



Economic Growth and Inequality: Evidence from the Young Democracies of South America

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Economic Growth and Inequality: Evidence from the Young Democracies of South America

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Abstract

We investigate in this paper whether income growth has played any role on inequality in all nine young South American democracies during 1970-2007. The results, based on dynamic panel time-series analysis, suggest that income growth has played a progressive role in reducing inequality during the period. Moreover, the results suggest that this negative relationship is stronger in the 1990s and early 2000s, a period in which the continent achieved macroeconomic stabilisation, political consolidation and much improved economic performance. On the contrary, during the 1980s (the so-called "lost decade"), the negative income growth experienced by the continent at the time has hit the poor the hardest, which has consequently lead to an increase in inequality. All in all, we suggest that consistent growth, and all that it encompasses, is an important equaliser which should not be discarded as a plausible option by policy makers interested in a more equal income distribution.

Keywords: Growth, inequality, South America.

JEL Classification: E20, O11, O15, O54.

I. Introduction and Motivation

South America has presented interesting characteristics in terms of long-run development, and particularly in the last forty years or so the region has seen dramatic economic and political events taking place. To mention a few: erratic, negative and sometimes only modest economic growth rates (with a slightly positive trend over the period though), relatively high (but not immutable) income inequality, political changes towards more democratic regimes, high rates of inflation and debt crises (and even hyperinflationary and default episodes in some instances), and finally macroeconomic stabilisation (in the spirit of Alesina and Drazen (1991)) and political consolidation (in the vein of Przeworski and Limongi (1997)).

More specifically, in the last twenty years or so the region has seen a period of unprecedented economic and political stabilisation, with economic growth displaying a less erratic trend since the 1990s, a much improved macroeconomic performance (at least in terms of inflation rates and public debt management), slightly lower inequality and, as we speak, not a single reversal to less democratic regimes as in the more distant past.

Therefore, taking the above eventful economic and political background into account, and the always enriching debate about the role of economic growth in reducing, or increasing, income inequality, we investigate whether income growth has played any role on inequality in the young democracies of South America during the 1970-2007 period. Intuitively, some would argue that economic growth has the ability of raising the boats of the poor higher than others'—via stronger economic activity in sectors which tend to absorb workers situated at the lower tail of the distribution—and consequently of reducing inequality. On the other hand, others would argue that, particularly in developing countries, growth can leave the poorest poorer because of, for instance, trade liberalisation and technological changes, features which would leave those at the bottom of the distribution (who also happen to be unskilled) behind.

Moreover, in young and rather unequal democracies, with the extension of the political franchise, the poor are able to demand for particular redistributive policies (based on public

transfers), which might have an effect on inequality. On the other hand, the established elites, in principle, have their influence diluted by the democratic process, and consequently are not able to influence policy as during the political dictatorship periods, a factor which can also influence inequality. All the same, both effects might play a role on how inequality behaves in such an environment and the South American context (given its rather recent political transition) offers us a rich ground for better understanding those possible relationships.

The sample we use for the analysis covers the period between 1970-2007 and all nine South American young democracies (most of these countries transitioned from military dictatorships to more democratic regimes in the 1980s), and the empirical strategy, since the time-series variation is longer than the cross-sectional one ($T > N$), is based on dynamic panel time-series methods. The main results reported robustly suggest that income growth has played a small, but statistically significant, role in reducing inequality in the continent over the whole period.

In addition, we are able to report that during the so-called "lost decade" of the 1980s, in which income was stagnant and growth displayed even negative rates at times, inequality increased. On the other hand, during 1990-2007, a period in which the continent achieved macroeconomic stabilisation and rather decent income growth rates, the Gini coefficient has, in fact, decreased. Therefore, we suggest that growth, and all the environment and institutional framework that it encompasses, is a potential equaliser that policy makers and other stakeholders interested in a more equal income distribution should not overlook. Moreover, the 1980's long recession hit the poor the hardest, which suggests that, for the sake of equality, recessions (and the bad policies that tend to cause them) should be avoided as well. Intuitively, the poor are the first ones to suffer from higher unemployment during recessions, a fact that tend to lead to higher inequality.

The literature has provided us with interesting, and sometimes even conflicting, results regarding the role of income growth on inequality. Initially, Psacharopoulos *et al.* (1995) suggest that income growth has reduced inequality in a sample of Latin American countries

in the 1980s. On similar vein, Li, Squire and Zou (1998), use a sample of 49 countries (they use the then newly released Deininger and Squire (1996) data set on income inequality) and panel data methods, to report that initial income reduces inequality. However, Easterly (1999), who also uses a panel of countries, reports that growth plays no role on inequality (his growth fixed effects estimates are not statistically significant). In addition, de Janvry and Sadoulet (2000) investigate twelve Latin American countries during the 1970-1994 period, to report that growth, as Easterly had done before, presents negative estimates, but not statistically significant, against inequality.

In what is probably the most cited study on the subject, Dollar and Kraay (2002), make use of a sample of 92 developing and developed countries over four decades, and the GMM estimator to report that "growth is good for the poor". Essentially, they suggest that the shares of the poorest quintile grow "equiproportionately" to average income. On the contrary, Lundberg and Squire (2003), make use of a larger sample than Dollar and Kraay (with 125 countries), to report that economic growth, in fact, increases the Gini coefficient in their broader sample.

Moreover, Lopez (2006) makes use of decadal dummies interacted with income to better pinpoint the effect of growth on inequality during different periods of time in his panel of countries (he uses the Dollar and Kraay sample). Essentially, he reports that in the 1990s income growth is associated with higher inequality, and he suggests that the trade liberalisation and particular technological changes taking place in the 1990s are behind his results. Furthermore, Foster and Székely (2008) use data from 34 countries during 1976-2000 (their sample is composed mostly of Latin American countries), to report that the incomes of the poor do not increase equiproportionately with average incomes.

