# *Does aid reduce inequality? Evidence from Latin America*

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**Abstract:**

There has been a wide an intense debate during the last decades over the efficacy and efficiency of foreign aid. The main focus of this debate was over the performance of beneficiary countries in terms of economic growth. Yet, much less analysis has been given to the role of aid on income distribution within receiving countries, despite the fact that reducing inequality is an explicit aim of international aid. In this paper, we analyse the role of aid in the evolution of income distribution over the last two decades for 18 Latin American countries. Latin America is, on the one hand, the most unequal region of the world, but also includes some of the countries currently leading the reduction of inequality in the world. On the other hand, Latin American countries are now losing much of the aid they currently receive. As a main contribution of our work, our results suggest a significant effect of foreign aid in reducing income inequality, once we have control for several variables relevant for the evolution of inequality in Latin America.

*Key words:* foreign aid; inequality; Latin America.

JEL: C23; D31; F35; O54.

## 1. INTRODUCTION

Rich countries have committed over and over again to the famous 0.7 per cent of their GDP towards international aid (United Nations' 2001 Millennium Declaration; OECD-DAC 2011; Clemens and Moss 2007, among many others). However, only five countries have been actually delivering international aid at levels close or above that 0.7 per cent (Sweden, Norway, Luxemburg, Denmark, and the Netherlands). Moreover, since the beginning of the current great recession there is a clear global downward trend in the levels of international aid: -2,7% in real terms for DAC countries in 2011, but with amazing cuts such as -34% by Spain, -22% by Greece, or -14 and -13% by Austria and Belgium respectively; OECD-DAC 2012.[1] Donor countries, especially European ones, are immersed in though fiscal positions leading to drastic budgetary cuts and their budgets for international aid have been among the first to be reduced.

In parallel and related to the above trend, there has been a wide an intense debate during the last decades over the efficacy and efficiency of international aid. The main focus of the debate has been the performance of beneficiary countries in terms of economic growth.[2] In fact, many authors suggest that aid actually does more harm than benefit (Easterly 2006; Moyo 2009). The stagnation of several African countries despite large aid inflows, in conjunction with evident corruption and mismanagement of resources in those countries, has been their main argument. Yet, much less analysis has been given to the role of international Official Development Assistance (ODA) on income distribution within receiving countries, and across regions of the world, despite the fact that reducing inequality is an explicit aim of international aid, as we will show further.

In this line, Latin America represents a very interesting case of analysis. On one hand, as a traditionally receiving region, Latin American countries have seen their levels of international aid inflow significantly reduced over the last years (from constant 2010 USD 7.130 million in 2001 to USD 5.400 million in 2010). The European Commission, in particular, is going to exclude all Latin American countries - except Haiti - from her Development Co-operation Instrument,

[1] ODA reached USD 128.7 billion in 2010, representing a historical maximum and an increase of +6.5 % over 2009 and 0.32% of the DAC's members GNI. In 2011, ODA was constant USD 2010 125.5 billion and 0.31% GNI.

[2] Literature on aid and growth is still controversial (see McGillivray et al. 2006) even when meta-analysis techniques are used. Whereas the meta-analysis of Doucouliagos and Paldam (2011) does not find any significant effect of aid on growth, Mekasha & Tarp (2011) show positive results using meta-analysis as well. There are some recent studies showing a positive link using a variety of robust econometric techniques (Dovern & Nunnenkamp 2007; Nowak-Lehmann 2009; Minoui & Reddy 2010; Arndt et al. 2010, 2011; Juselius et al. 2011 and Tezanos et al. 2012 for the Latin American case).

2014-2020. On the other hand, Latin America has been for long considered the most unequal region in the world. But, according to recent data, many Latin American countries are now among those leading inequality reductions in the world. In fact, in the period 2002-2008 inequalities decreased in 14 out of 17 continental Latin American countries, while on average the Gini coefficient dropped 2.3 points (Lustig and Gasparini 2011).

Although some works have analysed the determinants of the evolution of inequality in Latin America during the recent decades, none - to the best of our knowledge - have considered a possible role of international aid. Like wise, the study of the relationship between aid and income distribution in developing countries has surprisingly received very little attention. The aim of this paper is, therefore, to fill this gap and study the evolution of income inequality in Latin American countries during the last two decades using yearly data and paying special attention in assessing, theoretically and empirically, the role of international aid in this evolution. Our main finding is that ODA flows have had an egalitarian effect in Latin America, once it was controlled for redistributive domestic policies, labour market institutions and human capital, and trade and other external flows such as foreign direct investment and remittances. An additional 1% of aid/GDP reduces the Gini coefficient by 0.32 percentage points (0.27 when we control for inequality in educational achievements).

The structure of the paper is as follows. In the next section we first revise the literature on the determinants of inequality, giving the focus to the Latin American case, to then justify a possible role of international aid. In section 3 we present the data we use and describe the evolution of inequality and aid in the Latin American countries under study. In section 4 we set the empirical model and estimation techniques to follow and present our results along some robustness checks. Finally, in section 5 we conclude.

## 2. LITERATURE REVIEW

### *2.1. Determinants of inequality in Latin America*

It is well known that Latin America is the most unequal region of the world, especially in income terms. Although Gini indexes among Latin American countries show wide dispersion, the most equal Latin American country, measured under disposable income (Uruguay with 0.42) is still

more unequal than the European country where inequality is the highest (Portugal equals 0.38).[3] Although some authors have hypothesized that Latin American inequality was born under their independence due to their extractive institutions (Acemoglu et al. 2002) and factor endowments (Engerman & Sokolof 2002), recent evidence shows that this historical determinism might be a myth (Williamson 2009, Milanovic 2009, Prados de la Escosura 2007 a, b). In the same vein of these long run studies, Fitzgerald (2009) has shown that income inequality worsened between 1880-1920, it decreased in the 1920s decade, and it worsened again since 1930 to 1970. Moreover, a new period of decreasing inequality has been that between 1970 and 1982 and since 2002-03 to nowadays. In sum, Latin American inequality has not always been high and differences among countries have been outstanding.

Looking at possible determinants of the evolution of inequality in Latin America, in particular the "rise and fall" of the last decades (Lustig and Gasparini 2011), some recent literature has focused on the political reasons. On the one hand, McLeod & Lustig (2010); Birdsall et al. (2011) and Roberts (2012) have shown that, in contrast to the liberalization politics and conservative governments of the 1980s and 1990s, leftist governments have begun some redistributive-oriented reforms since 2002-2003, although the social democratic regimes (Brazil, Chile or Uruguay) have got higher success than the so-called left populist regimes (such as Argentina, Bolivia or Venezuela). On the other hand, and in a more economic vein, economic liberalization during the 80s and 90s (Londoño and Székely 2000; Székely 2003), trade openness (Székely & Sámano 2012), a new fiscal pact and tax policy (Cubero and Vladkova-Hollar 2010; Lustig coord. 2011; Ocampo and Malagón 2012; and Cornia et al. 2012), and the expansion and more effective social spending through cash and in-kind transfers (in education and health) and, to lesser extent, progressive direct taxes (Lustig coord. 2012), have been identified as determinants of recent inequality reductions.

