growth rate in lagging states and a 0.65 percent in leading states. The coefficients are significant at the one percent level, holding the

growth of investment and labor force constant. A higher negative impact from tax rates on growth is more dominant in leading states since they have a higher capability to tax at a higher rate and increase charges or fees from various sources. Leading states have a larger size and economies of scale due to the size of their population, capacity and diversification in their economy. Consequently, leading states have a larger tax base, as the private sector is more willing to invest. Yet, a higher tax rate can increase the cost structures in the economy that may negatively affect economic growth.

This outcome further validates one of the consequences of decentralization where states have the power to set new tax rates, charges and fees, but can run into the risk of excessive taxation. Although the negative impact from tax rates on growth is lower and can be assumed to be triggered by tax competition between states after decentralization, there is still a greater risk of higher tax rates on regional development. To balance the potential negative impacts from tax rates on economic growth, states should ensure that revenues from taxes, charges and fees are optimally utilized and distributed to benefit the public and private sectors. In several cases, new taxes, charges and fees have been introduced as part of schemes to enrich certain people that hold power in the state government. This may be due to a lack of accountability and oversight.

The coefficients for public expenditure in the panel data model with lagging states are for the most part insignificant, except in the case of current expenditure in the pre-

decentralization period.[84] Yet, the sign of the coefficients indicate that an increase in capital expenditure is associated with lower regional growth. The sign of the interaction coefficient in the post-decentralization period is also negative, which indicates that an increase in capital expenditure further lowers growth due to inefficiency and ineffectiveness in the allocation of capital spending.

Lagging states were not well prepared to manage a rapid increase in capital investment projects due to a lack of experience and resources. The less developed institutions in the lagging states also cause a lack of oversight on the allocation and management of capital investment projects. This would have an effect on the capability to limit abuses of power and corruption.

Other factor that affects inefficiency in capital spending is an increase in the scale and scope of programs that transferred to states by the central government. In some instances, states choose to cut their capital investment budget and spend a larger percentage of the budget on current expenditure as they are unable to manage certain level of capital investment projects. Consequently, these actions would lower the level of competitiveness and economic growth at the regional level. Furthermore, this can hinder efforts to reduce regional disparities between lagging and leading states and between eastern and western regions in Indonesia.[85]

[84] Due to a lack of statistical significance in the model, the effect from public expenditure on growth in lagging states is inconclusive and therefore the coefficients are not interpreted.

[85] A number of studies agreed that the decentralized system in Indonesia has not reduced the level of regional inequality. If regional convergence did in fact occur after the 1997 financial crisis, following a significant decline in the growth rates of most leading states, it was more likely temporary convergence.

An increase in current expenditure in lagging states is significantly associated with higher growth in the 10-year period of analysis where a one percent increase in current expenditure is associated with a 0.39 percent increase in growth. Even though the current expenditure coefficient in the post-decentralization is not significant, the sign of the coefficient is positive, which indicates that an increase in current expenditure after decentralization further boost regional growth in lagging states.

Looking at the sign and statistical significance of the public expenditure coefficients in leading states, it can be determined that an increase in both capital and current expenditures is associated with higher growth in the 10-year period of analysis. A one percent increase in capital expenditure will increase regional growth by 0.35 percent; while a one percent increase in current expenditure is associated with 0.26 percent increase in growth. This result shows that, as expected, the effect of capital expenditure on economic growth is higher than the effect of current expenditure, which is opposite to the results in the panel data model for lagging states. Again, it proves that leading states are more capable in strategically allocating capital spending to productive activities than lagging states.

The effectiveness of capital expenditure in supporting growth significantly decreased after decentralization in leading states. Thus, indicating the possibility of misallocation of capital spending after the implementation of decentralization. This is similar to what occurred in lagging states. Lower productivity of capital spending after decentralization is also a major issue in many developing countries.

A drastic decrease in capital spending caused by a state's limited financial capacity may also contribute to low productivity of capital investment projects. With limited financial capacity, states may choose to satisfy their current expenditure obligations first, while delaying spending on capital investment projects. The decision to grant capital investment needs lower priority may further challenge the level of state competitiveness and result in lower economic growth. Furthermore, there is also the possibility that an increase in current expenditure is part of ongoing rent seeking and corrupt practices, since oversight and accountability over current expenditure are weaker than over capital expenditure.

The productivity of current expenditure in supporting growth in leading states significantly increases after decentralization. Part of the reason for this is the sharp increase in current expenditure to administer the programs and services that were transferred to the states by the central government. Financing additional current expenditure may have come at the expense of capital expenditure, yet, it seems that part of the current expenditures went to the regional economy and supported growth.[86]

The results of the empirical analysis indicate that decentralization tend to benefit leading states more compared to lagging states, suggesting that leading states were more prepared and capable of exploiting the advantages of a larger fiscal capacity. Leading states are also argued to be more competent in managing fiscal decentralization with the more adequate support of human resources, management systems and technologies.

[86] Several studies have found a similar result associated with lower capital expenditure because of increased in the current expenditure after decentralization (Bose 2003, Rodriguez-Pose et. al. 2007).

6.3. Evaluation of Decentralization and Regional Competitiveness Policies

The collaboration between decentralization and regional competitiveness policies is key to creating robust and sustainable growth in Indonesian states. Yet, a number of challenges persist in particular since decentralization in Indonesia was not initially planned within the framework of an economic policy, but was rather the result of political compromise. Some of these challenges are discussed in an attempt to understand the complexity of policies that focus on revitalizing regions to become more competitive in a decentralized system.

