Genesis of Inequality Counts More than Inequality *per se.*

Daniel T. Haile [*†]

Abstract

This paper presents a theoretical model and uses both single period cross-section as well as panel data for the period 1980-1999 to identify the effect of genesis of inequality on economies' growth rates. It attempts to "deconstruct" the concept of inequality and analyzes the idea that what often matters is not the degree of inequality *per se* but rather the way in which it is actually perceived by members of society (e.g. whether it is perceived as being fairly or unfairly generated). I find that the negative effect of inequality, if any, operates only in highly corrupt countries suggesting that it only matters when its generation is perceived as unfair by members of a society. I conclude that while inequality alone may not directly affect an economy's aggregate growth potential, other things being equal, the way it is generated and how members of society react to it, might have a fundamental effect on growth rates.

Keywords: Inequality, Corruption, Instituions and Economic Growth.

1 Introduction

In recent years there has been a rapidly growing body of theoretical and empirical literature that explores how distribution of income affects the growth rate of an economy. Nevertheless, neither theoretical literatures nor empirical findings establish unambiguous results. On the one hand, the neoclassical paradigm provides a theoretical explanation of why inequality is good for growth. According to this conventional wisdom, inequality is fundamentally good for incentives because the

[*]Department of Economics, Acadia University, Canada, Email: daniel.haile@acadiau.ca

[†]I am gratefull for helpful comments from conference and seminar audiences at the APET international meeting in Nashville, CESifo Institute in Munich, Acadia University.

marginal propensity of the rich to save is greater than that of the poor and therefore should be viewed as growth enhancing. Besides, it is argued that the implementation of new fundamental innovations and, in particular, the creation of industries involve large sunk costs. In the absence of broad and well functioning financial markets, wealth needs to be sufficiently concentrated in order for an individual or a family to be able to cover such large sunk costs and thereby initiate new industrial activity. On the other hand, a high degree of inequality can affect economic growth negatively by lowering social cohesion which reduces trust amongst the population (Knack & Zak, 2001), raises social conflict (Alesina & Perotti, 1996; Benhabib & Rustichini, 1996), increases redistributive measures which crowd out private investment (Alesina & Rodrik, 1994; Bertola, 1993; Persson & Tabellini, 1994) and prevents the poor from investing in education and profitable projects (Galor & Zeira, 1992; Aghion & Bolton, 1997; Saint Paul & Verdier, 1993).[1]

I propose modelling economic reality as an interaction of individual agents where the degree of inequality has a neutral effect on growth. Observe that the different views on the theoretical results on growth and income inequality that are discussed above can, to a certain degree be traced back to a different view on the relevance of physical capital as opposed to human capital in driving economic growth. When the financial markets are binding and economic growth is crucially driven by physical capital accumulation i.e. investment demands huge capital stock, inequality fosters growth as high-income people are assumed to save disproportionately more. In contrast, inequality is bad for growth when driven by human capital accumulation and financial capital constraints are binding. This is essentially caused by the fact that there are diminishing returns to investing in human capital accumulation of every selective group of rich people and moreover the poor are unable to invest in education.

Suppose now that the economy demands the financial participation of all individuals and labor is homogeneous, but individuals are different with respect to their initial capital holdings. Aggregate output is a function of aggregate capital and individuals' efforts into the production process. The latter depends on the benefit of effort, which is proportional to individuals' capital endowment and on the cost of effort, which is proportional to the total capital accumulated in the economy. There is inequality in the model, because the individual earnings from total output are proportional to individual endowments, i.e. they are greater for the rich than for the poor. Then it is straight forward to expect inequality to be neutral to economic growth. In other words, a mean preserving redistribution has a neutral impact on the provision of aggregate labour supply. If individuals condition their effort choices on the perception of wealth generation, then for a given level of inequality,

[1] For an excellent survey of this literature see Aghion et al. (1999).

differences in effort provision could result. In particular, if society perceives that resource creation is unfair the supply of effort levels will be lower in equilibrium than otherwise.[2]

Similarly, nowadays the results on the empirical relationship between inequality and growth are inconclusive. The failure to provide consistent empirical results to the question as to how inequality affects growth is attributed to several factors viz. the sensitivity of the results to the time coverage under study, model specification, measurement error and heterogeneity in comparability of data.[3]

For example, as one can see from Table 2 (see Appendix), it seems that regressing 20 or more, 10 and 5 years averages of growth rates on inequality indicators yields negative, neutral and positive effects on economies' growth rates respectively. Another "excuse" given in the literature is the difficulty controlling country-specific effects and incomparability of data (Atkinson & Brandolini, 2001). In order to overcome this problem, recent research has focused on country-specific studies to have less bias via gaining a consistent and comparable nature of data. These exercises, however, do not result in having a consistent relationship - whether negative or positive - between levels of inequality and subsequent rates of growth (See Appendix-Table 2).[4] This means there is no strong law or at least no straightforward relationship between inequality and growth.

Without contesting the possible explanations given for the observed inconclusive empirical results, the tolerance displayed by different societies to the same measured amount of inequality could also be different, depending for example, on its source. In other words, inequality may mean different things to different people since its creation relies on several factors.

For example, when inequality reflects the outcome of the market process, it is probably perceived as fair by citizens as people feel that they "deserve" it. For those who interpret inequality as a sign of opportunity or reward of productivity, it is difficult to accept that there are negative effects. The European Value Surveys in 36 countries asked respondents, "Would you say that it is fair if quicker secretaries are paid higher than otherwise?" The mean response across all countries was that 83% of respondents thought it is fair, although different countries differ somewhat in how they judge fairness in this case.

If, however, inequality has emerged due to actions that are perceived as unfair,

[2] In unfair societies, if any group is unhappy with the distribution, it can use its leverage in the production process to impact the distribution which can take the form of slow-downs,strikes, damaging infrastructure etc.

[3] Barro(2000) also noted that it is difficult to find concrete relations on the effect of inequality on growth rates as theoretical predictions are washing-out each other.

[4] Even though in recent years, new and more reliable databases (Deininger and Squire 1996 and LIS 1998) have been collected and eventually used in empirical studies.

it is likely that people will feel others are getting something they don't deserve. For those who see inequality as a reflection of persistent disadvantage for a particular section of society, it is hard to see positive elements. Therefore the concept of "perceived inequality" I adopt is similar to Alesina & Angeletos (2005), based upon the distinction between two types of inequality: "justifiable" inequality induced by variation in talent and effort, and "unjustifiable" inequality induced by variation in corruption and rent seeking.

Given the fundamental differences of geneses of inequality, could it be the case that while income inequality may not directly affect an economy's aggregate growth potential, other things being equal, the way it is generated and how members of a society react to it, might have a fundamental effect on growth rates? An important issue that I address here is whether the same level of inequality could have different implications for economic performance in countries in which differences in the rule of law, expropriations, etc. prevail.

