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Working Paper

The fragility of the evidence on inequality, trade liberalisation, growth and poverty

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Abstract
There has been a recent resurgence of interest in the relationships between income inequality and growth, trade policy and growth, and growth and poverty. We contribute to this literature by exploring the relationships between inequality, trade liberalisation, growth and poverty in a sample of exclusively developing countries. We find moderately robust evidence for a negative effect of inequality on growth in the long run but no significant effect in the short run. However, the strength of the long-run effect is sensitive to the sample and specification, suggesting that inequality is only one measure of policy distortions that retard growth while the relationship between inequality and growth is quite different in some countries. Trade liberalisation appears to have a consistent and significant positive association with growth. There is no evidence that inequality, growth or trade liberalisation are significant determinants of cross-country variations in poverty. There is consistent evidence that, controlling for most other variables, sub-Saharan African countries experience below average growth performance, have higher inequality and higher poverty. While the empirical relationships are fragile, the analysis confirms that the fundamental determinants of inequality and poverty are country-specific factors not easily captured in cross-country regressions. This cautions against making any broad generalisations about how inequality, growth and poverty are related.

Outline

1. INTRODUCTION

The initial objective in writing this paper was to assess the evidence for a relationship between inequality, trade liberalization and poverty. This proved to be a frustrating, but we argue not entirely futile, enterprise largely because consistent comparative cross-country data on poverty are scarce. We use data from the World Bank's Global Poverty Monitor, the only source of consistent poverty headcount data comparable across countries, but this only provides more than one observation since the mid 1980s for about 30 countries. Lack of data on other variables of interest further restricted the sample. We report the results in the penultimate section. The results are weak; we find no robust evidence that inequality, or indeed growth, are determinants of cross-country variations in poverty. Poverty tends to be higher in sub-Saharan Africa (SSA), and lower in countries with higher initial income levels (unsurprising) and in countries that had a more open trade regime. We contend that this is not an irrelevant finding; any claims that are made regarding growth and poverty or trade liberalisation (even globalisation) and poverty should be interpreted with extreme caution. In this sense we reiterate the argument of Ravallion (2001) that heterogeneity of countries and the complexity of potential links between inequality, trade, growth and poverty render generalisations often misleading.

As any analysis we can undertake relating directly to poverty measures is limited, most of the paper relates to indirect approaches. Specifically, we devote most attention to exploring evidence for developing countries on the effect of inequality and trade policy on growth as economic growth is posited as being the most consistent indicator of potential gains in the incomes of the poor (Dollar and Kraay, 2000). This does not tell us about links between these variables and poverty, but it does allow us to identify factors that may indirectly affect poverty via their influence on growth.

Some researchers have circumvented the lack of direct measures by deriving measures of poverty indirectly from data on inequality (Dollar and Kraay, 2000); if those in the lower tail of the income distribution benefit proportionally from growth, then presumably the poor benefit. One difficulty with this approach is that there is no demonstrated systematic relationship between inequality and poverty, i.e. changes in inequality do not explain changes in poverty even if they tend to be positively correlated.

Quah (2001) demonstrates that the increase in inequality required to increase poverty would have to be very large, greater than empirically observed for any sustained period in any country except transition economies in the 1990s. Nevertheless, if income inequality captures the fact that (large) sections of society are significantly disadvantaged, one would expect a direct positive correlation between inequality and poverty. This correlation may be weaker across richer countries, where the relatively poor are not absolutely poor (in international terms), but if national income is low the relatively poor are likely to be absolutely poor (we focus on developing countries only).

Although growth is proposed as a determinant of poverty reduction, there is no systematic relationship between economic growth and inequality (e.g. Ravallion, 1997), and very little of the small changes in inequality observed can be explained by growth (Quah, 2001). Milanovic (2002) shows that although global inequality rose between 1988 and 1993, this was due almost completely to an increase in inequality *between* countries, while within-country inequality was largely unchanged. In other words, 'inequality is determined by factors which differ substantially across countries but tend to be relatively stable within countries' (Li et al, 1998: 27). In this context, inequality may capture country-specific effects that help to explain differences in growth between countries, which in turn may help to explain differences in poverty. Within countries over time inequality, on average, tends to change very little and researchers have not identified any consistent determinants of changes in inequality (there are few empirical regularities in the data, as shown below). To observe that inequality *on average* appears not to change in a consistent manner misses the fact that inequality does change, and such changes can affect poverty (Ravallion, 2001). While growth with stable inequality may benefit the poor, growth with redistribution, or indeed redistribution without growth, will be pro-poor (Dagdeviren et al, 2001; White and Anderson, 2001). For these reasons we consider the inequality-growth relationship and then factors relating to poverty and inequality separately.

If distribution is such that many are denied access to resources for investment and are discouraged from being entrepreneurial, inequality is directly associated with disincentives that reduce growth. In an economy where power is concentrated, distortions are widespread and rent-seeking is prevalent, we may expect to observe relatively high levels of inequality and relatively poor growth performance. In this sense

inequality is associated with policy distortions that reduce growth and probably increase poverty (as the rich look after themselves); inequality *per se* may not directly affect growth. Policy reforms could reduce these distortions without directly affecting either inequality or poverty. For example, trade liberalization (reduction or removal of trade-related distortions) should promote growth as it increases the efficiency of the economy, but the effect on inequality is ambiguous, at least in the short to medium term. Workers may shift from declining (import competing) to expanding (exporting) sectors, without any change in the overall level of income inequality or poverty. In such a case, trade liberalization is a *signal* of policy reform that reduces (some) distortions, and would be expected to be associated with increased growth rates and, ultimately, lower poverty.

We begin by considering factors relating inequality and economic performance. Section 2 provides a brief overview of the theoretical and empirical literature on the impact of inequality on growth, and identifies some implications for effects on poverty. This review is intended only to establish the context; we do not attempt to test, or discriminate between, alternative theories (nor, it should be stressed, is our empirical analysis intended to identify the determinants of growth). Section 3 presents econometric results for the relationship between inequality, trade liberalization and growth. We make use of the data that has recently been made available in the World Income Inequality Database (WIID, compiled by UNDP and WIDER) to construct a panel of developing countries, including countries from sub-Saharan Africa (SSA), for the empirical analysis. The principal finding is that inequality, and the types of policy distortions associated with inequality, are associated with lower rates of economic growth, but the result is not very robust. Section 4 presents our assessment of factors that may be influences on inequality and poverty. Neither growth nor inequality appears to be important in explaining cross-country differences in poverty in our sample; levels of poverty and inequality appear to be due to country-specific features not captured in our analysis. Section 5 presents a summary and conclusion, linking our results to the existing literature in inerquality and growth.

2. A BRIEF OVERVIEW THE LITERATURE ON INEQUALITY AND GROWTH

Most of the theoretical economics literature posits that inequality has a negative impact on growth. There are four general categories of model that explain how an unequal

initial distribution of assets and income can affect growth. For convenience these can be termed political economy, social conflict, credit market and X-inefficiency models.

