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Poverty and Economic Freedom: Evidence from Cross-Country Data

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**Poverty and Economic Freedom:
Evidence from Cross-Country Data¹**

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Abstract: This paper explores the empirical relationship between poverty and economic freedom. In doing so, it estimates the levels of absolute poverty for a panel of over forty developing countries and then utilizes fixed effects and GMM-IV estimators to derive the empirical relationships. The principal empirical results that emerge from this exercise indicate that important indicators of economic freedom such as openness to trade and small size of the government are robustly associated with poverty reduction. Labor market flexibility, which reflects an important dimension of economic freedom, does not have a significant effect on poverty on average. However, there is some evidence that trade's beneficial impact on poverty has been smaller in economies with more regulated labor markets. Finally, civil liberties that encompass various types of important economic freedom such as property rights, rule of law, etc., also contribute significantly to poverty reduction. This result contrasts with that for political liberties, which have seemingly no impact on poverty reduction. All these suggest that economic freedom is as much important for economic growth as for poverty reduction.

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1. Introduction

Poverty is a pervasive problem in developing countries. More than half of the population in the developing world lives on an income less than 2-dollar a day and about one fourth on an income less than a dollar a day (World Bank 2001). Given the magnitude of the poverty problem, the international development community has set out ambitious targets –known as the millennium goals—for addressing the problem of poverty in its various manifestations. However, the achievement of such goals would depend on the successful design and implementation of policies for addressing poverty. Unfortunately, there are few available studies that explore the interrelationship between policy and poverty to inform such decision-making processes. One notable study in this regard is by Dollar and Kraay (2001). However, the focus of the Dollar and Kraay study is *relative* poverty, which is more concerned with distributional issues than poverty *per se*.

Although there is a sizable economic literature on poverty in developing countries (see, among others, Lipton and Ravallion 1995; Pernia and Quibria 1999; and Fields 2001 for recent surveys), much of the policy discussion of this literature focuses on the relationship between poverty and growth. While the critical significance of growth in poverty reduction is now well understood, the pace of growth –or its pattern—cannot simply be willed by the policymakers. As it has been asserted by many (see, for example, Srinivasan 2001), growth and poverty reduction are the joint outcomes of the underlying forces of the economy shaped by its policies, along with its institutions and initial conditions. Identifying these policies and institutions that favor poverty reduction and assessing their empirical significance are critical to the design of a successful anti-poverty strategy.

But what policies matter for poverty reduction? This paper suggests that policies and institutions that support economic freedom are critical for poverty reduction. While the importance of economic freedom for promoting economic growth is well recognized, its role in poverty reduction is far from

widely accepted. Poverty reduction is still viewed by many as an arena for government control and activism to ‘empower’ the poor. The empirical message that seems to emerge from the present exercise is that such government activism has led to few successes.

What is meant by economic freedom? The quintessential elements of economic freedom are personal choice, voluntary exchange, freedom to compete and protection of person and property. When the economy has in place institutions and policies that promote economic freedom, it is easier for individuals to cooperate and specialize according to one’s comparative advantage. Similarly, when property rights are secure, individuals are protected from arbitrary interventions from the government and specialized interest groups are denied special favors, then costs of economic transactions are reduced, economic efficiency ensues and the less powerful segment of the society benefits.

The main indicators of economic freedom commonly used in the literature include: size of the government; sound money and stability of price; freedom to trade with the foreigners; the absence of over-regulation of markets, including the labor market; and civil liberties including the security of property rights, rule of law and protection from government malfeasance. This present paper provides an empirical assessment of the importance of economic freedom –in terms of its various components-- in determining the extent of poverty in developing countries. An extensive panel dataset on poverty in developing countries, drawing on the existing survey-based datasets on household income and expenditure distributions, is developed in order to do this.

This paper is organized as follows. Section 2 presents a brief review of the relevant empirical literature and highlights the analytical underpinnings of the current study. Section 3 discusses the empirical framework and estimation issues. Section 4 provides a discussion of data including the construction of the poverty data. Section 5 discusses the key findings. Section 6 offers some concluding remarks.

2. Recent Empirical Studies on Poverty

A number of recent econometric studies, based on cross-country regressions, have explored the quantitative relationship between growth and poverty reduction. These studies fall into two broad categories, depending on the concept of poverty used.

The first category relies on a relative concept of poverty. This category, which includes Dollar and Kraay (2001); Gallup, Radelet and Warner (1999); Roemer and Guerty (1997); and Timmer (1997), defines the poor as those who belong to the first quintile of the income distribution. These studies use the same (Deininger-Squire) dataset and arrive at similar conclusions. Except for Timmer, these other researchers find that economic growth has a one-to-one relationship with the income of the lowest quintile of the population. This unit elasticity result suggests that people belonging to the lowest quintile of the population seem to gain proportionately from overall economic growth. Alternatively, it means that income distribution remains invariant with economic growth.

The second category, which includes studies by Bruno, Ravallion and Squire (1998); Ravallion and Chen (1997); De Janvry and Sadoulet (2000); Morley (2000); and Smolensky and others (1994), uses an absolute concept of poverty. The first three studies use a global dataset, while the last three limit themselves to Latin American countries. Their results also differ: the last three find poverty elasticity around unity, while the first three find the value of poverty elasticity much exceeding unity at higher than two.

A set of recent studies attempt to further extend the growth-poverty relationship to include the impact of sectoral growth on the incidence of poverty (for example, Ravallion and Datt, 1996; Kakwani, 2001). These studies argue that while aggregate growth mattered, some patterns of growth –

particularly agricultural growth – are more effective in reducing poverty. Such findings, based on data from individual countries or a narrowly defined groups of countries, can be difficult to interpret. For instance, Ravallion and Datt (1996) find that growth in India’s primary sector is more effective in reducing poverty than growth in the secondary sector. While one interpretation of this finding is that growth in agriculture is inherently superior to that in industry in reducing poverty, Hasan and Quibria (2002) argue that the finding is in part a reflection of the fact that India failed to nurture an economic environment that encouraged labor-intensive industrialization which promoted employment growth and poverty reduction. Indeed, the experiences of the East Asian miracle economies is radically different from that of India in terms of patterns of growth and their impact on poverty reduction. During the period from the 1960s through the mid 1990s, when the East Asian economies achieved spectacular success in growth and poverty reduction, this process was essentially propelled by a rapid increase in the production and export of labor-intensive manufacturing (ADB, 1997).² In contrast to India, the East Asian miracle economies were not only far more open to trade, they also had fairly flexible labor markets, among other things.

In the light of these contrasting experiences, it is important to examine how various types of policies influence poverty. While some of the studies described above do examine the relationship between economic policies and poverty – for example, Dollar and Kraay (2001) and Gallup, Radelet and Warner (1999) – it is important to emphasize that their focus is on *relative* and not *absolute* poverty. The relationship between absolute poverty and different types of policies, an issue of immediate concern to developing countries and the international development community, does not emerge from these studies.

² The close link between industrial growth and poverty reduction in the case of East Asia (but not South Asia) is confirmed by Hasan and Quibria (2002).