On a slightly different strand of the literature, Kuznets (1955) suggests that during the processes of long-run economic development that particular societies go through over time, income inequality increases in the short run, just to decrease in the long run. This non-linear process happens mostly because of the sectoral reallocation taking place in developing

countries and eventual widening access to education in the urban sector. In terms of evidence, on one hand, Spilimbergo, Londoño and Székely (1999) make use of a panel of 108 countries during the 1947-1994 period to report the absence of a Kuznets effect. On the other hand, Barro (2000) tests for the same Kuznets hypothesis and he is able to report some evidence in favour of it in his sample.

All in all, this brief, and admittedly non-exhaustive, literature review, and given the importance of the subject, suggests firstly that there is no clear verdict about the role of income growth on inequality, and secondly that a better understanding of this relationship is important for policy purposes and also welfare (particularly in developing countries). The former and the latter provide us with enough motivation for a better understanding of the South American context, a continent with its own idiosyncrasies and which, given its historical and present characteristics, provides us with a rich ground for a better understanding of this relationship.

Ultimately, apart from the regional disaggregation we implement, which allow us to better understand the continent, and also to minimise generalisations which are not always warranted, we take advantage of dynamic panel time-series analysis which permits us to deal with interesting empirical issues—like heterogeneity, and statistical and economic endogeneity biases in dynamic panels—which have the potential to improve on previous estimates. The remainder of the paper is as follows: in the next Section we explain the data, the methodology used, and then we report and discuss the results obtained. In Section three we provide some final observations.

II. Empirical Analysis

A. A Look at the Data

The data set we use covers the period 1970-2007 and all nine South American young democracies, namely: Argentina, Bolivia, Brazil, Chile, Ecuador, Guyana, Paraguay, Peru and Uruguay ($T=38$ and $N=9$). The income inequality measure that we use is the Gini

coefficient, which is simultaneously consistent with the Anonymity, Population, Relative Income and Dalton principles, and is therefore Lorenz consistent (Sen and Foster (1997)). The Gini coefficients (*GINI*) come from the UNU-WIDER files. Income per capita (*GDP*) and the economic growth rates (*GROW*) come from the Penn World Table (PWT) 6.3 files.

The control variables used are relatively standard in the literature and they are as follows: the ratio of exports and imports to real GDP (*OPEN*), which is a proxy for economic openness; and the government share to GDP (*GOV*), our proxy for government size, and they both come from the PWT files. The proxy for democracy is the rather popular, and normalised (ranging from zero to one), Polity variable (*POLITY*), which comes from the Polity IV files. The ratio of the liquid liabilities to GDP (*M2*), is our measure of financial development, inflation (*INFLAT*), which is given by the usual transformation $\log\left(1 + \left(\frac{INFLAT}{100}\right)\right)$, is our proxy for macroeconomic performance, and urbanisation (*URBAN*), a proxy for long-run development, all come from the World Bank Development Indicators. Information on secondary education (*EDUC*) is provided by the Barro and Lee (2010) files.

As an initial look at the data, in Figure One we plot the simple-averaged country time series over the period. In the first panel we plot the growth rates, and we can see not only the "lost decade" in the 1980s, with its negative growth rates, but also the positive growth rates taking place after the structural reforms of the 1990s. All in all, growth in the region has been far from consistent, nevertheless it seems that apart from the negative effect of an external shock towards the end of the 1990s (the Asian crisis) and the odd Argentinean crisis (*i.e.*, 2001), the region has experienced better macroeconomic performance from the 1990s onwards than in the 1980s.

In the second panel we plot the averaged income per capita in logs over the period. Again, it is not difficult to visualise the "lost decade" and the economic stagnation associated with it, and also the recovery after the 1990s. Overall though, income per capita presents a positive long-run trend in the region, even when taking into account the stagnant 1980s. Finally, in the bottom panel we plot inequality. Over time, the trend in inequality in the

region seems to be positive, with a notable fall starting from the mid 1990s onwards, which coincides with the stabilisation and better economic performance period.



Figure 1: Economic growth ($GROW$), GDP per capita (GDP), and Inequality ($GINI$), South America, 1970-2007. Source: PWT and UNU-WIDER files.

Moreover, in Table One we provide the correlation matrix amongst all variables used in the analysis. The statistical correlation that interests us mostly here is the one between the Gini coefficient of income inequality ($GINI$) and income per capita in logs (GDP). This particular correlation is negative and statistically significant at the 5% level, and it indicates (without implying any causation at this early stage) that income growth is associated with lower inequality in the continent.

Another notable correlation is the one between inequality and GOV , the proxy for government size, which is negative and significant. This correlation is perhaps indicating

that governments have the potential (*e.g.*, via investment in social infrastructure) of reducing inequality. The correlation between *POLITY*, our indicator for democracy, and inequality is positive and significant, which perhaps illustrates the rather tumultuous first years after redemocratisation in the continent (which coincides with the "lost decade"). Moreover, *M2*, our proxy for financial development, which is positive and significant, indicates that finance is not benefiting the bottom of the income distribution in a progressive manner (perhaps because of informational asymmetries in terms of accessing formal financial markets).

In addition, the correlation between *URBAN* and inequality is negative and significant as well, which suggests that the urban sector of those economies tends to be less unequal than their rural counterparts (probably because the cities offer more dynamic job markets and employment opportunities). Finally, *EDUC* presents a positive correlation with inequality, and this correlation is possibly capturing the wage premium that people with secondary education (who usually hold technical jobs) get with respect to those with only primary education (who tend to hold low-paid manual jobs).

Table One: The Correlation Matrix: South America, 1970-2007.

