Inequality … of Opportunity and Economic Performance

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Introduction

A major discussion on the primary driving force behind inequality has recently captured the attention of pundits and policymakers. If the root cause of inequality is the change in technology (Goldin and Katz 2008), incomes at the top grow much faster than average because talented and hard-working individuals make significant economic contributions and, therefore, the implied increasing inequality should not be a concern (Mankiw 2013). However, if rent-seeking is the fundamental factor for the growing incomes of the rich (Stiglitz 2012), the resultant increase in inequality would be harmful for posterior development and growth (Piketty, Saez, and Stantcheva 2014). Hence, inequality promotes or deters economic performance depending on the origin of inequality.

The key to address properly this debate on the impact of inequality upon growth is to make a distinction between the different types of inequality, which is a common wisdom in the inequality-of-opportunity literature (Roemer 1993; 1998). Thus, individual income and implied inequality is mainly determined by two factors: first, free-will actions related to the level of exerted effort; second, opportunities, which are beyond the individual's control because they depend on circumstances like gender, race, family background, or health endowments.[1] A deeper analysis on this issue emphasizes that the relevance of these individual circumstances for determining personal income is strongly related with other non-personal circumstances like the macroeconomic conditions of the country where individuals perform their economic activities. For example, the importance of race and gender as major circumstances depends largely on the quality of economic and political institutions (Acemoglu et al. 2015); the impact of parental contacts or networks on individuals' income rests deeply on the degree of corruption and rent-seeking (Stiglitz 2012); the allocation of talent and effort is always conditioned by the conditions for credit to people with unfavorable circumstances (Galor and Zeira 1993).

The crucial hypothesis is that these two types of inequality, inequality of opportunity (IO) and inequality of effort (IE), affect economic performance in an opposite way (World Bank 2006; Bourguignon, Ferreira, and Walton 2007;

1 See, among others, Rodríguez (2008), Ferreira and Gignoux (2011), and Marrero and Rodríguez (2011) and (2012a) for empirical applications.

Marrero and Rodríguez 2013). On one hand, IO reduces growth as, for example, it favors human capital accumulation by individuals with better social origins rather than by individuals with more talent. The greater the IO, the stronger the role that background plays, rather than responsibility. On the other hand, income inequality among those who exert different effort (IE) stimulates growth because, for example, it encourages people to invest in education and effort. Thus, if inequality of effort increases due to technological change or better economic institutions, not only inequality but also growth increases. However, if inequality of opportunity increases due to a pervasive level of corruption or a worsening of credit markets, inequality will increase but economic performance will be dampened. Since both types of inequality act at the same time, they may offset each other, and the discussion on the impact of total inequality on growth could be misleading. In order to avoid this problem, a distinction should be made between both kinds of inequality and attention should be focused on the problematic one, inequality of opportunity.

Following this line of inquiry, this paper presents a panoramic view on the relationship between inequality of opportunity and economic performance. This literature is quite recent but has already produced a growing consensus: inequality of opportunity has significantly harmed growth in the United States. Despite the fact that they follow different approaches and use different databases, three empirical papers have studied this issue for the United States: Marrero and Rodríguez (2013), Hsieh et al. (2013), and Bradbury and Triest (2014). All of them highlight the same main result: relaxing barriers to opportunity is a viable strategy for promoting future economic growth.[2]

On the theoretical side, using an overlapping generation model with human capital, Marrero and Rodríguez (2014) have shown that the negative impact of inequality of opportunity on growth is always true in a developed economy. However, if there exists a trap in the accumulation of human capital (Azariadis and Stachurski 2005), an increase in any kind of inequality (including IO) might be good for growth in poor countries because that would help dynasties with better conditions move upward and get out of the trap (López and Servén 2009; Castelló-Climent and Mukhopadhyay 2013). Nevertheless, using simulations, Marrero and Rodríguez (2014) show that this situation only occurs when the economy is extremely poor (the absolute poverty rate is initially very high). The bottom line is clear, empirical research should be careful when mixing economies with large differences in poverty rates and other crucial characteristics like meritocracy degree.

2 Taking the evolution of IO in the United States between 1970 and 2009 from Marrero and Rodríguez (2011), Marrero and Rodríguez (2012b) analyzes the other way around of the causality. They study how macroeconomic determinants affect inequality of opportunity and inequality of effort in the United States along the 1970–2009 period.

This paper builds on literature that distinguishes individual circumstances, which are beyond the individual's control, and individual effort, which stands in for the range of factors influencing economic success about which an individual can make decisions (Roemer 1993). The next section develops the necessary distinction between the two components of overall inequality—inequality of opportunity and inequality of effort. In addition, the nascent empirical literature on the relationship between inequality of opportunity and economic performance is briefly reviewed. On pages 395–98, based on the theoretical model proposed in Marrero and Rodríguez (2014), a growth equation is derived that relates income growth with the different types of inequality. This equation will serve to explain the existing controversy in the inequality-growth literature and will guide in the development of an alternative less data-consuming cross-country empirical strategy. Pages 398–411 carry out a medium- and long-run cross-country analysis where growth is measured on a 20- , 10- , and 5-year basis between 1990 and 2010, and the cross-section is composed of 77 countries. The main conclusion is robust: inequality of opportunity always harms growth, while total inequality has an unclear impact on subsequent growth. Finally, the last section concludes and comments on some policy measures.

Inequality of Opportunity and Inequality of Effort: A Necessary Distinction

The modern theories of justice emphasize that income inequality is actually a composite measure of IO and inequality of effort (IE).[3] In keeping with this literature, IO refers to that inequality stemming from factors, called circumstances, beyond the scope of individual responsibility like gender, race, socioeconomic background, and macroeconomic conditions (corruption, quality of institutions, etc.). Meanwhile, IE defines the income inequality caused by individual responsible choices, like the number of hours worked or the occupational choice. Overall inequality is, therefore, a combination of IO and IE because individual's outcome (income, wealth, etc.) is a function of variables beyond and within the individual's control. According to this literature, inequality due to circumstances, IO, would be unfair and should be compensated for, while inequality due to individual effort is fair and should be acceptable.

This distinction between fair inequality (IE) and unfair inequality (IO) might be considered irrelevant by a pure positive economist, but fairness

3 See, among others, Roemer (1993), Van de Gaer (1993), Fleurbaey (2008), and Marrero and Rodríguez (2012a).

affects economic incentives and alters individual behavior (Fehr and Schmidt 1999; Fehr and Fischbacher 2003) so it also matters for efficiency. In fact, the literature has recently proposed that each component of total inequality could have a different effect on economic growth (World Bank 2006; Bourguignon, Ferreira, and Walton 2007; Marrero and Rodríguez 2013). On one hand, IO would reduce economic growth as it favors human capital accumulation by individuals with better social origins, rather than by individuals with more talent. Disadvantageous initial circumstances would reduce the opportunity to acquire higher levels of human capital, which would generate a misallocation of talent, underinvestment in human capital, and a negative consequence on growth. On the other hand, income inequality among those who exert different effort would provide incentive for people to invest in education and to work hard, which would stimulate growth. If this hypothesis is true, the impact of total inequality on growth should be ambiguous and the sign would depend on which type of inequality, opportunity or effort, dominates aggregate inequality. Existing theoretical and empirical evidence supports indirectly this view.

On the theoretical side, many channels through which inequality affects growth in opposite ways can be found.[4] The main proposed routes through which inequality might enhance growth are three. First, the larger accumulation of savings by the rich would make inequality good for the proportion of national income that is saved and, therefore, for growth (Kaldor 1956; Stiglitz 1969; Bourguignon 1981). Second, because output depends on unobservable effort, rewarding employees according to output performance would encourage them to exert more effort (Mirrlees 1971; Rebelo 1991). Third, investments in human or physical capital have to go beyond a fixed degree to affect growth, therefore, income and wealth should be sufficiently concentrated (Barro 2000).

On the contrary, inequality in the presence of credit market imperfections would have a negative impact on growth through the investment in human capital channel (Galor and Zeira 1993) and the entrepreneurial channel (Banerjee and Newman 1993). Other channels through which inequality could have a negative effect on growth are the following:

1. The rich have a higher marginal propensity to save but they make many unproductive investments (Mason 1988).
2. Because poor people consume more local goods, their demand favors growth (Marshall 1988).
3. Income inequality exerts a positive effect on the rate of fertility so it reduces per capita growth (Galor and Zang 1997; Kremer and Chen 2002).

