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Did Trade Openness Affect Income Distribution in Latin America?

Evidence for the years 1980–2010

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Abstract

This paper offers a medium-term perspective for analysing the trade openness–inequality relationship in Latin America. We present three contributions. The first is that we assemble a database on income distribution indicators systematically estimated from household surveys with emphasis on within-country consistency of methodology, definitions, and coverage for the years 1980-2010. This 30-year database allows observing clearly that the increases in inequality throughout the 1980s and 1990s decades have been almost totally counteracted by the improvements during the first 10 years of the twenty-first century: 75 per cent of the deterioration in income distribution was reversed in the first decade of 2000. The second is an estimation of the association between trade openness and income distribution over the 30-year period. Our central conclusion in this regard is that greater trade openness is associated with contemporaneous increases in inequality in the region. The third is that trade openness contributed—together with other factors—to the increase in inequality during the 1980s and 1990s, but once fully implemented, it did not lead to further rises in inequality, and did not represent a permanent obstacle to improvements in income distribution triggered by other factors such as greater education levels across the population.

Keywords: inequality, education, trade.

JEL classification: F1, I3

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Acronyms

CEPAL	Comisión Económica para América Latina y el Caribe
CGE	computable general equilibrium modelling
GDP	gross domestic product
HO	Heckscher-Ohlin theorem
LA	Latin America
SEDLAC	Socio Economic Database for Latin America
SS	Stolper Samuel theorem

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1 Introduction: Trade and income distribution in Latin America: Is there anything new to say?

A straightforward search in *JStore* reveals that in the 2000s decade alone, 1,241 articles were published in academic journals specifically on the relationship between trade and income distribution, and 15,188 articles if one includes those that analyse this relationship and other topics in the same paper. The bulk covers more than 2,800 publications in academic journals on this relationship specifically and 44,500 papers that include this, among other issues, if we consider the 1980-2010 period.[1] So, even though the literature has not been conclusive on whether trade openness has positive or negative effects on inequality, it is natural to ask whether it is still possible to offer anything new to say about this subject.[2]

The same applies to Latin America, since the number of papers published in academic journals analysing the region has grown proportionally faster, representing 18, 21 and 24 per cent of the total publications in the 1980s, 1990s, and 2000s, respectively. The interest in this region has been fuelled by the expectation that trade liberalization in the late 1980s and 1990s would lead to greater economic growth and a more equal distribution of resources as standard trade theory predicts. Although the literature is inconclusive about the strength and direction of the relationship also in this case, still the production of at least 700 academic articles written on the subject during the past two decades justifies the question of whether it is still worth continuing the exploration of what would seem an over-researched issue.

This paper argues that in spite of the vast literature on the relationship between income distribution and trade openness in Latin America, the second decade of the twentieth century offers an ideal moment to engage in deeper analysis both on the direction of the association between this particular policy and the distribution of income across individuals, and on the underlying mechanisms through which trade affects inequality. The reason is that trade openness is a process that triggers a reallocation of resources across the economy, which inherently needs time to produce its full effects. Most of the analyses for the region so far have either analysed relatively short time-spells in specific countries or at the regional level, or have used data from the 1990s and the early 2000s with few observations on the initial conditions of pre-trade liberalization in the 1980s.[3]

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1 The well-known literature survey by Goldberg and Pavcnik noticed already in 2004 that 'the number of literature reviews alone is so large by now that it seems that a review of literature reviews would be appropriate'.

2 As shown by Goldberg and Pavcnik (2007) a thorough literature review reveals that a large group of authors support the idea that trade reduces inequality, but an equally large group argues otherwise, and concentrates its efforts on explaining the reasons why more trade openness might lead to greater disparities along the distribution in spite of what the standard Heckscher-Ohlin and Stopler Samuelson theorems predict. Winters, McCulloch and McKay (2004) present similar conclusions for the poverty-trade relationship.

3 See, for example, Hanson (2001, 2004), Chiquiar (2008), Nicita (2004) and de Hoyos (2005) for Mexico; Ferreira, Leite and Wai-Poi (2007) for Brazil, and Attanasio, Goldberg and Pavcnik (2003) for Colombia.

This paper provides a medium-run analysis of the association between changes in income inequality and trade openness across Latin American by offering a new database with information from the early 1980s prior to the openness process in most countries, and all the way to the late 2000s with a broader 30-year view on this relation. We characterize trade openness as represented by the level of average tariffs in the economy, where reductions in this variable lead to greater openness. The main hypothesis we explore is whether changes in trade openness have a temporary effect over inequality that lasts only while the process is taking place, or whether the change leads to long lasting impacts that are not reversed even after the economy has been able to adjust to the shock implied by an abrupt reduction in tariffs. Since trade openness leads to a reallocation of factors across the economy, there are reasons to expect a contemporary increase in inequality, but once the adjustment has taken place, the distributional effect would tend to vanish. If this is so, once tariffs reach low levels, further effects over the distribution of income associated to it would tend to be small.

Expanding the timeframe of analysis goes at the heart of the policy interest on the trade–inequality relationship, since it can provide better answers to the central question of whether the losers in the process of trade openness will find new opportunities naturally to compensate for the adverse impact they might have experienced initially, or whether long-run or even permanent compensatory measures are necessary to ameliorate the adverse effects. In other words, with a longer-term view it is possible to determine whether initial distributional shifts provoke structural changes in the population that impede improvements thereafter, or if the contemporary deteriorations are only a road to more stable conditions once the economy has adjusted to the reform process.

Being able to compare the situation before the implementation of reforms and two decades after its initiation has the advantage of capturing some of the economy-wide effects and dynamics,which are not identifiable in shorter-run analysis but which can significantly modify and even reverse the immediate distributional impact of trade openness in a country. For instance, if trade affects the wage premium related to education, an immediate effect could be an increase in inequality associated with the higher education levels among richer individuals. However, if there is a secular long-term trend in the accumulation of human capital associated with progressive public policies that are independent from trade, a larger proportion of individuals in the middle or lower part of the income distribution could eventually benefit from the higher returns to education, which would tend to improve the distributional outcome at some point in time in the future. A short-term analysis would capture only the initial price effect of trade, but would not account for the progressive effect of a greater education stock in the future. A similar situation arises with short-term research on the reallocation of workers across sectors, occupations, etc., where the immediate impact may result in a worsening of the income distribution, but with possible improvements along the way when factors are reallocated to activities where they are more productive.

The paper is similar in spirit to the recent analysis by Cornia (2010) who examines the relationship between macro variables and the Gini coefficient for the 1990s-2000s period, although here we consider a wider time horizon, a slightly different framework, and different econometric specifications. Compared to the research reviewed in De Hoyos and Lustig (2009) who summarize the results from micro-simulations, computable general equilibrium modelling (CGE), inequality decompositions, and

micro-econometric models, our focus is on identifying general regional patterns that can later be used as reference for detailed micro analysis.[4]

An additional element of interest for examining the relationship between trade openness and income distribution is that different authors have recently identified a change in the increasing inequality pattern observed in Latin America over the 1990s, with reductions in several countries during the 2000s decade (see, for instance, Gasparini and Cruces 2011, and López-Calva and Lustig 2010). Our database allows placing these new changes in a historical perspective by providing comparisons since the 1980s decade. More importantly, we address the question of whether the new decreasing inequality trend is associated to the longer-run effects of openness that occurred two decades earlier.

In sum, the paper offers three contributions: (i) an analysis of inequality in Latin America for the three decades covering the 1980-2010 period; (ii) estimations on the sign of the association between inequality and trade openness over 30 years; and (iii) an illustration of the distributional dynamics that are observed once the initial impact of openness stabilizes and other factors come into place. The paper is organized as follows. Section 1 presents our database as well as the main stylized facts for the income distribution–trade openness relationship in Latin America. Section 2 discusses a framework that illustrates the complexity of tracing the effects of openness on inequality. Section 4 discusses our empirical strategy and presents our results. Section 5 concludes.

2 Stylized facts: inequality and trade reform in Latin America during 1980-2010

One advantage of the analysis of the trade–inequality relationship in Latin America (LA) is that the timing of the change towards more open economies can be clearly localized in the mid-1980s years. This allows establishing the situation before trade reforms, and after they were introduced. Fortunately, it is possible to characterize the changes in policy by observing average tariffs, and data are also available for observing their impact through the flow of imports and exports over the years.[5] Figure 1 clearly illustrates the changes in average tariffs, with a steep reduction from around 50 per cent at the regional level in 1985 to levels of around 10 per cent in the year 2000 and thereafter. It can also be seen that trade flows characterized as the share of imports plus exports over the value of gross domestic product (GDP) increased from 40 per cent in 1983 before trade openness was initiated, to levels between 70 and 75 per cent at the end of the 2000s decade.

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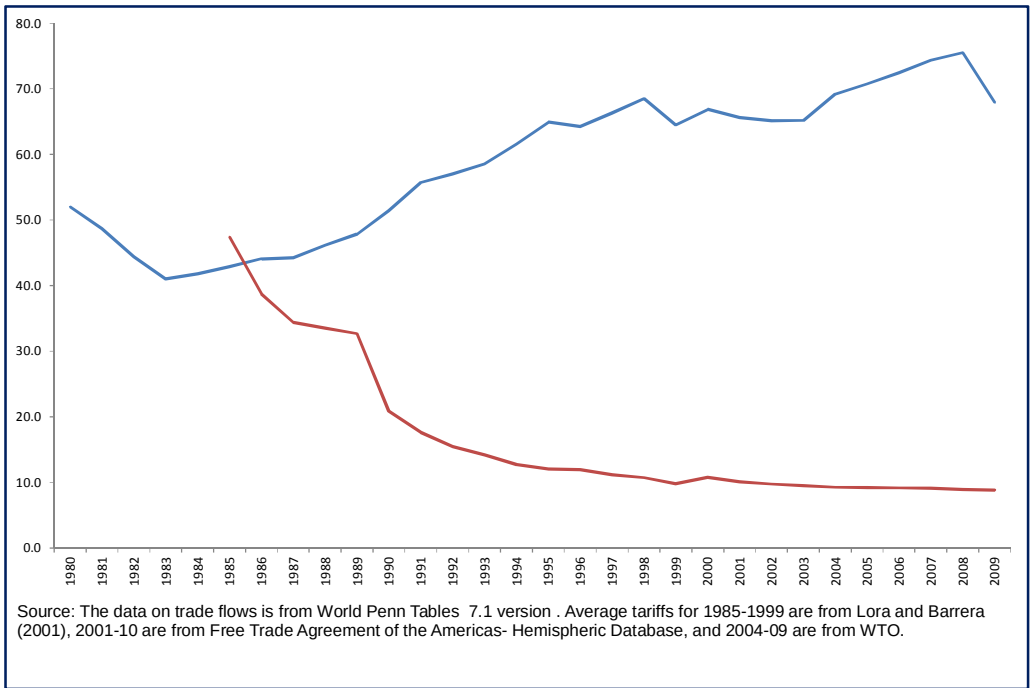
4 Examples of the CGE approach include the compilation of studies in Vos et al. (2008), Ganuza et al. (2005), and Sánchez (2007). Bourguignon, Ferreira and Lustig (2004) offer micro-simulation methodology and illustrate applications to a series of developing countries.

