WPS3981

Openness, Inequality, and Poverty: Endowments Matter*

Julien Gourdon[1]

Nicolas Maystre[2]

Jaime de Melo[3]

Abstract

Using tariffs as a measure of openness, this paper finds consistent evidence that the conditional effects of trade liberalization on inequality are correlated with relative factor endowments. Trade liberalization is associated with increases in inequality in countries well-endowed in highly skilled workers and capital or with workers that have very low education levels and in countries relatively well-endowed in mining and fuels. Trade liberalization is associated with decreases in inequality in countries that are well-endowed with primary-educated labor. Similar results are also apparent when decile data are used instead of the usual Gini coefficient. The results are strongly supportive of the factor-proportions theory of trade and suggest that trade liberalization in poor countries where the share of the labor force with very low education levels (likely employed in non-tradable activities) is high raises inequality. In our sample, countries with very low education levels also have relatively scarce endowments of capital. Quantitatively capital scarcity is the dominating effect so that trade liberalization is accompanied by reduced income inequality in low-income countries. Within-country inequality is also positively correlated with measures of macroeconomic instability. Simulation results suggest that relatively small changes in inequality as measured by aggregate measures of inequality like the Gini coefficient are magnified when estimates are carried out using decile data.

JEL classification: F11, F16, D3
Keywords: International Trade, Income Distribution, Poverty.

World Bank Policy Research Working Paper 3981, August 2006

* We thank Olivier Cadot, Sébastien Jean, Jaya Krishnakumar, Alessandro Nicita, Branko Milanovic, Marcelo Olarreaga, Mathias Thoenig, and Adrian Wood for very helpful comments on an earlier draft. We also thank Branko Milanovic for providing us his WYD data set and answers to our numerous queries.

[1] University of Auvergne and CERDI: e-mail: Julien.Gourdon@u-clermont1.fr
[2] University of Geneva: e-mail: Nicolas.Maystre@ecopo.unige.ch
[3] University of Geneva, CERDI and CEPR: e-mail: DeMelo@ecopo.unige.ch

1. Introduction

The relation between openness, inequality and poverty within countries continues to be subject to considerable controversy in the debate about globalization and in the academic literature where the relative importance of the different transmission channels linking openness to inequality and poverty remains elusive. First, detailed case studies decomposing the sources of the evolution of income inequality within countries reveal very different patterns across countries. As to trade liberalization and openness--usually understood to mean the ease with which goods and services and factors of production (e.g. capital, labor and skills) move across countries as transaction costs fall-—they are often used interchangeably and captured by a trade-to-GDP ratio which captures many other features of a country's exposure to trade. Second, whether from specific trade liberalization episodes or from cross-country studies, the evidence on the relation between trade liberalization and inequality is conflicting.[1] Third, in most cross-country studies, identification comes from cross-country variability in the inequality measure and no attempt is made to control for the source of the data on inequality.

If one were asked to point towards an emerging consensus, it would probably be that increasing openness has been reflected in a growing wage gap between skilled and unskilled wages. Moving to the association between openness and overall

[1] Bourguignon, Ferreira and Lustig eds. (2005, table 10.1) show the variety of underlying changes in inequality across four countries. Using four household surveys spanning the period of Mexican tariff liberalization, Nicita (2004) explores systematically the channels by which the Mexican trade liberalization affected households. He finds differential pass-through effects across commodities and strong effects on spatial inequality and concludes that, overall, tariff liberalization might have been associated with a reduction in poverty, but that inequality increased. Case study evidence is not considered further in this paper. Also see Galiani and Porto (2006) for a country study on trade liberalization and wage inequality in Argentina.

inequality (usually measured by the Gini coefficient) the evidence remains very mixed: many studies find no evidence of openness on inequality, or that openness increases inequality at all levels of development.[2]

More intriguing to many is the lack of robustness towards expectations from the standard Heckscher-Ohlin (HO) trade model: conflicting evidence that greater openness reduces (increases) inequality in developing (developed) countries and very qualified support for the hypothesis that endowments matter along the expected lines (see below), not to mention little support for robust results between trade liberalization and inequality.[3] One might also add that the lack of correlation between factor endowments and inequality should come as a surprise to scholars working on the institutional foundations of development who generally find strong evidence that endowments matter in the evolution of a country's inequality (Hoff (2004)).