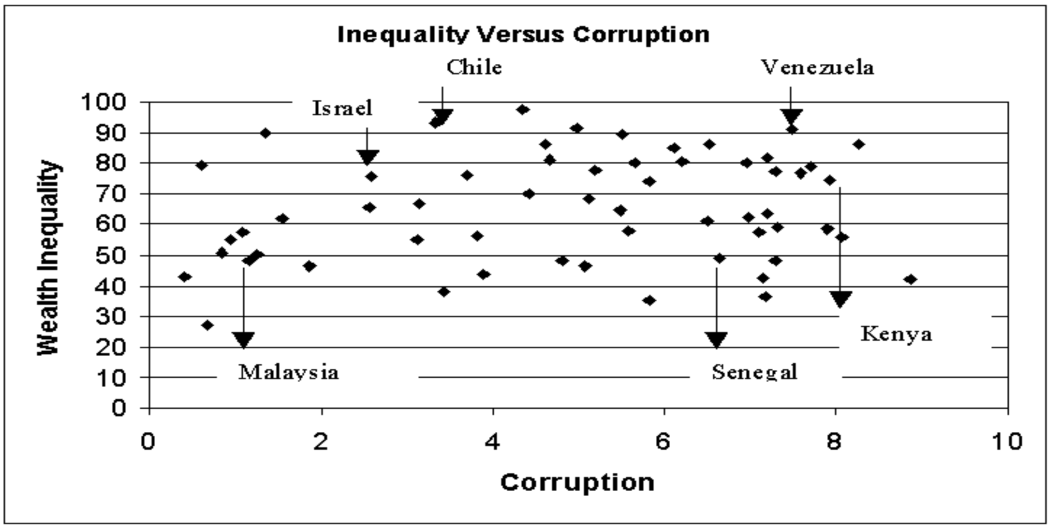

Figure 1: Inequality versus Perceived Corruption

Figure 1 presents a simple bivariate scatter plot of wealth inequality and corruption. The question that I ask is whether a Gini of (48.10) for Malaysia in the early 1980s has the same implications to a comparable Gini (49.27) for Senegal? Could an inequality measure that places Israel and Kenya in the same basket (75.49 and 74.59, respectively, in 1980s) in growth regressions carry the same information? For behavioral economists like Rabin (1993), Falk & Fischabacher (1999) the answer is no. They have offered models that incorporate the perceptions of others' intentions in the player's utility functions. They conjecture that if people observe other individuals as unfair to them, this may induce them not to cooperate which reduces trust amongst the population. In an experimental setting, Haile et al. (2003) show that if inequality is perceived as resulting from a fair procedure, it will not affect cooperation and hence not affect growth, whereas if it is perceived as resulting from unfair actions on the part of a small group, it will hamper growth.

If the genesis of inequality is important, countries with the same degree of inequality can pursue different growth rates as the origins of resource creation are heterogeneous. I hypothesize, *ceteris paribus*, that in countries like Kenya, Senegal and Venezuela growth can be expected to be lower given the fact that they have a higher level of corruption when one compares them to Malaysia, Israel and Chile respectively. To test my hypothesis, a need arises to deconstruct the concept of inequality (whether it is fairly or unfairly generated) which often demands/underscores the relevance of exploring the genesis of inequality. But where can such a thing be found? Economists and statisticians usually arrange people or households in ascending order according to income or expenditures abstracting from the way it emerges. Surprisingly, however, no comprehensive analysis of the genesis of inequality exists, perhaps because of the difficulty in measuring it.

An obvious candidate for measures of fairness might be the European Value Survey or World Value Survey, containing questions related to fairness. However, few observations exist for earlier periods. Therefore, the perceived level of corruption in a country, compiled by Transparency International, is used as a proxy as to how individuals perceive the generation of wealth in their country. This index is based not only on the locals but also on international surveys of business people and reflects their impressions and perceptions of the level of corruption within countries. It describes the level of perceived corruption in the public sector using a poll of political risk indexes. Corruption is indisputable where those in power use illegal means to enrich themselves; assuming that CPI raters used this same criterion, it becomes natural to think that the CPI's score could be used as a proxy as to how society perceives whether the generation of wealth is fairly or unfairly generated.

In testing my hypothesis, I run several regressions using both Ordinary Least Squares (OLS) and panel estimates. Contrary to previous findings on the inequality-growth regressions, this paper delivers a consistent message i.e. income inequality alone does not have a significant impact on growth. Rather its interaction with corruption is negative and statistically significant, suggesting the genesis of inequality counts more than inequality *per se*. When inequality reflects the outcome of the objective market process, which is perceived as relatively fair by citizens, inequality does not have a negative effect on growth. If, however, inequality has emerged due to actions that are perceived as unfair, theory expects to find a low incentive in productive activities, leading to a negative correlation between inequality and growth.

I proceed in the following fashion. I first present a theoretical model. Section 3 presents the data and estimation methods. The fourth section tests empirically the prediction that inequality is not significantly related to growth, but its origin does affect growth. The last section concludes.

2 The Model

The economy lasts for two periods and has a single storable consumption good which may be used as capital. There are a large number of agents that have identical preferences defined over wealth (capital) but differ in their capital endowment: k_i is the capital of an individual i. I assume that there is a finite number of wealth levels, that is $K = \{k_1...., k_n\}$ where k_j is increasing in j. Note that K_t is the level of aggregate capital in the economy in period t. As in Barro (1990), K_t can be interpreted as a combination of both physical capital and human capital. In other words it is the accumulation of capital that results from past production activities. That is, it can be written as:

$$K_t = {}_{j=1}^{n} y_{t-1}^{j} \tag{1}$$

Per capita output y_{t-1}^{i} is also the consumption for each individual. Individuals either consume their endowments at once or invest it in a future consumption good. For simplification, individuals will invest all their capital in the first period and consume in the second period.[5]

As noted above, the economy gives birth to $j = 1, ..., n$ individuals and these individuals need to join forces (to pool their initial resources) because the production activity requires a fixed and indivisible capital outlay $K(0) = \sum\limits_{j=1}^{n} k_j(0)$. In other words, the project requires the financial participation of all individuals in the economy in order to be fully implemented. Given investment has been made at date t, the production function takes the following form:

$$y_t = AK_t \ln(1 + \sum_{j=1}^{n} l_t^j), \;\; A > 0 \tag{2}$$

where A is an exogenous parameter that measures productivity on investment and $y_t(l_t^i)$ is a strictly increasing concave production function of the individual's own

[5]Galor and Zeira (1993) and others also assume that agents can only consume in the second period.

labor effort input (l_t^i) that generates a return on the invested capital.[6] I assume that $l_t^i \, \epsilon [0,1]$ and these efforts are exerted by the individuals aggregated to form total labor input in production. All individual efforts are perfect substitutes in generating returns on capital, i.e. the marginal productivity of effort is the same for every individual. Individuals maximize their life time utility net of their effort costs. Thus, the utility for an individual i is linear in consumption and can be written as:

$$U_t^i = (AK_t \ln(1 + \sum_{j=1}^{n} l_t^j))s_i - e^{\alpha} K_t (l_t^i)^2 \tag{3}$$

where s_i is the share of individual contribution to the required investment level i.e. individuals share the joint production, based on their contribution to the total capital K_t. The term $e^{\alpha} K_t (l_t^i)^2$ denotes the disutility of labor incurred by individual i. Individual effort involves a cost that is borne by the individual himself, which is increasing in $\alpha \in [0,1]$, where α is a parameter capturing the degree of perceived corruption. Note, from this expression, that α influences the marginal return to exert efforts. In a society free of diversion, i.e. $\alpha = 0$, individuals are motivated to exert effort. If individuals think that they are treated badly however, they are not willing to put in a larger amount of efforts. In particular, if individuals feel that they are treated badly they would rather withdraw their efforts. In fair societies, however, if individuals feel that they are treated kindly, they want to reward the society by exerting more efforts. As in Aghion et al. (1999), the cost incurred by individual i is proportional to total capital accumulated in the economy and the squared individual efforts.[7]

It can be noted from equation (3) that investing efforts in the joint activity has a public good character. All other individuals gain from the contribution of effort levels in the joint production, but for those who contribute it is costly. However, if nobody contributes to the production process, on the assumption that there is a high enough probability that the other would supply effort level, the rate of return on invested capital endowment will be zero. This means that individuals can derive return from the joint activity if and only if effort levels are positive. Taking the first order condition of equation (3) i.e. the optimal effort choice of an individual satisfies,

[6] The first order derivative is positive ($\frac{\partial y_t}{\partial l_t^i} = \frac{AK_t}{(1+\sum_{j=1}^{n} l_t^j)} > 0$) while the second order derivative is negative ($\frac{\partial^2 y_t}{(\partial l_t^i)^2} = -\frac{AK_t}{(1+\sum_{j=1}^{n} l_t^j)^2} < 0$) .