4 Surveys on this issue can be found in Bénabou (1996), Aghion, Caroli and García-Peñalosa (1999), Bertola, Foellmi, and Zweimüller (2005), and Ehrhart (2009).

4. By reducing the demand of domestic manufactures, income inequality has a negative impact on growth (Murphy, Schleifer, and Vishny 1989).
5. High levels of inequality provoke large distortionary taxes and, therefore, less private investments and growth (Alesina and Rodrik 1994; Alesina and Perotti 1994; Persson and Tabellini 1994).
6. Political instability and violence are typically fed by high levels of inequality, which harms growth (Gupta 1990).
7. Rent-seeking activities generate a clear miss-allocation of resources and thus inequality of opportunity (because certain profitable activities are not developed by the most talented individuals but those with better social contacts), which deters future growth (Stiglitz 2012).

On the empirical side, the vast empirical literature is also ambiguous.[5] This ambiguity has been justified by different factors:

- the quality of data (Deininger and Squire 1998);
- the econometric method (Forbes 2000);
- the degree of development of the countries under consideration (Barro 2000);
- the model specification (Panizza 2002);
- the type of inequality measures (Székely 2003; Knowles 2005); and
- the replacement of physical capital by human capital accumulation as a prime engine of growth along the process of development (Galor and Moav 2004).

This ambiguous result regarding the impact of overall inequality on growth might be reflecting the fact that some or all of the channels highlighted are working at the same time but in different directions. Following this reasoning, Voitchovsky (2005) estimates inequality among the poor (the 50/10 ratio) and among the rich (the 90/50 ratio), and finds that inequality among the poor deters growth while inequality among the rich enhances growth. In this manner, Voitchovsky (2005) is able to reconcile three alternative theories that relate inequality to growth: existence of constraints in the credit market, political instability, and the accumulation of savings by the rich. The first two ideas would justify the negative effect of inequality among the poor on growth, while the third

5 See Banerjee and Duflo (2003), among others, on the inconclusiveness of the cross-country empirical literature on inequality and growth.

one would explain the positive effect of inequality among the rich on growth.[6]

Alternatively, all the channels could be considered to be actually symptoms of two more encompassing concepts, inequality of opportunity and inequality of effort. For example, considering the credit market imperfections theory (Galor and Zeira 1993; Banerjee and Newman 1993), the claim could be made that people with unfavorable initial circumstances will face considerable barriers for accessing credit, regardless of their talent and degree of effort exerted. As a result, IO would imply suboptimal levels of investment in human capital, with a negative consequence on growth. By the same reasoning, the following models could be advocated.

1. Easterly and Levine (1997) and Gradstein and Justman (2002) report a negative impact of racial and ethnic heterogeneity on growth.

2. Galor and Moav (2004) report that land concentration, which is highly correlated with the proportion of wealth inequality explained by individual circumstances, adversely affects the implementation of human capital promoting institutions like public schooling and child labor regulations.

3. Stiglitz (2012) and Mankiw (2013) report that inequality is mainly explained by rent-seeking activities and technological change, respectively.

In the first case, bad macroeconomic conditions (corruption, low quality of institutions and the like) would raise IO, while in the second case IE would increase because top incomes grow much faster than average when the change in technology get faster.

The problem with the hypothesis that income inequality has two distinct offsetting avenues—IO and IE—affecting subsequent growth in opposite ways, is that direct evidence is difficult to find. On the theoretical side, total inequality has to be decomposed into the IO and IE components and then it has to be shown that more dynasties with bad circumstances raises IO and then harms growth, while higher exerted pure effort—effort not influenced by circumstances—increases IE and then enhances growth. As far as the authors are aware, Marrero and Rodríguez (2014) is the only theoretical model that shows the distinct impact on growth of the two alternative, though complementary, concepts of IO and IE.[7]

6 A similar result has been found by van der Weide and Milanovic (2014) using the U.S. Integrated Public Use Microdata Series (IPUMS) database at the state level for the period of time 1960–2010. In addition, these authors have disaggregated growth by quantiles and have obtained that overall inequality hurts the growth of the poor, while it improves the growth of the rich.

7 The closest model to Marrero and Rodríguez (2014) is Mejia and St-Pierre (2008). They proposed a static model where all circumstances are exogenous and there is no trade-off between the average level of human capital and equality of opportunity.

Taking human capital as the main engine of development, they show that a more equal distribution of opportunity increases growth, while the opposite happens when inequality of effort raises. And their model does not rely on a particular channel (credit markets, accumulation of savings, land ownership, unobservable effort, political economy, etc.), but it relies only on the set of circumstances and the incentives to effort that people have and the way both factors affect human capital accumulation and wages. Hence, the authors believe that this framework is a good starting point to be used as benchmark to characterize, theoretically and empirically, the relationship between inequality of opportunities and growth.

Testing empirically the IO-IE hypothesis is difficult, because the decomposition of overall inequality into the IO and IE components requires not only comparable measures of individual disposable income but also individual circumstances measured in a comparable and homogeneous way. Despite this difficulty, literature has progressed at a high pace during the last years. In a first empirical attempt, Marrero and Rodríguez (2013), using refined data of the Panel Study of Income Dynamics (PSID) database for 26 U.S. states in 1970, 1980, and 1990 found robust evidence that inequality of effort is growth enhancing, while inequality due to differences in opportunities is growth deterring.[8] Under any specification and econometric approach considered by the authors (pooled Ordinary Least Squares (OLS), long-run cross-sectional regressions, fixed effects, and system generalized method-of-moments (GMM) estimators), the impact of the IO component was significantly negative, while the impact of the IE component was significantly positive. According to their estimations, increasing IE by one standard deviation could raise decade growth between 2.3 and 4.1 percentage points depending on the method (the average decade growth in the 1970–2000 period was 20.2 percent), and between 209 and 834 real U.S. dollars per person (the average income in the 1970–2000 period was 14,363 U.S. dollars per person). Meanwhile, decreasing IO by one standard deviation could raise growth between 1.1 and 1.7 percentage points and steady-state income between 124 and 229 real U.S. dollars per person.

This initial result for the case of the United States has been supported by posterior studies. Thus, Hsieh et al. (2013) while adopting a completely different approach, have found that changes in occupational barriers facing women and blacks potentially explain 15 to 20 percent of growth in the

8 The dependent variable was the growth rate of real personal income divided by total midyear population in the entire decade. The explanatory variables were real per capita lagged income, inequality indices (total inequality, IE and IO), and a set of additional control variables, such as human capital, industry mix, farm employment, welfare public expenditures, lag employment growth and fertility rate. Time and regional-fixed effects were also included.

United States between 1960 and 2008. As in Marrero and Rodríguez (2013), the impact on growth is found to be not only damaging but also quite significant. Using the measures of absolute and relative intergenerational mobility in Chetty, Hendren, Kline, and Saez (2014) as proxies of equality of opportunity, Bradbury and Triest (2014) examine the relationship between inequality of opportunity and growth in a cross-section of U.S. "commuting zones."[9] They show a strongly positive effect of absolute mobility on economic growth, while the impact of relative mobility is also positive but weaker. Interestingly, the effect on growth of overall inequality is generally indistinguishable from zero.

Unfortunately, there are only, as far as we are aware, two studies across countries. They try to overcome the scarcity of data, in particular, the problem of observing a large enough sample of personal circumstances for a panel of countries. However, they present serious limitations. In the first, Molina, Narayan, and Saavedra-Chanduvi (2013) making use of a measure of educational opportunities that incorporates inequality between circumstance groups, find that inequality of educational opportunities affects negatively development outcomes such as economic growth, institutional quality, and infant mortality. In particular, their results support the prediction that agricultural endowments—specifically the relative abundance of land suitable for wheat compared to that suitable for sugarcane—predict unequal educational opportunities and this, in turn, predicts development outcomes. Nevertheless, as quoted by Brunori, Ferreira, and Peragine (2013), their measure of educational opportunities is better seen as a development index that is sensitive to inequality of opportunity than as a measure of inequality of opportunity per se. For this reason, it is unsurprising the positive relationship of this index with per capita income.

