RESEARCH WORKSHOP
MACROECONOMIC CHALLENGES IN LOW INCOME COUNTRIES
OCTOBER 23-24, 2003

MACROECONOMICS AND INEQUALITY

BY

HUMBERTO LOPEZ
THE WORLD BANK

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Humberto Lopez*
The World Bank (PRMPR)

This draft: September 25, 2003

Abstract

This paper enters the poverty debate by assessing the impact that a series of pro growth policies have on inequality. We find that improvements in education and infrastructure and lower inflation levels would lead to both growth and progressive distributional change. Instead, financial development, trade openness and decreases in the size of the government, all factors that would lead to faster growth, would be associated with increases in inequality. We assess whether the positive impact that these policies have on growth offsets the negative impact they have on inequality and find that while these policies are likely to be pro poor in the long run, they are also likely to lead to higher poverty in the short run.

* This paper has been prepared in the context of the "Pro Poor Growth" program sponsored by the World Bank's PREM Poverty Group. I would like to thank comments received from Aart Kraay, Ugo Paniza, Cico Ferreira, Tito Cordella, Ulrich Lachler, Edgardo Favaro, and Stefano Paternostro. Views expressed in this paper are those of the author and should not be attributed to the World Bank, its Executive Directors or the countries they represent. Address for correspondence: MSN MC4-415, The World Bank, 1818 H Street, Washington, DC 20433. Email: Hlopez@worldbank.org. Tel: 1+202-473-4909.

I. Introduction

A large number of papers have recently explored the links between growth and inequality and the resulting impact on poverty reduction. Questions arising from this debate include whether the benefits of economic growth are broadly felt by all groups of society including the poor; whether a poverty reduction strategy should mainly have a growth bias; whether there are trade offs between pro growth and pro poor growth strategies; and whether pro growth policies are also the best poverty reduction policies. As a result of this debate, a few findings have emerged on which there seems to be more or less broad consensus.

First, nobody seems to doubt the importance of growth for poverty reduction. Countries that have historically experienced the most reduction in poverty are those that have experienced prolonged periods of sustained economic growth. In fact, there is plenty of evidence suggesting that the poor typically do share from rising aggregate income and do suffer from economic contraction. This finding is robust to the use of a relative concept of poverty where the poor would be a pre-specified proportion of the population –usually the lowest quintile of the population– (Dollar and Kraay (2002), Foster and Szekely (2000)), or an absolute definition of poverty where the poor would be those with income[1] levels below a pre-specified threshold –for example PPP adjusted US$1 per person per day, or a country specific poverty line computed on the basis of the purchase cost of a country specific subsistence package– (Ravallion and Chen (1997)).

Second, progressive distributional changes are good for poverty reduction. While on one hand it is difficult to argue that poverty reduction can be achieved through redistribution policies alongside economic stagnation, let alone economic decline, growth associated with progressive distributional changes will have a greater impact in reducing poverty than growth which leaves the distribution unchanged. For example, Bourguignon (2001) and Son and Kakwani (2003) review the poverty-growth-inequality relationship and note that the impact of growth on poverty is a decreasing function of the degree of inequality. Poverty will therefore be more responsive to growth the more equal the income distribution is. Intuitively, if the poor have a low share in existing income, they will likely have a low share in newly created income.

Third, there is no strong empirical evidence suggesting a general tendency for growth as such to make income distribution more or less equal. For example, Dollar and Kraay (2002) find that, on average, the income of the poorest fifth of society rise proportionally with average incomes. Similarly, Foster and Szekely (2001) also find an average unitary impact elasticity. Previous works that had also suggested that changes in income and changes in inequality were unrelated include Deninger and Squire (1996), Chen and Ravallion (1997) and Easterly (1999). Growth, in consequence, would be good for the poor, or at least as good as for everybody else in society.

From a policy perspective, however, there is another issue that is likely to be more interesting than the existence of empirical regularities between growth, inequality, and poverty, namely what kind of policies should a country pursue in a successful poverty

[1] Strictly speaking many of studies exploiting absolute definitions of poverty are based on per capita expenditure levels and use income levels only as a substitute on data availability grounds.

reduction strategy. Since poverty outcomes will depend on how a given policy affects growth and inequality, assessing how appropriate a particular policy is for a poverty reduction strategy will require knowledge about the links between the policies of interest and growth on the one hand and between those same policies and inequality on the other hand.

On the growth front, the literature is quite rich and there are several empirical models that may offer guidance as to the expected impact that a particular policy may have on long-run growth. On the inequality front, however, our state of knowledge is much more limited. In principle, one might take the result pointing to lack of causality from growth to inequality mentioned above at face value and select policies on the basis of their expected impact on growth. Unfortunately, most pro growth policies might be expected to also have an impact on inequality, and in some cases even conflict with the growth objective. Thus advising on the expected growth impact of the policies alone could therefore lead to unpleasant outcomes (as the anti-globalization movement has been pointing out repeatedly over the last few years). Beyond the anti-globalization claims, Easterly (2001) finds that Bank and Fund structural adjustment tends to reduce the growth elasticity of poverty, a result that would be consistent with a positive relationship between increases in inequality and the implementation of adjustment programs. In fact, Easterly speculates that this may be due to the poor being ill placed to take advantage of the new opportunities created by structural adjustment reforms.

At a more operational level, even the World Bank and the International Monetary Fund have implicitly recognized that many of their supported policies may have a significant impact on income distribution. In this regard, the Bank and the Fund have recently undertaken efforts to increase the use of poverty and social impact analysis techniques for the analysis of the distributional impact of policy reforms supported in their operations.

This paper enters this debate with the main purpose of assessing, from a cross-country perspective, the impact that a series of policies that have received significant attention both in the empirical growth literature and in policy circles (particularly at the World Bank in the context of structural adjustment programs) have on inequality. The paper extends the existing literature along several dimensions. First, rather than proposing a new inequality model, this paper builds on an existing empirical growth model. This approach simplifies enormously the interpretation of the results we obtain since they can be compared against a growth model benchmark. Thus the assessment of whether the impact of a policy change on inequality is large or small can be based on the contemporaneous impact that the very same policy change is likely to produce on growth. In turn, this comparability between the two empirical models allows to combine growth and inequality projections and therefore infer the changes in poverty that would result from progress in a particular policy area.

Second, unlike other empirical studies on inequality and poverty, our estimation results are based on a dynamic model. In addition to take into account the possibility of inequality convergence (Benabou (1996), Ravallion (2002)), the empirical model allows, through the interaction with growth dynamics, to capture potential poverty dynamics. For example, if following the implementation of a pro growth policy that has a negative impact on inequality, there are important mismatches between when growth and inequality effects become apparent, it would be plausible to find that a policy intervention increases poverty in the short run and decreases it in the long run (this would

be the case if the inequality effect is felt immediately whereas the are important lags for the bulk of the growth effect to be noticeable). The issue is of particular interest for policy analysis because of the potential political economy risks associated with reform programs that lead to temporary increases in poverty. Further, since growth models tend to adjust very slowly (empirical estimates of the half-life of convergence found in the literature range from 20 to 40 years) it would be possible that the increases in poverty are temporary, but still long lasting.

Third, our estimation results are based on averages of non-overlapping five year periods rather than on a panel of unequally spaced spells –the typical approach used with most empirical studies on inequality data. While on one hand working with equally spaced averages has the undesired effect of dramatically reducing the sample size, on the other hand the five year average panel avoids an over representation of countries with a large number of surveys. Further, the transformed sample is likely to improve upon the use of single period observations when addressing long-run issues such as changes in inequality.

Fourth, we also take into account the possibility of fixed effects and the implications they have in a dynamic panel framework. Fixed effects can appear if some countries have a tendency to be more equal due to cultural or religious considerations. For example, Barro (2002) presents some evidence that the religious structure of society may influence income distribution.

To anticipate some of the results below, on the one hand we find that improvements in education and infrastructure and lower inflation levels would reduce inequality levels. The case for infrastructure and inflation is quite compelling since the estimates of the coefficients for these variables have always the expected sign and are highly significant from a statistical point of view. Thus these would be policies whose impact on growth and inequality push in the same direction when one has a poverty reduction objective in mind.