What types of policies and institutions are potentially important for poverty reduction? A recent study that makes an extensive review of the connections between poverty and economic policy in the Asian miracle economies is Quibria (2002). The important message that emerges from the study is that the main impetus for sustained high rates of growth and poverty reduction in the miracle economies has been their growth-promoting policies and institutions –and not policies that attempted at income or asset distribution, including land reform.³ These growth-promoting policies and institutions, on a closer look, turn out to be those that promote economic freedom. They included on the one hand such policies as openness to trade, labor market flexibility, and macroeconomic stability and on the other such institutions that ensured the security of property rights and the rule of law in the economic domain⁴ In such an environment, investments were geared to the production of goods that were in accordance with their comparative advantage in labor-intensive production. According to this perspective, growth in East Asia's miracle economies was essentially an inclusive process that created widespread opportunities for their respective work forces and led to a rapid reduction in poverty.

In light of these arguments, the present paper investigates econometrically the impact of the various types of economic freedom on poverty. The policies included in the investigation are openness to trade, labor market flexibility, size of the government and monetary policy stance. The paper also explores the role of such institutional factors as civil and political liberties. Civil liberties encompass many important dimensions of economic freedom that are critical for smooth and efficient economic transactions. They capture aspects of economic freedom above and beyond those captured by such economic policies as openness to trade, small government and labor market regulations.

³ He also argues that initial equality in income and assets, to the extent they existed, in some of these economies, might have made the growth process more equitable but did not affect the pace of growth itself.

⁴ This was not necessarily true in the political arena. The insulation of the economy from the polity was a particularly interesting feature of these economies. See Quibria (2002)

3. Empirical Framework and Estimation Issues

Our analysis of poverty and its determinants is based on estimating the following type of equation:

$$(1) \quad \ln P_{it} = \alpha + \beta \ln P_{it-1} + \gamma \ln X_{it} + \delta_t + u_i + \varepsilon_{it}$$

where P_{it} denotes the poverty rate, or the proportion of the population with consumption below a predefined poverty line, in country i and year t , X_{it} captures various factors which may influence poverty including measures of openness to trade, macroeconomic stability, and labor market flexibility, δ_t represents time effects, and $u_i + \varepsilon_{it}$ denotes a two-part error term. The first component of the latter, u_i , captures unobserved and time-invariant country effects that influence poverty while ε_{it} captures the residual errors in measuring poverty. Including lagged poverty on the right hand side (RHS) allows us to interpret the coefficients on other regressors as growth effects.

OLS estimates are likely to suffer from two sources of bias. First, since P_{it} is a function of u_i , P_{it-1} will also be a function of u_i thereby rendering OLS biased and inconsistent. Second, u_i is likely to be correlated with at least one or more of the other RHS variables. For example, suppose geography has positive and independent effects on both trade and poverty (the presence of bountiful rivers may make the surrounding soil more fertile; they may also make trade more possible). The relegation of geography to the error term would then lead to a biased estimate on the effects of trade on poverty.

A common solution to the omitted variable bias is to use the fixed effects (FE) estimator which eliminates u_i from the model via a “within transformation” of the data. But this approach does not correct the biases due to the presence of the lagged depended variable. In particular, the FE estimator introduces a correlation between the transformed P_{it-1} and transformed error ε_{it} even when ε_{it} is not

serially correlated.⁵ The FE estimator is thus biased while it will be consistent only for a long panel (i.e., large T).

Consistent and efficient estimates of the poverty equation can be obtained using the generalized method of moments (GMM) IV estimator of Arellano and Bond (1991). First, a first difference (FD) transformation of Equation 1 is used to get rid of the correlation between u_i and P_{it-1} and X_{it} :

$$(2) \quad \ln P_{it} - \ln P_{it-1} = \beta(\ln P_{it-1} - \ln P_{it-2}) + \gamma(\ln X_{it} - \ln X_{it-1}) + (\delta_t - \delta_{t-1}) + (\varepsilon_{it} - \varepsilon_{it-1})$$

Next, the lagged dependent variable $\ln P_{it-1} - \ln P_{it-2}$ is instrumented for. As long as ε_{it} are not serially correlated, a natural choice for an instrument is $\ln P_{it-2}$. Additional instruments can be obtained by utilizing the orthogonality conditions existing between the various available lagged poverty terms and ε_{it} . Estimation is carried out using GMM. See Arellano and Bond (1991) for more details.

In what follows, we estimate the poverty equation using the FE estimator as well as the GMM-IV estimator. Although the presence of the lagged dependent variable introduces a bias in the FE estimates as noted above, Monte Carlo simulations by Judson and Owen (1996) suggest that the bias of the coefficient on RHS variables other than the lagged dependent term tends to be small. Since our interest is in these other coefficients, FE estimates can still be informative.

We limit our estimating sample to country observations which are five years apart. This allows us to focus on the medium to long-term relationship between poverty and its determinants. It also helps in alleviating concerns that our results will be driven by countries with more data since the maximum

⁵ The transformed P_{it-1} is $P_{it-1} - \bar{P}_{i-1}$, where $\bar{P}_{i-1} = \sum_{t=2}^T P_{it-1} / (T-1)$. Similarly, the transformed ε_{it} is

$\varepsilon_{it} - \bar{\varepsilon}_i = \varepsilon_{it} - \sum_{t=2}^T \varepsilon_{it-1} / (T-1)$. The problem arises because P_{it-1} is correlated with $\bar{\varepsilon}_i$ by construction.

number of observations for any country can be eight given that the data runs from 1960 to 1997.^{6, 7} In addition, because the GMM-IV procedure requires at least three observations per country, we work with the sample of 42 countries for which there is sufficient data to yield three observations, each spaced five years apart.

4. Data

A significant drawback of available data on absolute poverty is the limited time-series information on poverty for many developing countries. The econometric techniques we apply require at least two to three observations on poverty per country. Moreover, since poverty rates may evolve slowly, we would like our observations on poverty to span relatively long periods of time as noted above. Poverty data such as those of Chen and Ravallion (2000), where the bulk of observations pertain to a short time period covering the late 1980s or early 1990s, are therefore inadequate for our purposes. As a result we need to estimate our own set of poverty estimates which constitute a panel spanning at least 10 to 15 years. A detailed discussion on our procedures for estimating poverty can be found in the appendix. A summary is provided below.

Our estimates on the incidence of absolute poverty are based on the approach of Chen, Datt, and Ravallion (2000; 1994). Three pieces of information are required to execute this approach: grouped data on distribution, the mean per capita consumption expenditures associated with this distribution, and the

⁶ Each poverty observation belongs to one of eight five-year periods: 1960-1964, 1965-1969, and so on. Thus, consider a country i and a poverty observation P for 1972. Since 1972 falls in period 3 (1970-74), equation 1 will look like:

$$\ln P_{i3} = \alpha + \beta \ln P_{i2} + \gamma \ln X_{i3} + \delta_3 + \varepsilon_{i3}.$$

The time effect is picked up by what is in effect a “period” effect where any period covers one of the eight five-year periods.

poverty line. For distribution data we start with the compilation of Dollar and Kraay (2001), restricting our attention to developing countries with at least two observations. We drop data from the transition economies of Eastern Europe. As Chen and Ravallion note, the transition economies of Eastern Europe have faced significant disruptions to their statistical systems. The relevant data therefore are unlikely to be comparable over time. In addition to a few subsequent but minor additions and deletions to this dataset (noted in the appendix), we carry out two important steps. First, the available distribution data pertain to either consumption expenditure or income. Since we want to work with distribution of consumption expenditures, we adjust the reported quintile shares from income distributions as in Dollar and Kraay (2001). Second, the time-series coverage of the distribution data is extremely uneven across countries. We therefore interpolate the distribution data to fill in the gaps. As long as distribution is slow to change over time, this procedure will not entail much error.