Other factors have accompanied political reasons, such as a fall in the premium to skilled labour - returns to education have fallen because of the increase in the average years of schooling (Lustig and López Calva 2012; Lustig, López-Calva and Ortiz-Juarez 2012; Acevedo & Cabrera 2012 for El Salvador) or due to a higher demand in low-skilled workers compared to skilled, to work in the so-called *maquiladoras* (Campos et al. 2012 for Mexico, for instance). In fact, Cruces et al. (2012) have pointed out that a more pro-poor pattern of the education upgrading and a

[3] Goñi et al. (2011). The Latin American average showed by the authors was 0.50 and 0.31 for the European sample. The authors use information for several years but since 2000 in the Latin American cases and 2001 for the EUROMOD's dataset.

more stable or even increasing relative demand for low skill labour explain significantly the egalitarian evolution of some Latin American countries in the 2000s, as the opposite was a remarkable factor of the increasing inequality of the 1980s (Psacharopoulos et al. 1995, 1997). In this line, Bashir & Luque (2012) have documented an inequality effect of tertiary education in Central America. Institutional factors related to labour market have also been identified as relevant. In particular, minimum wages have been found to have an egalitarian in the cases of Brazil (Barros et al. 2010), Chile (Contreras and Ffrech-Davies 2012), Argentina (Gasparini and Cruces 2010) and Uruguay (Amarante et al. 2011). External flows might also affect income inequality. Foreign direct investment, for example, is expected to have an impact on wage differences. Herzer et al. (2011) have identified a positive co-integration between FDI and inequality in Bolivia, Chile, Colombia and Mexico. Similarly, remittances could increase disposable income of those families that have received them versus families that have not (Acevedo & Cabrera 2012 for El Salvador; Klasen et al. (2012) for Honduras or Ponce and Vos 2012 for Ecuador). Cornia (2011) have showed these factors as example of differences in policies and results in inequality between Latin America and European economies in transition.

In this context, ODA could be considered as another external inflow that could be considered as possible determinant of inequality, especially in Latin American countries, which, as we have seen, have been important recipients of ODA until now. However, we do not find empirical evidences of ODA's role in the evolution of inequality in Latin America. None of the above studies have considered ODA flows as a factor determining income inequality. Our goal is this paper is precisely to test whether ODA flows have had a significant role in the recent fall of income inequality in Latin America and, if this is the given case, how that might be happened.

### *2.2. Aid as a possible determinant of the evolution of inequality*

Some previous works have considered a possible relationship between aid and inequality. Bornschier et al. (1978) found that aid has a positive effect on income inequality, as well as foreign investment. Dolan & Tomlin (1980) do not confirm this seminal result and find no significant correlation between aid and inequality for 1970-1973. Cuesta et al. (2006) found a negative relationship between aid and inequality using an ordered probit with annual data for 1995-98, but the effect was very sensible to sample countries and regions. In Latin America the effect was the lowest and the lower the initial inequality the lower was the effect identified. Under the donor countries perspective, Chong & Gradstein (2008), using *World Values Surveys* data, found an inverse relationship between income inequality in the donor country and citizen

agreement with foreign aid. Using cross-country regressions and dynamic panel data, Calderón et al. (2009) found no significant effect of aid on inequality or poverty. Layton & Nielson (2008) and Bjørnskov (2010) found a positive relationship between aid and inequality in the form of a regressive effect. Both studies identified a stronger regressive effect in democratic countries but did not in autocratic. The result is partially explained by rent-seeking activities and by the fact that aid is captured by local elites. Angeles & Neanidis (2010) and Holder & Raschy (2010) find similar results. Moreover, Tezanos et al. (2012-forthcoming) have shown that ODA flows had a significant effect on Latin American growth per capita if the income of the highest decile is subtracted. Finally, Herzer & Nunnenkamp (2012) have identified a positive panel cointegration between aid and inequality for 1970-1995 in a sample of 21 countries (six of them were Latin American).

Reviewing these results is interesting because it is often assumed that aid reduces poverty. Poverty can be reduced not only through economic growth but also by reducing inequality. Thus, aid could reduce poverty either by increasing growth or by reducing inequality, and pro-poor aid should reach the poorest among income distribution. In fact, international summits and OECD-DAC High Level Fora have explicitly remarked inequality reduction as one of the goals behind aid.[4]

Lustig's (2011) *Commitment to Equity Assessment* can enlighten the aid-inequality relationship. Lustig develops an analytic framework to assess whether taxes and transfers are progressive (egalitarian) or regressive (inequitable). Transfers are *absolute progressive* when poorer people get larger transfers in per capita terms. This implies that post-fiscal income is more equal than market income and they are called "pro-poor" transfers. Furthermore, transfers can be *relative progressive* if poorer people get larger transfers in relation to their income. Post-fiscal income is more equal than market income *but less equal* than when transfers are progressive in absolute

[4] Among others, the United Nations Millennium Declaration in 2000 states that: "#2. We recognize that, in addition to our separate responsibilities to our individual societies, we have a collective responsibility to uphold the principles of human dignity, *equality* and equity at the global level"; and in "#6. We consider certain fundamental values to be essential to international relations in the twenty-first century. These include: *Equality***.** No individual and no nation must be denied the opportunity to benefit from development. The equal rights and opportunities of women and men must be assured". The Paris Declaration (OECD 2005) says:"#2. At this High-Level Forum on Aid Effectiveness, we followed up on the Declaration adopted at the High-Level Forum on Harmonisation in Rome (February 2003) and the core principles put forward at the Marrakech Roundtable on Managing for Development Results (February 2004) because we believe they will increase the impact aid has in reducing poverty and *inequality*, increasing growth, building capacity and accelerating achievement of the MDGs". Finally, the Accra Agenda for Action (OECD 2008) states: "#3. We need to achieve much more if all countries are to meet the Millennium Development Goals (MDGs). Aid is only one part of the development picture. Democracy, economic growth, social progress, and care for the environment are the prime engines of development in all countries. Addressing *inequalities* of income and opportunity within countries and between states is essential to global progress".

terms. In the same vein, ODA flows might increase cash transfers or public services among the lowest quintiles (if progressivity and perfect allocation of ODA projects and programs is assumed) reducing the disposable income inequality. In-kind transfers and co-payments, user fees and participation costs in ODA interventions may also have and effect on final income inequality. By concept, it can be assumed that the most of ODA flows are channelled through the recipient's government apparatus (strictly speaking, ODA through NGOs might not fulfil this property, but these amounts are very low in the Latin American case).[5] Figure 2 shows the properties of absolutely and relatively progressive ODA flows under a theoretical concentration curves framework. Unfortunately, data on ODA classified by quintiles or deciles of the income distribution in each country are not available. In this sense, we cannot apply this methodology to test the aid-inequality relationship and we rely on the use of panel data techniques, as we will describe afterwards.

[Insert Figure 1. Concentration Curves for Progressive ODA flows]

## 3. DATA

### *3.1. Inequality*

To measure income inequality we use Gini coefficients. We follow Martorano & Cornia (2011) database. These Gini coefficients are based on income, calculated on a mixture of net income and gross income. The database includes annual data available for 12 out of 18 countries.[6] For missing values 71 interpolations were made among 323 observations (see IDLA Appendix 2 for details). Table 1 shows the main descriptive statistics for our sample and by country.

[Insert Table 1. Descriptive statistics for inequality]

Gini average reaches 52.39 with a maximum of 61.70 (Bolivia in 2000) and a minimum of 41.20 (Venezuela in 2008). Standard deviations show a wide dispersion (1.095-3.181), which means a strong heterogeneity among sample values. Additionally, all time series show order 1 autocorrelation [Box-Pierce test, Q(1)], except Honduras and Peru. In other words, inequality is highly persistent within countries and heterogeneous among them. Furthermore, when average Gini coefficient by country are computed and ranked, it can be seen that - with some exception -

[5] The highest proportion is 1% of the current USD ODA stock in Uruguay, for 1995-2009.
[6] Countries with uncompleted data are (missing years in parenthesis): Bolivia (2008); Ecuador (1990-94); Guatemala (2007-08); Nicaragua (1990-91 and 2006-08); Paraguay (1990-94); Peru (1990).

lower middle-income countries have higher inequality than upper-middle income countries, although the highest Gini belongs to an upper-middle income country, Colombia (Figure 1).

