GROWTH, POVERTY, AND INEQUALITY IN LATIN AMERICA: A CAUSAL ANALYSIS, 1970–94

BY ALAIN DE JANVRY AND ELISABETH SADOULET

University of California at Berkeley

Taking advantage of consistent poverty and income inequality data for 12 Latin American countries between 1970 and 1994, we analyze the determinants of changes in the incidence of urban and rural poverty and in Gini coefficients over spells of years, stressing in particular the role of aggregate income growth. We find that income growth reduces urban and rural poverty but not inequality. We also find that income growth is more effective in reducing urban poverty if the levels of inequality and poverty are lower, and the levels of secondary education higher. We show that there is an asymmetry in the impact of growth on poverty and inequality, with recession having strong negative effects on both poverty and inequality. Since growth does not reduce inequality, economic cycles create ratchet effects on the level of inequality. However, post-structural adjustment growth is quite effective at reducing poverty, particularly if inequality is low.

1. WHY POVERTY AND INEQUALITY ARE IMPORTANT POLICY ISSUES IN LATIN AMERICA

The Latin American region has exceptionally high levels of inequality and an "excess" incidence of poverty compared to other regions at similar levels of average per capita income (IDB, 1998). The high costs that poverty and inequality entail have been brought to public attention by the derailing of economic recovery in Mexico in part as a consequence of social exclusion, and by the threats of social backlash to the structural adjustment reforms in many other Latin American countries as the distribution of the benefits from growth is perceived to be excessively unfair (*The Economist*, 1996; Berry, 1997). Public sensitivity is exacerbated by the fact that the serious losses in purchasing power during the years of crisis and adjustment have increased impatience in sharing the benefits of recovery, leaving little room for further postponement. Successful transitions to democracy or improvements in democratic representation, and decentralization of governance throughout the continent, have given the poor new channels of access to the political process, making their demands for participation to the gains from growth more difficult to ignore. The strength of these demands has been significantly enhanced by proliferation of grassroots organizations and social movements which act as advocates for the poor. Finally, lessons derived from the Asian experience (Stiglitz, 1996) and from empirical studies of endogenous growth (Bénabou, 1996; Aghion and Howitt, 1998) have made it increasingly well-known that income inequality can have a negative influence on income growth, opening to question the economic wisdom of continued high levels of inequality in Latin America.

There is hence widespread recognition that the existing levels of poverty and inequality in Latin America need to be reduced (IDB, 1998). With countries emerging from severe recessions and resuming growth in the context of liberalized economies, the question as to how effective will aggregate income growth be in reducing poverty and inequality is a central issue for policy making: can income growth be relied upon to significantly reduce poverty and inequality, or is it a weak force that needs to be complemented by other policy interventions? This is the issue that we analyze in this paper.

Due to lack of comparable data over time and across nations, there have been few systematic causal analyses of the roles of economic growth and other variables in explaining poverty and inequality in Latin America. However, recent efforts at generating data made by Altimir (1995) and the Economic Commission for Latin America and the Caribbean (ECLAC, 1996) allow such an analysis to be undertaken. While data quality problems remain (Lustig, 1994), this information has started to yield results on identifying the determinants of poverty and inequality. For instance, inspection of these data by a number of analysts of Latin American incomes such as Altimir (1995), Beccaria et al. (1992), Fields (1992), Lustig (1995), Morley (1995), and Psacharopoulos et al. (1995) has led to the general conclusion that poverty and inequality have been closely linked to the economic cycle, rising during periods of recession and falling during recovery. Nevertheless, whether future growth will be able to sufficiently reduce poverty and inequality to accommodate popular demands so they do not create threats to the sustainability of recoveries remains a matter of debate. Opinions range from optimism (Morley, 1995), to calls on the need to complement the impact of growth with attention to education and employment creation (Psacharopoulos et al., 1995; Lustig and Deutsch, 1998), and to advocacy of extensive interventions to reduce inequality and target poverty (Beccaria et al., 1992; Fujii and Aguilar, 1995).

Quantitative analyses of the relation between growth, inequality, and poverty and of the role of other causal factors remain insufficient for five reasons. First, there have been few econometric analyses of the sources of change in poverty and inequality. Most studies do two-way tabular classifications of changes in GDP per capita (positive and negative) and changes in poverty or inequality across countries (positive and negative), looking for most frequent correspondence as evidence of a relationship. Recent exceptions are the work of Ravallion and Datt (1996), Ravallion (1997), and Ravallion and Chen (1997) who proceed with econometric analyses, though not for Latin America. Closest to what we do in this paper, the IDB (1997) used regression analysis to explain the change in inequality between 1985 and 1995 in 13 Latin American countries, showing that the change in GDP per capita (GDPpc) during the period and the initial level of education both helped reduce inequality, while the standard deviation of years of schooling increased inequality. Second, analysis of the role of aggregate income has in general been done by observing changes in poverty and inequality during globally defined historical periods broadly associated with growth and recession. Thus, data for the 1970s have been associated with growth, for the early and mid-1980s with recession, and for the late 1980s and the 1990s with growth recovery (see for example Londoño and Székely, 1997). This is, however, a gross approximation since countries had highly idiosyncratic phases of growth and recession, with some countries like Colombia

and Costa Rica largely avoiding recession, countries like Peru and Brazil still in recession in the late 1980s and even the early 1990s, and countries like Honduras and Venezuela relapsing into recession in the 1990s after temporary recoveries. To account for this, we conduct instead a detailed analysis of spells of years where episodes of growth and recession are specific to each country.[1] Third, if care is not taken to separate periods of growth and recession, the overall negative relation that has been established by analysts between changes in income and changes in poverty or inequality may derive from growth, from recession, or from both. If the strongest relation happens to occur during recession, the optimistic predictions about the role of income growth in reducing poverty and/or inequality will be dangerously fallacious. To avoid this error, we allow for separate effects of aggregate income growth on poverty and inequality during episodes of growth and recession. Fourth, there are important qualitative differences in the policy context of growth before and after the structural adjustment reforms that may alter the capacity of growth to influence poverty and inequality. Before the reforms, most Latin American economies were still implementing import substitution industrialization (ISI) strategies and accumulating debt, thus discriminating against agriculture and favoring growth in capital intensive industries. With the reforms, the general prescriptions of the "Washington Consensus" (Williamson, 1990) were implemented across the region, with strict fiscal discipline, restrictive monetary policies, competitive exchange rates, and trade liberalization, potentially redefining the distribution of benefits from growth. To capture this potential difference, we separate the effects of growth before and after the reforms. And fifth, the particular structural context within which growth occurs affects the ability of growth to influence poverty and inequality, calling on the need to look at interactive effects between growth and context. Most important among contextual features that affect the role of growth are the initial levels of inequality (Ravallion, 1997), poverty, and secondary education (Psacharopoulos et al., 1995; IDB, 1997).

