

The Composite Impact of Institutional Quality and Inequality on Economic Growth



By

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List of Acronyms

2SLS	Two Stage Least Square
FE	Fixed Effect
GNI	Gross National Income
GDP	Gross Domestic Product
GMM	Generalized Methods of Moments
ICRG	International country Risk Guides
IMF	International Monetary Fund
IV	Instrumental Variable
PCA	Principal Component Analysis
RBC	Real Business Cycle
RE	Random Effect
SWIID	Standard World Income Inequality Dataset
UNIDO	United Nations Industrial development Organization
UTIP	University of Texas Inequality Project
WIID	World Income Inequality Database
WDI	World Development Indicators

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Abstract

This study investigates empirically how income inequality influences the impact of institutional quality on economic growth by looking into the composite effect of income inequality and institutional quality on growth. A panel of nine low and lower-middle income countries is used to examine the question. The data spans over 1984-2010. The results suggest that inequality can adversely affect the otherwise positive impact of institutional quality on growth. This also suggests by implication that an egalitarian society improves the impact of institutions on growth.

Chapter 1

1. Introduction

For economic development of a country, resource distribution and the rules that govern the economy are very important. Developed nations in general have managed to establish strong economic institutions which have resulted into higher level of income per capita and the distribution of resources that yields a socially acceptable level of income inequality. On the other hand, in developing economies, the institutional arrangements are such that they are ill suited to development, thus resulting into a wide divergence in the development paths of the developed and the developing nations. Acemoglu, Johnson and Robinson (2005) in their work conclude that the primary cause of economic backwardness for developing countries is the manner in which economic and political institutions function in these countries.

This study seeks to examine how inequality influences the impact of institutions on economic growth. It builds up the idea discussed in literature that country-specific characteristics are important in examining any policy reform and its implementations. Thus it contributes to the literature in focusing explicitly on the determinants affecting the institution-economic growth relation adversely.

For any country, institutional quality plays an important role as it provides enabling environment for high and sustainable growth. It establishes impartial and consistently enforced rules which are crucial for improving the socio-economic conditions through a good governance structure. A large strand of literature has documented the importance of institutions for economic development. Acemoglu *et al.* (2004), Hall and Jones (1999), Knack and Keefer (1995) and Rodrik *et al.* (2004) (to mention a few) argue that good institutional quality is important for economic development.

As institutional quality varies across countries resulting into a divergent path of development for both- developed and developing countries, given this it is important to examine the underlying characteristics of a nation that encourage positive relationship between institutional quality and economic growth. There is much debate among the economists and social scientists over what constitute the adoption of bad or low quality institutions in countries which lead to the divergent path of development e.g. United States and Latin America. Engerman and Sokoloff (2002) argue that social polarization negatively affects the institutional quality in a country, Easterly (2001) and Keefer and Knack (2002) suggest that institutional quality depends, among other things, on political and economic conditions of a country. The concentration of wealth and power in the hands of few elites leads to the adoption of low quality of institutions which in turn affect the growth process and vice versa (Mark Gradstein, 2003). In recent years many studies have been conducted to examine the relationship between inequality and growth, impact of inequality on institutional quality, the role of institutions in the economic performance of a country, however little attention has been paid to explore the interlinkages among inequality, institutional quality and economic growth in a unified framework. This study aims to explore these inter-linkages.

There are a variety of mechanisms through which the extent of inequality in a society might affect the character of institutions that develop. Numerous studies have focused on the structures of political institution in a country which shape economic policies such as Olson (1993), Acemoglu (2003), (2005). These studies argue that if the political structure is concentrated in the hands of few elites, they will shape policies and institutions to their own advantage. This small segment of the population, which influences the structure of institutions, will always force the government to

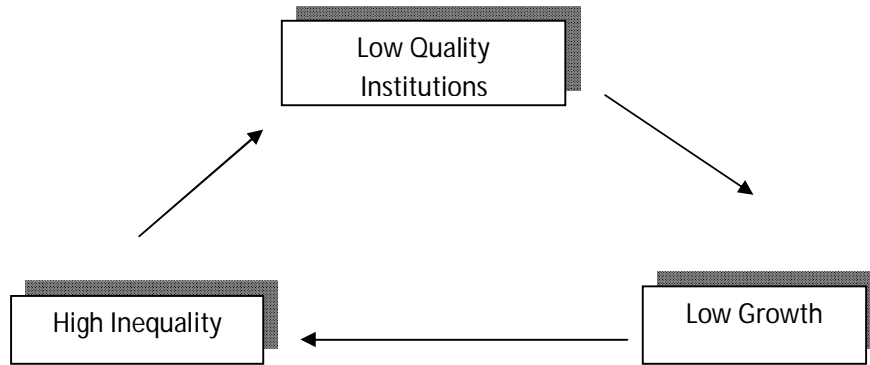
make investments and provide services which favor them the most or which treat them in a preferential manner. This sort of activity is present in all such societies where the political structure is unequal and those with more resources have the power to influence the government. It is the skewedness of the distribution of wealth that leads to political inequality which ultimately leads to institutions that favor a small segment of the society. Sonin (2003) presents a model which describes how income inequality leads to the subversion of institutional quality.

From the historical perspective low quality institutions can be linked to inequality by looking into the initial factor endowments and persistence of inequality in a number of countries that remained under colonialism. In some colonies initial factor endowments had given undue political power to the few elites who have established extractive institutions favoring their interests at the cost of the rest of society [Engerman and Sokoloff (2000)]. Thus income or political inequality is one major factor in determining the persistence of low quality institutions in developing countries which have shown an uneven path of development.

Ann-Sofie Isaksson (2007) argues that the relationship between institutions and economic growth is insignificant unless the country specific characteristics are taken into consideration. A socially cohesive society with low income inequality provides a conducive environment for the government to make policies and implement reforms which would benefit every segment of the society, on the other hand a highly polarized society with high income inequality is a hindrance in the way of adopting good policies resulting into underdevelopment. Mark Gradstein (2008) links the persistence of underdevelopment in a country to low-quality institutions, concentration of political and economic wealth. Thus he concludes that with concentration of

political and economic power in the hands of few results into low quality institutions and hence slows growth.

Figure 1: The inter-linkage between inequality, institutions and Growth:



As depicted in the figure 1, high inequality with wealth and political power concentrated in the hands of few elites leads to low quality institutions as these institutions benefit few class of elites who have access to the policy making process. This class is least interested in bringing a substantial change in the society through land reforms and provision of strong public education as a more educated population not only demands dynamic and transparent institutions but it also helps to build them. Without creating favorable economic conditions, through a reduction in income inequality, institutions are difficult to influence the growth process positively. This calls for strong role of the state to ensure that economic growth is directed towards promoting inclusiveness where access to opportunities is provided broadly to each segment of the society.

1.1. Objectives

The overall objective of this study is to find out the factors which adversely affect the positive influence of institutions on economic growth in low and lower-middle income countries. It focuses on income inequality and its role in affecting the

institutional quality adversely which ultimately affect the growth process. We shall assess the role of institutions for economic development given the constraints to the effectiveness of institutions in developing countries, especially in low and lower-middle income countries.

Specifically, the objectives are;

1. To investigate the relationship between institutions and economic growth. i.e. to test if institutions are associated with economic growth positively.
2. To analyze empirically the effect of income inequality on economic growth.
3. To analyze the effect of interaction between income inequality and institutional quality on economic growth.

1.2. Scheme of the Study

This study is organized into six chapters. After the introduction, chapter 2 reviews the literature on Inequality, institutions and their relationship with economic growth. Chapter 3 lays out the theoretical framework while the empirical methodology is explained in chapter 4. Chapter 5 reports the results which are followed by their interpretations. Chapter 6 concludes the study.