[Insert Figure 2. Average Gini coefficients by country]

When the time series are analysed some remarkable features are detected. As Figure 2 points out, eight out of 18 countries had a higher Gini at the end of the period (2008) than in the beginning (1990) (blue bars of the figure). Among these, Colombia was the country with a higher difference between the beginning and the end of the period. All the remaining sample countries experienced reductions of inequality from 1990 to 2008 but of different magnitudes.[7] In few words, inequality has recently decreased in Latin America, although not in all cases or in a homogeneous degree.

[Insert Figure 3. Changes in Gini indexes by country]

### *3.2. Aid*

The first feature that is worthy to bear in mind is, likewise inequality, the strong heterogeneity among the selected countries. Regarding income, in 2010 the Gross National Income per capita values varied from USD 11.590 in Venezuela to USD 1.090 in Nicaragua. Regarding the population size, we find countries from 195 million of inhabitants like Brazil, to countries with 3.4 million in Uruguay, being these two also the biggest and the smallest countries in surface terms respectively.

Foreign aid is also very different among countries in the sample. For ODA we rely on data from OECD-DAC (2012b) database. In **absolute terms** and for 2010, net ODA disbursements (in constant prices 2010 USD millions) varied from USD 910 million in Colombia to USD 49 million in Uruguay, or USD -254 million in Peru, a negative net flow. Remarkable differences can be exemplified comparing Brazil (USD 664 million in ODA for a population of 195 million)

[7] The amount of the reduction varies from -8.6 Gini points (Ecuador) to -1.2 (Costa Rica). In particular, Brazil has experienced an almost steady reduction in income inequality, although its Gini values are still above the median. By contrast, Honduras, Peru and Dominican Republic have experienced strong volatile movements in their Gini indexes. As regards the year of the inequality reduction onset, there is some concentration around 2003 (Paraguay, Dominican Republic, Peru), but also in 2002 (Argentina), in 2001 (Panama and Costa Rica) or even before (1998 Ecuador and El Salvador and 1995 in Mexico). Guatemala and Honduras have experienced some reduction in 2002 and 2003 respectively, but inequality rose again after these years. Finally, Mexico and Peru had their Gini over the median for some years (1995-2000 and, in the Peruvian case for 1998-1999 and 2003) but they managed to reduce it below the median, afterwards.

and Bolivia (USD 676 million for 9.9 million of population). That is, a very similar amount of ODA for countries with very different size.

The evolution of the net aid flows can be seen in Figure 3 that includes the average amount for three different periods: 1990-2000; 2000-2007; 2007-2010.

[Insert Figure 4. Net ODA evolution]

Other interesting feature is aid **volatility**. This is lower in Latin America - and for the 18 countries in the sample - compared to other regions. Measured by the coefficient of variation (or volatility around the mean), the value for Latin America between 1990-2010 was 0.12, whereas it was 0.31 for Europe, 0.28 for Asia, 0.26 for Oceania, 0.24 for Africa and 0.21 among all recipient countries. The coefficient of variation fitted 0.10 for South America and 0.19 for North and Central America. Among our sample countries, that coefficient varies from 1.17 in Costa Rica to 0.20 in Bolivia. As it was already pointed out for the case of Peru in 2010, there have been some cases of negative net aid flows. The dataset shows six more cases: Brazil in 1992 (USD -389.5 million); Dominican Rep. in 1993 (USD -2.3 million); Costa Rica in 1996 (USD -9.23 million) and 1999 (USD -0.95 million); Mexico in 2000 (USD -60.7 million); and Panama in 2007 (USD -107.0 million). In simple words, this means that in these years, the returns from past ODA loans have been higher than the "new" ODA disbursements. Remarkable enough, loans represented more than 20% of the net ODA in Argentina, Dominican Republic, Panama, Brazil and Costa Rica. On the contrary, grants for debt forgiveness reached 40% of total net ODA in Honduras, 34% in Bolivia and Nicaragua and 10% in El Salvador whereas it was null in Venezuela, Brazil and Paraguay.

Most of the aid flows to Latin American countries came from bilateral donors (from a minimum of 48% in Honduras or 55% in Dominican Republic, to 90-93% in Colombia, Panama, Brazil or Mexico in 2010). Among bilateral donors, Spain, the United States, Japan and Germany have played the main role.[8] The European Union institutions are the biggest multilateral donors (in fact these institutions were the first donor in Dominican Republic in 2009-10). EU ranks in the top ten donors in the 18 countries. Other important multilateral donors are the IDB Spanish Fund and the Global Education Fund –except in Andean and Central America countries. IDA

[8] Interesting enough, a non-DAC donor such as Israel ranked 10º in Argentina.

has been other important donor in Bolivia, Honduras and Nicaragua. (A table in the annex shows sample countries organized by their biggest bilateral donor).

Heterogeneity of ODA flows can also be appreciated in **relative terms**. For instance, it is clear that ODA is a more important flow in Nicaragua with an average of 24% in terms of GNI, USD 138 per capita and an amazing 113% relative to central government expense, than for "the big four": Argentina, Brazil, Mexico and Venezuela where ODA/GNI is smaller than 0.1%. In 2010, only Nicaragua (10%), Honduras (3.9%), Bolivia (3.6%), El Salvador (1.4%) and Guatemala (1.0%) received more than 1% aid/GNI. Table 2 shows main descriptive statistics for ***aid***, our measure of ODA in terms of GDP, for the whole sample and by country.

[Insert Table 2. Descriptive statistics for aid]

### *3.3. Inequality and Aid*

Bi-variate correlation by country among Gini indexes and ODA per capita is positive for eight sample countries (Argentina, Brazil, Costa Rica, Dominican Rep., Guatemala, Nicaragua, Uruguay and Venezuela), negative for five countries (Chile, Colombia, El Salvador, Mexico and Panama) and near cero for Bolivia, Ecuador, Honduras and Paraguay. However, by year the correlations between Gini and ODA per capita are positive for all years of the period, although their $R^2$ varies from 0.2243 in 2006 to 0.0040 in 1990. Figure 4 shows the pooled cross-section relationship between the Gini and the ODA/GNI ratio. Although Nicaragua is a clear outlier, the relationship does not change if this country is excluded.

[Insert Figure 5. ODA and inequality in Latin America: 1990-2008]

However, a positive relationship between aid and Gini coefficients is not enough to establish a causal effect of aid on inequality. Many more factors, most of them analysed in section 2, are very likely to have an influence on the evolution of inequality in Latin-American countries. Furthermore, poorer countries have in general higher levels of inequality and are, therefore, subject of higher external aid flows.