In this paper, we start in Section 2 by reviewing recent analyses of the determinants of poverty and inequality to motivate the specification of causal relations for econometric analysis. We proceed in Section 3 to present a data base where the unit of observation is change over spells of years between data points that give measurements of urban and/or rural poverty and of inequality. In Section 4, we present econometric estimates of the causal determinants of urban and rural poverty and of inequality across growth spells. Finally, in Section 5, we extract policy implications regarding the role of growth and the identification of additional instruments to reduce poverty and inequality.

2. PAST ANALYSES OF THE DETERMINANTS OF THE POVERTY AND INEQUALITY

The determinants of poverty and inequality that have been identified in previous studies can be classified in the following four categories.

[1] For clarification, the terminology we use in this paper is as follows: Spell of years: sequence of years between two consecutive data points. Episode: we distinguish between three growth episodes— early growth (spells with positive Gross National Income per capita growth (GNIpc) before the structural adjustment reforms), recession (spells with negative GNIpc), and late growth (spells with positive GNIpc after the reforms). The symbol $\dot{X}$ represents the growth rate of X.

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2.1. Role of Per Capita Aggregate Income Growth

There is general agreement in the profession that aggregate income growth is necessary to reduce poverty (World Bank, 1990). Using national-level data for the Latin American countries in the 1980s, Morley (1995) and Psacharopoulos *et al.* (1995) give evidence that poverty has mirrored the economic cycle, rising during recession and falling during recovery. Using a compilation of 682 measurements of the income of the poorest quintile in 108 countries, Deininger and Squire (1996) show that, in periods of aggregate growth, the income of the poor increased in 88 percent of the cases. Using a subset of 43 countries from the same data base, Birdsall and Londoño (1997) find that that aggregate growth increases the income growth of the poor with an elasticity of 1.3. From state-level data, Ravallion and Datt (1996) find that aggregate income growth reduced poverty in India. And using household data from pairs of surveys in 42 countries, Ravallion and Chen (1997) show that aggregate income growth reduced poverty. Hence, there is little disagreement on the proposition that aggregate income growth helps reduce poverty.

While agreement on the role of growth for poverty reduction is widely shared, this is not the case for inequality. Psacharopoulos *et al.* (1995) show that inequality in Latin America was, like poverty, anti-cyclical with growth. Other studies are not so affirmative. For instance, Ravallion and Chen (1997) in their 42 countries study find no evidence that aggregate income growth helped reduce inequality.

All changes in aggregate income may not be equally effective in affecting poverty and inequality. First, there may exist an asymmetry in the relationship between changes in poverty and inequality and changes in income associated with growth and with recession. For instance, a 1 percent increase in Gross National Income per capita (GNIpc) may have less effect on poverty or inequality than a 1 percent fall in GNIpc. Whether this difference exists or not has, however, not been pursued in past empirical analyses. As examples, the Psacharopoulos *et al.* (1995) and the Ravallion and Chen (1997) studies work with scatters of points that relate changes in poverty and inequality to changes in income. The negative relation between poverty/inequality and per capita income can come from growth as well as from recession, and no attempt is made to see if the strength of this relation differs as income rises or falls.

Second, the effect of income growth on poverty and inequality may also differ by policy context. While most previous analyses of the Latin American experience have focused on the 1980s, the effect of GNIpc growth on poverty and inequality can be contrasted between the ISI context that prevailed before the structural adjustment reforms and the open economy context that was introduced by the reforms. The 1990 World Development Report (World Bank, 1990) stressed the importance of the labor intensity of growth in reducing poverty. With transition from ISI to more open economy industrialization, the labor intensity of growths should have increased, and hence also the income elasticity of poverty.

2.2. Role of the Quality of Aggregate Income Growth

There are three other qualitative features of growth that have been associated with the poverty reduction power of a given quota of aggregate income growth.

(i) Instability of growth. This is measured by the coefficient of variation of GNIpc around its trend. Datt and Ravallion (1998) show that fluctuations in crop yields and in per capita non-farm output are detrimental for poverty reduction after controlling for income growth. Since we are working with spells of years which we characterize as episodes of growth or recession, the coefficient of variation of GNIpc is important in capturing income instability within the spell. Indeed, a spell may end up having positive or negative overall income growth while hiding considerable intra-spell instability. The coefficient of variation will thus help qualify how steady growth was for a given intra-spell trend.

(ii) Sectoral composition of growth. Ravallion and Datt (1996) analyze the relation between change in poverty and change in sectoral value added in the primary, secondary, and tertiary sectors. Using data for India, they find that growth in the primary and tertiary sectors has been effective in reducing both rural and urban poverty, but that secondary sector growth has not been effective due to the high capital intensity of industry. This stresses the roles that differential growth of the agricultural and services sectors can play in reducing poverty.

2.3. *Role of Macroeconomic Performance*

(i) Inflation and hyperinflation. Inflation has been associated with rising poverty by Datt and Ravallion (1998) and systematically mentioned in reviews of the determinants of poverty in Latin America, particularly when reaching hyperinflation levels (Lustig and Deutsch, 1998).

(ii) Real exchange rate depreciation. Adjustment has usually been associated with sharp depreciations of the real exchange rate. The poverty effects of depreciation have been observed to vary across social sectors. With depreciation, real wages in the formal sector tend to fall, increasing urban poverty, but rural poverty may decline if small farmers produce tradables and there is passing through from border to farm prices (Bourguignon, de Melo, and Morrisson, 1991). Inequality can also be reduced if the real incomes of the rural poor and of the urban poor in the informal sector fare better than those of the modern sector workers (Sahn, Dorosh, and Younger, 1996).