In the second, Ferreira et al. (2014) construct two new databases consisting of 118 household surveys (of income and expenditure) and 134 Demographic and Health Surveys (DHS) to examine whether IO has a negative effect on subsequent growth. They find that while overall income inequality is generally negatively associated with growth in the household survey sample, there is no evidence that this is due to the IO component. In the DHS sample, both overall wealth inequality and IO have a negative effect on growth in some of their preferred specifications, but the results are not robust to relatively minor changes. One of the main problems of this study is the lack of comparable individual data on circumstances across countries. In fact, the number of types considered in their computation varies considerably

9 Commuting zones are geographic areas representing aggregations of counties, which coincide with metropolitan areas where they exist, and exhaust U.S. territory by also including rural areas.

across countries, from approximately 5 to 1000. Thus, trying to understand their results, the authors comment on the possibility of having substantial amounts of inequality of opportunity contaminating the residual component (the IE component) due to omitted circumstances.

To overcome the inherent difficulty of observing a large enough number of individual circumstances for a panel of countries, this paper develops an alternative empirical exercise to measure the impact of inequality of opportunity on growth and theoretically justifies the empirical growth equation estimated on pages 398–411.

A Growth Equation with Inequality and Inequality of Opportunity

This section presents and comments on the growth equation in Marrero and Rodríguez (2015), which relates income growth with the different types of inequality using as a framework the theoretical model proposed in Marrero and Rodríguez (2014).

Marrero and Rodríguez (2014) presents a small and open economy with perfect competitive markets inhabited by a continuum of dynasties where output per capita and average human capital are one-to-one related, because the second is the key input for the former. Preferences depend positively on private consumption and the bequest devoted to offspring in the form of quality of education (Card and Krueger 1992), but it depends negatively on the level of exerted effort. The degree of disutility generated by total effort depends on the parameter $\gamma(i)$ that is dynasty-specific but independent of any factor in the economy. For this reason, it can be interpreted as a proxy of freewill or pure effort, that is, as the part of total effort that is not influenced by personal circumstances (Roemer 1998; Fleurbeay 2008). Following Bénabou (1996), the distribution of γ is assumed to be a mean-invariant log-normal function with variance Δ_{γ}^{2}.

On the other hand, individual human capital is accumulated according to a convex process that depends on two non-purchasable but complementary factors: total effort and circumstances, $\theta(i)$ (Mejía and St-Pierre 2009). Personal circumstances are assumed to be exogenous to the individual and to follow a mean-invariant log-normal distribution with variance Δ_{a}^{2}. Under log-normality, the variance term is closely related to the class of relative indices consistent with the Lorenz curve, such as the Gini coefficient or the Mean Logarithmic Deviation (Cowell 2009). For this reason and the fact that both, $\theta(i)$ and $\gamma(i)$, are independently distributed, their variances would proxy the IO and IE components of total inequality, respectively.

After solving the model, Marrero and Rodríguez (2014) characterize the dynamics of the average years of schooling and of the variance. Then, using the Mean Logarithmic Deviation as the index of inequality, they are capable of reproducing the classical decomposition in the inequality-of-opportunity literature. Namely, total income inequality, T_0, is additively decomposable into inequality of opportunity, T_0(a), and inequality of effort $T_0(\gamma)$.

Starting from this, Marrero and Rodríguez (2015) calculate the income growth rate and derive the following growth equation:

$$g(y) = b_0 + b_1 \cdot Trend - \beta \cdot \ln y_{t-1} - b_a \cdot T_0(a) + b_\gamma \cdot T \qquad (1)$$

where all coefficients are positive and depend on the structural parameters of the model. As it is typical in growth models, equation (1) predicts conditional convergence (i.e., the coefficient associated to $\ln y_{t-1}$ is negative), with a speed of convergence represented by the coefficient β that in our case is inversely related to the elasticity of intergenerational mobility. Note that in a cross-country framework this relationship makes a lot of sense because the lack of convergence is equivalent to the lack of mobility between countries. More importantly, noting that b_a and b_γ are positive, shows that the impact of inequality on growth depends on the type of inequality under consideration: negative for inequality of opportunity, $T_0(a)$; and positive for inequality of pure effort, $T_0(\gamma)$. Their corresponding short-term elasticities are $-b_a$ and b_γ, while their accumulated long-term elasticities are $-b_a / \beta$ and b_γ / β respectively. Since $\beta \in (0, 1)$, long-term elasticities are higher and, therefore, the transmission of the initial impacts of $T_0(a)$ and $T_0(\gamma)$ at the country level depends crucially on the magnitude of intergenerational mobility. It is interesting to note that empirical studies usually focus on the estimation of a reduced form that lacks support from a consistent theory. In this case, the model that gives support to equation (1), the reduced-form equation that relates income growth with the two components of total inequality—IO and IE—at the cross-country level, is an important input.

This model highlights that inequality of opportunity harms economic performance, while inequality of pure effort enhances growth. This result relies on the fact that the accumulation function of individual human capital obtained endogenously in Marrero and Rodríguez (2014) is strictly increasing and concave with respect to circumstances, while it is strictly decreasing and convex with respect to pure effort. Thus, compensating for bad circumstances is growth enhancing since marginal returns to human capital are higher for those individuals who have less favorable circumstances. On the contrary, rewarding the free will to exert effort would enhance growth because the marginal returns to human capital are larger for those individuals with a lower aversion to effort.

It is important to emphasize here that this result is obtained without relying on any particular channel since no assumption is imposed on market imperfections, political economy, savings, and the like. Because the concepts of IO and IE encompass many different avenues through which inequality could affect growth (as proposed by the literature), this broader perspective is proposed to understand better the existing ambiguous empirical relationship between overall inequality and economic performance. In fact, the lack of robustness regarding the impact of total inequality on growth is evident from equation (1). The impact of overall inequality on growth depends on which component, opportunity or pure effort, dominates. Because the impact of total inequality on growth strongly depends on the relative magnitude and elasticity of its components, it cannot be predicted a priory.

Another important implication becomes apparent when comparing equation (1) with the equation usually adopted in the empirical inequality-growth literature. Typically, scholars assume the equation:

$$g(y_{t,j}) = \alpha + \beta_0 \cdot \ln y_{t-1,j} + \beta_1 \cdot I_{t-1,j} + \beta_2 \cdot Z_{t,j-1} + \varepsilon_{t,j} \tag{2}$$

where I is an index of overall inequality, Z is an array of other controls and the subscript j refers to a country or region. In this framework, the set of controls included (or not included) in equation (2) will play a major role in the final sign of β_1. If the controls in Z are more correlated with the IO component, their inclusion in the regression together with I will cause that the coefficient of Z, β_2, captures the effect of IO, while the coefficient of I, β_1, captures better the impact of IE. The opposite would happen if Z is more correlated with the pure effort component of total inequality. In this case, the coefficient β_1 is expected to become less positive (or more negative) because I will behave more as a proxy of inequality of opportunity.

To illustrate this point, use the estimations of IO and IE for a sample of U.S. states and the controls of the baseline model (X) in Marrero and Rodriguez (2013). First estimate equation (2) introducing the IO component as an additional control and then re-estimate the same equation using the IE estimates instead. The results are the following:

$$g(y_{t,j}) = \alpha + \beta_0 \cdot \ln y_{t-1,j} + 93.69^{***} \cdot I_{t-1,j} - 201.43^{***} \cdot IO_{t-1,j} + \delta \cdot X_{t-1,j} + \varepsilon_{t,j} \tag{3}$$

$$g(y_{t,j}) = \alpha + \beta_0 \cdot \ln y_{t-1,j} - 120.29^{***} \cdot I_{t-1,j} + 203.92^{***} \cdot IE_{t-1,j} + \delta \cdot X_{t-1,j} + \varepsilon_{t,j} \tag{4}$$

where the *** means that estimations are significant at 1 percent level. It is clear from above that the coefficients estimated for total inequality are both significant but of opposite signs.