The standard **political economy** explanations of the effect of inequality on growth are premised on median voter models (Persson and Tabellini, 1994; Bertola, 1993; Partridge, 1997). The logic is that political decisions to redistribute income are more likely to be made when inequality is greater, and will result in economic policies that tax investment and therefore reduce growth (Alesina and Rodrik, 1994; Persson and Tabellini, 1994). These models assume both implicit, if not actual, democracy and that redistribution is implemented in a way that reduces growth. The redistribution could have an immediate effect of reducing poverty, but the slower growth suggests this would not be sustained. While these models may have some validity for relatively advanced economies, they hardly seem an appropriate way to represent the majority of developing countries over the past three decades. The underlying mechanism is that in order to maintain support the political elite redistributes income and in doing so reduces the return on capital. There is little evidence for this in developing countries. The successful East Asian economies implemented redistribution via land reform, public spending or real wages, rather than by discouraging investment (Morrissey and Nelson, 1998). Few African or Latin American countries have redistributed income; the productivity of capital may be low, but this is not because of redistribution.

The **social conflict** models can also be viewed as political economy in nature, and perhaps more applicable to the majority of developing countries. The underlying premise is that an unequal distribution of resources is a source of political tension and social conflict. One might expect that poverty would be relatively high in unstable environments, or at least would not be falling significantly; poverty and inequality will be positively correlated. In such a socio-political environment, property rights are insecure and this discourages accumulation. The higher is the gap between the rich and the poor, the greater is the temptation to engage in rent seeking and this in turn reduces investment (Benabou, 1996). Alesina and Perotti (1996) argue that greater inequality leads to less political stability and consequently sub-optimal investment levels.[1] This

1 A number of recent studies provide evidence for the latter effect in SSA. Gyimah-Brempong and Traynor (1999) find that political instability has a direct negative effect on growth and also an indirect effect via discouraging accumulation. Guillaumont et al. (1999) find that SSA has higher levels of primary instabilities

channel finds support from Rodrik (1998) who argues that greater inequality increases the share of resources dedicated to bargaining over distribution of rent thereby slowing the political system's effective response to external shocks.

Banerjee and Duflo (2001) propose a model that combines political economy and social conflict insights. Groups in a society bargain over whether 'growth-promoting' policies will be implemented. In order to 'buy-off' the poorer group, the rich have to offer some redistribution. If insufficient redistribution is offered, the poorer group withholds support and the beneficial policies are not implemented. While consistent with some of the stylised facts, this approach has limited applicability to developing countries. First, in developing countries one rarely observes an attempt, even implicit, of an elite to offer transfers to the poor (hence poverty is not falling over time).[2] Second, the elite often resists change not because of bargaining but because it threatens their control over resources and rents. The problem in many developing countries is that no bargaining occurs. Thus, while Banerjee and Duflo (2001) are concerned to explain how (breakdowns) in bargaining give rise to changes in inequality (redistribution) that reduce growth, the fact of developing countries is that inequality is persistent.

The **credit market** channel proposed by Chatterjee (1991) and Tsiddon (1992) is underpinned by the fact that investments are lumpy and access to credit depends on the existence of collateral. Consequently, there is a credit constraint stemming from unequal initial distribution of assets, and this hinders growth. In this context, inequality of land holdings represents a constraint on growth in the agriculture sector, typically the major productive sector in poor developing countries. This is consistent with arguments that stress the importance of land reform to provide a platform for growth. A related argument is that greater income equality encourages human capital accumulation, as there are fewer liquidity constraints and investment in human capital is lumpy (Chiu, 1998). The poor would tend to face the most severe credit constraints and these models offer one explanation for why it is so difficult for the poor to lift themselves out of

(political, climatic and terms of trade) than other developing country regions, and this reduces growth by distorting economic policy so that the rate of investment is volatile, thus the growth rate is lowered.

2 This may be one reason why donors now place a 'pro-poor orientation' so high on the agenda for aid and debt relief. Arguably, such external funding of expenditures targeted on the poor obviates, or at least postpones, the need for redistributing domestic resources.

poverty. Targeted policy interventions are required to reduce poverty. Thus, this model also suggests a correlation between poverty and inequality.

A fourth approach is based on the argument that high inequality reduces the **X-efficiency** of workers. X-efficiency refers to a measure of workers' productivity holding constant all other inputs into the production process including workers' skills (Leibenstein, 1966, cited in Birdsall et al., 1995). Workers' productivity is limited by a 'virtual' glass ceiling as they do not visualise themselves progressing beyond a certain point and this discourages effort and perpetuates a vicious cycle of low incomes and therefore high inequality. Thus, inequality has a disincentive effect that retards growth. This model relates to incentives and labour productivity (and is not obviously linked to poverty), rather than investment and accumulation (that underpin the other models). As such, this can be viewed as a direct effect of inequality on growth that should be apparent even over the relatively short run. The accumulation-based models, on the contrary, are long run in nature and relate inequality to growth in an indirect way.

2.1 Empirical evidence on inequality and growth

The 1990s have seen a growing interest in research on whether inequality retards growth. The results of a number of studies are summarized in Table 1. Most empirical work has relied on the Gini coefficient or income share as measures of inequality. Birdsall et al. (1995) find weak evidence for a negative effect of inequality on economic growth (but the finding is not significant on inclusion of a Latin America dummy variable). They also find that income inequality is not significant when land inequality is included, inferring from this that unequal access to productive resources (land) is the fundamental feature of the economic structure captured by income inequality. In other words, it is not income inequality *per se* that retards growth. Alesina and Rodrik (1994) find an income inequality effect independent of land inequality, although land inequality has a greater (negative) influence on growth. Birdsall and Londono (1997) find that the significance of initial land inequality is not robust to the inclusion of a dummy for the Latin America and Caribbean region (Knowles, 2001, offers an explanation for this). Initial education inequality appears to have the greatest (negative) influence on growth among all the variables capturing initial inequality, lending support to the argument of Chiu (1998). Deininger and Squire (1998) find a negative link between initial inequality and subsequent growth, although this result is only robust for land inequality. This

negative relationship is supported by other studies. Of the seven studies in Table 1, five found a negative relationship between income inequality and growth in the long-run, while for two the effect was insignificant or not robust. Benabou (1996: Table 2) summarizes a range of studies and shows that the balance of evidence is for a negative and significant relationship.

Table 1

Overview of some studies on inequality and growth

Study	Period	Sample	Estimation	Results (on inequality)
Persson and Tabellini (1994)	1830-1985	Developed, some LDCs 'low' quality	Pooled OLS	negative effect of income share richest 20%
Alesina and Rodrik (1994)	1960-85	70 countries 'low' quality	OLS and 2SLS	negative effect of income and land Ginis
Birdsall, Ross & Sabot (1995)	1960-85	74 countries 'low' quality	Pooled OLS	negative effect (ratio of income share richest 20% to bottom 40%)
Deininger & Squire (1998)	1960-92	27 developing* 'high' quality	Pooled OLS	negative effect of land Gini but income Gini not significant
Forbes (2000)	1965-95	30 (mostly developed) 'high' quality	Panel data (four methods)	negative long-run effect but positive short-run effect of income Gini
Banerjee and Duflo (2000)	1965-95	45 or 50 countries	Panel and non-linear	no robust effect of inequality on growth; *changes* in inequality reduce growth

Source: Summary of indicated studies compiled by the authors.

Notes: Most studies report results with various samples, often using different econometric techniques; the principal results are included here. 2SLS is two stage least squares. * This study also includes results for samples with developed countries.

