The Debate Over the Relationship Between Income Inequality and Economic Growth: Does Inequality Matter for Growth?

Jorge Alberto Charles-Coll[1],[*]

[1]Universidad Autónoma de Tamaulipas, Centro Universitario Tampico-Madero, Fac. de Comercio y Admon. de Tampico. C.P. 89000, Mexico

[*]Correspondence: Tel/Fax: (+52) 833-2412008 (ext.3706)   E-mail: jacoll@uat.edu.mx

Abstract

The last twenty years have seen an increasing interest by economist for understanding the effects that income distribution has on economic performance, and even though economic theory has focused traditionally in issues such as productivity and efficiency, scholars now recognize the potential causal relationship between income inequality and the way economies can grow. This paper contributes to the debate over the relationship between income inequality and inclusive economic growth by developing a comprehensive description and analysis of the most influential views that take part in this important topic. A description of the way this debate has been developing over the last decades is present, as well as a detailed review of the three main positions (negative, positive and non linear relationship) proposed in the literature. The main policy implication is that recent literature supports the statement that inequality does matter for economic growth and that inclusive distributional policies can impact growth rates in the long run.

Keywords: income inequality; economic growth

1. Introduction

Although economic theory has focused traditionally in issues such as productivity and efficiency, the role that income inequality plays in economic dynamics has been present but not manifest in economic literature since a long time. For some, inequality is simply an element of the generally accepted view of a necessary trade-off between efficiency and equality(Note 1), in which both cannot coexist and are mutually exclusive. Others implicitly perceive inequality as a condition that is automatically addressed by the markets and the efficient use of the available resources, in an extremely confident trickle down view. Even modern welfare economics see the process of income distribution as a secondary issue(Note 2) and are more focused on competitive equilibrium and reaching a Pareto optimality, thus abstracting from any judgment over distribution(Note 3).

While most of the debate over the inequality-growth relationship during the largest part of the XX century was focused on the effects of growth and development over inequality levels, the last twenty years have seen the development of a new debate: this time with the purpose to understand the other side of the relationship, namely the effects that income inequality might have over economic growth. Perhaps a contemporary phenomenon such as globalization, the enormous disparities between countries, or the inconsistencies found with the expected inequality among countries and their development level, have motivated this new approach, in an effort to better understand this phenomenon.

This paper develops a comprehensive description of the contemporary views that have tried to explain the effects that inequality exerts over growth, as well as the different positions that have shaped the new debate and the way it has developed over the last decades.

1.1 The effects of income inequality over economic growth

The increasing interest in understanding the way inequality influences economic performance has motivated the development of research on this topic over the last two decades. The results have not yet come to converge into one generalized position over the sign of the relationship. Moreover, the remarkable disparities in the results, both in theoretical and empirical studies, have derived into a complex debate, with four main positions: the studies which affirm a negative relationship (Alesina and Rodrik, 1994; Clarke, 1995; Perotti, 1993; Alesina and Perotti, 1996; Persson and Tabellini, 1994; De la Croix and Doepke, 2003; Josten, 2003; Ahituv and Moav, 2003; Viaene and Zilcha, 2003; Josten, 2004; Castelló-Climent, 2004; Knowles, 2005; Davis, 2007; Pede et al., 2009). The ones who found a positive one (Partridge, 1997; Forbes, 2000; Li and Zou, 1998; Nahum, 2005) the studies who propose a sign changing nonlinear relationship (Barro, 2000; Banerjee and Duflo, 2003; Pagano, 2004; Voitchovsky, 2005; Bengoa and Sanchez-Robles, 2005; Barro, 2008; Castelló-Climent, 2010). As well as an additional small group who found no correlation at all or find inconclusive evidence of one (Lee and Roemer, 1998; Castelló and Domenech, 2002; Panizza, 2002).

This paper provides a description of the current state of this debate, beginning with the description of the four main positions on the sign of the relationship as well as their main representatives, complemented by a brief explanation of the proposed mechanisms by which inequality effects growth.

1.2 A negative relationship between inequality and growth

Since the early stages of development of this line of research, the predominant position was in line with the proposal of a negative relationship between inequality and growth. This leading position, named by Rehme (2007) as the *Conventional Consensus View* is also consistent with the chronological development of this area of study, as it was not until almost a decade after the start of the first wave of studies that a contrasting view to the negative link was presented. Despite the fact that the interest in the study of this phenomenon started since the beginning of the 1990s, it was at the later part of the decade that the debate was formally set.