	GDP	GINI	OPEN	GOV	POLITY	M2	INFLAT	URBAN	EDUC
GDP	1								
GINI	-.377*	1							
OPEN	-.554*	.069	1						
GOV	.019	-.196*	-.183*	1					
POLITY	.151*	.210*	.175*	-.159*	1				
M2	-.192*	.247*	.555*	-.108*	.222*	1			
INFLAT	.122*	-.123	-.431*	.191*	.041	-.415*	1		
URBAN	.886*	-.340*	-.627*	-.070	.216*	-.236*	.207*	1	
EDUC	.172*	.225*	.349*	-.171*	.681*	.459*	-.137*	.235*	1

Sources: PWT, UNU-WIDER, Polity IV, World Bank and Barro-Lee files. * represents significance at the 5% level.

Furthermore, in Figure Two we plot the OLS regression lines between income growth and inequality in the continent. In the first panel we make use of the whole sample (1970-2007) and the regression line is slightly negative, which weakly confirms the negative statistical correlation reported above and the prospective progressive role of income growth on inequality. In the second panel we plot only the 1980s data, and the line now is positive, which indicates that during the "lost decade" when income was stagnant and growth erratic—growth even presented negative rates at the time—the Gini coefficient increased. In the bottom panel we make use of data covering only the 1990s, and what we observe now is that the regression line becomes negative again, and the relationship is stronger than in the first panel, which indicates that during the recovery of the 1990s income growth played a progressive role on inequality in the region.

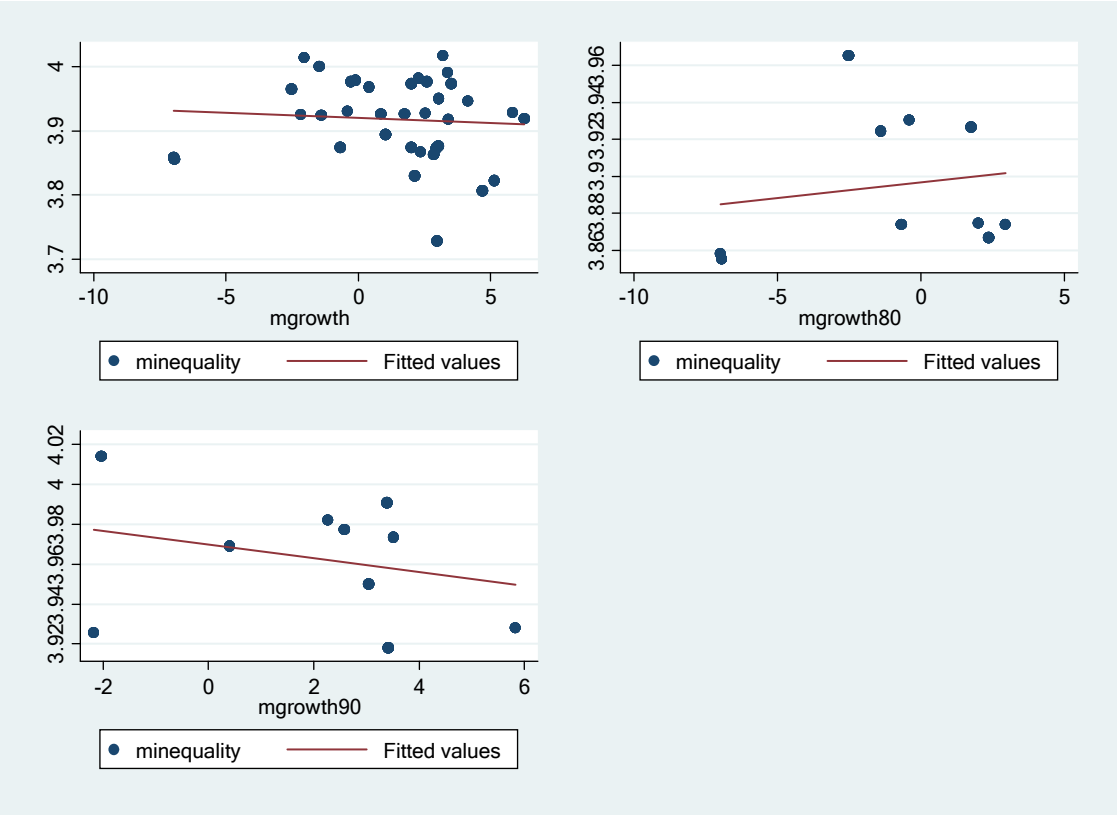


Figure 2: OLS regression lines. Economic growth (*GROW*) and Inequality (*GINI*), South America, 1970-2007. Source: PWT and UNU-WIDER files.

In essence, the above descriptive exercise (with all its caveats), and particularly the regression lines, suggest that there is an overall (negative) economic relationship between income growth and inequality in the continent, which coincidentally enough is stronger in the 1990s, the decade that the continent saw a number of structural reforms taking place (*e.g.*, the import substitution model, and all that it encompasses, came to an end in most countries and particular economic policies that tend to lead to macroeconomic stability were implemented), which in turn might have played a role on income growth and consequently on inequality (by lifting the boats of the poor higher). On the contrary, during the 1980s, or the "lost decade", income did not play the same sort of progressive role on inequality, perhaps because of the stagnant income and negative growth rates that took place at the time, which tends to hurt mostly the poor via loss of employment.

B. Empirical Strategy

In terms of empirical strategy, since we have a $T > N$ data set and also assuming that inequality is a persistent variable, the strategy followed is based on dynamic panel time-series analysis. This is interesting in itself because, apart from dealing with relevant empirical issues in relatively thin panels—heterogeneity and endogeneity biases—the panel time-series analysis allows us to conduct a more disaggregated study of South America, which furthers our knowledge of the region. Basically, we are able to specifically study the South American experience, avoiding particular generalisations and without treating the region either as a dummy or as an outlier to be discarded from the sample¹.