Unfortunately, the basic distribution data provide very little information on the associated mean per capita expenditure (or income). We therefore have no option other than to use a proxy and draw upon the National Account Statistics reported in the Penn World Tables (version 6) to compute mean per capita consumption expenditures over time and across countries. Finally, we define our poverty line at 2\$ a day in 1996 international prices.⁸

The distribution data (adjusted and including interpolated observations), the corresponding mean per capita consumption expenditures, and the poverty line are then used to compute poverty rates in two stages. First, Lorenz curves are estimated using the grouped distribution data. Next, a numerical method is used for determining the incidence of poverty given the values of the mean consumption expenditures

⁷ In a small number of cases a fifth year observation on poverty was not available but a fourth or sixth year observation was. In these cases – limited to eight observations in all, we simply took the fourth or sixth year observation on poverty and all relevant variables and re-coded the year as the fifth year.

corresponding to each Lorenz curve and the poverty line. Both stages are executed using the software of Chen, Datt, and Ravallion (2000).⁹ Table 1 reports our estimates of 2\$ a day poverty (the headcount index) by country over eight five year periods.

In addition to information on absolute poverty, we require data on various measures of economic policy and institutional conditions. Table 2 presents these, including definitions and sources used. Table 3 presents averages of some of the variables over the 1980s for the four regions for which sample country coverage is relatively extensive.¹⁰ In terms of these regional averages, East Asia tends to be the most open to trade, have the most stable macroeconomic conditions, and regulate labor markets the least. The latter may be seen in terms of both the number of ILO Conventions ratified as well as an index of labor market rigidity developed by Forteza and Rama (2001).¹¹ Latin American countries are also fairly open, but their high average inflation rates imply that macroeconomic conditions have been far from stable. Latin America also appears to have had the most tightly regulated labor markets with South Asia and Sub-Saharan Africa in between. Interestingly, the data reveal that notwithstanding their emphasis on policies and institutions that supported economic freedom, East Asian countries have lagged behind in terms of democratic institutions. In this regard, Latin America and South Asia have been better performers. Finally, the data on factor endowments reveal East Asia as the most labor abundant region followed by South Asia, Latin America, and Sub-Saharan Africa in that order.

⁸ The main reason we use the 2\$ a day poverty line rather than the 1\$ a day poverty line to estimate poverty is that the latter yielded fewer technically reliable estimates on poverty. See Appendix for details.

⁹ We are thankful to Shaohua Chen for her advice on using POVCAL to estimate poverty for large datasets.

¹⁰ The sample countries which are not used in computing the figures reported in Table 3 include Jordan, Tunisia, and Turkey. In terms of regional groups defined by the World Bank, the first two belong to the Middle East and North Africa while Turkey belongs to Europe and Central Asia.

¹¹ Once a country ratifies a particular Convention, it commits to make it legally binding. Thus the number of Conventions ratified by a country may be taken as an indicator of the extent to which labor markets are regulated.

5. Results

Fixed Effects Estimates

We begin our analysis by estimating poverty equation (1) using the FE estimator.¹² As noted in Section 3, although the presence of a lagged dependent variable induces a bias in the FE estimator, there is evidence that the bias may be small for right hand side variables other than the lagged dependent term itself (Judson and Owen, 1996). Given that our interest is in the estimates of these other variables, there is therefore some merit in examining the results of the FE estimator. This is especially so since missing data – a feature of some of the variables we would like to include on the right hand side – is less of a problem when using the FE estimator as compared to the GMM-IV estimator.

The first column of Table 4, which describes the FE estimates, indicates that greater openness in terms of higher trade shares is associated with lower poverty. In particular, a one percent increase in trade shares is associated with a 0.32 percent decline in the incidence of poverty controlling for initial poverty. The effect is significant at the 5 percent level. It is worth emphasizing that in the presence of country fixed effects, the impact of trade shares on poverty is not affected by country specific determinants of trade such as geography which may also influence poverty. Nevertheless, trade shares are not a direct measure of trade policy, arguably a more relevant variable for policy making purposes. Column 2 therefore replaces trade shares with a direct measure of trade policy, import duties as a share of total imports. Although the number of observations falls by nearly half on account of missing data on import duties, the results are qualitatively similar. Thus greater openness, this time measured in terms of lower duty rates, is associated with a decline in poverty. The coefficient on import duties just fails to be significant at the 10 percent level, however. It is possible that with more data, the effect of lower duties

¹² A Hausman test always led to the rejection of the random effects model.

would turn out to be significant. But a bigger problem with import duties as a measure of openness is that it does not capture the effects of non-tariff barriers. It also underestimates actual protection when high tariff rates drive corresponding imports down. For these reasons and in order to work with the largest number of observations possible, we revert to our trade share based measure of openness, which when used with an FE estimator, is influenced by both time-varying tariff and non-tariff barriers to trade.

In columns 3 and 4 we include regressors which relate to fiscal and monetary policy. Large government expenditures may be expected to assist people in climbing out of poverty if these are targeted in an effective manner toward the poor.¹³ On the other hand, numerous studies on economic growth find that government expenditures tend to weaken growth (for example, Fischer, 1993; Eaterly and Levine, 2001), suggesting that large governments may exacerbate poverty. These studies also find inflation to be inimical to growth; surveys additionally reveal that the poor are particularly likely to rate inflation as a serious concern. The latter may however be more relevant to particular groups of the poor, such as the urban poor; indeed, inflation may even benefit the poor such as when they carry large debts whose real values may erode due to inflation. The effects of macroeconomic factors on the poor are therefore an empirical matter.

Higher rates of inflation are associated with higher poverty. However, the association is not statistically strong (column 3). Larger government expenditures, on the other hand, are significantly associated with greater poverty so that a one percent increase in the share of government expenditures is associated with a 0.41 percent increase in poverty (column 4). This result would be somewhat

¹³ When we included a measure of budget deficits in place of government expenditures, it yielded a highly insignificant coefficient (not reported). Problems with our data on budget deficits - not only is availability patchy across our panel, the measure we use captures only the central government's finances - constrains us from drawing much from this finding or analyzing the relationship between budget deficits and poverty any further.

surprising if larger government expenditures translate into larger social outlays. Our data on social expenditures, albeit limited in coverage, suggests however that governments with large expenditures do not necessarily focus on the poor. In the first place, large public expenditures do not automatically translate into large outlays for social services. Restricting attention to those observations for which we have information on both government expenditures and social expenditures (as shares of GDP), we find that correlations on the country specific means of these variables are surprisingly low: they are less than 0.21 for the 39 countries for which social service expenditure data is available (0.19 if the Spearman rank coefficient is used). In other words, the notion that governments which are large spenders spend correspondingly large amounts on social services is not borne by the data. Second, what social services are provided may not even be targeted at the poor. To take an example, many poor countries, particularly those in South Asia, provide substantial subsidies to secondary and higher education. Since the relatively better off are more likely to avail of these subsidies – especially at tertiary levels of education – the education subsidies are not targeting the poor as well as they could. In summary, the estimates on government expenditures may be capturing the effect of fiscal indiscipline on the poor. If so, fiscal discipline seems to have a positive effect on poverty reduction.