One of the first studies to suggest a negative relation was the one developed by Perotti (1993) where a theoretical model was developed by combining political economy arguments with imperfect financial markets to define the way inequality influences growth rates. With a strong "trickle down" focus and the assumption of linear taxes and lump sum redistribution, Perotti proposed that growth rates depend on the existing level of inequality, the resulting political equilibrium (with strong democratic assumptions), redistributive decisions associated to this equilibrium, and the amount of investment in human capital associated to the previous events. In this model, different income distributions and different levels of income will generate different growth rates through the effects of allowing individuals in the lower brackets of income to overcome the costs of investing in education. Here the negative relationship arises as poor individuals in countries with high inequality and low redistribution are not able to accumulate the potential human capital necessary for promoting growth.

Another relevant study which found a negative relationship between inequality and growth is the one by Alesina and Rodrik (1994). In their study, the authors develop a political economy model in an endogenous growth framework, where political decisions (specifically tax related) exert a specific influence on economic performance. In this model, the negative relation arises in the case of having such an income distribution that the majority of the voters pressure the level of taxation towards higher imposition and redistribution from capitalist to workers. In this context, there would be a tradeoff between the benefits of the redistribution on the income of the working class and the negative effects of the high taxes on capital, resulting in lower growth rates.

Clarke (1995) argued in favor of a negative relation but, in contrast with Alesina and Rodrik (1994), he emphasized the fact that this relationship is independent of the political regime or the differences in the growth regression. He controlled for this circumstances and argued in favor of the political economy model as the transmission vehicle for the relationship between inequality and growth (specifically trough the effects of taxation and redistribution). Even though Clarke finds a negative and significant relationship, he concludes that it does not represent a considerable magnitude in its participation in growth rates.

Persson and Tabellini (1994) are among the main supporters of the negative relation between ax-ante inequality and growth. In their study, they use the political economy arguments in a model of endogenous growth, where tax policy and inequality levels determine different paths of growth. For the empirical test they employ two different data sets: one consisting of a pooled data collection with historical information (going as far as the middle of the XIX century) for nine countries, including the United States and eight European countries(Note 4); and another

one covering 67 countries in the period of 1960 to 1985.

As in Perotti (1993), the variable by which inequality can affect growth rates is through the accumulation of human capital and its effects on productivity. Here, individuals decide how much to invest in the accumulation of human capital based on the future returns of their higher marginal productivity. A situation in which high rates of inequality prevail would result in a political equilibrium where higher taxes on capital gains would prevent individuals from receiving the returns on their investment in human capital (or at least a part of it), thus diminishing the incentives for its accumulation and lowering productivity and growth.

A second strand of pioneering works trying to identify the "real" relationship between inequality and growth are the ones who argued about the socio-political problems persistent in highly unequal and polarized countries and the potential effects of this situation on investment rates and ultimately on the economic performance.

Alesina and Perotti (1996) developed a study in this line, with a model where high levels of income inequality create social unrest which derives into socio-political instability, less investment and the associated reduction in economic performance. The authors construct an index for measuring social instability composed of three elements: the amount of politically motivated assassinations; the number of people killed as the result of domestic violence; the number of attempted but unsuccessful coup détats; the number of successful ones; and a dummy variable that captured the democratic status of the country. For the data on income distribution they use the same dataset as Perotti (1993) and Alesina and Rodrik (1994), which is based on Jain (1975). To test their arguments they developed a system of equations that relate first socio-political instability to investment (and thus growth), expecting a negative sign; and second, the income distribution indicator to the socio-political index. The simultaneous equations are as follows:

$$INV = \alpha_0 + \alpha_1 SPI + \alpha_2 PRIM + \alpha_3 PPPIDE + + \alpha_4 PPPI + \varepsilon_1$$

$$SPI = \beta_0 + \beta_1 PRIM + \beta_2 GDP + \beta_3 INV + \beta_4 MIDCLASS + \varepsilon_2$$

Where SPI is the variable measuring socio-political instability; PRIM is the enrollment ratio in primary studies; PPPI and PPPIDE capture the effect of domestic distortions which could affect investment, by measuring the value of the investment deflator (in this case in 1960) relative to that of the U.S., and the magnitude of the deviation of PPPI from sample mean, respectively. INV is the total private plus public investment and finally, MIDCLASS is the measure of income equality employed by the authors.

After estimating their model with the 70 countries dataset via OLS and 2SLS they find "solid" results that confirm their model, stating that "an increase by one standard deviation of the share of the middle class causes a decrease in the index of political instability of about 3.3. This in turn causes an increase in the share of investment in GDP of about one percentage point". (Alesina and Perotti, 1996, p. 12)

Later on, Josten (2003) followed this line of argument but abstracting from the effects of inequality on political stability and focusing directly on the specific relationship between inequality and criminal behavior. His arguments are that in a context of high inequality and low rule of law conditions, individuals will have lower opportunity costs for choosing to

"specialize" in criminal activities. As these individuals profit from the appropriation of income and the returns from legal productive activities they slow down economic performance. The greater the amount of individuals who incur in these activities, the lower the growth of the economy. The author depicts these ideas theoretically in an overlapping generations, general equilibrium model but fails to contrast them empirically.