[7] I assume that as the economy becomes more prosperous the utility loss of providing a certain amount of effort increases.

$$\frac{As_i}{(1+\sum_{j=1}^{n} l_t^j)} - 2e^{\alpha} l_t^i = 0 \tag{4}$$

Observe that from (4), an individual effort is positively related to his/her initial capital endowment level i.e. l_t^i is positively related to s_i. Thus, contribution to the production process will be some fixed proportion of any given capital endowment. In this sense, the model contains the income-neutrality characteristics of public good contributions developed by Warr (1983). In other words, a mean preserving redistribution has a neutral impact on the provision of effort levels and hence growth rates. From (4) the reaction function is easy to generate:

$$l_t^i = -\frac{1}{2}(1+\sum_{j\neq 1}^{n} l_t^j) + \frac{1}{2}\sqrt{(1+\sum_{j\neq 1}^{n} l_t^j)^2 + \frac{2As_i}{e^{\alpha}}} \tag{5}$$

From (5), it will be optimal to contribute to the joint activity, i.e., l_t^i is greater than zero, no matter what others contribute. Thus, the equilibrium effort levels will not be at the corner of the outcome space of zero contributions. From equation (4), we find that in equilibrium it will hold that $\frac{l_t^i}{k_t^i} = \frac{l_t^j}{k_t^j}$. Given the income-neutrality characteristics, the optimal effort level is given by:

$$\left(l_t^i\right)^* = -\frac{s_i}{2} + \frac{s_i}{2}\sqrt{1+\frac{A}{e^{\alpha}}} \tag{6}$$

Thus indeed, in equilibrium the optimal effort level depends on the share of the individual capital endowment in total endowment. From this it is not hard to see that $\frac{\partial (l_t^i)^*}{\partial \alpha} < 0$ i.e. the equilibrium effort supply is declining in α, suggesting that if an individual perceives the distribution to be unfair, she/he will have a lower incentive to exert effort. In case of a perfectly egalitarian society in which each household is endowed with the same share of capital stock i.e. $k_t^i = k_t^j$ for all i, the equilibrium value boils down to $\left(l_t^i\right)^* = -\frac{1}{2n} + \frac{1}{2n}\sqrt{1+\frac{A}{e^{\alpha}}}$. In equilibrium, the growth rate will be:

$$g = \ln\left(\frac{y_t}{y_{t-1}}\right) = \ln\left(\frac{AK_t \ln(1+\sum_{j=1}^{n} l_t^j)}{K_t}\right) = \ln A[(\ln(1+\sum_{j=1}^{n}(l_t^j)^*))] \tag{7}$$

Because everything is growing at the same rate for all individuals, their income (capital) shares remain the same over time and therefore, the effort levels.

The social (Pareto) optimum allocations can be obtained if we assume that social-welfare is the sum of individual utilities and maximize this function with respect to individual efforts. The highest level of social welfare would be achieved if everyone contributes to the joint activity thinking that it will also create positive externalities to others return compared to equilibrium. Differentiation $\sum_{i=1}^{n} U_t^i$ with respect to l_t^i gives:

$$\sum_{i=1}^{n} U_t^i = AK_t \ln(1 + \sum_{j=1}^{n} l_t^j) \sum_{i}^{n} s_i - e^{\alpha} K_t \sum_{i}^{n} (l_t^i)^2 \tag{8}$$

From the first order condition (8) we obtain:

$$(l_t^i)^c = -\frac{s_i}{2} + \frac{s_i}{2}\sqrt{1 + \frac{A}{e^{\alpha} s_i}} \tag{9}$$

In this case, the highest level of social welfare would be achieved if everyone contributes to the production process, thinking that it will also create positive externalities to others return. In the special case of income equality where $k_t^i = k_t^j$ for all i, we have that $(l_t^i)^c = -\frac{1}{2n} + \frac{1}{2n}\sqrt{1 + \frac{nA}{e^{\alpha}}}$. Apparently, the only difference between the equilibrium case and social optimum is that in the latter case under the square root the term $'n'$ is added. Of course, this is due to the spillover generated by individual effort contributions to others. As a result, $(l_t^i)^c > (l_t^i)^*$ will obviously hold. Hence the growth rate will be higher under social optimum, since the production externality is internalized by individuals.

An Example: Suppose the economy's initial aggregate capital stock is 300. Moreover, the technology parameter A is set to be 15 and the number of individuals in this economy is fixed at 3. Table 1 shows individual labour supply and growth rates for different values of α. The first part of Table 1 considers the case where three individuals $(1, 2, 3)$ are involved with the following vector of initial capital endowments $(150, 75, 75)$, respectively. The columns labeled "Eq" reproduce the equilibrium described in equations (6) for different values of α under varying Gini coefficients.[8] As one can see from Table 1, the equilibrium efforts are declining as α increases and thus lead to a decline in growth rates (g).

The optimal individual contribution in equilibrium for the rich individual (l_t^1), in case the Gini and α are set to be 0.25 and 0 respectively, is $l_t^1 = 0.75$ while for the relatively poor individuals (l_t^2 and l_t^3) each provide effort level of 0.375. As shown in the table, for a given degree of inequality ($Gini = 0.25$) as α increases, the equilibrium efforts decline and consequently the growth rate decreases.

[8] That is, $\frac{1}{2n^2 \bar{k}} \sum_{i=1}^{n}\sum_{j=1}^{n} \left| k_t^i - k_t^j \right|$. Note that each person's captial enters into $2n$ pairs of incomes, n times when the individual appears as i and n times when he appears as j.

Table 1: Growth under varying degree of perception and inequality

$Gini = 0.25$	$\alpha = 0$	$\alpha = 0.5$	$\alpha = 1$
	Equilibrium	Equilibrium	Equilibrium
l_t^1	0.75	0.586	0.450
l_t^2	0.375	0.293	0.227
l_t^3	0.375	0.293	0.227
g	2.48	2.100	1.740
$Gini = 0.60$			
l_t^1	1.000	0.782	0.605
l_t^2	0.250	0.196	0.151
l_t^3	0.250	0.196	0.151
g	2.480	2.100	1.740

In the second part of the Table 1 analogous calculations are shown for a different degree of inequality. As an example, a mean preserving redistribution of capital endowment from the two poor individuals to the rich individual $(220, 40, 40)$ does not change the aggregate supply of efforts for given values of α. In this case the Gini coefficient increases. From the column indicated by "Eq", it becomes clear that, under high income inequality setting the total supply of efforts remains similar to the low inequality settings for given α, suggesting that a mean preserving redistribution does not result in a change to the overall growth rates.

3 Empirical Evidence

The hypothesis that I formulate depends on the relation between inequality and growth. Effort contributions to the production process and hence to growth are invariant under redistributions of income suggesting income inequality is neutral to growth. Moreover, the model predicts unfair societies not to favor growth of future production. In highly corrupt countries, the misuse of public power for private benefits is observed signalling a degrade in the perception towards the fairness of resource generation. For given level of inequality, differences in the perceived level of corruption i.e. different values of α will result in different growth patterns. This is because individuals have a lower incentive to supply effort because individuals are conditionally cooperative, it will be more expensive for them to exert efforts than otherwise. An empirical test of this more general theoretical result that predicts income inequality should not affect growth rates will be investigated in section 4, but first, the data and model specification will be presented.