First, there has been imbalanced development and a concentration of the market economy in certain regions. Rapid growth during the New Order was limited to specific regions, at the expense of other regions. One reason why this occurred was due to restrictive government regulations and the influence of specific interest groups, which is a common practice in the market economies of developing countries. Consequently, this limited the ability of state governments to stimulate and sustain the real sector of the economy to support local economic development in specific regions. A strong local economy will help support the national economy and with a strong local market and real sector of the economy, the impact from future economic crises could potentially be minimized.

Second, there has been a lack of coordination in the economic policies to support a strong and diverse regional economy. Strategic economic policies with clear priorities are needed to develop the real sector of the regional economy, encourage entrepreneurial

activities and build industrial integration.[87] An example of those sound economic policy are the assurance of property right, contract law, and non-discriminatory toward small businesses. Economic policies during the New Order were geared towards supporting large conglomerations and state owned enterprises, which were influenced by certain interest groups and the regime in power.

Third, the public sector in Indonesia was impaired by entrenched corruption and rent seeking, ranking the country as one of the most corrupt in the world. Furthermore, red-tape bureaucracy has been the primary causes for inefficiency in the public services. This also affects the competitiveness level of private sector due to higher transaction cost. In the private sector, the low competitiveness of firms and enterprises is also caused by protectionist policies, among other policies, issued by the government that created wrong incentive structures and resulted in negative externalities.

In conclusion, growth in Indonesia has been unsustainable because has been a lack of policies to strengthen the relationship between institutions, markets and firms. At a sub-national level, such policies should focus on the development of local institutions and the market economy. These policies are best to follow the concept of Market Preserving Federalism, which provides direction on how to create incentive structures in a decentralized or federal system using a market mechanism.[88] Based on this

[87] Co-ops (*Koperasi*) has been used to promote local economic development and to provide a strong foundation for a market economy has not been optimal. In addition, the state government also supports entrepreneurial through a number of policies, such as the non-discriminatory toward small businesses, special loans or credits to small–medium enterprises.

[88] The New Institutional Economics aim to depict the relationship between institutions and the market economy. Economic reform in developing countries is intended to reap the benefits of the market

framework, it is important for state governments to facilitate the development of the private sector and market economy through laws, policies and regulations. By pursuing this path, Indonesia should be able to achieve sustainable growth and better manage future financial crisis.

One of the key concepts of decentralization is creating incentive structures, which can increase the efficiency of state governments. Several factors drive state efficiency levels. Policy analysis should evaluate these factors to understand how to maximize the benefits from the implementation of decentralization. This dissertation has identified a number of factors that influence state efficiency levels, which result from the implementation of fiscal decentralization. One policy that can raise state efficiency levels is the decision to allow states to generate their own revenues. The centralized revenue system that was implemented in Indonesia during the New Order has been proven to be an obstacle to development because it has resulted in an imbalanced distribution of growth. Another policy to increase efficiency levels is to offer incentives for states to spend on human capital development utilizing technology.[89]

The empirical analysis of this dissertation has concluded that policies to support higher levels of fiscal decentralization and state efficiency are critical for economic growth. The following fiscal decentralization policies should be further examined to ensure that state governments promote appropriate incentives.

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economy, but in many cases, there has been little attention to and progress on the institutional front. To a certain degree, this was exactly the problem in Indonesia before the 1997 economic crisis.

[89] The analysis shows that the organizational management through better administration and increased productivity of state employees influences state efficiency. However, these may not affect growth significantly even if the quality of public service is improved.

First, a review should be performed of policies that regulate and monitor the utilization of public funding and public debt.[90] With the expansion of a market economy, there is a desire by states to finance development through market mechanisms. States can sell local bonds through domestic financial markets in order to broaden their access to capital. However, states must also be aware of the moral hazard that can exist if states borrow excessively, forcing central governments to bail them out, ultimately putting a country's macroeconomic stability at risk.[91]

Second, an analysis of policies that dictate how revenues are generated and how expenditure is used to ensure that states have the capability and capacity to meet their goals should be undertaken. Restrictions on the types and sources of revenues will cause state and district governments to find other ways to balance their budget. So, if state and district governments are not allowed to introduce new taxes, charges or fees other than what has been determined by law, they will be forced to increase current tax rates, charges, and fees in order to raise revenues and close fiscal gaps. Consequently, tax distortions may raise costs excessively and burden the private sector, limiting its ability to compete in a market economy.[92]

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[90] Regulations that allow state governments in Indonesia to issue debt has been delayed considering the potential risks in regard to the accountability and moral hazard.

[91] It is important that state governments recognize the dangers or risks of excessive spending that are financed with debt. This issue becomes more critical when states' spending on specific capital investments is not efficient or productive.

[92] States that are not endowed with many natural resource or that lack economic advantages will have to carefully consider raising taxes, charges, and fees. These actions may have a negative impact on the level of investment and economic growth. The concern is typically on the indirect taxes that hinder productive efficiency. Moreover, this type of taxes can be easily levied in developing countries, for examples fees collected in ports and roads.