2.4. *Role of the Structural Context and Initial Conditions*

(i) Structural variables. There are a number of structural variables that have been identified as affecting poverty. One is the share of agriculture in GDP (positive on urban poverty and negative on rural poverty), after controlling for the level of GNIpc and the share of population in the rural sector. Demographic features also matter, particularly the rate of population growth and the distribution of population between rural and urban sectors (for the impact of the latter on aggregate inequality, see Fields, 1980).

(ii) Education. Psacharopoulos *et al.* (1995) place much emphasis on how the spread of education reduces both inequality and the incidence of poverty. Higher school enrollment ratios equalize the distribution of education and subsequently reduce income disparities. They also help reduce poverty directly by increasing the productivity of the poor, improving their chances of access to better-paid employment, and allowing vertical mobility for the children of the

poor. The role of secondary education in reducing inequality is observed by Bourguignon and Morrisson (1998). In general, the role of education in reducing poverty and inequality is both direct (as above) and indirect in giving the poor greater ability of benefiting from aggregate income growth, an interaction that we will explore.

(iii) Initial level of GNIpc. Convergence theories tell us that lower initial levels of GNIpc should be associated with higher growth rates, and hence potentially with more decline in poverty (Sala-I-Martin, 1996). After controlling for GNIpc growth, however, the relation is ambiguous. For instance, higher GNIpc countries have better performing labor markets, allowing greater trickle down of the benefits from growth and hence higher income elasticities of poverty.

(iv) Initial level of inequality. Here again, there are direct effects of the initial level of inequality on changes in poverty and inequality and also indirect effects through the qualification of income growth. Direct effects on inequality can be either a pure numerical phenomenon (a given change in inequality ΔG, where G is the Gini coefficient, gives a lower percentage change in inequality $\Delta G/G_0$ when initial inequality G_0 is high) or represent greater opportunities for change when initial inequality is low, implying in both cases a negative sign between initial inequality and growth rate in inequality. With inequality very high in Latin America and differing substantially across countries (the Gini ranged from 0.62 in Brazil to 0.30 in Uruguay in 1993–94), the role of inequality in indirectly reducing the benefits of growth for poverty alleviation is a significant issue. Ravallion (1997) analyzes 41 spells in 23 countries to show that a higher initial inequality lowers the income elasticity of poverty, thus also sheltering the poor during recessions. He estimates a relation $\dot{P} = \beta(1 - G_0)G\dot{D}Ppc$, where P is the headcount ratio, G_0 the initial inequality index, and $\beta(1 - G_0)$ the income elasticity of poverty, showing that inequality dampens the poverty reduction effects of GDPpc growth. With higher inequality, the poor receive a lower share not only of total income but also of its increments through growth. Psacharopoulos et al. (1995) similarly find that high inequality reduces the poverty reduction effect of aggregate income growth. And, more specifically, Birdsall and Londoño (1997) show that it is land and educational inequality that contribute to lowering the income growth of the poor

(v) Initial level of poverty. While this has not been analyzed quantitatively, higher initial levels of poverty could reduce the income elasticity of poverty either through numerical effects (as above for G) or through higher inequalizing effects of growth.

In this paper, we analyze separately rural and urban poverty because they have different determinants, and hence suggest differential policy interventions for poverty reduction. It should be clear, however, that the overall incidence of poverty could be falling with no change in either the rural or urban incidence of poverty due to sectoral population shifts. Conversely, the relation that holds at the aggregate level between growth, inequality, and poverty does not carry at the sectoral poverty levels. In the results we present here, it is consequently possible for sectoral poverty not to fall when GNIpc is rising and income distribution has remained unchanged.

3. DATA AND DESCRIPTIVE STATISTICS

The data characterize 48 spells in twelve Latin American countries for which we have consistent information on changes in poverty and inequality for the period 1970–94 as well as the set of exogenous variables needed for causal analysis (several data points on poverty cannot be used due to lack of information on the initial level of inequality for the spell).[2] It is evident that there is no perfect data set and that considerable disagreements remain among users of Latin American income statistics. We tried to minimize discrepancies across data points by remaining true to the data set on poverty assembled by Altimir and published by the Economic Commission for Latin America and the Caribbean in *Social Panorama for Latin America* (ECLAC, 1996). The analysis presented in this paper will clearly need to be repeated and the results obtained confirmed with data sets constructed by other analysts of Latin American incomes.[3]

To identify (1) potential asymmetries in the relation between poverty/inequality and income during episodes of growth and recession; and (2) the contrasted effects of growth on poverty and inequality under alternative development strategies (ISI before the structural adjustment reforms and open economy growth afterwards), the spells are classified into three growth episodes as follows:
  —Early growth: spells with positive GNIpc before the reforms.
  —Recession: spells with negative GNIpc.
  —Late growth: spells with positive GNIpc originating after the reforms.
For each country, the year of the reforms was identified from macroeconomic indicators, looking in particular for a major upsurge in the real exchange rate. These years are given in Table 1. The spells, the corresponding GNIpc and their classification in three episodes are also given in Table 1.

The timing of the surveys from which observations are derived was not the same across countries. Most countries have an observation in 1970. Most of the subsequent observations are clustered around 1979–81, 1986, 1990, and 1994. A majority of countries had growth during the 1970 to 1979–91 period, recession between 1979–81 and 1986, and then different degrees of recovery or relapse in the 1990s for which we have shorter spells. Thus, in general, the spells characterize fairly well phases of growth or recession. However, this is only an approximation. For this reason, we characterize each spell not only by the overall GNIpc during the period, but also by the coefficient of variation of GNIpc around its trend. An exact breakdown into spells of years of uninterrupted growth or recession would require annual data, which we do not have.

The observed spells fall quite naturally before and after the reforms. The only exception for which there is ambiguity is Colombia in 1980–86 since the reforms occurred sometime toward the middle of the spell. For this reason, we do sensitivity analysis by classifying this spell alternatively as early and late growth.