3.1 Data Description

Tables 3 and 4 report summary statistics of the variables in the paper. My study attempts to identify the impact of inequality on growth rates using panel data of 53 countries from the period 1980-1999. Earlier data and wider coverage are not considered, due to the incompleteness of data on corruption. The main indicators for corruption used in this analysis are Transparency International (TI)'s Corruption Perception Index (CPI). For a robustness check I also used another source of corruption data which is available from the Political Risk Service (PRS)'s ICRG (International Country Risk Guide).

In this study, in order to minimize measurement errors, I use two measures of inequality i.e. land and income Gini, though obtaining accurate data for income distribution is challenging. For many years, it was argued that using income inequality as a proxy for the inequality of wealth is not a serious problem as the shapes of the two distributions are believed to be similar in a cross section of countries. However, recent empirical evidence shows that, albeit the distributions are correlated, it does make a difference whether one uses inequality of income or wealth. See Deininger and Olinto (2000). When analyzing inequality, it is important to distinguish between accumulated wealth (i.e. assets) and current income. There are at least three reasons why the distribution of wealth is an important factor in explaining inequality. First, ownership of financial wealth is a significant source of income: inequity in the distribution of wealth implies a corresponding inequity in the distribution of dividends, interest, rent and other income received by wealth owners. The distribution of other income generating assets, such as bonds and equity, are available for only a limited number of countries. Second, wealth provides security: a wealthier household is better to cope with negative shocks. Finally, wealth brings its owners political and economic power in several forms.

Some authors, (see Appendix Table 2) use initial land distribution as a proxy for wealth distribution. The relevance of this proxy is that possession of land could be a major determinant of individuals productive capacity (their ability to invest) and, moreover, it doesn't require assumptions regarding the mapping from income flows to stocks of assets. The data of Deininger and Squire (1996) show that the distribution of land is characterized by a greater cross-country variation than that of distribution of income. Moreover, land inequality, unlike income inequality, shows similar variations across regions than income inequality.

Nevertheless, using land distribution as a proxy for wealth distribution is not without problems. The first shortcoming of land inequality is that few observations exist within countries and as a result this is difficult to use for panel data studies. Second, the contribution of land towards GDP is higher for less developed countries than for developed countries. Moreover, the data of land inequality is compiled at the beginning of each decade which makes it difficult to use for panel data analysis.

Hence, the distribution of income, more easily available, is used as an additional proxy to measurement of inequality. I used income inequality compiled by the Texas Inequality Project which is available for quite a long period of time and convenient for panel data. I do not use data on inequality from Deininger and Squire (1996) as few observations for the mid-1990s are available.[9]

I include control variables that are widely used in cross-country studies of growth, including initial GDP per capita at the beginning of the period (to check for the convergence hypothesis), the average ratio of investment to GDP over the period, a measure of human capital investment, inflation, openness, government consumption ratios, political right index and both time and continental dummies. For further sources of data used and description of variables see the Appendix.

3.2 Model Specification

In this empirical study, I will analyze inequality-growth relationships in the short, medium and long run, meaning that the dependent variable (the growth rate of GDP per capita) is averaged over 5 years forward, over 10 years forward and over 20 years forward, respectively. But first I will present the econometric model. Almost all the empirical studies on the relationship between economic growth and inequality base their regression on reduced form estimations of the determinants of growth in a cross section of countries which look like

$$g_i = \mathbf{X}_i^{\prime}\beta + \varepsilon_i \tag{10}$$

where g_i is the average growth rate of GDP per capita over a certain time period, $\mathbf{X}_i$ is a vector of determinant of growth rates and ε_i is an error term. β is a vector of coefficients to be estimated. Most of the models of inequality and growth up to 1996 use a reduced form of estimation where they add the income distribution variable as one of more explanatory variables in a standard economic growth regression. The problems that plague cross-sectional growth regressions have recently received a great deal of attention (Jonathan Temple, 1999) namely omitted-variable bias due to unobserved heterogeneity.

Here I address these issues by using panel data estimators which permit to mitigate the confounding impact of omitted variables on the inequality-growth relation-

[9]Moreover, the problems concern the fact that the Gini coefficients compiled by Deininger and Squire (1996) for different countries have not all been calculated using the same methods. For example, some are based on gross income, while others use net (disposable) income. In addition, although the data set is largely based on the household as the choice of reference unit, some measurements are based at the individual level. Another difference between the country time series of Gini coefficients is that some use expenditure whereas others use income.

ship by controlling for country-specific effects via the following specification.

$$g_{it} = \mathbf{X}'_{it-1}\beta + \eta_i + \delta_{t-1} + u_{it} \tag{11}$$

where i represents each country and $t = 1, 2, ...T$ (five-year time period); $\mathbf{X}'_{it-1}$ now is a vector of lagged (for a five-year period) explanatory variables that can vary over t and i; η_i is unobserved heterogeneity with variance σ^2_η and δ_{t-1} are period dummies. It can be viewed as unobserved country characteristics e.g. due to technical inefficiency, that are constant over time and influence g_{it}; and u_{it} is an idiosyncratic error term with variance σ^2_u. With panel data the issue is whether to use a random effects or fixed effects estimation approach. Hausman's specification test will be used to identify whether the random effects assumption is satisfied or not. If the estimated coefficients generated by both random and fixed effects are statistically different, Hausman opts for the consistent fixed effects estimator as the assumption of the random effects are incorrect. In other words η_i and $\mathbf{X}'_{it-1}$ are correlated.

4 Results

I now turn to the baseline estimation. I have considered five variations viz. OLS five year panel regressions, OLS base line regressions medium and long term, the base line regressions with more countries and different measures of corruption, medium run panel estimates and short run panel estimates of the relationship between inequality and growth. As the Tables in the Appendix show, the regression coefficients of both inequality measures are not significant in almost all cases. Rather the interactive term between inequality and corruption is negative and statistically different from zero, suggesting that genesis of inequality matters more than inequality *per se*. My findings are consistent with the theoretical prediction that income inequality is neutral to growth, in general and negative if its source is perceived to be unfair. The next subsections present the detailed results.

4.1 OLS Cross-Section Regressions

The question I raised is how inequality and its genesis affect economic growth. I start my analysis from OLS estimation and see whether the estimation results are sensitive to estimation methods. First, I report the pooled short run analysis and second I will display the results of medium run and long run growth analyses.

4.1.1 Short run pooled regressions

Table 5 and 6, the standard reduced form of the model, pool the data of average growth between 1980-84, 1985-1989, 1990-1995 and 1995-1999 as a dependent variable. The independent variables include a log of initial GDP per capita for each period, corruption, the percentage of secondary enrollment in the population (initial human capital investment), inequality measures (income and land Gini) and their interaction with corruption, inflation, government consumption ratio, openness, regional dummies and political rights index. Table 5 shows a set of regressions for the estimated model.