Firstly, some would suggest that by demeaning the data the Fixed Effects (FE) estimator is able to purge the statistical endogeneity problem, which is caused by the presence of the unobserved heterogeneity in the error term (Bond (2002)). On the other hand, Judson and Owen (1999) argue that the issue of the Nickell bias in dynamic $T > N$ panels—of order $O(1/T)$, and which is caused because the FE transformed error term (which purges the country-specific effect) tends to be correlated with the lagged dependent variable—can be

a problem even with $T = 30$ (although we have $T = 38$ in our data set). Therefore, we implement the bias approximation provided by Bruno (2005), which extends on Bun and Kiviet (2003), and that allows for an unbalanced panel to give "corrected" FE estimates. In this case we use the Anderson and Hsiao option as our baseline consistent estimator.

Hence, we use the FE estimator (with robust standard errors clustered at the country level) and the Bruno (2005) correction (LSDVC) which provide consistent estimates in dynamic models when $T \rightarrow \infty$ (Smith and Fuertes (2010)). The estimated dynamic equation is as follows:

$$(1) \quad \begin{aligned} gini_{it} = & \alpha_i + \beta gdp_{it} + \gamma open_{it} + \delta gov_{it} + \epsilon polity_{it} + \varepsilon m2_{it} + \\ & + \zeta \inf lat_{it} + \eta urban_{it} + \theta educ_{it} + \vartheta gini_{it-1} + v_{it}, \end{aligned}$$

where *GINI* is our measure of inequality in logs, *GDP* is income per capita in logs, *OPEN* is our proxy for trade openness, *GOV* is the proxy for government size, *POLITY* is our variable for democracy, *M2* is a measure of financial development, *INFLAT* is inflation and it proxies for macroeconomic stability, *URBAN* is the share of the population living in urban areas and a proxy for long-run development, and *EDUC* accounts for education.

Secondly, we follow Lopez (2006) and introduce in our FE regressions interaction terms between income growth and dummies covering the 1980s and 1990-2007 respectively, with zeros elsewhere. With those interaction terms we can better understand the role of the "lost decade" on inequality, and the behaviour of inequality during the period in which the continent saw structural changes with the implementation of particular economic policies and institutions, like trade liberalisation and central bank independence. The estimated dynamic equation is as follows:

$$(2) \quad \begin{aligned} gini_{it} = & \alpha_i + EITHER\beta_1 gdp80_{it} OR\beta_2 gdp90 - 07_{it} + \gamma open_{it} + \delta gov_{it} + \\ & + \epsilon polity_{it} + \varepsilon m2_{it} + \zeta \inf lat_{it} + \eta urban_{it} + \theta educ_{it} + \vartheta gini_{it-1} + v_{it}, \end{aligned}$$

where $GDP80$ and $GDP90 - 07$ are our interaction terms between income growth and the respective decade (1980s) or time period (1990-2007) being studied, with zeros elsewhere.

Thirdly, although we use the variables and controls suggested by the previous literature (given data availability), it can be argued that there are some omitted variables or measurement error present. In addition, some would argue that there is reverse causality present (*e.g.*, Persson and Tabellini (1994), Clarke (1995), Forbes (2000) and Panizza (2002) all suggest that inequality, in one way or another, determines income growth). We therefore use the Fixed Effects with Instrumental Variables (FE-IV) two-stage Least Squares estimator, and with the Solovian assumption in mind ($\dot{k} = sy$)—(Solow (1956))—we make use of investment (INV), from the PWT 6.3 files, as our external identifying instrument for contemporaneous income growth. The estimates provided by the FE-IV estimator are asymptotically consistent and efficient as $T \rightarrow \infty$, and it retains the time series consistency even if the instrument set is only predetermined (Arellano (2003))².

The estimated second-stage FE-IV dynamic equation is as follows:

$$(3) \quad \begin{aligned} gini_{it} = & \alpha_i + (\beta gdp_{it} = \beta_1 inv_{it}) + \gamma open_{it} + \delta gov_{it} + \epsilon polity_{it} + \\ & + \varepsilon m2_{it} + \zeta inf lat_{it} + \eta urban_{it} + \theta educ_{it} + \vartheta gini_{it-1} + v_{it}, \end{aligned}$$

with investment in the first-stage regression serving as the identifying instrument for income growth.

Essentially, although these countries experienced political transitions and shared similar poor macroeconomic characteristics in the 1980s and early 1990s (which makes the assumption of common slopes plausible), these Fixed Effects estimators account not only for important econometric issues—heterogeneity bias and endogeneity—but also for the fact that some of these countries do indeed present their own economic idiosyncrasies, such as different levels of economic development (*e.g.*, Argentina and Brazil are known to be relatively more developed than Bolivia and Peru)³.

C. Results and Discussion

In what follows we estimate baseline regressions of income growth against inequality with the most popular control variables previously used by the literature and then we insert other controls also used before in a stepwise fashion for robustness sake.

In Table Two we report the FE dynamic estimates of income growth (*GDP*) on inequality (*GINI*) using the variation during the whole period. Essentially, the *GDP* estimates are all negative and statistically significant against inequality during 1970-2007 (and they are similar, at least in terms of size, to the ones reported by Lopez (2006)). For instance, the *GDP* estimate in regression five indicates that a point increase in income has the ability of reducing inequality in .09 points. All the same, given the characteristics of the Gini coefficient, we can say that income growth has affected the bottom of the income distribution in a fashion that has reduced overall inequality (*e.g.*, Li, Squire and Zou (1998) and Dollar and Kraay (2002)).