The indicators of poverty we use are the growth rates in the headcount ratios for the rural ($\dot{P}_0^r$) and urban ($\dot{P}_0^u$) populations, and the indicator of inequality is

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[2] Detailed information on data sources and data adjustments, when needed, are available on the authors' webpages at http://are.Berkeley.EDU/~alain/ or http://are.Berkeley.EDU/~sadoulet/.

[3] Londoño and Székely (1997) for instance construct annual time series on poverty for the Latin American countries starting from the "good quality" income inequality measures reported by Deininger and Squire (1996). This approach is not free from strong assumptions.

TABLE 1

GROWTH SPELLS AND GNI PER CAPITA ANNUAL GROWTH RATES, LATIN AMERICA, 1970–94

(Average annual growth rates in percent)

Countries	Year of the Reforms	Growth Episode		
		Early Growth GNIpc > 0	Recession GNIpc < 0	Late Growth GNIpc > 0
Argentina	1976	1970–80: 0.79*	1980–86: −2.85* 1986–90: −4.18*	1990–92: 10.84* 1992–94: 6.05*
Brazil	1980	1970–79: 5.53	1987–90: −3.53	1979–87: 0.43 1990–93: 0.10
Chile	1973		1970–80: −1.79° 1980–87: −1.42°	1987–90: 7.40 1990–92: 8.00 1992–94: 5.56
Colombia	1984	1970–80: 3.62* 1980–86: 0.21*		1986–90: 0.44* 1990–92: 1.73* 1992–94: 5.60*
Costa Rica	1981	1970–81: 1.75		1981–88: 1.87 1988–90: 0.77 1990–92: 4.64 1992–94: 4.40
Guatemala	1986		1980–86: −3.50	1986–90: 0.85[+]
Honduras	1988	1970–86: 0.61°	1990–92: −0.19	1986–90: 0.57 1992–94: 3.18
Mexico	1992	1970–84: 2.76	1989–92: −0.61	1984–89: 0.22 1992–94: 1.09
Panama	No reform		1986–89: −7.93	1979–86: 1.31 1989–91: 5.58 1991–94: 5.05
Peru	1977–78	1970–79: 0.00	1979–86: −2.94 1986–91: −5.22	1991–94: 1.91
Uruguay	1983	1970–81: 2.03*	1981–86: −4.53*	1986–90: 0.96* 1990–92: 7.31* 1992–94: 4.75*
Venezuela	1984		1981–86: −4.12 1986–90: −0.64 1992–94: −5.78	1990–92: 3.83

[+] Urban Poverty headcount ratio not available.
*Rural Poverty headcount ratio not available.
°Gini not available.
GNIpc not available for Panama 1970–79 and Venezuela 1970–81.
Data sources: See authors' webpages.

the growth rate in the Gini coefficient ($\dot{G}$). Working with growth rates, however, underestimates the difficulty of reducing poverty and inequality at high levels of P_0^r, P_0^u, and G. Consequently, the regression equations overrate the achievements at low levels of poverty and inequality. An alternative set of indicators is to use changes in the rural and urban incidence of poverty and in inequality over the spells. In this case, the indicators underestimate the difficulty of reducing poverty and inequality at low levels of P_0^r, P_0^u, and G, and the regressions overrate the achievements at high levels of poverty and inequality. In the empirical analysis, we use both types of indicators of change to identify the robustness of the determinants of poverty and inequality.

In the econometric analysis that follows, each country is considered as a separate experience and the data are consequently not weighted by population size. However, they are weighted by years of duration of each spell since a longer spell is equivalent to a repeat of observations of years of growth or recession compared to a shorter spell. Spells were longer under early than late growth since household expenditure surveys were not as frequent in the 1970s and early 1980s. The endogenous variables in the regressions are consequently the average annual growth rates of, and the average annual differences in, poverty and inequality during the corresponding spells.

Countries have countless unobservable characteristics that also influence the observed changes in poverty and inequality. Since we work with panel data, and the endogenous variables are changes over spells, additive fixed effects are eliminated by differencing. However, non-linear unobservable country effects may remain. We consequently introduce fixed and random effects in the estimated equations and test for the hypotheses that fixed effects are zero and random effects have a zero variance. We use these effects whenever the tests reject the corresponding hypotheses.

4. DETERMINANTS OF URBAN POVERTY, RURAL POVERTY, AND INEQUALITY

In the following analyses, we start by estimating the roles of aggregate income growth, of the qualitative features of growth, of the macroeconomic performance that accompanies growth, and of the structural context where growth occurs, on changes in poverty and inequality. We then qualify the role of income growth by showing how its effects on poverty and inequality are modified by the initial levels of inequality, poverty, and education; by differences between episodes of early growth, recession, and late growth; and by the sectoral composition of growth.

4.1. Urban Poverty

Role of Aggregate Income Growth

Results in Table 2 show the determinants of the annual growth rate in the incidence of urban poverty $\dot{P}_0^u$. The hypotheses that fixed effects are zero and random effects have a zero variance could not be rejected. These effects are consequently not included in the results presented in Table 2.

Confirming what other analysts have observed (Fields, 1992; Morley, 1995; Psacharopoulos et al., 1995; Altimir, 1995; Lustig, 1995), we find that GNIpc reduces urban poverty, here with an elasticity of -0.95. Hence, urban poverty is indeed anti-cyclical, falling under GNIpc growth and rising in recession.

Among macroeconomic variables, depreciation of the real exchange rate increases urban poverty. Adjustment policies have a short run cost on poverty. By contrast, structural variables have no significant effects.

We can use the estimated equation in Table 2 to calculate the relative roles of income growth and of all the other variables that explain poverty. At the sample mean of all explanatory variables (except GNIpc) over the 48 spells for

TABLE 2

DETERMINANTS OF CHANGE IN URBAN POVERTY

	Coefficient	P-value
Aggregate income growth		
GNIpc growth	-0.95	0.00
Qualitative features of growth		
Coefficient of variation of GNIpc	0.16	0.57
Macroeconomic performance		
Real exchange rate growth	0.20	0.02
Hyperinflation dummy	1.74	0.36
Structural context at beginning of spell		
GNIpc ('000 1995US$)	-0.06	0.93
Share of agriculture in GDP	0.09	0.55
Population growth	2.31	0.14
Urban population share	0.09	0.21
Secondary education	-0.04	0.49
Inequality	2.55	0.74
Incidence of urban poverty	-0.09	0.26
Intercept	-7.47	0.52
Number of observations	48	
R^2	0.71	
Adjusted R^2	0.65	

Endogenous variable: annual growth rate in urban poverty incidence by spell.