5 As is well known, non-tariff barriers can be even more important than tariffs themselves in promoting trade, but systematic comparable information on this type of trade restrictions is much more limited.

Figure 1
Trade flows and average tariffs in Latin America, 1980-2010



Source: The data on trade flows is from World Penn Tables 7.1 version . Average tariffs for 1985-1999 are from Lora and Barrera (2001), 2001-10 are from Free Trade Agreement of the Americas- Hemispheric Database, and 2004-09 are from WTO.

Table 1
Trade flows and average tariffs in Latin America, 1980-2009

	Trade flows			Average tariffs		
Country	1980	2009	Change 1980-2009	1985	2009	Change 1980-2009
Argentina	22.6	41.7	19.2	28.0	12.6	-15.4
Bolivia	35.9	59.3	23.3	20.0	10.3	-9.7
Brazil	9.3	24.2	15.0	80.0	13.6	-66.4
Chile	41.1	76.9	35.7	36.0	6.0	-30.0
Colombia	23.9	40.6	16.6	83.0	12.5	-70.5
Costa Rica	42.5	84.3	41.8	53.0	5.4	-47.6
Dominican Republic	76.0	49.3	-26.7	88.0	7.1	-80.9
Ecuador	43.6	60.1	16.5	50.0	11.2	-38.8
El Salvador	38.7	59.2	20.5	23.0	5.9	-17.1
Guatemala	61.3	53.8	-7.5	50.0	5.6	-44.4
Honduras	144.2	102.8	-41.4	41.9	5.6	-36.3
Mexico	17.0	54.9	37.9	34.0	11.5	-22.5
Nicaragua	45.9	98.1	52.2	54.0	5.6	-48.4
Panama	172.2	141.7	-30.5	15.8	7.1	-8.7
Paraguay	57.3	120.0	62.6	71.3	10.3	-61.0
Peru	30.1	42.9	12.8	64.0	5.5	-58.5
Uruguay	30.9	60.9	30.0	32.0	10.5	-21.5
Venezuela	43.5	52.4	9.0	30.0	12.5	-17.5
LA Average	52.0	67.9	15.9	47.4	8.8	-38.6

Source: The data on trade flows taken from World Penn Tables 7.1 version. Average tariffs for 1985-99 are from Lora and Barrera (2001), 2001-2010 are from Free Trade Agreement of the Americas Hemispheric Database and 2004-09 are from WTO.

Table 1 presents the differences across 18 LA counties. Tariff reductions were greatest during the years 1985-2009 in the Dominican Republic, Paraguay, Brazil and Peru, with declines of around 60 points or more—reaching more than 80 points in the Dominican Republic—to reductions below 10 points in Peru and Panamá. The largest increases in trade flows were observed in Paraguay and Nicaragua—above 50 percentage points—with reductions in the Dominican Republic, Honduras and Panama.

As for indicators on income distribution, data availability is much more limited. Household surveys, which are regarded as the most reliable source on individual and household income, were started to be gathered systematically only during the 1970s and 1980s in some countries, and more widely across the region only from the 1990s and 2000s decades, which explains why the number of studies comprising the before-after reform process is limited.

For the purposes of this work, we build on previous efforts by several authors in order to assemble a historical database covering the three decades of interest, which we expect would allow us to capture not only the immediate short-run effects of openness on inequality, but also the medium- and longer-run consequences of the restructuring of each country's economy after the exposure to more trade. To summarize the information on the distribution of income, we rely on Gini indexes that have been computed directly from household surveys, using household income per capita as the welfare indicator, where the income definition includes labour income and other sources, and which has consistent geographic coverage within each country throughout the period.

All in all, the database consists of 265 Gini indexes comprising the 1980-2010 period. To our knowledge, this is the largest database on income distribution indicators consistently developed from household surveys with the same methodology and definitions for these three decades for the Latin American region up to date. In order to assemble our 265 observations, we combine data from the following four sources,always assuring consistency of types of data, definitions and methodology within countries: (i) we use data from Londoño and Székely (2000) who provide consistent information across countries for the 1970-95 period; (ii) we use the information developed in Székely (2003) who builds a consistent database for the 1990s; (iii) we access directly 108 recent household surveys for the 1999-2010 period to compute the Gini index; (iv) we complement the information with data taken from SEDLAC for the years where a household survey for the countries considered exists, and which is not available in the previous three sources.[6] Appendix Table A1 presents the data.[7]

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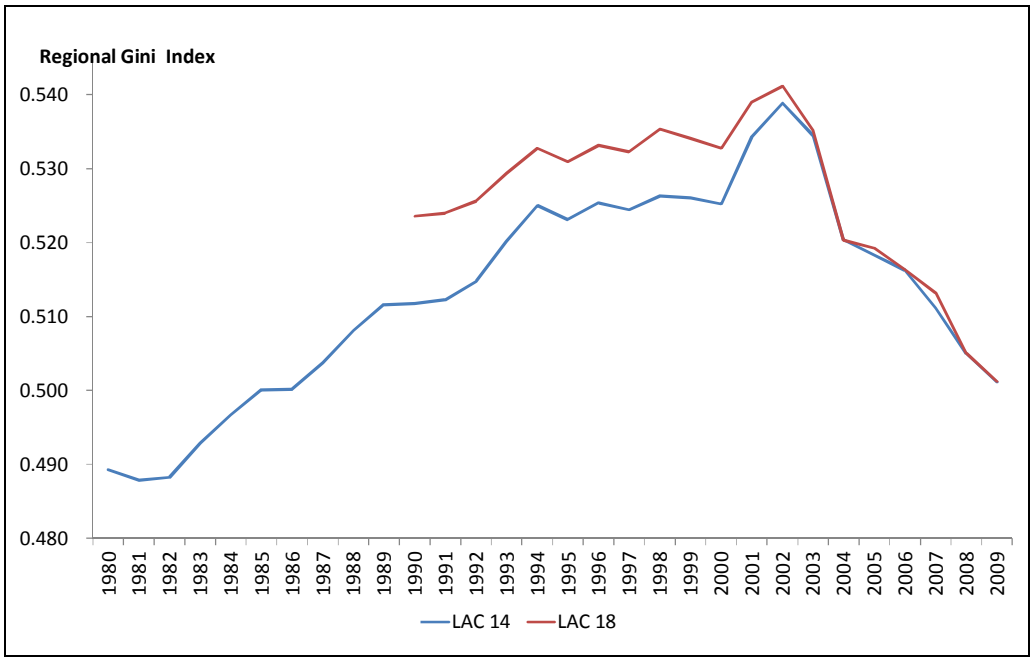
6 SEDLAC is the Socio Economic Database for Latin America, by CEDLAS and the World Bank. The data can be accessed at www.sedlac.econo.unlp.edu.ar/eng/statistics-detalle.php?idE=35.

7 Our database includes 45 observations for the 1980s, 89 Gini indexes for the 1990s and 131 observations for the first decade of 2000. The country with the largest number of observations is Costa Rica with 27, followed by Venezuela and Brazil with 26. For Uruguay we have 21 indicators, for Honduras and the Dominican Republic we have 17 surveys, while for Peru and El Salvador we have 16. Panamá, México and Argentina have 16, 15 and 14 data points, respectively, while for Colombia and Paraguay 12 are available. Chile, Bolivia, Guatemala and Ecuador have 11, 10, 9 and 8, respectively, while for Nicaragua, which is the country with the lowest number of observations, only 4 data points are available. While our data comply with the 'good quality standards' usually defined in

In 15 out of the 18 countries included in our analysis, the household survey is representative at the national level. In the case of Argentina, Bolivia and Uruguay, national surveys have been made available only recently, so we compute Gini indexes for urban areas across the years for which we have surveys in order to be able to incorporate earlier data into the analysis.[8] All countries but Ecuador, Nicaragua, Paraguay and El Salvador have household surveys since the 1980s.

Figure 2 presents the regional pattern of the evolution of inequality in Latin America by utilizing our data. As in Londoño and Székely (2000), to construct the regional pattern in the figure, we interpolate observations within years with missing data, including the information available for the 1970s decade when available. When considering the 14

Figure 2
Average Gini index for Latin America, 1980-2009



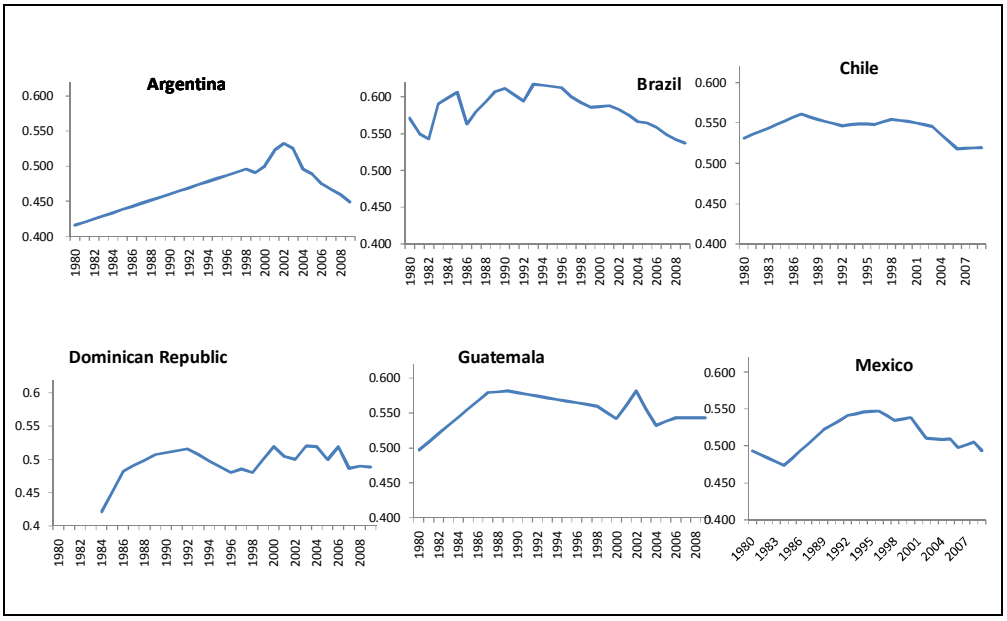
Source: Authors' calculations. See data appendix for details.