Chapter 2

2. Literature Review

The debate over the importance of institutions in the growth process has been the focus of attention for some decades now. A variety of literature examines the growth process across nations in relation to many concepts ranging from inequality, trade, geography to institutions. Some of these works are reviewed below:

2.1. Inequality and Growth

The relationship between inequality and growth has been repeatedly challenged making it difficult to capture the exact relationship between growth and inequality. While Kuznets' inverted U-curve hints that inequality will rise as the economy grows in the early stage of development and falls when GDP per capita surpasses a certain level. However, it is argued that high inequality may lead to reduced economic growth, suggesting a negative relationship between inequality and growth [Alesina and Rodrik, (1994), Persson and Tabellini, (1994), and Clarke, (1994)]. These studies suggest that redistributive policies hamper the growth process as such policies call for higher taxation which adversely affect investment. Explaining the negative relationship between growth and inequality Birdsall et al. (1995) and World bank (1993) point towards the fact that growth had been high in relatively egalitarian East Asia as compared to Africa and Latin America where growth was low due to high inequality. Perotti (1996) finds no evidence for the role of higher tax rates causing inequality but his study links this negative relationship between inequality and growth to the political instability and low human capital development prevailing in more unequal societies. The negative inequality- growth relation has been challenged by many researchers who found zero, or a positive relationship between inequality and

growth. [Forbes (2000), Barro (2000), Banerjee and Duflo (2003)]. These authors confirm the long held belief in economics about the positive association between inequality and growth. The underlying argument being that the rich with higher propensity to save will provide more capital for investment thereby positively influencing growth. However, given data constraints, especially regarding the data on inequality, these studies did not test the relationship for poor countries.

A large strand of literature is focused on the mechanisms which have guided the inequality and growth literature. Apart from the redistributive mechanism identified in the work of Alesina and Rodrik (1994) and Persson and Tabellini (1994), institutional mechanism is a strong determinant of the negative relationship between inequality and growth [Easterly (2002), Olson (1993), Acemoglu (2003), (2005) and Sokoloff and Engerman (2000)]. Easterly (2002) has examined the impact of inequality; on institutions, openness and schooling and he finds negative effect of inequality on all three. Olson (1993) and Acemoglu (2003) confirm the negative relationship between inequality and growth by identifying how inequality and political instability lowers the growth process. Sokoloff and Engerman (2000) emphasize the role of few powerful elites in delaying the implementation of growth enhancing policies and conclude the inequality adversely affects economic development.

The mechanism that adversely affects inequality and growth relation is human capital accumulation as discussed in the work of Galor-Zeira, (1993) and Perotti (1996). These authors demonstrate that with greater credit market imperfections a borrower ends up paying more interest making it difficult for the poor to borrow. The inequality in . Similarly, Easterly (2007) supports the hypothesis that inequality has an adverse effect on human capital formation and economic development. His cross

country analysis suggests that inequality has been a barrier to schooling and economic prosperity.

The literature on inequality is quite scarce not only because of non availability of data on inequality but also due to the poor quality of the available data. Initially Dennigner and Squire (1996, 1998) offered a dataset on inequality, which has mostly been used for studies on inequality. However, the Dennigner and Squire data have been criticized on various counts by Atkinson and Brandolini (1999). They argue that the inequality measured for different countries is based on variables; individual versus household income, income vs. expenditure and pretax vs. post-tax income. They argue that the adjustment required to make the data comparable across countries has not been carried out.

An alternative global inequality dataset as been constructed by University of Texas Inequality project (UTIP) based on Industrial Statistics data base published annually by United Nations Industrial development Organization (UNIDO). This data does not measure household income inequality rather it is a set of measures of the dispersion of pay across industrial categories in the manufacturing sector. This source has been used most often in the literature for the study of inequality over time and across countries. Yet another source for inequality data is Standardizing World Income Inequality Dataset (SWIID) which provides data for more than 153 countries starting from 1960. It interpolates the missing data from the World Income Inequality database (WIID). Recently, the updated version of 'Standardizing World Income Inequality Data Set', SWIID, version 3.1(Solt, 2011) has made it quite possible to study the issue of inequality for wide panel of countries.

2.2. Inequality and institution

While the importance of institutions for development has widely been accepted, a significant body of literature confirms that institutional quality varies across countries. Several studies examine the impact of economic conditions on institutional quality. In particular, studies like Hoff and Stiglitz (2004), Sonin (2003), and Chong and Gradstein (2004) suggest that an equal distribution of income is very important for establishing good institutions. Hoff and Stiglitz (2004) present a framework for institutional subversion; Sonin (2003) presents a dynamic model suggesting that low quality institutions are responsible for the adverse effect of inequality on growth as low-quality institutions are associated with wasteful redistribution towards the rich which affects the growth process negatively. Chong and Gradstein (2004) propose a mechanism which identifies that the intensity of rent seeking derived from a public asset—such as technological knowledge or a natural resource— is a source of low institutional quality. Using a panel vector Autoregressive approach and Granger causality test they find a bi-directional causal relationship between income inequality and institutions. Sonin (2003), using a theoretical model, shows that in the absence of democracy (political inequality and wealth inequality) the rich and the politically influential make the institutions work for their benefit through rent seeking activities. Such activities retard the development process due to waste of resources in rent seeking, resulting into lower growth and high inequality. `

Engerman and Sokolof (2002) [and also Sokoloff and Engerman (2000)] look at this relationship in historical perspective. They argue that initial (historical) factor endowments are the main determinants of inequality developed in colonial regimes. Given high inequality the colonial regimes were able to establish extractive institutions in Latin America whereas they failed to do so in North America, where

relative egalitarianism prevailed. The authors argue that high inequality in these colonies provided unbalanced economic opportunities which benefited the elite. In line with study of Engerman and Sokolof (2002), many social scientists and economists have successfully tested inequality's hypothesis. Easterly (2001) uses middle class share as a proxy for inequality and commodity endowments as an instrument for inequality, and so confirms a negative relationship between inequality-democracy. Erickson and Vollrath (2004) test the Engerman and Sokolof hypothesis using land inequality as a measure of inequality and they find no influence of land inequality on institutions. Quite contrary to the findings of Erickson and Vollrath (2004), Keefer and Knack (2002) test the impact of land and income inequality on property rights controlling for political regimes (democracies versus autocracies). They show that inequalities negatively affect institutions (property rights).

Some studies, such as Bardhan (2001), Hoff and Stiglitz (2001), and Busch and Muthoo (2010) link the persistence of inefficient institutions with bargaining power. Bardhan (2001), using a simple Nash bargaining model, demonstrates that a growth-enhancing institutional change may create winners and losers and argues that it is the losers who would resist the change. They further argue that the change being resisted is potentially Pareto improvement. Similarly, Busch and Muthoo (2010) study the issue in a two player's model in which the players have options to negotiate over an efficiency-enhancing institutional change. The model assumes that the players have perfect and complete information. They show that if this change is implemented then how the players' respective bargaining power would be altered, resulting into a change in the players' incentive to conduct the institutional change. Both the studies conclude that greater degree of inequality in the players' bargaining powers leads to the persistence of inefficient institutions. Similarly in one of his pioneering works

Acemoglu (2002) argues that the conflict over redistribution policies is a key factor determining the persistence of inefficient institutions

2.3. Institutions and Growth

The link between institutions and growth has been widely debated to explain the cross country variation in the development path. Since the first studies in development economics that used institutions as explanatory variables of growth in cross-country regressions (e.g., Barro, 1991), variety of large number of empirical studies have used variety of datasets that provide 'institutional variables' to be added to the usual explanatory variables in cross-sectional growth regressions. e.g. International Country Risk Guide (ICRG), Business Environment Risk Intelligence (BERI), the Polity database, the Freedom House index, etc. [Knack and Keefer, (1995), Mauro, (1995), Clague *et al.* (1997) and Hall and Jones, (1999)].

In a cross-country analysis, Knack and Keefer (1995) investigate the impact of property rights on economic growth using institutional indicators. These institutional indicators include quality of bureaucracy, property rights, and the political stability of a country compiled by country risk evaluators to potential foreign investors. They find a statistically significant positive relationship between institutions and economic growth. Similarly, Mauro (1995) and Easterly (1999) show corruption affects the growth process negatively as countries with a higher level of corruption tend to have persistently lower growth.

