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REDISTRIBUTION AND HUMAN CAPITAL: THE IMPACT ON LONG-RUN GROWTH

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To my parents and my girlfriend, thank you for giving me all the love in the world

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Abstract

Given the controversy around the effect of income inequality on economic growth, we analyze if government intervention towards its reduction is desirable. Moreover, we test if human capital is a major vehicle through which redistribution operates. Using data on 174 countries, from 1960 to 2008, we verify that those who redistribute more present higher levels of 10-year growth more frequently. We also find that redistribution has a statistically significant positive effect on growth, and this impact is higher in developing economies. We did not find evidence that human capital captures this positive impact, which supports that other vehicles are responsible for this effect.

Keywords: Inequality, Redistribution, Human Capital, Growth

1 Introduction

The impact of inequality on economic growth is still a controversial topic among economists. Even for those who found that it can jeopardize growth, it is not immediate that policymakers should intervene to reduce it, as the effect of that intervention can also harm growth, by creating market distortions which generate a dead-weight loss.

One of the vehicles through which inequality might harm growth is by depriving individuals from investing in human capital. We aim to study how does government intervention to reduce inequality affects growth, and also up to which extent is that effect captured by the human capital vehicle. Human Capital was described by Adam Smith as something that not only allowed enterprises to become more efficient and profitable, it adds to the collective wealth of society. Investing in human capital usually requires a threshold of wealth which might not be affordable for every individual within a given economy. One of the most common methods used to measure human capital is through schooling, since it allows individuals to obtain knowledge which as Adam Smith said, can be further used for their own benefit (by increasing the productivity of their work) as well as helping individuals to become better citizens which benefits the whole society. But schooling has a cost, which not all families can afford, and when the wealth distribution within the society is too unequal, a large number of families might face financial struggle would they send their children to school, and as consequence, opt for not doing so. That can lead to a sub-optimal level of investment in human capital, and thus comprise the potential output of the economy. It is under this theoretical framework that we test the hypothesis that government intervention that reduces inequality generates growth in the long-run, and if human capital is a vehicle through which inequality might harm growth.

1.1 Literature Review

The first economists who focused on inequality issues were Lewis (1954) and Kaldor (1955), who stated that a higher level of inequality would have a positive impact on economic growth. Under the assumption that the marginal propensity to save of individuals increases with their wealth level, inequality that favors high saving capitalists, would allow for higher capital accumulation, and thus generate growth. Lazear and Rosen (1979) supported the same conclusion, justifying that inequality could provide incentives for entrepreneurship and innovation.

However, the theoretical models changed, and inequality became widely accepted as affecting growth negatively, even though, not always directly. The first vehicle through which inequality can harm growth is due to redistribution policies. Okun (1977) argued that unequal countries spend more resources in redistribution. Perotti (1996), develops the hypothesis raised by Okun, as he found empirical evidence that inequality increases the pressure for redistribution policies, which have a marginal cost for society. Saint-Paul and Verdier (1993) claimed that providing health and education spending for the poor can help offsetting both labor and capital market imperfections, since the poor have lower bargaining power, thus leading to inefficiencies.

Galor and Zeira (1993), came up with the idea that inequality can be harmful since it denies a higher proportion of the population in a given economy the capacity to invest in human capital, and thus compromises the potential output. This work was a departure point for many others as it presented a structural disadvantage to having inequality increase. Alesina and Perotti (1996) suggested that inequality increases fertility, thus increasing the Malthusian effect of population growth. Aghion et al. (1999) came up with two extra reasons to explain why inequality can be harmful to growth: first, it worsens borrowers incentives by increasing the demand for credit, and thus reducing the disposable wealth available for those who inherit less, which can impede them to invest in human capital. Second, it also increases macro-economic volatility, since the cost of credit increases, the capacity for individuals

to borrow in order to smooth wealth cycles declines. Rodrik (1999) complemented the macroeconomic analysis of the effects of inequality. He suggests that a country with higher inequality, is more likely to have conflicts within it's society, which can make the allocation of resources inefficient when a response to a negative external shock is required: fiscal policy and the adjustment of relative prices such as wages can be compromised by redistribution, instead of used to increase productivity.