More intuitively, perhaps income growth in South America has relied on the rather flexible services sector (which also includes the large informal sector seen in the continent) and these sectors make use mostly of people with some technical skills (*e.g.*, sales, computing, office work, etc.) who happen to be at the lower tail of the distribution, and not so much on highly skilled people with tertiary education (*e.g.*, de Janvry and Sadoulet (2000)).

About the controls, trade openness (*OPEN*) is not entirely significant across the different specifications, however regressions four and five indicate that openness plays a regressive role on inequality. This regressive effect of openness on the Gini coefficient is perhaps illustrating the role of skills (or factor endowments) when processes of trade liberalisation take place, or that those benefiting most from openness (which includes technological transfer) are those with tertiary education who happen to be better placed in the distribution (*e.g.*, Spilimbergo, Londoño and Székely (1999) and Barro (2000)).

The control for macroeconomic performance, inflation (*INFLAT*), as one would expect in South America, has had the effect of increasing inequality in the continent. This inflation

effect is because South America experienced episodes of high inflation, and even some bursts of hyperinflation in countries like Argentina, Bolivia, Brazil, Peru and Uruguay, and the poor, for not having access to indexed financial assets and for carrying more cash than the better off end up paying the regressive inflation tax (*e.g.*, de Janvry and Sadoulet (2000) and Foster and Székely (2008))⁴.

Moreover, our proxy for financial development, ($M2$), presents positive and significant estimates against inequality, however one would expect negative ones (*e.g.*, Li, Squire and Zou (1998)). These negative estimates are perhaps illustrating the fact that the poorest have less experience, and even lack information, on how to make formal financial markets work in their favour in terms of investment opportunities (Foster and Székely (2008))⁵.

Another interesting result is the one associated with urbanisation, ($URBAN$), which indicates that the long-run process of migration to the cities that has taken place in South America during the 20th century has helped to reduce the Gini coefficient (de Janvry and Sadoulet (2000) report similar results, however their static random effects estimates are not entirely statistically significant). In other words, it is perhaps easier to find employment (including jobs in the informal sector) and also to acquire education in cities than in rural areas (Kuznets (1955)). In addition, the first lag of inequality ($GINI_1$) is positive and statistically significant (but not approaching one), which confirms the fact that inequality is a slow-moving, but not non-stationary, variable. Finally, in column six we report the LSDVC estimates using the complete specification and they are in line with the ones reported in column five (*i.e.*, the Nickell bias is not of a significant size in regression five).

Table Two: Dynamic FE Estimates, South America, 1970-2007.

GINI	1 (FE)	2 (FE)	3 (FE)	4 (FE)	5 (FE)	6 (LSDVC)
GDP	-.055 (-2.42)	-.063 (-2.42)	-.060 (-1.99)	-.081 (-2.93)	-.093 (-3.28)	-.083
OPEN	.086 (1.59)	.072 (1.22)	.090 (1.70)	.131 (2.96)	.114 (2.73)	.107
GOV	-.073 (-0.92)	-.078 (-1.09)	-.093 (-1.38)	-.078 (-1.35)	-.052 (-0.97)	-.045
POLITY	-.008 (-0.75)	-.007 (-0.66)	-.011 (-0.93)	-.005 (-0.39)	-.011 (-0.94)	-.012
M2		.019 (2.39)	.024 (1.99)	.034 (3.05)	.032 (3.07)	.031
INFLAT			.017 (3.76)	.019 (4.26)	.017 (3.43)	.018
URBAN				-.369 (-1.95)	-.737 (-1.99)	-.753
EDUC					.097 (1.37)	.102
GINI ₁	.498 (6.08)	.485 (5.74)	.468 (6.79)	.476 (7.70)	.461 (6.30)	.500
F test	41.68	35.16	31.97	29.99	27.65	
F* test	6.23	6.42	7.08	7.46	8.05	
R ²	0.59	0.61	0.58	0.51	0.49	

T-ratios in parentheses. Number of observations: $NT = 342$. *GINI* are the Gini coefficients in logs, *GDP* is the GDP per capita in logs, *OPEN* is a measure for trade openness, *GOV* the government share to GDP, *POLITY* is a proxy for democracy, *M2* are the liquid liabilities to GDP, *INFLAT* are the inflation rates, *URBAN* is the share of urban population and *EDUC* is secondary education. FE is the Fixed Effects estimator and the LSDVC are the Bruno-corrected estimates.

In Table Three we report the dynamic FE estimates, but now we use our interaction term between income growth and the decadal dummy for the 1980s (*GDP80*), with zeros elsewhere. All *GDP80* estimates are positive and statistically significant, which indicates that the "lost decade", or the stagnation of the 1980s, played a regressive role on inequality. All the same, these estimates are somehow expected, in times of macroeconomic instability and lack of income growth, those being affected mostly by recessions and rising unemployment are the poor and unskilled (*e.g.*, Psacharopoulos *et al.* (1995) and de Janvry and Sadoulet (2000)). For instance, a point reduction in income increases inequality in .002

points.

Furthermore, the estimates of trade openness are all positive and mostly significant this time, clearly suggesting that trade openness in South America benefits mostly those who are highly skilled in the distribution and who can operate incoming technologies. Inflation, given its nature in the continent in the 1980s and early 1990s, keeps its regressive and significant effect on inequality, and the lagged-dependent variable maintains its significant persistence over time. Finally, the Bruno-corrected estimates in column six are in accordance with the ones provided in column five, indicating that the Nickell bias is not so much of an issue in this context.

Table Three: Dynamic FE Estimates, South America, 1970-2007.