The two popular studies which have examined the role of institutions on economic growth are Hall and Jones (1999) and Acemoglu *et al* (2001). The former focuses on social infrastructure and the later emphasizes the risk of expropriation that current and potential investors face. Given the endogeneity between institutions and growth, both the studies use instrumental variables to examine the relationship between institutions

and growth. Hall and Jones (1999) examine the hypothesis that the difference in cross-country economic performance is based on variations in inputs (physical capital and human capital). Their results show that the large amount of variation in the level of the Solow residual across countries cannot be fully explained the differences in physical capital and educational attainment. They conclude that the differences in capital accumulation, productivity and therefore output per worker across countries are determined by differences in institutions and government policies, which they call social infrastructure. Acemoglu *et al.* (2001) argue those European colonizers established good institutions in countries where the disease environment allowed them to settle, while they established extractive institutions in countries where they couldn't settle themselves.

Rodrik *et al.* (2002) investigates the impact of institutions, geography and trade in affecting the variations in income levels around the world. Their results show that the quality of institutions succeed in explaining the variation – once institutions are controlled for, trade does not directly affect economic growth, while geography weakly affects it. Trade and other geographical indicators have negative relationship with growth. Rodrik *et al.* (2002) finds a bi-directional relationship between institutional quality and trade. This suggests that trade can indirectly affect the growth process by improving institutional quality. They also examine the impact of geography on economic growth and their results confirm the findings of Easterly and Levine (2002) that geography has a significant effect on institutions, this could be, e.g. through the disease environment.

The literature, discussed in this chapter, provides a one link phenomenon in which either inequality has been linked to growth or to institutions, or institutions have been linked to growth and vice versa. There are only a selected number of papers which

study the determinants of institutions and the influence of these institutions on growth. Olson (1993), Acemoglu (2003), and (2005) discuss the political determinants of development in which they argue that political inequality affects economic institutions which in turn affect the growth process. In historical perspective Sokoloff and Engerman (2000) links the development pattern of the New World's colonies to the initial level of inequality which, they argue, has resulted into the subversion of institutional quality in Africa and Latin America. The authors conclude that economic inequality in the age of colonization adversely affects suffrage, schooling, banking and other institutions and continues to affect growth to this very day. Social and cultural dynamics of a country also play an important role in establishing efficient and much effective institutions. In line with this argument Ann-Sofie Isaksson (2007) and Easterly *et. al* (2006) find that measures of social cohesion (or social division) such as income inequality and ethnic fractionalization endogenously determine institutional quality which in turn causally determines growth. Mark Gradstein (2008) emphasizes on the role of political and economic inequality over formal institutions in the growth process. However, Mark Gradstein does not empirically test this relationship argued. The present study seeks to fill this gap.

A tabulated summary of the literature discussed above is given in table 2.1.

Table 2.1**Summary of Literature Review**

S.No	Citation	Study Area	Findings	Conclusion
1.	Alesina and Rodrik, (1994), Persson and Tabellini, (1994), and Clarke, (1994)	The interrelationship between inequality and economic growth.	Negative relationship between inequality and growth.	Higher inequality calls for redistributive policies which hampers the growth process.
2.	Birdsall et al. (1995) and World bank (1993)	Inequality-Growth Nexus-A comparison of East Asia with Africa and Latin America	Negative relationship between inequality and growth.	Growth has been high in relatively egalitarian East Asia as compared to Africa and Latin America where growth was low due to high inequality
3.	Forbes (2000), Barro (2000), Banerjee and Duflo (2003)	Inequality-Growth Nexus-A study of developed economies.	Positive relationship between inequality and growth.	The rich with higher propensity to save will provide more capital for investment thereby positively influencing growth.
4.	Easterly (2002), Olson (1993), Acemoglu (2003), (2005) and Sokoloff and Engerman (2000)	Inequality-Growth Nexus- The Role of institutions and political stability in low income countries.	Negative relationship between inequality and growth.	Inequality and political instability lower the growth process.
5.	Galor-Zeira, (1993) and Perotti (1996)	Inequality-Growth Nexus :Human Capital Mechanism	Negative relationship between inequality and growth.	With greater credit market imperfections, access to credit market constrains the human capital formation affecting economic growth adversely.
6.	Hoff and Stiglitz (2004), Sonin (2003), and Chong and Gradstein (2004)	Interlinkage between Institutional Quality and Inequality	Negative relationship	Rent seeking activities of the rich retards the growth process.

7.	Engerman and Sokolof (2002), Sokoloff and Engerman (2000)	Inequality-Institutional quality Nexus: A comparison of North and Latin America.	Negative relationship between inequality and institutional quality.	With high inequality the colonial regimes were able to establish extractive institutions in Latin America whereas they failed to do so in North America.
8.	Easterly (2001)	Relationship between inequality and democracy.	Negative relationship	With class share as a proxy for inequality and commodity endowments as an instrument for inequality, confirmed a negative relationship between inequality-democracy.
9.	Bardhan (2001), Hoff and Stiglitz (2001), and Busch and Muthoo (2010)	Inequality and persistence of inefficient institutions	Higher inequality leads to more inefficient institutions.	These studies conclude that greater degree of inequality in the players' bargaining powers leads to the persistence of inefficient institutions.
10.	Knack and Keefer (1995), Mauro (1995) and Easterly (1999)	Institutions and Economic growth nexus.	Positive relationship	A statistically significant positive relationship between institutions and economic growth.
11.	Hall and Jones (1999) and Acemoglu et al (2001), Acemoglu <i>et al.</i> (2001), Rodrik <i>et al.</i> (2002)	Importance of institutions for Economic growth	Positive relationship	Primacy of institutions over other factors in determining the growth process across countries.
12.	Ann-Sofie Isaksson (2007), Easterly <i>et. al</i> (2006) and Mark Gradstein (2008)	Inequality (Social Division), Institutions and economic growth	Inequality and ethnic fractionalization influence the quality of institutions.	Country-specific characteristics are important in determining the positive role of institutional quality for growth.

Chapter 3

3. Theoretical model

In this section, we describe the theoretical framework linking institutional quality to inequality and growth. The basic framework of the model is owed to Mark Gradstein (2008)¹. The model demonstrates that under plausible conditions, good institutional quality has a long lasting effect on the development process as it helps in preventing the diversion of resources away from productive activities and thus increases the rate of growth. In particular, economic factors as well as concentration of political power play an important role in determining the institutional quality which in turn have developmental consequences. Inequality may, therefore, adversely affect the growth process by affecting the overall institutional structure in an economy.

To illustrate, consider an economy populated by a household indexed by i , each consisting of a parent and a child, operating in discrete time t . its basic features are as follows:

- The household i 's initial income is exogenously given as y_{i0} ,
- In period t , the income level y_{it} , is endogenously determined.
- The initial income distribution F_0 is given.
- The income distributions in subsequent periods, F_t , are endogenously determined.
- In each period, the household allocates its income between consumption, productive investment, and rent seeking. Here rent seeking is an unproductive investment which affects the distributional incidence of the publicly provided good.

¹ For detailed description refer to " Institutional Trap and Underdevelopment " by Mark Gradstein 2008

Specifically, the individuals allocate resources between consumption, c_{it} , productive investment, k_{it+1} , and rent seeking, r_{it+1} ; normalizing all prices to one, the budget constraint then is:

$$y_{it} = c_{it} + k_{it+1} + r_{it+1} \quad (3.1)$$

Eq 1 shows that the individuals are credit constrained which implies that that richer individuals spend more resources on rent seeking than poorer ones.²

Now assume that tax is levied on investment, and the proceeds from the tax are used to produce publicly provided goods. The government's budget constraint is:

$$G_{t+1} = T_{t+1}K_{t+1} \quad (3.2)$$

Where T_{t+1} denote the tax rate, G_{t+1} the amount of the publicly provided good, and K_{t+1} the aggregate amount of investment,

This inclusion of publicly provided goods in growth models takes inspiration from Barro (1990). It emphasizes on the idea that productive publicly provided goods such as infrastructure and education are crucial for successful development (World Bank Development Report, 1997). Here it is assumed the rent seeking activities of individual households affect the incidence of the publicly provided goods as they spend more resources on rent seeking to distort the incidence of publically provided goods for their own benefits. Number of works support this assumption for example Reinikka and Svensson (2004) provide detailed evidence on the non-uniform incidence of public spending. Similarly, Olken, (2006), notes that the unequal incidence of publically provided goods is due to the differences in political influence across income groups.