Barro (2000) put an end to the cycle of pro-equality research, by suggesting that in very poor countries, some inequality can be beneficial, by allowing a few individuals to have the minimum threshold to become entrepreneurs, or to pay for education. It is the same as saying that when the wealth distribution is positioned in such low level, some positive skewness can trigger growth.

Back to pro-equality, Benabou (2000) has some reserves as to Perotti's hypothesis that inequality generates pressure for redistributive policies. He claims that the empirical data do not support that more unequal countries are the ones who redistribute more. He then suggests that redistributive policies can increase ex-ante welfare, and the political support for those is reduced with higher inequality. Easterly (2007) provided us with an atypical piece of work. He used cross-country data on agricultural endowments to predict inequality, and then to predict not only growth, as well as other development outcomes such as quality of institutions and schooling, enhancing the idea that inequality can undermine growth.

Kumhof and Ranciere (2010) suggested that less equality can lead to higher financial leverage of the lower and middle classes, since the high income of the upper class households is "recycled" to the poor and middle-class via loans, thus increasing the vulnerability to a crisis. Stiglitz (2012) also contributed to support the idea that inequality hurts growth: under the idea developed by Kumhof and Ranciere, Stiglitz found evidence that the upper classes can undermine the political process in their favor, thus increasing inequality, and thus leveraging the economy, as wealth is moved from those with higher marginal propensity to consume, to those with less, creating a gap which is filled by that leverage, and thus

increasing volatility, as more levered economies are expected to be more affected by shocks. However, Stiglitz suggests that volatility also promotes higher levels of inequality, since the bargaining power of those at the bottom is lower, they are the ones most affected by negative shocks. These ideas suggest that inequality is a vicious cycle. Finally, Ostry et al. (2011) and Berg et al. (2012) tested the hypothesis that inequality can increase the probability of a break in a growth cycle. They verified, using cross-country data, that growth is easy to trigger, but hard to keep going, and inequality appears to have a statistically significant negative effect on the duration of growth spells.

We found that inequality is a controversial issue for those who study economics, either due to its direct and indirect effect on growth. Three vehicles through which inequality can harm economic growth were presented: increasing pressure for redistribution policies which enables to mitigate the inequality problem, can not do so without a cost. However, Benabou found evidence that more equal countries tend to distribute more, which is the inverse of what was proposed by Okun. Second, inequality can deprive individuals from investing in human capital, and finally, it can increase macroeconomic instability. In this work we propose to analyze the partial impact of redistribution policies on growth. Even under the assumption that inequality can harm economic growth, it is not clear that the government should intervene to reduce it, due to the marginal cost of such intervention. When brought together, the causality relationships between inequality, redistribution, human capital investment and growth might not be clear to identify. Let us for instance assume the hypothesis that more unequal countries tend to impede their citizens from investing in human capital. It then seems that redistribution is the solution for this problem, since it would provide the lower classes with the income level they needed to pay for education. However, this redistribution policies usually have a marginal cost of implementation. Hence, the net effect may not be crystal clear. We will analyze which of the impacts is supreme, or if they actually cancel out. Furthermore, we test if some of the impact of redistribution is captured by the human capital vehicle, which would mean that more redistribution allows

more individuals to invest in human capital

2 Methodology

2.1 Data

In order to measure inequality, we use the data of the Gini index from the Standardized World Income Inequality Database (SWIID), which combines data from the World Income Inequality Database of the United Nations University, the OECD, the World Bank, the UN Economic Comission for Latin America and the Caribbean, the World Top Income database, the University of Texas Inequality Project, and many other academic studies. The SWIID provides data on inequality in 174 countries, measured by the Gini Index. It has the advantage of being previously prepared for comparison purposes, and also provides the data for the net and gross Gini index. The gross Gini Index measures the level of market inequality, i.e. resultant from "a free market economy", prior to government intervention. On the other hand, the net Gini index measures the level of inequality after government intervention.