On the other hand, we find that financial development, trade openness, and decreases in the size of the government would be associated with increases in inequality. Thus, these would be policies whose impact on growth and inequality present some conflict. To the extent that the positive impact on growth attributed to progress on this front offsets the negative impact on inequality, these pro growth policies would also be pro poor (in the sense that an associated poverty measure of interest falls as a result of the implementation of the policy). When we illustrate the expected impact that progress on these areas may have on (headcount) poverty levels, we find that these policies are likely to be pro poor in the long run (i.e. the growth effect offsets the increase in inequality) but are also likely to lead to higher poverty in the short run.

We also find that financial crises would hit the better off more than the poor and be therefore associated with reduced inequality levels (of little consolation when a crisis negatively affects growth and therefore the reduction in inequality occurs when poverty is increasing) and find no evidence that output volatility, external imbalances, terms of trade shocks, or governance affect inequality.

At a more general level, our empirical model predicts inequality convergence (in line with Benabou (1996) and Ravallion (2002)); finds no solid evidence indicating that growth as such negatively affects inequality (in line with Dollar and Kraay (2002)); and

finds some evidence that inequality, as such, negatively affects growth (in line with Alesina and Rodrik (1994)).

All in all, the findings of this paper suggest that pro growth policies, regardless of their impact on inequality, are likely to be pro poor in the long run. In other words, the positive impact that policies have on growth should be enough to eventually offset the potential negative effects they may have on inequality. However, there is also a need to face the possibility and associated implications that some reform policies are conductive to temporary increases in poverty. This is especially the case given that in this framework "temporary" may span several years. All in all, we take the results of this paper as an indication of the need to encourage growth policies but in a context that: (i) expands the use of poverty and social impact analysis techniques at a country level and beyond the average results inherent to cross country regressions; (ii) takes into account the political economy risks that might be associated to a reform program that could temporarily increase poverty; and (iii) ensures that liberalization programs are complemented by pro poor interventions that minimize the damage caused by the short run deterioration in income distribution.

The rest of the paper is structured as follows. In section II we review some basic growth-inequality-poverty relationships that stress the important inter-relations between growth and inequality for poverty reduction. Sections III to V attempt to explain changes in inequality from a cross country perspective. In Section III we discuss the different policy determinants to be included in the empirical model. Section IV addresses econometric issues paying particular attention to the challenges involved in the estimation of a dynamic panel with country specific effects and reviews the data used in the empirical section. In section V we present the results for the empirical inequality model, and in section VI we link the growth and inequality results to make inference on the likely impact that changes in the policy determinants under consideration may have on poverty. Section VII closes the paper with some conclusions.

II. Growth, inequality and poverty

The degree of poverty in any given country depends upon two factors: the average income level of the country and the extent of income inequality. Formally,

$$P=P(y,L(p)), \qquad (1)$$

where P is a poverty measure (which for simplicity will be assumed to belong to the Foster-Greer-Thorbecke (FGT) (1984) class[2]), y is per capita income and $L(p)$ is the Lorenz curve measuring the relative income distribution. $L(p)$ is the percentage of income enjoyed by the bottom $100\times p$ percent of the population.

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[2] The FGT class of poverty measures is given by $P_\alpha = \int_o^z \left[\frac{z-x}{z}\right]^\alpha f(x)dx$ where α is the parameter of inequality aversion, z is the poverty line, and x is income. For α= 0, the previous expression reduces to the familiar headcount ratio. When α=1 it weights each poor by his/her distance form the poverty line (the poverty gap), and when α=2 the weight given to each poor is proportional to the square of the income shortfall (square poverty gap). Put in other words, higher values of α would give more weight to the extreme poor than to those groups closer to the poverty line z.

Changes in poverty can be decomposed into a growth component that relates changes in y to P, and an inequality component that relates poverty to changes in inequality. In general, increases in average income (growth) will reduce poverty. Thus, denoting by γ the growth elasticity of poverty one could write:

$$\gamma = \frac{\partial P}{\partial y}\frac{y}{P} < 0. \qquad (2)$$

Measuring the effect of inequality on poverty is slightly more complex because inequality can change in infinite manners. Although intuitively progressive distributional change is likely to reduce poverty[3], this result cannot be generalized without additional assumptions. For example, consider the (possibly unlikely) case of a transfer from the extremely rich to the very (but not extreme) rich. This would improve inequality levels but would not affect poverty. To make the problem of the impact of inequality changes on poverty tractable, Kakwani (1993) makes the assumption that the entire Lorenz curve shifts by a constant proportion of the difference between actual share in total income accruing to each income and equal shares. Under this assumption it is possible to express the inequality elasticity of poverty ϕ as the elasticity of poverty with respect to the Gini index G:

$$\phi = \frac{\partial P}{\partial G}\frac{G}{P} > 0. \qquad (3)$$

With these elements in mind, a change in poverty can be expressed as:

$$dP = \partial P/\partial y \; dy + \partial P/\partial G \; dG, \qquad (4)$$

or operating, and using (2) and (3) as

$$\lambda = \gamma + \phi \varphi, \qquad (5)$$

where

$$\lambda = \frac{dP}{dy}\frac{y}{P}, \qquad (6)$$

measures how poverty change with income when inequality is allowed to change, and

$$\varphi = \frac{dG}{dy}\frac{y}{G}, \qquad (7)$$

would measure how inequality changes for a given growth rate.

[3] Strictly speaking for the inequality elasticity of poverty to be positive it is also required that the level of average per capita income is above the poverty line. Otherwise, there is the risk that progressive distributional changes increase poverty.

Equation (5) tell us that the impact of a policy change on poverty will depend on (i) how the policy affects growth; (ii) how growth is translated into poverty reduction (i.e. γ); (iii) how inequality is affected relative to the generated growth (φ); and finally, (iv) how changes in inequality are translated into poverty reduction (ϕ). In principle, γ and ϕ could be considered to be independent of the policy in question and depend on the particular income distribution, the initial level of per capita income y and the initial level of inequality G.[4]

For example, Table 1 presents the theoretical elasticities of headcount poverty to growth and headcount poverty to inequality computed under the assumption that the income distribution can be approximated by a long-normal density function.[5] The elasticities are computed for different Gini coefficients (running from .3 to .6) and different levels of development (expressed in terms of the share of the poverty line to per capita GDP). Table 1 suggests that in a country where the poverty line is about 33 percent of per capita income and the Gini coefficient is .3, the gross growth elasticity would be –3.9 (i.e. growth of one percent of GDP would reduce poverty by almost 4 percent) whereas the inequality elasticity would be 5.2 (a one percent increase in the Gini would increase poverty by 5.2 percent). In contrast, if the same country had had high inequality levels, say a Gini of .6, the growth elasticity of poverty would have been -.8, and the inequality elasticity 2. Thus high initial inequality levels are likely to represent a barrier for poverty reduction since both the impact of growth on poverty and the impact of progressive distributional change on poverty will be much smaller than in countries with a better income distribution.

However, unlike γ and ϕ, φ will be policy dependent since in principle different policies will not only affect growth differently but also for a given growth rate will affect inequality levels in a complete different fashion. In turn, this will require estimates of how the policy in question affects growth and how affects inequality.

III. Growth determinants and inequality

The previous section has reviewed the role that inequality levels play for poverty reduction. It has also highlighted that inference on how a particular policy will affect poverty requires knowledge about the impact of the policy on both growth and inequality. On the growth front, the literature is quite rich and there are several empirical models that may offer guidance as to the expected impact that a particular policy may have on long-run growth. On the inequality front, however, not only the literature is less rich but also in most of the cases it is based on empirical models that are difficult to relate to a growth model and therefore of limited use for the analysis of poverty. This section explores an empirical model of inequality that is fully comparable to a growth model.

We follow in this regard recent work by Loayza, Fajnzylber and Calderon (2002) who propose an empirical growth model that focuses on policies that have received the most attention in academic and policy circles, and specially at the World Bank in the context of structural adjustment operations. The variables in that model try capture the main

[4] See Son and Kakwany (2003) for an excellent review of the relationship between inequality, average income and the elasticities of poverty.

[5] If the distribution of income y is log-normal, then $log(y) \sim N(\mu, \sigma)$, with $G = 2\,\Phi(\sigma/\sqrt{2}) - 1$ where $\Phi(.)$ denotes the cumulative normal distribution (Aitchinson and Brown (1966)).

elements of structural and stabilization reforms, together with standard growth regressors such as transitional convergence, and external conditions.