The model asserts that the incidence of public spending, which an individual household can affect, depends not only on the extent of rent seeking and but also on

² This may also imply that after consumption, Poor have left less so cannot go for rent seeking

the level of institutional quality, represented by the parameter Q_{t+1} , which is endogenously determined. In particular, the accrued share of the publicly provided good to household i is given as:

$$g_{it+1} = \frac{r_{it+1}^{1-Q_{t+1}}}{\int r_{jt+1}^{1-Q_{t+1}} d_j} G_{t+1} \quad (3.3)$$

Where, $0 \leq Q_{t+1} \leq 1$

Here larger values of Q_{t+1} ³ represent that the allocation of benefits are more equitable as it decreases the marginal productivity of rent seeking, whereas smaller values allow for more rent seeking activities which makes the distribution of benefits unequal. The specification in (3.3) follows Sonin (2003) and Chong and Gradstein (2007).

The next-period income, y_{it+1} is generated using the after-tax portion of the investment along with the accrued benefits from the publicly provided goods. Specifically, the production function is given by:

$$y_{it+1} = A_{it+1} [(1 - T_{t+1}) k_{it+1}]^\beta g_{it+1}, \quad A > 0, 0 < \beta < 1 \quad (3.4)$$

where ε_{it+1} is interpreted as individual specific shock such as innate abilities. The model further assumes that each parent's preferences are derived from current private consumption and from the child's income. Assuming for simplicity symmetric logarithmic preferences, we write the expected utility:

$$u(c_{it}, y_{it+1}) = \ln(c_{it}) + \ln(y_{it+1}) \quad (3.5)$$

This assumption captures the “warm glow” motive for intergenerational transfers and has been often used in related literature⁴. This greatly simplifies the analysis by

³ Large values of Q_{t+1} refers to better institutional quality and vice versa

⁴ Warm glow theory is based on altruism motives i.e. parents need not to take into account children's action when making their own decision

disregarding the potential for the parents to manipulate the political environment in the next generation.

For the political inequality, the model assumes that the political process which guides collective choices is shaped by the households exerting influence on the outcome and is biased in favor of the rich. A reduction in the political bias is interpreted as democratization; which increases the political power of the poor.

3.1. Equilibrium Analysis:

It is assumed that in each period for a given level of tax rate and institutional quality, the individuals allocate their incomes among consumption, investment and rent seeking. Given the institutional constraints, consumption, investment and the individual rent seeking levels are determined. An individual household makes the allocation of resources so as to maximize the utility given in equation (3.5) with given constraints (3.1)–(3.4):

$$U(c_{it}, y_{it+1}) = \ln(c_{it}) + \ln(y_{it+1})$$

From equation (3.1),

$$y_{it} = c_{it} + k_{it+1} + r_{it+1}$$

$$c_{it} = y_{it} - k_{it+1} - r_{it+1}$$

Substituting the values of c_{it} and y_{it+1} in equation 3.5, we get

$$= \ln(y_{it} - k_{it+1} - r_{it+1}) + \ln \left[A_{eit} + 1 \left\{ (1 - T_{t+1}) k_{it+1} \right\}^\beta \right] \frac{r_{it+1}^{1-Q_{t+1}}}{\int_0^1 r_{jt+1}^{1-Q_{t+1}}} (T_{t+1} K_{t+1}) \quad (3.5a)$$

maximizing equation (3.5a) given the constraints we obtain:

$$\alpha = \ln(y_{it+1} - k_{it+1} - r_{it+1}) + \ln \left[A_{eit} + 1 \left\{ (1 - T_{t+1}) k_{it+1} \right\}^\beta \right] \frac{r_{it+1}^{1-Q_{t+1}}}{\int_0^1 r_{jt+1}^{1-Q_{t+1}}} (T_{t+1} K_{t+1}) + \lambda [c_{it} + k_{it+1} + r_{it+1} - y_{it}]$$

By taking the first-order conditions with respect to r_{it+1} is

$$-1/(y_{it} - k_{it+1} - r_{it+1}) + (1 - Q_{t+1})/r_{it+1} = 0 \quad (3.6)$$

Similarly, the first-order condition with respect to k_{it+1} is

$$-1/(y_{it} - k_{it+1} - r_{it+1}) + \beta/k_{it+1} = 0 \quad (3.7)$$

Combining (3.1), (3.6), and (3.7) and aggregating we obtain the following equilibrium values:

$$k_{it+1} = \beta y_{it}/(2 - Q_{t+1} + \beta), \quad r_{it+1} = (1 - Q_{t+1})y_{it}/(2 - Q_{t+1} + \beta) \quad (3.8)$$

$$c_{it} = y_{it}/(2 - Q_{t+1} + \beta), \quad K_{t+1} = \beta Y_t/(2 - Q_{t+1} + \beta),$$

Where Y_t denotes the average income in period t

Taking derivative of K_{t+1} ,

$$dK_{t+1}/dQ_{t+1} = \beta Y_t/(2 - Q_{t+1} + \beta)^2 > 0 \quad (3.8a)$$

Equation (3.8a) clearly shows the positive relation between investment and institutional quality i.e., better institutional quality enhances investment.

From the above equations, the next-period level of the publicly provided good, its incidence to each individual and next-period income are, respectively, given as follows:

$$G_{t+1} = T_{t+1}\beta Y_t/(2 - Q_{t+1} + \beta) \quad (3.9)$$

$$g_{it+1} = [T_{t+1}\beta Y_t/(2 - Q_{t+1} + \beta)]y^{1-Q_{t+1}} / \int_0^1 y_{it}^{1-Q_{t+1}} dj \quad (3.10)$$

$$y_{it+1} = A_{cit+1}(1 - T_{t+1})\beta [\beta y_{it}/(2 - Q_{t+1} + \beta)]^\beta \\ \times \{ [T_{t+1}\beta Y_t/(2 - Q_{t+1} + \beta)] y^{1-Q_{t+1}} / \int_0^1 y_{it}^{1-Q_{t+1}} dj \} \quad (3.11)$$

Equations 3.9-3.11 clearly show the effect of institutional quality (Q_{t+1}) on the variables on the left side of the three equations mentioned above. The level of the publicly provided goods increases with the level of institutional quality, Q_{t+1} . It explains that better institutional quality channels resources into productive investment diverting it from rent seeking activities. Thus it limits the comparative advantage of

the rich in rent seeking. Better institutional quality also implies a more egalitarian distribution of the incidence of the publicly provided goods.

From equation (3.11) the average level of next-period income, Y_{t+1} , is obtained as:

$$Y_{t+1} = A (\varphi^2/2) T (1-T)^\beta [\beta/ (2- Q_{t+1} +\beta)]^{1+\beta} Y_t \int_0^1 y_{jt}^{1+\beta-Q_{t+1}} dj \cdot \int_0^1 y_{jt}^{1-Q_{t+1}} dj$$

and the economy's growth rate is given by:

$$\begin{aligned} Y_{t+1}/Y_t &= A (\varphi^2/2) T (1-T)^\beta [\beta/ (2- Q_{t+1} +\beta)]^{1+\beta} \int_0^1 y_{jt}^{1+\beta-Q_{t+1}} dj \cdot \int_0^1 y_{jt}^{1-Q_{t+1}} dj \\ &= A (\varphi^2/2) T (1-T)^\beta [\beta/ (2- Q_{t+1} +\beta)]^{1+\beta} \times [(1 + \beta - Q_{t+1}) \mu_t \\ &\quad + (1 + \beta - Q_{t+1})^2 \sigma^2] / [(1 - Q_{t+1}) \mu_t + (1 - Q_{t+1})^2 \sigma^2 t] \end{aligned} \quad (3.12)$$

This last equation reveals that the average level of next year's income (Y_{t+1}) is influenced by the level of institutional quality and income inequality. It increases with improvement in institutional quality and decreases with current income inequality. This supports the literature on the relationship between institutional quality and the growth process and the allocation of publicly provided goods via political mechanisms. This equation shows that the exogenous allocation of the publicly provided goods across individuals does not adversely affect the growth rate and it is the rent seeking which skews the incidence of the benefits of publicly provided goods and thus affects the long run development process. As the rich elites attain greater political influence to block the adoptions of better quality institutions this ultimately hampers the growth process in an economy. This supports the literature which finds a direct causal effect of institutional quality on growth. Acemoglu et al. (2005) argue that there is conflict over the choice of economic institutions among different interest groups and it is resolved in favor of groups with more political power. In particular they show that, among others things, political institutions and distribution of resources

determine the distribution of power. Thus, they emphasize that political institutions determine economic institutions and policies which in turn affect the distribution of resources in a society.