In order to follow an objective and precise description of the most influential studies in the *Conventional Consensus View* it is necessary to draw a line on the time sequence of the development of the literature. We must notice four important features of what can be called the *first wave* of studies that reach conclusions in line with a negative and significant correlation between income inequality and economic growth:

a) The fact that at that point only two mechanisms had been placed forward to explain the channel by which inequality affects growth, the political economy channel and the socio-political instability mechanism.

b) The use of fairly irregular datasets of income inequality measures, structured with data from mixed sources and little emphasis on the characteristics, composition and calculation.

c) Predominant use of income shares and ratios from one to others as measure for inequality and little use of positive indexes such as the Gini coefficient.

d) Predominant use of econometric methodologies such as *Ordinary Least Squares* (OLS), and *Two Stage Least Squares* (2SLS).

After this first wave and the establishment of a mainstream consensus on the relationship between inequality and growth, a new strand of researches started to place interest not only in the sign of the relationship and the path for this relation to happen, but into the quality of the data and the methodology to test such hypotheses. One of the most relevant was the new dataset on income inequality put forward by Deininger and Squire (1996) in which they establish the basic requisites that inequality measures should meet in order to be considered high quality data. Here follows a brief description of the four basic criteria:

1) *Data on household vs. individuals*. The data should be based on information of individual units obtained from household surveys. Although an adjustment based on the number of adult family members is recommended.

2) *Comprehensive coverage of the population*. To obtain the data from statistically representative samples covering all of the population, not only from urban areas, from economically active population and taxpayers in order to avoid unnecessary bias in the estimations.

3) *Income vs. expenditure*. Here the emphasis is on the necessity of including all kinds of income and not solely wage income, as in many countries (especially developing countries) nonmonetary income and nonwage income represent a significant proportion of total income and expenditure.

4) *Gross vs. net income*. Gross income does not take into account fiscal redistribution. Capturing only gross income could generate upward biases on the estimations of

income inequality.

The Deininger and Squire dataset comprised inequality information for 138 countries and came to be the most recurred source of information for income inequality data in empirical studies, raising the quality of the estimations and shifting the preferences to the use of the Gini coefficient as the most used inequality measure.

One of the studies that employed the new dataset was developed by De la Croix and Doepke (2003), with the additional feature of introducing a new mechanism to explain the way income inequality negatively affects growth. In their study, they build a model which links the long run effects of income inequality with fertility differentials for the different income brackets. This differential fertility results in a reduction of the aggregate stock of human capital in the economy, thus affecting productivity and long term growth.

To support the first part of their arguments they relied on the results of Kremer and Chen (2002) who studied the relationship between education levels of the working population and their respective fertility choices, finding that "empirical evidence suggests that the fertility differential between the educated and uneducated is greater in less equal countries".

In order to check for their second hypothesis they gathered data for a sample of 67 countries in two periods of 16 years (from 1960 to 1976 and from 1976 to 1992), and estimated a standard growth equation via the *Generalized Method of Moments,* including a variable that captured the proposed fertility differentials. Their findings were in line with the predictions, fertility differentials affect negatively growth with a magnitude in which "an increase in the fertility differential from one to two would lower growth by 0.8% per year" (De la Croix and Doepke, 2003).

The Fertility-human capital mechanism constitutes one of the four principal arguments to link inequality with growth (which will be discussed later). It is worth noticing however that even though the authors successfully validate the hypothesis of a negative relationship between fertility differentials and growth, they fail to empirically corroborate the variable that is supposed to detonate the effect on growth, the human capital variable, which is stated by the authors to be negatively affected by fertility differential and which in turn reduces economic performance. In this context, this omission left open for debate the question over the validity of implementing educational policies in order to ensure the access to education for the most abundant population in the lower brackets of income, or if it is only through lowering income inequality(Note 5) how the negative effect could be reverted. Later on, authors like Ahituv and Moav (2003) and Viaene and Zilcha (2003) demonstrated the first: that fertility is closely correlated with educational levels, and that education is positively related to economic growth and the second: that policies intended to provide universal access to education would encourage not only a better economic performance but also a better overall income distribution.