The differences in the results from studies of the inequality-growth relationship can be largely attributed to four factors (all identified in Table 1)—differences in data quality, time period, sample coverage and estimation methods. Data quality is a general problem in growth regressions including developing countries, but is especially acute for inequality data. The Deininger and Squire (1996) database is widely accepted as one of the most reliable sources of data on inequality and is used in the more recent studies (and

is included in the WIID data source we draw on).[3] With regard to the time period, almost all studies before 1996 are based on long period averages for a cross-section of countries, and thus capture any 'long-run' relationship. Later studies use the Deininger and Squire (1996) data that provides observations for a large number of countries over 1960-92. Forbes (2000), for example, uses sub-period panels to examine the 'short-run' relationship. She finds a positive, significant and robust relationship between inequality and growth in the medium and short run, that is, higher inequality is associated with higher growth. This is in contrast to the evidence for a negative relationship in the long run.

Another factor explaining the divergence in results is the sample coverage. Forbes (2000), for example, includes no sub-Saharan African country and half of the sample comprises OECD countries (most others are relatively rich developing countries). About half of the countries in the samples used by Deininger and Squire (1998), Barro (1999), Banerjee and Duflo (2001) are developing. The evidence suggests that the relationship is different for OECD as compared with developing countries. Another reason for differences in results could be the estimation methods. Cross-section estimation methods have many weaknesses, documented by, among others, Levine and Renelt (1992). The use of panel estimation methods to control for country and time specific effects has been precluded by the paucity of good quality data. Forbes (2000) stands out in this regard. Furthermore, the inability of cross-country work to address the effect of a change in a country's inequality level on within-country growth provides justification for use of panel data methods (Forbes, 2000).

3. RESULTS ON INEQUALITY, OPENNESS AND GROWTH

What emerges from the foregoing discussion is that there is likely to be a negative relationship between inequality and growth in the long run, although this may not be the case in the short-run. In general one would expect poverty to be higher in countries with higher levels of inequality. Research on the inequality-growth relationship has tended not to include SSA countries in the sample, nor has the potential role of trade and trade policy been explored. As trade liberalization is an indicator of economic policy shifting to a market-oriented regime with greater incentives, it should have a positive impact on

3 This paper provides a discussion of the criteria for selecting and cleaning the data and a critical discussion of the data used in earlier studies. Knowles (2001) provides a critical discussion of this data, demonstrating that the

growth. Our empirical analysis extends the literature in these two directions—focussing on developing countries and including trade variables. We first consider cross-section estimates of the long-run relationship, then panel estimates to capture short-run effects.

As with all empirical growth regressions, there is a trade-off between maintaining adequate degrees of freedom (by being parsimonious in the number of explanatory variables included) and avoiding omitted variable bias (by including the most important variables). We address this by following the specifications most commonly used in the inequality-growth literature, and reporting results when additional explanatory variables are included. In practice, we are constrained by data availability (specifically on inequality and openness) and by the problem that some explanatory variables are collinear (and hence should not be included together). The later problem can be to our advantage as some variables, such as initial GDP and inequality, can capture the influence of other potential explanatory variables, such as human capital and political regime.

3.1. Cross-section (long-run) results

For the basic 'long-run' regression we use cross-section data for 44 developing countries over 1970-95 (the list of countries and details on data sources are provided in the Appendix). The growth literature points to the importance of initial values in explaining subsequent growth. We estimate a standard version of the cross-country growth regressions now prevalent in the literature. The base specification is a modification of Lensink and Morrissey (2000), including initial inequality (*GINI*), the value of the Gini index for the year closest to 1970) but excluding aid. The basic variables in the growth regressions are the investment/GDP ratio (*INV*, average over the period), initial income per capita in 1970 (*GDP0*) and initial human capital as proxied by the secondary-school enrolment rate in 1970 (*HC0*).[4] The basic equation estimated, where the dependent variable is per capita GDP growth over the period (g), is:

$$g = \beta_0 + \beta_1 GINI + \beta_2 GDP0 + \beta_3 HC0 + \beta_4 INV + \mu \qquad (1)$$

use of income as against expenditure based measures biases the results.

4 We tried alternative human capital measures, such as average years of schooling, but the results were unaffected.

GDP0 and *HC0* are included because they have been shown to have a robust and significant impact on economic growth (Lensink and Morrissey, 2000). If *GDP0* captures convergence the expected sign is negative, but if it captures initial conditions the sign may be positive. The coefficient on *GINI* is expected to be negative. The coefficients on *HC0* and *INV*, representing human and physical capital respectively, and are expected to have positive signs.

This specification is similar to that used in most empirical work in this area (Perotti, 1996, Forbes, 2000), although precise measures of the variables differ from study to study. The variables included are widely accepted as core explanatory variables. The reasons for not including additional variables are similar to those advanced by Forbes (2000) and Perroti (1996), namely; the need to maximise degrees of freedom given the limited availability of inequality data and to facilitate comparability between studies. Nevertheless, we do include other variables relating to trade policy. We do not report the entire array of estimates that can be obtained, but do emphasise which findings are fragile and under what circumstances.[5] The results should be interpreted cautiously given the limited sample size and the exclusion of variables that others have found to be significant determinants of growth. However, the inclusion of initial GDP should capture some country-specific effects. We also include a dummy for Latin American countries (*LAdum*), as other studies have found this to be significant, and for sub-Saharan African countries (*SSA*), as there is a general tendency for an 'SSA' dummy to be negative and significant in cross-country growth regressions (Collier and Gunning, 1999). We later include trade variables.

5 These results can be compared with an earlier version (Mbabazi et al, 2001) that did not incorporate a Latin America dummy or land inequality. Omitting these resulted in more significant effects of inequality on growth.

Table 2

Cross-section regressions for GDP per capita growth

	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)
GINI	-0.06	-0.04	-0.02		
	(-2.72)***	(-2.11)**	(-1.08)		
LandGINI				-0.04	-0.03
				(-1.71)*	(-2.31)**
GDP0	-0.0004	-0.0003	-0.0003	-0.0005	-0.0005
	(-1.62)	(-1.30)	(-1.52)	(-1.74)*	(-1.91)*
HC0	0.01	-0.01		0.03	0.03
	(0.51)	(-0.60)		(1.50)	(1.60)
INV	0.32	0.32	0.28	0.25	0.25
	(7.62)***	(7.63)***	(6.85)***	(5.46)***	(5.62)***
SSA		-1.27	-1.91		
		(-1.80)*	(-2.83)***		
LAdum			-1.23	0.22	
			(-2.23)**	(0.32)	
R–squared (adj)	0.62	0.64	0.68	0.65	0.66
Observations	44	44	44	34	34

Source: Authors' estimates.

Notes: Figures in parentheses are t-ratios: ***denotes significant at 1 percent level, **significant at 5 percent and *significant at 10 percent. The F-test supports the hypothesis that all coefficients are jointly significant (i.e. rejects the null that all are zero). *HC0* is not significant even if initial GDP omitted. Diagnostic tests reveal no evidence of serial correlation or heteroscedasticity. The normality assumption of the error term is not violated and tests support the functional form used.

Table 2 presents the results from estimating the basic equation with income inequality in the first three columns. Investment is the principal 'driver' of growth, an expected result although our human capital variable is not significant. While growth may itself be a determinant of investment, implying potential endogeneity, our use of the average investment/GDP ratio implies that this should not be a serious problem for overall period growth rates. Endogeneity of inequality is not a problem as we are using the initial value of the Gini but period growth. Similarly, as the dependent variable is long-term growth it is unlikely that endogeneity of other explanatory variables is a problem. The coefficient on *GINI* is found to be negative, i.e. higher inequality results in lower growth. This result is robust to the inclusion of either regional dummy alone (we report only for *SSA*,

which is significant – *LAdum* alone is not significant), but is not robust to the inclusion of both regional dummies together (2.3).