Data on educational attainment was selected from the Barro and Lee database, which contains several indicators considered by the World Bank as accurate to measure the level of Human Capital. We use data on the proportion of over 15 aged individuals who attended a minimum level of schooling.

For the data on the per capita GDP and degree of trade openness, we use the available data from World Bank.

Our dataset contains a total of 174 countries, and ranges from 1960 to 2007, yielding a total of 3524 observations, from which 1385 are complete.

2.2 Variables

To study the impact of redistribution policies on economic growth, one needs to take into account several issues. First, income inequality can be measured prior and post government intervention. Gross inequality is the level of inequality that results from the free market activity, prior to government intervention. Net inequality on the other hand, refers to the level of inequality existent in a given country after government redistribution policies (taxation and subsidies) affect the wealth of individuals. We proxy the redistribution level due to government action by computing the difference between the gross and net Gini indices, given by:

$$Red = G_{gross} - G_{net}$$

where *Red* stands for redistribution, G_{gross} is the gross Gini Index and G_{net} is the net Gini Index. The causality relationship between inequality and growth is not clear. Does inequality affect growth, or countries which grow faster tend to have different wealth distributions than those who grow slower? This could undermine any conclusion we derive from our results as we intend to capture the impact of redistribution on growth, it could be case that we were capturing the impact of growth on redistribution. Since the future can not affect the past, we solve this simultaneity problem by studying the behavior of economic growth on 10-year cycles, based on variables at the beginning of the cycle. In practice, any growth in per capita GDP on the next ten years can not explain the level of effort the government does today to correct inequalities, on the other hand, the effort made today might help explaining the economic growth of the next ten years. For the per capita GDP growth, we compute:

$$g_{10,t} = \frac{GDPPC_t - GDPPC_{t-10}}{GDPPC_{t-10}}$$

where $g_{10,t}$ stands for 10 year GDP per capita growth, and $GDPPC_t$*:* Is the GDP per capita of year t.

From the Barro and Lee dataset we obtain the geographic regions used as control variables in our regressions. The regions list includes: East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia and the Sub-Saharan Africa.

In order to control for trade openness we use the proportion of international trade (sum of exports and imports) over GDP, directly download from the World Bank. We then compute the proxy for trade openness:

$$TradeOpenness = \frac{Exports+Imports}{GDP}$$

Finally, we are left with human capital. There is no general consensus on which variable is the best proxy for human capital. The World Bank suggests that education is a good one, but there are many indicators which can be used. Unlike physical capital, human capital is hardly measured in monetary units, which makes it difficult to quantify. We focus on the education component of human capital, due to the lack of data available on other instruments. From the Barro and Lee dataset we obtain the proportion of over 15-aged individuals who attained a minimum level of schooling, which we denominate as *Schooling*. The descriptive statistics of our variables are as follows:

Table 1 - Descriptive statistics

	Advanced			Sub-developed			Full Sample		
Variable	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Year	1987	1960	2008	1990	1960	2007	1,989	1960	2008
g^{10}	107.52%	-100.00%	498.02%	69.88%	-71.97%	732.83%	82.70%	-100.00%	732.83%
Red	0.15	0.02	0.29	0.06	-0.05	0.23	0.08	-0.05	0.29
Schooling	94.7%	33.94%	99.93%	75.04%	6.33%	99.99%	80.63%	6.33%	99.99%
$GDPPC_{t-10}$	12938	349	53357	2101	59	31572	5794	59	53358
TradeOpenness	64.50%	8.76%	336.25%	72.27%	5.01%	411.04%	70.11%	5.01%	411.04%
# Complete Obs.		553			852			1,385	

2.3 Model & Tests

We use cross country regression analysis on 10-year growth, since we intend to test the impact of redistribution policies which might take some time to impact. We run a full sample regression in order to have a general outlook of the relationship between the reduction of inequality due to government intervention and economic growth, and then we present a regression for the advanced economies (under the classification found in Barro and Lee) and for developing economies for robustness purposes.