Weighted OLS, with weights equal to the length of the spell. Hypotheses that country fixed effects are zero and random effects have a zero variance could not be rejected with an F-test and a Breusch and Pagan Lagrangian multiplier test, respectively.

which there are complete data and for the whole 1970–94 period, the estimated equation is:[4]

$$\dot{P}_0^u = 2.33 - 0.95 \, \text{GNIpc}.$$

With GNIpc = 0.83 over the sample, the net upward effect on the rate of change in the incidence of urban poverty of the combined 2.33 percent drift due to other variables and the negative effect of income growth with an elasticity of -0.95 is 1.54 percent. What this result shows is that, for growth to have held the incidence of urban poverty in check, the average annual growth rate in GNIpc over the period would have had to be not 0.83 percent but a much larger 2.45 percent. Clearly, the growth performance over the period fell far short of this achievement and the incidence of urban poverty rose.

Role of the Qualifiers of Income Growth

The qualifiers of income growth were introduced one at a time in separate regressions by interacting GNIpc with these qualifiers. Partial results are reported in Table 3 when significant. The first three experiments show that GNIpc is only effective in reducing the growth rate of urban poverty if (1) the level of inequality

[4]The regression is written as $\dot{P}_0^u = X\beta - 0.95 \, \text{GNIpc}$, where X represents all the covariates other than GNIpc. At the mean value $\bar{X}$ of these covariates, $\bar{X}\beta = 2.33$.

TABLE 3

PARTIAL RESULTS ON THE DETERMINANTS OF CHANGE IN URBAN POVERTY

	Coefficient	P-value	Adjusted R^2	Overall Effect of Growth	
				Lowest	Highest
				In 1993–94	
Interactive effect with initial inequality				(Uruguay)	(Brazil)
GNIpc growth	−2.92	0.01	0.65	−1.61**	−0.23
Initial inequality *GNIpc growth	4.36	0.08			
Interactive effect with initial poverty				(Uruguay)	(Honduras)
GNIpc growth	−2.24	0.00	0.68	−1.98**	0.73
Initial urban poverty *GNIpc growth	0.04	0.01			
Interactive effect with education				(Honduras)	(Uruguay)
GNIpc growth	0.03	0.96	0.65	−0.58**	−1.49**
Secondary education *GNIpc growth	−0.02	0.06			
Growth episodes					
GNIpc growth, early growth episode	−0.22	0.73	0.62		
GNIpc growth, recession episode	−1.06	0.01			
GNIpc growth, late growth episode	−1.05	0.00			
Growth episodes and interactive effect with initial inequality				(Uruguay 92)	(Guatemala 86)
GNIpc growth, late growth episode	−5.53	0.04	0.63	−2.45**	0.10
Initial inequality *GNIpc growth	10.24	0.09			
Sectoral composition of growth					
Agricultural growth	−0.06	0.89	0.60		
Industrial growth	−0.06	0.75			
Service growth	−0.95	0.01			
Sectoral composition of growth and interactive effect with initial inequality				(Uruguay)	(Brazil)
Service growth	−4.54	0.03	0.63	−1.95**	0.78
Initial inequality *Service growth	8.63	0.08			

Endogenous variable: annual growth rate in urban poverty incidence by spell.

Qualitative features of growth, macroeconomic performance, and structural context variables as in Table 2 not reported.

*(**)Significantly different from 0 at the 90% (95%) confidence level.

is not too high, (2) the level of poverty is not too high, and (3) the level of secondary education is high enough. To illustrate the meaning of these results, we predict the roles of the initial levels of inequality and poverty and of the level of secondary education on the income elasticity of poverty by using their lowest and highest observed values in the sample of countries in 1993–94. This gives the following results. While with low inequality (a Gini of 0.30 as observed in Uruguay) the overall income elasticity of poverty is − 1.61, it is not significantly different from zero with high inequality (a Gini of 0.62 as observed in Brazil). Hence, as suggested by Ravallion (1997), high inequality does indeed erase the ability of growth to reduce poverty. Put it another way, countries with high levels of inequality cannot rely on growth to reduce poverty, but need to deal first with inequality through a separate set of redistributive interventions if they want to rely on growth as an anti-poverty strategy. Similarly, the overall income elasticity of poverty is − 1.98 with low initial urban poverty (a headcount ratio of 6 percent as observed in Uruguay) while it is not significantly different from zero with high poverty (a headcount ratio of 70 percent as observed in Honduras). Hence, growth is only effective in reducing poverty when poverty is not too high. Otherwise, direct interventions to reduce poverty are first needed. Finally, a high level

of secondary school enrollment (83 percent in Uruguay) yields an income elasticity of poverty of −1.49, while it is only −0.58 (but still significantly different from zero at the 95 percent confidence level) with a low school enrollment (33 percent in Honduras). Hence, a one percentage point of income growth is 2.6 times more effective in reducing poverty at a high than at a low level of secondary education, confirming the key role that education plays in allowing growth to reduce poverty as suggested by Psacharopoulos et al. (1995).

The next two experiments in Table 3 have the objective of testing for asymmetries between the roles of early growth, recession, and late growth in affecting poverty. We find that there is a strong asymmetry between early growth and recession. Early growth was unable to reduce urban poverty. By contrast, a one percentage point decline in GNIpc increases poverty by 1.06 percent. An econometric analysis of the relationship between income growth and poverty using data for early growth and recession without separating these episodes would thus have been highly misleading: the estimated negative relation would have been established by recession instead of growth. However, this asymmetry disappears with late growth, as it reduces poverty with an elasticity of −1.05. Late growth (open economy) is thus much more effective to reduce poverty than was early growth (ISI).[5]

The role of growth episodes is also conditional on the initial level of inequality. We found that, overall, growth only reduces poverty when inequality is low. We see that this relation is basically established during the late growth period. For late growth, the overall elasticity is −2.45 with low inequality (a Gini of 0.30 as observed in Uruguay in 1992) but insignificant with high inequality (a Gini of 0.55 as observed in Guatemala in 1986). Open economy growth is thus particularly sensitive to inequality in its capacity to reduce poverty.