The pattern of results shows that the regional dummies are important. In respect of the income inequality sample, 23% of the countries are SSA and have the highest mean Gini, while 41% are LA and have the next highest mean Gini; the other countries, 36% of the sample, have the lowest mean Gini (see Appendix Table A2). Thus, it is not surprising that the coefficient on *GINI* is insignificant when both regional dummies are included. Inequality in distribution of land (for which the total sample is smaller) is highest for LA (44% of the sample); SSA accounts for 15% of the sample, and has a mean *LandGINI* above that of 'others' (Table A2). Again, including both regional dummies should eliminate the significance on *LandGINI* (and it does, results available on request).

The final two columns report results using data for inequality in the distribution of land (*landGINI*) based on the smaller sample. Contrary to Birdsall and Londono (1997), we find that the significance of initial land inequality is robust to the inclusion either regional dummy alone (but not to including both), and *LAdum* is not significant. However, the significance of land inequality is not robust to the exclusion of Argentina, Israel and Venezuela (all of which have very high land inequality and relatively high initial GDP). If these are omitted from the sample, the coefficient on *LandGINI* is insignificant but that on *GDP0* is negative and significant (results available on request). This suggests that, excepting these countries, land inequality and initial GDP are negatively correlated and it is not possible to distinguish the two effects. This supports the claim that land inequality captures inherent growth-retarding distortions that are reflected in initial values. Overall, the results in Table 2 reveal the difficulty inherent in cross-country growth regressions: growth experiences are heterogenous and it is difficult to identify variables for all countries that are consistently significant. Investment is the only such variable in our case. Note that initial GDP is generally insignificant, while coefficients on inequality are generally robust, but both capture similar country effects for most of the sample. As both measures of inequality are higher for SSA and LA, which together account for about two-thirds of each sample, the insignificance of inequality when both are included does not imply that inequality is unimportant. Rather, there appear to be unobserved features of these regions that may be associated with high

inequality and low growth; we need to look for other variables that discriminates between countries in these regions.

It is well known that collinearity causes the sampling variances, standard errors and covariances of the least squares estimator to be large, implying high sampling variability and wide interval estimates and consequently reduced precision of the estimates. The literature points to possible correlation between physical capital investment (*INV*) and investment in human capital (*HC0*) as well as correlation between income inequality and secondary school enrolment.[6] This is not strongly supported by our dataset, with correlation coefficients of 0.24 and -0.048 respectively. As the coefficient on *HC0* is not significant, this is the variable we choose to drop. In doing this we follow other studies, such as Clarke (1995), Deininger and Squire (1996). This implies that the coefficient on *GINI* includes any indirect effect of income inequality on growth through its effect on education (Knowles, 2001).

We now introduce indicators of the trade regime into specification (1). There is a large literature on the relationship between trade policy and growth, and the difficulties of measuring trade orientation are well known (see Edwards, 1993, 1998; Greenaway *et al*, 1998; Milner and Morrissey, 1999; Rodrik, 1992, 1998, 1999). Given the problems of measuring openness we use two of the more widely accepted measures. The Black Market Premium (*BMP*, defined as (black market rate/official rate)-1) is a good indicator of the overall level of distortion in the economy as it captures the deviation of the exchange rate from its market level. The second indicator is the proportion of years between 1965 and 1990 that an economy could be considered open, the Sachs-Warner index (*OPEN*). Both measures are drawn from Sachs and Warner (1997). It should be noted that few of the African economies liberalized much before 1990. The choice of the indicators is driven by their demonstrated robustness in empirical studies (Harrison, 1996; Edwards, 1998).[7] Again, we emphasize that we are seeking to identify correlations and the results should not be interpreted as implying a causal relationship.

6 Indeed, Li et al (1998) found that higher values of initial schooling and civil liberties were strongly associated with lower levels of inequality. As initial GDP seems to capture the schooling effect in our sample, inequality may be capturing the restrictive political regime, at least in part.

7 Dollar and Kraay (2001) in a study with a similar focus to ours, use a trade volume measure to capture trade policy. The disadvantage with their approach is that one must infer policy from observed volume changes (that may be attributable to non-policy factors in an unsystematic way). As our concern is to capture the

Table 3

Cross-section estimates with openness indicators

	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)
GDP0	-0.0005	-0.0004	-0.0004	-0.0002	-0.0002
	(-2.32)**	(-2.07)**	(-1.87)*	(-1.15)	(-1.09)
INV	0.31	0.27	0.26	0.19	0.17
	(7.85)***	(6.13)***	(5.74)***	(4.08)***	(3.90)***
SSA	-1.07	-0.77	-1.19	-1.81	-1.64
	(-1.95)*	(-1.41)	(-2.19)**	(-3.13)***	(-3.02)***
BMP	-0.85			-0.97	
	(-2.13)**			(-1.52)	
OPEN		1.95	1.94		1.85
		(2.17)**	(2.48)**		(2.45)**
GINI	-0.03	-0.04			
	(-1.64)	(-2.32)**			
landGINI				-0.51	-0.04
				(-3.64)***	(-3.57)***
R-squared (adj)	0.71	0.67	0.66	0.72	0.75
N	44	44	44	34	34

Source: Authors' estimates.

Notes: As for Table 2. The F-test supports the hypothesis that all coefficients are jointly significant and diagnostic tests support the specification.

The results from cross-section estimation are in Table 3, representing the addition of trade openness variables to the regressions in Table 2. Column (3.1) shows that when *BMP* is included it has a negative and significant coefficient whereas the coefficient on *GINI* becomes insignificant. This may indicate possible collinearity between *GINI* and *BMP* although the correlation between the two is relatively low (0.295). A plausible interpretation is that *BMP* and *GINI* do not always proxy for the same distortions, but they do in general. In other words, in the spirit of Birdsall et al. (1995), the results suggest that it is not inequality *per se* that retards growth but inequality is associated with the types of distortions that retard growth, and these are often captured by the *BMP*.

signal of trade policy change, the openness measure used here (and the timing of liberalization measure used below) is appropriate, if imperfect.

We note in passing that if *LAdum* is included in the regressions of Table 3 without *SSA*, it is not significant and other coefficients are largely unaffected. If both the regional dummies are included together, the effect is as for Table 2 (results available on request). The persistent result for the dummies is that *LAdum* is insignificant in the regressions with land inequality. The probable explanation is that growth performance is generally better in LA than SSA. As LA has the highest land inequality, but not the lowest growth, the regional effect is captured by *LandGINI* in those regressions.[8] As SSA has the lowest growth, there is a regional effect independent of inequality.

The significant coefficient on *OPEN* is robust to the inclusion of *GINI* or *LandGINI*. Openness appears to be conducive to growth. Note that the correlation between *GINI* and *OPEN* is very low (-0.07). When *OPEN* is included on its own (3.3), the coefficient is positive and significant while the SSA dummy is negative and significant, notwithstanding the fact that SSA countries only liberalized their trade regime towards the end of our sample, hence the value of *OPEN* will be low for them. When both *OPEN* and *GINI* are included, *SSA* becomes insignificant. The results in (3.2) suggest that the combination of restrictive trade policies and income inequality account for the SSA effect. This is not apparent in the case of inequality in the distribution of land (3.5), although there are only five SSA countries in that smaller sample. That feature of SSA that retards growth is, we suggest, policy distortions associated with high inequality and low openness.