We use two regression models in our study. To test for the net impact of redistribution on GDP per capita growth, we regress the variable of growth $g^{10}_{i,t}$, on our redistribution proxy, plus the set of control variables previously described.

$$g^{10}_{i,t} = \alpha + \beta_1 Red_{i,t-10} + \mathbf{X'}_{i,t-10}\gamma$$

where $\mathbf{X'}_{i,t-10}$ stands for the vector of control variables used and γ the vector of coefficients for the controls, which include the degree of trade openness, the starting point measured by the GDP per capita level at the beginning of the 10-year cycle, the different geography locations found in the Barro and Lee database, and a dummy variable per year to control for year specific effects.

Given a set of vehicles through which inequality can harm growth, and a set of vehicles through which it can support it, our regressions intend to show which one prevails. If we find that redistribution does have a positive effect on growth, we believe it is interesting to test if the human capital vehicle captures any of that effect. This would support the hypothesis raised by Galor and Zeira that inequality might harm growth by jeopardizing human capital accumulation. If we find that it does not, then it is likely that the remaining vehicles found in the literature operate as main drivers, or that innovative work on this topic is still required.

$$g_{i,t}^{10} = \alpha + \beta_1 Red_{i,t-10} + \beta_2 Schooling_{i,t-10} + \mathbf{X'}_{i,t-10}\gamma$$

After running the regressions, we intend to test whether or not the distribution of growth rates of per capita GDP changes with the level of redistribution that occurs due to government action. We take the residuals from the regressions without including the variable for redistribution, and then we separate those residuals in three groups. The first group corresponds to the set of observations that in each year belong to the bottom 33% of countries who maid a smaller redistribution effort. The second group corresponds to the set of observations that in each year belong to the group of countries within the bottom 33% and the top 33% of redistribution effort. Finally, the third group corresponds to the top 33% who redistribute more in each year. After creating these groups, we test whether or not the distribution of growth (net of general growth factors, by using the residuals from the regressions) changes between them by running a Kolmogorov-Smirnov Test for the full sample, and also for the advanced and developing economies samples. Below we can find the plots with the distributions of the residual 10-year growth, per quantile of redistribution effort.

Figure 1 - Distributions of residual 10-year per capita GDP growth conditional on redistribution effort - Full Sample