We next add the number of ILO Conventions ratified as a regressor. This is added as a proxy for labor market rigidity on the grounds that labor markets will be slower to adjust in countries with greater regulation of the labor market. If barriers to adjustment in labor markets create incentives for entrepreneurs to save on labor in production then it is possible that a more regulated labor market would dampen economic opportunities for workers and thereby contribute to poverty. The insignificance of the estimate on the ILO variable suggests that a more regulated labor market has little systematic relationship with poverty (column 5). A measure of human capital - the average years of education in

the population above 15 years of age – is similarly weak in terms of its association with poverty (column 6).

Finally, we replace the education variable with an indicator for democratic institutions which ranges from zero to one.¹⁴ The estimated coefficient implies that a move from the poorest democracy ratings possible (for example, a value of zero as is found for Ethiopia in the early 1980s) to the best possible ratings (for example, a value of one as is found for Costa Rica) would reduce poverty by 0.43 log points (column 7). The effect is statistically significant at the five percent level.

In what follows we carry out additional analysis, which in addition to providing robustness checks on the results obtained so far, explore more closely the channels by which particular variables affect the poor.

GMM-IV Estimates

As noted in Section 3, bias induced by the presence of a lagged dependent term in an estimating equation can be corrected for using the GMM-IV estimator of Arellano and Bond. Table 5 reports the results of various versions of equation 2, estimated by instrumenting the lagged, differenced poverty term on the right hand side by at most the fourth lag of poverty in levels.¹⁵ Because the validity of these instruments hinges on the absence of serial correlation in the residuals of the poverty equation, the table also reports Arellano and Bond's test for *second order* serial correlation of the *differenced* residuals. In every case considered by us the null of no second order serial correlation could not be rejected

¹⁴ Education is dropped from further analysis because of (i) its insignificance across all specifications considered by us in addition to the one just reported; and (ii) the fact that including it requires dropping five countries for which this data is missing from our analysis.

¹⁵ Results based on allowing higher lags of poverty as instruments were virtually identical and are not reported.

indicating that lagged levels are valid instruments.¹⁷ The estimates detailed in Column 1 reveal that the essential features of the last column of Table 4 are preserved. That is, greater openness in terms of larger trade shares, lower government expenditures, and more democratic institutions are all independently and significantly associated with reductions in poverty. To take one illustration, the estimated coefficient of -0.24 on openness implies that if India in 1985 had a trade share of 22 percent (equal to that of China's) rather than the actual 14 percent, its poverty rate would have 61.2 percent as opposed to the actual 68.6 percent holding all else constant. This is not a trivial effect. Replacing the current trade shares with lagged trade shares to alleviate endogeneity concerns does not change the results qualitatively (column 2). In fact, if anything, the trade share term becomes even more negative and is now significant at the five percent level.

Openness, Factor Endowments, and Labor Regulations

While the estimates just described indicate that trade has contributed to reducing poverty, it is quite possible that trade's effect on poverty varies by context. Standard models of international trade predict that the effect of openness on factor payments depends on factor endowments. In particular, labor is more likely to benefit from openness in countries where labor is the abundant factor. Since the principal asset of the poor is their raw labor, the poor would therefore be more likely to benefit from openness in labor abundant countries. Similarly, trade models in which labor market frictions are introduced indicate that labor market rigidities in an open economy can have particularly harmful side-effects for labor overall, as opposed to those workers who are protected by the regulations (Edwards and

¹⁷ A test for over-identifying restrictions, again due to Arellano and Bond, also confirmed instrument validity in every case considered by us. These are based on two-step GMM-IV estimates and not reported.

Edwards, 1994). Thus the benefits that the poor may derive from openness may also depend on the nature of labor market regulations.

To investigate both these possibilities, we continue to rely on the GMM-IV estimator but now introduce interaction terms between openness and measures of labor abundance and labor market rigidity. Column 3 of Table 5 introduces an interaction term between openness and a dummy indicator of labor abundance. The latter takes the value of one if the average value of arable land per capita over the period under consideration is below the median across all sample countries and zero otherwise. While the interaction term, like the own openness term, is negative and indicates that the poor in labor abundant countries derive more benefits from openness, the effect is statistically insignificant.

Column 4 replaces the interaction term between openness and the labor abundance dummy with the ILO variable. As in the case of the labor abundance dummy, the interaction term has the “right sign” – that is, a more regulated labor market erodes the beneficial impact of openness on poverty as typical trade models suggest. While the interaction term itself fails to be significant at conventional levels (though it is estimated much more precisely than the labor abundance and openness interaction), it is instructive to examine the marginal effect of openness (the implied partial derivative of log poverty with respect to log trade shares) for different values of the ILO variable. Thus, holding all else constant, a country with zero ILO ratifications (Korea as late as 1985) has a marginal effect of openness of -1.21 . An F-test reveals that this effect is significant at the 11 percent level. By contrast, a country with 72 ratifications (Brazil in 1995) would have a marginal effect of openness that is not statistically different from zero at any conventional level of significance. In other words, openness reduces poverty in environments characterized by minimal regulation of the labor market but it leaves poverty unchanged in highly regulated labor markets. In column 5, the ILO variable is replaced in its interaction with openness by a labor market “rigidity” dummy. A country is defined to have a rigid labor market if its

aggregate rigidity index as defined by Forteza and Rama (2001) is above the median across all sample countries. The positively signed coefficient on the openness-rigidity interaction term indicates that greater rigidity erodes the effect of openness as in the case of the ILO variable; however, the effect is statistically very weak. The fact that the rigidity index is only a cross-sectional indicator may be partly responsible for this statistical weakness. However, a bigger drawback may be that the rigidity index does not take into account restrictions on firings that may be found in formal labor markets. Clearly, developing measures of labor market rigidity which incorporate this element of labor market regulations is an important issue for future research to consider.

Transmission Channels

Though the estimates above inform us about which of various factors influence poverty and in what direction, they do not tell us anything about the underlying mechanisms, in particular, whether poverty is affected through a “growth” channel or a “distributive” channel. To shed some light on this issue, we include per capita income on the right hand side of our poverty equation. If a variable continues to exert a significant impact on poverty even after controlling for incomes, we take this to be a strong indicator that the variable in question has important distributive consequences which impact poverty rates. Column 1 of Table 6 presents the results of this exercise.¹⁹ In line with results from previous studies which examine the relationship between poverty and growth, Column 1 reveals that the effect of per capita incomes on poverty is quite large: the estimated “poverty elasticity of growth” is –

¹⁹ This estimate is derived by assuming per capita income term to be pre-determined. Estimates without this assumption failed the serial correlation test for instrument validity. Though it is not clear why this happened, it is possible that correlation between the poverty equation error term and per capita incomes is somehow to blame. This is because any shock to per capita incomes is likely to effect our poverty measure since the latter is indirectly related to per capita incomes by construction.

2.20. This is clearly within the range of estimates derived by Ravallion and Chen (1997) for different poverty lines.²⁰

The inclusion of per capita incomes on poverty, however, comes at the expense of openness' and democracy's impact: although both of the latter terms continue to affect poverty in the same direction as before (so that greater openness and democracy are associated with lower poverty), the effects are not significant at the ten percent level anymore. Only government expenditures continue to exert a statistically significant impact on poverty. In other words, openness and democratic institutions seem to influence poverty by driving overall economic growth. The adverse effect of large governments on poverty, on the other hand, appears to work through distributive channels.