Although the explanatory power is quite acceptable for cross-country growth regressions, we would not attach too much weight to these results; significance levels are sensitive to which variables are included, a typical result of such regressions. As *GINI* is an initial value, growth is an outcome over the whole period and trade liberalization is an event at some point during the period, the specification estimated here may be misleading. The *OPEN* variable is the proportion of the time a country was liberalized, and will be higher the earlier the country liberalized (and very low for most SSA countries). Political economy models would predict that high inequality is associated with distortions to the economy, and should discourage liberalization. These models do not, however, predict what would happen when liberalization occurs. On the one hand,

8 If Argentina, Israel and Venezuela are excluded from the sample (as outliers on *GDP0*), the coefficient on *GINI* in (3.2) becomes insignificant, although other results in table 3 are largely unaffected.

one may expect that high inequality implies that the benefits of liberalization will be unevenly distributed. On the other hand, liberalization itself may be a sign that inequality (or at least the distortions induced by inequality) is being reduced. It is therefore important to try and locate the timing of openness, hence the need for the panel approach undertaken in the next section.

3.2 Panel data (short run) estimates

This section employs panel estimation methods to investigate whether there is a difference in the long and short run effects of inequality on growth, and the relationship of this to trade liberalization. A panel is constructed of five 5-year time periods running from 1970-4 to 1990-4. A sub-set of the countries in the cross-section analysis is used (determined by data availability). The indicator of the timing of trade liberalization used is the Sachs and Warner (*SW*) index, a dummy variable taking a value of 1 for each year beginning from the year when liberalization is said to have occurred and 0 before this.[9] We also augment the Sachs-Warner index (*SWaug*) to add another five countries using our judgement of when they liberalized (see Appendix). Investment is Gross Domestic Investment as a percentage of GDP averaged over the five year period (*GDIP*). The *GINI* is income inequality at the start of the five-year period, or as near to then as available (from WIID). A period dummy (*PDum*) is used for 1980-94, during which most of the sample liberalized their trade regime. Starting income is measured as the log of initial GDP (*GDP0*) in each period. We do not include region dummies (*SSA* and *LAdum*) because they give rise to collinearity and prohibit estimation of the fixed effects model (we tested for the appropriate form of estimator for all panel regressions).

Results are reported in Table 4. The coefficient on *GINI* is insignificant, in contrast to Forbes (2000) who finds these to be positive and significant. The difference in the results can be attributed to several factors, notably differences in samples, data and estimation technique—Forbes (2000) used GMM estimators but our data are inadequate to avail of that particular technique. In our sample, there is no consistent pattern of within country variation in inequality – some exhibit large changes, positive or negative, but most exhibit small changes – and this is one reason why the variable is not significant in the panel regressions. More generally, within country changes in inequality

9 We are grateful to Peter Wright for providing the data. We also tried the World Bank and Dean indicators used in Greenaway, Morgan and Wright (1998), but the coefficient was insignificant in almost all specifications.

do not appear to be determinants of period (short-run) growth. As previously, investment is a major determinant of growth, and there is evidence for convergence within the sample. We find evidence that trade liberalization, as proxied by the SW (or our augmented SW) index, is associated with higher growth. Note that the period dummy has a negative coefficient (only significant if openness indicators included), implying that liberalization offset some other negative effect on growth.

This equation may be mis-specified as *GDIP* is likely to be endogenous, i.e. growth is a determinant of average investment rates during each period. Endogeneity of inequality does not appear to be a problem—growth does not appear to be an influence on the change in inequality (results available on request). To address the problem of endogeneity of investment, we re-estimated the equation without investment, but including initial education level (*SEC*, initial values of secondary school enrolment rates for each period) as a proxy for initial capital.[10] In Table 5 the results suggest that trade liberalization does promote growth, whereas inequality independently appears to have no short run effect on growth. There is weak evidence of convergence, and that countries with higher levels of human capital tend to exhibit higher rates of growth. There is also evidence that growth performance was generally poor in the 1980-94 period, due to factors not specified in our model. The only robust results are that investment (in physical or human capital) and opening up to trade are associated with higher growth, whereas countries with lower initial GDP tend to grow less. As higher inequality tends to be associated with lower GDP, this may be one reason why there is no significant effect of inequality.

10 We also tried alternative measures of human capital, but the coefficients were never significant.

Table 4

Panel regressions with Sachs-Warner indices

	(4.1)	(4.2)	(4.3)	(4.4)
GINI	0.0004	-0.0003	0.0006	0.0006
	(0.96)	(-1.02)	(1.29)	(1.58)
GDIP	0.002	0.002	0.002	0.002
	(2.62)***	(4.03)***	(3.44)***	(4.31)***
GDP0	-0.02	-0.008	-0.02	-0.02
	(-2.01)**	(-3.00)***	(-2.53)**	(-2.81)***
SW		0.023		
		(4.76)***		
SWaug				0.02
				(3.41)***
PDum	-0.01	-0.02	-0.01	-0.01
	(-1.66)	(-3.79)***	(-1.58)	(-3.06)***
R^2 (adj)	0.38	0.29	0.40	0.46
N	129	129	145	145

Source: Authors' estimates.

Notes: As for Table 2. The Lagrange Multiplier test did not reject the null hypothesis that pooled least squares (POLS) is appropriate against an alternative of fixed or random effects in (4.2) Where appropriate, the Hausman test was used to choose between Random Effects and Fixed Effects models. Tests supported the efficiency of fixed effects models for (4.1), (4.3) and (4.4). Further results available on request. We experimented with initial and lagged GDI separately but the coefficients were negative (and significant in some instances). These probably capture an initial GDP effect, hence the negative coefficient implies convergence.

Table 5

Panel regressions excluding investment

	5.1	5.2	5.3
GINI	-0.0001	-0.0001	0.0003
	(-0.33)	(-0.38)	(0.64)
SEC	0.0005	0.0004	
	(2.82)***	(2.42)**	
GDP0	-0.01	-0.01	-0.01
	(-1.92)*	(-2.42)**	(-1.55)
PDum	-0.02	-0.03	-0.02
	(-4.74)***	(-5.68)***	(-3.32)***
SWaug		0.02	0.01**
		(4.11)***	(2.35)**
R^2 (adj)	0.17	0.24	0.37
N	132	132	148

Source: Authors' estimates.

Notes: As for Table 4. Tests supported the efficiency of POLS for (5.2) , whereas random effects estimates are reported in (5.1) and fixed effects in (5.3). Further results available on request.

4. INFLUENCES ON INEQUALITY AND POVERTY

The results in the previous section suggest that inequality is associated with lower growth in developing countries over the long run, although one cannot infer that inequality itself is a significant constraint on growth. Higher inequality is associated with lower growth, so initial inequality (at the start of the long-run period, around 1970) should be an indicator of poverty at the end of the period (the 1990s). If high inequality is associated with poverty, this effect should be persistent. We test this in the second sub-section below. First, we explore factors influencing differences in inequality and then poverty across countries. We have insufficient data to consider factors influencing changes in inequality or poverty.