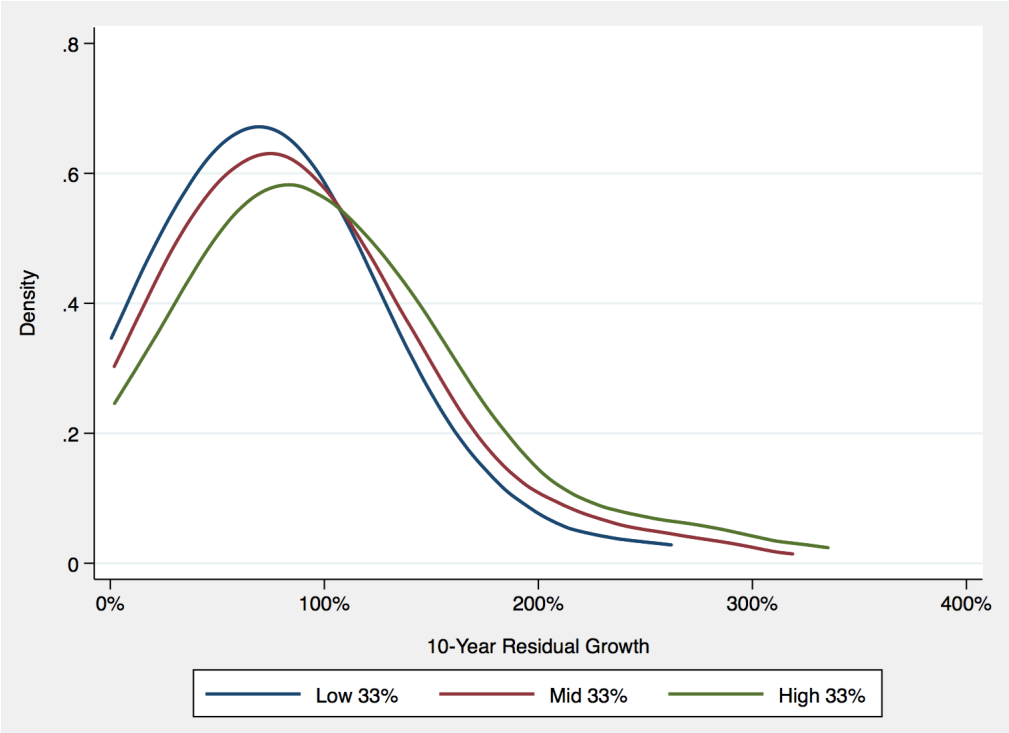
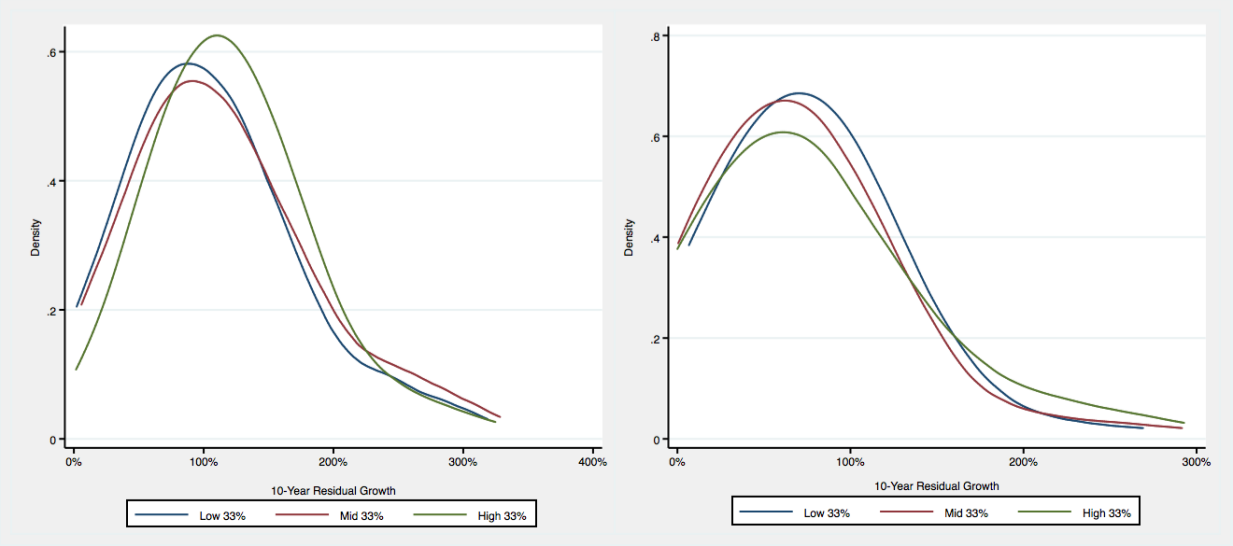


Figure 2 - Distributions of residual 10-year per capita GDP growth conditional on redistribution effort - Economies versus Sub-developed



The previous figures plot the distribution of the per capita GDP growth net of the effects controlled in the regression and conditional on the redistribution effort made each year. The blue line represents the empirical distribution of the set of the 33% countries who redistributed less each year, using Kernel density. The green line captures the set of 33% who redistributed more, and the red plots the ones in between. In the full sample and in the sample of the advanced economies (Figure 1 and right hand side of Figure 2) one can see a movement of the distribution to the right when the level of redistribution effort is higher, thus supporting that countries which redistribute more can increase the probability of achieving higher levels of growth. In the sample of developing economies, we do not see that the same movement, but the positive skewness of the distribution is clearly ascending with the level of redistribution effort, which also indicates that countries who distribute more tend to have a higher probability of achieving higher levels of long-run growth in per capita GDP

We perform a Kolmogorov-Smirnov test to test the hypothesis that countries who stand on different quantiles of the redistribution effort have a different distribution of the long-run GDP per capita growth.