Perhaps this should not come as a surprise and not concern us too much if, via other channels such as growth, increased openness reduces poverty. After all, HO theory should only be expected to inform us about the relation between endowments and factor rewards in response to a reform-induced change in relative factor demands rather than between endowments and overall income inequality which is determined by many other factors. And, as pointed out by Baldwin (2004, p. 517) in his review of the trade liberalization and growth literature, since trade liberalization is rarely applied in isolation, it makes little sense to try and isolate its effects from those of associated policies.

---

[2] Barro (2000), Lundberg and Squire (2003) and Milanovic (2005) find that openness increases inequality whereas Edwards (1997), Ravallion (2001) or Dollar and Kraay (2002) find no significant relationship.

[3] See Anderson (2005) for a survey of the conflicting evidence on openness and inequality, and Winters et al. (2004) for a survey of the evidence on trade liberalization and poverty. Spilimbergo et al. (1999), Milanovic (2005) and Bensidoun et al. (2005) are the studies most closely related to ours.

In contrast to this agnosticism, following an exhaustive review of the evidence on trade liberalization and poverty, Winters et al. (2004, p. 108) conclude that trade liberalization might be the easiest poverty-alleviating reform to accomplish, and the most powerful direct mechanism to alleviate poverty in a country. If so, knowing more about the links between trade policy and inequality is important since, from a political-economy perspective, knowledge about the links between openness and inequality will inform about the feasibility of policies that increase openness and are likely to reduce poverty.

We bring new evidence on this issue using two data sets covering a larger sample of developing countries than most previous studies. We introduce fixed-effects (FE) so that identification of the effects of globalization is confined to variations in that country's variables. We also broaden as much as possible the range of control variables to address endogeneity concerns (i.e. controlled for having another omitted variable jointly determining inequality and the right-hand-side variables). In this set up, we find rather consistently that trade liberalization is associated with increases in inequality. Second, unlike most previous studies, we find that endowments matter along the lines suggested by the standard HO theory arguments reviewed in section 2. We find consistently that trade liberalization increases inequality in countries that are relatively well-endowed with capital and with highly skilled workers while it decreases inequality in countries relatively well-endowed in primary educated (unskilled) workers. On the other hand, as suggested by Wood (1994, 2002), we find that trade liberalization increases inequality in countries relatively well-endowed with workers lacking basic education.

The paper is organized as follows. Section 2 discusses the main channels linking openness and trade liberalization to

inequality identified in the literature along with the two data sets used in this paper. Using data over the period 1980-2000, section 3 establishes that the correlation between trade liberalization and inequality follows patterns predicted by factor-proportions theories. These results are largely confirmed with a 'high quality' data set (based on deciles) covering the period 1988-98 in section 4. Section 5 concludes.

2. Transmission Channels and Data

2.1 Transmission Channels

The debate on the channels through which openness might affect inequality has largely revolved around the role of openness-induced changes in relative factor demands and their consequent expected effects on factor rewards. For natural-resource-rich countries, though they do not deal directly with trade liberalization, Leamer et al. (1999), provide plausible scenarios and some evidence as to why the development paths of such countries could lead to rising inequality.

Concentrating on accumulable endowments where rent effects should be minimal, Wood (2002) provides a convenient summary of the different channels via which globalization might affect wage inequality (see also Kremer and Maskin (2003)). As all forms of transaction costs fall with globalization, factor mobility (capital via FDI and Northern K-workers in the terminology of Wood) is enhanced, leading to greater cooperation of Northern K-workers who travel to work with skilled workers in the South. In the South, workers with little or no-education (and hence low wages) would then be expected to be confined to non-traded activities. Trade liberalization would then not only lead to rising wages for skilled workers in the North and in the South, but under

plausible assumptions, it would also lead to an increase in wage inequality in the South.[4]

Feenstra and Hanson (1996) interpret globalization as an increase in FDI (rather than a movement of K-workers) leading to a rising volume of trade in intermediates (see Hummels et al. (2001) for supporting evidence) as the process of production leads to a fragmentation of production. Again, in a HO framework where a continuum of intermediates are produced by the North and the South, and where the North is relatively well-endowed in skilled labor and capital (with capital and skilled labor complementary factors in production), Feenstra and Hanson, echoing Wood, show that an increase in FDI can lead to rising wages for skilled workers in the North and the South as FDI raises the skill-intensiveness of production in both countries.[5]

In reality, other channels beyond changes in factor rewards will affect inequality when a country becomes more outward-oriented. At the simplest level, in the Ricardo-Viner model changes in relative prices lead to changes in the purchasing-power of households, and if the poor consume the exported good intensively, trade liberalization could increase income inequality. Several exercises using simulation models reported in Hertel and Winters eds. (2006) quantify the potential magnitude of some of these channels, notably the

[4] In a two-sector model (tradables and non-tradables) with capital and two categories of workers (skilled and unskilled), in which the three household categories are not diversified in their factor-ownership holdings and the unskilled are confined to the non-tradable sector, Bensidoun et al. (2005) show formally that an increase in the wage of skilled labor (brought about by increased openness) will raise the value of the Gini index if the share of unskilled labor is large enough.