This result is consistent with the empirical evidence found in the literature. Thus, Birdsall, Ross, and Sabot (1995) found that the effect of income inequality on growth is sensitive to the inclusion of alternative explanatory variables. Meanwhile, Deininger and Squire (1998) found that the impact of initial land inequality—that captures more closely opportunity than income—on growth is significantly negative and robust to the introduction of different explicative variables. As mentioned before, these ideas are used in the next section to propose an alternative empirical strategy to estimate the impact of the different concepts of inequality on growth.

Inequality, Inequality of Opportunity and Growth: A Cross-Country Empirical Proposal

Estimating equation (1) is difficult because it is necessary to decompose previously total inequality into inequality of opportunity and inequality of (pure) effort, which requires microdata of comparable measures of individual income and observed circumstances that span at least two decades and cover a large enough cross section of states or countries. In this respect, Marrero and Rodríguez (2013) for a panel of U.S. states and Ferreira et al. (2014) for a panel of countries are the most prominent proposals in the literature, although they present some difficulties. The main problem with Marrero and Rodríguez (2013) is that they used refined data of the PSID database for 26 states in the 1970s, 1980s, and 1990s to have enough information to estimate IO. In spite of this, the smallness of their survey samples makes IO estimates vulnerable to sampling error. The failure of Ferreira et al. (2014) to find robust support for the main hypothesized relationship, inequality of opportunity harms growth, might be reflecting, as highlighted by Bradbury and Triest (2014), the very spotty set of circumstance variables they eke out of their income and expenditure survey sample and their demographic and health survey sample. Of course, it could also reflect that the relationships estimated by Marrero and Rodriguez (2013) do not apply across nations with different levels of development and institutional backdrops.

To elucidate this important issue, we propose next an alternative empirical strategy to estimate the relationship between growth and the components of overall inequality based on the growth equation presented in the previous section.

The Strategy

First, this paper considers a large database of inequality indices with a big cross-section dimension. In particular, the Gini coefficients from the World Income Inequality Database (UN-WIID2) and Povcal-Net database are used

(López and Servén 2009). Following Dollar and Kraay (2002), the existing heterogeneity of Gini coefficients within the databases is corrected.[10]

Second, a set of variables, *X*, are defined that proxy circumstances at an aggregate level. Milanovic (2015), looking for the degree of global inequality of opportunity, proposed a reduced-form approach relating the annual average household per capita income with two macro variables, the country's gross domestic product (GDP) per capita and the Gini coefficient. His argument is that, in a world where there is no migration, individuals within a particular country make personal decisions under certain macroeconomic characteristics over which they have no control (circumstances) like the GDP per capita and the degree of total inequality. Inspired by this work, inequality of opportunity is proxied by the OLS fitted value of the Gini coefficient on a particular set of macroeconomic variables.

Here corruption, military in power, democracy, fertility, ethnic and religion fractionalization are considered as macro factors because they fulfill three essential properties to proxy inequality of opportunity. First, following Milanovic's argument, these variables are clearly beyond the individual's control so can be treated as circumstances. Second, and more importantly, these variables are closely linked to some of the most important channels identified by the literature, through which inequality may affect growth. In fact, as commented on pages 389–95, these channels are related with a detriment of opportunities and, therefore, with unfair inequality. For example, the empirical literature has found that fertility and political instability are the two more robust channels through which inequality negatively affects growth. In addition, other channels like the capacity of the elite to develop rent-seeking activities (Stiglitz 2012) and the functioning of democracy (Acemoglu et al. 2015) have received large support over the last years. Third, a measurable macroeconomic variable—available for a vast set of countries and years—could proxy for the channels through which the lack of opportunities may affect growth.

To measure the capacity of people to assume positions of power through patronage rather than personal effort and ability, i.e., the level of nepotism and rent-seeking, adopt three variables: an index of corruption (corruption); an index of military in power that estimates the presence of military in government positions (military); and an index of democratic accountability that measures how responsive government is to its people (democracy). Second, in order to account for the importance of race and religion fractionalization, consider the existence of ethnic-linguistic tensions (ethnic) and the degree of

10 Our proposal can be adapted without problem to any other inequality index, for example the Mean logarithmic Deviation. Unfortunately, the Gini coefficient is the only inequality index for which there are enough observations across countries and over time.

religious tensions (religion). Third, to proxy for the opportunity that women have to accumulate human capital we consider the country fertility rate (fertility). Finally, for the sake of robustness, consider as a proxy of parental background the 20-year lag of human capital (HC). The first five variables come from the Political Risk Module of the International Country Risk Database (ICRD).[11] The fertility rates come from the World Bank database and for human capital we use the human capital index recently developed in the Penn World Table (PWT 8.0) (using information from Barro and Lee 2013).

Once this set of variables has been defined, the strategy proposed by Ferreira and Gignoux (2011) is adapted to this case. Making use of micro data, these authors run an OLS regression to estimate individual income as a function of circumstances and then used the fitted part to proxy inequality of opportunity (actually a lower bound of inequality of opportunity). To adapt this proposal to aggregate cross-country data, an OLS regression is run between total inequality (represented by the Gini coefficient) and the set of variables *X* defined previously as follows:

$$Gini_j = \alpha_0 + \alpha_1 \cdot X_j + v_j \tag{5}$$

At the country level, the fitted part, $\hat{\alpha}_0 + \hat{\alpha}_1 \cdot X_j$, can be taken as a proxy of inequality of opportunity, while the OLS residual, v_j, can be interpreted as the residual part of inequality. This residual picks up the inequality-of-effort component, although it will be contaminated by inequality of opportunity due to unobserved circumstances and luck. For this reason, the interpretation of the sign and significance of its coefficient must be done with caution.

After decomposing the Gini coefficient in its fitted (IO) and residual (referred here as IE by simplicity) components, the following four sequential regressions are run:

$$g(y_{t,j}) = \alpha + \beta \cdot \ln y_{t-1,j} + \rho_{11} \cdot Gini_{t-1,j} + \varepsilon^1_{t,j} \tag{6}$$

$$g(y_{t,j}) = \alpha + \beta \cdot \ln y_{t-1,j} + \rho_{12} \cdot Gini_{t-1,j} + \rho_{21} \cdot IO_{t-1,j} + \varepsilon^2_{t,j} \tag{7}$$

$$g(y_{t,j}) = \alpha + \beta \cdot \ln y_{t-1,j} + \rho_{13} \cdot Gini_{t-1,j} + \rho_{31} \cdot IE_{t-1,j} + \varepsilon^3_{t,j} \tag{8}$$

$$g(y_{t,j}) = \alpha + \beta \cdot \ln y_{t-1,j} + \rho_{22} \cdot IO_{t-1,j} + \rho_{32} \cdot IE_{t-1,j} + \varepsilon^4_{t,j} \tag{9}$$

Equation (6), the regression of reference, is a standard inequality-growth equation corresponding to equation (2). Equation (9) is a particular version of our theoretical reduced form (equation (1)). Meanwhile, equations (7) and (8) are robustness checks related with (3) and (4), which come from the theory as

11 These variables are explained in detail in the appendix.

well. According to the theory presented in the previous section, the relationships between the different estimates of ρ should be the following:

R1. The sign and significance of the coefficients of overall inequality, ρ_{11}, ρ_{12}, ρ_{13} are not determined a priori because they depend on the set of controls specified in the regression. First, the sign of the coefficient ρ_{11} depends on which component, opportunity or effort, drives the Gini coefficient. Second, if Z = IO (equation (7)), $\rho_{12} > \rho_{11}$, and desirable $\rho_{12} > 0$ because the Gini coefficient get closer to inequality of effort. On the contrary, if Z = IE (equation (8)), $\rho_{13} < \rho_{11}$, and desirable $\rho_{13} < 0$ because in this case the Gini index proxy inequality of opportunity.

R2. The coefficients ρ_{21} and ρ_{22} must be negative since they capture the effect of the (lower bound) IO component on growth.

R3. In principle, the coefficients ρ_{31} and ρ_{32} should be positive but, as mentioned previously, the IE component is actually a residual (contaminated by some unobserved inequality of opportunity) so the only prediction we can make for sure is that these coefficients will be higher than the coefficients corresponding to the Gini coefficient.