the literature (see, for instance, Deininger and Squire 1996), any study attempting to assess the progress of inequality over long periods in the region should be aware of the shortcomings of the existing information. Székely and Hilgert (2007) provide a detailed discussion on the central issues to be considered when using and interpreting distributional data from household surveys. According to Deaton (1997) at least three important issues should be taken into account when evaluating the use of these types of data: (i) the characteristics of the sample, (ii) differences in survey quality and coverage of population groups, and (iii) differential coverage of income sources and geographic areas. All these elements were taken into account for assuring the highest degree of within-country consistency in our data, but this still does not guarantee strict full comparability across countries. It is still possible that differences across countries and even within countries could be driven by income misreporting, underreporting, under-representation of regions or socioeconomic groups, or other features of the data. Székely and Montes (2006) present a detailed discussion on the complexity of gathering long-term good quality indicators on income distribution in Latin America, including the issues just mentioned.

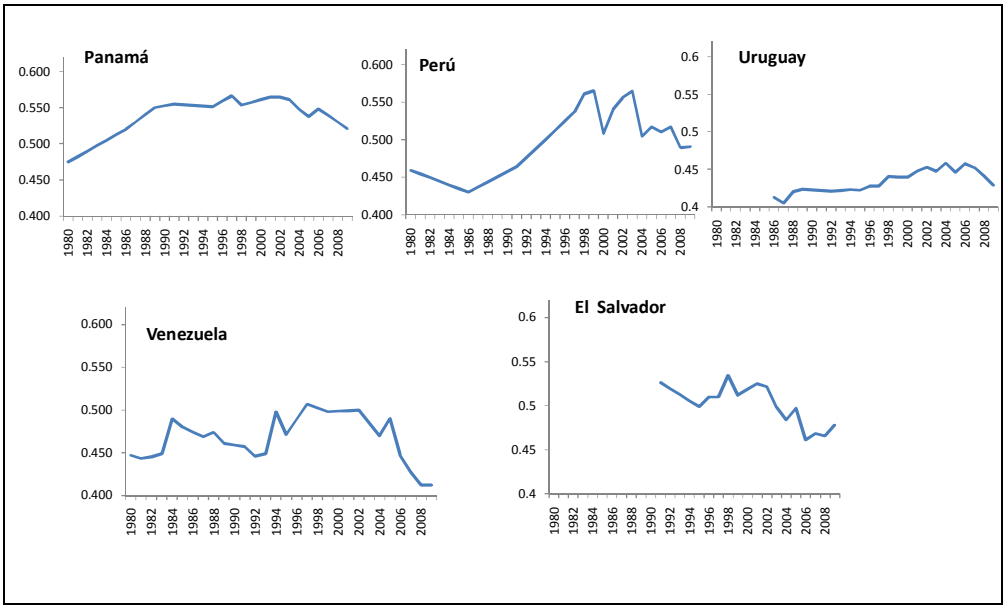
8 However, inequality trends in these three countries are similar to the pattern observed in the national years for which surveys are available. It must be borne in mind, nevertheless, that one of the expected effects of trade openness is to generate resource reallocations across sectors, which have impacts on the distribution of income within and between sectors. In the three countries where the Gini index is representative of urban areas only, the changes in inequality will be underestimated since they will not be able to capture shifts in the distribution between rural and urban areas, and within rural areas.

countries with information since the 1980s, an interesting inverted 'U' pattern emerges, with a consistent increase in inequality throughout the 1980s and 1990s, and a turning point between the years 2002 and 2003. From then on, a sharp decline in the value of the Gini index is observed all the way through 2009. A similar pattern emerges when the data for the 18 countries are included for the restricted period of 1990-2009.

Figure 3
Latin American countries with inverted 'U' pattern
similar to regional average, 1980-2009

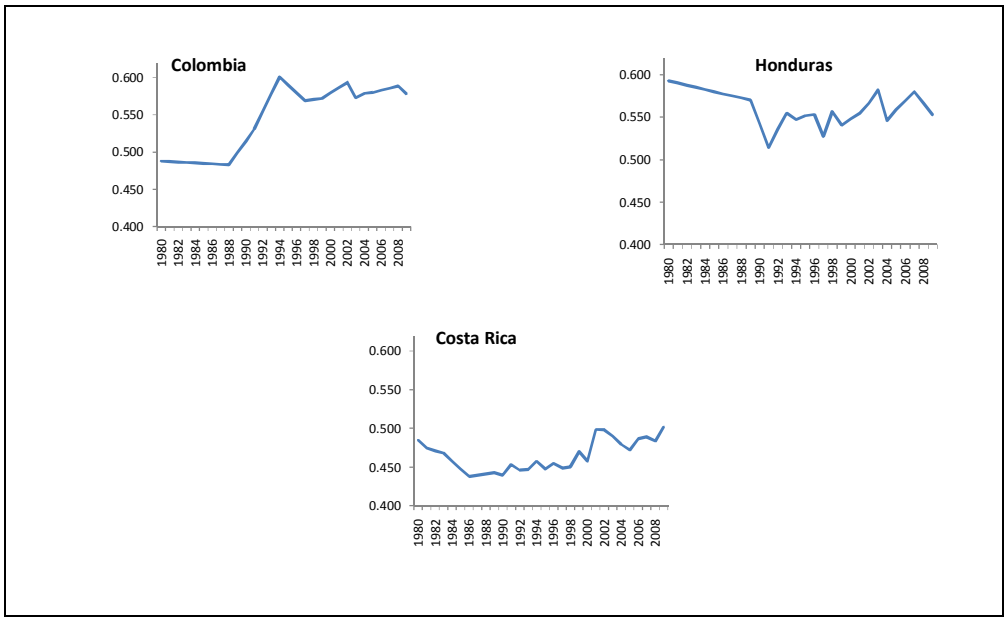


Source: Authors' calculations. See data appendix for details.



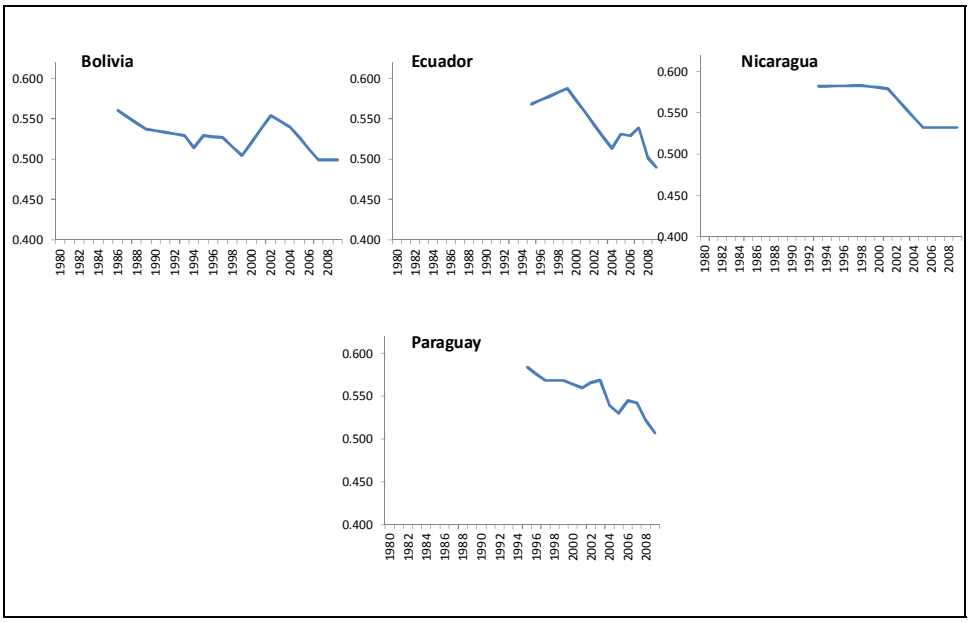
Source: Authors' calculations. See data appendix for details.

Figure 4
Latin American countries with increasing inequality pattern, 1980-2009



Source: Authors' calculations. See data appendix for details.

Figure 5
Latin American countries with decreasing inequality pattern, 1980-2009



Source: Authors' calcuations. See data appendix for details.

The pattern is consistent, on the one hand, with studies that argued that the 1980s and 1990s were decades of a sharp deterioration in income distribution in Latin America (see, for instance, IDB (1998), de Ferranti et al. (2004), Londoño and Székely (2000), and Székely (2003); and on the other, with recent studies documenting an improvement during the first years of the 2000s, including López-Calva and Lustig (2010) and CEDLAS (2009)). What our picture adds to the discussion is a historical perspective

that reveals that the changes during the 2000s are strong enough to reverse almost 75 per cent of the increase originating in the late twentieth century.

Figures 3, 4 and 5 present the trends by country. The data in Figure 3 show that a majority of 11 countries present patterns similar to those in Figure 2, including Argentina, Brazil, Chile, Dominican Republic, Guatemala, Mexico, Panama, Peru, Uruguay, Venezuela and El Salvador, all of which register sharp increases in inequality up to the end of the 1990s or the early 2000s, and a decline thereafter (the only exception is El Salvador, for which we do not have evidence for the 1980s decade). According to Figure 4, only Colombia, Honduras and Costa Rica present a pattern of increasing inequality during the three decades. Figure 5 plots the trends for Bolivia, Ecuador, Nicaragua and Paraguay, the four countries for which inequality declines for the whole period for which data are available, but in all four cases the analysis can only be performed from the 1990s and in some cases, from the 2000s onward.