4.1 Differences in inequality across countries

Li et al (1998) identify four factors that appear to explain about three-quarters of the variation in income inequality across countries -measures of initial schooling, civil liberties, inequality in the distribution of land, and financial development (the ratio M2/GDP). All of these seem to be significant indicators of the share of income going to the poor, which is higher the higher is schooling, civil liberties, financial development and equality in the distribution of land. As we have a different sample and dataset, we

cannot replicate their analysis. We posit that initial GDP captures some of the effects associated with civil liberties, and include a measure of schooling. We then test if land inequality, trade variables and regional dummies help to explain variations in inequality.

Three of the variables deserve some explanation. As observed earlier, land inequality is significantly higher in Latin America, but there is no reason to suppose that the relationship between land and income inequality is uniform across regions. Thus, we interact these two variables such that *LNDLA* captures the effect of land inequality in LA. More generally, the effect of land on income inequality should be related to relative land abundance (*NRE* measures land area per worker), thus *LANDNRE* interacts *LandGINI* with *NRE*. Higher values imply greater inequality in land abundant economies. We also include *SSA* and a variable to capture natural or non-policy barriers to trade (*NBT* is a measure of transport costs, higher values being a barrier to trade). The latter could be important if countries facing lower trade barriers can expand trade, thereby supporting growth, and alter the composition of trade (spreading the benefits wider and reducing inequality). For this reason in some specifications we interact *NBT* and *OPEN*.

The results are in Table 6. The specification explains 40-50% of the variation in income inequality (in the 1990s) across the countries. Initial GDP (in 1970), schooling (*ALPC*, the percentage of pupulation with primary education completed) and *OPEN* are generally insignificant. Income inequality is higher in SSA and in LA (given that land inequality is higher in LA). Controlling for these regional effects, income inequality is lower the higher are natural barriers to trade and *LANDNRE*. These results appear surprising, and suggest that land inequality (in land abundant countries) and natural barriers to trade are not necessarily determinants of income inequality. Countries that have adopted policies (not captured directly here) to address the constraints imposed by land inequality and barriers to trade have lower income inequality, and such countries do not appear to be in SSA or LA. The significant result, however, is that it is features of countries, or specifically regions, that are associated with higher income inequality. Structural features that vary across countries (income, schooling, trade barriers) do not consistently explain variations in levels of inequality. This suggests that income inequality is indeed an outcome of policy decisions, rather than structural characteristics,

thereby lending support to our interpretation of inequality in the previous section as capturing features of policy in a country that are associated with lower growth.

The results are clearly sensitive to outliers and to specification, i.e. they are fragile. The results for regression (6.4) are instructive in this respect. With this combination of variables, *SSA* is no longer significant and higher education is associated with lower inequality. As SSA countries tend to have a (near) zero value of *OPEN* they will have relatively low values (typically zero) of *NBT*OPEN*. Countries with open trade policies tend to have higher income inequality if natural barriers are high. This merely reinforces the point that the relationship between trade policy and inequality is not a general one, it depends on other factors. One factor we have identified is transport costs. The general result remains that structural features of the economy are not robust determinants of variations in levels of income inequality.

Table 6

Cross-section influences on level of inequality

	(6.1)	(6.2)	(6.3)	(6.4)
GDP0	0.23	0.001	-0.0014	0.003
	(0.28)	(2.06)*	(-0.47)	(1.00)
PCGROWTH		0.82		0.52
		(0.93)		(0.57)
ALPC	-0.04	-0.33	-0.23	-0.72
	(-0.14)	(-1.31)	(-0.82)	(-3.29)***
LNDLA	0.19	0.18	0.20	0.18
	(6.26)***	(3.99)***	(5.56)***	(4.90)***
LANDNRE	-0.01	-0.008	-0.01	-0.007
	(-3.93)***	(-3.38)***	(-3.30)***	(-3.54)***
SSA	11.76	11.67	11.97	9.21
	(2.55)**	(1.98)	(2.63)**	(1.72)
NBT	-100.87		-94.80	
	(-3.156)***		(-2.24)**	
OPEN	0.23		2.91	
	(0.06)		(0.84)	
*NBT*OPEN*		0.41		5.57
		(0.11)		(1.98)*
R^2 (ADJ)	0.40	0.32	0.46	0.32
N	28	28	25	25
F (PROB)	0.01	0.07	0.01	0.05
	with outliers	with outliers	no outliers	no outliers

Source: Authors' estimates.

Notes: As for Table 2. Dependent variable is the value of *GINI* in the 1990s. *ALPC* is average percentage of primary school completed in total population, comparable to initial mean years of secondary schooling used in Li et al (1998). *LNDLA* is the interactive term *landgini* LaDum*, *LandNRE* is the interactive term for *landgini* NRE*. The outliers are Argentina, Israel and Venezuala.

4.2 Variations in poverty

Adequate data on poverty are not available for all of the countries included in the previous analysis and the data that are available only provide observations after 1985 (World Bank, 2001; Hanmer and Naschold, 2001). We constructed the following dataset. For each of 32 countries there are two observations of poverty, *POV1* (1985-90) and *POV2* (after 1990) – observations for another two countries are available only for *POV2* (see Appendix). The explanatory variables used are all lagged (i.e. they refer to an

earlier period) and we include initial GDP, initial inequality, *OPEN* and *SSA*. We here present some exploratory analysis using this data.

Table 7

Cross-section influences on level of poverty

	POV1	*POV1*	*POV2*	*POV2*
GDP0	-0.001	-0.0082	-0.01	-0.01
	(-2.47)**	(-1.364)	(-2.77)***	(-2.61)**
GINI	-0.14	-0.54	-0.14	-0.36
	(-0.39)	(-1.91)*	(-0.53)	(-1.35)
OPEN	-13.08	-9.42	-20.60	-18.27
	(-1.79)*	(-1.521)	(-3.67)***	(-3.35)***
SSA	27.94	24.40	18.03	16.98
	(4.28)***	(4.08)***	(3.13)***	(3.28)***
R^2 (adj)	0.43	0.43	0.46	0.46
N	32	30	34	32
F (prob)	0.001	0.001	0.0002	0.0003
	With outliers	no outliers	With outliers	no outliers

Notes: Figures in parentheses are t-ratios: *** denotes significant at 1 percent level, ** significant at 5 percent and * significant at 10 percent. The F-test supports the hypothesis that all coefficients are jointly significant (i.e. rejects the null that all are zero). *SEC* is not significant even if initial GDP omitted. Diagnostic tests support the functional form used. Outliers for column 2 and columns 4 are Venezuela for GDP0[11], and Zambia for Gini, Pov1 and Pov2.

The results are presented in Table 7. The only robust result is that poverty is higher in SSA. There is fairly robust evidence, at least for *POV2*, that poverty is lower in countries with higher initial income. While this is unsurprising, note that growth tends to have been slower in countries with higher *GDP0*, controlling for other factors, suggesting no consistent influence of growth on cross country variations in poverty. Indeed, when growth was included as an explanatory variable the coefficient was insignificant (see below). As we can only observe end of period poverty, we cannot infer that growth does not reduce poverty. However, there is also fairly robust evidence that more open countries have lower poverty, and openness is quite a consistent determinant of growth.

11 Argentina and Israel are also outliers in GDP0 but are already omitted because of missing values for Pov1 and Pov2.

This evidence is consistent with the argument of Fane and Warr (2001) that it is the sources of growth, accumulation and technical change and whether in agriculture or other sectors, that determines the effect on poverty. In other words, the results are consistent with the argument that it is the pattern of growth, not growth itself, that is important for poverty.