## 4. EMPIRICAL STRATETEGY

### *4.1. Empirical model*

In this section we empirically test our main hypothesis, whether ODA has a significant impact on the inequality reduction process that has happened in Latin America. Following previous contributions such as Cornia (2011, 2012) and Robinson (2009, 2010), we model inequality under three vectors or groups of regressors: domestic redistributive, labour institutions and human capital, and external flows (see Appendix A for details and sources). The independent variables were selected among the Martorano & Cornia's dataset. When several indicators were available for a given instrument or flow, the highest correlated to the Gini index were selected.[9] For domestic redistributive policies (X) we choose: ***pub_exp*** **-** general government final consumption expenditure, ***soc_exp*** **-** social public expenditure, and ***cpi*** - the Consumer Price Index. Both *pub_exp* and *soc_exp* are expressed as percentage of GDP. Social public expenditure is expected to have a negative sign, as a mean for redistribution of income, while the sign of general government final consumption expenditure will depend on the role of the government in the economy. Inflation is expected to have a positive correlation with Gini index. Distortions in process and lack of credit access of the poor could explain the effect (Cornia 2011). For labour institutions and human capital (Y): the share of adults aged 25-65 with 0 to 8 years of formal education (*hc_low*), with 9-13 years of formal education (*hc_medium*) and with more than 13 years of formal education (*hc_high*) would capture differences in years of schooling among the population. Theoretically, the higher these differences the higher returns of education, and the higher income inequality, so we would expect a positive sign for the medium and high years of schooling. Alternatively, we use the Education Gini Index (***gini_edu***). As Castelló & Doménech (2012) has pointed out, in later stages of development, where most of the population is literate, the evolution of the Gini coefficient for human capital is determined by the Gini coefficient

[9] A correlation matrix was computed (table #) with this preliminary group and those with a significant correlation over ±10% were rejected in order to deal with multicollinearity problems, or they did not regressed in the same equation.

among the literates. In spite of a large reduction in human capital inequality in Latin America, the inequality in the distribution of income might hardly change. Improvements in literacy are not a sufficient condition to reduce income inequality, even though they improve life standards of people at the bottom of the income distribution. For that reasons, we might expect a positive or negative sign between education Gini and income Gini. We also include ***un*** - the unemployment rate, and ***mw_shareformal*** - the index of nominal minimum wages deflated by countries and for the formal sector. Unemployment is expected to have positive relation with inequality, especially if subsidies or insurances are not taken for granted due to informality, and minimum wages are expected to have a negative impact on inequality, because they increase the earnings of the lowest skilled workers and, therefore, the lowest deciles of the income distribution. Finally, for external redistributive flows (Z): we selected international terms of trade (***tot1***), net foreign direct investment (***fdi***), workers' remittances receipts (***rem***), and ***aid*** - the net ODA received. These last three variables are all expressed as percentage of GDP. Terms of trade can represent a countercyclical policy and might have a negative impact on the Gini index. FDI has been high, and significantly increasing, in many Latin American countries (Argentina, Brazil, Chile and Colombia, for example) and its effect on income inequality could be mixed. On the one hand, FDI might expand profits and revenues of the higher income quintiles, whereas, on the other hand, if international firms employ low-skilled workers they may reduce inequality through higher formal employment. Remittances have been found as critical factor in reducing inequality because they increase the income of lower-income households (although not the lowest, because the poorest can not migrate). Finally, ***aid***, our key variable of interest, is expected to reduce inequality, at least as it is by principle oriented to reduce poverty and inequality, as we discussed in section 2.

Table 3 shows the correlation matrix among all the considered regressors.

[Insert Table 3. Correlation matrix]

The reduced form equation of our dynamic panel data model is:

$$G_{it} = a_i + v_{t+} G_{it-1} + \beta_1 X_{it} + \beta_2 Y_{it} + \beta_3 Z_{it} + \varepsilon_{it} \qquad (0.1)$$

Where G is the Gini index, i is the country i=1…18; t is the time period t=1990…2008; *X, Y* and *Z* are the above-mentioned vectors and ε is a composite error term that includes an unobserved country-specific effect, a time-specific effect and a stochastic error term.

### *4.2. Estimation techniques*

Several econometric problems arise from estimating equation [1.1]. One major concern arises from reverse causality from inequality to aid; as we have seen, poorer countries have in general higher levels of inequality and are, therefore, subject of higher external aid flows. A further concern comes from unobserved time-invariant country-specific characteristics, which can lead to inconsistent estimates. Finally, the presence of lagged Gini as a regressor - likely to be correlated with the country-specific characteristics - leads to a dynamic bias in the estimation.

Different panel data techniques can be used to estimate [1.1] and partially address the above-mentioned concerns. Random Effects (RE) estimations allow us to control for unobserved country-specific characteristics retaining cross-sectional differences. However, if the country-specific characteristics are correlated with the regressors - what is highly likely - RE is inconsistent and Fixed Effects (FE) estimations should be preferred. FE also controls for time-invariant country specific effects, but only considers within variation and still does not solve reverse causality and dynamic bias concerns. In this case, when independent variables are not strictly exogenous and there are time-invariant country specific effects, GMM approaches (Arellano and Bover 1995) can be a useful solution. Moreover, System-GMM estimates (Blundell and Bond 1998) are expected to be more efficient than any other dynamic GMM estimators for our specific panel data conditions: i) small number of temporal observations and ii) heteroscedasticity and autocorrelation (see Q test (1)) between observations from the same country (not between different countries). We estimate [1.1], therefore, by System-GMM.[10]

The difficulty of finding appropriate instrumental variables to help par-inequality reinforces the methodological choice of System-GMM estimations. System-GMM estimates rely on two equations: one of first differences instrumented on lagged levels - as in traditional GMM estimators - and one of levels instrumented on lagged first differences, thus also retaining information in the equation in levels. For System-GMM to yield consistent estimates we need to

[10] Previous estimations have been carried out under a similar theoretical framework with static, autoregressive dynamic and simulated maximum likelihood techniques, finding an egalitarian effect of aid in lower-middle income Latin American countries (González & Larrú 2012). In this paper we apply the System-GMM approach to deal with endogeneity, using internal instruments, in order to improve the causal effects of the independent variables, and considering a wider set of ODA measures.

ensure that lagged first differences of the endogenous variables are valid instruments for the untransformed equation in levels, which depends on the instrumented variables to be mean stationary after controlling for time trends. We also need to ensure conventional conditions used in traditional GMM estimations: that the lagged levels of the endogenous variables are valid instruments for the first-differenced equation, which depends on the absence of serial correlation of the residuals. Both things together build in some insurance against weak specification, because if the series are persistent and lagged levels are weak instruments for first differences, it may still be the case that lagged first differences have some explanatory power for levels (Durlauf et al. 2005).[11]

### *4.3. Results*

Table 4 presents results for our System-GMM estimations for [1.1]. We start by introducing *aid*, our variable of interest, plus all the above-mentioned controls except those for inequality in educational achievements, in order to keep the number of observations as large as possible (column 1). In column 2 we introduce *gini_edu* at the expense of a reduction in the sample size. As desired, in all our System-GMM estimations the ar1 test rejects the null hypothesis of no autocorrelation, while the ar2 test fails to reject it. Likewise, according to the Hansen test our set of instruments is valid.

[Insert Table 4. System-GMM estimations]

As expected, inequality is highly persistent in Latin America, especially as we are working with yearly observations[12]. Regarding our control variables, among internal redistributive policies, total **social expenditure** shows a negative and significant coefficient while **government expenditure** shows a significant but positive one. (It is, nevertheless, possible that the effects of these variables are very related, due to its high correlation, 0.535). In line with the literature, the expansion and more effectiveness of social expenditure has been a relevant determinant for income inequality reduction in Latin America in recent decades. I**nflation** (*cpi*) shows a non-

[11] Serial correlation tests, along with test for overidentifying restrictions, are standard to check the validity of instruments. For instruments to be valid first-order serial correlation is expected, but not second-order serial correlation. We report ar1 and ar2 Hansen tests in the results tables. Serial correlation does not appear to be a problem.