Column 1 of Table 5 displays a simple regression which takes income inequality and the log of initial GDP per capita as regressors. Both explanatory variables are not only significant but also have the expected signs. Similar to many findings, the coefficient for log GDP per capita is significant and has the expected sign, showing that those countries with highest product in the previous period grew less, suggesting conditional convergence. Column (2) extends the model by including corruption as a regressor. The inclusion of corruption improves the fit of the model, leaving the signs and statistical significance of the two previous regressors unchanged. In column (3) I checked whether the results are sensitive to the inclusion of regional dummies. Indeed, while the fit of the model increased, similar to many findings in the literature (see e.g. Deininiger and Squire, 1998; Forbes, 2000) the significance of income Gini vanishes, suggesting the existence of omitted variable bias. Moreover, similar to many cross-country regressions the regional dummy for African countries is now negative and statistically significant at 5% and also the dummy which represents Asian countries is positive and significant at 1%. Column (4) adds the interactive term between income Gini and corruption. The interactive term is significant and has the expected sign while the sign of both income Gini and corruption now change to positive and retain their significance. Finally, I find the corruption variable has an unexpected sign though its net effect is negative. [10]

In column 5 of Table 5, I include policy variables as control regressors. The measure of government consumption as a proportion of GDP, which is used to proxy the effect of government fiscal policy and intervention in the economy, is negatively affecting growth rates similar to the findings of Barro (2000). Moreover, the education variable which captures countries human capital investment is positive and statistically different from zero suggesting that policies to expand education will have positive impact on countries growth rates. Contrary to the findings of East-

[10] Higher corruptibility clearly correlates with lower growth rates. A unit increase in corruption decreases growth (at the mean) by 0.53 units ($= 0.88 - 0.031$ x 39.187). With respect to inequality, the (significant) coefficient imply that a unit increase in inequality (evaulated at sample means) causes a decline in growth by 2%($= 0.121 - 0.031$x4.561).

erly *et al* (1993) , I find openness to positively affect growth rates, although it is statistically insignificant. The inflation rate, used to proxy the effects of exchange rate and monetary policy, has an unexpected sign and is not statistically significant. With the political rights index in the model, corruption has no more a significant coefficient, even though the signs remain the same.

Table 6 illustrates a similar exercise with land inequality. The result remains basically the same. In particular, the interactive term between wealth inequality and corruption is highly significant.

4.1.2 Medium run and Long run regressions

Another issue involved in the inequality - growth regressions is whether one averages growth over a decade or longer periods. Most theoretical models are built on inter generational growth patterns; therefore, the long run economic growth is usually investigated. Most of the previous studies analyze the effects of inequality on growth over a period of 20-25 years, starting from 1960. Long run data are particularly useful for thinking about why countries differ in their level of income today, because, much of the variation in income today has its roots in the last 100 years of economic growth. As we have seen so far, my analysis with respect to growth started in 1980 mainly due to the unavailability of data for corruption for earlier periods.

To check the sensitivity of my results with respect to length of time period, I performed several regressions. Columns (1) and (2) of Table 7, for example, average the dependent variable over a 10 year period, securing a two decade panel. While some observations are lost, most of the previous results are retained. From column 1, we see that a unit increase in corruption decreases growth (at the mean) by 0.13units $(= 2.116 - 0.038 \text{ x } 38.311) - 0.013(63.471)$. With respect to land inequality, the (significant) coefficient, imply that a unit increase in inequality (evaluated at sample means) causes a decline in growth by $3\%(= 0.029 - 0.013\text{x}4.701)$. Results remain if we see on column (2) of Table 7 that explains 49.08% of the variation in economic growth, which is a good fit. In particular variables like loggdp, Ingini*corr, land*corr, govt and openness variables are significant and have expected signs. Inflation is significant though with unexpected sign while income and land Gini are not significant any more and have unexpected sign. The education and the political index variable are not only insignificant but also have unexpected sign. The dummy for income is negative and significant, suggesting that growth tends to be lower in low-income countries on average.[11]

In column (3) to (4) of Table 7, I test the long run relationship between in-

[11]Not reported here, I also checked regional dummies and legal dummies. Both dummy measures do not change much of the results.

equality and growth by considering an average of a 20 year period.[12] Not only the interactive term between income inequality and corruption is significant as shown in specification (3) and (4) but also the interactive term between wealth inequality and corruption is significant at conventional levels. From the results one could deduce, that controlling for the genesis of inequality, both inequality measures do not seem to matter for growth. That is to say, both inequality measures lose their significance after the inclusion of the interactive term suggesting that income inequality does not have an impact on economic growth. In contrast, the interactive term between corruption and inequality is highly significant. From column (3) one can see that a unit increase in corruption decreases growth (at the mean) by 0.38 units (= 2.596 − 0.054 x 37.260) − 0.015(64.252). The education variable not only loses its significance but also has unexpected sign, which is common in the literature dealing with cross section studies. The other variable which has unexpected sign is the inflation variable.[13]

The long run and medium run results reveal that the significance of the interactive term is robust and highly significant across different time dimensions, i.e. whether growth is averaged over 10 year or 20 year periods. I also checked whether the results summarized in Table 7 are not driven by a few observations. I increased the number of countries from 37 to 83 using different measures of corruption, i.e. Countries Risk analysis and data of corruption used by Persson and et al (2004). Then I re-estimated specification (1) and (2) in Table 7, the results of which are summarized in Table 8. Columns (1) to (3) use data from Persson and et al (2004) and the last column (4) uses data compiled by International Country Risk Guide (ICRG). The significance levels are only slightly affected, while none of the earlier conclusions are challenged.

4.2 Panel Data Regressions

In pooled OLS estimator, η_i is assumed to be zero, and $\mu_{i,t}$ are i.i.d. and independent of all explanatory variables. That is, the intercepts do not vary across all countries (homogenous), that each observation is cross sectional and time-series independent and that all explanatory variables are strictly exogenous. Clearly, these assumptions are restrictive: e.g. if there are country-specific effects on growth, the homogeneity assumption will be violated. If inequality is dependent across growth, OLS estimator will underestimate standard errors. After relaxing the assumptions, can we replicate the results with panel estimates?

[12] The Data for the estimation of longrun growth rates diminishes from 53 to 37 countries due to the incompleteness of data.

[13] Note that the inclusion of the interactive term improves the fitness of the model for all specifications not reported here.

Estimates vary significantly, based on which technique is used, so it is necessary to test the validity of the assumptions underlying each method. Note that in the fixed effect approach, $\eta_i's$ are treated as model parameters and are hence estimated. The random effect model treats $\eta_i's$ as the result of a random draw form some distribution (e.g. normal). For growth models the use of a fixed effects model is recommended, as country specific issues matter (See e.g. Verbeek 2000). Still, the consistency criterion of such a random-effect approach requires $\eta_i's$ to be uncorrelated with explanatory variables of the model, i.e. the $X's$ (Balgati, 2001). Since the Hausman specification test points out that in almost all specifications this assumption is violated as one would expect, I report the results from the fixed-effect approach.[14]

Before I report the results of panel estimates of the short run period (five year averages), Table 9 shows estimates of a ten-year panel using both fixed and random effects. This exercise is done to check whether results are sensitive to period length. I introduce both time dummies and investment GDP ratio to the panel estimation following Forbes (2000) and Squire & Ontillo (2004) respectively. The time varying regressors used in the basic growth equation includes initial log GDP per capita for each period, share of gross domestic investment to GDP, corruption, education, inflation, government, openness and also time dummies. To control for endogeneity, initial values of the beginning of the period are used.[15] The coefficient on inequality remains insignificant while the coefficient of the interactive term between inequality and corruption still survives i.e. it is negative and statistically significant at 5%.[16] I find that, similar to the Squire and Ontillo (2004) results, the investment/GDP ratio is positively related to the growth rates and is statistically significant. With the exception of inflation variable, almost all the policy variables are of the expected sign and the only variable that is statistically different from zero is the government consumption ratio.

The next question that I address is whether the inequality variable becomes positive when 5-year panel is estimated. Table 10 shows the panel estimates of short run growth regressions. I concentrate my interpretation on the last column

[14] In both panel estimates the subset of coefficients that are estimated by the fixed effects and the random effects estimators are significantly different suggesting that η_i and $\mathbf{X}_{it}^{'}$ are correlated. The null Hypothesis that there is no systematic difference in coefficients is rejected as p value is less than 5%, Hausman is in favour of the fixed effects estimator (See Table 9 and 10).