Third, an assessment should be done of regulations that distinguish between national and sub-national expenditures, to ensure that central government intervention on spending decisions in the regions is limited.[93] Currently, decentralization policies in Indonesia have not clearly assigned expenditure responsibilities between the different levels of government. Under the new decentralization law, state and district governments do not have spending restrictions but are required to maintain a balanced budget. There have been debates on whether policy guidelines should be established to specify a minimum portion that should be allocated to critical sectors. An example of this is the existence of a minimum percentage that must be allocated to expenditure on education, health and infrastructure to support the desired level of productivity and development in a region. This type of policy guideline should correspond with national development strategies that promote competitiveness. However, the government should be aware that these types of guidelines are still considered another form of central government intervention.

Fourth, it is important to ensure that there is sufficient funding for programs and services that are being transferred to the regions to better overcome unfunded mandates. With changes in the distribution or allocation of revenue and expenditure, the central government transfers a number of programs and services that are initially the responsibility of the central government, to the sub-national level governments without considering the financial consequences to the states. State governments may suddenly

[93] The central government has full control over spending associated with national interests, such as providing national defense, maintaining macroeconomic stability, and funding public utilities that benefit the entire country.

find themselves responsible for funding part or all of these programs and services. Problems can surface when states do not have sufficient funds to cover the costs of these programs and services because of restrictions on the types and bases of revenue that states and districts can generate. This may cause an interruption of public services and can jeopardize production activities of firms and enterprises, risking a region's competitiveness. To prevent this to take place, there is a need for a greater policy coordination between the central and state governments[94]

Fifth, a review of policies related to the allocation of public capital expenditure at both the national and regional levels should be conducted. Policies on public capital investments should aim to increase productivity and reduce the cost of production. It is important for states to identify the type, scale and scope of capital investments that can encourage private sector development. States should explore the different types of incentives that they can offer, such as tax incentives, critical infrastructure, access to highly trained workers, and low production cost structures. States also need to manage the challenges of balanced budget policies, whereby they are forced to use all the funds allocated to specific programs within a certain time frame, even though the spending may not be necessary.

[94] Promoting public-private partnerships (PPP) to finance the development of public services is an alternative for limited state budgets, in the event that states are not allowed to issue debt. Public-private partnerships will not only provide the means for states to access capital, but also reduce the risks associated with certain capital investments. Hence, the issue with allowing the private sector to finance critical public services is related to how much balance exists between the service charged to consumers and the return to investment to private investors.

Sixth, it is necessary to manage policies on public capital investment to ensure that the outcomes of these policies do not "crowd-out" private capital investment. An excessive investment in public capital projects may cause the private sector to reduce its investment and consumption, when in fact, the effect from private investment is potentially larger than public investment when taking into account externalities and spillovers into the regional economy. Thus, "crowding-out" can indirectly lower state growth rates.

Seventh, it is important to support policies that promote good governance. These policies should encourage transparency, accountability and the rule of law. In many developing countries, one factor that has negatively influenced the efficiency and productivity of public capital expenditure is corruption and rent-seeking activities.[95] These illegal activities increase transaction costs and cause the regions to be less competitive. The role of institutions is important and cannot be considered as an exogenous factor anymore since it determines the quality of institutions and development process as a whole (Borner et al. 2004). Regional institutions should have strong good governance policies in place, otherwise decentralization will not be effective.[96]

Besides reviewing fiscal decentralization policies, it is also important to review policies that aim to reduce disparities at the regional level. This issue is particularly

[95] The term "soft money" refers to collusion practices whereby state officials collaborate with the private sectors for personal benefit. The lack of transparency in awarding and supervising contracts, collusion in the permit application, or the use of regulations to benefit certain groups are examples of where "soft money" is being used. This further deteriorates states capacity to allocate resources efficiently.
[96] In the democratic system, decentralization should ensure the accountability of state government as demanded by the public.

critical for developing countries since it affects imbalances in state revenue and development levels. Fair and progressive revenue sharing schemes between central and state governments can help reduce regional disparities. Yet this type of redistributive policy typically draws dissatisfaction from rich resource regions, because they believe that it is unfair for the central government to exploit their resources to subsidize other regions.

Growth policies at the regional level should take into consideration the investment needs of the private sector. Private capital investment at the regional level is affected by labor and population growth in addition to public goods and services that are provided by the state. From the supply side, skilled labor is a key production input for firms and enterprises. From the demand side, the private sector's decision to invest is driven by population growth, which ultimately determines what and where to produce.

In sum, the financial crisis in Indonesia provided a window of opportunity for policy reform to occur. Hence, many of the policies are only geared towards short-term solutions and have not been comprehensive enough to respond to more long-term problems. Part of the reason for this is attributed to the uncertainty that existed at the time when the policies were introduced. Decentralization policies should evolve over time where policy reforms are allowed to realign the goals and strategies of development and mitigate the negative side effects from the implementation of decentralization.

7. Concluding Remarks

This dissertation aims to expand previous empirical and theoretical approaches on fiscal decentralization and economic growth with the inclusion of efficiency factors of state governments. Past empirical studies on the effect of fiscal decentralization on regional growth have been robust yet inconclusive in their results. Following the key premise of decentralization, which provides state governments with incentives to become more efficient and independent in managing their fiscal resources, it is crucial to also measure the effect of state efficiency on regional growth.