[12] The coefficient for lagged Gini in our benchmark estimation (column 1) is 0.67, very close to that of Cornia (2012), 0.63. When we introduce *gini_edu* the sample size decreases and the coefficient for persistency increases. However, as shown in the robustness check, as we introduce more variables in the analysis the value of the coefficient for lagged Gini decreases and again gets closer to the values found in our benchmark estimation and in Cornia.

statistically significant coefficient. Regarding labour market institutions and education, and on one hand, minimum wages in the formal sector seem to significantly increase inequality, contrary to what expected. This could be explained by the fact that higher minimum wages create a greater divide between formal and informal sectors, especially relevant in Latin American countries, as they have large informal sectors, and as higher minimum wages also might favour top percentiles of the wage distribution when wages are indexed based on minimum wages. (Arango and Pachon 2004 in fact find regressive effects of minimum wages in Latin American countries like Colombia). On the other hand, when we introduce inequality in the distribution of educational achievements (*gini_edu*) the sign of its coefficient is positive, as expected, but non-significant. Regarding foreign redistributive policies, terms of trade and remittances show negative coefficients (significant in some of the estimations) while foreign direct investment seems to have a positive, and significant effect when we control for *gini_edu*, as expected - our coefficient (0.041) is in fact close to the obtained by Cornia (2012), 0.035. Finally, our interest lays on the effect the ODA. Our estimations always yield significant and negative coefficients for aid as percentage for *aid*. To the best of our knowledge, this is the first time that a result like this is shown.

Our results suggest, therefore, a statistically significant progressive effect of international aid on income distribution in Latin American countries. An additional 1% of aid/GDP reduces the Gini coefficient by 0.32 percentage points (0.27 when we control for inequality in educational achievements) in our sample for Latin American countries. However, as the level of aid in terms of GDP is very low in most of these countries, the impact on inequality might not be economically significant. In any case, on one hand we are estimating a yearly effect that accumulated on the long run can become considerable, and on the other hand, complementarity effects are not considered in our analysis; the progressive role of aid for income distribution may also be relevant by enhancing other redistributive policies at national level.

### *4.4. Sensitivity and robustness checks*

As a first check to the effect of aid on inequality, in table 5 we replace our aid measure for alternative measures of ODA. When we measure ODA in per capita terms, rather than as percentage of GDP, our results remain the same, and the estimation still yields a negative and significant coefficient for ODA.

[Insert Table 5. Estimations with other measures for ODA]

As a second check for our results, in table 6 we add further controls suggested by the literature. In first place we consider institutional and political variables. In column 1 we add Polity2 index, as a measure of the quality of democratic institutions. In column 2 we add dummies for the government's political orientation: a dummy for socio-democratic regimes and a dummy for radical-populist regimes. The considered variables have the expected sign and are significant; better quality of democratic institutions and radical-populist regimes seem to significantly reduce inequality. In second place we consider overall economic performance by introducing economic growth (columns 3). Its effect seems to be non-significant. In any case, the coefficient for our variable for aid remains negative and significant. Hence, even after controlling for a wide variety of factors relevant for the evolution inequality in Latin American countries, international aid seems to have had a progressive effect on income distribution in these countries.

[Insert Table 6. Further controls]

## 5. CONCLUSIONS

Whereas the relationship between aid and growth has been largely investigated, this is not the case for aid and inequality; notwithstanding income distribution and poverty are the main revealed goals of foreign aid, whereas economic growth is not. Latin America is the most unequal region all over the world, but it has recently experienced remarkable reductions in poverty and inequality, especially since 2002-2003. Knowing whether aid has played an active role in this fact is important, mainly because the region has experienced a reduction in ODA flows and some donors are abandoning the region, based mainly on the fact that these countries are becoming now middle-income countries. In this line, in this paper our main interest has been to analyse the effect that aid has had on the recent evolution of income distribution on Latin American countries. Present and future decisions on the allocation, or retreat, of ODA flows should acknowledge possible income distribution effects of such decisions.

The literature has organised drivers of inequality around three main vectors: domestic redistributive and productive policies; human capital and labour market institutions; and trade and external financial flows. We have studied the evolution of inequality in Latin American, based on panel data for 18 countries for 1990-2008 and using system GMM estimations. As a main result (and contribution of our work), we have found a significant effect of international

aid in reducing income inequality, once we have control for several variables that capture the three vectors just described.

Some policy lessons could be derived from our findings. Firstly and straightforward, if ODA flows have had an egalitarian impact in Latin America, the cuts of the amounts of ODA or the abandon of the continent by some donors should be revised if improving income distribution is still an explicit aim of such aid (and given that, despite significant improvements, Latin American countries continue to be highly unequal). Second, while aid might have backfire effects on economic growth, as some authors suggest, it might still be a relevant tool to enhance much needed income redistribution in Latin America. Aid, by no means of course, should replace domestic redistribution policies of proven effect (in our results social expenditure always appears as a significant factor reducing inequality). In this line, and as interesting issue of further research, the effectiveness of ODA flows could be enhanced is done hand in hand with cash transfers. Donors could allocate a substantial portion of their ODA in cash transfers funds. This would imply higher ownership, use of local procedures and systems, higher alignment and could increase mutual accountability. In contrast, donors could lose political influence, but Paris-Accra-Busan principles for aid effectiveness would be enhanced. Lastly, our results should never imply an excuse for not carrying on with unavoidable fiscal reforms that Latin American countries need.

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**Tables:**

Table 1. Descriptive statistics for GINI coefficients

| Country | observ. | min | mean | Max | std.dev | Q(1) test |
|---|---|---|---|---|---|---|
| Argentina | 19 | 44,432 | 48,358 | 53,264 | 2,572 | 13.958 |
| Bolivia | 18 | 49,400 | 56,359 | 61,703 | 3,181 | 12.06 |
| Brazil | 19 | 54,214 | 58,269 | 60,379 | 1,786 | 13.948 |
| Chile | 19 | 51,822 | 54,289 | 55,451 | 1,201 | 15.336 |
| Colombia | 19 | 51,320 | 55,657 | 58,900 | 2,100 | 12.224 |
| Costa Rica | 19 | 43,956 | 46,711 | 49,884 | 1,925 | 10.459 |
| Dom. Rep. | 19 | 47,208 | 49,895 | 51,998 | 1,363 | 6.358 |
| Ecuador | 14 | 50,157 | 55,360 | 58,822 | 2,399 | 7.469 |
| El Salvador | 19 | 46,102 | 50,547 | 53,446 | 2,128 | 10.403 |
| Guatemala | 17 | 53,227 | 56,056 | 58,221 | 1,420 | 6.793 |
| Honduras | 19 | 52,765 | 55,249 | 58,252 | 1,491 | 2.456 |
| México | 19 | 49,760 | 52,604 | 54,717 | 1,680 | 17.057 |
| Nicaragua | 14 | 50,220 | 53,237 | 56,331 | 2,141 | 12.731 |
| Panamá | 19 | 52,093 | 55,235 | 56,653 | 1,095 | 6.27 |
| Paraguay | 14 | 52,139 | 55,797 | 58,377 | 1,763 | 5.33 |
| Peru | 18 | 46,400 | 50,604 | 55,538 | 3,022 | 1.695 |
| Uruguay | 19 | 42,114 | 43,947 | 47,056 | 1,541 | 14.418 |
| Venezuela | 19 | 41,200 | 44,882 | 47,633 | 2,196 | 8.171 |
| LATAM-18 | 323 | 41.200 | 52.251 | 61.703 | 4.643 | |