For the purpose of this paper, perhaps the most relevant result from Figures 1 and 2 is that the pattern of changing inequality in Latin America is consistent with the hypothesis that a shift towards more trade openness generates an intensive reallocation of resources in the short run, that after the adjustment and once the trade openness process has stabilized, it can lead to a more equal distribution of income once the factors of production and production patterns have been able to adjust to the new circumstances, and can therefore exploit the comparative advantage of the country.

The following section discusses the complexity of the inequality–trade relationship and argues that in order to explore the above hypothesis it is necessary to disentangle the many transmission mechanisms, and the short-, medium- and long-run effects that work through the process. Section 3 engages in an empirical investigation to determine whether there is any support for this view.

3 The complexity of tracing changes in inequality

The analysis of the microeconomic effects of policies that increase the level of trade in a country generally identifies four channels through which, as consequence, the distribution of welfare (as proxied by consumption levels) is altered: (i) by changing the price of the goods consumed by each individual, where the implications depend on the particular consumption structure; (ii) by changing the wages and salaries that reward different types of human capitalin the labour market; (iii) by altering the conditions under which households produce goods and services; and (iv) through modifying the level of public revenues that finance public services.

Here we refer only to the second and third channels, which already include a large and complex number of transmission mechanisms to be considered.This complexity can be illustrated even by starting from a simple accounting framework following Attanasio and Székely (2001) who represent the income of each individual in a society as a function of the combination of four essential elements: first, the stock of income-earning assets owned by each individual; second, the extent to which these assets are used for producing income; third, the market value of income-earning assets; and fourth, the income received independently of income-earning assets, which may include transfers, gifts and bequests among others—and which can be financed by public

revenue among other sources. Consequently, family income per capita can be expressed in the following equation:

$$y_i = \frac{(\sum_{i=1}^{j}\sum_{a=1}^{l} A_{a.i} R_{a.i} P_a) + \sum_{i=1}^{k} T_i}{n} \quad (1)$$

where ***y*** represents the household income per capita of the individual ***i***, ***A*** is a variable representing the stock of asset type ***a***, owned by an individual ***i***, ***R*** is a variable representing the rate at which asset type ***a*** is used by individual ***i***, and ***P*** is the market value per unit of asset type ***a***. The variable ***j*** represents the number of income earners in the household to which the individual ***i*** belongs, ***l*** is the number of different types of assets and ***k*** is the number of individuals in the household obtaining income from transfers and bequests, while ***n*** is the size of the household to which ***i*** belongs.[9]

For our analysis we classify income-earning assets into human capital (*H*), physical capital (*K*) and land (*L*), represented in Equation 2. Human capital assets are the set of skills endowed to individuals, such as knowledge, capabilities, or expertise, normally represented by the years of schooling or the highest education level achieved by an individual. Physical capital refers to the monetary value of any form of financial asset, be it money holdings, property, rents, capital stock used for production or any other form of physical capital used to produce a good or service. In the case of land, its value comes from the natural resources or potential for production that it embodies. These stocks can be used in several ways; they can either be invested for production or accumulated in order to function as savings.

$$y_i = \frac{\sum_{i=1}^{n} (A_H R_H P_H) + (A_K R_K P_K) + (A_L R_L P_L) + T_i}{n} \quad (2)$$

The ownership of, or the access to, any of these assets, implies that an individual has the potential capacity to generate income at some point in time, but the income that is actually generated depends on the use and price of the asset. For instance, in the case of human capital, the years of schooling of an individual will only be translated into income if there is labour market participation (that is, $R_H>0$ in Equation 2). Physical capital becomes an income when it is invested ($R_K>0$). Land will generate a resources flow depending on the rate at which it is used (R_L), including agricultural or similar production, or the natural resources extracted or processed from it.

The market price of income-earning assets is determined by supply, demand and institutional factors, in which the relative weight of each individual is negligible. Prices

9 This simple identity is inspired by the work of Sokoloff and Engerman (2000), who argue that the main factor driving the persistently disparate income levels in Latin America, is the skewed distribution of factor endowments, or income-earning assets, among individuals. Cornia (2011) presents a similar analysis, but does not include the use of the asset (*R* in the equation) as an individual decision that can be affected by policy.

are therefore set by the economic system, and they become relevant to the individual in the process of deciding whether to place the asset to productive use or not.[10]

To understand the dynamic process, Equation (1) should be complemented with equations describing the accumulation of each asset, the decisionmaking process that determines its use, and the mechanisms through which the price for each is determined in the economy. The process of accumulation, obviously, would be asset-specific, and can have interactions with others. For instance, in the case of human capital, its accumulation would depend on the rate of utilization of that asset and the price paid for its use in the productive sector, but it might also depend on the availability of other assets for its accumulation (e.g., parents' human capital or access to physical capital in the form of credit to finance its development).

In the end, the distribution of income y_i across individuals will depend on the distribution of assets, as well as on the differences in the rates of use and prices along the distribution. Inequality is exacerbated when the rate of use and the price are themselves positively influenced by the size of the stock. For instance, in the case of human capital, the poor usually have smaller stocks who receive the lowest rewards not only for having a small stock but also because the returns are non-linear and increase with the size of the stock. Due to the low returns, the poor, and specifically women, ultimately end up putting this asset to work at a much lower rate. The same can be applied to K and L. Smaller stocks of capital and land tend to be relatively less productive, and therefore yield lower returns and even lower incentives for their productive use.[11]

One of the central justifications for promoting trade openness in Latin America during the 1980s was precisely that when income-earning assets are highly concentrated, one of the few mechanisms through which income distribution can be improved, is by changing the price structure in a way that those with smaller stocks receive better rewards for their productive use. For example, if the demand for unskilled labour intensive goods is expanded by lowering tariffs as a short-term response, P_H in Equation (2) would be expected to shift in favour of the human capital assets owned by those in the lower part of the distribution. In addition, if the prices of the intermediate inputs used in the production process by individuals with lower incomes decline, one would expect higher returns to investment and a reduction in income inequality as a first round effect through P_K.

Similarly, trade can affect the demand for human capital in specific sectors or occupations. Even if rewards to factors were not modified through the raise in demand, a change in $R_H$in Equation (2) through increased labour participation in certain activity would result in higher income flows, and if the raise is greater among low-income households, the participation effect would improve the distribution of income. Depending on the speed at which labour is reallocated across sectors, the price and the

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10 Birdsall, Pinckney and Sabot (1999) develop a model in line with this argument, where they sort out the interaction between returns to labour, the incentives to the use of human capital, and income distribution.

11 The final outcome in terms of distributional shifts evidently can be much more complex. For instance, in the presence of market imperfections in land, credit and skill markets, the reallocation of factors and the possibilities of accumulating them over time can be significantly hampered.

'employment' effect can even reinforce themselves until the incentives to move from one sector to another are reduced.

Any short-run analysis of the effect of trade on y_i would tend to capture these types of contemporaneous impacts, but would not consider other important effects, such as those of factor reallocation processes that take longer to consolidate, or changes in the incentives to accumulate assets under the different price structure. For instance, one would expect that the dynamics of the human capital component in Equation (2) would be modified once individuals are able to identify the sectors and skills that generate the greatest rewards, and are able to become engaged in the corresponding accumulation of A_H. Similarly, the short-run effects of the returns to physical capital or land would also be expected to be different once households are able to adjust to the new production processes and are able to identify new markets and opportunities.

Moreover, there are cases where the same household can adjust its amount, use and investment of the three types of assets *H*, *K* and *L* simultaneously, with reinforcing or compensating effects across them. These types of shifts would also be missed by a short-term analysis.

In sum, even a very simple accounting framework illustrates that the analysis of the trade-inequality relationship is, on the one hand, complicated by the identification of the full short- and long-term effects triggered by the change in trade patterns, but also by the fact that several different transmission mechanisms can be in place for the same household or groups of households, which makes it even more difficult to identify such mechanisms unambiguously.

In their long-term analysis of the relationship between trade and the distribution of assets across countries, Spilimbergo, Londoño and Székely(1999) use a similar framework and find that inequality tends to be lower in countriesthat are *H* rather than *K* or *L* intensive. Their explanation is that *H* has an upper limit to its accumulation—a single individual can accumulate only a certain number of schooling years during his lifetime, which imposes an upper bound to inequality—while the concentration of *K* and *L* does not necessarily have natural boundaries. These authors find that trade openness reduces inequality in *K* and *L* abundant countries by introducing competition and reducing monopolistic rents, but increases inequality in *H* abundant nations where the returns to relatively higher skills are augmented.

The literature on the effects of trade on income distribution through the price structure is especially abundant, with a variety of results (see, for instance, Attanasio, Goldberg and Pavcnik (2003), Nicita (2004), Chiquiar (2008), Ferreira, Leite and Wai-Poi (2007), de Hoyos (2005), Behrman, Birdsall and Székely (2007), Bucciferro (2010), Perry and Olarreaga (2006), among many others). Most research on price effects, however, focuses on *H*, under the argument that household resources are mainly composed of labour income. Other studies have focused on employment effects, including Ferreira, Leite and Wai-Poi (2007), Chiquiar (2008) and Hanson (2003, 2006). These studies share the focus on the dynamic processes *during*reform, with more limited information on the *pre*- and *post*-reform situation. Porto (2007) develops a micro household model to account for price and uses general equilibrium effects simultaneously, and is among the few authors who account for immediate and medium-term impacts.

In their comprehensive literature review, Goldberg and Pavcnik (2004, 2007) argue that the literature on the trade-distribution relationship can be divided broadly into two groups. The first includes the authors who generate evidence in favour of the standard trade theory result that trade openness induces greater demand for the factors of production related to each country's comparative advantage. The second comprises those who find evidence against the Heckscher-Ohlin (HO) and Stolper Samuel (SS) Theorems, and offer alternative arguments for explaining the divergence. The five most common arguments include: (i) that the HO and SS should be extended to include more countries and goods into the modelling; (ii) the consideration of intermediate products that use factors of production that are different to those predicted by HO and exploit comparative advantages not foreseen by basic theory; (iii) increased capital flows to developing countries,which are complimentary to skilled labour and which raise demand for this factor—as opposed to the increases in demand for unskilled labour predicted by HO; (iv) the presence of skilled-biased technological change,which is inherent in trade flows, and which increases the demand for relatively skilled labour even in unskilled labour abundant countries; and (v) the existence of compositional changes within industries, plants and firms that can behave differently in different environments.[12]Another possible explanation is that trade openness could promote a rise in the trade of commodities that are intensive in highly concentrated factors of production.