[15] Forbes' panel data set, constructed from Deininger and Squire, consists of six five year intervals, from 1961-65 through 1986-90. In each interval she chooses the data point closest to the end point of the interval, instead I choose an initial period to minimize endogienity problems as I am using fixed and random effects estimators.

[16] Higher corruptibility clearly correlates with lower growth rates. A unit increase in corruption decreases growth (at the mean) by 0.36 units (= 1.816 – 0.047 x 38.635).

of Table 10 that shows the results that combine specification (1) and (2). This nested model explains 48.24% of the variation in economic growth, which is a good fit, compared to other regressions. The interactive term between income inequality and corruption is negative and significant as shown in specification (5). Contrary to the results of Forbes (2000) and Zou and Li (1998), the results in Table 10 suggest that income inequality does not have any impact on economic growth. Similar to many findings, the coefficient for log GDP per capita is significant and has the expected sign showing conditional convergence. Similar to the results of Deininger and Olinto (2000) we can see that investment and education do have expected sign and are significant contributors to economic growth. Similar to the results of Li and Zou (1998), time specific dummy variables for (1985-1989), (1990-1994), (1995-1999) appear to be significant and increase over time. This result seems to suggest that economic growth has been relatively faster in recent years.

The measure of trade openness, i.e., the ratio of imports and exports with respect to GDP, we find openness to positively affect short run growth rates, although it is statistically insignificant. The inflation rate, used to proxy the effects of exchange rate and monetary policy, does have an unexpected sign and is statistically insignificant. The measure of government consumption as a proportion of GDP, which is used to proxy the effect of government fiscal policy and intervention in the economy, is negatively affecting growth rates similar to the findings of Barro (2000).

5 Conclusion

To date the relationship between inequality and growth is far from well understood. Even if empirical and theoretical results predict a negative or positive effect of inequality on growth, the significance and magnitude of the relationship still vary in different dimensions viz. the relationship is sensitive to the definition of inequality or the time coverage under study. This paper emphasizes the importance of genesis of inequality that has been largely ignored by studies on inequality-growth relationships.

In reality, there are many sources of inequality viz. market generated inequality which is perceived as relatively fair and inequality generated via unfair means. This paper is an attempt to "deconstruct" the concept of inequality and in particular the idea that what often matters is not the degree of inequality *per se* but rather the way in which it is actually perceived by members of society. In general this insight has implications for the relationship between inequality and growth and in particular for the tolerance displayed by different societies to the same measured amount of inequality.

I analyze the importance of genesis of inequality and find that the interactive term between corruption and inequality is negatively related to countries' subsequent growth rates. Using panel data estimates, this paper directly estimates how changes in inequality are correlated with changes in growth within a given country. Results suggest that both in the short and medium run, an increase in a country's level of income and an increase in wealth inequality does not have any relationship with subsequent growth rates. In fact, my results suggest the effect of income inequality is only operative in countries where institutions are weak, i.e. in highly corrupted countries. The sensitivity analysis challenges the current belief that measures of inequality are negatively related to long run growth. Both long run and medium term OLS regressions suggest that while inequality measures do not have a significant relationship with growth rates, their interaction with corruption is negative and statistically significant, suggesting that genesis of inequality matters more than inequality *per se*.

In my view, the results of this paper should be seen as corroborating the view that genesis of inequality is an important element in explaining growth. Thus, an improvement in institutional setup that may result due to regime shifts accompanied with effective anti-corruption measures could mitigate the negative effect of inequality on growth.

Therefore, the estimates in this paper should be interpreted as suggesting that further careful analyses should be developed for the measurement of the genesis of inequality. It would be desirable to construct an index measure of perceptions for several countries, to be used as additional explanatory variables within a regression analysis based on cross-country data and identify the possible channels for the effect of inequality on growth. Moreover, the theoretical model could be enriched in several ways, e.g., by considering how perceptions affect the incentive to produce or by developing a dynamic setting in which the perceptions of individuals for a given distribution is made endogenous.

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Appendix: Description, Source and Relevance of the Variables

Corruption [**Corruption**] is from Transparency International (a coalition against corruption in international business transactions). This index is based not only on the locals but also on international surveys of business people and reflects their impressions and perceptions of the countries surveyed. The index is available from 1980, 1985, 1988-92, and 1995 and ranks countries on a scale of 0 to 10. For conformity I inverted the scale where 0 means the lowest level of corruption and 10 the highest. (www.transparency.de)

Corruption Risk [**Corrrisk**] data is from the International Country Risk Guide (ICRG)This is a measure of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the economic and financial environment. The index is constructed by asking business people. It ranks countries from 0 to 6 points. For conformity and comparability, I inverted the scale where 0 means the lowest level of corruption and 10 the highest.

Corruption Perception Index [**CPI**] data is from Persson and et al. (2003) and uses an average of the CPI index over the period 1995-2000. This is done to gain more observations as the TI compiles data for more countries from 1995.

Income Inequality [**Ingini**]: Estimated household income inequality is used as a measure of income Gini. It is available for a long period of time. This approach uses econometric methods to estimate the relationship between income inequality and pay inequality. The estimates are conditioned by other variables, including the relative size of the manufacturing sector, for a matched set of observations covering just over 500 data points in Deininger and Squire. The estimated regression coefficients are available from http://utip.gov.utexas.edu/ web site. The index takes values between 0 and 100, with a higher number indicating greater inequality.

Land Gini [**LandGini**]: is from FAO which compiles summaries of official "Agricultural Census". Source (Klause Deininger and Pedro Olinto). The index takes values between 0 and 100, with a higher number indicating greater inequality.

Growth rate of Real GDP per Capita [**Growth**]:World Bank's World Development Indicators (WDI). I choose WDI rather than the Penn World Trade because the WDI is more updated and it contains more observation for extended time periods than the latter. (average of 80-84,85-89,90-94,95-99)

Gross Domestic Investment % of GDP **[Gdi]:** is the ratio of real investment to real GDP. The measure is the average of the annual observations on the ratio for each of the periods. (1980-1984,1985-1989,1990-1994,1995-1999)

Log of Initial GDP per capita **[Loggdp]** is from CD Room of WDI 2003. (1980,1985,1990,1995)

Inflation (annual %) **[Inflation]** as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

Education: [**Education**] total enrollment in a specific level of education, regardless of age, expressed as a percentage of the school population corresponding to the same level of education in a given school-year. Computed by dividing the number of students at a given level of education regardless of age, by the population of the age-group corresponding to the given level of education, and multiplying the result by 100. Source: UNESCO - Education Indicator Category Participation (www.unesco.org).

Openness: [**Openness**], defined as the sum of exports and imports of goods and services as a share of gross domestic product. (averaged over five year periods) Source: The World bank's World Development Indicators CD-Rom2003.(1980-1984,1985-1989,1990-1994,1995-1999)

General government consumption ratio [**Govt**] includes all government current expenditures excluding military expenditures and education to real GDP. WDI CD Room 2003.

Political Rights Index **[Political]** is an index that measures the level of political freedom. The index ranks countries on a scale of 0 to 7. I reversed the scale and converted the original ranking of 0 to 7 into a scale of 0 to 10 where the higher the score means the lower the level of political freedom.