Briefly, this empirical growth model is based on the estimation of a regression of the form:

$$y_{it} - y_{it-1} = \delta y_{it-1} + \omega' X_{it} + \nu_i + \tau_t + \upsilon_{it}, \quad (8)$$

where y is the log per capita income, X represents the set of explanatory variables other than the lagged measure of income, ν is an unobserved country specific effect, τ is a time specific effect and υ is the error term. The subscripts i and t represent country and time period. In this paper, instead, we estimate the following variation:

$$G_{it} - G_{it-1} = \alpha G_{it-1} + \beta' X_{it} + \mu_i + \eta_t + \varepsilon_{it}, \quad (9)$$

where G is the log of the Gini coefficient for country i and period t and μ, η and ε are the equivalent of ν, τ, and υ in (8). Beyond the interest on the impact that the coefficients of the different policies may have on growth and inequality, (8) and (9) can be employed to obtain estimates of φ in (7) that would be associated to a change in policy j of X. It must be noted, however, that the presence of dynamics allow to differentiate between the instant impact that a change in a given policy has on both income and inequality and the long-run impact that results from the dynamic feedback. For example, changes to policy j will lead in the short run to

$$\varphi_j = \frac{\beta_j}{\omega_j}, \quad (10)$$

whereas in the long run they will lead to:[6]

$$\varphi_{jLR} = \frac{\delta\beta_j}{\alpha\omega_j}. \quad (11)$$

Clearly, if the dynamics in equations (8) and (9) are similar (i.e. if δ is similar to α) then (11) reduces to (10). But if one of the variables adjusts much faster than the other then one should expect to also find dynamics in poverty.

Moving now to consider the growth and inequality determinants in X, we divide them into five general groups: transitional convergence, cyclical reversion, structural policies and institutions, stabilization policies, and external conditions. Transitional convergence would introduce dynamics in the models and would imply that the initial position of the dependent variable matters for its subsequent evolution. Cyclical reversion is specially important in a growth context to filter out business cycles effects (specially with the data frequency we use), but also in the inequality model if the position in the business cycle has a significant effect on wages. As for the rest of the policies under consideration:

[6] This assumes that $\delta \neq 0$ and $\alpha \neq 0$. If the parameter controlling the dynamics is zero, all the adjustment would take immediately.

Human capital

Human capital has a crucial and positive role in long-run growth that goes beyond its direct role as a factor of production. Education and human capital may also be considered a complement to other production factors, determine the rate of technological innovation, and facilitate technological absorption. On the other hand, expansions in education are usually regarded as one of the most significant tools in reducing inequality. Not only more educated workers do earn more than less educated ones but also the chances of less educated people to benefit from newly created opportunities seem reduced. What does the empirical evidence say in this regard? Recent work by Datt and Ravallion (2002) using 20 household surveys for India's 15 major states identifies poor basic education, among other factors, as an impediment to the ability of the poor to participate in opportunities for economic growth.

In the empirical model below we measure the policies directed to increase education and human capital in general with the rate of gross secondary enrollment. This flow measure captures more closely current policies on schooling and human capital investment than stock measures related with educational attainment of the adult population.

Financial development

There is ample evidence that financial development and well functioning financial systems promote long-run growth. On the other hand, capital markets improvements may be associated with increases in inequality because the better off may be able to exploit more effectively the new opportunities, including the adoption of capital intensive technologies that may be complementary with highly skilled labor but substitute for less skilled labor. For example, using household data over more than two decades for seventeen Latin American countries, Behrman, Birdsall and Szekely (2001) estimate that the financial sector liberalization reforms that took place during the 1990s negatively affected income distribution. Within a cross country framework, Dollar and Kraay (2002) also find that financial development negatively affects inequality.

The measure of financial depth we use in this exercise is the ratio of private domestic credit supplied by private financial institutions to GDP. The use of this variable is justified not only on it own merit (the incentives to perform efficiently are clearer and stronger for private agents) but also on the significant correlation it exhibits with other variables such as M2/GDP, or the market capitalization to GDP.

Government burden

Despite the significant role that Government's can play in the provision of public goods and services, governments may also be a drain for private activity. This is likely to be the case if it imposes high taxes, assumes roles most appropriate for the private sector, and maintain ineffective public programs and a bloated bureaucracy. Thus in principle, a larger government is likely to harm growth prospects. However, the impact of the size of the government on inequality is less clear. On the one hand, if the government is a burden for the economy is likely to be more because of predation than because of benevolence. And if there is a predatory government, it may be for a desire to direct rents to specific groups (not the poor). On the other hand, in a retrenchment of the public sector, programs that benefit the poor (the benevolent face of the government) might be

cut. Also, if public employment plays a safety net role (by over-staffing public units beyond needs to, maybe, gain the support of particular groups) then retrenchment may lead to increasing inequalities. Further, there is some evidence indicating that governments tend to pay premium salaries on unskilled workers (i.e. they are paid above market rates) at the expense of higher grade employer's salaries (which would be paid below market rates). Clearly this policy is not likely to lead to efficiency gains by any standard, but admittedly has an income distribution component.

The measure that is used here for comparing the government burden across countries is the ratio of government consumption to GDP.

Infrastructure

The importance of infrastructure to explain growth performance has been long acknowledged in the growth literature. Infrastructure can directly enter the production function, and improve total factor productivity. Lack of adequate infrastructure on the other hand, is usually seen as a bottleneck that can harm prospects for investment and therefore, growth. As for the impact of infrastructure on income distribution if infrastructure investment is directed to areas that have the greatest potential because of an already proven dynamism, then infrastructure could negatively affect inequality. If instead, it is used as a policy instrument to improve the possibilities of poor areas, and these areas manage to exploit the new possibilities, then infrastructure will reduce inequality. Productive public investment can also potentially alleviate inequality even if expenditures are uniformly distributed. This would be the case if the poorest groups of society face a credit constraint that prevents them from acquiring private substitutes for infrastructure, whereas the richest class is able to complement the free public provision of this services (see Ferreira (1995)).

The variable used in this exercise to capture infrastructure provision is telecommunications capacity. Although this choice is in part motivated by data availability considerations, it must also be noted that the correlation between telecommunications and electricity generated and paved roads (two other likely candidates) is .8 and .7 respectively. The correlation between telecommunications and the first principal component of the three variables is .9.

Governance/institutions

Good governance has increasingly been recognized as a crucial pre requisite for economic growth given its critical link with the investment climate, and in principle one would also expect that a responsive, non corrupted, and efficient government has a positive impact on inequality. Good governance can also be expected to be positive for income distribution, to the extent that rent seeking by privileged groups is avoided and government bureaucracies concentrate on enhancing the possibilities of the poor..

To capture the level of governance of the different countries, we use the first principal component of four indicators reported by the International Country Risk Guide. They are prevalence of law and order, quality of bureaucracy, absence of corruption, and accountability of public officials.

International trade openness

Most the empirical growth literature indicates that the relationship between economic growth and international openness is indeed positive and that it reflects a virtuous cycle by which higher openness leads to faster growth and this in turn generates larger trade. However, this is an area where the final outcome on inequality is difficult to anticipate due to countervailing forces. Trade liberalization tends to reduce wage differentials if product market changes shift production towards a country comparative advantage, which in most development countries would seem to benefit less skilled workers. However, if the pre-liberalization regime was characterized by protection for unskilled labor, trade liberalization is likely to have a negative impact on poverty levels. Further, sharp reduction of import tariffs and quotas may undermine the industrial capacity of countries much faster than it creates incentives to shift production towards new export sectors. The empirical evidence on this front is also divided. Dollar and Kraay (2002) find that trade openness affects positively income distribution. A similar result is obtained by Behrman, Birdsall and Szekely (2001) for a set of Latin American countries. However, Sanchez and Schady (2003) find the opposite result in six Latin American countries, where trade volumes would negatively affect inequality. Spillimbergo et al (1999) also find that trade openness would be associated with higher inequality.

The typical measure of international openness used in the literature is the volume of trade (exports plus imports) over GDP. However, this measure does not take into account structural characteristics. For example, small countries are more dependent on international trade; oil exporters can have quite large volumes of overall trade but impose significant restrictions in non-oil trade; and landlocked countries tend to face larger transport and trading costs and hence to trade less than other countries. To avoid attributing to trade policy what is merely the result of country characteristics, we use a volume of trade that is adjusted by country size (area and population), whether the country is landlocked, and whether it is oil exporter.