This dissertation aims to fill gaps in the way state efficiency is measured by developing a method to adjust technical efficiency scores from the non-parametric DEA model that merely represents efficiency of expenditures. The adjustment is made using the interaction between the following two determinants: ratio of productive spending and operating costs. These two determinants represent state government choices and preferences in allocating fiscal resources, which are also a reflection of the priorities in development strategies and an indication of state institutional quality.

The process of decentralization influences state institutional setting where political dynamics and performance of state administrators as economic agents are among the key factors. In that regard, the bottom up process of decentralization supposedly has an effect on state institutional setting as it encourages citizens to be more involved and

supportive in the process of decentralization and democratization. At the same time, state administrators should be more transparent and responsible as the citizens demand accountability for their action. Hence, the implementation of decentralization in Indonesia has resulted in a greater unchecked power of state and district governments that is considered as the cause for inefficiency, rent seeking and corruption.

In theory, regional competition is not a zero sum game since states are motivated to become more efficient and productive in order to remain competitive. A decentralized system also encourages states to compete against each other as they become more independent. In reality, some states are more capable and prepared than others in managing fiscal decentralization that serves the best interests of their citizens as well as meeting their development goals. Furthermore, decentralization does not always provide the same incentive structures; or in other word, a level playing field may not fully exist between regions. Decentralization potentially assigns different incentive structures and net fiscal benefits to specific regions, as an example, rich resource regions in Indonesia may receive significantly larger transfers from revenue sharing schemes with the central government. Although there is an effort to equalize transfers through General Allocation Funds (DAU) and Special Allocation Funds (DAK), there are still fiscal imbalances that give higher net benefits to certain regions.

Another factor can also affect growth at the regional level, such as the differences in structure and economic capacity of regions. Certain regions may have larger economies of scale and fiscal capacity that will influence the choices or preferences and

priorities in development policies, including the strategies over allocation of fiscal resources.

One of the lessons learned from the implementation of decentralization in Indonesia is the need to better plan the transition to a decentralized system. Lack of consideration on issues surrounding decentralization policies, such as horizontal and vertical fiscal imbalances, tax distortion and less accountability are recipes for failure that will cost citizens of the respective states. It is necessary to prepare state governments to manage both administrative and fiscal decentralization. Providing technical support in the transition process to a decentralized system and constructing a framework of good governance, particularly to lagging states, is critical to help states reap the benefits of decentralization to accelerate growth and development in their region.

A larger policy framework on economic and social equity also needs to be an integral part of decentralization. The role of the central government in supporting lagging states may be limited under a decentralized system; however, it is the responsibility of the central government to implement a fair distribution policy as one of the fundamentals of regional competitiveness to help reduce regional disparities and accelerate growth at the regional level.

This chapter provides a conclusion to this dissertation. The first part contains a summary of the key findings. The second part discusses the limitations of the research and the third part provides recommendations for future research needed on fiscal decentralization and economic growth.

Summary of Key Findings

From the empirical analysis of the Tobit model it is evident that the degree of fiscal decentralization in Indonesia influences state efficiency levels. Thus, it can be concluded that decentralization policies provide a framework for incentive structures to support higher state efficiency levels. The magnitude of the effect that fiscal decentralization has on state efficiency levels was significantly higher in the post-decentralization period in Indonesia.

Second, the ratio of variables productive spending and operating cost have an inverse relationship with state efficiency levels in the post-decentralization period in Indonesia. Contrary to this, productive spending had a positive correlation with state efficiency levels in the pre-decentralization period, and the magnitude of this positive correlation was significantly higher than in the post-decentralization period. This indicates that state governments were less efficient in the decentralized system.

Third, the results of the Tobit model indicate that the ratio of state employee salary and allowances that is part of current expenditure positively influences state efficiency levels. It is implied that more spending on human capital development and higher wages of state government employees can potentially improve state efficiency levels. The rationale is that better welfare and improvement in the quality of state government employees can increase productivity and potentially reduce rent seeking and corruption in the states.

Higher revenue independence affects state efficiency levels through an underlying assumption that state governments can be more efficient as they become more

independent in generating revenue from their own sources. Similar to the assumption that relates productivity of state government employees to state efficiency levels, the same principle applies to the assumption that principal agents in state organizations act for the common purpose of the state, which is to improve public welfare and support the process of development in their respective regions.

The Tobit model also confirms per capita income and per capita spending as determinants of state efficiency. Still, the probability that per capita income has an effect on state efficiency levels is very low in both the pre- and post-decentralization periods. Therefore, it is valid to assume that per capita income is a weak explanatory variable of state efficiency levels. In contrast, the probability that per capita spending has a negative impact on state efficiency levels is significantly higher in the post-decentralization period. One explanation for this is that states with a larger spending capacity following decentralization are more inclined to be less efficient.

Followings are the results of the growth panel data analysis. First, fiscal decentralization generally supports higher growth assuming that there are insignificant imbalances in the growth of labor force. Hence, despite the fact that fiscal decentralization is one of the stronger determinants of higher state efficiency, there is no indication that the incentive structures from decentralization are associated with higher growth. Of concern is whether a higher state efficiency levels following a larger fiscal capacity cause corruption and rent seeking in the regions if compared to the period prior to decentralization.