In the same line of argument Castelló and Domenech (2002) place the role of human capital inequality in the spotlight as responsible for the negative effects on investment rates and economic growth. The authors develop a Gini for human capital and include it in a standard growth regression, with a dataset of 108 countries over the period from 1960 to 2000, and using

Deininger and Squire (1996) inequality data.

Their findings contrast somewhat to those of De la Croix and Doepke (2003) in that human capital inequality is negatively correlated with growth but not income inequality when both are included. They argue that even though they find income inequality to be negatively and significantly correlated to growth, when introducing the human capital inequality the sign of the income inequality variable changes to positive and further when including geographical dummies, the positive coefficient becomes insignificant.

Josten (2004) develops a model which might capture the essence of both the human capital and socio-political instability channels with arguments in which social capital is the variable affecting growth and affected by inequality. Even though the propositions are not confirmed empirically, the author develops his idea through a heterogeneous agents overlapping generation model incorporating social capital additionally to endogenous growth precepts. The basic idea behind it is that as income inequality grows; the communitys social capital decreases consequently, affecting negatively the growth rate of the economy.

Castelló-Climent (2004) reassesses her previous results and emulates the model developed by Forbes (2000), who found a positive relationship between inequality and growth and therefore will be addressed on the next section. The author continues with the arguments of her prior studies in the sense of testing for the effects of human capital inequality on economic growth. For this, she builds a 108 country database covering from 1960 to 2000 with standard growth variables as well as an augmented Deininger and Squire (1996) dataset for the income inequality measure as well as her own estimations on human capital inequality.

The author affirms that after estimating by system equations via GMM and controlling for human capital inequality, the effects of income inequality tend to become insignificant and human capital inequality turns out with a negative and significant sign. It is very important to point out that Castelló-Climent assumes human capital inequality to be a high quality proxy for wealth inequality, and criticize the income inequality measure as a good measure due to deficiencies with the quantity and quality of the data.

The main conclusions are that human capital inequality exerts negative effects on economic growth, and the principal transmission mechanism is through the effect over investment rates and over fertility rates, this last one in line with De la Croix and Doepke (2002). Accordingly, the policy implications are related to the implementation of mechanisms to ensure a better distribution of access to education in order to ensure additional growth.

As mentioned before, the remarkable developments in the study of the relationship between income inequality and economic growth evolved from the initial establishment of a general consensus view, to the improvement in the quality of the data employed, the models and the methodology. Nevertheless, during the later part of this decade, new perspectives to address the inequality-growth question have arisen in the context of a negative relation.

Knowles (2005) turns back the attention to the quality of the data used to measure income inequality, and affirms that most of the results found on recent literature are biased due to inconsistent measures and, if measured correctly, they would lose robustness. He proceeded to build a "reliable" dataset for income inequality in order to test for the relation and finds that

when estimating with data composed by income measures of inequality, the relationship is not significant, but when doing so with expenditure data the relationships turns to be negative and significant. The author concludes that when taking into account redistribution and measuring net expenditure, the negative relationship arises.

A study by Pede et al. (2009) is the exception, not only due to the results and the country specific orientation, but because they are among the first researchers in this area of study to implement the recently developed methodology of spatial econometrics to the study of the inequality-growth relationship. Even though the authors do not test any formal transmission mechanism, they do look for direct effects of income inequality on employment growth in the main economic sectors of the United States economy, with data disaggregated at a county level (3074 obs.) and covering the period of 1990 to 2008. After estimating the effects on each of the 12 economic sectors they find that "inequality has negative and significant impact on employment growth in the Construction sector, and results are mixed for other sectors such as: Manufacturing; Retail Trade; Professional Scientific and Technical Services; Accommodation and Food Services; and Educational Services".