In the case of LA one important element to consider is the heterogeneity across the region. In a recent analysis Kuwayama (2009) argues, for instance, that at least three different trade patterns can be found among the countries in the region: (i) integration into vertical trade flows in manufactures centred on the United States market (including Mexico and some Central American countries); (ii) horizontal production and marketing networks in natural resource based commodities (most South American countries); and (iii) services exports including tourism, financial and transport services (especially in Panama). Since these patterns require different mixes of *H*, *K* and *L*, we would expect to find a variety of trade-inequality patterns across the region.[13]

For instance, in the case of the first group, skill intensiveness relative to other regions in the world would be expected to play a major role. If the USA is the major trade partner for this set of countries, the prediction is that lower tariffs would increase the demand for goods that are, according to US standards, relatively intensive in unskilled labour, which in turn would increase the rewards to this factor. Depending on whether this type of labour is considered low-, medium-, or even high-skill intensive in the country of reference, different distributional impacts would be observed. In the case of the second group, however, the demand in world markets (including the USA) for primary commodities would shift price levels, and depending on the structure of ownership of land and agricultural production, inequality could either increase (when ownership is concentrated) or decline (when commodity production is widespread).

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12 Reina and Zuluaga (2008) present a literature review specifically for LA, finding similar arguments. Winters, McCulloch and McKay (2004) and Hertel and Reimer (2004) also present similar analysis, by focusing on the effects of trade on the incomes of the poor.

13 Montenegro, Pereira and Soloaga (2010) present a related analysis by focusing on the effect of China's integration into the world economy and its differential impact across LA, while Ocampo (2004) uses this same characterization to explain the effects of trade across the region.

Furthermore, the above effects can vary over time depending on the trade policy of other countries. In particular, China and India, which have become international key players since the 1990s, may exert influence on price levels across the world. In both countries, openness has attracted considerable investment for the production of relatively unskilled labour abundant goods and services, while at the same time increasing the global demand for primary commodities. The effect on the first group of LA countries would be a lower demand for unskilled labour intensive goods, which would tend to increase inequality, while for the second group the expected effect is a rise in commodity prices, which affects the distribution depending on the structure of ownership.

The following section presents some new evidence on the inequality–trade relationship in LA over the past 30 years in order to explore these dynamics at the regional level.

4 Trade and inequality in LA during the past 30 years

Our empirical strategy consists of estimating the association between trade openness and inequality by taking Equation (2) as reference. Specifically, we use the Gini inequality index to characterize income distribution, average value of tariffs to represent the extent of trade openness and changes in trade policy, as well as variables representing the stock, use and market price for *H*, *K* and *L*, respectively. This section presents the data for implementing the strategy, as well as our econometric results.

4.1 Factors associated to income inequality

Figure 6 presents the evolution of the variables we use to represent A_H, R_H and P_H.[14] As can be observed, the human capital stock as characterized by the average years of education for the working age population increased from 4.5 to more than seven years during the course of three decades—that is, from an average of unfinished primary to about one-half of the basic secondary cycle. Since the number of years of education that A single individual can accumulate throughout his lifetime is limited, such increases would lead to assume that the distribution of years of education also improved—those with already high levels could not accumulate as many more years as those with fewer years. Since the returns to education are nonlinear, this also suggests that if all other variables had remained unchanged, more individuals had access to higher returns during the 2000s as compared to the situation during the 1980s, which would be expected to improve the distribution of income.

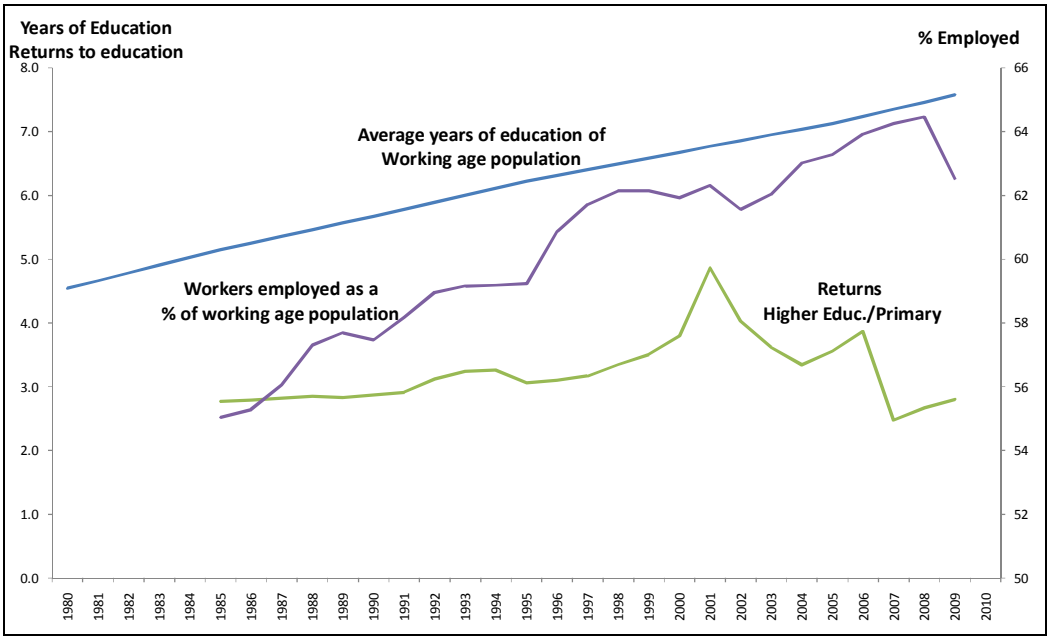
Employment levels (which represent the use of human capital) also increased during the period. Figure 8 shows that the proportion of working age population reporting as being employed increased from 56 to about 63 per cent. Several studies that have investigated

[14] The human capital stock is represented by the average years of education of the working age population, taken from the Barro-Lee database (2011). Employment is calculated as the proportion of working age population reporting as being employed or working (from ILO) with respect to the total working age population (from UN Population Statistics, 2010 version). Returns to education are calculated directly from the household surveys available to us, and complemented by the returns to education, also calculated from household surveys from SEDLAC. In order to smooth out the series in this case, we linearly interpolate data for missing years and calculate 3-year moving averages.

the dynamics of labour market participation in Latin America have documented that employment rates among males tended to remain stable at around 90 per cent, while female employment rates have increased considerably over time, especially among less educated women, given that labour market participation is positively associated with education.[15] As in the case of the years of schooling variable, if the increase in employment was driven mainly by females with relatively lower incomes and education levels, the raise would be expected to generate a reduction in the Gini inequality index. However, if employment opportunities were greater for educated individuals, the increase in employment would lead to increases in the Gini index.

In the case of the returns to education, the Figure illustrates an important feature already widely documented in the literature of increasing returns to higher education relative to the returns to primary during the 1990s. According to our data, the increase was over 60 per cent between 1985 and the year 2002. The novelty of the pattern covering 25 years is the strength of the inverted 'U' trend with sharp declines after 2002.[16] Actually, 2009 is the year showing the lowest relative returns to higher education in the 25-year series, which is consistent with the hypothesis that once general equilibrium longer-term factors come into place, the initial price effects associated with the reallocation of resources in the economy, can be counteracted. If these had been the only changes taking place over the past three decades, our hypothesis would be an increase in inequality up to the early 2000s and a decline thereafter, with a patter similar to that observed in Figure 2.

Figure 6
Evolution of variables characterizing the stock, use
and market price of HUMAN CAPITAL in Latin America 1980-2009



Source: Authors' calculations from household survey data, SEDLAC, and Barro-Lee database.

15 It should be noted that here we use employment rates, rather than labour market participation, which includes not only those who have found a job, but also those who are still seeking one—because we are interested in measuring the actual use of human capital.

16 The regional averages are presented from 1985 onward since five countries do not have data points prior to this year.

Appendix Table 2 summarizes the information by decade and by country. In all 18 cases the average years of schooling follow the long-term regional trend of consistent increases throughout the period, while the evolution of employment is more mixed, with increases in 15 countries, and declines or stagnation in Mexico, Paraguay and Uruguay. With respect to the returns to higher education, the main feature is that six countries register important increases,rather than the inverted 'U' trend, between the decades of 1980s and 2000s, including Argentina, Brazil, Chile, Costa Rica, Peru and Uruguay.

Figure 7 plots the evolution of variables that could be used to characterize A_K, R_K, and P_K.[17] As opposed to the case of education, the alternatives for accessing timeseries for representing the stock, use, and price of physical capital are much more limited and imperfect, so they should be taken with caution. Our choice of indicators is driven namely by the existence of series covering the 1980s-2000s decades throughout, rather than being an optimal proxy for the variables of interest. One rough approximation is the use of the rate of gross capital formation to characterize the accumulation of physical capital. As can be seen, this variable increased steadily during the 1980s and 1990s, it declined between 1999 and 2003, and increased through 2007 with a new decline towards 2009. Since capital tends to be distributed more unequally—because, among other reasons, there are no limits in Latin America to its accumulation—our expectation would be that the increase in the first two decades would have provoked inequality-increasing effects, with mixed positive and negative impacts over the 2000s years.

Another option would be the use of the investment rate, which follows a similar trend as observed in Figure 7. However, its effect over the distribution is more ambiguous and depends on the specific type of investment undertaken. The use of capital in the production of skill intensive goods would tend to be inequality increasing through the positive demand for skilled labour, while the opposite would be expected if investment flowed to the production of goods and services that require relatively more unskilled labour.

A possible proxy for the price paid in the economy for the productive use of capital is the interest rate. Figure 7 shows a steady decline in this variable between 1985 and 2010 which would be expected to contribute to reduced inequality throughout the period due to the unusually high concentration of capital assets. Appendix Table A3 shows the can decade averages by country.