[5] Arguing that much trade is between rich countries and that much trade can be viewed as the production of a single product manufactured by outsourcing of components made and assembled in different countries, Kremer and Maskin (2003) develop a model in which globalization (again an increase in FDI) can plausibly lead to an increasing wage gap between skilled and unskilled workers in both the North and the South. The key mechanism in their model is that globalization leads to more cross-matching than self-matching (workers with the same skill levels working together).

poverty implications of tariff reductions on the purchasing power of households with different expenditure patterns.

More importantly, there are other context-specific transmission channels (see Winters et al. 2004 for discussion) which cannot be captured in a cross-country exercise seeking to extract common elements that are likely to hold across a range of countries. For example, as shown by Nicita (2004) in his detailed case study of tariff liberalization in Mexico during the 90s, price pass-through effects were substantially different across commodities, and the poverty effects of trade liberalization varied substantially across regions.

2.2 Framework and Data

Using panel data, the literature has usually estimated a relation of the form:

$$INQ_{it} = D_i + \alpha_1 \overline{Y}_{it} + \beta_1 OPEN_{it} + \sum_l \delta_l Z_{it} + \varepsilon_{it} \qquad (1)$$

where INQ_{it} is the measure of inequality, $\overline{Y}_{it}$ is average income per capita (either from the national accounts or from household surveys), $OPEN_{it}$ is a measure (eventually lagged to control for endogeneity) that proxies for the country's outward-orientation[6], and Z_{it} is a vector of control variables. In the discussion above, there is no role for income as an explanatory variable. Its inclusion rests on some variant of a Kuznets-type relationship, but also for structural changes (other than endowments but including increased financial integration) that are associated with rising GDP per capita and could affect the transmission of globalization-related effects to households.

In all specifications we include a set of country dummies, D_i, that eliminate all cross-country variation.

[6] Greater outward-orientation goes beyond integration in goods markets. It includes integration in capital markets, as well as behind-the-border measures. Insofar as a reduction in transaction costs affect countries equally, these can be ignored. See further discussion below.

The use of country fixed-effects has usually not been the practice in previous studies. For example, in their widely cited study examined below, Spilimbergo et al.(1999) do not control for country-specific features that could account for differences in inequality such as labor market specificities emphasized by Rama (2002)), productivity differences (see Easterly (2004)), or institutions (Barro 2000). Nor do more recent studies (e.g. Milanovic (2005)) typically use such controls for heterogeneity.[7] Insofar as omitted factors do not change over time, the inclusion of fixed effects controls for such idiosyncratic factors. Since our data set covers a rather long period, and inevitably some of the relevant omitted variables will change over time, this needs to be kept in mind when interpreting results. Likewise, the validity of the results rests on the assumption that the data reflect a sufficiently stable relationship (this is why we exclude all transition economies from our samples) and that the same dynamics can be imposed on all countries, an assumption that is less likely to hold, but about which little can be done. We use two data sets. The first set of results are based on five-year average data spanning the 1980-2000 period relying on the extensively used Deininger and Squire (D-S) data set (augmented to include the year 2000 by the availability of the WIDER (2004) data). The second is the more recent high-quality data set World Income Distribution (WYD) also at approximately five-year intervals which covers the 1988-1998 period. Using two data sets provides further robustness checks, and the second data set is helpful when trying to quantify effects of trade liberalization on poverty. Table 1 shows that our sample

[7] Among the studies that control for heterogeneity, Edwards (1997, 43 countries, 70s and 80s) finds no evidence that openness or trade liberalization increases inequality. When including fixed effects, Barro (2000, 84 countries for 1960-90, table 6) finds no correlation between inequality and openness, echoing Ravallion's correlations between average household incomes and inequality across 117 growth spells (Ravallion (2001), table 1).

has a good representation across regions, and that developing countries are adequately represented.[8]

Regarding the variable used to capture a country's outward-orientation, we use lagged tariffs i.e. $TAR_{i,t-5}$, (computed as the ratio of tariff revenues to imports) as a measure of trade openness. This is a more direct measure of openness than those often used previously (i.e. a trade output ratio, a 'trade adjusted ratio' obtained as a residual from an estimated relation of openness, or the Sachs-Warner index). As a consequence, our sample does not include the 1960-80 period covered in some of the earlier studies. Since most trade liberalization in developing countries started in the early 1980s, this may not be too damaging (Table 2).