GINI	1 (FE)	2 (FE)	3 (FE)	4 (FE)	5 (FE)	6 (LSDVC)
GDP80	.002 (3.18)	.002 (2.57)	.003 (2.92)	.002 (2.52)	.002 (2.79)	.002
OPEN	.098 (2.11)	.094 (1.62)	.116 (2.45)	.144 (3.22)	.130 (3.01)	.125
GOV	-.056 (-1.23)	-.056 (-1.23)	-.074 (-1.56)	-.055 (-1.67)	-.038 (-0.99)	-.035
POLITY	-.007 (-0.84)	-.007 (-0.78)	-.011 (-1.15)	-.006 (-0.57)	-.009 (-0.90)	-.009
M2		.004 (0.35)	.009 (0.88)	.017 (1.52)	.017 (1.46)	.015
INFLAT			.018 (3.75)	.020 (4.62)	.019 (3.84)	.019
URBAN				-.286 (-1.48)	-.469 (-1.41)	-.484
EDUC					.048 (0.88)	.053
GINI ₁	.487 (6.02)	.487 (6.03)	.466 (6.96)	.481 (8.23)	.481 (7.81)	.524
F test	44.01	36.34	33.45	30.47	27.09	
F* test	7.38	7.28	8.13	7.81	7.82	
R ²	0.56	0.58	0.52	0.52	0.54	

T-ratios in parentheses. Number of observations: $NT = 342$. *GINI* are the Gini coefficients in logs, *GDP80* is the GDP per capita in logs in the 1980s with zeros elsewhere, *OPEN* is a measure for trade openness, *GOV* the government share to GDP, *POLITY* is a proxy for democracy, *M2* are the liquid liabilities to GDP, *INFLAT* are the inflation rates, *URBAN* is the share of urban population and

EDUC is secondary education. FE is the Fixed Effects estimator and the LSDVC are the Bruno-corrected estimates.

In Table Four we use our interaction term between income growth and the dummy for the period 1990-2007 (*GDP90–07*), with zeros elsewhere. This period is interesting because South America achieved macroeconomic stabilisation, with the implementation of particular economic policies and institutions (which include trade liberalisation and fiscal responsibility laws), and it has also managed to consolidate its democratic institutions. These *GDP90–07* estimates are all negative and significant, which indicate that during this period of economic recovery, not to mention the real income growth that has taken place since then, income has played a progressive role on inequality (or that the sort of economic activity taking place at the time has had the ability of affecting the incomes of those more towards the bottom of the distribution). For instance, a point increase in income reduces the Gini in .006 points.

Furthermore, trade openness keeps its positive and significant estimates, confirming that trade openness in South America tends to benefit those with higher education mostly, as well as inflation which keeps its regressive effect on inequality. An interesting surprise is that the proxy for government size, (*GOV*), presents negative and significant estimates. This result is probably reflecting better governance and therefore better spending (*e.g.*, in social infrastructure) of public money (Foster and Székely (2008)). It must be said though, that this variable is highly aggregated and therefore it becomes difficult to draw more solid conclusions about the role of government on inequality (or what type of government participation plays a progressive role on income distribution). No doubt this is an issue that deserves more attention, as long as more disaggregated data become available. The lagged dependent variable keeps its persistent role against itself and the Bruno-corrected estimates provided in column six are in line with the ones provided in column five.

Table Four: Dynamic FE Estimates, South America, 1970-2007.

GINI	1 (FE)	2 (FE)	3 (FE)	4 (FE)	5 (FE)	6 (LSDVC)
GDP90-07	-.006 (-2.86)	-.006 (-2.54)	-.007 (-3.06)	-.006 (-2.97)	-.006 (-3.31)	-.006
OPEN	.139 (2.78)	.136 (2.28)	.174 (3.80)	.177 (3.94)	.161 (3.95)	.154
GOV	-.080 (-2.28)	-.079 (-2.32)	-.105 (-3.20)	-.094 (-3.38)	-.068 (-2.31)	-.064
POLITY	-.000 (-0.08)	-.000 (-0.08)	-.004 (-0.45)	-.002 (-0.27)	-.008 (-0.83)	-.008
M2		.002 (0.31)	.007 (0.83)	.011 (1.71)	.009 (1.15)	.009
INFLAT			.022 (4.72)	.022 (4.94)	.021 (4.11)	.021
URBAN				-.118 (-0.57)	-.406 (-1.17)	-.430
EDUC					.078 (1.27)	.078
GINI ₁	.487 (5.82)	.487 (5.85)	.458 (6.39)	.468 (7.11)	.461 (6.07)	.509
F test	46.26	38.17	36.40	31.76	28.83	
F* test	8.14	8.02	9.50	8.44	8.81	
R ²	0.44	0.45	0.36	0.40	0.47	

T-ratios in parentheses. Number of observations: $NT = 342$. *GINI* are the Gini coefficients in logs, *GDP90 – 07* is the GDP per capita in logs in 1990-2007 with zeros elsewhere, *OPEN* is a measure for trade openness, *GOV* the government share to GDP, *POLITY* is a proxy for democracy, *M2* are the liquid liabilities to GDP, *INFLAT* are the inflation rates, *URBAN* is the share of urban population and *EDUC* is secondary education. FE is the Fixed Effects estimator and the LSDVC are the Bruno-corrected estimates.

In Table Five we account for possible endogeneity and report the second-stage dynamic FE-IV estimates. All instrumented *GDP* estimates are negative and statistically significant against inequality. The estimates themselves are bigger in size than the ones reported before because of the external variation provided by our identifying instrument, investment. Essentially, these negative income estimates are somehow confirming the progressive role of growth in reducing the Gini coefficient, or in positively affecting the lower tail of the income distribution in South America during the eventful period of 1970-2007.