Macroeconomic Stabilization Policies

The importance of stabilization policies for growth goes beyond their impact at the business cycles frequencies. In fact, there is now plenty of evidence suggesting that macroeconomic stabilization and crisis-related variables have an impact on growth over short an long horizons. Fiscal, monetary and financial policies that contribute to a stable macroeconomic environment and avoid financial and balance of payments crisis are important for long-run growth. Further, macroeconomic stability is also likely to benefit the poor. For example, using a panel for 38 countries Easterly and Fisher (2001) find that high inflation tends to worsen inequality and increase poverty. Likewise, Romer and Romer (1998), and Behrman, Birdsall and Szekely (2001) also find that high inflation and macroeconomic instability are associated negatively to the incomes of the poor. In principle this can be explained because macroeconomic shocks tend to hit poorer families that cannot hedge risks more than proportionally, but this may depend on the nature of the shock. In this regard, the Asian financial crisis that started in 1997 seems to have affected more young adult urban workers working in relatively well paid construction and financial sectors than the allegedly most vulnerable groups (Behrman, Deolalikar and Tinakron, (2000 and 2001). Similarly, Sanchez and Schady (2003) also find in a sample of six Latin American countries that inequality tends to fall following financial crises.

Here we consider indicators that capture the quality of fiscal and monetary policies as well as external imbalances and financial crisis. Specifically we consider four variables in this area. The first is the lack of price stability as measured by the inflation rate. The inflation rate tends to be a good summary measure of the quality of fiscal and monetary policies and is positively correlated with other indicators of poor macroeconomic policies such as fiscal deficits and the black market premium on foreign exchange. The second aspect is the cyclical volatility of GDP and would reflect the lack of output stability that could be due by, among other things, the impact of armed conflicts. This is measured by the standard deviation of the output gap for the respective period. The third is an index of real exchange overvaluation. Real exchange overvaluation would capture distortions in the allocation of resources between the tradable and the non tradable sectors. Exchange rate misalignment can therefore be associated with internal and external disequilibria, whose correction can result in the collapse of the economy. The last variable we consider in the macroeconomic stabilization group is the occurrence of financial crisis, proxied by the number of years that a country undergoes a banking crisis in the period under analysis. Banking crisis can be related to a financial liberalization undertaken without adequate strengthening of supervisory agencies, or to a shift in fiscal or monetary policies that significantly change the risk of the portfolio of the country financial institutions.

External conditions

The economic activity and growth of a country does not only depend on internal factors but also on external conditions. In this regard, there is ample evidence of transmission of cycles across countries via international trade, external financial flows, and investors' perceptions about the expected profitability of the global economy. The impact on inequality of the external conditions is less clear and likely to depend on the impact that trade has on inequality, something that as noted above is an open question.

In the empirical model, we consider two variables to capture external conditions. They are the terms of trade shocks affecting each country individually and a period-specific shift affecting all countries in the sample. Terms of trade shocks capture changes in both the international demand for a country's exports and the cost of production and consumption inputs. The period-specific shifts (or time "dummy" variables) summarize the prevalent global conditions at a given period of time and reflect worldwide recessions and booms.

IV. Estimation and data issues.

Estimation of (9) above poses several challenges including the presence of country specific effects and the possible endogeneity of some of the explanatory variables with inequality. Arellano and Bond (1991) propose differencing equation (9) to eliminate the country specific effects. After accounting for time specific effects (with the inclusion of period specific dummies) equation (9) can be rewritten as:

$$(G_{it} - G_{it-1}) - (G_{it-1} - G_{it-2}) = \alpha(G_{it-1} - G_{it-2}) + \beta'(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (11)$$

or

$$(G_{it} - G_{it-1}) = (1+\alpha)(G_{it-1} - G_{it-2}) + \beta'(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}). \quad (12)$$

This differencing, however, introduces a new bias since the error term (ε_{it} -ε_{it-1}) is correlated with the lagged dependent variable (G_{it-1} -G_{it-2}). Under the assumptions that the error term ε is not serially correlated Arellano and Bond (1991) propose a two-step generalized methods of moments (GMM) estimator using as moment conditions:

$$E[G_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \quad \text{for s} \geq 2 \quad (13)$$

and if the explanatory variables X are predetermined but not strictly exogenous:

$$E[X_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \quad \text{for s} \geq 2. \quad (14)$$

In the first step, the error terms are assumed to be independent and homoskedastic across countries and time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the covariance matrix, and thus relaxing the assumptions of independence and homoskedasticity. Using the moment conditions in (13) and (14) and denoting θ=[α β']', the GMM estimator of θ and corresponding covariance matrix Σ_θ are given by:

$$\hat{\theta} = (\overline{X}'Z\hat{\Omega}^{-1}Z'\overline{X})^{-1}\overline{X}'Z\hat{\Omega}^{-1}Z'G \quad (15)$$

$$\hat{\Sigma}_\theta = (\overline{X}'Z\hat{\Omega}^{-1}Z'\overline{X})^{-1} \quad (16)$$

where $\overline{X}$ =[G_{it-1} X], Z is the matrix of instruments, and $\hat{\Omega}$ is the a consistent estimate of the covariance matrix of the moment conditions constructed with the residuals of the first step regression.

The consistency of the GMM estimator above depends on the validity of the assumption that the error terms do not exhibit serial correlation as well as on the validity of the instruments. We present two specification test to address these issues. The first is Sargan test of overidentifying restrictions. The second test examines whether the error term ε is not serially correlated, which in turn would imply that the difference error in (11) does not present second order serial correlation.

As for the data, we rely on two main sources. Inequality data comes from Dollar and Kraay's Database on inequality. This database expands the inequality data used in their (2002) paper and contains 953 observations of the Gini coefficient for 137 countries. We acknowledge that the Gini coefficient is less than perfect and that other measures, such as the share of income of the lowest quintile, may be more appropriate. Data availability, however, dictates the choice.[7] As for the growth determinants they come from Loayza, Fajnzylber, and Calderon (2002).

Our regressions are conducted using non overlapping averages of five-year period spanning the years 1960-2000. After converting the inequality data to five year averages,

[7] Using for example the growth rate in the income of the lowest quintile of the population would leave us with only one third of the observations we manage to use for the Gini regressions.

the sample is reduced to 298 observation for 91 countries for which we have at least 2 consecutive Ginis. If we also eliminate countries with less than 3 observations (note that as implied by (13) and (14) we need a minimum of three observations per cross section unit to run the GMM estimator outlined above), the sample is further reduced to 200 inequality observations for 65 countries.

The original sample of growth determinants is higher and includes data for 78 countries and the total number of observations is 350. When both databases are merged, the number of observations available for estimation purposes is however reduced to 133 cases and 44 countries. Working with five year averages reduces the problems associated with the original panel where 24 counties would account for more than half of the 953 observations. Further, the use of at least three observations for each country (i.e. 15 years) gives a long-run perspective to the problem that is lost with the original panel where more than 30 countries have only one observation.

Admittedly, using averages also brings some complications. For example, the sample size is notoriously reduced from the original inequality database and the five year averages are computed on an unequal number of observations (in several cases only one). The reduction in the number of observations is particularly important when one considers the estimator proposed above since we are working with a large number of variables and a small cross section dimension (41 countries in some cases). For example, if we were to consider the explanatory variables as predetermined, even limiting the maximum number of lagged levels to be used as instruments to 2, we would still end up with 170 instruments in some of our specifications. Not only the problem becomes then too large to estimate but also the excessive number of overidentifying restrictions relative to the sample would dramatically affect the performance of the GMM estimator. Against this background the results presented below only treat as predetermined the lagged dependent. Since the model is still overidentified we can test the validity of the hypothesis that the proposed instrument set is uncorrelated with the error term using Sargan test for overidentidying restrictions.