The previous pages described the most influential arguments concurring with a negative effect of income inequality on economic growth. As depicted in Figure 1, the relationship passes either through the human capital or the investment variable and it is detonated by several intermediate effects such as fertility differentials, socio-political instability, redistribution and the associated taxes (mainly on capital), as well as some alternative not so cited like the accumulation of social capital or the growth of the informal sector.
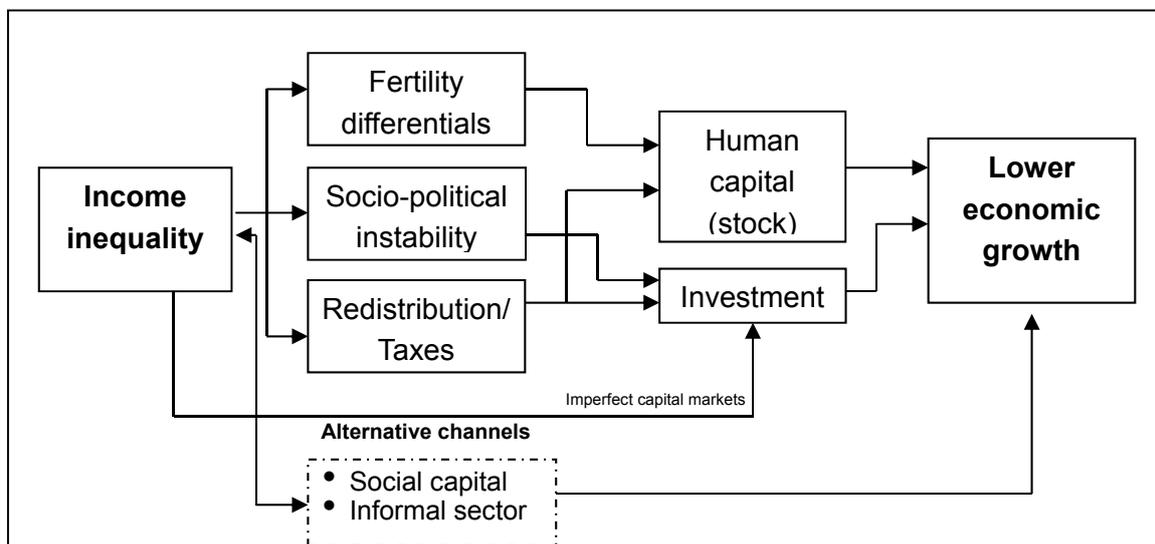
Figure 1: Transmission mechanisms in the Conventional Consensus View

1.2 A positive relationship between inequality and growth

The formal beginning of the debate over the sign of the effects of income inequality over economic growth starts with the publication of the first research papers whose results challenge the *Conventional Consensus View, f*inding a positive sign on this relationship.

Li and Zou (1998) are considered by many to be the first to propose this contrasting view. In their study, they suggest a theoretical relationship based on a political economy model in which public consumption is the feature that detonates the positive correlation. The idea behind their theoretical model is that in an economy where government spending is entirely allocated to consumption, individuals, in a more egalitarian economy where the median income is higher, will have incentives to vote for higher income taxes in order to raise the amount of government consumption, resulting in lower economic growth.

The authors developed an empirical validation using the Deininger and Squire (1996) dataset, covering a total of 112 countries in a panel for the period of 1947 to 1994, and they estimate several sets of equations in order to check the results through different methodologies as well as different model specifications. In the first set of equations they include time specific dummies, democracy and a combination of both, as well as a base regression, an estimating both with fixed as with random effects. The results showed, in all cases a positive and significant sign for the Gini variable, nevertheless, all random effects estimations resulted in lower coefficient and less significance for the inequality measure. According to the coefficient, the practical inference is that the fixed effects results imply that a one standard deviation increase in the Gini coefficient will result in an increase of almost half percentage point of the GDP growth rate.

On the following sets of equations they included a series of control variables commonly used in growth studies like population growth, urbanization ratio, openness, investment share, black market premium or financial development. They found that when including the complete set of variables the inequality variable looses significance but remains positive. Nonetheless, when including only some of them, and after implementing a backwards stepwise estimation, the coefficients remain significant and positive in most regressions. Among other things they find the inclusion of the investment ratio to provoke the lost of significance.

Partridge (1997) developed one of the few relevant country specific studies in related literature, in which he proposes a positive relationship between inequality and growth. The study, applied to US state level data, covered the period of 1960 to 1990. It was structured somewhat as a comparison to those of Persson and Tabellini (1994) and Alesina and Rodrik (1994), therefore his theoretical basis for the inequality-growth relationship come from political economy arguments.

The results support a positive relationship between income inequality (measured with the Gini coefficient) and economic growth. Nevertheless, when including the income share of the middle quintile (which is a measure of equality), the sign comes out positive, thus generating ambiguities in the results. The author justifies this difference with related literature by introducing an assumption in the sense that "the likelihood of growth enhancing policies increases as higher-income groups gain political power relative to lower-income groups (which is what the positive Gini-economic growth relationship may reflect). If political influence and power are positively related to political contributions, this outcome is possible. (Partridge, 1997, p. 13)

It can be noticed that this addition effectively neutralizes the assumption of the "one man, one vote" in which political power is homogeneously distributed. An additional conclusion was

that the negative relationship might explain the difference in the inequality-growth relation between countries but not within them.

Another foundational study for what could be called the *Alternative View Consensus* is the widely cited reassessment of the inequality-growth relationship developed by Forbes (2000), who verified the relationship over 5 year averages using an improved panel dataset for income inequality and testing by several methodologies.