Do large governments adversely affect the poor through the growth channel also? Previous literature on growth has often found that larger governments are inimical to growth. Since our sample is different from the typical one used in the growth literature it is not necessary that the same relationship would hold in our case. We therefore estimate a standard growth regression using the same data used in estimating our poverty equations.²¹ Doing so also provides a way to confirm that openness and democratic institutions effect growth as we have inferred somewhat indirectly above.

The results of our growth regression, described in column 2, indicate that the broad features found in the empirical growth literature apply to our sample also. In particular, greater openness to trade, lower inflation, and smaller governments are all associated with higher growth. The last two are

²⁰ Table 6 of Ravallion and Chen report growth elasticities of poverty ranging from -0.53 to -3.12 depending on the specific poverty line and sub-sample of developing countries used.

²¹ The growth equation, estimated using GMM-IV and the same sample observations used to estimate our poverty equations, takes the form:

$$\ln Y_{it} - \ln Y_{it-1} = \beta(\ln Y_{it-1} - \ln Y_{it-2}) + \gamma(\ln X_{it} - \ln X_{it-1}) + (\delta_t - \delta_{t-1}) + (\varepsilon_{it} - \varepsilon_{it-1})$$
 where t

refers to one of the eight five-year periods.

not significant, however, suggesting that large government expenditures have affected the poor through a distributive channel and not via an impact on growth. Of the various right hand side variables, only greater openness to trade and democratic institutions are significantly associated with higher economic growth. Interestingly, the magnitude of openness' impact is on the low side in so far as the growth literature is concerned. For example, Levine et al (2000) report an estimated coefficient on openness of between 0.33 to 0.50 while ours is only around 0.07. While this is most probably a reflection of the different samples – Levine et al pool 74 developing and developed countries to examine the effects of financial intermediation on growth – what seems relevant to note is that despite an apparently small (but statistically significant) effect on growth, openness has a economically significant impact on poverty as revealed by the estimates of our poverty equations discussed above.

Democratic Institutions and Poverty: An Exploration

While the analysis above suggests that democracy helps the poor by influencing growth, the nature of our democracy variable allows us to carry out some explorations about the channels through which it works. In particular, the democracy variable is composed of two separate rankings: one pertaining to political rights and the other to civil liberties. Although political rights and civil liberties are conceptually related they emphasize different institutional factors. As is well known, the political rights variable is a measure of the degree of competitiveness of the political system. Among other things, it gauges the extent to which a political system offers citizens the chance to *contest* and *participate* in the determination of the rulers.²² The civil liberties rankings on the other hand emphasize a related but distinct set of issues pertaining to such items as the rule of law, security of

²² Dahl (1971, 1989), in his celebrated accounts of democracy lays out two basic criteria of democracy; contest (the freedom to contest the rulers) and participation (of the diverse political groups in the process

property rights, freedom from the risk of expropriation and the risk of repudiation of contracts. The main difference between these two variables therefore appears to be that while one captures political liberties the other is more closely related to aspects of economic freedom that stem from effective governance and respect for property rights.

Examining the estimates of column 3 which introduce the two component measures of democracy separately in the poverty equation, we find that it is civil liberties and not political rights which have mattered for poverty reduction. Apparently improvements in political rights and thus political competition within countries has not led to significant poverty reduction. Improvements in civil liberties have. Growth regressions which introduce the democracy variables in terms of its two components measures suggest why political competition does not seem to have led to the enactment of policies that are strongly pro-growth. On the other hand, the protection of civil liberties seems to have mattered for growth, and therefore for poverty reduction (column 4).²³ This result is similar to Barro (1996)

Working with the two component measures of our democracy variable also sheds some light on why large government expenditures are associated with greater poverty. Column 5 introduces the measures of political rights and civil liberties only in terms of interactions with government expenditures. If political competition were to lead government expenditures to be better focused on the poor, then we would expect to find the interaction between government expenditures and political rights to be negative and significant. While the interaction term for political rights is negative, it is small in magnitude and statistically insignificant. In contrast, the interaction term between civil liberties and government expenditures are not only negative and large, they are significant at the five percent level.

of determining the rulers). The first criterion pertains to political liberalization and the second criterion to inclusiveness.

²³ For a discussion of the underlying political economy mechanism, see Quibria (2002).

In other words, while government expenditures are associated with greater poverty, they are less so when governments are efficient and uphold basic economic freedoms. These set of findings is clearly important.

6. Some Concluding Remarks

Poverty is a complex, multifaceted phenomenon. While there is a large literature on poverty in developing countries, this literature does not shed much light on the relative quantitative significance of the various types of policies and the role of institutions. The present paper makes an exploratory quantitative investigation into these issues focusing in particular on the relationship between various indicators and dimensions of economic freedom and poverty reduction. Some findings of this exercise are worth emphasizing.

First, a principal result that emerges is that openness to trade, an important indicator of economic freedom, is robustly associated with poverty reduction. Ratification of large numbers of ILO conventions – a proxy for the thickness of the labor code and thus an indicator of over-regulation of labor markets – does not appear to have a significant, direct impact on poverty. However, we do find evidence that the beneficial impact of openness on poverty accrues in an environment characterized by limited regulation of the labor market. Especially in view of the fact that most developing countries are moving forward with greater trade liberalization, the possibility that labor market regulations may work against the interest of the poor as an economy opens up is cause for concern. One area for future research on poverty-policy linkages must therefore be on developing better and more refined indicators of labor market regulations. This would allow us to determine which types of labor regulations are having unintended and adverse consequences on poverty.

Second, we do not find any particularly significant adverse impacts of inflation on the poor in our sample. However, we do find an important role for fiscal discipline in reducing poverty. A positive relationship between total government expenditures and poverty is one of our most robust results and appears to confirm that although higher levels of government expenditure may in principle be associated with large outlays on social expenditures, in practice they are more likely to reflect fiscal indiscipline on the part of the government.

Third, civil liberties that encompass various types of important economic freedom such as property rights, rule of law etc also contribute significantly to poverty reduction. This result contrasts with that for political liberties, which have seemingly no impact on poverty reduction.

All these findings suggest that economic freedom is important for poverty reduction. Of course, given the nature of our data, the above findings should be taken as tentative. It is hoped that the present paper will stimulate further empirical work on the role of policies and institutions and get out of the present sterile debate on the nexus between growth and poverty.

Appendix: Estimating Poverty

We describe here in detail the data steps we undertook to construct our measures of poverty. As noted in Section 4, we make use of three pieces of information: Data on distribution by quintile, the mean per capita consumption expenditures associated with this distribution, and finally a poverty line.

Distribution data. We begin with the recent compilation of distribution data by Dollar and Kraay (2001).²⁴ Since our interest is in a level of absolute poverty which is not a significant problem in developed countries, we drop all observations pertaining to developed countries. We also exclude the transition economies of Eastern Europe. As Ravallion and Chen (1997) have noted, these economies' measures of living standards are not easily comparable either over time or across countries due to the large structural changes they are undergoing. We also make a few additional minor modifications to the Dollar and Kraay compilation. First, in a few cases it appears that essentially the same distribution data is reported for two consecutive years. We retained only one of the apparently duplicated data. Second, we added a few observations from World Bank Poverty Monitoring Website which were not reported in the Dollar and Kraay data. Finally, some of the distributional information in the Dollar and Kraay dataset report only the Gini coefficient and not the actual shares of income/expenditure accruing to the various income/expenditure categories (quintiles). We drop such observations from our analysis. In all, we are left with information on distribution for 424 observations covering 85 countries spanning six regions as defined by the World Bank (Table A1).