The model thus provides an appropriate test-bed for investigating the effects of inequality on the institutional payoffs i.e. on the economic performance through its effects on the institutional quality.

Chapter 4

4. Empirical model

The behavioral relationship between income inequality, institutional quality and economic growth set in the previous chapter helps us to formulate the empirical version of the model given below:

$$Y_{it} = \beta_0 + \beta_1 Inst_{it} + \beta_2 Ineq_{it} + \beta_3 Inst_{it} \cdot Ineq_{it} + \beta_4 \mathbf{X}_{it} + u_{it} \quad (4.1)$$

Y_{it} is the annual per capita growth rate of GDP, $Inst_{it}$ is institutional quality, $Ineq_{it}$ is inequality, $Inst_{it} \times Ineq_{it}$ is the interaction term allowing the institutional parameter to vary along inequality, \mathbf{X}_{it} is a vector of control variables including inflation, trade openness, change in capital taken as investment and population growth, whereas u_{it} is the random error term.

In the above equation, the main focus is on β_4 which is the parameter for the interaction term of institutional quality and inequality. Interaction models are generally used to capture the effect of one variable over the other through mediating mechanism. Ann-Sofie Isaksson (2007) investigates the hypothesis in socially segmented countries the impact of institutional quality on economic performance is insignificant. To account for the role of social division on economic performance, the author employs a nonlinear model that captures the possibility of interaction between institutional quality and social division (Gini x social division). The study finds that high institutional quality increases economic growth and this relationship is adversely affected in countries with high social divisions. Similarly, Antonio Savoia and Joshy Easaw (2007) test the effects of economic institutions on inequality by taking into account the role of political equality, i.e. democracy, on the prevalence of economic institutions. They use the interaction of economic institutions and political equality to

gauge their influence on income inequality. They find that the impact of economic institutions on income inequality is influenced by the level of political equality.

4.1. Expected Relationship of Explanatory Variables with Economic Growth

Institutional quality is expected to affect economic growth positively as it is considered to be a driving force behind growth. Numerous studies have confirmed this relationship as shown in the work of Acemoglu *et al.* (2004), Hall and Jones (1999), Knack and Keefer (1995), and Rodrik *et al.* (2004). We expect this relationship to be positive. This is possible with better bureaucratic quality, long term stability of a government, a strong mechanism of democratic accountability, with low level of corruption better investment profile and a well enforced rule of law. Collectively these provide a suitable environment for growth and stability.

Literature suggests opposing hypothesis on the relationship between income inequality and economic growth. Alesina and Rodrik (1994), Persson and Tabellini(1994) and Clarke (1994) present a negative relationship. They base their argument on redistributive policies which they consider to affect the growth process negatively. On the other hand, Forbes (2000), Barro (2000), Banerjee and Duflo (2003) find a positive relationship between income inequality and economic growth implying that given the higher propensity to save of rich, the inequality in income contributes positively to growth. Given the controversy in literature on the exact nature of relationship between income inequality and economic growth, we expect the relationship to be ambiguous.

The interactive term (Gini x institutional quality) is expected to affect economic growth negatively. It is argued that high income inequality and ethnic fragmentation will worsen the impact of institutional quality on growth. [Ann-Sofie Isaksson (2007), Lauren Heller (2009)]. The authors assert that it is not appropriate to consider the

effects of income inequality and institutional quality on growth in isolation as it may not present a clear picture for policy makers to bring any policy reform. It is therefore, necessary to look into the joint impact of both – income inequality and institutional quality – on economic growth. Based on these studies we expect the coefficient of the interactive term to be negative.

Among the controls, inflation is expected to cast a negative or positive relation with economic growth. There are opposing predictions from two schools of thoughts on the relationship between inflation and economic growth. One group of researchers argues that there is positive relationship between inflation and growth. They base their argument on the Phillips curve [see e.g. Mallik and Chowdhury (2001), Gerlach and Smets (1999) and Paul *et al.* (1997)]. While the other group base their argument on the Real Business Cycle (RBC) theories and assert that inflation negatively affects growth. Kydland and Prescott (1990) emphasize that supply shocks, rather than demand shocks, are responsible for the inverse relationship. They argue that inflation after a certain threshold level is harmful for growth. As in developing countries inflation is typically high and above the threshold level therefore, we expect it to negatively affect growth.

Investment is expected to have a positive relationship with economic growth as argued by Levine and Renelt (1992) and Mauro (1995). Trade openness also influences growth positively. Numerous studies find a positive relationship of trade openness with economic growth [Anderson and Neary (1992), Leamer (1988), Dollar (1992), and Sachs and Warner (1995)]. We also expect trade openness to have a positive influence on growth. Similarly, population growth is also expected to be positively related to growth: as argued that greater the total population, more the labor

force and greater the level of technological growth yielding greater per capita income [Simon (1977)].

4.2. Data Description and Sources

We use panel data for nine low and lower-middle income countries⁵. The sample of countries include: Bangladesh, El-Salvador, Egypt, Honduras, India, Indonesia, Pakistan, Philippine, and Sri Lanka. The selection of nine countries within the low and lower middle income countries is based on the availability of time series data (1984-2010) on income inequality institutional quality. All the data is from World Development Indicators (WDI). The components of institutional index are from International Country Risk Guide (ICRG) published by the PRS Group. The detailed description of variables with data sources is given in table 4.1.

Table 4.1
Description of Variables

S. No.	Variable	Description / Source
1.	<i>Economic Growth (Y)</i>	GDP per capita growth (% annual). / WDI
2.	<i>Income Inequality (Gini)</i>	Gini Coefficients. / SWIID Version 3.1
3.	<i>Institutional Quality Index(Q)</i>	ICRG Components/PCA Index
4.	<i>Investment (Inv)</i>	Gross fixed capital formation as percentage of GDP. /WDI
5.	<i>Population Growth (PG)</i>	Population Growth(% Annual)./WDI
6.	<i>Inflation (Inf)</i>	Consumer Prices (Annual %)./WDI
7.	<i>Trade Openness (TO)</i>	Sum of Imports and Exports as a ratio of GDP. / WDI
8.	<i>Investment (Inv)</i>	Gross fixed capital formation as percentage of GNI. /WDI

⁵The classification of low and lower middle income countries is based on WDI data set

4.2.1. Institutional Quality

To capture the impact of institutional quality various measures are used based on the dataset developed by International country Risk Guides (ICRG). These measures have been extensively used in the literature to capture the institutional impact on different variables. [Hall and Jones (1999), Acemoglu et al. (2001), Rodrik (2002) and Keefer and Knack (2002)]. Following Keefer and Knack (2002)⁶ we use the six out of the twelve indicators developed by ICRG. It includes: Government stability, Democratic Accountability, Law and order, Quality of the Bureaucracy, Investment profile and Corruption⁷. These are discussed briefly below:

4.2.1.1. Government Stability (Maximum score: 12 points)

It refers to an assessment of the government's ability to execute its declared programs as well as its ability to stay in office.

4.2.1.2. Democratic Accountability (Maximum score: 6 points)

It is an assessment of how well the government responds to its people

4.2.1.3. Law and Order (Maximum Score: 6points).

It measures two components. The Law subcomponents measures 'the strength and impartiality of the legal system' while, the Order subcomponent is the assessment of 'popular observance of law'.

4.2.1.4. Quality of Bureaucracy (Maximum score: 4 points)

It is an assessment of 'the strength and expertise to govern without drastic changes in policy or interruption in government services'. Higher score of bureaucratic quality refers to the autonomous nature of bureaucracy from political pressures.