Second, when taking into account regional inequalities, the positive effect of fiscal decentralization on economic growth is more apparent in leading states. Lagging states often fail to reap the benefits of decentralization due to lower efficiency of state governments in allocating fiscal resources, lower economic capacity and lack of own resources. The results of this empirical study are in agreement with the argument that there are different outcomes from the implementation of fiscal decentralization in lagging and leading states.

As expected, a third result from the panel data analysis is that higher tax rates are associated with lower growth because of an increase in the production costs of firms and enterprises. The impact of high tax rates on growth in leading states is more significant than in lagging states, reflecting the consequence of the choices made by leading state governments to raise additional revenue through taxes, charges and fees since they have a stronger and more stable economic structure.

A fourth outcome is that there is a tendency for state governments to increase current expenditure at the expense of capital expenditure in a decentralized system, negatively affecting economic growth. Unfortunately, because states have limited fiscal resources and are not willing to reduce current expenditure and cut overhead costs, capital expenditure is minimized. This path is taken even though the action puts the competitiveness level of each respective state at risk. The results from the growth panel data analysis support this conclusion, showing that the productivity of current expenditure is higher than that of capital expenditure in the post-decentralization period. In lagging states, capital expenditure has a negative relationship with economic growth

despite the argument that public capital expenditure is typically more productive in supporting economic growth than current expenditure.

Contrary to the hypothesis, the negative correlation between public capital expenditure and economic growth after the implementation of decentralization signifies that increased capital spending results in higher inefficiencies in resource allocation. Part of the inefficiencies can be attributed to poor capital expenditure choices by the state government. It can also be due to increased rent seeking and corruption practices at the regional level in the post-decentralization period. Since the productivity level of public capital expenditure was significantly lower in lagging states compared to leading states, it implies that the extent of rent seeking and corruption practices may be far more entrenched in lagging states.

Research Limitations

This dissertation acknowledges that a number of constraints could not be fully controlled, and may have affected the outcomes and interpretations of the empirical analysis. The first constraint is the period of observation used in the empirical model, where the process of decentralization coincided with the 1997 financial crisis. The extent and depth of the economic shock and macroeconomic instability on state expenditure could not be fully controlled, since the model did not include specific macroeconomic variables such as interest rates and inflation.

The second constraint is data limitation. There were limited data for the pre-decentralization period, which did not allow this study to include a lag of more than one

year in the model. This may have affected the results of the capital expenditure and private investment variables in the growth model, since both have a lagging effect on growth. Furthermore, there are limited data on the composition of public capital expenditure for each sector of spending as well as inconsistency in data compilation.

The third constraint is related to the finding that fiscal decentralization has contributed to regional growth in Indonesia, despite the fact that effects of state efficiency on growth are small due to the extent of rent seeking and corruption at the regional level. The following aspects can contribute to the contradiction between the findings in this dissertation and current observations over the implementation of decentralization:

- This dissertation focuses on the efficiency of states in allocating fiscal resources and it does not necessarily capture other causes of inefficiencies that take place in the decentralized system in Indonesia, such as corruption, collusion and nepotism. The difficulty of accounting for these inefficiency factors is related to the availability and validity of data. An index of corruption or rent seeking has not been fully developed at the regional level.
- States can be more efficient because of the structure and proportion of revenue sharing which is relatively more constrained than that of local districts. Lower revenue at the state level compared to the district level could mean lower spending and potentially higher efficiency. As discussed in the beginning of this dissertation, the reason to choose states as the unit of analysis is that studies that focus on states in

a decentralized system are lacking, eventhough states play a key role in setting up priorities and strategies for development.[97]

- The period of observation in the growth panel data model did not include the period of New Order prior of the 1997 financial crisis where the growth rate was significantly high. The reason for this was to remove outliers where low level of fiscal decentralization during the New Order is associated with high growth rate.

The last constraint in this dissertation is the assumption that state administrators behave rationally in allocating fiscal resources to improve public welfare. In reality, many of the state administrators have personal interests and aim to enrich themselves and their supporter at the expense of the citizens of the states that they represent. Lucrative contracts and other types of collusion activities are meant to compensate donors who support candidates during the state election campaign ("soft money politics"). This can result in inefficiency in fiscal resource allocation as personal interests instead of the public interest influence state decision-making.

Suggestions on Future Research

Future studies should look at other factors that may influence state allocative efficiency and the effectiveness of fiscal decentralization policy, such as the institutional

[97] There is recently an effort to redefine the role of states as part of the 10-year assessment of the decentralization law in Indonesia. States are supposed to be the representatives of the central government responsible for providing oversight, assistance and coordinating local districts under their jurisdiction. Refer to UNDP (2009), "Ten Years of the Implementation of Indonesia's Decentralization: Reformulating the Role of the Province", Online access: http://www.undp.or.id/press/view.asp?FileID=20090625-1&lang=en.

framework for the development of laws and regulations, politics and the leadership of state governments. These areas can influence the dynamics between institutions in the decentralization process, as many of the issues in a decentralized system are the result of conflicts of interest between central and regional government, groups of people in power and political parties. The inclusion of other institutional factors can also add to advancing the literature on the relationship between democracy and decentralization.

Since a corruption index at the regional level does not currently exist, future studies may want to explore the possibility of constructing a corruption index in order to improve the growth panel data model presented in this dissertation. One possibility is to correlate corruption with cost inefficiency in discretionary spending, which is typically associated with state capital expenditure to finance specific public investments. Cost inefficiency is also closely connected with the productivity of public capital expenditure.