Results

There were three main econometric difficulties of the empirical proposal for this paper. First, there could be a problem of endogeneity since inequality and growth are simultaneously determined. However, the empirical setting, like standard growth regression models, lacks obvious outside instruments to deal with this problem (this situation also happens for example in Acemoglu et al. 2015). To alleviate this problem, all regressors in (6)–(9) will be predetermined variables because they will be lagged 20, 10, or 5 years, depending on the specification. Second, there may be country-specific effects potentially correlated with the explanatory variables and, third, possible endogeneity of all other regressors. To address the last two problems, in the absence of suitable external instruments, this paper applies the system-GMM approach and checks the robustness of the results to alternative model specifications and econometric methods (pooled-OLS, fixed effects, instrumental variable generalized two stage least square (G2SLS)). In addition, the variance-covariance matrix will always be estimated using a robust method and for the system-GMM case, this matrix will be corrected for the problem of finite samples following Windmeijer (2005).

In table 1 the estimates of equation (5) are presented using the entire sample. Overall inequality is decomposed into inequality of opportunity and inequality of effort according to the variables included in X so neither regional nor time dummies are included as in Ferreira and Guignoux (2011). Three versions of the regression in equation (5) are run to check the robustness of the results. In the first model, only the variables of the Political Risk Module, i.e., corruption, military, democracy, ethnic and religion is considered. In the second model, the fertility rate is introduced across countries. Additionally, the 20-year lag of human capital is included in the last model.

As expected, more corruption and military power (that is, lower meritocracy and opportunity) increase significantly total inequality. The quality of democracy has no significant influence on inequality. This result accords with Acemoglu et al. (2015) where democratization is found to have a statistically weak effect on inequality since democracy lowers barriers to entry and improves the investment in public goods, while simultaneously bringing economic change, which increases inequality. The literature has found that ethnic-linguistic fractionalization is bad for growth, while religious fractionalization enhances growth (Alesina et al. 2003). In a similar manner, different effects are found for these two types of tensions; ethnic-linguistic tensions have no significant effects on inequality, while religious tensions reduce overall inequality. It seems that a society with a higher diversity of religions provides more opportunities to its citizens. Also, worse social conditions for women—represented by a higher fertility rate—are found to have a significant negative effect on the degree of equality. Finally, a higher average of parental human capital, proxy by the 20-year lag of human capital, is found to reduce overall inequality. Looking at the three columns in table 1, these results are robust to the specification under consideration. From now on, the results in specification (b) will be used to avoid potential problems of collinearity. In some specifications of the growth equation (see subsequent), the human capital will be considered, among other controls, so collinearity between this variable and the IO and IE indices could appear.

After measuring the proxy of IO and IE components, the regression analysis is started by considering the growth rate between 1990 and 2010 (an interval of 20 years), and all explicative variables at 1990. Data availability restricts the final sample to a cross-country section of 69 observations. Table 2 shows the long-run pool-OLS estimates of equations (6)–(9) for that cross-country section. The first panel of regressions include only time and regional dummies; the second panel, following Forbes (2000), also includes human capital and the price of investment; finally, the third panel adds the size of the government and the degree of openness. These variables, the price of investment, the size of the government and the degree of openness are from the Penn World Tables. Results are consistent with the previous theory (the R1, R2, and R3 predictions exposed previously) and robust to the three panels. In addition, human capital is significantly positive for growth in the extended version of the Forbes specification; the price of investment, as a proxy of the degree of market imperfections, has a negative effect on growth; the size of government plays no role for long-run growth; and, the degree of openness has a positive influence on future growth.

Table 1: Decomposition of the Gini coefficient

	(A)	(B)	(C)
Corruption	0.0138***	**0.0149***	0.0163***
	(3.73)	**(4.30)**	(4.03)
Military	0.0164***	**0.0079**	0.0080*
	(4.51)	**(2.10)**	(1.90)
Democracy	−0.0061	**0.0008**	0.0043
	(-1.61)	**(0.24)**	(1.07)
Ethnic	0.0013	**−0.0018**	−0.0018
	(0.37)	**(−0.57)**	(−0.53)
Religion	−0.0166***	**−0.0219***	−0.0242***
	(-4.66)	**(−6.48)**	(−6.46)
Fertility		**0.0248***	0.0205***
		(8.37)	(5.38)
L4.HC			−0.0320***
			(−2.77)
_cons	0.3710***	**0.2920***	0.3590***
	(14.76)	**(12.41)**	(9.79)
N	480	**474**	400
adj. R-sq	0.179	**0.297**	0.328

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

For illustrative purposes, figures 1a–1c show the main intuition of the results, which show similar information as those in Marrero and Rodriguez (2013) for the case of the United States. They show the different scatter plots between growth and the alternative measures of inequality (after adjusting by time and regional dummies and initial log of per capita GDP). The first scatter plot relates growth with initial total inequality and its relationship is slightly positive but clearly non-significant. figure 1b shows how the relationship with our measure of inequality of opportunity is clearly negative, while the third scatter plot relates growth with initial residual inequality and finds a positive and significant slope.

In order to increase the number of observations, the interval of time is reduced to calculate the growth rates. First, r intervals of 10 years are considered so the number of observations increases to 158 (two waves in the case of most countries). For this new panel of data alternative econometric approaches

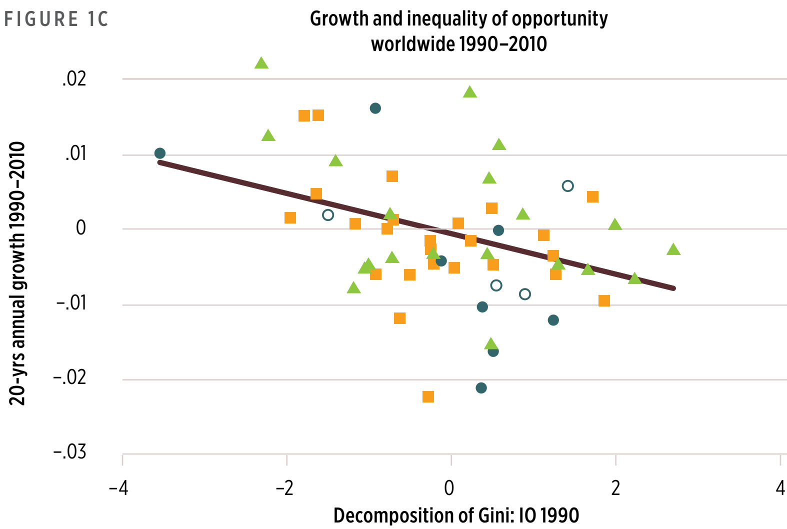
Figures 1A-C. Inequality, IO, IE, and growth (long-run cross-country analysis–20 years interval)

● Low income ○ Lower-middle income ▲ Middle income ■ Upper-middle and high income

FIGURE 1A

FIGURE 1B

FIGURE 1C



Note: Variables in the axes are OLS adjusted by initial log of per capita GDP, time dummies, and regional dummies.

are applied: pool-OLS (table 3); fixed effects (table 4); and G2SLS (Balestra and Varadharajan-Krishnakumar 1987) to correct for potential endogeneity problems (table 5). Again, the empirical results are consistent with the proposal. In particular, the predictions R1, R2, and R3 are generally fulfilled.

Finally, whether the long-run (10- and 20-year interval) results apply also to a 5-year interval growth model is checked. In this case, the time series dimension increases to 389 observations, so more sophisticated econometric techniques to correct for endogeneity can be applied. In this respect, the system-GMM technique developed by Blundell and Bond (1998) is used. The one-step version is adopted because, in contrast with the two-step version, it has standard errors that are asymptotically robust to heteroskedasticity and are more reliable for finite sample inference (Blundell and Bond 1998; Bond, Hoeffler, and Temple 2001). In addition, Roodman (2009) is followed and the set of instruments validated by using the Hansen *J*-test, in accordance with this test lag (1, 3) are taken.[12] The results for pool-OLS in table 6 and one-step system-GMM in table 7 accord with previous findings and conclude again that the initial inequality-of-opportunity component exerts a negative and significant effect on subsequent growth.