3 Results

Table 2- Kolmogorov-Smirnov Test for the difference between distributions

	Low vs. Mid	Mid vs. High
Full Sample	**0.005**	**0.000**
Advanced Economies	0.925	**0.000**
Sub-developed Economies	0.915	**0.000**

The reported values are p-values

Table 2 presents the p-values of the Kolmogorov-Smirnov test performed on the full sample, the sample of advanced economies and the sample of developing economies. We test if the distribution of the long-run run per capita GDP growth changes with the level of redistribution effort made per country in each year. The results found in the full sample indicate a positive difference between all categories supporting that more redistribution increases the probability of reaching higher levels of economic growth. In the sub-samples we were not able to find statistical evidence that there is a difference in the distribution of long-run growth between those in the bottom 33% of the redistribution effort each year, and those in the middle. However, we found statistical evidence that there is a difference in the same distribution between those in the middle and those in the top. Note that this finding also suggests a difference between those in the bottom and those at the top, since the distributions tend to move to the right as the redistribution level increases.

The main finding of this test indicates that there is a positive effect of redistribution on economic growth, net of the effects controlled in the regression. This effect was verified in all samples used, since in all of them we were able to find evidence of at least a positive difference between those in the middle and those at the top up to 1% significance level.

Table 3 - Regression Estimates (Full Sample)

$Growth_i$	(1)	(2)	(3)	(4)	(5)	(6)
$Red_{i,t-10}$	3.4653***	2.8214***			2.3491***	2.4269***
	(0.4348)	(0.4489)			(0.4776)	(0.4604)
$Schooling_{i,t-10}$			0.0084***	0.0063***	0.0061***	0.0050***
			(0.0009)	(0.0011)	(0.0010)	(0.0011)
$TradeOpenness_{i,t-10}$	✗	✓	✗	✓	✗	✓
$GDPPC_{i,t-10}$	✗	✓	✗	✓	✗	✓
$Geography_i$	✗	✓	✗	✓	✗	✓
$Year_t$	✗	✓	✗	✓	✗	✓
Observations	1,597	1,384	1,445	1,404	1,425	1,384
R^2	0.0461	0.5122	0.0518	0.5078	0.0678	0.5185

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We find evidence that redistribution has a net positive effect on 10-year growth. Table 3 reveals evidence of statistical significance, even when controlled for the general growth factors. A reduction in income inequality due to government action has a positive effect on 10-year growth up to 1% significance level. This results can support the theory that the negative effects of inequality have a higher impact than the positive ones, and thus, government intervention that reduces income inequality is on average desirable. We also find the same evidence as Barro and Lee, that an increase in the proportion of the population that has a minimum level of schooling can increase growth in the long-run.

Another finding is that given that the variable redistribution does not lose statistical significance when we introduce schooling in the regression shows that human capital may not be the major channel through which inequality harms growth, and thus supports the findings of those who pointed other vehicles, since the negative impact of inequality is still evident,

and the difference between the coefficient of redistribution in (2) and (6) falls between the confidence interval of the estimator. We also find that on average, government intervention that reduced inequality measured by the Gini Index of 1 point (0.01), can result in an increase of 2.43% of per capita GDP, in 10-years time, or approximately 0.243% per year.

Table 4 - Regression Estimates (Advanced Economies)

$Growth_i$	(1)	(2)	(3)	(4)	(5)	(6)
$Red_{i,t-10}$	-0.2380	1.1669***			-0.3741	1.0199**
	(0.6893)	(0.4003)			(0.7336)	(0.4262)
$Schooling_{i,t-10}$			0.0020	0.0050	0.0026	0.0036
			(0.0033)	(0.0030)	(0.0036)	(0.0032)
$TradeOpenness_{i,t-10}$	✗	✓	✗	✓	✗	✓
$GDPPC_{i,t-10}$	✗	✓	✗	✓	✗	✓
$Geography_i$	✗	✓	✗	✓	✗	✓
$Year_t$	✗	✓	✗	✓	✗	✓
Observations	551	542	551	542	551	542
R^2	0.0002	0.7011	0.0005	0.6993	0.0009	0.7022