Finally, the last experiment in Table 3 looks at the importance of the sectoral composition of growth. Results show that service sector growth is effective in reducing urban poverty, while agricultural and industrial sector growth are not. Interacting sectoral growth with inequality, a low inequality (a Gini of 0.30 as observed in Uruguay) gives service sector growth an income elasticity of poverty of −1.95, while a high inequality (a Gini of 0.62 as observed in Brazil) erases the role of service sector growth in poverty reduction. Growth of the service sector is thus particularly sensitive to inequality in reducing poverty.

4.2. Rural Poverty

The data on rural poverty are not as complete as those on urban poverty, and there are reservations about the validity of some of the data reported in ECLAC (1998). In particular, the rural poverty data for Argentina, Colombia, and Uruguay reported by ECLAC are not nationally representative. Dropping these data reduces the number of useable spells to 34.

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[5] Since reforms in Colombia came somewhere around the middle of the 1980–86 spell, it is not *a priori* evident whether this spell should be assigned to early or to late growth. We did a sensitivity analysis by reassigning this spell to late growth and found that results are robust to this change. The income elasticities of urban poverty for the three periods are −0.19, −1.05, and −1.08, respectively.

TABLE 4

DETERMINANTS OF CHANGE IN RURAL POVERTY

	Coefficient	P-value
Aggregate income growth		
GNIpc growth	−0.75	0.00
Qualitative features of growth		
Coefficient of variation of GNIpc	0.05	0.87
Macroeconomic performance		
Real exchange rate growth	0.07	0.41
Hyperinflation dummy	−0.15	0.96
Structural context at beginning of spell		
GNIpc ('000 1995US$)	−2.79	0.03
Share of agriculture in GDP	−0.44	0.14
Population growth	−3.20	0.19
Rural population share	0.02	0.82
Secondary education	−0.13	0.03
Inequality	−5.81	0.64
Incidence of rural poverty	−0.03	0.55
Intercept	29.40	0.01
Number of observations	34	
Overall R^2	0.66	

Endogenous variable: annual growth rate in rural poverty incidence by spell.

Weighted OLS, with weights equal to the length of the spell.

Random effects model.

Role of Aggregate Income Growth

In testing for fixed and random effects, we find that the former can be rejected but not the latter. In Tables 4 and 5, we consequently report results for rural poverty equations with random effects. Results in Table 4 show that, like

TABLE 5

PARTIAL RESULTS ON THE DETERMINANTS OF CHANGE IN RURAL POVERTY

	Coefficient	P-value	Overall R^2	Overall Effect of Growth	
				Lowest	Highest
Interactive effect with initial poverty				(Costa Rica)	(Honduras)
GNIpc growth	−1.57	0.01	0.69	−1.18**	−0.29
Initial rural poverty *GNIpc growth	0.02	0.17			
Growth episodes					
GNIpc growth, early growth episode	−0.22	0.78	0.68		
GNIpc growth, recession episode	−0.67	0.03			
GNIpc growth, late growth episode	−1.06	0.01			
Sectoral composition					
Agricultural growth	0.02	0.96	0.67		
Industrial growth	−0.06	0.66			
Service growth	−0.70	0.02			

Endogenous variable: annual growth rate in rural poverty incidence by spell.

Qualitative features of growth, macroeconomic performance, and structural context variables as in Table 4 not reported.

*(**) Significantly different from 0 at the 90% (95%) confidence level.

Random effects models.

in the urban sector, GNIpc is a significant force in reducing the incidence of rural poverty. The income elasticity is -0.75, compared to -0.95 in the urban sector. Hence, rural poverty is less responsive to changes in aggregate income: it responds less to growth but also less to recession, sheltering the rural poor from booms and busts.

At the sample mean of all variables else than GNIpc, for the 34 spells over the whole 1970–94 period, the estimated equation is:

$$\dot{P}_0^r = 0.12 - 0.75 \, \text{GNIpc}.$$

With GNIpc $= 0.64$ over the sample of 34 spells, the net effect is a downward drift in the incidence of rural poverty of -0.36 percent. The variables that contribute significantly to this negative drift in rural poverty are the initial levels of GNIpc and of secondary education. By contrast, the macroeconomic performance (real exchange rate depreciation), which was a source of increase in urban poverty, has no effect on rural poverty. Hence, rural poverty was also sheltered from macro performance. Also, observed annual growth in per capita income (0.64 percent) was greater than the minimum rate of growth needed to prevent an increase in rural poverty, namely 0.16 percent, and the incidence of rural poverty fell.

Role of Qualifiers of Income Growth

The role of income growth in reducing rural poverty is qualified by the initial level of poverty (Table 5). The income elasticity of poverty is -1.18 at low levels of rural poverty (Costa Rica with an incidence of rural poverty of 23 percent) while it is not significantly different from zero at high levels of poverty (Honduras with an incidence of rural poverty of 76 percent). Hence, similar to urban poverty, the beneficial effect of growth on poverty is erased at high levels of poverty. However, by contrast to urban poverty, secondary education does not help make growth more effective in reducing rural poverty, a phenomenon that has been observed by Lopéz and Valdés (1997) across a number of Latin American countries.

Similar to urban poverty, there is an asymmetry in the role of early growth and recession, with a 1 percent decline in income during recession erasing the poverty gains of 3.0 percentage points of early growth. However, this asymmetry is to the benefit of growth under late growth, with a 1 percentage point of growth erasing the poverty losses of 1.6 percentage points of recession.

Finally, as in the urban sector, the sectoral composition of growth matters for rural poverty reduction, with service sector growth the most effective, with an elasticity of -0.70, while agricultural and industrial growth do not have significant effects on rural poverty.