Table 2. Descriptive statistics for aid (as percentage of GDP)

| Country | observ. | min | mean | Max | std.dev |
|---|---|---|---|---|---|
| Argentina | 19 | 0.019 | 0.065 | 0.149 | 0.036 |
| Bolivia | 19 | 3.775 | 8.731 | 12.229 | 2.599 |
| Brazil | 19 | -0.067 | 0.028 | 0.047 | 0.025 |
| Chile | 19 | -0.011 | 0.172 | 0.378 | 0.118 |
| Colombia | 19 | 0.093 | 0.353 | 0.906 | 0.200 |
| Costa Rica | 19 | -0.110 | 0.542 | 3.174 | 0.926 |
| Dom. Rep. | 19 | -0.015 | 0.504 | 1.504 | 0.329 |
| Ecuador | 19 | 0.434 | 1.049 | 2.321 | 0.561 |
| El Salvador | 19 | 0.445 | 2.714 | 7.234 | 2.108 |
| Guatemala | 19 | 0.919 | 1.501 | 2.687 | 0.425 |
| Honduras | 19 | 3.865 | 8.578 | 16.035 | 3.466 |
| México | 19 | -0.010 | 0.045 | 0.141 | 0.044 |
| Nicaragua | 19 | 11.938 | 24.650 | 72.060 | 14.743 |
| Panamá | 19 | -0.730 | 0.548 | 2.499 | 0.778 |
| Paraguay | 19 | 0.329 | 1.132 | 2.365 | 0.475 |
| Peru | 19 | 0.263 | 0.883 | 1.890 | 0.424 |
| Uruguay | 19 | 0.073 | 0.250 | 0.758 | 0.206 |
| Venezuela | 19 | 0.011 | 0.055 | 0.165 | 0.033 |
| LATAM-18 | 342 | -0.730 | 2.878 | 72.060 | 6.892 |

Table 3. Correlation matrix

| | gini | aid | pub_exp | soc_exp | cpi | mw_sh. | un | tot1 | fdi | rem |
|---|---|---|---|---|---|---|---|---|---|---|
| gini | 1.000 | | | | | | | | | |
| aid | 0.148 | 1.000 | | | | | | | | |
| pub_exp | 0.395 | -0.058 | 1.000 | | | | | | | |
| soc_exp | -0.264 | -0.221 | 0.503 | 1.000 | | | | | | |
| cpi | 0.084 | -0.055 | 0.057 | 0.125 | 1.000 | | | | | |
| mw_shareformal | -0.390 | -0.283 | 0.046 | 0.452 | -0.097 | 1.000 | | | | |
| un | -0.110 | -0.110 | 0.034 | 0.034 | -0.099 | 0.019 | 1.000 | | | |
| tot1 | -0.037 | -0.114 | -0.001 | 0.131 | -0.130 | 0.155 | -0.026 | 1.000 | | |
| fdi | -0.003 | 0.245 | -0.027 | 0.111 | -0.080 | -0.052 | -0.267 | 0.047 | 1.000 | |
| rem | 0.132 | 0.292 | -0.303 | -0.452 | -0.094 | -0.253 | -0.111 | -0.129 | 0.165 | 1.000 |
| gini_edu | 0.503 | 0.478 | -0.014 | -0.466 | 0.153 | -0.345 | -0.481 | -0.157 | 0.121 | 0.559 |

Note: 172 observations for gini_edu, 246 observations for the other variables

Table 4. Estimations System-GMM

| Dependent Variable: gini | | |
|---|---|---|
| | 1 | 2 |
| Variable | Coeff. | Coeff. |
| L.gini | 0.6751** | 0.8110*** |
| | (0.307) | (0.172) |
| aid | -0.3244* | -0.2726*** |
| | (0.187) | (0.071) |
| pub_exp | 0.4803* | 0.5200** |
| | (0.271) | (0.215) |
| soc_exp | -0.4431** | -0.4978*** |
| | (0.199) | (0.112) |
| cpi | 0.0007 | 0.0003 |
| | (0.001) | (0) |
| mw_shareformal | 0.0140 | 0.0285* |
| | (0.032) | (0.014) |
| un | -0.0258 | -0.0516 |
| | (0.104) | (0.086) |
| tot1 | -0.0078 | -0.0158 |
| | (0.018) | (0.015) |
| fdi | 0.0222 | 0.0417*** |
| | (0.031) | (0.014) |
| rem | -0.0155 | -0.1126** |
| | (0.104) | (0.049) |
| gini_edu | | 0.0112 |
| | | (0.052) |
| constant | 17.1042 | 10.0238 |
| Obs | | |
| ar1 p-value | 0.065 | 0.031 |
| ar2 p-value | 0.223 | 0.757 |
| J stat p-value | 0.267 | 0.505 |
| Estimation by System GMM | | |
| Laggs 2 and 3 periods as instruments for endogenous variables. | | |
| Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1 | | |

Table 5. Estimations with other ODA measures

| Dependent Variable: gini | | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Variable | Coeff. | Coeff. | Coeff. |
| L.gini | 1.0974*** | 0.7353** | 0.8958*** |
| | (0.201) | (0.264) | (0.209) |
| ODApc | -0.0695** | | |
| | (0.026) | | |
| ODA_ExclDebt_Mcurr | | 0.0005 | |
| | | (0.003) | |
| netODApc_noDebt | | | -0.0460 |
| | | | (0.027) |
| pub_exp | 0.3493* | 0.5035** | 0.4640** |
| | (0.176) | (0.230) | (0.201) |
| soc_exp | -0.4985*** | -0.4070*** | -0.4712* |
| | (0.137) | (0.137) | (0.227) |
| cpi | -0.0001 | 0.0006 | 0.0002 |
| | (0.001) | (0.001) | (0.001) |
| mw_shareformal | 0.0318 | 0.0177 | 0.0304 |
| | (0.019) | (0.017) | (0.033) |
| un | -0.0479 | -0.0624 | -0.0953 |
| | (0.091) | (0.055) | (0.107) |
| tot1 | -0.0279 | -0.0078 | -0.0171 |
| | (0.017) | (0.009) | (0.012) |
| fdi | 0.0469* | 0.0135 | 0.0247 |
| | (0.023) | (0.012) | (0.017) |
| rem | 0.0478 | -0.0781 | -0.0212 |
| | (0.068) | (0.076) | (0.057) |
| gini_edu | -0.0857 | -0.0257 | -0.0363 |
| | (0.057) | (0.077) | (0.092) |
| constant | 2.1197 | 13.9387 | 8.0101 |
| Obs | 168 | 168 | 168 |
| ar1 p-value | 0.0228 | 0.0345 | 0.0547 |
| ar2 p-value | 0.664 | 0.758 | 0.968 |
| J stat p-value | 0.391 | 0.545 | 0.298 |

Estimation by System GMM
Laggs 2 and 3 periods as instruments for endogenous variables.
Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1

Table 6. Estimations with further controls

| Dependent Variable: gini | | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Variable | Coeff. | Coeff. | Coeff. | Coeff. |
| L.gini | 1.0256*** | 0.7904*** | 0.6892*** | 0.788*** |
| | (0.261) | (0.106) | (0.142) | (0.199) |
| aid | -0.3452*** | -0.2385*** | -0.2370*** | -0.2748*** |
| | (0.083) | (0.059) | (0.064) | (0.080) |
| pub_exp | 0.4923* | 0.6288** | 0.8532** | 0.5673** |
| | (0.262) | (0.251) | (0.357) | (0.201) |
| soc_exp | -0.5884*** | -0.5246*** | -0.6222** | -0.5224*** |
| | (0.173) | (0.165) | (0.264) | (0.169) |
| cpi | 0.0001 | 0.0004 | 0.0009 | 0.0003 |
| | (0.000) | (0.000) | (0.001) | (0.000) |
| mw_shareformal | 0.0666* | 0.0430 | 0.0421 | 0.0297 |
| | (0.038) | (0.042) | (0.041) | (0.017) |
| un | 0.0334 | 0.0022 | -0.0320 | -0.0846 |
| | (0.138) | (0.118) | (0.103) | (0.109) |
| tot1 | 0.0179 | 0.0165 | 0.0180 | -0.0110 |
| | (0.037) | (0.031) | (0.030) | (0.015) |
| fdi | 0.0558** | 0.0419* | 0.0421 | 0.0406* |
| | (0.022) | (0.021) | (0.026) | (0.020) |
| rem | -0.1154** | -0.0925*** | -0.0292 | -0.1132* |
| | (0.051) | (0.029) | (0.083) | (0.059) |
| gini_edu | 0.0733 | 0.0418 | 0.0642 | 0.0148 |
| | (0.108) | (0.080) | (0.070) | (0.076) |
| polity2 | 0.6623 | | | |
| | (0.550) | | | |
| social_dem | | -0.2038 | | |
| | | (0.700) | | |
| populista | | -2.9948*** | | |
| | | (0.931) | | |
| reer | | | 0.1302 | |
| | | | (0.169) | |
| reer_sq | | | -0.0004 | |
| | | | (0.001) | |
| growth | | | | -0.0371 |
| | | | | (0.037) |
| Constant | -13.2693 | 4.3881 | -2.0318 | 10.6544 |
| Obs | 168 | 168 | 166 | 168 |
| ar1 p-value | 0.0521 | 0.01 | 0.0405 | 0.0297 |
| ar2 p-value | 0.885 | 0.951 | 0.479 | 0.782 |
| J stat p-value | 0.832 | 0.848 | 0.447 | 0.487 |