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 - Regression Estimates (Developing Economies)

$Growth_i$	(1)	(2)	(3)	(4)	(5)	(6)
$Red_{i,t-10}$	4.9334***	5.2978***			5.5222***	4.8690***
	(0.7971)	(0.9140)			(0.9341)	(0.9286)
$Schooling_{i,t-10}$			0.0065***	0.0065***	0.0061***	0.0051***
			(0.0011)	(0.0013)	(0.0011)	(0.0014)
$TradeOpenness_{i,t-10}$	✗	✓	✗	✓	✗	✓
$GDPPC_{i,t-10}$	✗	✓	✗	✓	✗	✓
$Geography_i$	✗	✓	✗	✓	✗	✓
$Year_t$	✗	✓	✗	✓	✗	✓
Observations	1,046	842	894	862	874	842
R^2	0.0393	0.4311	0.0346	0.4131	0.0772	0.4387

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results obtained on the advanced economies (Table 4) show a reduction on the magnitude of redistribution over economic growth, and the results remain significant up to 5% significance level. On average, government intervention that reduces inequality measured by the Gini Index of 0.01, can result in an increase of 1.02% of per capita GDP, in 10-years time, which yields an increase of 0.10% per year. This suggests that the importance of government intervention on wealth distribution is higher on developing economies, as the impact on economic growth is expected to be almost twice higher when these are included in the sample. We also do not find evidence that redistribution affects growth via schooling since the redistribution coefficient of (6) also falls between the confidence interval for the estimator in (2).

Table 5 presents the regression for the developing economies. As expected, given the previous results, the impact of redistribution on growth is higher in this sample. We expect

that a 0.01 reduction on the Gini Index due to government intervention yields an increase on the 10-year GDP per capita growth of 4.87%, or approximately 0.49% a year. We do not find evidence that schooling captures the effect of redistribution, given that the redistribution coefficient remains significant up to 1% significance level, and the change in the coefficient is much lower than one standard deviation of the estimator.

We also find evidence that the impact of redistribution on growth has higher magnitude on developing economies than in advanced economies. This effect can be useful for policymakers since the magnitude of the effect on the developing sample is higher, it is possible to infer that reducing inequality can help these countries to catch up with those who are considered advanced, given that the level up to which redistribution is a mechanism to trigger growth appears to be more effective on the developing nations.

4 Discussion

Our results support one out of two hypotheses tested. First we found that government intervention that redistributes wealth more equitably is expected to generate growth in the long run. We found support for this claim in the Kolmogorov-Smirnov test performed, since we found statistical evidence of differences in the long-run growth distribution conditional on the level of redistribution effort made by the government. In all samples the idea that the countries whose government make higher effort to reduce the level of inequality are the ones which can expect higher levels of growth in the next ten years. However, when we were not able to find statistical evidence of a difference between the distribution of those in the bottom 33% of the redistribution level, and those in the middle. It appears that there is a threshold from to which the impact on growth becomes evident. This finding indicates that redistribution may not have a linear impact on growth, and other specifications of the model can be used for further studies which intend to capture a better picture of the marginal impact of redistribution on growth.

The regressions show that redistribution has an overall positive effect on growth. All coefficients present statistical significance up to 5% confidence level, and up to 1% in the full sample and in the sample of developing economies. This emphasizes that even though redistribution may have a marginal cost of implementation, the negative effect inequality has on growth justifies the intervention of policymakers in order to smooth it. However we did not find evidence that part of the positive effect of government intervention is captured by the human capital vehicle, as we did not obtain a statistically significant change on the marginal impact of redistribution when controlling for the proportion of individuals who attained a minimum level of schooling. These finds strengthen the findings of the authors who pointed other vehicles for the negative impact of inequality such as increasing macroeconomic volatility, as the effect of reducing inequality on growth is statistically significant in all the samples.