The productivity of specific sectors of capital expenditure, including health, education and infrastructure should be integrated in the future state expenditures study. The inclusion of the composition of capital expenditure in the growth model makes it possible to compare productivity factors by sector of capital expenditure against economic growth. Doing so would help create a more robust policy discussion and enable better decision making on the type, scale and scope of public capital investments.

More in-depth studies on regional imbalances and how they influence state efficiency and regional growth are also suggested for future research. It is important to examine the impact not only on growth, but also on state efficiency levels, of poverty, income inequality and imbalances in the distribution of population and labor, since all of

these factors may affect how state governments allocate fiscal resources. Furthermore, in any future study it is also important to include the spatial characteristics of states that may influence allocative efficiency and economic growth. Differences in a state's jurisdictional area, population density and urban and rural concentration can affect the process and outcome of decentralization as well. As an example, smaller states may be more manageable and less bureaucratic, while densely populated states with larger urban centers may benefit from the efficiency of public service delivery.

Appendix A

RECENT PROGRESS OF DECENTRALIZATION IN INDONESIA

Decentralization in Indonesia continues to move forward despite a number of problems, particularly an increase in corruption and rent-seeking activities at the regional level. One of the key issues with promoting good governance policy is the ambiguous process in assessing transparency and accountability of state governments. This also causes many state and district governments choose not to allocate capital spending in order to avoid a legal fight when it comes to fiscal audits. Consequently, this stalls the development in the regions as capital expenditures that are supposed to finance critical infrastructure, health and educational facilities and transportation decline significantly. It is important for the central government to resolve this issue to prevent a risk of being less competitive compared to other East Asian countries.

A recent study by the World Bank has identified specific infrastructure investments that are critical to strengthen the regional economy and increase competitiveness.[98] New investment initiatives and incentives for financing are the key to spur public-private partnership and stimulate growth and development in the regions.

[98]" *Now is the time to build on the achievements of the past few years and to spend Indonesia's financial resources effectively and efficiently to improve the quality of education, expand healthcare, close critical infrastructure gaps, in order to reduce poverty and build a competitive economy*". Online access: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/INDONESIAEXTN/0,,contentMDK:21433945~pagePK:141137~piPK:141127~theSitePK:226309,00.html#PER.

Appendix B

B.1. Granger Causal Test: (H0) State Spending affects GRDP

```
      Source |       SS       df       MS              Number of obs =     234
-------------+------------------------------           F(  2,   231) =10332.76
       Model |  1.3981e+18     2  6.9907e+17           Prob > F      =  0.0000
    Residual |  1.5628e+16   231  6.7655e+13           R-squared     =  0.9889
-------------+------------------------------           Adj R-squared =  0.9888
       Total |  1.4138e+18   233  6.0676e+15           Root MSE      =  8.2e+06

------------------------------------------------------------------------------
        GRDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   GRDP_lag1 |   1.164899   .0148358    78.52   0.000     1.135668     1.19413
Total_Spen~1 |   1.581375   .6892525     2.29   0.023       .22335      2.9394
       _cons |  -454939.4   655738.1    -0.69   0.489     -1746931    837052.5
------------------------------------------------------------------------------

 ( 1)  Total_Spending_lag1 = 0

       F(  1,   231) =    5.26
            Prob > F =    0.0227 (Significant at the 5% level – Reject H0)
```

B.2. Granger Causal Test: (H0) State Spending affects State Revenue

```
      Source |       SS       df       MS              Number of obs =     260
-------------+------------------------------           F(  2,   257) = 3058.98
       Model |  7.4811e+14     2  3.7406e+14           Prob > F      =  0.0000
    Residual |  3.1426e+13   257  1.2228e+11           R-squared     =  0.9597
-------------+------------------------------           Adj R-squared =  0.9594
       Total |  7.7954e+14   259  3.0098e+12           Root MSE      =  3.5e+05

------------------------------------------------------------------------------
Total_Reve~e |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Total_Reve~1 |   1.199314   .0911483    13.16   0.000     1.019821    1.378806
Total_Spen~1 |  -.0697105   .1015295    -0.69   0.493    -.2696462    .1302253
       _cons |   49449.84   25117.86     1.97   0.050    -13.19901    98912.88
------------------------------------------------------------------------------

 ( 1)  Total_Spending_lag1 = 0

       F(  1,   257) =    0.47
            Prob > F =    0.4930 (Not Significant – Accept H0)
```

Appendix B

B.3. Granger Causal Test: (H0) Total Public Capital Expenditure affects Private Investments

```
      Source |       SS       df       MS              Number of obs =     234
-------------+------------------------------           F(  2,   231) =   44.75
       Model |  2.0306e+09     2  1.0153e+09           Prob > F      =  0.0000
    Residual |  5.2412e+09   231  22689182.2           R-squared     =  0.2792
-------------+------------------------------           Adj R-squared =  0.2730
       Total |  7.2718e+09   233  31209403.6           Root MSE      =  4763.3

------------------------------------------------------------------------------
Total_Inve~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Total_Inve~1 |   .5052403   .0536137     9.42   0.000      .399606    .6108746
  Capex_lag1 |  -.0001279   .0002823    -0.45   0.651    -.0006841    .0004284
       _cons |   1333.895   362.1241     3.68   0.000      620.407    2047.383
------------------------------------------------------------------------------

 ( 1)  Capex_lag1 = 0

       F(  1,   231) =    0.21
            Prob > F =    0.6511 (Not Significant – Accept H0)
```