4.3. *Inequality*

Role of Aggregate Income Growth

Inequality, measured by the Gini coefficient, is harder to explain than poverty (Table 6). There are also measurement problems for inequality since reported Gini are sometimes national and sometimes only urban. We used national inequality data from Altimir (1998), Morley (1995), Lustig and Deutsch (1988),

TABLE 6
DETERMINANTS OF CHANGE IN INEQUALITY

	Coefficient	P-value
Aggregate income growth		
GNIpc growth	−0.15	0.13
Qualitative features of growth		
Differential growth agriculture–non-agriculture	−0.18	0.30
Coefficient of variation of GNIpc	−0.10	0.39
Macroeconomic performance		
Real exchange rate growth	0.00	0.99
Hyperinflation dummy	0.40	0.68
Structural context		
GNIpc ('000 1987US$)	−0.05	0.86
Share of agriculture in GDP	−0.10	0.14
Population growth	−0.10	0.88
Urban population share	−0.04	0.24
Secondary education	−0.01	0.71
Initial inequality	−6.88	0.03
Intercept	8.70	0.10
Number of observations	48	
R^2	0.44	
Adjusted R^2	0.27	

Endogenous variable: annual growth rate of Gini coefficient by spell.
Weighted OLS, with weights equal to the length of the spell.
Hypotheses that country fixed effects are zero and random effects have a zero variance could not be rejected with an F-test and a Breusch and Pagan Lagrangian multiplier test, respectively.

CEPAL (1993 and 1995), and INEGI (1993 and 1994) when available, and urban inequality data from *Social Panorama in Latin America* (ECLAC, 1996) when not.[6] We show in the Appendix that there is no significant bias in combining national and urban Gini in analyzing (1) the role of the initial level of inequality (G_0) on the growth of poverty and inequality, and (2) the determinants of growth in inequality ($\dot{G}$). Results are consequently robust to these definitional problems. They indicate that income growth did not reduce inequality over the 1970–94 sample of spells at the 90 percent confidence level. This lack of influence is consistent with the Ravallion and Chen (1997) finding. However, frequently made assertions that growth has been inequalizing in Latin America are globally incorrect. The role of variables other than income growth implies a positive drift in the annual growth rate of inequality of 0.58 percent. Among these variables, the initial level of inequality contributes to reduce this drift, suggesting that it is harder for inequality to rise when it is already high.

Role of Qualifiers of Income Growth

There is a strong asymmetry in the effects of growth and recession on inequality. Results in Table 7 show that the association between income growth and change in inequality exclusively comes from recession. Neither early nor late growth are able to make a dent in inequality. Hence, estimating an overall relation

[6] See the authors' webpages for detailed information on data sources.

TABLE 7

PARTIAL RESULTS ON THE DETERMINANTS OF CHANGE IN INEQUALITY

	Coefficient	P-value	Adjusted R^2
Growth episodes			
GNIpc growth, early growth episode	0.65	0.17	0.26
GNIpc growth, recession episode	−0.28	0.07	
GNIpc growth, late growth episode	−0.02	0.92	

Endogenous variable: annual growth rate of Gini coefficient by spell.
Qualitative features of growth, macroeconomic performance, and structural context variables as in Table 6 not reported.

between income and inequality, as in Table 6, without distinguishing between episodes of growth and recession is misleading: the policy implication is not that income growth does not affect inequality, but that recession is devastating on inequality, and growth ineffective in reducing it. Growth, even late growth which we have seen to be powerful in reducing both urban and rural poverty, cannot be relied upon as an equalizing force. If greater equality is deemed desirable by governments, in particular to enhance the poverty reducing effect of growth, then direct inequality-reducing interventions will be necessary.

5. ROBUSTNESS OF THE RESULTS

We consider here two issues to check on the robustness of the results. One has to do with the choice of endogenous variables and the other with measurement errors.

As indicated above, using rates of change in poverty and inequality as endogenous variables in the estimated equations gives more importance to achievements in low poverty and low inequality countries, respectively. An alternative specification of the endogenous variables is to use points of change in the indicators of poverty and inequality, again scaled on an annual basis within spells since they are of unequal length. This specification gives more importance to countries with high levels of poverty and inequality. Estimated coefficients from the two sets of endogenous variables would thus bracket what an ideal indicator would offer. We should recall, however, that in both cases we control for the initial levels of poverty and inequality, thus reducing the difference in these indicators on estimated coefficients. Results in Table 8 show that the role of aggregate income growth remains the same with the two approaches. A one percent increase in GNIpc lowers the incidence of urban poverty by 0.25 percentage point and the incidence of rural poverty by 0.30 percentage point. Asymmetries between growth episodes remain clear. Early growth had no impact on poverty reduction, recession creates a sharp increase in poverty, and late growth is effective in reducing poverty. The overall effect of GNIpc growth on inequality has borderline significance. Hence, one could say that aggregate income growth has a negative effect on inequality. However, it is clear that this effect is exclusively due to recession. Neither early nor late growth have an impact on inequality. The conclusion that crises create ratchet effects on inequality that growth cannot erase is thus confirmed.

TABLE 8

SENSITIVITY ANALYSIS: INDICATORS OF POVERTY AND INEQUALITY

	Coefficient	P-value	Goodness of Fit
Determinants of change in urban poverty			Adjusted R^2
GNIpc growth	-0.25	0.00	0.55
Growth episodes			
GNIpc growth, early growth episode	-0.18	0.28	0.53
GNIpc growth, recession episode	-0.28	0.00	
GNIpc growth, late growth episode	-0.22	0.02	
Determinants of change in rural poverty (random effects model)			Overall R^2
GNIpc growth	-0.30	0.00	0.64
Growth episodes			
GNIpc growth, early growth episode	-0.06	0.85	0.66
GNIpc growth, recession episode	-0.30	0.03	
GNIpc growth, late growth episode	-0.39	0.03	
Determinants of change in inequality			Adjusted R^2
GNIpc growth	-0.0007	0.10	0.33
Growth episodes			
GNIpc growth, early growth episode	0.0029	0.14	0.34
GNIpc growth, recession episode	-0.0013	0.05	
GNIpc growth, late growth episode	-0.0001	0.89	

Endogenous variables: changes in urban and rural poverty incidence, and change in Gini.
Qualitative features of growth, macroeconomic performance, and structural context variables as in Tables 2, 4, and 6 not reported.