Furthermore, openness and inflation maintain their regressive roles on inequality, and *GOV* presents once again mostly significant negative estimates. Moreover, the positive and significant *M2* estimates indicate the existence of asymmetries in terms of access to formal financial markets, and the negative *URBAN* estimates suggest again that inequality tends to be lower in the cities. The lagged dependent variable keeps its persistent effect against itself. Lastly, in the first-stage regressions, the identifying instrument, *INV*, is always statistically significant, and positive, against income growth, and the F tests for overall significance are also statistically significant in all first-stage regressions which minimise the issue of weak instruments (available on request).

Table Five: Dynamic FE-IV Estimates, South America, 1970-2007.

GINI	1	2	3	4	5
GDP	-.143 (-1.88)	-.157 (-2.01)	-.137 (-1.80)	-.172 (-2.19)	-.172 (-2.24)
OPEN	.101 (3.83)	.084 (2.99)	.099 (3.49)	.149 (4.28)	.126 (3.64)
GOV	-.112 (-2.14)	-.120 (-2.26)	-.126 (-2.43)	-.114 (-2.24)	-.078 (-1.55)
POLITY	-.008 (-1.25)	-.008 (-1.15)	-.011 (-1.61)	-.004 (-0.61)	-.012 (-1.50)
M2		.024 (1.48)	.028 (1.78)	.041 (2.46)	.037 (2.30)
INFLAT			.017 (2.11)	.019 (2.43)	.017 (2.12)
URBAN				-.434 (-2.61)	-.852 (-3.09)
EDUC					.113 (2.01)
GINI ₁	.455 (5.21)	.437 (4.91)	.429 (4.94)	.433 (5.06)	.422 (4.97)
F test	40.40	33.92	31.16	28.84	26.74
F* test	6.26	6.43	7.07	7.19	7.65
R ²	0.49	0.50	0.50	0.43	0.44

T-ratios in parentheses. Number of observations: $NT = 342$. *GINI* are the Gini coefficients in logs, *GDP* is the GDP per capita in logs, *OPEN* is a measure for trade openness, *GOV* the government share to GDP, *POLITY* is a proxy for democracy, *M2* are the liquid liabilities to GDP, *INFLAT* are the inflation rates, *URBAN* is the share of urban population and *EDUC* is secondary education. FE-IV is

the Fixed Effects with Instrumental Variables estimator and investment (*INV*) is the identifying instrument for *GDP*.

It is worth mentioning that in all tables above the F^* tests suggest that we can reject the null of homogeneous intercepts, which validates the use of the Fixed Effects estimator. Secondly, the variable *EDUC* is positive against inequality, however far from statistically significant. A plausible explanation for the (wrong) sign and for the lack of significance is perhaps the fact that the variables *OPEN* and *M2* are the ones capturing the importance of education in terms of the need to have an educated workforce in open economies (*e.g.*, when those countries opened up in the 1990s they started buying technologies which required human capital) and also the need of education for a better use of finance.

Thirdly, given that all these countries are young democracies and relatively unequal, we would expect the variable *POLITY*, our proxy for democratisation, to play a progressive role on inequality. Essentially, without the constraints imposed by those military *juntas*, demand for redistribution would be higher in those young democracies, and perhaps inequality lower. On the other hand, in dictatorships the rich would be able to lobby for particular economic policies that would benefit themselves (Barro (2000)). Moreover, in some of those countries, the first years of democratisation were marred by poor macroeconomic performance (Bittencourt (2012)), a factor which might be affecting the results somehow. Overall, given the nature of the estimates reported, and also that democratisation took place in different countries at different points in time (but mostly in the 1980s), it is plausible that those effects are cancelling each other out in South America. All the same, the issue of democracy and inequality deserves more attention.

Also important to mention, the income growth estimates reported above are in line with some of the previous studies, *e.g.*, Li, Squire and Zou (1998) and Dollar and Kraay (2002), at least in terms of income growth and reduced inequality. On the other hand, our estimates contrast with the ones provided by de Janvry and Sadoulet (2000) and also Lopez (2006). This is perhaps because we have more data (which includes the economic recovery

of the 1990s and 2000s) and take advantage of better estimation analysis, that deals with heterogeneity and endogeneity in dynamic panels, than de Janvry and Sadoulet (2000). In the case of Lopez (2006), we find that, at least in South America, the period of economic recovery between 1990-2007 has seen a decrease in inequality instead. The latter highlights the importance of regional disaggregations that can have the effect of reducing unwarranted generalisations about the role of income growth on inequality. All in all, the role of the various changes taking place in different regions of the world in the 1990s (*e.g.*, the end of the Cold War and the Washington consensus) is an interesting issue that deserves more attention.

In a nutshell, by accounting for heterogeneity bias and endogeneity concerns in dynamic panel time-series, we find that income growth plays a small, but robust progressive role on inequality in South America. In addition, the long economic and political instability of the 1980s, illustrated by a long and protracted recession, had the effect of increasing the Gini coefficient in the continent, which confirms the long-held view that recessions hurt the poor the hardest. Furthermore, coincidentally enough, after the reforms, stabilisation and consolidation of the early 1990s, economic activity resumed and income growth has played the expected role in reducing inequality, which highlights once again the importance of consistent economic activity (and all that it encompasses) in reducing inequality⁶.

III. Final Observations

We have investigated whether income growth increased, or reduced, income inequality in the young democracies of South America in 1970-2007. The results, based on dynamic panel time-series analysis, suggest that income growth has had the effect of reducing inequality in the continent. Moreover, the protracted recession and poor macroeconomic performance seen in the 1980s has hurt the poor the hardest, with inequality increasing at the time. Furthermore, after the stabilisation, and the structural reforms taking place in the 1990s, income growth has played a progressive role on inequality.