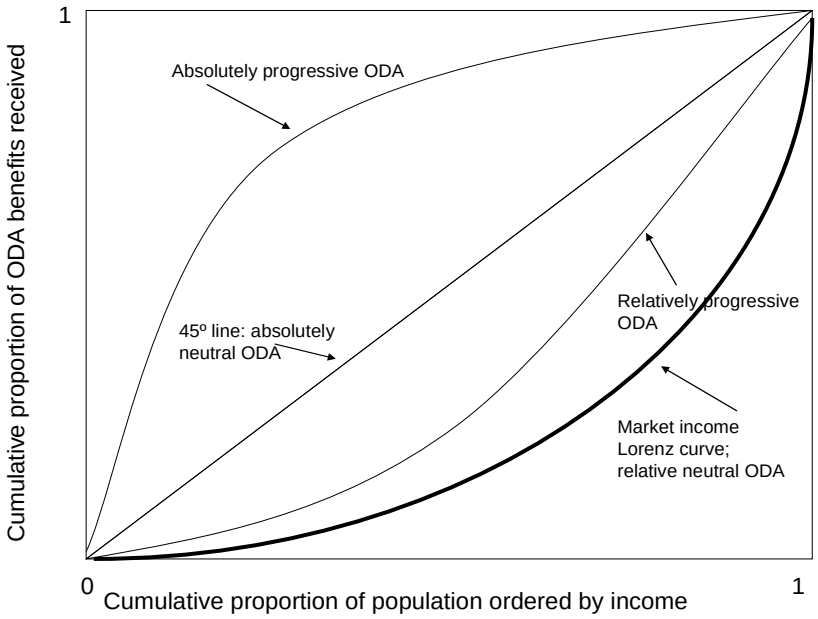
Estimation by System GMM

Laggs 2 and 3 periods as instruments for endogenous variables.

Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1

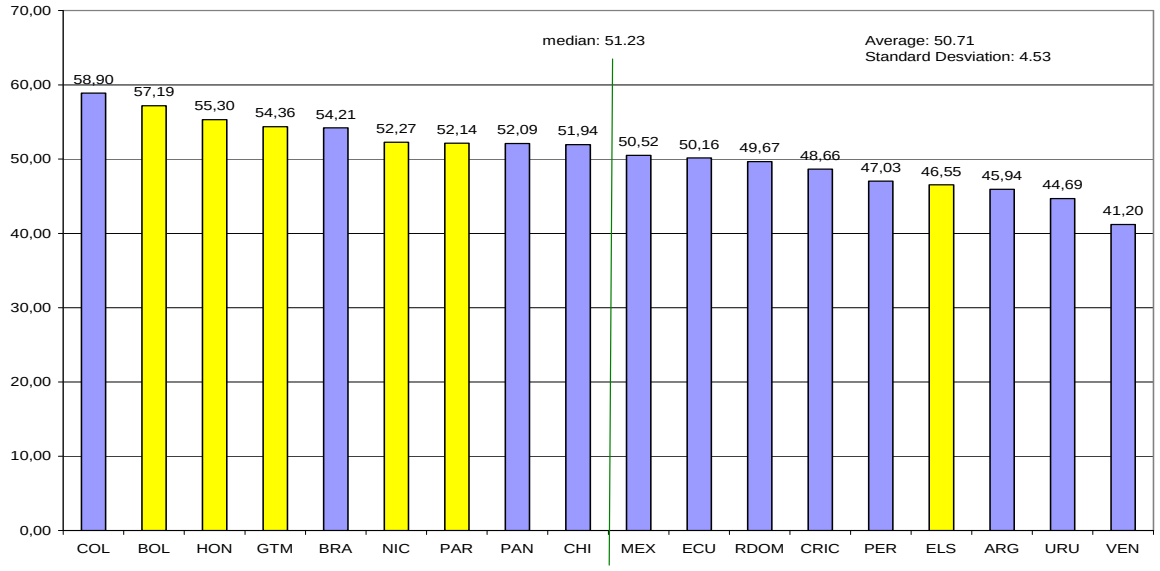
**Figures:**

Figure 1. Concentration Curves for Progressive ODA flows



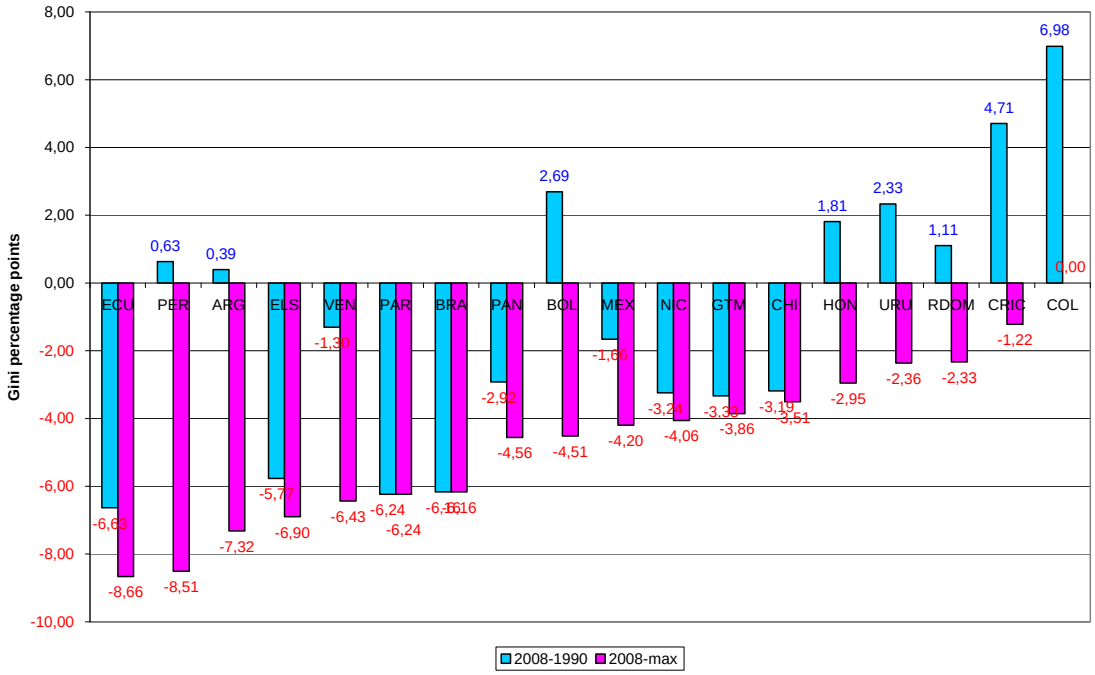

Source: inspired in Lustig (2011).