B.4. Granger Causal Test: (H0) State Revenue affects GRDP

```
      Source |       SS       df       MS              Number of obs =     234
-------------+------------------------------           F(  2,   231) =10156.94
       Model |  1.3979e+18     2  6.9893e+17           Prob > F      =  0.0000
    Residual |  1.5896e+16   231  6.8813e+13           R-squared     =  0.9888
-------------+------------------------------           Adj R-squared =  0.9887
       Total |  1.4138e+18   233  6.0676e+15           Root MSE      =  8.3e+06

------------------------------------------------------------------------------
        GRDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   GRDP_lag1 |   1.178994   .0149928    78.64   0.000     1.149454    1.208535
Total_Reve~1 |   .7099419   .6255137     1.13   0.258    -.5224995    1.942383
       _cons |  -441145.3   661382.6    -0.67   0.505     -1744259      861968
------------------------------------------------------------------------------

 ( 1)  Total_Revenue_lag1 = 0

       F(  1,   231) =    1.29
            Prob > F =    0.2576 (Not Significant – Accept H0)
```

Appendix C

Chow Threshold Test: (H0) Coefficients in two linear regressions of different data sets (Lagging States and Leading States) are equal

```
      Source |       SS       df       MS              Number of obs =     260
-------------+------------------------------           F(  6,   254) =26977.04
       Model |  75003.1066     6  12500.5178           Prob > F      =  0.0000
    Residual |  117.697562   254  .463376229           R-squared     =  0.9984
-------------+------------------------------           Adj R-squared =  0.9984
       Total |  75120.8042   260   288.92617           Root MSE      =  .68072

------------------------------------------------------------------------------
     logGRDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Lagging_st~s |       2.765   1.781436     1.55   0.122    -.7432657    6.273266
   Lagging_K |   .0114158   .0283985     0.40   0.688    -.0445108    .0673424
   Lagging_L |   .9564533   .1270595     7.53   0.000      .706229    1.206678
Leading_st~s |   8.273819   1.048804     7.89   0.000     6.208359    10.33928
   Leading_K |   .1881685   .0425988     4.42   0.000     .1042767    .2720604
   Leading_L |   .5410831   .0743392     7.28   0.000     .3946833    .6874829
------------------------------------------------------------------------------

 ( 1)  Lagging_K - Leading_K = 0
 ( 2)  Lagging_L - Leading_L = 0

       F(  2,   254) =    8.45
            Prob > F =    0.0003 (Significant at the 1% level – Reject H0)

 ( 1)  Lagging_K - Leading_K = 0
 ( 2)  Lagging_L - Leading_L = 0
 ( 3)  Lagging_states - Leading_states = 0

       F(  3,   254) =    21.06
            Prob > F =    0.0000 (Significant at the 1% level – Reject H0)
```

Appendix D

Hausmann Test: (H0) No Significant Correlation Between Unobserved Effects and Explanatory Variables (Regressors)

```
                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------------
logCapital~e |   -.0457227    -.0249879       -.0207348        .0031562
logCurrent~e |   -.0505497    -.0664467        .0158969        .0151653
logTotal_R~e |    .1088678     .0789652        .0299026        .0014041
logTotal_I~t |    .0047338      .007569       -.0028351        .0033058
         DEA |   -.2327463    -.1945454       -.0382009               .
logLabor_F~e |    .8483187     .8685814       -.0202628        .0137371
logPopulat~n |    .8852812      .930497       -.0452158        .0091985
logFiscal_~n |    .1116613     .0835998        .0280615        .0180253
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    32.71
                Prob>chi2 =    0.0001 (Significant at the 1% level – Reject H0)
                (V_b-V_B is not positive definite)
```

Appendix E

The impacts of Technical Efficiency and State Efficiency on Regional Growth

```
             |  logGRDP State_~3 Techni~y
-------------+---------------------------
     logGRDP |   1.0000
State_Effi~3 |  -0.1058   1.0000
Technical_~y |   0.0291  -0.0042   1.0000


      Source |       SS       df       MS              Number of obs =     260
-------------+------------------------------           F( 11,   248) =    4.01
       Model |  57.7480557    11  5.24982325           Prob > F      =  0.0000
    Residual |  324.579683   248  1.30878904           R-squared     =  0.1510
-------------+------------------------------           Adj R-squared =  0.1134
       Total |  382.327739   259  1.47616887           Root MSE      =   1.144

------------------------------------------------------------------------------
     logGRDP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
State_Effi~3 |  -.9612762    .783949    -1.23   0.221    -2.505323    .5827706
Technical_~y |   1.065689   .6634075     1.61   0.109    -.2409426     2.37232
 _IYear_1997 |   .1854139   .3182198     0.58   0.561    -.4413439    .8121718
 _IYear_1998 |   .6457695   .3196761     2.02   0.044     .0161431    1.275396
 _IYear_1999 |   .7875638   .3225859     2.44   0.015     .1522065    1.422921
 _IYear_2000 |   .8653532   .3200239     2.70   0.007      .235042    1.495664
 _IYear_2001 |   1.011069   .3207036     3.15   0.002     .3794185    1.642719
 _IYear_2002 |   1.133541   .3220991     3.52   0.001     .4991422    1.767939
 _IYear_2003 |   1.218853   .3241784     3.76   0.000     .5803596    1.857347
 _IYear_2004 |   1.341588   .3225169     4.16   0.000     .7063666    1.976809
 _IYear_2005 |   1.511473   .3200553     4.72   0.000     .8811003    2.141847
       _cons |   15.29539   .6474544    23.62   0.000     14.02018     16.5706
------------------------------------------------------------------------------
```