Table 2a gives regional averages for the two main variables of interest, the inequality measure and our measure of openness, tariffs computed from customs data (see the annex for data sources and data manipulations). Table 2a shows little variation in the average measure of inequality within regions and persistent differences across regions while the measure of protection indicates (on average) a downward trend in all regions except Africa. Since much of the trade reforms in the 1980s often consisted of replacing NTBs by tariffs, what appears as an increase in protection could in fact represent either a reduction, or no increase in protection. In selecting tariffs as our measure of openness, we take refuge in the often-made observation that, on average, the average tariff level is an adequate approximation of the restrictiveness of a country's trade regime, and arguably less

[8] Only countries with economy-wide inequality measures ('high-quality' indices according to D-S) are retained in the sample. As a reference for comparison among the studies that concentrate on openness and inequality, the often-cited study by Spilimbergo et al. had 17 developed and 17 developing countries in their sample.

controversial than other measures often used.[9] Of course, having a measure of tariff spreads across industries or between agriculture and manufactures would be helpful. Unfortunately such data are not available for a sufficiently large sample of countries. However, as shown by Pritchett and Sethi (1994), because of widespread exemptions, tariff revenues do not increase proportionately with tariff rates suggesting limited further information from having information on tariff spreads.

Figure 1 describes the main characteristics of the data at the regional level. The relative patterns of inequality remain unchanged across regional groupings, being the highest in Latin America and Sub-Saharan Africa throughout. Within regions, tariff dispersion fell and, except for the Middle East and North Africa (MENA) region, average tariffs declined during the sample period.

As a check on the use of tariffs as a proxy for openness, table 2b gives the correlation between our measure and others frequently used, starting with the trade share in GDP (column 1). It is clear that the correlation with the often-used GDP trade ratio is very low, but also with the black market premium and the index used by Spilimbergo et al. On the other hand, reassuringly, the correlation with the carefully constructed Wacziarg and Welch (2003) index is quite high.[10]

---

[9] According to Rodrik (2000), (p. 3): "Tariff and non-tariff averages are reasonably accurate in ranking countries in terms of trade policy openness, and in showing changes in openness over time". Goldberg and Pavcnik (2004) reach the same conclusions and conclude that tariffs capture relatively well the combined effects of trade policy changes. They also note that the preoccupation about the endogeneity of tariffs is lessened by the fact that many countries moved towards a reduction in protection and more uniformity in their tariff structures when they became full members of the GATT/WTO. Moreover, the use of a synthetic index to measure of a trade regime still has appeal especially during the 70s and 80s when many countries still had a multiplicity of trade barriers in their foreign exchange regimes.

[10] Tariffs are also strongly positively correlated with other measures of trade barriers such as taxes on input and capital used by Barro & Lee (2002). Among the model-based estimates, tariffs are most closely correlated with the gravity-based index of Hiscox & Kastner (2002) and the residuals from adjusted trade ratios estimated econometrically by Leamer (1987), but weakly with the Pritchett (1997) index.

Even though these comparisons are comforting for those wishing to use tariffs as a rough indicator of the overall restrictiveness of a trade regime, it still remains that the strongest justification for their use is their widespread availability and the likelihood that error measurements will be less than with other proposed measures.[11]

The main weakness in the data set is the absence of a measure of financial openness. Miniane (2004) provides a summary of available indices of financial market integration. It turns out that even for the WYD data set which only covers the 1988-98 period, about 2/3 of the countries in our data set would not have a measure of financial market integration. We have therefore decided not to tackle the issue of financial market integration (using FDI as in e.g. Milanovic (2005), would not be appropriate since it is largely an outcome variable).

3. Trade Liberalization and Inequality: Endowments matter

We start exploring the basic HO prediction that trade liberalization should reduce inequality in low-income countries and increase it in high-income countries. Next, we bring in factor endowments which we interact with the tariff variable to isolate the effects of differing endowments on inequality. Throughout this section, the data cover the period 1980-2000 and the Gini coefficient is the inequality measure.