It must be noted in this regard that the employed specification tests generally support the econometric models. That is, Sargan and second order correlation tests cannot reject the hypothesis that the models are well specified and that our instrument set is valid.[8]

Table 2 presents some descriptive statistics for the data. The Gini coefficient, would have a mean value of .37 and show considerable dispersion (the 2 standard deviation confidence interval would range from about .19 to .55). The maximum Gini in our sample is .63 (Gabon) and the minimum is .16 (Luxemburg). There is also some evidence of a skewed distribution with a long and thin upper tail (reveling the presence of few very unequal countries in the sample). Regarding changes in the (log) Gini, the average annual change between two five year average periods would be .1 percent, indicating that on average inequality changes little over time. However, there is considerable dispersion: the 2 standard deviation interval would range from about –2.7 percent to 2.7 percent. The changes in the Gini also present a skewed distribution but in this case is towards the lower tail. As for the income data, the average per capita GDP in the sample is about US$6,000, with a maximum of US$18,500 and a minimum of US$336. Average annual growth rates between two five year periods would be about 2 percent, but dispersion is

[8] The only exception to this rule is the regression of growth on the initial value of income.

also high (the 2 standard deviation confidence interval would range from about –2 percent to 6 percent). The variables that aim at representing the various aspects of economic development tend to be skewed towards the lower tail, something that would reveal the presence of a few very underdeveloped countries in the sample. The inflation rate also presents a skewed distribution but in this case is likely to reflect a few instances of extreme macroeconomic mismanagement.

V. Empirical results

Tables 3 and 4 present the results obtained when the changes in the (log) Gini are regressed on the (log) Gini's initial value, and on the (log) Gini's initial value and growth. The results in table 3 are based on a pooled OLS estimator, whereas table 4 reports results for the GMM estimator that takes into account the possibility of fixed effects. Inspection of these tables suggests significant differences between the two estimators. For example, although in both cases we find evidence of inequality convergence, the estimated speeds are very different. The corresponding half-life of the pooled estimator is about 21 years, whereas the GMM estimator would suggest a much faster speed of adjustment (about 2.5 years to halve an initial disequilibrium). These results are consistent with the findings of Benabou (1996) and Ravallion (2002)[9] who also find inequality convergence. Further, their estimated coefficients of the speed of convergence are of a similar order of magnitude to those in table 3. Two possible interpretations behind inequality convergence given by Ravallion are related to (i) the implications of the neoclassical growth model (which in addition to predicting income convergence across countries would also predict inequality convergence), or more pragmatically to (ii) the widespread convergence of economic policy during the 1990s. This second argument is likely to weight less, however, when we take into account that we also find inequality convergence when we control for policy changes, and therefore for policy convergence.

The difference between the pooled and the GMM estimator are even more contrasting when one includes growth in the basic inequality convergence specification: whereas the pooled estimator suggest that growth, as such, reduces inequality, the GMM estimator suggests that growth, as such, does not cause inequality to change in either direction. Our findings in this regard would be fully consistent with those of Dollar and Kraay (2002).

Tables 3 and 4 also present the results that are obtained when one regresses per capita growth on initial income and on initial income and inequality and again there are some important differences. The pooled estimator would reject in both cases the hypothesis of convergence in average incomes whereas the GMM estimator would suggest convergence. As for the impact of inequality on growth, we find that higher inequality levels, as such, would cause growth to slowdown. Both pooled and GMM point estimates are negative, although the former is not significant. According to the GMM estimator, a five percent increase in the Gini would be associated with a decrease in per capita growth by about .1 percent. This finding would be more in line with Alesina and Rodrik (1994), Barro (2000), and Easterly (2001) who find that evidence that inequality negatively

[9] Ravallion uses a different estimation technique. Rather than relying on the relation between initial Gini and the subsequent change in the index, Ravallion (2002) measures the speed of convergence by comparing estimated trends in inequality with predicted initial levels of inequality.

affects growth than with Forbes (2000) who finds a positive relationship between inequality and growth.

Table 5 reports in its first and second columns the results of two growth regressions that can be used as benchmarks for the inequality results. The first column reports the results obtained by Loayza et al. (2002) for their growth model. The second column augments that model with inequality. Two basic messages emerge from these models. First, inequality continues to be significant: more inequality would lead to lower growth. Second, the point estimates of the coefficients of the different policies are very similar to those obtained by Loayza et al. This, despite the second model being based in a much smaller number of observations (about half), and countries (about two-thirds).[10]

As for the empirical models for inequality, table 5 presents estimates for three models. They differ in that they may include, in addition to initial inequality and the policies of interest, initial per capita income, and initial per capita income and the initial output gap. Overall including the initial level of GDP and the position of the economy in the business cycle would not significantly affect the estimates of the coefficients of policy variables. Interestingly, however, the point estimates of the initial GDP level and the initial position in the business cycle have different signs. Contrary to what one would expect from a Kuznets type of relationship, the initial level of GDP would carry a negative sign implying that richer countries would be more equal than poorer countries. However, the relative position of the economy in the business cycle would have the opposite impact; economies that are in a recession at the start of the period would be expected to improve the Gini during the period in question, and economies that are in the high part of the cycle would be expected to suffer a deterioration of the Gini. This would be the case if wages are relatively high when the business cycle is at its peak and therefore expected to fall over the following years.

The results for education are mixed. On the one hand, with the exception of one regression for the logged Gini, the sign is always the one would expect from our discussion above. On the other, the estimated coefficient of education does not come close to being statistically significant. This result is maintained when the regression is done with primary education enrollment rather than secondary education enrollment as the proxy for human capital. However, if instead of using the log of the Gini coefficient we alternatively consider changes in the log of one minus the Gini, or changes in the Gini coefficient we would find that education does affect inequality (table 6). Table 6 also presents the results of a regression for log Gini when education is treated as a pre determined variable, something that in principle should address concerns with possible simultaneity bias. Also in this case more education would diminish income inequality. We take this as (at least weak) evidence that education may belong to the specification and that more education will likely reduce inequality.

The estimated coefficient for financial development is always significant and suggests that progress on this front would be associated with increases in inequality. As noted above, this could be due to: (i) the more educated (and likely richer) being able to exploit the new opportunities better; (ii) adoption of capital intensive technologies that substitute for unskilled labor, or both. Thus to some extent, our results would support the findings or Behrman, Birdsall and Szekely (2001) and Dollar and Kraay (2002). As for the

[10] Loayza et al. (2002) results, however, are more efficient.

magnitude of the parameter, it would be similar to the one obtained from the growth regression but clearly, the forces would work in opposite directions.

Contrary to financial development, where most of the available empirical results already suggest that more financial development implies more inequality, the available results for trade openness point towards less than unanimous conclusions. Our results would suggest in this regard that more trade openness is conductive to more inequality echoing the findings of Sanchez and Schady (2003) and Spillimbergo et al (1999). Further, not only the estimated coefficient is always significant, but also of a sizeable magnitude. In particular, larger than the coefficient found in the growth regression.

As with trade openness and financial development, cutting the size of the government is also likely to lead to faster growth, but to increases in inequality. The estimated coefficient for this variable is always statistically significant even at the 1 percent level. Thus, there is at least some evidence that governments may be inefficient (i.e. more government means less growth) but maybe with a benevolent face (i.e. more government increases equality).

Public infrastructure is an area that would belong to the win-win type of policies (i.e. policies that both increase growth and reduce inequality). That is, not only society would be better off as a whole but also the poor would benefit more than proportionally. The estimated coefficient has always the right sign and is significant.

The result for the governance variable is one of the surprises and maybe the only disappointment of the empirical model. Although we want to stress that the coefficient is never significant, judging from point estimates we would find that more governance would lead to more unequal societies[11]. This could imply that the effects of governance on inequality work through government policies, and hence once we account for most of this policies, the level of governance would become statistically insignificant. For example, Rodrick, Subramanian, and Trebbi (2002) argue that when one thinks of institutions as a stock variable capturing the cumulative outcome of past policy actions, then it would not be appropriate to consider both policies and institutions in the same regression model.

As for macroeconomic stability, the estimated coefficient of inflation would indicate that inflation is a penalty for the poor and that countries with lower inflation would have a tendency to be more equal. Given that low inflation is also positively associated with faster growth, polices aimed at reducing inflation would also belong to the win-win category. This result would, therefore, be in line with the findings of Easterly and Fisher (2001), Romer and Romer (1998) and Beherman, Birdsall and Szekely (2001). Regarding financial crises, our results would suggest that in turbulent times (at least in those where the turbulence is created by a financial crisis) inequality would fall. As noted above, Sanchez and Schady (2003) find a similar result for a sample of six Latin American countries and explain it by noting that the important downturns in the demand for tertiary educated workers are highly correlated with economic downturns. Clearly, one has to also note that since overall per capita income is also falling this is likely to be

[11] Treating the governance index as a predetermined variable, something that would take into account potential simultaneity bias, would not affect the result.

of little consolation for the poor who in effect will be worse off regardless of the changes in inequality.