Appendix F

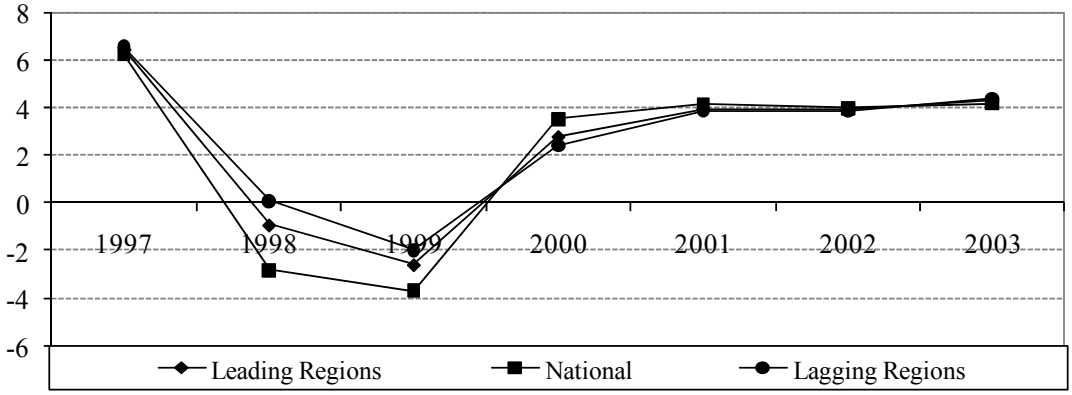

Figure 10. Growth Rate in Indonesia during the Period of Financial crisis

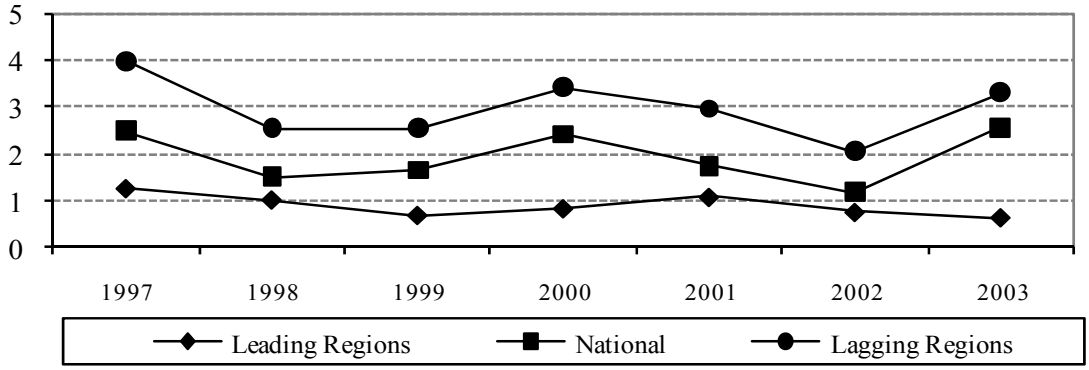

Figure 11. Growth of Private Investments in Indonesia during the Period of Financial crisis

Appendix H

EXTERNAL READER CURRICULUM VITAE

Iwan Azis is a professor of regional science and economics in the Regional Science (RS) Program, and adjunct professor at the Johnson Graduate School of Management, Cornell University. He is currently the Director of Graduate Study in the RS program, and President of the Regional Science and Economic Network (RSERN).

Prof. Azis has addressed and published topics of financial economics, regional and economic modeling, and the link between macroeconomics and poverty. In early 1998, he spoke before the Joint Economic Committee (JEC) of the US Congress on the Asian Crisis along with the deputy Prime Ministers of Thailand and Korea. During the last few years he has been a research adviser to the Indonesian central bank.

His recent publications include: "Institutional Constraints and Multiple Equilibria in Decentralizationl," Review of Urban and Regional Development Studies, Vol. 20, No. 1, 2008; "Indonesia's Slow Recovery After Meltdown," Asian Economic Papers, Vol 6, No 3, MIT Press.

Prof. Azis has conducted research and consulting work for various international organizations, e.g., the World Bank, Asian Development Bank, IDRC, ADB Institute, ISEAS, Asia Pacific Development Center, UNDP, Research Triangle Institute, International Food Policy Research Institute, the Asia Foundation, and Carnegie Endowment for International Peace, to name a few; as well as for universities, e.g., the Center for International Development at Harvard University, Initiative for Policy Dialogue at Columbia University, Institute of Advanced Studies at the UN University, Center for Economic Policy Analysis at the New School University.

He received an award on "Distinguished Scholar in Regional Science, Financial Economics, and Economic Modeling," presented at the Instituto Superior de Ciencias do Trabalho e da Empresa (ISCTE) Business School, Lisbon, Portugal, July 21, 2006.

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