Econometrically, the fact of using a rate of change as the endogenous variable, while using the initial level of the same variable as exogenous, can create a correlation between the exogenous variable and the error term if there are measurement errors in the exogenous variable, resulting in an estimation bias. This concern would apply to the inequality equation where the change in Gini is explained by the initial level of inequality with a significant coefficient. Since one can expect measurement errors on inequality to be large, the significant role of initial inequality may be due to measurement errors. To verify robustness of the results to this specification, we instrumentalize the initial level of inequality by splitting the observations into three groups and using dummy variables for the lowest and highest third, with the middle group serving as reference level. This procedure averages measurement errors and thus reduces the correlation between the exogenous variable and the residual. Results in Table 9 show that significance

TABLE 9

SENSITIVITY ANALYSIS: MEASUREMENT ERRORS IN INEQUALITY

	Coefficient	P-value	Adjusted R^2
GNIpc growth	-0.14	0.16	0.23
Initial inequality: lowest third	-0.11	0.88	
Initial inequality: highest third	-1.47	0.07	

Endogenous variable: annual growth rate of Gini coefficient by spell.
Qualitative features of growth, macroeconomic performance, and structural context variables as in Table 6 not reported.

of the initial inequality effect was not due to measurement errors. The income elasticity of inequality also remains unaltered (−0.14) and non-significant.

6. Summary and Policy Implications

While there is no agreement among analysts of Latin American incomes about what the best data set is, we found that, with the information used here that principally derives from the efforts of the ECLAC at constructing a consistent data set, strong causal regularities emerge. Analysis of the determinants of change in poverty and inequality over spells between 1970 and 1994 shows that per capita aggregate income growth can lower the incidence of urban and rural poverty with statistically significant elasticities of −0.95 and −0.75, respectively. Growth has, by contrast no significant impact on inequality, although significance can be borderline when using points of change in Gini instead of rates of change, i.e., when using an indicator of change that gives more weight to countries with high levels of inequality.

However, the reassuring result that growth can be relied upon as an instrument to reduce poverty needs to be seriously qualified for the following four reasons:

1. Growth only reduces urban poverty if the initial levels of inequality and poverty are not too high. In the Latin American countries where this is not satisfied, growth is ineffective in reducing urban poverty. Once these thresholds have been reached, the lower the initial levels of inequality and poverty are, the more effective growth is in reducing poverty. For rural poverty, the same result holds with respect to the initial level of poverty. While the level of secondary education has no effect on the income elasticity of rural poverty, it needs to be sufficiently high for growth to reduce urban poverty. Hence, current concerns that aggregate income growth is not sufficiently powerful to attack urban poverty imply that targeted efforts need to be made to reduce inequality and poverty and to increase educational levels to make it more effective.

2. There exists an asymmetry in the effect of income change on poverty, whereby a 1 percent decline in income can cancel the poverty reduction effects of more than 1 percent of income growth. For urban and rural poverty, this was true between early growth and recession. If asymmetry prevails, the overall relation between income and poverty is misleading since it is principally obtained through recession instead of through growth, leading to erroneous predictions about the potential of growth to reduce poverty. A very encouraging result is that, following the shift from import substitution to open economy industrialization, asymmetry in poverty effects is no longer observed under late growth. Late growth is a strong force in reducing the incidence of poverty, with elasticities of −1.05 for urban poverty and −1.06 for rural poverty. Late growth is particularly sensitive to inequality in helping reduce urban poverty. Hence, direct attacks on inequality can help make late growth a more effective poverty reducing instrument.

3. While late growth is effective in reducing poverty, this is not the case with inequality. Results show that growth was always ineffective in reducing inequality, under early as well as late growth. Hence, while it cannot be said that

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growth is inequalizing, neither can reliance be placed on growth to reduce inequality. Other instruments need to be used for this purpose, basically focusing on enhancing control over assets for the poor and on equalizing opportunities in accessing the markets, institutions, and public goods that determine the income generation value of these assets. Recession creates a ratchet effect on inequality. Strong asymmetry between growth and recession implies that avoiding the inequalizing effects of recession should be an explicit policy concern.

4. Finally, differential growth of the services sector has been key in reducing the growth of both urban and rural poverty. It has often been observed that the informal sector, which includes a large service component, has indeed been the most dynamic source of employment creation (PREALC, 1991). The urban poverty reducing effect of services growth can be reinforced by lowering the level of inequality.

We thus conclude that the current concerns with inequality in Latin America are unlikely to be met with aggregate income growth. Inequality needs to be attacked through direct policies designed for this purpose. Growth can be effective to reduce urban and rural poverty, but only beyond thresholds in the levels of inequality and poverty. For urban poverty, growth is only effective if the level of inequality is sufficiently low and that of secondary education sufficiently high. Beyond these thresholds, the urban poverty reducing effects of aggregate income growth can be significantly enhanced by direct interventions to reduce the initial levels of inequality and poverty to and raise the coverage of secondary education.

APPENDIX

To test whether there is a systematic bias in combining Gini measurements at the national and urban levels in regression analyses that use rates of growth as endogenous variables, all poverty regressions were run with a multiplicative national dummy variable D_n (taking the value of one when the Gini is measured at the national level), and all inequality regressions were run with both level and multiplicative national dummies in the inequality equations as follows:

Poverty equations: $\dot{P} = \beta' X + (\gamma_0 + \gamma_1 D_n)G_0$.

Inequality equations: $\dot{G} = (\alpha_0 + \alpha_1 D_n) + \beta' X + (\gamma_0 + \gamma_1 D_n)G_0$,

where X is the set of other regressors in each equation.

In all regressions, the coefficient of the D_n variable was not significant. Similar interactive and level dummies were introduced in all regressions with interactive terms between inequality and GNIpc growth, inequality and GNIpc growth per episode, and inequality and sectoral growth, with no significant effects. We thus conclude that there is no significant bias in combining the national and urban Gini in analyzing (1) the role of the initial level of inequality (G_0) on the growth of poverty and inequality, and (2) the determinants of growth in inequality ($\dot{G}$).

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