Finally, the volatility of the business cycle would also be negatively related to inequality (sharper economic fluctuations would be associated with higher inequality); however, the estimated coefficient is not significant. As for exchange rate management policies (i.e. the degree of overvaluation), the coefficient would be insignificant. The point estimate, however, suggests that devaluations would increase inequality. A possible reason for this finding is that a devaluation is in practice equivalent to a reduction of the wage level; if the owners of capital are protected against the devaluation, then we would find this effect. Finally, regarding the evolution of the terms of trade, we do not find them to be significant. Thus good luck in the form of favorable terms of trade would not affect inequality.

VI. Poverty impact of policies.

The previous section has reviewed the main results that are obtained when one relates inequality to a broad set of policy variables. Overall the inequality model would suggest that there are some win-win policies (infrastructure, macroeconomic stability and to some extent education) that could be associated with growth and progressive distributional change. That is, the poor would benefit from growth more than proportionally. However, we have also found policies that present trade offs in the sense that they push inequality and growth in different directions. Among these policies, one could mention cuts to the size of the government, financial development, and trade openness.

From a policy perspective, however, the weight given to the impact that a policy has on inequality is likely to be relative. For example, consider the unrealistic but illustrative case of two policy alternatives: policy 1 increases average incomes by 1 percent and, to simplify as much as possible, the incomes of the poor by 2 percent. This policy would result in both lower inequality and lower poverty. Policy 2, however, increases average incomes by 5 percent and the income of the poor by 4 percent. This policy would also result in lower poverty but with higher inequality (the rich are doing better than the poor after all). The question is, however, whether the poor would be better off with the first policy (where their incomes increase 2 percent) or with the second (where their incomes increase 4 percent). If lower inequality is a policy objective per se, then the first policy may be preferred. If however, poverty reduction is the main policy objective then one should pick the second policy.

In more realistic cases, with complex growth-inequality interactions, the poverty impact of a policy is likely to be less straightforward than in the example of the previous paragraph, but one can still resort to the identity linking poverty to income and inequality as discussed in section II above[12]. Furthermore, the reviewed set up allows to discriminate between the short and long run poverty impact of policies, something that is particularly appropriate in this context given that the estimated parameter of the lagged dependent variable in the inequality regressions is about 10 times the corresponding estimate for the income regression model (that is, given the different speeds in

[12] Admittedly, it is possible to find examples where (5) proves too general. For example, Ferreira and Leite (2003) present evidence for Brazil suggesting that the observed reductions in inequality during the 1990s were not beneficial to the bottom of the distribution.

convergence). The presence of dynamics may eventually imply that policies that are pro poor in the long run (in the sense that poverty falls as a result of their implementation) are not so pro poor in the short run.

Tables 7 and 8 present the net growth elasticities associated to those policies presenting growth-inequality conflicts (government size, financial development, and trade openness) and also for three policies that do not present any such a conflict (education, infrastructure and inflation). Table 7 focuses on the short run whereas table 8 is more focused on the long run. In order to deal with the country specificity of the gross elasticity of poverty to growth and the elasticity of inequality to growth, we assume that income follows a log-normal distribution and present results for different Ginis and poverty lines (as a share of per capita income).

Inspection of Table 7 would suggest that in the short run, the net elasticity of poverty of the three policies that have growth and distributional change pushing in the same direction (i.e. education, infrastructure and lower inflation) is always negative. Put in other words, progress on those fronts would lead to lower poverty. It is worth noting that the different elasticities vary significantly depending on the initial conditions as given by levels of development and inequality something that would suggest that initial conditions matter in this context. In the cases where growth and progressive distributional change tend to move in different directions, the sign of the elasticity depends on the country initial conditions; in some cases (usually in poorer and more equal countries), the growth effect tends to offset the negative impact on inequality. However, in highly unequal countries (Gini of .6), progress with these policies would tend to increase poverty.

In the long run (table 8). however, all the pro growth policies would lead to reductions in poverty. This is regardless of the impact that these policies may have on inequality. Put in other words, in the long run, a pro growth strategy will benefit the poor. Admittedly, it could be argued that, regardless of their long run effect, the fact that some policies may temporarily increase poverty would be enough to exclude them from a poverty reduction strategy. In this regard, there is a need for a couple of clarifications. First, there is some evidence (Gallego and Loayza (2002)) that economic development is likely to follow a multiplicative model where what matters is not only the "quantity" of an implemented policy but also the overall policy mix. In this regard, it seems difficult to assume that a poverty reduction strategy can be uniquely based on policies such as education or infrastructure without addressing bottlenecks in other areas such as the financial sector, or external trade distortions. This would suggest that focusing on a few areas is likely to lead to disappointing results. Second, equation 5 above allows to measure the impact of a policy change on poverty everything else equal. However, assuming that everything else is equal when there is growth seems a bit unrealistic. Faster growth and therefore, higher per capita income levels, will in turn allow the implementation of education, or infrastructure policies that would feed back into the growth process and also reduce inequality. Further, it is unlikely that investments in priority sectors could be significantly stepped up in absence of additional growth that generates the required resources.

But having said that, we do not want either to minimize the potential negative impact that some policies, even if temporarily, can have on poverty, especially when "temporary" in this context may refer several years. In fact, we take the results of this paper as an indication of the need to support pro growth policies and in parallel to: (i) expand the use of poverty and social impact analysis techniques in the context of reform programs and at

the specific country level (i.e. beyond the average results that are obtained in a cross country regression); (ii) take into account the political economy risks that might be associated to a reform program that could temporarily increase poverty if there is a dynamic mismatch between reforms that increase poverty and those that reduce it (in the sense that the pain arrives well before the cure); and (iii) ensure that liberalization programs are complemented by pro poor interventions that minimize the damage caused by the deterioration in income distribution.

VII. Conclusions

This paper has reviewed the impact on income inequality of a set of variables usually considered in the growth literature as potential growth determinants. Our paper differs from others in that it (i) uses standard growth determinants as inequality determinants, something that in turn allows us to assess the impact of pro growth policies on poverty (through the projected interaction of growth and inequality); (ii) allows for the possibility of income and inequality dynamics which in turn allows for poverty dynamics aimed at capturing the potential different impact that policies have on short and long run poverty; (iii) relies on a large database of non-overlapping five year averages that mitigates to some extent the problems encountered when the distribution of surveys across countries is very unequal (countries with 40 surveys against others with just 1 or 2); and (iv) allows for fixed effects in a dynamic panel framework.

The results presented in the paper suggest that there would be inequality convergence; that growth, as such, would not affect inequality; and that inequality, as such, may negatively affect growth. On the policy front, we find that improvements in education and infrastructure and lower inflation levels would lead to both growth and progressive distributional change. Financial development, trade openness, and cuts to the size of the government, all policies that would lead to faster growth, would be associated with increases in inequality. We also find that financial crises would be associated with reductions in inequality.

On the interaction between growth and inequality, the paper argues that in the short run, the positive impact on growth of the identified win-lose policies would not be enough to offset the negative impact they have on inequality and therefore, in absence of pro poor policies that accompany those reforms or additional feedback effects from growth (such as improvements in education or infrastructure) poverty could actually increase. In the long run, however, we find that the growth impact of these policies would offset the negative impact on distribution, and therefore poverty would fall as a result of the implementation of pro growth policies. These findings would justify the adoption of: (i) a pro growth policy package at the center of any poverty reduction strategy, and (ii) pro poor measures that complement such a package and avoid to the extent that it is possible potential short run increases in poverty.

References

Aitchinson, J. and J. Brown (1966). "The Log-Normal Distribution", Cambridge, Cambridge University Press.

Alesina, A. and D. Rodrik (1994). "Distributive Policies and Economic Growth". *Quarterly Journal of Economics*. 109: 465-90.

Arellano, M. and S. Bond (1991). "Some Tests of Specification for Panel Data: Monet Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies* 58, 277-97

Benabou, R. (1996). "Inequality and Gowth", in B. Bernake and J. Rotemberg fd, NBER Macroeconomics Annual, Cambridge, MIT Press 11-74

Barro, R. (2000). "Inequality and Growth in a Panel of Countries". *Journal of Economic Growth*, 5, 5-32.