Table 2: Empirical Literature on Inequality-Growth Relations

Literature	Time Span	Inequality	Estimation	Relation
	Cross section studies			
Alesina&Rodrik ('94)	15-20	Income & Land Gini	OLS	-
Persson&Tabellini('94)	20	Income share of upper class	OLS	-
Clark ('95)	20	Coefficient of variation, Thiel Index	OLS	-
Birdshall&Ross ('95)	20	Income share ratio	OLS	-
Keefer & Knack ('00)	20	Income and Land Gini	OLS	-
Easterly ('01)	10	Income share of middle class	3SLS	-
Lundberg & Squire('02)	30	Income and Land Gini	3SLS	?,-
	Cross Country Panel data			
Li & Zou('98)	5	Lagged income & land	FE,RE,OLS	+
Forbes ('00)	5	1 period lagged Income Gini	FE,RE,GMM	+
Deininger& Olinto ('00)	5	Lagged income & land Gini	GMM	?,-
Barro ('00)	10	Income & quintile shares	3SLS	zero
Banerjee & Dufflo('04)	5	Gini, Change in Gini	FE,RE,GMM	≡
	Country specific studies			
Patridge ('97)	10 (US)	Income Gini and income share	OLS,2SLS	+
Ravalion ('98)	20 (CHINA)	Initial wealth	OLS	-
Ghosh & Pal ('04)	20 (INDIA)	Rural & urban, rural/urban cons.	OLS	-,+
Benjamin et al ('04)	5 (CHINA)	Lagged Gini	FE&RE	?
+,-,≡ and ? denote positive,negative, inverse u-shaped and not robust effect of inequality on growth resp.				

Table 3: Variables used for short, medium and long run OLS estimates

Variable	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
	Short run, N=151		Medium run, N=78		Long run, N=37	
Growth	1.895	2.593	1.942	1.626	1.896	1.446
Loggdp	3.89	0.412	3.877	0.412	3.852	0.407
Ingini	39.373	6.226	38.311	6.068	37.26	6.034
Corruption	4.656	2.663	4.700	2.741	4.61	2.689
Ingini*corr	193.700	125.900	190.028	124.4	181.287	120.090
Landgini	63.828	16.867	63.472	16.840	64.252	16.931
Landgini*corr	300.939	189.751	305.046	196.351	305.712	203.429
Education	73.940	29.510	69.823	27.452	65.345	25.911
Inflation	134.10	999.651	91.577	422.620	24.308	28.539
Govt	16.620	6.170	16.829	6.498	16.670	6.013
Openness	59.47	31.810	58.455	31.035	58.569	29.596
Political Right	4.139	2.611	4.139	2.611	0.531	0.502
Africa	0.205	0.405	0.205	0.405	0.205	0.405
Asia	0.033	0.180	0.033	0.180	0.033	0.180
Middle east	0.099	0.300	0.099	0.300	0.099	0.300
Latin	0.205	0.405	0.205	0.405	0.205	0.405
Europe	0.293	0.457	0.293	0.457	0.293	0.457
North America	0.119	0.325	0.119	0.325	0.119	0.325

Table 4: Variables used for short and medium run panel regressions

Variable	Mean	Std. Dev.	Mean	Std. Dev.
	Meduim run N=81		Short run N=158	
growth	1.831	1.721	1.821	2.335
Loggdp	3.852	0.425	3.870	0.428
GDI	22.220	4.838	22.232	5.202
Ingini	38.635	6.240	39.649	6.374
Landgini	65.26	17.281	64.523	17.281
Corruption	4.786	2.714	4.753	2.675
Education	68.031	28.476	72.457	30.146
Inflation	88.440	414.933	129.665	977.427
Govt	16.661	6.450	16.427	6.141
Openness	58.039	30.557	60.424	36.513
Ingini*corr	195.028	125.114	199.075	127.414

Table 5: OLS Pooled Regressions (Data divided into 5 year panels)

Estimation	1	2	3	4	5
Constant	10.405	15.382	11.386	7.298	10.260
	(3.955)***	(3.995)***	(3.966)***	(3.799)*	(5.438)*
Loggdp	-0.937	-2.113	-1.897	-2.272	-2.982
	(0.653)***	(0.742)***	(0.721)***	(0.729)***	(1.084)**
Ingini	-0.124	-0.103	-0.035	0.121	0.133
	(0.042)***	(0.042)**	(0.044)	(0.076)**	(0.083)*
Corruption		-0.276	-0.275	0.880	0.724
		(0.109)***	(0.115)**	(0.437)**	(0.083)
Asia			1.753	1.700	0.885
			(0.562)***	(0.553)***	(0.711)
Europe			0.648	0.723	0.458
			(0.520)	(0.504)	(0.689)
Latin			-0.421	-0.546	-0.800
			(0.678)	(0.638)	(0.715)
Middle			0.267	-0.125	0.633
			(0.769)	(0.787)	(0.959)
Africa			-2.239	-2.425	-2.575
			(1.201)*	(1.227)**	(0.949)*
Ingini*corr				-0.031	-0.028
				(0.012)***	(0.013)*
Education					0.030
					(0.012)**
Inflation					0.0001
					(0.0002)
Openness					-0.0004
					(0.005)
Govt					-0.136
					(0.047)***
Political					-0.019
					(0.138)
Landgini					
Land*Corr					
#obser.	179	179	179	179	157
R^2	0.0567	0.0993	0.2061	0.2324	0.2229

"*',**, and *** denote 10%, 5% and 1% significance level respectively.
Numbers in brackets denote robust standard errors.

Table 6: OLS Pooled Regressions (Data divided into 5 year panels)

Estimation	1	2	3	4	5
Constant	4.663	7.075	6.797	4.412	6.233
	(1.434)***	(2.664)***	(2.947)***	(3.148)	(4.101)***
Loggdp	-0.092	-0.627	-0.897	-0.821	-1.486
	(0.321)	(0.611)***	(0.686)*	(0.675)	(0.941)
landgini	-0.038	-0.037	-0.020	0.013	-0.030
	(0.010)***	(0.011)**	(0.011)	(0.021)	(0.021)
Corruption		-0.100	-0.117	0.401	0.463
		(0.107)	(0.112)	(0.320)	(0.346)
Asia			1.238	0.924	0.686
			(0.503)***	(0.489)	(0.519)
Europe			0.559	0.703	0.438
			(0.500)	(0.438)	(0.431)
Latin			-0.427	-0.148	-0.054
			(0.630)	(0.648)	(0.601)
Middle			0.142	-0.125	-0.083
			(0.741)	(0.723)	(0.802)
Africa			-0.958	-1.032	-0.990
			(0.856)*	(0.843)**	(1.105)*
Landgini*corr				-0.008	-0.011
				(0.002)***	(0.004)***
Education					0.017
					(0.011)
Inflation					-0.00001
					(0.00001)
Openness					0.001
					(0.005)
Govt					-0.094
					(0.042)***
Political					-0.068
					(0.117)
#obser.	182	182	182	168	168
R^2	0.091	0.081	0.123	0.162	0.188

”*’,**, and *** denote 10%, 5% and 1% significance level respectively.
Numbers in brackets denote robust standard errors.

Table 7: OLS estimates of Meduim run and Long Run Growth rates

Estimation	1	2	3	4
Constant	9.514	13.200	18.451	22.47
	(4.843)***	(4.833)***	(6.590)***	(6.085)***
Loggdp	-2.502	-3.051	-4.109	-4.495
	(1.125)**	(1.156)***	(1.402)***	(1.322)***
Gini	0.089	0.105	0.075	0.064
	(0.076)	(0.069)	(0.080)	(0.076)
Corruption	2.116	1.894	2.596	2.063
	(0.497)***	(0.464)***	(0.708)***	(0.708)***
Landgini	0.029	0.019	0.018	0.007
	(0.014)**	(0.014)	(0.015)	(0.012)
Income*corr	-0.038	-0.038	-0.054	-0.048
	(0.012)***	(0.011)***	(0.015)***	(0.013)***
Land*corr	-0.0125	-0.012	-0.015	-0.018
	(0.003)***	(0.003)***	(0.004)***	(0.004)***
Education	0.009	-0.001	0.0004	-0.004
	(0.017)	(0.014)	(0.024)	(0.014)
Inflation	0.001	0.001	0.012	0.013
	(0.0002)***	(0.0002)***	(0.010)	(0.008)
Govt	-0.117	-0.141	-0.107	-0.142
	(0.040)***	(0.036)***	(0.058)*	(0.045)***
Openness	0.009	0.011	-0.002	0.002
	(0.006)	(0.006)*	(0.006)	(0.006)
Political	-0.110	0.012	-0.206	-0.084
	(0.109)	(0.095)	(0.138)	(0.129)**
Incomedum		-1.859		-1.925
		(0.542)***		(0.618)***
#obser.	78	78	37	37
R^2	0.4334	0.4908	0.561	0.652

"*',**, and *** denote 10%,5% and 1% significance level respectively. Numbers in brackets are robust standard errors. Column 1 and 2 are pooled OLS estimates (data divided into 10 year periods).(Column 3 to 4, are long run OLS estimates. Growth is averaged over 20 years).