In addition, the results suggest that poor macroeconomic performance, in terms of high inflation, tends to be regressive on inequality, therefore the importance of institutions (*e.g.*, central bank independence) and policies (*e.g.*, fiscal rules) which are conducive to macroeconomic stability and therefore growth, and that were implemented in South America only in the 1990s. Moreover, although education *per se* is not entirely meaningful in the above analysis, our proxies for openness and financial development indicate that education plays an indirect role on inequality, in the sense that human capital is an important safety net in open and technologically driven societies, and also because it allows people to make good and productive use of finance. Finally, the long-run process of urbanisation taking place in the continent, seems to offer better prospects in terms of lower inequality than life in rural areas.

Future work can be extended to other regions, *e.g.*, it would be interesting to see whether the recent income growth seen in sub-Saharan Africa has played any role on poverty, since poverty is a more pressing issue in the region. Moreover, the Brazilian case, given its historical inequality and recent economic growth, is an interesting case to investigate as well as the South African case with its more structural inequality and modest growth rates. All the same, such disaggregations can shed some light on how income, inequality and other welfare variables behave in different regions and continents. Furthermore, with more historical data on income and inequality we could test for the Kuznets hypothesis in the South American continent, which would certainly enrich our knowledge of the region.

To conclude, we suggest that growth (and all the institutional framework and environment that it encompasses) is a prospective—and perhaps non-intrusive—equaliser which should not be overlooked by policy makers and other stakeholders interested in a more equal income distribution, particularly in developing countries. It is also always worth mentioning that without economic activity, or growth, it becomes difficult to fund particular, and alternative, redistributive policies like public transfers which specifically target the poor. Ultimately, growth is no panacea, but it matters and it can be good for all, including the

poor.

A Appendix

In this appendix we provide some extra results which come from the FE and LSDVC regressions with income on the right hand side combined with each interaction term in turn, and then both interaction terms on their own. The *GDP* estimates in columns one, two, three and four confirm the estimates reported above, *i.e.*, that income growth has played a progressive role on inequality during the whole period. Moreover, the interaction terms in these equations confirm the regressive role of the stagnation of the 1980s on inequality and the progressive role of the recovery of the 1990s onwards. Finally, in equations five and six, when we regress both interaction terms on their own against inequality, the 1980s interaction term is not entirely statistically significant this time, however the progressive role of the economic recovery of the 1990s and 2000s on inequality is confirmed.

Table Six: Dynamic FE Estimates, South America, 1970-2007.

GINI	1 (FE)	2 (LSDVC)	3 (FE)	4 (LSDVC)	5 (FE)	6 (LSDVC)
GDP	-.077 (-3.03)	-.069	-.067 (-2.92)	-.058		
GDP80	.001 (2.24)	.001			-.001 (-1.60)	-.001
GDP90-07			-.005 (-2.96)	-.005	-.008 (-3.29)	-.008
OPEN	.134 (2.97)	.129	.163 (3.95)	.155	.162 (3.98)	.154
GOV	-.059 (-1.30)	-.053	-.084 (-2.32)	-.076	-.072 (-2.40)	-.071
POLITY	-.010 (-1.03)	-.010	-.009 (-0.98)	-.009	-.008 (-0.79)	-.008
M2	.024 (1.98)	.023	.016 (1.94)	.015	.009 (1.29)	.009
INFLAT	.018 (3.49)	.019	.020 (3.84)	.020	.021 (4.18)	.021
URBAN	-.617 (-1.78)	-.627	-.533 (-1.52)	-.549	-.423 (-1.20)	-.449
EDUC	.072 (1.13)	.074	.091 (1.37)	.094	.094 (1.49)	.097
GINI ₁	.450 (5.58)	.486	.434 (4.76)	.472	.461 (5.97)	.515
F test	25.22		26.59		25.81	
F* test	8.34		9.20		8.80	
R ²	.48		.44		.47	

T-ratios in parentheses. Number of observations: $NT = 342$. *GINI* are the Gini coefficients in logs, *GDP* is the GDP per capita in logs, *GDP80* is the GDP per capita in logs in the 1980s with zeros elsewhere, *GDP90 – 07* is the GDP per capita in logs in 1990-2007 with zeros elsewhere, *OPEN* is a measure for trade openness, *GOV* the government share to GDP, *POLITY* is a proxy for democracy, *M2* are the liquid liabilities to GDP, *INFLAT* are the inflation rates, *URBAN* is the share of urban population and *EDUC* is secondary education. FE is the Fixed Effects estimator and the LSDVC is the Bruno-corrected estimates.

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Notes

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¹For instance, Barro (2000) and Dollar and Kraay (2002) make use of dummies for Latin America.

²Perhaps it is worth mentioning that Bond (2002) argues that GMM-type estimators are not an alternative under $T > N$ because of the overfitting problem.

³Another issue that some would argue to be of importance in panel time-series, cointegration, is less of a problem here because inequality is a bounded variable, within zero and one, which cannot be non-stationary. This fact theoretically precludes us from using estimators that take cointegration into account.

⁴These results are in accordance with a parallel literature which deals explicitly with the role of inflation on inequality. For instance, Easterly and Fischer (2001) suggest that the poor from 38 countries consider inflation to be a more pressing problem than the rich, and Bittencourt (2009) reports that the high rates of inflation seen in Brazil in 1983-1994 contributed to increase earnings inequality.

⁵On the contrary, a parallel literature suggests that access to finance can reduce inequality via investment in productive activities, *e.g.*, Beck, Demirgüç-Kunt and Levine (2007) and Bittencourt (2010).

⁶In addition, we run regressions with the inflation tax $\frac{INFLAT}{1+INFLAT}$ on the RHS and the results are in line with the ones provided above, available on request. Furthermore, in the appendix we provide some extra results from regressions that include income per capita and the interaction terms on the RHS and they confirm the estimates reported above.