Barro, R. (2002). "Quantity and Quality of Economic Growth", in N. Loayza and R. Soto eds. *Economic Growth: Sources, Trends and Cycles.* Central Bank of Chile.

Behrman, J., N. Birdsall, and M. Szekely (2001). "Economic Reform and Wage Differentials in Latin America ". Inter American Development Bank, mimeo.

Behrman, J., A. Deolalikar and P. Tinakron (2000). "The Effects of the Thai Economic Crisis and of Thai Labor Market policies on Labor Market Outcomes". Thailand Development Research Institute, Mimeo.

Behrman, J., A. Deolalikar and P. Tinakron (2001). "What Really Happens to Wage Rates During the Financial Crisis?". University of Pennsylvania, Mimeo.

Bourgignon, F. (2001). "The Growth Elasticity of Poverty Reduction; Explaining Heterogeneity Across Countries and Time Periods", Delta, Mimeo.

Chen, S. and M. Ravallion (2000). "How Did the World's Poorest Fare in the 1990s?" Policy Research Working Paper # 2409, The World Bank.

Datt, G. and M. Ravallion (2002). "Why has Economic Growth be More Pro Poor in Some States of India than Others?" *Journal of Development Economics*, 68, 381-400.

Deninger, K. and L. Squire (1996). "A New Data Set Measuring Income Inequality". The World Bank Economic Review, 10, 565-591.

Dollar, D and A. Kraay (2002). "Growth is Good for the Poor", *Journal of Economic Growth*, 7, 195-225

Easterly, W. (1999). "Life during Growth", *Journal of Economic Growth*, 4, 239-276.

Easterly, W. (2001). "The Middle-Class Consensus and Economic Development", *Journal of Economic Growth*, 4, 317-335.

Easterly, W. (2001). “The effect of IMF and World Bank Programs on Poverty”, WIDER Discussion Paper # 2001/102

Easterly, W. and S. Fisher (2001). “Inflation and the Poor”, *Journal of Money, Credit and Banking* , 33, 160-178.

Ferreira, F. (1995). "Roads to equality: Wealth Distribution Dynamics with Public-Private Capital Complementarity", LSE Discussion Paper TE/95/286

Ferreira, F. and P. Leite (2003). "Policy Options for Meeting the Millennium Development Goals in Brazil", Policy Research Working Paper # 2975, The World Bank.

Forbes, K. (2000). "A Reassessment of the Relationship between Inequality and Growth", *American Economic Review*, 90: 869-97.

Foster, J., J. Greer, and E. Thorbecke (1984). “A Class of Decomposable Poverty Measures”, Econometrica, 52, 761-766.

Foster, J. and M. Szekely (2000). “How Good is Growth”, *Asian Development Review*, 18, 59-73

Gallego, F. and N. Loayza (2002), “The Golden Period fro Growth in Chile: Explanations and Forecasts”, in Norman Loayza and Raimundo Soto eds. *Economic Growth: Sources, Trends and Cycles.* Central Bank of Chile.

Kakwany, N. (1993). “Statsitical Inference in the Measurement of Poverty”, *Review of Economic and Statistics*, 75, 632-639.

Loayza, N. P. Fajnzylber and C. Calderon (2002). “Economic Growth in Latin America and the Caribbena: Stylized Facts, Explanations and Forecasts, The World Bank Mimeo.

Ravallion, M. (1997). “Good and Bad Growth: The Human Development Reports”, *World Development*, 25, 631-638.

Ravallion, M. (2002). “Inequality Convergence”, The World Bank, Mimeo

Ravallion M. and S. Chen (1997). “What Can New Survey Data Tell us about Recent Changes in Distribution and Poverty?”, *The World Bank Economic Review*, 11, 357-382.

Rodrick, D., A. Subramanian, and F. Trebbi (2002). “Institutions Rule The primacy of Institutions over Geography and Integration in Economic Development”. IMF Working Paper # 02/189

Romer, C. and D. Romer (1998). Does Economic Growth Reduce Poverty?”, NBER Working Paper # 6793.

Sanchez, C. and N. Schady (2003). "Off and Running? Technology, Trade, and the Rising Demand for Skilled Workers in Latin America", Policy Research Working Paper # 3005, The World Bank.

Son, H. and N. Kakwany and H.(2003). "Poverty reduction: Do Initials Conditions Matter?" Mimeo, The World Bank

Spillimbergo, A. J.L. Londono and M. Szekely (1999). "Income Distribution, Factor Endowments, and Trade Openness", *Journal of Development Economics*, 59, 77-101.

Table 1. Theoretical Elasticities under log-normal assumption[a]

	Growth Elasticity			
PL[b] **/ Gini**	**0.3**	**0.4**	**0.5**	**0.6**
0.33	-3.9	-2.1	-1.3	-0.8
0.50	-2.8	-1.6	-1	-0.7
0.67	-2	-1.2	-0.8	-0.5
1.00	-1.2	-0.8	-0.5	-0.4
	Inequality Elasticity			
PL[b] **/ Gini**	**0.3**	**0.4**	**0.5**	**0.6**
0.33	5.2	3.3	2.4	2
0.50	2.5	1.7	1.3	1.2
0.67	1.2	0.9	0.8	0.8
1.00	0.2	0.2	0.3	0.4

[a] Source: Son and Kakwani (2003)

[b] Poverty line as a share of per capita GDP

Table 2: Descriptive Statistics

Variable	Mean	S.D.	Max	Min
Gini	0.373	0.094	0.632	0.166
Δlog(gini)	0.002	0.028	0.096	-0.119
GDP	6110	4713	18544	336
growth	0.021	0.022	0.099	-0.039
Education	4.030	0.561	5.029	2.469
Financial depth	-0.978	0.810	0.707	-3.543
Trade openness	-0.003	0.444	1.229	-1.243
Government burden	-1.971	0.394	-1.235	-3.270
Public Infrastructure	4.194	1.743	6.527	0.501
Governance	1.041	1.779	3.468	-2.688
Price Stability	4.768	0.361	7.801	4.560
Cyclcical Volatility	0.017	0.011	0.067	0.002
External imbalances	4.520	0.369	5.634	3.406
Banking crisis	0.105	0.245	1.000	0.000
External conditions	-0.005	0.038	0.095	-0.196

Table 3. Growth and income distribution[a]

	Dependent Variable			
	Δlog(Gini)		Growth	
Inequality				-0.006
				(-.94)
Lagged Inequality	-0.03	-0.03		
	(-6.00)	(-4.91)		
Initial GDP per capita			.003	0.002
			(-3.17)	(1.24)
Growth		-.22		
		(5.78)		
Summary statistics				
Number of observations	298	278	828	352
R^2	0.12	0.22	0.01	0.01

[a] OLS Pooled Estimation. t-statistics are in parentheses

Table 4. Growth and income distribution[a]

	Dependent Variable			
	Δlog(Gini)		Growth	
Inequality				-0.022
				(-4.74)
Lagged Inequality	-0.14	-0.173		
	(-11.29)	(-16.95)		
Initial GDP per capita			-0.106	-0.106
			(-24.33)	(-24.28)
Growth		0.011		
		(0.269)		
Summary statistics				
Number of countries	65	62	65	62
Number of observations	200	183	200	183
Sargan (p-val)	.14	.12	.003	.15
Second order correlation (p-val)	0.32	0.65	0.45	0.61

[a] The models are estimated using Arellano and Bond (1991) GMM estimator. t-statistics are in parentheses

Table 5. Determinants of growth and distribution[a]