There are two major difficulties in using this data for computing poverty. First, there are differences in terms of whether the distributions pertain to consumption expenditures or income.

²⁴ Available at <http://econ.worldbank.org> and/or www.worldbank.org/research/growth. Dollar and Kraay sources are: Deininger and Squire (1996); UN-WIDER World Income Inequality Database

Among our 424 observations, 41% provide information on consumption distribution. The remainder provide information on income distribution, either in gross or net of taxes basis (see Table A2).

Given the fact that consumption is more equally distributed than income, and taxes and transfers are designed to reduce income inequality, we cannot treat any of the three types of distribution data as equivalents. Second, the availability of distribution data over time varies tremendously across countries. Thus 28 observations are available for India over the 1960-1997 period. In contrast, there are many countries with two or three observations spanning less than five years. In order to overcome these problems, we first adjust for the differences in distribution type. Next, we interpolate the distribution data to get a more consistent time series across countries.

Following Dollar and Kraay (2001), we regress the reported quintile shares (quintiles 1-through 5) on the dummy indicators for distribution type (consumption, gross income, net income) and region dummy variables. In 28 cases, we do not have information on whether income is gross or net of tax and transfers. We include these cases in the regression by including one more category (income distribution with gross/net status unknown). It is perhaps not an ideal solution to missing information, but we can at least use the information on whether distribution data is based on consumption or income surveys in this way. We treat consumption distributions as our base category. Table A3 describes the results of our regressions. The estimated coefficients of the various quintiles have reasonable signs. The estimated coefficients for the lower four quintile shares are smaller for income distributions. Those for the top quintile share are bigger for income distributions.

The next step is to adjust the reported income distribution data using the estimated coefficients. For instance, if the distribution is based on the gross income, we make the distribution comparable to consumption distribution by adding the estimated mean difference of 0.013 to quintile 1 and 0.014 to

(2000); Lundberg and Squire (2000); and the World Bank Poverty Monitoring Website data developed

quintile 2 and so on. Adjustment for the fifth quintile is calculated as a residual since the five quintile shares must add up to one. Adjusting the fifth quintile using the regression coefficients generates similar results, but then the five quintile shares may not sum to exactly one.

Finally, assuming that distribution changes smoothly over time, as in Sala-I-Martin(2002), we carry out linear interpolation of quintile shares across years. In this way, we are able to add substantially to our original data on distribution. Thus, starting with 424 actual observations, we are able to fill in 999 observations. The total number of distributional observations is then 1,423. (As will be noted later, however, we are not able to utilize all these in computing poverty rates.)

Mean consumption. Although some of our distributional data report the corresponding mean consumption expenditures (or mean incomes in the case of income distribution data), this information is missing for a large majority of the data. We therefore use the data on private consumption expenditures (PCE) per capita from the national accounts (NAS) as a proxy for mean per capita consumption expenditures. Our source for PCE per capita is the Penn World Tables (PWT 6).

In this context, it is important to note an important point. Comparisons of PCE per capita from national accounts with corresponding values of mean expenditures per capita show divergence between the two in both levels as well as growth rates (see, for example, Ravallion 2001). In view of the tendency for PCE to be higher than survey means, poverty estimates will generally be lower for measures derived using the former as compared to the latter. But this fact by itself does not indicate that our measures of poverty – being based on PCE from NAS - will be misleading. As noted by Ravallion (2001) the procedures for obtaining PCE and survey means are *both* subject to a variety of biases and errors. In the case of NAS based PCE data, one source of bias stems from the possibility that household

by Chen and Ravallion (2000).

based production activities which were not included in NAS data begin to get included as an economy develops. Such “formalization” of economic activity would impart an upward bias to measured NAS growth rates of output” (page 6, Ravallion). On the other hand, underreporting of consumption and especially incomes are problems with survey based estimates of mean consumption or income. Indeed, for this reason and others, Bhalla (2002) argues that survey based estimates of mean consumptions are too low to be plausible and that NAS based estimates of PCE are more reliable.

Poverty line. In order to facilitate analysis of poverty in both the within and cross country dimensions, we use a poverty line which is absolute in value across countries and over time. We define the poverty line as either 1\$ a day or 2\$ a day (at international prices) as in Chen and Ravallion (2000).²⁵ The only difference between our poverty line and that of Chen and Ravallion is that while their poverty lines are based on 1993 PPP consumption exchange rates, ours are based on 1996 PPP consumption exchange rates reported in the PWT 6.

We obtain our poverty lines using the following steps. First, we convert the \$1 a day poverty line (or more accurately \$1.08) of Chen and Ravallion into Indian rupees using the 1993 PPP consumption exchange rate for India (Rs 7.02 per international dollar for consumption). We then use a consumer price index for India, imputed from PWT 6, to determine what the resulting poverty line would be in 1996 rupees.²⁶ This works out to be approximately Rs. 10.33 per person per day. Finally,

²⁵ Chen and Ravallion in turn rely upon the \$1 a day poverty line constructed by Ravallion, Datt, and van de Walle (1991). The latter is representative of poverty lines defined and utilized by national agencies in low income countries such as Bangladesh, Indonesia, Kenya, Morocco, Nepal, and Tanzania. When more than one national poverty line is available, as in the case of rural and urban poverty lines, Ravallion, et al consider the lowest one.

²⁶ CPI series may be derived from the PWT 6 data by using the reported series relating to consumption shares, real GDP per capita, and official and PPP consumption exchange rates. These series can be manipulated to construct series on total private consumption expenditures in current and constant local currencies. Dividing the former by the latter yields the country specific CPI.

we convert this figure into 1996 international dollars using the PPP consumption exchange rates in PWT 6 (approximately Rs. 8.05 per international dollar for consumption). Our resulting 1\$ a day poverty line is roughly \$1.28 per person per day in 1996 PPP consumption exchange rates (or \$468.11 per person per year).²⁷ Multiplying this by two gets us our “\$2” a day poverty line in 1996 PPP.

The poverty estimates.

Armed with the distributional data, the measure of mean living standards, and the poverty lines, we compute 1\$ and 2\$ a day poverty estimates using the algorithm and software of Chen, Datt, and Ravallion (2000). As noted in Section 4, this entails estimating Lorenz curves using the data on the distribution of expenditures and its mean value in the first instance and then using a numerical method to compute the incidence of poverty for a given poverty line.

Chen, Datt, and Ravallion’s software, POVCAL, estimates two Lorenz curves for each “observation”: one corresponds to the General Quadratic specification due to Villasenor and Arnold (1989); the other to the Beta specification due to Kakwani (1990). Since a theoretically valid Lorenz curve needs to satisfy various conditions (for example, it should be strictly increasing and it should be convex from below), the software also tests those conditions that do not hold by construction. For equally valid Lorenz curves, a comparison of the sum of squared errors over the part of the Lorenz curve up to level of poverty allows the program to decide which Lorenz curve fits the data better.