Characterizing the stock, use and prices of land assets is even more complex than for capital stocks. Also here, only some rough proxies are available for the 1980-2010 years, so their use is even more cautious. One of the few options for measuring the size of the stock of assets in this category is arable land per capita, which has two important drawbacks. The first is that this variable does not capture the effect of mining, which

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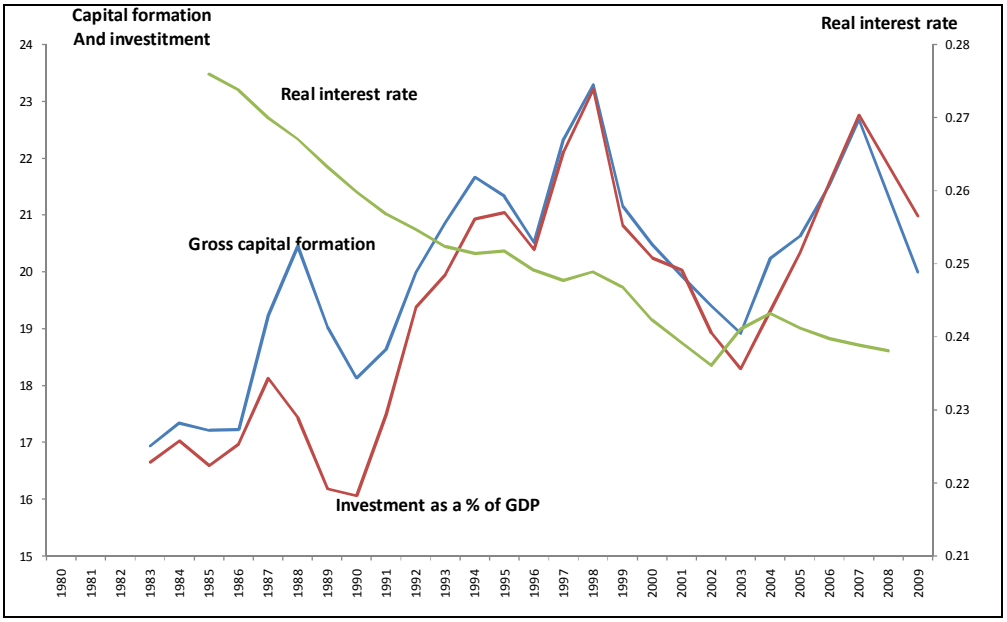
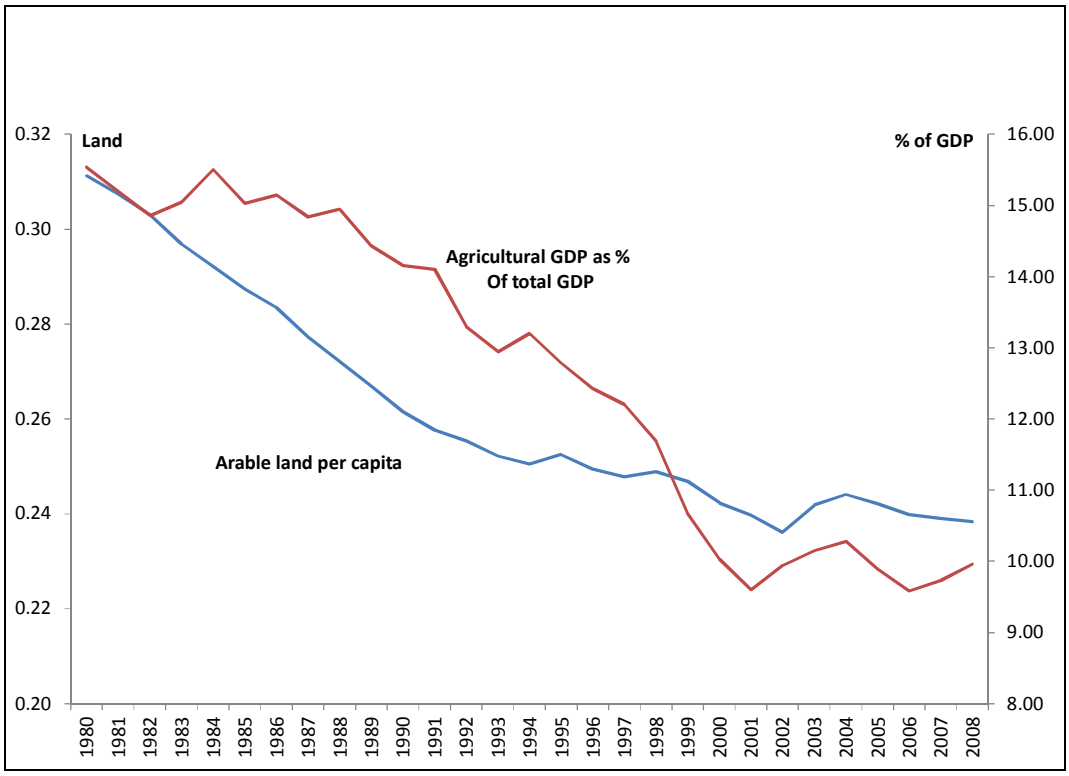
17 For the stock of physical capital we use gross capital formation as a share of GDP from the World Development Indicators. The use of physical capital is characterized by the level of investment as a share of GDP from the World Penn Table, 7.1 version, while the returns to capital are represented by the real interest rate from the World Development Indicators. Real interest rates are chosen due to the lack of other indicators capturing information on the returns to investment. As is well known, these normally underestimate the returns to capital across the economy. Therefore, they should be interpreted only as a lower bound to the real returns.

Figure 7
Evolution of variables characterizing the stock, use and market price
of PHYSICAL CAPITAL in Latin America, 1980-2009



Source: Authors' calculations based on World Bank (2011) and World Penn Table (see text for details).

Figure 8
Evolution of variables characterizing the stock, use and market price
of LAND ASSETS in Latin America, 1980-2009



Source: Authors' calculations based on World Bank (2011).

has been one of the important sectors being promoted by trade openness and the demand for primary commodities (the exclusion of mining will not allow capturing the full effect of trade on the $A_L$asset). The second drawback is that it is normally affected by other policies that can be quite independent from trade, such as land reform. As for the rewards for these assets we were not able to find indicators of the terms of trade in the primary sector for the reference period that would be more adequate for our analysis. One of the few options available is the use of agricultural GDP as a share of total GDP which can be a gross representation of the use (investment) of the asset and the price received in the market for its produce.[18]

Figure 8 shows declining trends of both the size of the stock of A_L and of the relative value of the produce from one of the uses of this asset. The declining trend in arable land per capita would be expected to generate an inequality-reducing effect in countries where land holdings are concentrated among few individuals, while the effect of reducing the share of agriculture in GDP is more difficult to predict. Income levels are normally lower in rural areas where agriculture is relatively more important, so declines in the size of the sector could tend to be inequality increasing. However, the final effect would depend on whether the population in these activities remained constant or not. Migration from rural to urban areas could offset part of the negative effect on incomes at least to some extent, with an ambiguous impact on the Gini index. Appendix Table A4 shows the data by country. In most cases the pattern is similar to the regional trends in Figure 8.

4.2 Regression results

Table 2 presents our regression results from the implementation of Equation (2) using the data described above. In all cases the estimation is performed through fixed effects and random effects regressions and we report the preferred specification according to the Hausman Test in each case. The first regression refers to the simple association between inequality and trade policy as characterized by the level of average tariffs. The result is that a strong negative relationship emerges between these two variables for the full 1980-2000 period. That is, lower average tariff levels (greater trade openness) are associated with higher inequality, while greater tariffs (more closed economies) are associated with a less concentrated distribution of resources. We report these results before a more complete implementation of Equation (2), since throughout our analysis this association is maintained.[19] The preferred model is the random effects specification, but the fixed effects estimation leads to exactly the same result.

This result is consistent with the stylized facts reported in Figures 1 and 2 that show that during the process of openness, income inequality in Latin America increased substantially, but also declined substantially when the process of openness stabilized.

The second regression includes the three variables that account for the stock, use and price of human capital. The random effects model is also preferred in this case although the fixed effects specification leads to exactly the same results. When the human capital

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18 Both variables are from the World Bank (*World Development Indicators*, 2011 version).

19 During our analysis we perform a large number of tests by using alternative indicators and specifications and the result that inequality and openness are inversely and significantly related, remains.

variables are included, the negative effect of tariffs is strengthened and we also observe a negative association between the Gini index and the average years of schooling of the working age population (the human capital stock). In contrast, a strong positive statistical relationship is observed with the relative returns to higher education (the price effect), as would be expected. The employment effect is positive, but not statistically significant.

This regression is our base specification and the main conclusions from this paper rest in these associations, since the characterization of the human capital stock, use and price variables is much more solid than for the set of physical capital and land indicators. As will be observed in what follows, incorporating variables that proxy the other two types of assets does not alter either the sign nor the significance of the associations between inequality and the trade openness, years of schooling, returns to education, and employment variables.All together, the variables in the base model account for about 20 per cent of the variation in the value of the Gini index.

Our result for the trade-inequality relationship in these estimations is in line with other authors' findings that more trade openness leads to a worsening in the income distribution. Some of these studies include Lundberg and Squire (2003), Morley (2000),

Table 2
Basic regression model of the effect of trade on income distribution

	(1)	(2)	(3)	(4)
Variable	Base model	Human capital	Physical capital	Land
	re*	re*	fe*	fe*
Tariffs	-0.0303**	-0.0636***	-0.1149***	-0.0723*
	0.015	*0.0218*	*0.0413*	*0.0416*
Years of schooling		-1.1018***	-0.969**	-1.0743**
		0.2821	*0.4872*	*0.4605*
Employment		0.0013	-0.0206	0.0103
		0.0337	*0.0524*	*0.0528*
Ratio returns higher over primary		0.1458***	0.1764**	0.2126***
		0.0564	*0.0858*	*0.0818*
Real interest rate			-0.0051	-0.0258*
			0.0152	*0.0156*
Gross capital formation			-0.026	0.0314
			0.0466	*0.0437*
Agricultural GDP/GDP				-0.0884
				0.1142
Arable land per capita				-11.5778
				5.9436
No. of obs			178	171
No. of countries			18	18

Note: The dependent variable is the Gini index. Estimates of the intercepts are not reported.
Coefficients are multiplied by 100 for simplicity.
*Significant at 10%; ** significant at 5%; *** significant at 1%.
* Sign over the fixed effects or random effects regression means that this particular specificationis preferred to the other according to the results of Haussman Test.

Source: See text.

Lindert (2001), Perry and Olarreaga (2006), Bucciferro (2010), and Cornia (2010, 2011). The conclusions are also consistent with the argument in Atolia (2007), who puts forward the hypothesis that trade liberalization has transitory positive effects over (wage) inequality and negative long-run impacts over the distribution due to the asymmetries in the speed of adjustment in the export and import sectors.One of the few studies arguing for a negative relationship between inequality and openness is Dollar and Kraay (2001) although these authors do not directly test this hypothesis, but look instead at the effect on the incomes of the poorest 20 per cent of the population.