⁶ Keefer and Knack (2002) uses 5 out of 12 indicators included in the ICRG dataset.

⁷ The explanation of institutional indicators is based on PRS group.

4.2.1.5. Investment Profile (Maximum score: 12 points)

It makes an assessment of factors that affect investment in the country. Sub categories are: Contract Viability/Expropriation, Profits Repatriation and Payment Delays which are given equal weightage.

4.2.1.6. Corruption (Maximum score: 6 points)

It is an assessment of the level of corruption in a political system. It refers to the 'misuse of public power for personal use'.

The above mentioned six indicators selected to proxy institutional quality have a strong bearing on income inequality and economic growth. Government stability refers to the completion of government tenure which ensures the completion of development projects. It contributes to the alleviation of income inequality as policy makers are able to implement reforms targeting the marginalized section of the society. On the other hand an unstable government causes uncertainty in the future course of economic policies. This causes an uncertain environment for investment which directly affects the mass as it hinders further job creations in the economy. Thus the relationship between income inequality and government stability is negative. Similarly, democratic accountability affects economic growth positively as a strong accountability system does not let the rich to amend the policies in their own interest. Absence of an accountability setup allows the powerful to use power for their interest which further increases the gap between rich and poor. Investment profile refers to the underlying conditions conducive for investment. It has strong bearing in explaining the effects of institutions on growth. Better investment profile boosts investment which provides an enabling environment for each segment of the society to participate

in economic activity. This helps in reducing the gap and enhances economic growth. Bureaucratic quality and better law and order also affect the growth in the manner as discussed above. Better quality of both have a strong positive impact not only on economic growth but also on the level of inequality as these ensure a conducive environment for everyone to participate – the inclusiveness facilitates consensus on policy reforms. Corruption is one of the most widely used components of institutional quality which could adversely affect the economic activity in any country. It affects economic growth as the rich, or the interest groups will appropriate more resources for themselves which comes at the cost of the whole society. Given opportunities for corruption, more resources are diverted from productive investment towards unproductive activities which retards the growth process. With increased inequality, the rich will have greater resources to buy influence, both legally and illegally (Glaeser, Scheinkman, and Shleifer 2003). This greater income inequality is associated with higher level of corruption and vice versa.

4.2.2. Institutional Index : Construction

As all the components discussed above are likely to be strongly correlated with each other therefore to avoid estimation problems we have constructed an index of institutional quality. Given the merits and demerits of all the components of institutions, we feel that an index generated using the six components will better reflect the role of institutions in economic growth. The institutional quality index has been generated using the Principal Component Analysis⁸. This is the most commonly used technique for aggregating social indicators. With this procedure a set of correlated variables are transformed into a set of uncorrelated variables (called

⁸ Principal component analysis is based on the frame work used by Bishoi et al (2009)

principal Components) ordered by reduced variability. The uncorrelated variables are a linear combination of the original variables. It computes a compact and optimal description of the data set.

Table 4.2 displays the results obtained from the principal component analysis. The Eigen values indicate that the first and second principal component (PC1 and PC2) explain 65% of the variance cumulatively. Therefore the first two components explain variation in institutional quality better than the other variables.

Table 4.2
Eigen Values of Correlation Matrix

	PC1	PC2	PC3	PC4	PC5	PC6
Eigen values	2.93	1.01	0.78	0.51	0.44	0.33
variance %	192.13	22.59	26.92	7.18	10.92	-
Cumulative %	48.81	65.6	78.62	87.15	94.49	100
Eigen vectors						
Variables	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
Bureaucratic quality	0.43	0.03	-0.43	0.65	-0.44	-0.12
Corruption	0.33	0.47	0.69	-0.01	-0.38	0.20
D. Accountability	0.35	0.63	-0.32	-0.04	0.59	0.18
Government Stability	0.43	-0.52	-0.03	-0.11	0.06	0.72
Investment profile	0.46	-0.05	-0.23	-0.71	-0.27	-0.40
Law and Order	0.43	-0.32	0.43	0.25	0.49	-0.48

The institutional quality index based on the first two components is formed as a linear combination of the initial values of the institutional quality measures with weights given by Eigen vectors.⁹ It can be written as:

$$X_j = \sum_{i=1}^n a_{ji} P_i, \quad (j = 1, 2 \dots n) \quad (4.1)$$

Where, X_j is the variable under consideration, P_i is the i^{th} principal component; a_{ji} is the factor loading of the j^{th} variable on the i^{th} principal component. The principal components are given by,

$$P_i = \sum_{j=0}^n \frac{a_{ji} X_j}{\lambda_i} \quad (4.2)$$

Where λ_i is the Eigen-value associated with p_i . After obtaining the principal components (PCs), Institutional Quality Index (Q) is computed using the expression given below:

$$Q = \frac{\sum_{i=1}^n (P_i E_i)}{\sum_{i=1}^n E_i} \quad (4.3)$$

Where, E_i are the Eigen-values with respect to the percentage of variance. We have retained components with Eigen value ≥ 1.0 and accounting for more than 60 % of variance i.e. the Eigen values of bureaucratic quality and corruption are both greater than 1 and both explain more than 60%.

⁹ Weights have been normalized.

4.2.3. Income Inequality

The use of income inequality as a measure of overall inequality in a society is an established practice in literature. Numerous papers have used this measure to assess the general level of inequality in the society. Mark Gradstein (2008) argues that as political inequality is endogenously determined by income inequality, so the use of income inequality to measure the overall level of inequality (both in political and economic sense) is appropriate. Therefore we use Gini index as a measure of inequality. Gini index measures the statistical dispersion within a range of 0–100, with 0 representing perfect equality and 100 indicating perfect inequality. Most of the studies on inequality have used the Gini dataset constructed by Deininger and Squire (1996). However, it is observed that this data suffers from many deficiencies due to sparse coverage, errors in measurements and use of different methodologies in a single data-set. Therefore it is difficult to use Deininger and Squire dataset not only across counties, but also over time. The data of Gini coefficient is from Standardizing World Income Inequality Dataset (SWIID). This dataset provides comparable Gini indices of gross and net income inequality from 1960 to 2011 for countries examined in this study.

4.2.4. Physical Capital

A number of different proxies have been used in literature to capture the effect of physical capital on economic growth which are close substitute of each other. Mosley(2000) and Pellegrini and Gerlagh (2004) use ratio of private investment to GDP and rate of investment in physical capital while Levine and Renel (1992) and Mauro (1995) use gross fixed capital formation (%GDP) as measures for physical

capital accumulation. We also use gross fixed capital formation¹⁰ as percentage of GDP to capture the effect of physical capital on growth.

4.2.5. Trade Openness

Another variable included as a control variable is trade openness. It is used to capture the effect of liberalization on growth. Trade openness is the sum of exports and imports of goods and services measured as a share of gross domestic product (GDP).

4.2.6. Inflation

The impact of Inflation, a control variable, is proxied by CPI annual index (% GDP).

4.2.7. Population Growth

Population growth (%GDP) is used to examine the impact of population growth on economic growth.

4.2.8. Economic Growth

We use GDP per capita growth to measure economic growth.

4.3. Econometric Methodology

To begin with, we use a panel of nine countries to estimate the impact of inequality and institutional quality on economic growth. The basic model has been estimated using fixed effects method as well as random effects method, the results are shown in table 5. Hausman test is applied to choose between both the methods. To tackle endogeneity, two stage least square has been employed as the possibility of endogeneity cannot be ruled out in kind of specifications that we are using. The main advantage of 2SLS is that it allows using all the independent variables as instruments

¹⁰Gross fixed capital formation takes into account of land improvements (drains, ditches, fences etc), the construction of railways, roads, hospitals, offices, schools, private residential dwellings, and commercial and industrial buildings; plant, machinery and equipment acquisitions as well as net acquisitions of valuables are also considered as capital formation (World Development Indicator 2008).

to correct the endogeneity. This study tests the model using both, fixed effects method as well as instrumental variable method, i.e. 2SLS.