	Growth	Growth	Δlog(Gini)	Δlog(Gini)	Δlog(Gini)
lagged Inequality			-0.222	-0.221	-0.215
Log(Gini)			(-21.81)	(-23.13)	(-21.03)
Inequality		-0.028			
Log(Gini)		(-2.06)			
Initial GDP per capita	-0.018	-0.118		-0.023	-0.024
(logs)	(-3.80)	(-16.22)		(-2.37)	(-2.58)
Initial output gap	-0.237	-0.114			0.031
(log actual/potential GDP)	(-8.52)	(-3.61)			(0.97)
Education	0.017	0.019	-0.005	0.001	-0.001
(log secondary enrollment)	(6.70)	(4.23)	(-0.70)	(0.14)	(-0.09)
Financial depth	0.006	0.009	0.009	0.010	0.009
(log private domestic credit/GDP)	(4.28)	(3.68)	(2.62)	(2.78)	(2.57)
Trade openness	0.010	0.006	0.024	0.021	0.022
(log adjusted trade volume/GDP)	(3.14)	(1.16)	(3.02)	(3.06)	(3.31)
Government burden	-0.015	-0.018	-0.022	-0.023	-0.021
(log government consumption/GDP)	(-3.18)	(-4.35)	(-3.38)	(-3.24)	(-3.04)
Public Infrastructure	0.007	0.007	-0.018	-0.013	-0.014
(log per capita telephone lines)	(2.71)	(1.80)	(-3.02)	(-1.91)	(-2.01)
Governance	-0.001	0.006	0.002	0.003	0.003
(principal component ICRG)	(-0.68)	(3.95)	(1.11)	(1.19)	(1.45)
Price Stability	-0.005	-0.009	0.006	0.007	0.006
(log [100 + inflation rate])	(-1.89)	(-3.39)	(2.53)	(3.93)	(3.74)
Cyclcical Volatility	-0.277	-0.265	0.076	0.127	0.15)
(std output gap)	(-3.76)	(-4.61)	(0.78)	(1.36)	(1.61)
External imbalances	-0.006	-0.013	0.001	0.005	0.005
(log Dollar index)	(-3.90)	(-4.98)	(0.17)	(0.91)	(0.82)
Banking crisis	-0.029	-0.018	-0.015	-0.016	-0.015
(frequency of years)	(-7.42)	(-4.74)	(-4.28)	(-4.46)	(-4.15)
External conditions	0.072	0.000	0.021	0.01)	0.015
(growth rate of TOT)	(4.98)	(.933)	(1.31)	(0.98)	(1.00)
Summary statistics					
Number of countries	78	50	44	44	44
Number of observations	350	168	133	133	133
Sargan (p value)	.99	.25	.45	.39	.46
Second order correlation (p value)	.46	.10	.93	.88	.97

[a] The models are estimated with time dummies using Arellano and Bond (1991) GMM estimator. t-statistics are in parentheses

Table 6. Determinants of growth and distribution[a]

	Δlog(Gini)	Δlog(1-Gini)	ΔGini	Δlog(Gini)[b]
Lagged Inequality	-0.224	-0.222	-0.221	-.18
Log(Gini)	(-26.99)	(-24.04)	(-21.85)	(50.0)
Education	0.003			
(log primary enrollment)	(0.22)			
Education		0.011	-0.450	-.034
(log secondary enrollment)		(2.78)	(-1.83)	(-4.67)
Financial depth	0.010	-0.007	0.439	
(log private domestic credit/GDP)	(3.33)	(-3.74)	(3.60)	
Trade openness	0.028	-0.019	1.187	
(log adjusted trade volume/GDP)	(3.61)	(-3.23)	(3.38)	
Government burden	-0.024	0.018	-1.072	
(log government consumption/GDP)	(-4.37)	(4.17)	(-3.89)	
Public Infrastructure	-0.020	0.009	-0.656	
(log per capita telephone lines)	(-4.08)	(2.70)	(-2.99)	
Governance	0.003	-0.002	0.131	
(principal component ICRG)	(1.37)	(-1.38)	(1.61)	
Price Stability	0.006	-0.003	0.154	
(log [100 + inflation rate])	(2.60)	(-1.98)	(1.88)	
Cyclcical Volatility	0.061	-0.017	0.907	
(std output gap)	(0.73)	(-0.26)	(0.24)	
External imbalances	-0.001	0.004	-0.254	
(log Dollar index)	(-0.15)	(0.95)	(-1.08)	
Banking crisis	-0.015	0.007	-0.494	
(frequency of years)	(-4.51)	(2.82)	(-3.13)	
External conditions	0.020	-0.012	-0.012	
(growth rate of TOT)	(1.33)	(-1.16)	(-1.16)	
Summary statistics				
Number of countries	41	44	44	64
Number of observations	134	133	133	190
Sargan (p value)	.52	.79	.86	.46
Second order correlation (p value)	.89	.57	.55	.73

[a] The models are estimated with time dummies using Arellano and Bond (1991) GMM estimator. t-statistics are in parentheses

[b] The model is estimated with education as a predetermined variable.

Table 7. Net short-run growth elasticiticies of poverty to selected policies (%)[b]

	Education					Finan. Development			
PL[a]/Gini	0.3	0.4	0.5	0.6	PL[a]/Gini	0.3	0.4	0.5	0.6
0.33	-9.30	-5.27	-3.44	-2.39	**0.33**	2.34	1.71	1.38	1.32
0.5	-6.05	-3.59	-2.37	-1.81	**0.5**	0.57	0.57	0.57	0.66
0.67	-4.02	-2.50	-1.77	-1.26	**0.67**	-0.12	0.09	0.24	0.42
1	-2.14	-1.46	-1.00	-0.89	**1**	-0.54	-0.30	-0.03	0.12
	Trade Openness					**Government Burden**			
PL[a]/Gini	0.3	0.4	0.5	0.6	PL[a]/Gini	0.3	0.4	0.5	0.6
0.33	8.42	5.72	4.39	3.94	**0.33**	3.68	0.98	-0.22	-0.97
0.5	3.13	2.43	2.08	2.14	**0.5**	2.03	0.23	-0.67	-1.12
0.67	0.84	0.93	1.10	1.40	**0.67**	0.83	-0.37	-0.97	-1.42
1	-0.73	-0.33	0.21	0.55	**1**	-0.37	-0.97	-1.42	-1.57
	Infrastructure					**Inflation**			
PL[a]/Gini	0.3	0.4	0.5	0.6	PL[a]/Gini	0.3	0.4	0.5	0.6
0.33	-12.09	-7.41	-5.23	-4.16	**0.33**	4.97	2.96	2.04	1.56
0.5	-6.46	-4.18	-3.04	-2.65	**0.5**	2.85	1.79	1.25	1.05
0.67	-3.56	-2.46	-2.00	-1.79	**0.67**	1.70	1.12	0.86	0.71
1	-1.20	-0.92	-0.89	-1.00	**1**	0.72	0.52	0.42	0.43

[a] Poverty line as a share of per capita GDP

[b] Under the assumption of log-normal distribution.

Table 8. Net long-run growth elasticiticies of poverty to selected policies[b]

	Education					Finan. Development			
PL[a]/Gini	0.3	0.4	0.5	0.6	PL[a]/Gini	0.3	0.4	0.5	0.6
0.33	-3.44	-1.86	-1.16	-0.73	**0.33**	-0.96	-0.50	-0.29	-0.16
0.5	-2.44	-1.40	-0.88	-0.62	**0.5**	-0.74	-0.41	-0.25	-0.16
0.67	-1.73	-1.04	-0.70	-0.44	**0.67**	-0.55	-0.32	-0.21	-0.12
1	-1.02	-0.68	-0.43	-0.35	**1**	-0.35	-0.23	-0.14	-0.10
	Trade Openness					**Government Burden**			
PL[a]/Gini	0.3	0.4	0.5	0.6	PL[a]/Gini	0.3	0.4	0.5	0.6
0.33	-1.39	-0.69	-0.39	-0.18	**0.33**	2.83	1.48	0.88	0.50
0.5	-1.13	-0.62	-0.36	-0.22	**0.5**	2.00	1.10	0.65	0.43
0.67	-0.87	-0.50	-0.31	-0.16	**0.67**	1.40	0.80	0.50	0.28
1	-0.58	-0.38	-0.22	-0.16	**1**	0.80	0.50	0.28	0.20
	Infrastructure					**Inflation**			
PL[a]/Gini	0.3	0.4	0.5	0.6	PL[a]/Gini	0.3	0.4	0.5	0.6
0.33	-1.79	-1.01	-0.65	-0.44	**0.33**	1.11	0.61	0.39	0.25
0.5	-1.18	-0.70	-0.46	-0.34	**0.5**	0.77	0.44	0.28	0.21
0.67	-0.80	-0.49	-0.35	-0.24	**0.67**	0.53	0.32	0.22	0.15
1	-0.44	-0.30	-0.20	-0.17	**1**	0.31	0.21	0.13	0.11

[a] Poverty line as a share of per capita GDP

[b] Under the assumption of log-normal distribution.