Implicit in the cross-section approach is the assumption that the coefficient on the explanatory variables is the same for each country. It follows that we can treat each observation of poverty as independent and pool the sample (i.e. we assume the coefficient on the explanatory variables are the same for each country over time in addition to assuming the coefficients are the same for all countries). Thus, to permit a larger sample for the exploratory analysis, we pool the data. The results are in Table 8, where *growth* refers to the difference of log GDP per capita between 1980 and 1984 for *POV1* and between 1985 and 1989 for *POV2*. The coefficient on *growth* is insignificant, supporting the arguments above, but countries with higher levels of human capital tend to have lower poverty. Controlling for the other variables, SSA countries have higher levels of poverty. Inequality here appears to be negatively associated with poverty (significantly so when we omit outliers). Accounting for the tendency of poverty to be higher in SSA and lower in countries with high levels of secondary enrolment, it appears that poverty is lower in countries with high inequality. Openness appears to have no independent effect on poverty.

Table 8

Influences on poverty, pooled sample

	8.1	8.2	8.3	8.4
Growth	-57.26	-95.36	-68.14	-107.64
	(-1.25)	(-1.94)*	(-1.65)	(-2.38)**
GDP0		-0.007		-0.005
		(-1.79)*		(-1.85)
SEC	-0.53	-0.45	-0.47	-0.42
	(-3.37)***	(-2.77)***	(-3.74)***	(-3.29)***
GINI	-0.53	-0.45	-0.75	-0.74
	(-1.6)	(-1.38)	(-2.52)**	(-2.56)**
OPEN	-4.61	-2.80	1.23	2.91
	(-0.50)	(-0.31)	(0.17)	(0.41)
SSA	26.92	23.68	27.23	24.49
	(3.66)***	(3.21)***	(4.28)***	(3.87)***
R^2 (adj)	0.52	0.54	0.57	0.60
N	45	45	41	41
F (prob)	0.00	0.00	0.00	0.00
Estimator	POLS	POLS	POLS	POLS
	With Outliers	With Outliers	No Outliers	No outliers

Source: Authors' estimates.

Notes: As for Table 7. Results for tests for choosing between POLS, FEM and REM are available on request. The countries excluded as outliers are Botswana, India, Jamaica and Zambia. The model was estimated with *NRE* but the coefficient was insignificant. A version with a smaller sample was estimated with *SWaug*; the coefficient was insignificant and otherwise results were similar.

Our data only relate to poverty levels (there are too few observations to construct a reasonable sample for changes in poverty). As it would take time for growth to affect poverty, and the responsiveness of poverty to growth will differ across countries, it is perhaps not surprising that we fail to find evidence that previous period growth rates help to explain relative levels of poverty. We do find that higher levels of human capital are associated with lower poverty. To the extent that long-run growth is associated with rising levels of secondary school enrolment, this suggests a pro-poor pattern of growth (i.e. growth that reduces the poverty headcount). Similarly, a sustained relatively open trade regime also appears to be part of a pro-poor growth pattern (in Table 7), although this finding is not robust. Similarly, there is no robust evidence that inequality is a determinant of poverty although poverty, like inequality, is consistently higher in SSA.

5. CONCLUSIONS

The manner in which inequality, growth and poverty are related and whether trade policy has an influence are important empirical questions. Income inequality tends to be associated with (or even a proxy for) inequalities in the distribution of power. High inequality will be associated with distortions in the economy, such as high levels of protection, and incentives for rent-seeking behaviour. These in turn tend to reduce growth. Thus, inequality and restrictive trade policies will tend to be correlated, at least in the long run, and both associated with lower growth. Trade liberalization is an indicator of economic policy reform in which distortions are reduced and market incentives increased. Consequently, it should be growth-promoting, but may not have any systematic effect on inequality. In general, one expects poverty to be higher if growth is lower and/or if inequality is higher. These are the relationships we set out to explore. Ultimately, we must conclude that the empirical evidence is fragile for developing countries.

Section 3 uses cross-section and panel econometric techniques to investigate the links between growth, inequality and trade liberalization. A number of general conclusions emerge from our sample of 44 developing countries for the 'growth regressions', and these are in line with the results of other studies summarised in Section 2. First, inequality does tend to retard growth in the long run (there is no evidence for a short-run effect), whereas trade liberalization tends to be associated with increased growth (in both the long and short run). However, when we included the black market premium as a measure of policy distortions, the coefficient on inequality was insignificant. Similarly, the inclusion of dummies for SSA and Latin America eliminated the effect of inequality. We infer from the results that inequality captures country-specific policy features that retard growth. Other controls for policy or region can eliminate the inequality effect. Africa does appear to be different—SSA countries have a below average growth performance that cannot be explained fully by the variables we consider, including inequality. We do find that the combination of income inequality and restrictive trade policies do appear to account for the negative 'SSA effect' on growth.

The four theories proposed to explain the relationship between inequality and growth in Section 2 can now be evaluated against the evidence in this paper.

- The **political economy** models are all premised on some version of an argument that inequality encourages redistribution policies that then reduce growth. An implication is that inequality that leads to redistribution reduces growth but should also reduce future inequality. There is no convincing evidence for this. Banerjee and Duflo (2001) find that inequality tends to change least in countries with high inequality, i.e. these countries do not redistribute income to a significant degree. Redistribution is most prevalent in richer economies, for which Forbes (2000) finds that higher inequality is associated with higher growth in the short run (which is not support for these models). There is no evidence for a consistent pattern of redistribution, which may be one reason why there is no consistent relationship with poverty. Our evidence is that inequality has a consistent long-run negative effect on growth in developing countries.

- **Social conflict** models can be considered as alternative 'socio-political economy' models, in which inequality increases tension and conflict (perhaps because it does not lead to redistribution). Conflict and social tension discourage accumulation and therefore growth. If this type of model can be interpreted as representing elite rent-seeking and corruption as social conflict measured by inequality, then this is supported by the evidence for developing countries. Higher inequality results in lower growth, and the elites behind this effect withstand pressures for redistribution.

- **Credit market** models are based on the observation that the poor are constrained in their ability to access credit, therefore invest less and growth is lower. Our results do not test such hypotheses, even indirectly, although we do find that investment is a driver of growth. Future research could explore whether inequality does indeed constrain the level and/or productivity of investment.

- The **X- efficiency** models are appropriate to catch the direct effect of inequality in reducing incentives for effort, hence slowing dynamism and growth. Such effects should be observable in the short-run, but we find no evidence for a negative short-run relationship between inequality and growth in developing countries.

We then presented an exploratory analysis of the influences on variations across countries in inequality and poverty. The only strong patterns in the data are that structural features (initial GDP, schooling, openness) do not explain cross-country variations in inequality; most of the explanatory power comes from regional dummies and land inequality (a policy rather than structural variable). We found no evidence that differences in growth rates or inequality are associated with cross-country variations in levels of poverty. However countries with less restrictive trade policies over a sustained period and those with higher initial levels of income tend to have lower levels of poverty at the end. Again SSA is different, and exhibits higher levels of inequality and poverty.