²⁷ An alternative poverty line that we constructed was based on official poverty lines from India. This line was arrived at as follows. First we weighted the rural and urban poverty lines of Rupees 49 and 57 per capita per month in 1973-74 prices respectively by their population coverage in 1973-74. This composite poverty line was updated to 1996 prices using the national CPI and then converted into international dollars by using 1996 PPP exchanges rate for consumption. The resulting poverty line was roughly \$1.31 per person per day in 1996 PPP prices (or \$479.07 per person per year). Because of its similarity to the conventional \$1 a day poverty line we chose not to use this poverty line.

Missing data relating to any of the key variables - PPP consumption exchange rates, PCE per capita, or distribution of income/expenditure by quintile – naturally imply that we cannot estimate poverty. In principle, it should be possible to derive estimates of poverty for the remaining observations. In practice, matters are not that simple. Because we use the larger NAS based estimates of mean per capita consumption, our estimates of poverty tend to lower when compared to the corresponding survey based estimates of mean per capita consumption used by Chen and Ravallion. While low values for measured poverty are not a problem – recall that Bhalla (2002) argues that these are closer to the truth than higher poverty estimates derived using survey based mean per capita consumptions – deriving statistically reliable estimates of poverty becomes more difficult the closer the poverty line is to the lower tail of the expenditure distribution. This is obviously a bigger problem for the 1\$ a day poverty estimates than the 2\$ a day poverty estimates. We, therefore, focus on the 2\$ a day poverty estimates for which we were able to generate 1318 “reliable” observations covering 79 developing countries. Not all these observations are used in our analysis, however. As noted in the text, our econometric methods mean that we must restrict our attention to countries for which we have at least three observations on poverty spaced at least five years apart.²⁸ As also noted in the text, Table 1 reports our estimates of poverty spaced five years apart across eight periods for the 42 countries for which such data is available.

²⁸ Our estimates of 2\$ a day poverty show that this type of poverty had ceased to be a problem in Taiwan by 1979. Thus we drop from our analysis post-1979 observations for this country.

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Table 1. Poverty estimates

Country/ Period	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99
Bangladesh	57.85	68.61	77.76	68.43	58.6	55.13	46.83	
Bolivia		27.67	23.15	17.54	26.24	23.44		
Brazil	65.02	52.1	43.34	37.85	18.59	17.55	32.49	16.69
Chile		9.65	9.93	16.33	22.73	17.1	2.82	
China					86.3	61.13	52.65	39.84
Colombia	43.12	20.51	12.75	16.68	15.92	13.03	13.66	
Costa Rica	27.85	5.18	6.82	14.42	14.73	7.99	13.59	12.41
Dominican Rep.						11.83	23.3	19.4
Ecuador		33.16	30.24	20.5	21.46	23.79	26.74	
El Salvador				16.05	25.19	25.37	13.03	
Ethiopia					92.87	96.83	95.32	
Ghana						60.83	59.96	54.15
Guyana	30.14	38.11	26.12	19.94	21.18	22.43	45.26	
Honduras		57.97	56.41	49.21	52.63	51.41	46.86	
India	83.18	83.6	78.57	78.4	75.99	68.55	56.31	51.43
Indonesia				75.76	44.13	32.37	18.8	8.9
Ivory Coast						28.49	33.94	34.92
Jamaica	39.33	34.98	36.35	27.86	34.2	32.79	18.97	11.57
Jordan					24.7	5.45	19.35	17.92
Korea, Rep.		32.79	17.7	13.69	11.23	4.11		
Madagascar	53.44	54.79	48.07	60.94	66.13	71.87	77.19	
Malaysia			39.27	32.42	16.38	12.6	7.46	4.39
Mexico	20.8	20.71	17.39	13.09	4.38	2.21	4.39	4.38
Nepal				91.35	83.82	81.78	76.39	
Niger	47.25	43.69	54.21	86.92	65.39	78.28	83.45	
Nigeria	76.33	79.5	77.64	69.99	55.9	61.38	71.75	84.52
Pakistan	77.6	69.44	66.79	57.26	53.14	45.72	35.84	
Panama			34.56	29.03	16.44	14.38	26.32	24.23
Peru					12.16	4.96	17.92	11.48
Philippines	43.45	39.6	32.22	30.67	21.84	24.89	23.06	22.62
Puerto Rico	5.15	9.34	6.85					
Senegal	50.42	52.92	59.59	56.4	57.23	57.71	60.07	
Sierra Leone			57.16	59.31	60.12	60.34		
Sri Lanka	61.69	49.76	42.34	39.33	23.92	22.93	9.53	
Taiwan	42.09	17.3	2.84	1.01				
Tanzania		99.91	97.23	92.91	94.44	92.25	94.52	
Thailand	69.5	59.73	47.77	39.62	34.65	27.94	18.06	4.09
Trinidad & Tobago	19.21	14.62	20.74	11.1	4.87			
Tunisia		36.02	42.15	16.57	5.98	6.36	5.43	
Turkey		26.5	16.19	8.74	8	3.25	1.53	
Venezuela	26.05	22.22	18.61	2.33	4.29	5.32	1.91	
Zambia	53.35	56.46	53.97	65.25	73.63	78.13	76.52	80.94

Note: The first reported poverty rate for any country is presented within the particular 5-year period it belongs to. The next poverty rate is that occurring five years later and so on.

Table 2. Variables other than poverty

Variable	Definition	Source/Comment
Openness to trade	Sum of exports and imports as a share of GDP	Penn World Tables (6).
Government expenditures	Government expenditures as a share of GDP	Penn World Tables (6).
Import duties	Import duties as a share of total imports	World Development Indicators, 2000.
Inflation rate	Percentage growth in CPI (100 in 1996), where CPI is derived as the ratio of current to constant consumption expenditures.	Based on Penn World Tables (6).
ILO conventions	Number of ILO conventions ratified, adjusted for denunciations.	International Labour Office.
Labor market rigidity*	Index of aggregate labor market rigidity (Range is 0 to 1 with 0=minimum rigidity)	Forteza and Rama (2001).
Democracy	Composite indicator of civil liberties and political rights: (14-political rights score-civil liberties score)/12 where scores on political rights and civil rights range from 1 (maximum rights/liberties) to 7 (minimum rights/liberties) each.	Freedom House (2003). Note: Original data is from 1972 onwards. To work with poverty data from earlier years, we assume that 1972 values applied to previous years.
Average years of schooling	Average years of schooling in the population above 15	Barro and Lee, 2000.
Quota coverage*	Own-import weighted non-tariff frequency on imported inputs and capital goods.	Barro and Lee, 1994.
Budget deficit	Overall budget deficit, including grants as a share of GDP	World Development Indicators, 2000. Note: Data pertain to central government only.
Social spending	Expenditure on health, education, housing, social security and welfare as a share of GDP.	World Development Indicators, 2000.

Note: (*) This variable is only available as a single cross-section.