4.3.1. The Fixed Effects Method

The fixed effect method accounts for the unobserved individual effects that may be correlated with the included variables. This formulation assumes that variation across groups can be captured in a unique constant term. Constant term for each cross section is treated as the unknown parameter to be estimated. It controls for all time-invariant differences across countries. Thus the estimated fixed-effects coefficients cannot be biased because of omitted time-invariant characteristic like culture, religion, gender, race, etc. In the fixed effects model the constant is treated as specific to each region.. This means that the model allows for different constants for each country. So the model can be written as:

$$Y_{it} = \beta_i + \beta_1 Inst_{it} + \beta_2 Ineq_{it} + \beta_3 Inst_{it} . Ineq_{it} + \beta_4 X_{it} + u_{it} \quad (4.1)$$

Here the constant term β_i accounts for unobserved country-specific effects.

4.3.2. Random Effects Model

An alternative method of estimation is the random effects model. Unlike the fixed effects model, it takes the constants for each country as random parameter as the variation across countries is assumed to be random and uncorrelated with the independent variables included in the model.

“...the crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not” [Green, 2008, p.183]

If the individual effects are strictly uncorrelated with the regressors, then it might be appropriate to model the individual specific constant terms as randomly distributed

across countries. Hence the variability of the constant for each country can be expressed as:

$$\beta_i = \beta + \mathcal{E}_i$$

Where ε_i is standard random variable with mean zero. The Random effect model therefore takes the following form:

$$Y_{it} = \beta + \beta_1 Inst_{it} + \beta_2 Ineq_{it} + \beta_3 Inst_{it} . Ineq_{it} + \beta_4 \mathbf{X}_{it} + (\mathcal{E}_i + u_{it}) \quad (4.2)$$

4.3.3. Random Effect Verses Fixed Effect Method

To choose the appropriate method between random effect and fixed effect methods, the Hausman test has been used. The null and alternative hypotheses of the test are:

H₀: Random effects are consistent and efficient.

H_a: Random effects are inconsistent.

The Hausman test statistics follows chi square distribution and we can estimate the test statistics using the following formula:

$$H = (\Omega_{FE} - \Omega_{RE})' [\text{Var}(\Omega_{FE}) - \text{Var}(\Omega_{RE})]^{-1} (\Omega_{FE} + \Omega_{RE}) \sim \chi^2$$

Here Ω is a vector of slope coefficients. If the difference between the parameters being estimated by random effect and fixed effect method is high then the value of Hausman test statistics will be highly significant. Large value of test statistic provides evidence against the null hypothesis while small value refers to the rejection of alternative hypothesis.

Chapter 5

5. Empirical Findings

Based on the empirical setup described in the previous chapter, this chapter explains the empirical results. It includes summary statistics, correlation matrix, covariance matrix, interpretations of results.

5.1. Summary Statistics

The summary statistics are shown in table 2 which includes mean, median, standard deviation and skewness for all the variables.

Table 5.1
Summary Statistics

	Mean	Median	Maximum	Minimum	Std.deviation
Economic Growth	2.81	2.86	17.15	-15.70	3.10
Institutional Quality	0.49	0.51	0.78	0.19	0.12
GINI	38.61	35.79	53.23	26.92	6.74
GINI x Inst.Quality	19.15	18.56	34.77	5.41	5.78
Inflation	9.58	8.35	58.39	0.52	7.04
Trade Openess	56.46	53.62	136.75	12.36	26.16
Investment	21.93	21.54	38.11	11.46	5.36
Population Growth	1.80	1.80	3.42	-1.61	0.68

The correlation matrix given in table 5.2 reports correlation between variables. Institutional quality, trade openness and investment are positively correlated with per capita income growth while Gini index, population growth and the interactive term (Gini x institutional quality) are correlated negatively. The correlations are in accord with the expectations outlined in section 4.

Table 5.2
Correlation Matrix

	Y	Q	GINI	GINI*Q	INF	TO	INV	PG
Economic Growth (Y)	1							
Institutional Quality (Q)	0.29	1						
GINI	-0.18	0.02	1					
GINI x Inst.Q	-0.12	0.83	0.55	1				
Inflation (INF)	-0.41	-0.34	0.05	-0.27	1			
Trade Openness (TO)	0.10	0.25	0.68	0.62	0.01	1		
Investment (INV)	0.30	0.38	0.05	0.33	0.12	0.31	1	
Population growth (PG)	-0.24	-0.42	-0.11	-0.42	0.08	-0.19	-0.05	1

the covariance matrix shown below in table 5.3 exhibits relationship similar to observed in the correlation matrix among variables. Gin index, population growth and the product of Gini and institutional quality covariate negatively with per capita income while all others covariate positively.

Table 5.3
Covariance Matrix

	Y	Q	GINI	GINIxQ	INF	TO	INV	PG
EconomicGrowth (Y)	9.591							
Institutional Quality (Q)	0.110	0.015						
GINI	-3.870	0.016	45.303					
GINI x Inst.Quality	-2.234	0.586	21.356	33.237				
Inflation (INF)	-9.091	-0.294	2.515	-11.147	49.433			
Trade Openness (TO)	8.058	0.823	121.008	92.792	17.752	681.432		
Investment (INV)	5.067	0.253	1.709	10.201	4.657	42.953	28.667	
Population Growth (PG)	-0.512	-0.035	-0.501	-1.635	0.378	-3.368	-0.188	0.463

5.2. Hausman Test

As specified in the previous chapter, the basic model has been estimated using both, fixed effects method as well as random effects method. To estimate which one of the two methods is efficient or more appropriate, Hausman test has been applied. This test compares two different sets of estimates in such a manner where one set of estimates is consistent under the null hypothesis as well as under the alternative hypothesis, while the other one is consistent only under null hypothesis. If the distance between both the estimates is large, the null hypothesis will be rejected and the decision will go in favor of the alternative hypothesis, i.e. random effects are inconsistent. The results of Hausman test are reported in the three panels of table 5.4.

Table 5.4
Hausman Test

Correlated Random Effects - Hausman Test				
Test cross-section random effects				
Test Summary (Panel 1)	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	24.8906	6.0000	0.0004	
(Panel 2) Cross-section Random Effects Test Comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
Institutional Quality	-4.63	3.88	32.19	0.03
GINI x Inst.Quality	0.06	-0.15	0.02	0.18
Inflation	-0.18	-0.16	0.00	0.01
Trade Openness	-0.01	-0.01	0.00	0.01
Investment	0.20	0.15	0.01	0.11
Population Growth	0.07	-1.29	0.15	0.03
Panel (3) Cross-section Random Effects Test Equation:				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.90	1.14	0.79	0.42
Institutional Quality	-4.69	6.41	-0.72	0.47
GINI x Inst.Quality	0.06	0.14	0.42	0.67
Inflation	-0.18	0.02	-6.84	0.00
Trade Openness	-0.001	0.01	-0.13	0.89
Investment	0.20	0.05	4.06	0.00
Population Growth	0.38	0.16	0.02	0.002
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.45	F-statistic	12.77	
Adjusted R-squared	0.41	Prob(F-statistic)	0.00	

The first panel describes the test statistics, and overall the summary of the results. The results show that the null hypothesis, i.e random effects are consistent and efficient, is rejected, thus favoring the fixed effects model.

The second panel provides additional information about the test, where two sets of estimates each of fixed effects and random effects, are shown. The variance of difference between the two sets is also shown along with their probabilities for the null hypothesis i.e. no difference between the two sets of estimates. The results indicate that except for few variables all the other variables have probabilities less than 0.05 which rejects the null hypothesis. We conclude that the results of fixed effects are consistent and efficient under fixed effects. The third panel estimates the model using fixed effects method.

5.2. Results

The estimation results are presented and discussed below.

5.2.1. Fixed Effect Estimation

Based on the results of Hausman test which favors fixed effects method, the model has been estimated using this method and to tackle the problem of endogeneity two stage least square (2SLS) has been applied. Per capita income growth the dependent variable: institutional quality, Gini index and the interactive term of both (Gini x institutional quality) are main interest variables while inflation, investment, trade openness and population growth are control variables. The Results are described in table 5.5.