We do not identify the factors explaining differences in levels of poverty across countries, but we do identify some factors that are important. Countries with lower levels of poverty tend to be those that invested in human capital and sustained a relatively open trade regime. In such countries, relatively high levels of inequality are not associated with relatively high levels of poverty (if anything, the reverse is the case). Thus, just as we argued that inequality *per se* may not be a constraint on growth, inequality itself is not a bar on reducing poverty. It is the policy distortions that tend to be associated with high levels of inequality that retard growth, and it is the patterns of growth, rather than growth itself, that determines the effect on reducing poverty. Our results also caution against concluding that a pattern of growth that reduces inequality *automatically* reduces poverty. Some countries with relatively high levels of inequality nevertheless have relatively low levels of poverty.

The major conclusion from our analysis is that the aggregate relationships between inequality, growth, trade and levels of poverty are fragile. Inequality does not appear to have a robust influence on growth that is independent of policy distortions or regional effects. Relative income levels do not explain variations in inequality across countries, and growth does not explain variations in poverty across countries. We can go beyond the simple statement that 'policy matters' to state that policies rather than structural characteristics are the fundamental determinants of inequality and poverty. The types of policies that promote growth may not reduce inequality or poverty. This message is consistent with many of the papers cited in Section 1 (e.g. Banerjee and Duflo, 2001; Dagdeviren et al, 2001; Quah, 2001, Ravallion, 2001). However, the types of policies that reduce inequality are likely to be conducive to growth. Furthermore, policies that

promote growth and reduce inequality are the most likely to reduce poverty. Our results suggest two such policies, education and trade openness (the latter because it reduces distortions rather than because trade *per se* is good for the poor), but there are likely to be others. Cross-country analysis can be useful to identify patterns and suggest issues to focus on, but much of what happens is country specific. Future research will need to focus on individual countries to explore the patterns of growth and how these are related to inequality and poverty reduction. If we achieve no more than to convince readers to interpret cross-country evidence on inequality, growth and poverty with extreme caution and to eschew generalisations based on such evidence, we would be content.

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Appendix: List of variables and data sources

GDP0 = GDP per capita in 1970

GROWTH = average real per capita growth rate over 1970-95 period

INV = average investment to GDP ratio over 1970-95 period

BMP = Black Market Premium, computed as [(black market rate/official rate)-1]

OPEN = Proportion of the years between 1965 and 1990 that the economy is considered to be open by the criteria set by Sachs and Warner (1997).

HC0 = Secondary school enrolment rate (1970)

SEC= *S*econdary school enrolment rate at start of period.

ALPC = Average percentage of primary school complete in total population

GINI = Gini coefficient of income inequality (1970 or as close as possible to 1970).

Landgini = Land concentration Index (Gini in1970 or as close as possible to 1970)

SSA = dummy variable with the value of unity for countries in Sub-Saharan Africa and zero for all others

Ladum = dummy variable with the value of unity for countries in Latin America and the Carribbean region and zero for all others

POV1 = Average Headcount Index (% below $ 1 per day PPP 1993) 1985-89

POV2 = Average Head count Index 1990-94.

LNDLA = Interactive term *landgini* LaDum*,

LandNRE = Interactive term for *landgini* NRE*

GDIP = Average period investment to GDP ratio

Pdum = dummy variable with the value of unity for period 1980-1994

SW =Dummy capturing Sachs and Warner openness indicator taking value of 1 when countries liberalised

SWAug = Augmented SW index using our judgement of when 5 countries liberalised.

NBT = CIF/FOB factor

Sources are *World Development Indicators 1997 and 2000* (CD-ROM), Barro–Lee data set, World Income Inequality Database (WIID), Sachs and Warner (1997), IFAD (2001) for LandGini, International Financial Statistics Yearbook 1995 (CIF/FOB factor)

Descriptive summary statistics

Series	N	Mean	Std dev	Minimum	Maximum
GDP0	44	1052.7	1100.8	92.2288	5736.6
GINI	44	46.8132	11.4625	27.9	79.5
HC0	44	25.5682	14.9688	1.000	59.000
INV	44	21.7489	5.5350	10.5600	35.45

Table A1 Additional countries for augmented Sachs-Warner index

	1970-4	1975-9	1980-4	1985-9	1990-4
Egypt	0	0	0	0	1
Nepal	0	0	0	0	1
Madagascar	0	0	0	1	1
Nigeria	0	0	0	1	0
Turkey	0	0	0	1	1

Table A2 Regional Variations in Inequality

	Income Gini			
	SSA	*LA*	*Others*	*All*
Mean	54.12	49.14	39.63	46.81
StDev	13.76	8.28	9.39	11.46
N	10	18	16	44
	Land Gini			
	SSA	*LA*	*Others*	*All*
Mean	62.5	81.86	53.04	67.15
StDev	15.15	4.35	13.85	17.25
N	5	15	14	34

Table A3: Sample and Data on Gini and Poverty

Country	*GINI*	*Land Gini*	*Diff Gini*	*POV1*	*POV2*
Botswana	57.4		-9.4	33	15.42
Egypt	35	45.87	-3		
Nepal	53	57	36.7	42.13	39.77
Kenya	47.9	68.41	9.6	45.76	33.54
Madagascar	39.1	80.4	4.34	49.18	60.17
Niger	29.2		21.3	65.72	57.80
Nigeria	60.34		-22.87		52.17
Senegal	51.3	49.27	2.82	58.08	32.63
Sierra Leone	61.17	44.32	1.73		
South Africa	53	70.1	6		11.47
Tunisia	50.19	64.56	-9.19	1.67	1.26
Zambia	79.5		-27.1	87.49	63.88
Zimbabwe	62.3		-9.44	40.46	35.95
Costa Rica	50	81.33	-3	18.9	10.32
Dom Rep	49.28	81.97	1.61	7.73	3.19
El Salvador	46.53	80.97	-0.53		
Guatemala	29.96	84.84	29.54	43.43	51.37
Honduras	44.23	77.88	9.47	44.67	41.35
Jamica	41.272	80.59	-3.35	4.58	3.08
Mexico	45.54	74.7	8.16	12.05	15.61
Panama	57	77.78	-0.2	16.57	14.95
Argentina	35.3	87.3	10.7		
Bolivia	53		-1	10.7	11.28
Brazil	57.61	85.21	2.49	18.41	13.19
Chile	46		10.5	10.2	5.45
Colombia	52.02	85.92	5.18	4.47	2.82
Ecuador	62.5	81.55	-11.18	24.85	24.55
Guyana	56.16		-15.94		
Thailand	42.63		6.17	25.91	4.11
Peru	59.41	76.6	13.21	1.14	12.31
Uruguay	49.68	80.34	-7.6		
Venezuela	49	90.96	-2.2	7.55	8.93
Bangladesh	34.34	41.87	-6.04	27.86	32.47
China	27.9	21.1	-8.31	11.11	17.10
Hong Kong	43		9		
India	30.38	61.44	-0.68	72.96	44.21
Indonesia	34.6	55.59	2.44	28.08	16.32
Israel	30.87	75.49	-0.31		
Turkey	56	57.79	-5		
Korea	33.3	35.12	1.66		
Malaysia	50	58.26	-1.65	12.69	4.3
Pakistan	32.3	50.81	-1.1	49.63	37.54
Philippines	49.41	50.93	0.19	20.53	16.15
Sri Lanka	31.16	66.7	-5.44	9.39	5.19

Notes: Gini is the initial value (nearest to 1970); *DiffGINI* is the change in Gini coefficient over the 1970-94 period.

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