12 When using the two-step system-GMM technique the results are very similar. Meanwhile, when reducing the number of instruments by using the collapse option in the *xtabond2* command in Stata, the same qualitative results are obtained but the Hansen *p*-values get lower.

Table 2. The effect of inequality of outcomes and opportunity on growth (20 years: 1990–2010)

(POOL-OLS; decomposition (b) of the Gini coefficient)

	SIMPLE MODEL (WITH TIME & REG. DUMMIES)				FORBES MODEL (WITH TIME & REG. DUMMIES)				EXT. FORBES MODEL (WITH TIME & REG. DUMMIES)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L4.log y	-0.0052	-0.0087	-0.0087	-0.0087	-0.0091*	-0.0123**	-0.0123**	-0.0123**	-0.0099**	-0.0131***	-0.0131***	-0.0131***
	(-1.16)	(-1.67)	(-1.67)	(-1.67)	(-1.70)	(-2.23)	(-2.23)	(-2.23)	(-2.20)	(-2.95)	(-2.95)	(-2.95)
L4.Gini	**-0.0299**	**-0.0248**	**-0.1310****		**-0.0109**	**-0.0042**	**-0.1220****		**-0.0156**	**-0.0087**	**-0.1160****	
	(-1.04)	**(-0.85)**	**(-2.49)**		**(-0.43)**	**(-0.18)**	**(-2.28)**		**(-0.63)**	**(-0.37)**	**(-2.26)**	
L4.IO		**-0.1070****		**-0.1310****		**-0.1180****		**-0.1220****		**-0.1070****		**-0.1160****
		(-2.12)		**(-2.49)**		**(-2.60)**		**(-2.28)**		**(-2.48)**		**(-2.26)**
L4.IE			**0.1070****	**-0.0248**			**0.1180****	**-0.0042**			**0.1070****	**-0.0087**
			(2.12)	**(-0.85)**			**(2.60)**	**(-0.18)**			**(2.48)**	**(-0.37)**
L4.HC					0.0098**	0.0076	0.0076	0.0076	0.0101**	0.0083*	0.0083*	0.0083*
					(2.09)	(1.59)	(1.59)	(1.59)	(2.40)	(1.95)	(1.95)	(1.95)
L4.price inv.					-0.0029***	-0.0031***	-0.0031***	-0.0031***	-0.0036***	-0.0037***	-0.0037***	-0.0037***
					(-6.29)	(-6.35)	(-6.35)	(-6.35)	(-5.55)	(-5.56)	(-5.56)	(-5.56)
L4.Gov. Size									0.000738	0.000588	0.000588	0.000588
									(1.55)	(1.31)	(1.31)	(1.31)
L4.Openness									0.000047*	0.000052*	0.000052*	0.000052*
									(1.70)	(1.84)	(1.84)	(1.84)
_cons	0.0920**	0.1620**	0.1620**	0.1620**	0.0966**	0.1730***	0.1730***	0.1730***	0.0952**	0.1670***	0.1670***	0.1670***
	(2.11)	(2.60)	(2.60)	(2.60)	(2.21)	(2.98)	(2.98)	(2.98)	(2.56)	(3.49)	(3.49)	(3.49)
N	69	69	69	69	69	69	69	69	69	69	69	69
adj. R-sq	0.211	0.251	0.251	0.251	0.314	0.365	0.365	0.365	0.363	0.404	0.404	0.404

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

Table 3. The effect of inequality of outcomes and opportunity on growth (10 years: 1990–2000 & 2000–10)

(POOL-OLS; decomposition (b) of the Gini coefficient)

	SIMPLE MODEL (WITH TIME & REG. DUMMIES)				FORBES MODEL (WITH TIME & REG. DUMMIES)				EXT. FORBES MODEL (WITH TIME & REG. DUMMIES)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L2.log y	-0.0121***	-0.0161***	-0.0161***	-0.0161***	-0.0152***	-0.0177***	-0.0177***	-0.0177***	-0.0146***	-0.0174***	-0.0174***	-0.0174***
	(-5.63)	(-6.86)	(-6.86)	(-6.86)	(-6.04)	(-7.04)	(-7.04)	(-7.04)	(-5.93)	(-7.06)	(-7.06)	(-7.06)
L2.Gini	**0.0099**	**0.0138**	**-0.1560*****		**0.0132**	**0.0185**	**-0.1290*****		**0.0136**	**0.0180**	**-0.1210*****	
	(0.50)	**(0.70)**	**(-3.64)**		**(0.70)**	**(1.02)**	**(-2.92)**		**(0.73)**	**(1.00)**	**(-2.80)**	
L2.IO		**-0.1690*****		**-0.1560*****		**-0.1480*****		**-0.1290*****		**-0.1390*****		**-0.1210*****
		(-4.12)		**(-3.64)**		**(-3.54)**		**(-2.92)**		**(-3.33)**		**(-2.80)**
L2.IE			**0.1690*****	**0.0138**			**0.1480*****	**0.0185**			**0.1390*****	**0.0180**
			(4.12)	**(0.70)**			**(3.54)**	**(1.02)**			**(3.33)**	**(1.00)**
L2.HC					0.0135***	0.0098**	0.0098**	0.0098**	0.0128***	0.0095**	0.0095**	0.0095**
					(3.53)	(2.46)	(2.46)	(2.46)	(3.27)	(2.39)	(2.39)	(2.39)
L2.price inv.					-0.0034***	-0.0034***	-0.0034***	-0.0034***	-0.0039***	-0.0037***	-0.0037***	-0.0037***
					(-7.42)	(-8.21)	(-8.21)	(-8.21)	(-5.93)	(-6.14)	(-6.14)	(-6.14)
L2.Gov. Size									0.000533	0.000304	0.000304	0.000304
									(1.19)	(0.72)	(0.72)	(0.72)
L2.Openness									0.000027	0.000029	0.000029	0.000029
									(0.86)	(0.94)	(0.94)	(0.94)
_cons	0.1350***	0.2330***	0.2330***	0.2330***	0.1300***	0.2160***	0.2160***	0.2160***	0.1200***	0.2050***	0.2050***	0.2050***
	(5.80)	(7.08)	(7.08)	(7.08)	(5.67)	(6.75)	(6.75)	(6.75)	(5.30)	(6.52)	(6.52)	(6.52)
N	158	158	158	158	158	158	158	158	158	158	158	158
adj. R-sq	0.298	0.357	0.357	0.357	0.373	0.414	0.414	0.414	0.380	0.414	0.414	0.414

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

Table 4. The effect of inequality of outcomes and opportunity on growth (10 years: 1990–2000 & 2000–10)

(FE; decomposition (b) of the Gini coefficient)

	SIMPLE MODEL (WITH TIME DUMMIES)				FORBES MODEL (WITH TIME DUMMIES)				EXT. FORBES MODEL (WITH TIME DUMMIES)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L2.log y	-0.0640**	-0.0609**	-0.0609**	-0.0609**	-0.0632*	-0.0594**	-0.0594**	-0.0594**	-0.0629*	-0.0592**	-0.0592**	-0.0592**
	(-2.03)	(-2.21)	(-2.21)	(-2.21)	(-1.98)	(-2.14)	(-2.14)	(-2.14)	(-1.92)	(-2.06)	(-2.06)	(-2.06)
L2.Gini	**0.0448**	**0.0497**	**-0.1590**		**0.0486**	**0.0566**	**-0.1630**		**0.0485**	**0.0643**	**-0.1640**	
	(0.96)	**(1.01)**	**(-1.55)**		**(1.05)**	**(1.12)**	**(-1.60)**		**(1.37)**	**(1.67)**	**(-1.57)**	
L2.IO		**-0.2090****		**-0.1590**		**-0.2190****		**-0.1630**		**-0.2280****		**-0.1640**
		(-2.17)		**(-1.55)**		**(-2.20)**		**(-1.60)**		**(-2.32)**		**(-1.57)**
L2.IE			**0.2090****	**0.0497**			**0.2190****	**0.0566**			**0.2280****	**0.0643**
			(2.17)	**(1.01)**			**(2.20)**	**(1.12)**			**(2.32)**	**(1.67)**
L2.HC					-0.0051	-0.0088	-0.0088	-0.0088	-0.0045	-0.0093	-0.0093	-0.0093
					(-0.23)	(-0.50)	(-0.50)	(-0.50)	(-0.20)	(-0.49)	(-0.49)	(-0.49)
L2.price inv.					-0.0022	-0.0039	-0.0039	-0.0039	-0.0020	-0.0033	-0.0033	-0.0033
					(-0.25)	(-0.66)	(-0.66)	(-0.66)	(-0.20)	(-0.46)	(-0.46)	(-0.46)
L2.Gov. Size									-0.000016	-0.00046	-0.00046	-0.00046
									(-0.01)	(-0.26)	(-0.26)	(-0.26)
L2.Openness									-0.000018	0.000016	0.000016	0.000016
									(-0.15)	(0.16)	(0.16)	(0.16)
_cons	0.5570**	0.6110***	0.6110***	0.6110***	0.5620*	0.6230***	0.6230***	0.6230***	0.5600*	0.6260**	0.6260**	0.6260**
	(2.03)	(2.71)	(2.71)	(2.71)	(1.99)	(2.71)	(2.71)	(2.71)	(1.94)	(2.59)	(2.59)	(2.59)
N	158	158	158	158	158	158	158	158	158	158	158	158
adj. R-sq	0.341	0.433	0.433	0.433	0.336	0.437	0.437	0.437	0.328	0.433	0.433	0.433
N_g	96	96	96	96	96	96	96	96	96	96	96	96