The positive association between inequality and the returns to schooling is consistent with the literature finding that the short-run price effects in the labour market in favour of educated individuals are inequality increasing.

The third regression incorporates (imperfectly) the variables characterizing physical capital (the interest rate and gross capital formation). Neither of these additional variables has a statistically significant association with the Gini index. The fourth regression incorporates the proxies for land assets and their use. These two additional variables are not statistically significant either, and have minimal influence on the size and significance of the other variables in the equation. The only observable change is that the coefficient for the interest rate becomes significant, with a negative sign. It is possible that these (insignificant) associations in regressions (3) and (4) are a consequence of the impossibility of measuring the variables of interest for capital and land for the years 1980-2010 through more solid data; notice also that the number of observations is much lower than in our base regression due to missing data. Other than informing about the influence of capital and land stocks, these two last regressions should be interpreted as robustness tests performed on the second regression.

Table 3 presents additional estimations with interactions between tariffs and the stock, use and price of human capital. The results in the first regression show that the size of the interaction effect is statistically significant for the trade openness-average years of schooling variable. The interpretation, on the one hand, is that the inequality-increasing effect of trade openness is exacerbated in countries with larger human capital stocks; and on the other, that once the openness process stabilizes and releases its pressures over the distribution, greater reductions in inequality will be observed also in countries with greater education stocks. In other words, after absorbing the initial negative shock on inequality from the reduction in tariff levels, a country may observe improvements in the distribution of income if education levels increase sufficiently. The second regressions presents a robustness test by including the proxy variables related to the capital and land stocks. The observed association between inequality and the interaction of the trade-human capital variable remains similar to that observed in the first regression in the table.

As already mentioned, Kuwayama (2009) argues in a recent paper that the trade patterns in LA are not homogeneous and have to be distinguished for different types of countries grouped in three categories (those where trade patterns are linked directly to the United States' manufacturing sector, those where trade is linked more to tourism and the transportation sector; and the countries with trade patterns characterized by a larger importance of primary sector goods linked to Asia and other markets).In order to explore the possible heterogeneity of relationships across the region, we estimate our base regression by splitting the sample into two groups of countries: (i) Mexico and Central America (which includes Costa Rica, El Salvador, Guatemala, Honduras,

Mexico, Nicaragua, and Panama), and (ii) South America (including the rest of the countries considered in the base regression).

Table 4 presents the results. Interestingly, the negative and significant trade-inequality association remains in both samples, and the variable years of education is also strongly and negatively related to the Gini index. The main difference is that the returns of higher relative to primary education are positively and significantly associated to inequality in the first set of countries, but not in the second group. Given the differences in trade patterns, one possible interpretation is that countries where trade flows are dominated by skill intensity in the manufacturing sector tend to experience greater variability in prices as a response to the increased demand for skills that are still relatively scarce in the supplying countries. However, the main implication of the results in Table 4 seems to be that the associations already identified in the previous estimations basically hold for the LA region as a whole.

Table 3
Regression model of the effect of trade on income distribution with interaction effects

Variable	(1)	(2)
	fe*	fe*
Tariffs	0.5048*	0.2892
	0.3055	*0.3109*
Years of schooling	-0.6094*	-0.6274
	0.3544	*0.5413*
Employment	0.0377	0.0464
	0.0605	*0.0668*
Ratio returns higher over primary	0.0631	-0.0109
	0.1646	*0.3334*
Real interest rate		-0.0244
		0.0157
Gross capital formation		0.0359
		0.0439
Agricultural GDP/GDP		-0.0513
		0.1183
Arable land per capita		-12.5412*
		7.0992
Tariffs interaction with ratio returns higher over primary	0.0077	0.0178
	0.0166	*0.0266*
Tariffs interaction with years of schooling	-0.0644***	-0.0468*
	0.0223	*0.0282*
Tariffs interaction with employment 2000s dummy	-0.0045	-0.0025
	0.0032	*0.0034*
No. of obs	197	171
No. of countries	18	18

Notes: *Significant at 10%; ** significant at 5%; *** significant at 1%.
Source: See text.

Table 4
Estimates with groups of countries

Variable	(1) Mexico and Central America	(2) Rest of the countries
	re*	**re***
Tariffs	-0.0996**	-0.0618**
	0.0508	*0.027*
Years of schooling	-0.8324**	-1.464***
	0.3615	*0.4343*
Employment	0.0637	-0.0458
	0.0718	*0.0444*
Ratio returns higher over primary	0.1642**	0.1262
	0.0684	*0.0894*
No. of obs	74	123
No. of countries	6	12

Notes: * Significant at 10%; ** significant at 5%; *** significant at 1%.
Source: See text.

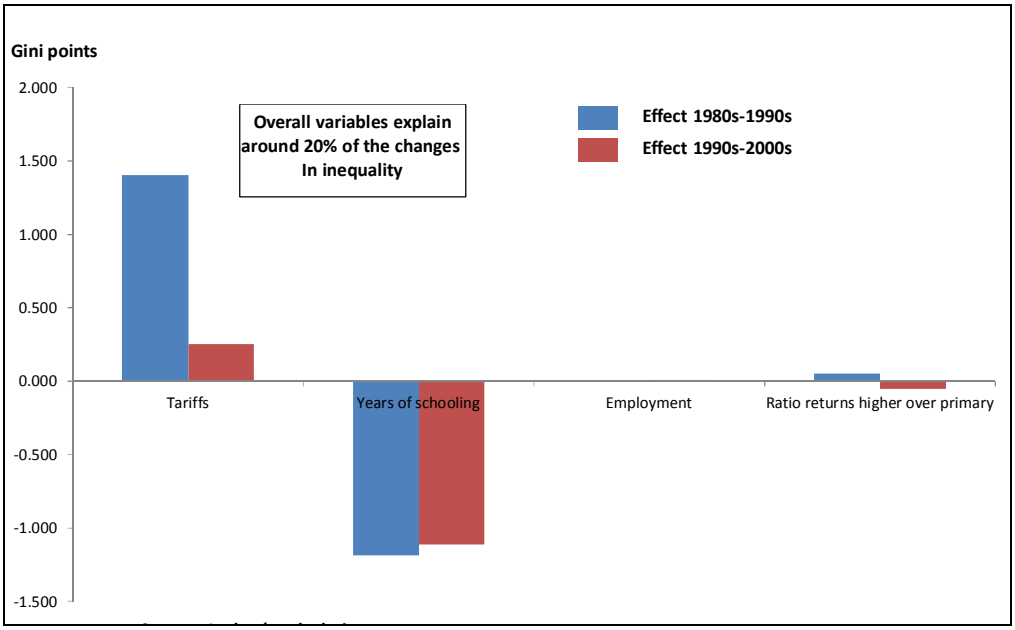
4.3 Decomposing changes in inequality

Figure 9 decomposes the changes in inequality in LA by using our coefficient estimates in the base specification (second regression in Table 2). The decomposition is performed by multiplying each coefficient by the mean value of the respective variable for the 1980s, 1990s and 2000s, respectively, in a simple accounting framework. This exercise provides a view of the importance of the shifts taking place over the 30-year period by using the information on the observable variables in our analysis. As already mentioned, our base regression accounts for about 20 per cent in the variation of the Gini index over time—the adjusted R squared is of 0.1945—so other variables affecting the distribution of income and accounting for about 80 per cent of the variation are not accounted for. This in itself is an important result, since it means that trade variables and those associated to the stock, the use and price paid for human capital assets (and physical capital and land assets as characterized here) can account only for a minority of the dynamics of income distribution in LA during the 30 years for which we have data.

The Figure clearly highlights the central argument of this paper: trade openness had an initial contemporaneous inequality-increasing effect that remained up to the end of the 1990s. Parallel to this inequality-increasing effect, the secular increase in the average years of schooling had an inequality-reducing effect, which was totally counterbalanced by the unequalizing trade effect. In the 2000s decade, the regressive trade effects faded away after the reform had been implemented, while the equalizing effect of human capital accumulation continued, and prevailed.[20] The positive effects of the long-term increase in the average years of schooling observed over the decades were thus initially cancelled out by the tariff declines in the twentieth century, but were able to impact favourably on the distribution of income in the 2000s decade once the trade openness effect disappeared. Surprisingly, the changes in the skill premium for higher education

20 To explore this further we include lagged values for over six years for the tariff variable. Neither the contemporaneous nor the lagged data appear to have a significant effect over inequality.

Figure 9
Decomposition of the change in inequality between the 1980s and the 1990s
and between the 1990s and the 2000s



Source: Authors' calculations.

during the 1990s and 2000s, respectively, appear to have a minor impact over the change in the value of the Gini index. This suggests that the main force driving the improvement in the distribution of income in the last decade was the longer run asset accumulation effects and not the short-term price shifts. Having a positive premium for more years of education at the same time as the average years of education of the population are increasing seems to have reduced inequality through the access of higher returns to larger sectors of the working age population. Employment effects have the smallest impact among the three variables included.

All in all, we can characterize the 1980s-2000s years in Latin America as a period where trade openness was associated with significant inequality-increasing effects, but these were not strong enough and did not affect the structure of the economy in such a way so as to impede future improvements once longer-run processes such as accelerations in the accumulation of human capital took over.

5 Conclusions

This paper offers a medium-run perspective for analysing the trade openness–inequality relationship in Latin America over the past three decades. One advantage of this perspective is that it can account for both the contemporary effects of reducing tariff levels, and also for the longer-term dynamics observed once trade liberalization has been fully implemented and the effects of other variables come into place.

The paper offers three contributions. The first is to assemble a database on income distribution indicators systematically estimated from household surveys with emphasis on within-country consistency of methodology, definitions, and coverage. This 30-year

database allows observing clearly that the increases in inequality throughout the decades of the 1980s and 1990s have been almost counteracted by the improvements in the 2000s decade: 75 per cent of the deterioration in income distribution was reversed during the first ten years of the twenty-first century.

The second is an estimation of the association between trade openness and income distribution over the 30-year period. Our central conclusion in this regard is that greater trade openness is associated with contemporaneous increases in inequality in Latin America. The drastic reductions in average tariffs observed during the 1980s and 1990s mirror the sharp deterioration in income distribution over the same years.