Table 5.5
Empirical Findings

Variables	Fixed Effects	2SLS	Random Effect
Institutional Quality	14.58 (8.86)***	29.17 (11.44)**	17.71 (7.67)**
GINI	0.38 (0.11)*	0.53 (0.14)*	0.16 (0.08)***
Inflation	0.22 (0.02)*	-0.26 (0.03)*	-0.22 (0.02)*
Trade Openness	0.23 0.02	0.53 -0.02	-0.002 (0.009)
Investment	0.23 (0.04)*	0.15 (0.07)**	0.24 (0.03)*
Population Growth	0.07 0.45	0.28 (0.75)*	-1.28 (0.2)
GINI x Inst.Quality	-0.49 (0.22)**	-0.87 (0.28)*	-0.56 (0.19)*
C	-14.06 (4.76)*	-18.48 (6.26)*	-2.42 (3.42)
R-square	0.48	0.46	0.417
Adjusted R-squared	0.45	0.41	0.39
F-statistics	14.44	-	-23.96
Prob(F-statistic)	0.00	-	0.00
J-statistic	-	9.89	-
Prob(J-statistic)	-	0.13	-

Note: All the values in the parenthesis denote standard errors. The ***, **and * indicate the significance at 10%, 5% and 1% respectively.

The R-square value is 0.48 which is fit. Though the value of R-Square is low, but the probability of F-statistics is Zero which ensures the effectiveness of the model.

One of the variables of our interest is institutional quality, which positively influences growth. It is highly significant and conforms to literature. This finding confirms that institutions influences economic growth. The second variable of our interest is income inequality measured by Gini index. The results indicated in the fixed effects model show that the coefficient of this variable is positive and highly significant at 1%. The coefficient suggests that a 1% increase in Gini Index leads to 0.38% increase in economic growth. The result is consistent with the findings of Forbes (2000), Barro, (2000) and Banerjee and Duflo (2003). The underlying argument is that the rich with higher propensity to save provide more capital for investment thereby positively influencing growth.

The third variable which is the main focus of this study is the interactive term of income inequality and institutional quality. This is included to capture the effects of institutions on economic growth given high inequality in a society. The Results show that the interactive term affects economic growth negatively. A 1% increases in the coefficient of the interactive term (Gini x institutional quality) retards the growth process by 0.49%. This indicates that it adversely affects economic growth and is highly significant at 1%.

Inflation, investment, trade openness and population growth are the control variables. Investment/GDP is highly significant at 5% level of significance and is positively related to growth; while inflation (CPI), significant at 1%, is negatively associated with lower GDP. Trade openness and population growth to influence the growth process positively as both enhance the growth by 0.07%. All the results are as expected.

5.2.2. 2SLS Estimation

In 2SLS estimation, the validity of the obtained results depends on the value of J-statistics which tests the null hypothesis of correct model specifications and over identification restriction i.e. the validity of the instruments. The results reported in table 5.6 show that the null hypothesis is not rejected at any conventional level of significance ($p = 0.129$). This confirms the validity of the model and of the instruments. The results from the 2SLS are quite in line with results from the fixed effects model.

5.2.3. Discussion

Our results clearly show that institutions influence economic growth. These results are as expected and in conformity with the literature. . [Acemoglu et al. (2004), Hall and Jones (1999), Knack and Keefer (1995), and Rodrik et al. (2004)]. Our results suggest that the relationship between income inequality and economic growth is positive this finds support in the work of Forbes (2000), Barro (2000), Banerjee and Duflo (2003). The underlying argument being that the rich with higher propensity to save will provide more capital for investment thereby positively influencing growth. The observed positive impact of income inequality on growth may not be relevant for policy purpose unless it is considered along with its adverse impact on institutional quality. To account for the composite impact of income inequality and institutional quality on growth, we introduced an interactive term which captures the effects of both- inequality and institutional quality together. The results here show that the interactive term negatively influences growth. It is more or less universally accepted that institutions influence growth positively our results also confirm this. The composite impact of income inequality and institutional quality casts a negative impact on growth. This implies that for institutions to play a positive role in economic

growth a certain minimum level of egalitarianism in a society is essential, i.e. the level of inequality is difficult to alleviate unless the institutional quality is improved.

5.3. Sensitivity Analysis and Robustness Check

We have conducted a whole range of robustness checks to investigate the sensitivity our results by including different control variables in our basic model. For this purpose six different regressions have been estimated using both fixed effects and 2SLS. The results are described in table 5.6.

Table 5.6
Robustness Check and Sensitivity Analysis

Variables	Fixed Effects			2SLS		
	1	2	3	4	5	6
Institutional Quality	6.51 (1.62)*	-4.31 (2.24)***	14.58 (8.86)***	26.25 (13.97)**	5.95 -2.62	29.17 (11.44)**
Gini	-	0.19 (0.07)*	0.39 (0.11)*	-	0.26 (0.09)*	0.53 (0.14)*
Inflation	-	-0.22 (0.025)*	-0.23 (0.03)*	-	-0.2 (0.03)*	-0.26 (0.03)*
Trade Openess	-	0.01 (0.02)	0.02 -0.02	-	0.01 (0.02)	0.53 (0.02)
Investment	-	0.24 (0.05)*	0.24 (0.05)*	-	0.27 (0.06)**	0.15 (0.07)**
Population Growth	-	0.02 (0.46)	0.06 -0.46	-	-0.07 (0.54)	0.28 (0.75)*
Gini x Inst. Quality	-	-	-0.49 (0.22)**	-	-	-0.87 (0.28)*
C	-0.41 (0.82)*	-6.25 (3.20)	-14.06 (4.76)*	-19.54 -6.57	-7.84 (3.79)*	-18.48 (6.26)*
R-squared	0.25	0.48	0.49	0.16	0.38	0.47
Ad. R-squared	0.22	0.44	0.45	0.11	0.33	0.41
F-statistic	8.8	14.87	14.44	-	-	-
Prob(F-statistic)	0.00	0.00	0.00			
J-statistic	-	-	-	3.85	6.93	9.89
Prob(J-statistic)	-	-	-	0.28	0.22	0.12

Note: All the values in the parenthesis denote standard errors. The ***, **and * indicate the significance at 10%, 5% and 1% respectively.

Chapter 6

6.1. Summary and Conclusion

The relationship between institutions and economic growth has attracted significant attention among applied economists in recent years. Majority of the studies have concluded that institutional quality positively influences the economic performance of a country. However, the impact of institutions on economic growth varies across regions and countries. This calls for looking into the reasons for variation. Ann-Sofie Isaksson (2007) finds that the association between institutions and economic growth is weak in African countries as compared to the rest of the world. The author links it to social fragmentation and argues that higher income inequality and ethnic fragmentation are the prime factors responsible for this weak association between institutions and economic performance. Easterly *et. al* (2006) also considers income inequality and a more fragmented societies as detrimental for the strong impact of institutions on economic growth. However few researchers have looked into the factors responsible for the weak impact of these institutions on growth in developing countries. To examine the impact of institutions, we constructed an index of institutional quality using 6 out of 12 institutional categories included in the ICRG dataset. These categories included: Government stability, Democratic Accountability, Law and order, Quality of the Bureaucracy, Investment profile and Corruption. To examine the impact of inequality, we used the data on Gini coefficient from Standardizing World Income Inequality Dataset (SWIID). Besides examining the independent impact of institutional quality and inequality on growth we also examined the composite impact of the interaction of institutional quality and inequality on growth using the interactive term: (institutional quality x inequality).

Our findings confirm the importance of institutions for economic growth as in all the specifications the coefficient of institutional quality is positive with high level of significance. For inequality the coefficient of Gini index is also positive implying a positive relationship with growth which supports the positive inequality hypothesis. We argued that it is not appropriate to consider the effect of either institutions or inequality in isolation because both are likely to affect each other. For example, given high inequality, otherwise brilliant individuals may not make it to the labor market due to market frictions which would signify poor institutional quality; therefore we investigated the composite effect of institutional quality and inequality on growth. The results suggest that the impact of the interactive term on economic growth is negative.

The policy implication is that to alleviate inequality on a long term basis the state should focus on improving institutions. This is important because a more egalitarian society tends to provide a suitable environment for policy makers to implement reforms thereby promoting growth.

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