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

Table 5. The effect of inequality of outcomes and opportunity on growth (10 years: 1990–2000 & 2000–10)

(IV: G2SLS; decomposition (b) of the Gini coefficient)

	SIMPLE MODEL (WITH TIME & REG. DUMMIES)				FORBES MODEL (WITH TIME & REG. DUMMIES)				EXT. FORBES MODEL (WITH TIME & REG. DUMMIES)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L2.log y	-0.0107***	-0.0176***	-0.0176***	-0.0176***	-0.0158***	-0.0192***	-0.0192***	-0.0192***	-0.0151***	-0.0192***	-0.0192***	-0.0192***
	(-4.58)	(-5.51)	(-5.51)	(-5.51)	(-5.11)	(-5.48)	(-5.48)	(-5.48)	(-4.80)	(-5.07)	(-5.07)	(-5.07)
L2.Gini	**-0.0479**	**-0.0312**	**-0.3870*****		**-0.0429**	**-0.0276**	**-0.3320*****		**-0.0337**	**-0.0251**	**-0.3100****	
	(-1.31)	**(-0.84)**	**(-3.31)**		**(-1.11)**	**(-0.79)**	**(-2.70)**		**(-0.91)**	**(-0.72)**	**(-2.40)**	
L2.IO		**-0.3550*****		**-0.3870*****		**-0.3040*****		**-0.3320*****		**-0.2850****		**-0.3100****
		(-3.38)		**(-3.31)**		**(-2.66)**		**(-2.70)**		**(-2.38)**		**(-2.40)**
L2.IE			**0.3550*****	**-0.0312**			**0.3040*****	**-0.0276**			**0.2850****	**-0.0251**
			(3.38)	**(-0.84)**			**(2.66)**	**(-0.79)**			**(2.38)**	**(-0.72)**
L2.HC					0.0179***	0.0097*	0.0097*	0.0097*	0.0169***	0.0103*	0.0103*	0.0103*
					(3.63)	(1.84)	(1.84)	(1.84)	(3.48)	(1.95)	(1.95)	(1.95)
L2.price inv.					-0.0063	-0.0035	-0.0035	-0.0035	-0.0054	-0.0028	-0.0028	-0.0028
					(-1.61)	(-0.80)	(-0.80)	(-0.80)	(-1.37)	(-0.66)	(-0.66)	(-0.66)
L2.Gov. Size									0.00075*	0.00024	0.00024	0.00024
									(1.74)	(0.51)	(0.51)	(0.51)
L2.Openness									0.000031	0.000031	0.000031	0.000031
									(1.08)	(1.12)	(1.12)	(1.12)
_cons	0.1470***	0.3360***	0.3360***	0.3360***	0.1490***	0.3060***	0.3060***	0.3060***	0.1320***	0.2910***	0.2910***	0.2910***
	(5.00)	(4.92)	(4.92)	(4.92)	(5.12)	(4.23)	(4.23)	(4.23)	(4.49)	(3.71)	(3.71)	(3.71)
N	113	113	113	113	113	113	113	113	113	113	113	113
N_g	73	73	73	73	73	73	73	73	73	73	73	73

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

Table 6. The effect of inequality of outcomes and opportunity on growth (5 years: 1985–2010)

(POOL-OLS; decomposition (b) of the Gini coefficient)

	SIMPLE MODEL (WITH TIME & REG. DUMMIES)				FORBES MODEL (WITH TIME & REG. DUMMIES)				EXT. FORBES MODEL (WITH TIME & REG. DUMMIES)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L.log y	-0.0092***	-0.0122***	-0.0122***	-0.0122***	-0.0119***	-0.0142***	-0.0142***	-0.0142***	-0.0118***	-0.0141***	-0.0141***	-0.0141***
	(-5.00)	(-5.82)	(-5.82)	(-5.82)	(-5.59)	(-6.41)	(-6.41)	(-6.41)	(-5.55)	(-6.34)	(-6.34)	(-6.34)
L.Gini	**0.0062**	**0.0106**	**-0.1270*****		**0.0199**	**0.0247**	**-0.1080*****		**0.0190**	**0.0229**	**-0.0998****	
	(0.37)	**(0.61)**	**(-3.31)**		**(1.21)**	**(1.49)**	**(-2.84)**		**(1.16)**	**(1.39)**	**(-2.53)**	
L.IO		**-0.1380*****		**-0.1270*****		**-0.1330*****		**-0.1080*****		**-0.1230*****		**-0.0998****
		(-3.52)		**(-3.31)**		**(-3.59)**		**(-2.84)**		**(-3.21)**		**(-2.53)**
L.IE			**0.1380*****	**0.0106**			**0.1330*****	**0.0247**			**0.1230*****	**0.0229**
			(3.52)	**(0.61)**			**(3.59)**	**(1.49)**			**(3.21)**	**(1.39)**
L.HC					0.0116***	0.0090**	0.0090**	0.0090**	0.0108***	0.0086**	0.0086**	0.0086**
					(3.33)	(2.56)	(2.56)	(2.56)	(3.12)	(2.47)	(2.47)	(2.47)
L.price inv.					-0.0045***	-0.0048***	-0.0048***	-0.0048***	-0.0051***	-0.0051***	-0.0051***	-0.0051***
					(-5.34)	(-5.86)	(-5.86)	(-5.86)	(-5.45)	(-5.57)	(-5.57)	(-5.57)
L.Gov. Size									0.00053	0.00035	0.00035	0.00035
									(1.54)	(1.01)	(1.01)	(1.01)
L.Openness									0.000056**	0.000056**	0.000056**	0.000056**
									(2.37)	(2.42)	(2.42)	(2.42)
_cons	0.1140***	0.1910***	0.1910***	0.1910***	0.1070***	0.1820***	0.1820***	0.1820***	0.0991***	0.1710***	0.1710***	0.1710***
	(6.19)	(6.69)	(6.69)	(6.69)	(6.00)	(6.75)	(6.75)	(6.75)	(5.36)	(5.97)	(5.97)	(5.97)
N	389	389	389	389	389	389	389	389	389	389	389	389
adj. R-sq	0.165	0.186	0.186	0.186	0.210	0.228	0.228	0.228	0.223	0.237	0.237	0.237

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

Table 7. The effect of inequality of outcomes and opportunity on growth (5 years: 1985–2010)

(System-GMM (1 step; lag(1,3)); decomposition (b) of the Gini coefficient)