Forbes reaches the conclusion that in the short and medium run inequality affects positively and significantly economic growth, "A ten-point increase in a countrys Gini coefficient is correlated with a 1.3 percent increase in average annual growth over the next five years" (Forbes, 2000, p. 10). The arguments for the challenging results do not derive from any theoretical model but from criticism related to the quality of the data and the methodology used in previous papers for the estimations. About the data, she gathers a high quality dataset, including only countries with at least two consecutive observations and ends up with a sample of 45 countries and 180 observations covering the period 1966 to 1995(Note 6).

Regarding the methodology, the author proposes the use of estimations via the Arellano and Bond (GMM) estimator. By this method, each variable is expressed as the first difference in reference to the previous period. The idea is to eliminate any country specific effect and express the variables as deviations from period means, as well as to use the lagged values as instrumental variables. The general equation after the first differences transformation is as follows:

$$y_{it} - y_{i,t-1} = y(y_{i,t-1} - y_{i,t-2}) + (X'_{i,t-1} - X'_{i,t-2})\beta + (u_{it} - u_{i,t-1}),$$

Garbis (2005) confirms Forbes short run results and finds a statistically significant positive effect of inequality measured by the Gini coefficient. Another interesting result of this paper is the fact of having also found a positive link between inequality and growth in the long term(Note 7). The author offers a compelling theoretical justification, arguing that in the short term and in a context of low income dispersion, the existence of imperfect credit markets makes higher savings and physical capital accumulation growth enhancing. On the other hand, as human capital becomes one of the most relevant determinants of growth in the long run, the effects of high inequality are detrimental to economic performance due to the impossibility of many individuals below a certain income level to obtain credit to invest in human capital or other potentially productive activities. This impossibility is the result of the allocation inefficiencies created by the imperfect credit markets.

The prior are the main representatives of the *Alternative View Consensus,* which proposes a positive effect of income inequality and growth. Figure 2, depicts the channels by which this relationship is transmitted, according to the literature. It is relevant to notice that it is mainly through political economy arguments that the positive sign is theoretically justified, and that methodological issues represent a substantial part of the arguments in favor of a statistically significant positive relationship.
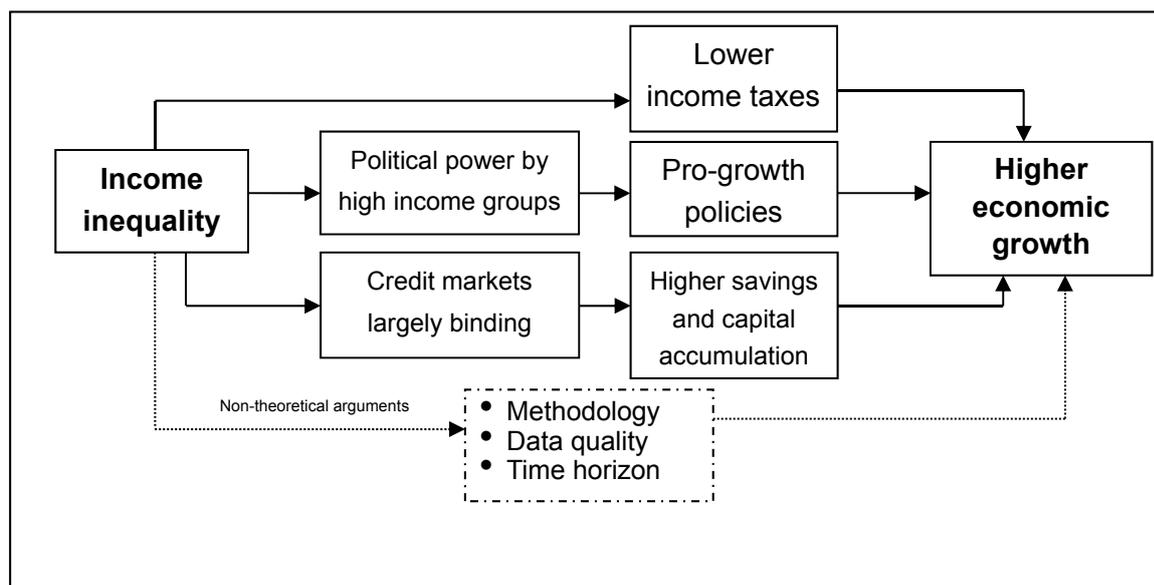
Figure 2: Transmission mechanisms for the positive relationship between income inequality and economic growth

1.3 A kinked nonlinear relationship between inequality and growth

This third line of thought could be considered either as a theoretical conciliation of the two previous positions or as a new contrasting and perhaps more complex position over the real effects of income inequality over economic growth.