Table 3. Summary statistics by region

Region	East Asia	Latin America	South Asia	Sub-Saharan Africa
Openness to trade	64.90	63.00	33.87	43.72
Import duties	9.47	11.29	21.76	18.22
Quote coverage	0.20	0.20	0.32	0.09
Inflation	7.99	152.09	9.58	23.69
Budget deficit	-3.20	-5.56	-6.23	-6.02
Government expenditures	19.75	21.72	20.01	20.54
ILO convention	9.31	36.51	23.68	28.44
Labor market rigidity	0.18	0.31	0.27	0.23
Democracy	0.36	0.58	0.46	0.23
Average years of schooling	6.09	5.18	3.04	2.52
Arable land per capita	12.09	21.32	14.41	33.53

**Table 4. Fixed effects estimates
(dependent variable is log(poverty))**

	1	2	3	4	5	6	7
Lagged poverty ^a	0.54*** (6.82)	0.23 (1.61)	0.60*** (7.57)	0.56*** (7.31)	0.54*** (6.73)	0.52*** (6.06)	0.56*** (7.00)
Openness to trade ^a	-0.32** (-2.32)				-0.36** (-2.55)	-0.39** (-2.53)	-0.38*** (-2.74)
Import duties ^b		0.25 (1.57)					
Inflation ^b			0.20 (1.62)		0.12 (0.95)	0.09 (0.66)	0.14 (1.13)
Government expenditure ^a				0.41** (2.34)	0.45** (2.57)	0.47** (2.32)	0.40** (2.31)
ILO conventions ^b					-0.05 (-0.37)	-0.05 (-0.40)	-0.09 (-0.69)
Average years of schooling ^a						-0.13 (-0.38)	
Democracy							-0.43** (-1.98)
R-square (within)	0.43	0.28	0.42	0.43	0.46	0.47	0.47
Number of Countries	42	39	42	42	42	37	41
Number of Observations	204	113	204	204	204	185	202

Notes: ^aIn the regression, this variable is included as log(variable).

^bIn the regression, this variable is included as log(1+variable).

**Table 5. GMM-IV estimates
(dependent variable is log(poverty))**

	1	2	3	4	5
Lagged poverty ^a	-0.07 (-0.37)	-0.07 (-0.39)	-0.08 (-0.39)	-0.09 (-0.42)	-0.10 (-0.44)
Lagged openness to trade ^a		-0.28** (-1.96)			
Openness to trade ^a	-0.24* (-1.91)		-0.22 (-1.19)	-1.21 (-1.56)	-0.30 (-1.44)
Inflation ^b	0.02 (0.23)	0.05 (0.42)	0.03 (0.30)	0.05 (0.51)	-0.01 (-0.06)
Government expenditure ^a	0.60*** (3.75)	0.50*** (3.27)	0.60*** (3.96)	0.51*** (4.21)	0.68*** (2.76)
ILO conventions ^b	-0.06 (-0.92)	-0.02 (-0.28)	-0.07 (-1.00)	-1.40 (-1.32)	0.14 (0.72)
Democracy	-0.45* (-1.94)	-0.40* (-1.81)	-0.47** (-1.98)	-0.44* (-1.87)	-0.40 (-1.58)
Openness*Labor abundance			-0.03 (-0.11)		
Openness*ILO				0.29 (1.26)	
Openness* Labor rigidity					0.22 (0.70)
Number of Countries	41	41	40	41	37
Number of Observations	161	161	160	161	147
2nd order serial correlation test ^c (P-value)	0.23	0.22	0.25	0.16	0.19

Notes: ^aIn the regression, this variable is included as log(variable).

^bIn the regression, this variable is included as log(1+variable).

^cThe null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 6. GMM-IV estimates
(dependent variable is either log(poverty) or log(per capita income))

	Poverty 1	Income 2	Poverty 3	Income 4	Poverty 5
Lagged poverty ^a	0.04 (0.51)		-0.05 (-0.24)		-0.06 (-0.28)
Per capita income ^a	-2.20*** (-5.73)				
Lagged per capita income ^a		0.24 (0.79)		0.25 (0.88)	
Openness to trade ^a	-0.08 (-0.92)	0.07** (2.10)	-0.26** (-2.09)	0.08** (2.40)	-0.27** (-2.10)
Inflation ^b	-0.05 (-0.37)	-0.02 (-0.67)	0.03 (0.26)	-0.02 (-0.73)	0.03 (0.30)
Government expenditure ^a	0.34** (2.31)	-0.07 (-0.82)	0.60*** (3.81)	-0.07 (-0.81)	0.68*** (4.01)
ILO conventions ^b	-0.14 (-1.42)	0.03 (1.18)	-0.07 (-0.98)	0.03 (1.20)	-0.06 (-0.83)
Democracy	-0.09 (-0.62)	0.19** (2.28)			
Political rights			-0.06 (-0.30)	0.01 (0.09)	
Civil liberties			-0.50** (-2.20)	0.24*** (2.81)	
Government expenditure* Political rights					-0.01 (-0.20)
Government expenditure* Civil liberties					-0.17** (-2.29)
Number of Countries	41	41	41	41	41
Number of Observations	161	161	161	161	161
2nd order serial correlation test (P-value)	0.15	0.18	0.22	0.17	0.23

Notes: ^aIn the regression, this variable is included as log(variable).

^bIn the regression, this variable is included as log(1+variable).

^cThe null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

**Table A1. Number of countries (observations) with distribution data by region and income levels¹⁾:
developing countries only**

	High income	Upper middle income	Lower middle income	Low income	Total
East Asia and Pacific	2(38)	1(9)	4(41)	7(22)	14(110)
Europe and central Asia	0	0	1(4)	0	1(4)
Latin American and Caribbean	0	13(87)	12(53)	1(1)	26(141)
Middle East & North Africa	0	1(1)	6(15)	1(2)	8(18)
South Asia	0	0	1(10)	4(66)	5(76)
Sub-Saharan Africa	0	3(7)	2(3)	26(65)	31(75)
Total	2(38)	18(104)	26(126)	39(156)	85(424)

1) low income(\$745 or less), lower middle income (\$746-\$2,975), upper middle income (\$2,976-\$9,205), high income(\$9,206 or more).

Table A2. Observations by distribution types

Distribution	Frequency	Percent
Consumption	175	41.3
Gross income	148	34.9
Net income	73	17.2
Income(gross/net unknown)	28	6.6
Total observations	424	100

Table A3. Regression of quintile shares on distribution types and region dummies

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Constant	0.077 (36.60)	0.122 (45.92)	0.162 (58.15)	0.226 (80.91)	0.413 (45.70)
Income/gross	-0.013 (-5.99)	-0.014 (-5.42)	-0.012 (-3.96)	-0.008 (-2.49)	0.047 (5.17)
Income/net	-0.009 (-3.79)	-0.008 (-2.45)	-0.005 (-1.63)	-0.007 (-2.30)	0.03 (2.67)
Income/unknown	-0.015 (-6.26)	-0.016 (-4.76)	-0.015 (-3.71)	-0.013 (-3.51)	0.059 (4.80)
Europe and Central Asia	-0.024 (-4.96)	-0.027 (-5.17)	-0.282 (-3.70)	-0.019 (-4.08)	0.098 (4.97)
Latin American and Caribbean	-0.027 (-13.59)	-0.033 (-13.90)	-0.026 (-9.90)	-0.016 (-5.58)	0.102 (12.22)
Middle East & North Africa	-0.013 (-3.32)	-0.02 (-3.52)	-0.013 (-2.17)	-0.02 (-3.15)	0.066 (3.38)
South Asia	0.007 (3.21)	0.003 (1.00)	0.001 (0.50)	-0.01 (-3.66)	-0.001 (-0.10)
Sub-Saharan Africa	-0.022 (-7.02)	-0.03 (-7.87)	-0.023 (-5.30)	-0.019 (-4.75)	0.094 (7.17)