This study is subject to a common problem in econometrics, which is that not all the right hand side of the regression is fulfilled. Battisti et al. (2014) present eight control variables that are used in many growth regressions. Although due to lack of available free data, we were only able to use three of them. We leave aside the following variables:

- *(1) The share of land in a country that is tropical*
- *(2) The share of land in a country that is within 100 km from a coast or from a navigable river*
- *(3) The level of ethnic fractionalization*
- *(4) The quality of institutions*
- *(5) The share of public expenditures in GDP*

The first two intend to capture growth that can arise from the exploitation of maritime and alluvial resources, and from the use of sea and rivers as means of transportation. We do not believe that there is a high level of correlation with the redistribution proxy used,

nor with schooling, such that it can cause our estimators to be biased. The level of ethnic fractionalization can influence the political process, and thus the redistribution effort, thus it can be a flaw of our study, and we suggest its incorporation if the data is available. The quality of institutions is also a determinant not only of the redistribution level, but also of its effectiveness, and thus we consider it its absence in our regression as the major flaw of this study. As for the share of public expenditures in GDP, we believe that the redistribution proxy can partially mimic its behavior, since they are directly linked, as part of the redistribution effort made by the government is made through subsidies, which account as public expenditure. The variable schooling also reflects some part of public expenditure in education, at least on the countries where public schooling represents a significant share of the supply of education. Therefore, we believe that the absence may not be very harmful for the significance of our results, its inclusion would most likely be partially replicating the effect of the variables we are studying. The final limitations we identify are up to what extent do our variables represent the impacts we aim to study. The redistribution effort we computed is measured in units of Gini index, which can make the use of our findings for policy purposes complicated. How much does the government need to redistribute in order to reduce 0.01 points in the Gini index, might not be easily computed.

The variable schooling intended to capture the impact of human capital on growth. However, human capital is hard to measure, and even though education can capture a significant part, human capital also includes the potential for technological innovation, according to the world bank, and this potential is nearly impossible to measure quantitatively.

Given the limitations identified, we still believe that due to the high level of statistical significance of our results, the conclusions of our study remain valid and can be used by policymakers.

5 Conclusion

This study started by presenting the different views regarding the impact of income inequality on economic growth. In the literature we found arguments that support that some level of inequality might be desirable and can sustain economic growth, at least in the short-run. However, most recent studies point out three main vehicles through which inequality jeopardizes growth. The first argument is that more unequal countries tend to redistribute more, and thus incur in a cost while redistributing their wealth. This raised the first question of our study. If inequality is bad for growth, does the benefit of reducing it compensates for the marginal cost of redistribution? The second argument is that inequality can deprive individuals from investing in human capital. We then test this argument by verifying up to what extent does the level of schooling captures the effect of redistribution on growth. The last argument we found was that inequality can increase macroeconomic volatility, but we leave this vehicle out of the scope of this study.

Our data sets are the Standardized World Income Inequality Database (SWIID) and the Barro and Lee dataset. The SWIID provides data on the net and gross Gini index of 174 countries. The Barro and Lee dataset provided the proportion of over 15 age individuals who attain a minimum level of schooling, and the regions used as control variables. Data on each country's exports and imports was downloaded from the World Bank. Our final dataset includes data from 1960 to 2008

We perform a Kolmogorov-Smirnov test to verify if countries who make higher redistribution efforts have different distributions of long-run growth, net of the effects of the control variables. We found that there is at least a positive difference between the 33% who redistribute less and the 33% who redistribute more in all the samples. We use a full sample, a sample of advanced economies and one of developing.

Finally we run a growth regression in these samples to test for a positive marginal impact of redistribution, and if the schooling vehicle captures some of that impact. Our results support that the negative effects of inequality compensates the marginal cost of redistribution.

We found that redistribution has a net positive effect on growth in all samples. We found evidence that this impact is higher in developing economies than in advanced economies.

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6 Appendix

List of countries used in the sample:

Albania, Algeria, Andorra, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kyrgyz Republic, Lao, Latvia, Lebanon, Lesotho, Liberia, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Reunion, Romania, Russian Federation, Rwanda, Senegal, Serbia, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Slovak Republic, Slovakia, Slovenia, Somalia, South Africa, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Viet Nam, Yemen, Yugoslavia, Zambia, Zimbabwe.