Possibly the main exponent (and possibly the pioneer) of this view is Barro (2000), whose work estimates the inequality-growth effect over 10 year periods with a broad panel of countries covering from 1965 to 1995 and finds that even though the overall relationship between inequality and growth is weak, there is a tendency by which the effects of these variables would be different for countries in different circumstances, specifically for different income levels, thus implying a non linearity in the relation, conditional to the average income level, being the income breakpoint of around $2,000 US Dollars of GDP per capita (1985 US Dollars).

Barro estimated in a standard growth model the effect of different measures of income inequality such as the Gini coefficient and income quintiles on growth and on investment. His estimations are via three stage least squares, structured as system equations with the correspondent instrumental variables. The growth equations include variables such as the log of the initial GDP per capita, the investment ratio, government consumption as percentage of GDP, a rule of law index, a democracy index, inflation rates, years of schooling, the log of the total fertility rate, the growth rate of terms of trade as well as regional dummies. The objective for this inclusion is, apart from constructing the estimation with growth variables standard to this kind of models, to control for some of the mechanisms that are supposed to transmit the effects of inequality to the growth rates.

Initially, when estimating with the complete sample, the inclusion of the Gini variable results in a statistically insignificant relationship, with a coefficient value close to cero. This result was

confirmed in an estimation using the highest quintile of income distribution as proxy for income inequality, the results were remarkably similar as those of the Gini coefficient. An additional result, related to those of De la Croix and Doepke (2002) is the fact that controlling for fertility rates captures some of the effects of the Gini, and when excluded from the equation, the coefficient for the Gini sensibly rises.

Another influential study with a non linear relation is the paper of Banerjee and Duflo (2003). In their political economy model (with some arguments of the imperfect financial markets mechanism), they affirm that movements in the levels of income inequality, in any direction, will result in distortive policy decisions that will lower the growth rate of the economy. For the authors, the fact of having to negotiate and having to agree in policy decisions after distributional movements generates inefficiencies and distortions in economic dynamics, even if the bargain process result in growth enhancing policies, the time and resources invested in the process of agreement will have economic costs.

To test the model they use Barro (2000) and Perotti (1996) regression like specifications. They use the Deininger and Squire (1996) inequality dataset, including in the sample only countries with at least two consecutive observations, which reduces it to mainly developed countries. Instead of including the Gini variable as in most similar studies, Banerjee and Duflo capture only the rate of change between the current and previous period inequality level, as well as its square value in order to measure the effect of absolute changes. The specification is as follows:

$$(g_{it} - g_{it-\alpha}) \text{ and } (g_{it} - g_{it-\alpha})^2$$

And the base regression is:

$$\frac{(y_{it+\alpha} - y_{it})}{\alpha} = \alpha y_{it} + X_{it}\beta + h(g_{it}) + k(g_{it} - g_{it-\alpha}) + v_{i} + \epsilon_{it}$$

The estimations include controlling for fixed and random effects and estimating via the Generalized Method of Moments (GMM), Arellano and Bond type GMM, Ordinary Least Squares (OLS), Seemingly Unrelated Regression (SUR) and Three Stage Least Squares (3SLS).

The main implication of this study is not necessarily related to Inequality itself and its effects on growth but rather to the decisions over inequality and the distortions they generate. According to them, Growth rates are maximized when there are no changes in inequality; accordingly, they are lowered when inequality changes in any direction.

Pagano (2004) reaches the same conclusions as Barro (2000) in the sense of the existence of a non linear relationship between inequality and growth defined by the income level of the country. In rich countries the effect of inequality is growth enhancing and in poor economies it is growth detrimental. Additionally, he finds a negative and significant reverse causality between both variables.

Another research that endorses the proposition of a non-linear relation between inequality and growth derived from the income levels is Voitchovsky (2005), who reaches an analogous conclusion but from an intra-distribution view. The proposition here is that inequality exerts different effects within a distribution (as between countries), inequality at the bottom of the

income distribution is negatively linked to growth and the opposite occurs for the upper end of the distribution. The author tested this proposition by basically dividing the general income distribution of his sample into low and high income(Note 8) groups and obtaining new inequality measures for each of them.

Among the main implications proposed by the author is the affirmation that the results of studies not accounting for this intra distributional effects reflect only the average effect of inequality over growth at both income ends, thus not capturing the fundamental complexity of the correlation.

Bengoa and Sanchez-Robles (2005) validate the Barro-type inequality-growth relation. In their study they test for the relationship in two sets of countries, one composed of medium income countries and another one made up of high income economies. Their result for the first set was ambiguous due to having found a "humped shaped" relationship between inequality and growth(Note 9), nevertheless, in the second sample (the one composed of high income countries) they found a strong positive and statistically significant effect of inequality over growth. Suggesting that "the impact of equality on growth may be different at the various stages of development" (Bengoa and Sanchez-Robles, 2005).