Table 8: Sensitivity analyisis : Medium run data , estimation obtained using OLS over 10 years averages

	(1)	(2)	(3)	(4)
Constant	9.383	0.060	7.535	0.533
	(5.020)*	(4.112)	(4.081)*	(5.907)
Loggdp	-2.058	-0.864	-1.423	-0.357
	(0.980)**	(0.882)	(0.824)*	(1.196)
Ingini	0.127		0.085	0.124
	(0.085)		(0.063)	(0.097)
Corruption	0.761	0.300	1.161	1.445
	(0.517)	(0.269)	(0.450)**	(0.889)**
Ingini*corr	-0.034		-0.023	-0.042
	(0.014)**		(0.011)**	(0.023)**
Govt	0.164	-0.131	-0.140	-0.110
	(0.038)***	(0.038)***	(0.030)***	(0.040)***
Education	0.005	0.012	-0.002	0.013
	(0.015)	(0.012)	(0.012)	(0.016)
Openness	0.011	0.011	0.010	0.011
	(0.006)*	(0.004)***	(0.004)**	(0.004)***
Inflation	0.0001	0.0002	0.0003	0.0001
	(0.0002)	(0.0001)	(0.0001)**	(0.0001)
Landgini		0.023	0.016	
		(0.019)	(0.020)	
Land*Corr		-0.010	-0.012	
		(0.003)***	(0.001)***	
#obser.	70	59	57	83
R^2	0.2322	0.300	0.4600	0.22

”*’,**, and *** denote 10%,5% and 1% significance level respectively. Numbers in brackets are robust standard errors. Column from (1) to (3) uses from Peresson et al. while column (4) uses corruption measure compiled by ICRG.

Table 9: Data divided into ten-year panels. Estimation obtained using both fixed effect (FE) and random effects (RE)

	1 (Income Gini)		2 (Land Gini)		3 (Nested)	
Estimation	FE	RE	FE	RE	FE	RE
Loggdp	-7.547	-2.918	-10.420	-2.553	-10.197	-2.112
	(3.271)**	(1.112)***	(3.384)***	(1.078)**	(3.648)***	(1.030)***
Gdi	0.017	0.139	0.043	0.106	0.001	0.064
	(0.103)	(0.044)***	(0.095)	(0.045)**	(0.104)	(0.044)
Ingini	0.172	.017			.175	.073
	(0.147)	(0.080)			(0.153)	(0.077)
Ingini*corr	-0.047	-0.016			-0.045	-0.029
	(0.022)**	(0.013)			(0.024)*	(0.013)**
Corruption	1.456	.286	.589	.140	2.532	1.411
	(0.835)*	(0.490)	(1.083)	(0.341)	(1.527)	(0.617)**
Education	0.045	0.031	0.044	0.027	0.051	0.011
	(0.030)	(0.015)	(0.027)	(0.015)*	(0.030)	(0.015)
Inflation	0.001	0.0005	-0.011	0.0005	-0.004	0.001
	(0.013)*	(0.0004)	(0.012)	(0.0004)	(0.013)	(0.0004)
Govt	-0.162	-0.114	-0.076	-0.075	-0.117	-0.107
	(0.073)	(0.045)***	(0.077)	(0.042)*	(0.078)	(0.041)***
Openness	0.048	0.007	0.032	0.005	0.042	0.008
	(0.030)	(0.008)	(0.024)	(0.008)	(0.030)	(0.008)
Time90	0.211	0.220	0.374	0.069	0.374	0.269
	(0.479)	(0.270)	(0.467)	(0.250)	(0.493)	(0.264)
Landgini				0.008		0.007
				(0.025)		0.024
Land*Corr			-0.006	-0.006	-0.012	-0.009
			(0.013)	(0.006)	0.013	(0.004)**
R^2	0.5756	0.358	0.4332	0.3981	0.5581	0.5560
#obser.	81	81	83	83	78	78
groups	48	48	46	46	44	44
Hausaman	0.0298		0.0177		0.01	

"*',**, and *** denote 10%,5% and 1% significance level respectively. Numbers in brackets are robust standard errors.

Table 10: Short run panel estimates of the relationship between inequality and growth. Both fixed effects (FE) and random effects (RE) are reported.

	1(Income Gini)		2 (Land Gini)		3 (Nested)	
Estimation	FE	RE	FE	RE	FE	RE
Loggdp	-17.173	-4.040	-15.871	-3.266	-15.660	-3.276
	(3.096)***	(1.056)***	(2.638)***	(1.034)***	(2.914)***	(1.148)***
Gdi	0.273	0.215	0.291	0.178	0.240	0.163
	(0.063)***	(0.040)***	(0.053)***	(0.039)***	(0.057)***	(0.040)***
Ingini	0.139	.020			0.155	0.062
	(0.137)	(0.081)			(0.125)	(0.083)
Ingini*corr	-0.041	-.017			-0.039	-0.025
	(0.019)**	(0.013)			(0.017)**	(0.013)*
Corruption	1.462	0.266	-.778	-.046	1.135	1.104
	(0.753)*	(0.503)	(0.722)	(0.358)	(1.171)	(0.642)*
Education	0.048	0.042	0.045	0.035	0.045	0.031
	(0.021)**	(0.013)***	(0.015)***	(0.012)***	(0.018)**	(0.014)**
Inflation	0.0001	.0001	-.0001	-.00005	0.0001	0.0001
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Govt	-0.230	-0.104	-0.167	-0.084	-0.164	-0.101
	(0.080)***	(0.044)***	(0.068)**	(0.042)**	(0.072)**	(0.044)**
Openness	.020	-.006	.020	-.0003	.022	0.004
	(0.015)	(0.006)	(0.013)	(0.007)	(0.014)	(0.007)
Time85	1.603	1.304	1.530	1.102	1.490	1.152
	(0.411)***	(0.420)***	(0.353)***	(0.357)***	(0.370)***	(0.372)***
Time90	1.419	.662	1.545	0.518	1.441	0.644
	(0.501)***	(0.430)	(0.423)***	(0.361)	(0.457)***	(0.382)
Time95	2.380	1.157	1.978	0.701	2.136	1.436
	(0.704)***	(0.552)**	(0.558)***	(0.403)*	(0.646)***	(0.495)
Landgini				0.006		0.010
				(0.025)		(0.027)
Land*Corr			0.010	-0.004	0.004	-0.006
			(0.010)	(0.005)	(0.011)	(0.005)
R^2	0.4748	0.3580	0.4304	0.3362	0.4824	0.3947
#obser.	158	158	169	169	151	151
groups	48	48	46	46	44	44
Hausman (p)	0.0002		0.0000		0.0000	

"*',**, and *** denote 10%,5% and 1% significance level respectively.
Numbers in brackets are robust standard errors.