	SIMPLE MODEL (WITH TIME DUMMIES)				FORBES MODEL (WITH TIME DUMMIES)				EXT. FORBES MODEL (WITH TIME DUMMIES)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
L.log y	-0.0008	-0.0145***	-0.0155***	-0.0165***	-0.0145***	-0.0210***	-0.0207***	-0.0214***	-0.0147***	-0.0211***	-0.0206***	-0.0212***
	(-0.18)	(-3.35)	(-3.20)	(-3.63)	(-3.83)	(-4.78)	(-4.58)	(-4.92)	(-3.83)	(-5.03)	(-4.88)	(-5.06)
L.Gini	**-0.1330*** **	**-0.0249**	**-0.6380*** **		**-0.0117**	**0.0327**	**-0.4090*** **		**-0.0319**	**0.0172**	**-0.351*** **	
	(-2.91)	**(-0.66)**	**(-4.93)**		**(-0.31)**	**(1.01)**	**(-4.65)**		**(-1.10)**	**(0.67)**	**(-5.02)**	
L.IO		**-0.5790*** **		**-0.6410*** **		**-0.4410*** **		**-0.4410*** **		**-0.3740*** **		**-0.3770*** **
		(-5.40)		**(-5.61)**		**(-5.06)**		**(-4.96)**		**(-5.23)**		**(-5.39)**
L.IE			**0.6130*** **	**-0.0596**			**0.4430*** **	**0.0092**			**0.3680*** **	**-0.0018**
			(4.99)	**(-1.48)**			**(4.86)**	**(0.26)**			**(4.95)**	**(-0.06)**
L.HC					0.0370***	0.0184*	0.0183*	0.0150	0.0324***	0.0206**	0.0205**	0.0183**
					(4.28)	(1.83)	(1.86)	(1.46)	(3.90)	(2.30)	(2.34)	(2.03)
L.price inv.					-0.0061***	-0.0073***	-0.0073***	-0.0071***	-0.0068***	-0.0065***	-0.0067***	-0.0065***
					(-2.90)	(-3.07)	(-3.05)	(-2.92)	(-3.52)	(-4.03)	(-4.05)	(-3.83)
L.Gov. Size									0.00076	0.00019	0.00031	0.00024
									(0.95)	(0.25)	(0.42)	(0.31)
L.Openness									0.00014***	0.00010**	0.00011***	0.00011**
									(3.18)	(2.48)	(2.70)	(2.54)
_cons	-5.5210***	-6.0090***	-6.1810***	-6.2160***	0.6210	-2.0140	-2.0750	-2.7180	0.9000	-0.6540	-0.5860	-1.0860
	(-3.24)	(-2.79)	(-2.78)	(-2.85)	(0.30)	(-0.76)	(-0.79)	(-1.00)	(0.45)	(-0.26)	(-0.24)	(-0.42)
N	389	389	389	389	389	389	389	389	389	389	389	389
Hansen-p	0.00342	0.0499	0.0562	0.0659	0.253	0.315	0.316	0.264	0.850	0.730	0.738	0.632
ar1-p	0.000749	0.000789	0.000761	0.00116	0.000438	0.000367	0.000368	0.000510	0.000576	0.000703	0.000765	0.000948
ar2-pp	0.225	0.258	0.244	0.254	0.0896	0.147	0.148	0.144	0.131	0.316	0.344	0.323
N_g	108	108	108	108	108	108	108	108	108	108	108	108
j	42	49	49	45	82	83	83	79	122	117	117	113

Note: t statistics in parentheses. *p<0.10; **p<0.05; ***p<0.01

Concluding Remarks

The literature on equality of opportunity affirms that overall inequality is actually a composite measure of inequality of opportunity and inequality of effort. Thus, the outcome of an individual (income, education, or occupation) is in fact the result of, at least, two main sets of factors. First, those factors beyond the individual's control (taken as given at birth), called circumstances, and which are related with parental background (including parental income, education, social position, etc.), and also with gender, race, ethnicity, religion, or macroeconomic conditions of the individual's birth place, such as the level of corruption or democracy. Second, it is the set of factors related with free-will action to exert effort and take risks in entrepreneurship activities, or with an individual's ability or talent. The former set of factors determines the level of IO, while the second defines the extent of IE.

The hypothesis defended in this paper is that the impact of overall inequality on economic performance is ambiguous because the two main components of inequality have opposite effects on growth: IO negative and IE positive. After revising the existing evidence for this hypothesis, a novel cross-country analysis is contributed. Applying a long-run cross-country analysis, this paper concludes that inequality of opportunity always harms growth, while total inequality has an unclear impact on subsequent growth.

Accordingly, governments must be aware of implementing general redistribution policies. These policies might affect total inequality but without knowing which type of inequality is being affected. This finding is in line with Ostry, Berg, and Tsangarides (2014), who find that some redistribution can reduce inequality and is good for growth (maybe because it reduces IO), but too much redistribution is growth deterring (maybe because, too much redistribution ends up reducing IE). The bottom line for policymakers is clear, they should focus on reducing IO while improving incentives to effort, which reduces unfair inequality and promotes growth.

This could be achieved with affirmative-action policies applied to people with bad circumstances, such as

- policies that implement cash transfers conditional on specific behaviors, such as school attendance;[13]
- early childhood development interventions through family visits by social workers;

13 The programs *Oportunidades* in Mexico and *Bolsa Família* in Brazil are two relevant examples of this kind of policies.

- policies that facilitate the access of individuals to education through higher public funding and the reduction of constraints in private credit markets to pay for fees and other schooling costs;
- interventions to increase learning rates at public schools and reduce teacher-absenteeism;
- health interventions to increase basic knowledge of nutrition, hygiene and sexuality.

With respect to the most advantaged people, policies could include

- improving the design of institutions like the financial system to be both efficient and resilient to capture;
- a better design of the regulatory framework for the privatization and running of utilities with natural monopoly power;
- interventions to improve the management of the commons and to avoid the capture of delivery of services and transfers by local elite.

Thus, fighting against rent-seeking activities and corruption would reduce unfair inequality (IO) and would improve the allocation of resources, increasing efficiency and future growth.

To finish, the authors point out that the findings in this paper allow for the reinterpretation of several relevant results in the inequality-growth literature. For example, Barro (2000) found that the relationship between inequality and growth is negative for less developed countries while it is positive for developed ones. The interpretation in this paper would be that the importance (share) of IO with respect to overall inequality is higher in less developed countries than in more developed countries, and for this reason the relationship is not linear.

A second example worth mentioning is the set of results in Acemoglu, Gallego, and Robinson (2014) and Acemoglu et al. (2015). In the first paper the authors provide strong evidence that democracy has a significant and robust positive impact on GDP and growth, while in the second they emphasize that "Democratization has a statistically weak effect on inequality." The argument exposed by these authors is that "*Democracy may be bringing new opportunities and economic change, which may increase inequality, while simultaneously lowering barriers to entry and investing in public goods, which may reduce inequality.*" This paper interprets these results as democracy creates better rules that incentive effort increasing IE, while at the same time, democracy reduces IO by reducing barriers to entry. Despite that the effect of democracy on overall inequality is unclear because it raises IE but reduces IO, its effect on growth is well defined since democracy enhance growth through both channels. ■

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Appendix

The way the variables from the Political Risk Module of the International Country Risk Database (ICRD) are constructed is briefly explained. In all cases, the variables go from 1 (lowest value) to 6 (highest value).

The **index of corruption** within the political system measures: suspiciously close ties between politics and business; demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans; nepotism; job reservations; "favor-for-favors"; and, secret party funding.

The **military** in power assesses the involvement of the military in politics. The military is not elected by anyone so its involvement is always a diminution of democratic accountability. It usually indicates that the government is unable to function effectively or that there exist an actual or created internal or external threat.

The **index of democracy** measures how responsive government is to its people. The points are awarded on the basis of the type of governance enjoyed by the country: autarchy; de jure one-party state; de facto one-party state; dominated democracy; and alternating democracy.

The **index of ethnic tensions** assesses the degree of tension within a country attributable to racial, nationality, or language divisions. Higher values correspond to countries where racial and nationality tensions are high because opposing groups are intolerant. Lower values correspond to countries where tensions are minimal.

The **index of religious tensions** measures the degree of tension that may stem from the domination of society by a single religious group that seeks to replace civil law by religious law and to exclude other religions from the political and social process. This index ranges from inexperienced people imposing inappropriate policies through civil dissent to civil war.