Barro (2008) revisited his 2000 paper with an enhanced and actualized inequality database from the UNs World Income Inequality Dataset (WIID). The author confirms his previous results of a positive inequality-growth relationship in rich countries and a negative one in poor economies with the difference that here the income breakpoint for the shift in the sign is considerably higher, at around $11,900 (in 2005 US Dollars) (Note 10). This implies that the income breakpoint level grew which provoked that less countries where now situated in the positive side of the relation.

The final paper in this line of thought is the one of Castelló-Climent (2010). She confirms Barros proposition and makes it analogous to human capital inequality by finding, on the one side, a negative overall relationship between inequality and growth, and on the other, a positive relationship for developed countries(Note 11), especially for income inequality and a negative for developing economies, when running the estimations with different samples of different income level countries. Castelló-Climent gathers three sets of data for inequality, one consisting of an up to date and enhanced Deininger and Squire (1996) inequality dataset structured with 55 countries in which now (contrarily to the one used in previous papers) are included more less developed countries; a second one containing information for a reduced group of high income countries, obtained from the Luxemburg Income study and; a broader dataset previously structured by the author, with human capital inequality measures for 108 countries for the period of 1960 to 2000.

The non-linear perspective is predominantly oriented towards the importance of income levels as the force defining the sign of the relationship (see Figure 3). This explanation could effectively conciliate the opposite views within the inequality-growth debate as it offers a framework in which both perspectives fit. However, it leaves some question marks over the existence of specific mechanisms working, perhaps at different intensities, within the different income levels, and who are responsible of generating the influence on growth.

2. Discussion

The last twenty years have seen a growing interest by economist for understanding the effects that income distribution has on economic performance, and even though economic theory has focused traditionally in issues such as productivity and efficiency, scholars now recognize the potential causal relationship between income inequality and the way economies can grow. Nevertheless, the results of the different studies have not yet come to concur into a general position over the sign of the inequality-growth relationship. Moreover, the remarkable disparities in the results, both in theoretical and empirical studies, have derived into a complex debate. Even within each of the proposed relationships (negative, positive and non-linear) there is no general agreement on how does the fact of having an unequal distribution of income result in lower or higher GDP growth after a period of time. While some authors focus only on the general sign of the relationship and pay no attention to the way it works, there have been others who have put forward some arguments that try to explain the transmission mechanism of the effect of inequality over growth.

The current situation may lead to believe that the relationship between income inequality and economic growth may still be far from being understood. The very existence of a debate with three contrasting views (positive, negative and non-linear) might strengthen that idea even more. It seems that a general consensus may be distant from being reached and, even though the non linear propositions could act as a conciliatory argument, a complete framework for understanding both the causal relationship as well as the embedded mechanisms by which the relationship takes place is still missing. The question mark is still open and more studies are necessary in order to understand such a complex phenomenon, and to find a unifying explanation for this important relationship.

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Endnotes

Note 1. This argument was formalized by Mirrlees (1971)

Note 2. The following comment resumes Sen's position on this issue: "How much guidance…can we expect to get from modern welfare economics in analyzing problems of inequality? The answer, alas, is: not a great deal. Much of modern welfare economies is concerned with precisely that set of questions which avoid judgments on income distribution altogether". (Sen, 1973. p. 6)

Note 3. Refer to Sen (1973) and (1980) for a more in depth analysis over the inequality implications of welfare economics.

Note 4. Austria, Denmark, Finland, Germany, the Netherlands, Norway, Sweden, Finland and the UK.

Note 5. A third option would be to lower the fertility levels for the population in the lowest income levels, but that would not ensure them a higher provision of education, if the income level persists at a low level.

Note 6. The final sample does not contain any African country and it is composed predominantly by OECD countries. As it will be commented later, this data choice could have unintentionally influenced the estimation results.

Note 7. Measuring the effects over 10 and 15 year periods.

Note 8. The breakpoint dividing the bottom and upper ends of the distribution was set arbitrarily at the median, thus capturing in both parts, a fraction of the middle income group.

Note 9. Later on it will be commented how the authors failed to read this result as evidence of the nonlinear effects that inequality levels have on growth and which are the care proposition of this thesis.

Note 10. For the sake of comparison with Barro (2000), this amount is equivalent to around $7,330 US 1985 dollars.

Note 11. The positive relationship for human capital inequality resulted to be weaker than the negative one after a series of robustness tests.

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