The third result is that that once enough time is allowed for the economy to adjust to openness, no further pressure over inequality is observed, and the liberalization of trade in previous decades did not represent a permanent obstacle for improvements in income distribution thereafter. One example is the prevalence of the inequality-reducing forces generated by the secular increases in the skill level of the population, which seem to have dominated the arena in the distributional dynamics in Latin America during the 2000s decade.

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Appendix Table A1
Gini Index by country in Latin America, 1980-2010

Year	Arg	Bol	Bra	Chi	Col	Cri	Drep	Ecu	Guat	Hond	Mex	Nic	Pan	Pry	Per	ElS	Uru	Ven
1980	0.416		0.571	0.531									0.475					0.447
1981			0.550			0.475												0.443
1982			0.543			0.471												0.445
1983			0.591			0.468												0.449
1984							0.421				0.474							0.490
1985			0.606															0.480
1986		0.560	0.563			0.438	0.482						0.520		0.430		0.413	0.474
1987			0.580	0.561					0.580								0.405	0.469
1988					0.483												0.420	0.474
1989		0.537	0.607			0.443	0.507		0.582	0.570	0.522		0.550				0.424	0.461
1990			0.611	0.551		0.440												0.459
1991					0.531	0.454				0.514			0.555		0.464	0.527		0.457
1992			0.594	0.547		0.446	0.516			0.536	0.541						0.421	0.446
1993		0.529	0.617			0.447				0.555		0.582						0.449
1994		0.514		0.549	0.601	0.458				0.548	0.546				0.500		0.423	0.498
1995		0.529	0.614			0.447		0.568		0.552			0.551	0.584		0.499	0.423	0.471
1996			0.612	0.548		0.455	0.480			0.553	0.547					0.510	0.428	
1997		0.527	0.600		0.569	0.449	0.485			0.528			0.567	0.568	0.537	0.510	0.428	0.507
1998	0.496		0.592	0.555		0.450	0.480		0.560	0.557	0.535	0.583	0.554		0.561	0.534	0.440	
1999	0.491	0.504	0.586		0.572	0.470		0.588		0.541				0.568	0.565	0.512	0.440	0.498
2000	0.501			0.552		0.458	0.519		0.542		0.538				0.508	0.519	0.440	
2001	0.522		0.588			0.499	0.504			0.555		0.579	0.565	0.560	0.540	0.525	0.447	
2002	0.533	0.554	0.583		0.594	0.498	0.500		0.582	0.567	0.510		0.564	0.566	0.556	0.522	0.454	0.500
2003	0.525		0.576	0.546	0.573	0.490	0.520		0.556	0.583			0.561	0.569	0.565	0.498	0.447	
2004	0.496	0.540	0.566		0.579	0.480	0.519	0.513	0.532	0.546	0.508		0.548	0.540	0.505	0.484	0.459	0.470
2005	0.488		0.564		0.580	0.472	0.499	0.531		0.559	0.510	0.532	0.538	0.530	0.517	0.497	0.446	0.490
2006	0.475		0.559	0.518		0.487	0.519	0.529	0.544		0.498		0.549	0.545	0.510	0.461	0.458	0.447
2007		0.499	0.548			0.489	0.487	0.539		0.580				0.542	0.517	0.468	0.452	0.427
2008	0.459		0.542		0.589	0.484	0.490	0.502			0.505			0.521	0.489	0.466	0.441	0.412
2009	0.449		0.537	0.519	0.578	0.502	0.489	0.489		0.553			0.521	0.507	0.491	0.478	0.429	
2010	0.441										0.4819							

Sources: Londoño and Székely (2000), Székely (2003), direct access to 108 household surveys, and SEDLAC(2011).

Appendix Table A2
Evolution of variables characterizing the stock, us and market price of human capital in Latin America, by country
1980-2009

	Average years of schooling			Employment			Returns secondary /primary			Returns higher/primary		
Country	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s
Argentina	7.3	8.2	8.9	23.8	30.1	41.7	3.6	4.9	3.3	4.6	6.3	5.4
Bolivia	5.3	7.0	8.3	28.6	40.2	52.6	1.4	1.5	1.6	2.9	3.6	2.5
Brazil	3.1	4.6	6.5	77.5	77.8	77.7	1.3	1.6	1.9	1.9	2.5	3.0
Chile	7.2	8.4	9.3	55.2	61.0	60.9	2.2	2.6	3.3	3.7	4.6	5.6
Colombia	4.8	6.0	6.8	22.9	28.0	27.4	3.2	2.6	1.8	3.7	3.4	4.0
Costa Rica	6.1	7.4	8.0	63.2	62.9	69.9	2.1	2.3	2.7	3.4	4.3	5.1
Dominican Republic	4.3	5.5	6.5	62.8	64.2	68.2	1.9	1.8	1.6	3.2	3.2	3.8
Ecuador	5.9	6.8	7.3	33.8	50.4	54.8	4.0	3.1	2.4	4.5	3.7	3.7
El Salvador	3.3	4.6	6.7	66.6	72.6	75.9	2.2	1.9	1.7	1.9	2.8	1.5
Guatemala	2.7	3.2	3.7	69.0	73.8	74.2	2.1	2.1	2.0	3.1	3.1	2.7
Honduras	3.6	4.7	5.9	70.6	76.9	81.4	2.2	2.2	2.1	3.1	2.6	2.6
Mexico	4.7	6.4	7.9	75.8	73.8	70.3	1.5	1.8	1.7	2.2	2.5	3.0
Nicaragua	3.6	4.3	5.2	66.1	63.9	75.3	1.3	1.4	1.8	2.3	2.5	3.4
Panama	6.5	7.9	9.0	59.5	59.6	63.5	4.3	2.5	1.8	3.7	3.4	2.9
Paraguay	5.2	6.0	6.8	90.8	91.1	86.8	2.0	2.1	2.5	2.9	3.0	4.2
Peru	5.9	7.1	8.2	21.1	23.0	24.7	1.1	1.8	1.9	1.2	2.6	4.8
Uruguay	6.7	7.4	8.1	59.0	61.4	55.4	2.9	2.2	4.4	1.1	3.3	4.8
Venezuela	5.0	5.2	5.9	64.1	67.5	72.2	1.7	2.3	2.5	2.7	2.5	2.4
LA average	5.1	6.1	7.2	56.1	59.9	62.9	2.29	2.26	2.27	2.91	3.34	3.73

Source: Average years of schooling are from the Barro-Lee database (2011), employment statistics are from ILO (2010) and the returns to education are estimated directly from household survey data and from SEDLAC (2011).

Appendix Table A3
Evolution of variables characterizing the stock, use and market price of physical capital by country, Latin America
1980-2009

	Gross capital formation			Investment as % of GDP			Real interest rate		
Country	1980s	1990s	2000s	1980s	1990s	2000s	1980s	1990s	2000s
Argentina	19.9	17.8	19.0	19.2	20.2	19.7	0.787	0.778	0.780
Bolivia	15.3	16.9	14.8	11.3	12.9	11.6	0.332	0.334	0.378
Brazil	21.0	18.8	17.4	20.7	19.2	17.6	0.347	0.345	0.327
Chile	18.5	25.3	21.4	16.9	22.5	24.6	0.256	0.158	0.093
Colombia	19.4	19.9	19.7	20.2	21.7	21.8	0.118	0.077	0.052
Costa Rica	19.6	18.7	23.6	16.4	19.0	22.7	0.098	0.067	0.048
Dominican Republic	22.6	19.8	18.2	17.0	18.7	18.8	0.120	0.110	0.087
Ecuador	20.2	20.3	24.7	31.9	25.1	26.6	0.168	0.143	0.104
El Salvador	12.9	17.0	15.9	11.6	14.6	15.0	0.102	0.103	0.109
Guatemala	13.3	15.5	19.0	13.5	15.7	18.5	0.156	0.136	0.122
Honduras	18.0	30.5	27.8	15.0	25.3	25.8	0.322	0.283	0.156
Mexico	22.3	23.0	23.8	18.9	19.4	21.8	0.282	0.274	0.244
Nicaragua	21.4	24.9	29.0	24.7	25.2	28.1	0.323	0.332	0.366
Panama	18.1	24.7	20.4	13.4	21.0	20.2	0.209	0.191	0.173
Paraguay	25.4	24.3	18.8	25.7	25.0	17.1	0.497	0.524	0.633
Peru	25.7	20.9	20.4	20.4	24.1	23.7	0.166	0.152	0.133
Uruguay	14.9	15.4	17.2	16.5	16.8	18.2	0.415	0.406	0.412
Venezuela	21.5	20.5	23.6	19.9	16.2	20.4	0.164	0.122	0.100
LA Average	19.4	20.8	20.8	18.5	20.1	20.7	0.27	0.25	0.24

Source: Authors' calculations from World Bank (2011) and World Penn Table 7.1.

Appendix Table A4
Evolution of variables characterizing the stock, use and market price of land assets physical capital by country, Latin America
1980-2009

	Arable land per capita			Agricultural GDP/GDP		
Country	1980s	1990s	2000s	1980s	1990s	2000s
Argentina	0.89	0.79	0.78	8.2	5.9	8.6
Bolivia	0.35	0.33	0.38	19.0	16.4	14.4
Brazil	0.36	0.34	0.33	10.4	6.9	6.1
Chile	0.29	0.16	0.09	7.6	8.1	4.6
Colombia	0.13	0.08	0.05	18.4	15.1	8.3
Costa Rica	0.11	0.07	0.05	13.3	12.8	8.5
Dominican Republic	0.16	0.11	0.09	16.4	10.6	6.9
Ecuador	0.18	0.14	0.10			
El Salvador	0.10	0.10	0.12	17.4	14.6	10.6
Guatemala	0.17	0.14	0.12	25.5	24.2	13.9
Honduras	0.35	0.28	0.16	21.5	21.2	13.6
Mexico	0.31	0.28	0.24	9.0	6.2	3.9
Nicaragua	0.33	0.33	0.37	22.1	22.6	19.6
Panama	0.21	0.19	0.17	8.9	8.0	7.1
Paraguay	0.51	0.52	0.63	27.9	21.9	19.9
Peru	0.17	0.15	0.13	10.9	8.8	7.5
Uruguay	0.44	0.41	0.41	13.0	8.1	9.8
Venezuela	0.17	0.12	0.10	5.9	5.2	4.2
LA Average	0.29	0.25	0.24	15.0	12.7	9.8

Source: Authors' calculations from World Bank (2011).