Figure 2. Average Gini coefficients by country



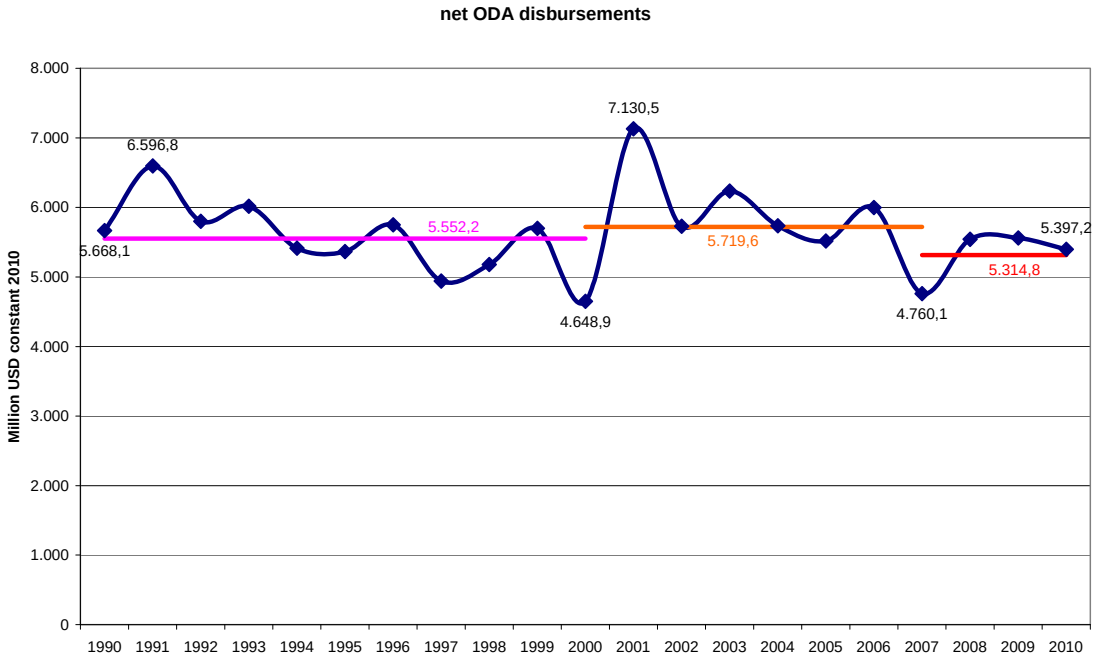

Source: Author's calculation based on IDLA dataset.

Figure 3. Changes in Gini indices



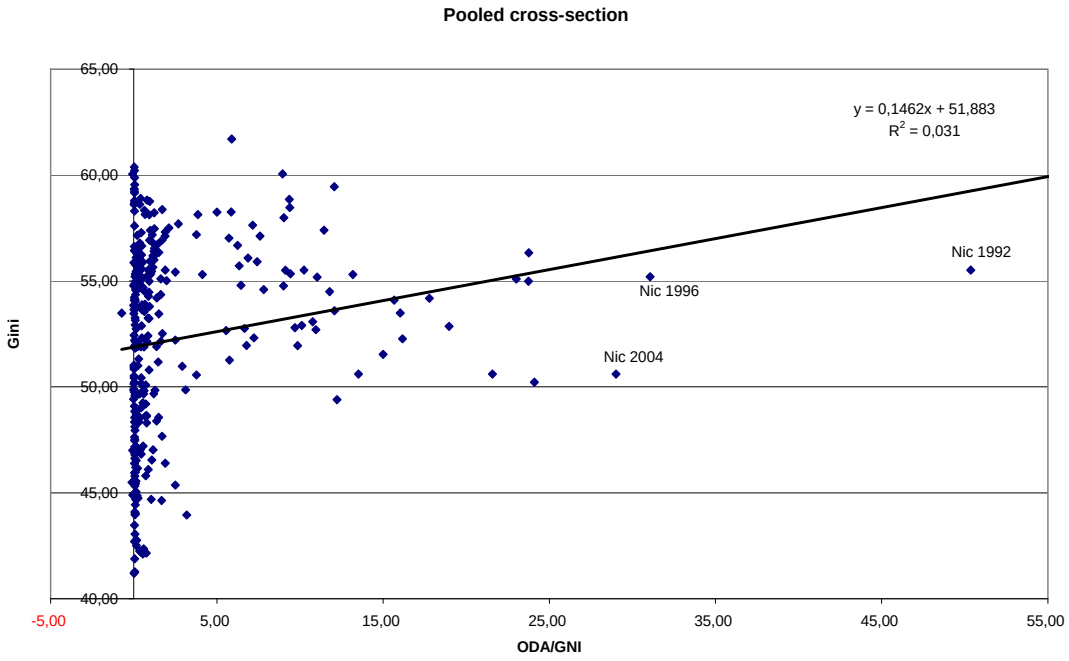

Source: Author's calculation based on IDLA dataset.

Figure 4. Net ODA averages




Source: OECD-DAC. [Excel sheet: Graf nODA 90-10 ctes]

Figure 5. ODA and inequality in Latin America: 1990-2008




Source: Authors' elaboration with data from Martorano and Cornia (2011).

**Appendix:**

Variables considered

| Variable | Description | Source |
|---|---|---|
| gini | Gini index on income, calculated on a mixture of net income and gross income concept | Martorano & Cornia (2011) |
| pub_exp | General government final consumption expenditure (% of GDP) | World Development Indicators |
| soc_exp | Social public expenditure as percentage of GDP | CEPALSTAT |
| cpi | Inflation measured by the average consumer price. Data for inflation are averages for the year, not end-of-period data ( annual percent change) | WEO |
| mw_shareformal | Index of nominal minimum wages deflacted by countries' CPI (2000=100) (The indicator corresponds formal sector) times share of formal total urban employed population | CEPALSTAT and authors' elaboration |
| un | Unemployment, total (% of total labour force) | World Development Indicators |
| gini_edu | Education Gini Index. It is computed as one measure of inequality in education. | SEDLAC |
| tot1 | International terms of trade, fob (2000=100) | CEPALSTAT |
| fdi | Net foreign direct investment stocks measured as percentage of GDP | UNCTAD |
| rem | Worker's remittances receipts as percentage of GDP | USAID, UNCTAD, WDI |
| aid | Net ODA received (% of GDP) | World Development Indicators |
| ODApc | Net ODA per capita | World Development Indicators |
| ODA_ExclDebt_Mcurr | Net ODA excluding debt relief in current USD million | OECD-DAC |
| NetODApc-no debt | Net ODA per capita excluding debt relief | OECD-DAC and authors' elaboration |
| Reer (and reer_sq) | Index of real effective exchange rate (2000=100). | Economic Survey of Latin America and the Caribbean (several issues) |
| growth | Growth rate of real GDP chain per capita in 2005 constant prices | PWT 7.1 |
| Polity2 | Democratic level that ranges from +10 (strongly democratic) to -10 (strongly autocratic). | Polity IV Project |
| Social_dem | Dummy denoting a country with a social-democratic government. | Martorano and Cornia (2011) |
| populista | Dummy denoting a country with a populista government. | Martorano and Cornia (2011) |

Main donor of net stock ODA 1990-2010

| Spain | Japan | US | Germany | Italy |
|---|---|---|---|---|
| Dom. Rep. | Costa Rica | Colombia | Brazil | Argentina |
| Ecuador | Paraguay | El Salvador | Chile | |
| Uruguay | | Guatemala | | |
| Venezuela | | Honduras | | |
| | | Mexico | | |
| | | Peru | | |
| | | Nicaragua | | |
| | | Panama | | |
| | | Bolivia | | |

Source: Author's elaboration with OECD-DAC data.