3.1 Openness, Income and Inequality

We start with the traditional specification:

[11] Because tariffs do not take into account NTBS, we also correlated several frequency indices of NTBs with our tariff measure at the HS-6 level using Jon Haveman's treatment of TRAINS data. Correlations (available upon request) for different tariff ranges and the overall NTB frequency index ranges between 0.20 and 0.30 confirming high tariffs barriers are effectively correlated with high indices of NTBs.

$$INQ_{it} = D_i + \alpha_1 \bar{Y}_{it} + \beta_1 TAR_{i,t-5} + \beta_2 (TAR_{i,t-5} * \bar{Y}_{it}) + \sum_l \delta_l Z_{it} + \sum_{k=1,3} \gamma_k DS_{ikt} + e_{it}, \quad \text{i=1,...,76, t=1,..., 4} \tag{2}$$

In(2), the index of inequality is regressed on a set of country dummies D_i, on income per capita measured in PPP, $\bar{Y}_{it}$, tariffs (lagged one-period to control for endogeneity)[12], $TAR_{i,t-5}$, dummy variables, DS_{ikt}, to control for the source of inequality data (dummy variables for gross vs. net income, income vs. expenditure, and households vs. individuals), and on a set of control variables, Z_{it}. All the variables are expressed in logarithms. As mentioned above, all data are five year averages (this helps to control for autocorrelation and measurement error), giving us four observations across time. The use of country fixed-effects reduces considerably the variance in inequality to be explained so that measurement errors are exacerbated. Taking 5 years averages helps, though imposing the same dynamics on all variables increases measurement errors (see Pritchett (2001)). Having more data points within countries, as in e.g. Galani and Porto (2006) who study the trade-liberalization wage-inequality relation in Argentina over 30 years would clearly be a superior identification strategy, but such an option is not yet in the cards. Robustness checks and the use of an alternative data set in section 4 seem the best options currently available.

Should an increase in openness (here lower values for TAR_{it-5}) raise inequality, it would be reflected in $\hat{\beta}_1 < 0$, while the relationship expected from a 'basic' HO interpretation (with capital and labor as the sole endowments) would call for $\hat{\beta}_1 > 0, \hat{\beta}_2 < 0$ since lowering tariffs in high-income countries

[12] We also checked for reverse causality by regressing the Gini on forward tariffs, obtaining a non-significant coefficient suggesting that reverse causality is not a problem.

would be expected to increase inequality with a turning point at $\bar{Y} = -\frac{\beta_1}{\beta_2}$.

Results in the first three columns of Table 3, with no fixed effects, correspond to those usually found in the literature (e.g. Barro (2000), Ravallion (2001), Rama (2002)). Under this specification, trade liberalization raises inequality in poor countries, but reduces it in rich countries (i.e. with income per capita higher than 6,215$ in column 1 and higher than 7,182$ in column 2), in contradiction with HO expectations. The relation is robust to the addition of other controls (column 2).

Adding dummy variables for the source of income inequality data improves considerably the fit, while the results contrary to HO predictions continue to hold (though the turning point is now 4,279$). The signs on the dummies are always as expected with the Gini coefficients based on income being higher than those based on expenditure. Our first finding is that all studies should control for the source of income inequality data (a point already made by Ravallion 2001 and Bensidoun et al. 2005)). Since the coefficients on these dummies are always similar to those in this table, we do not comment on this aspect any further.

Column 4 introduces fixed-effects (FE) into the estimation. Now, the HO predictions hold, though they are still insignificant. However, with a GLS estimator to correct for heteroskedasticity[13] in the coefficient estimates (and in their variance), the coefficients are significant at the 1% level (with a reduction in protection increasing inequality

[13] The Breusch Pagan test and the White test indicate heteroskedasticity in the error process ($\sigma^2_{it} \neq \sigma^2$). In case we would have only intra individual heteroskedasticity we could just perform a White correction on standard error. Since the Wald test indicates the presence of inter individual heteroskedasticity ($\sigma^2_{it} \neq \sigma^2_t$), we preferred to use a GLS estimator which corrects estimates as well as standard errors. This estimator is more efficient in case of inter individual heteroskedasticity.

when income per capita exceeds 4,363$. Our second conclusion is that results from studies that do not control for effects of omitted variables via FE are likely to be biased.

This reversal between OLS and OLS with FE can be understood from the data patterns in figure 1. Since the richest countries (OCDE) have the smallest tariffs and the lowest level of inequality through time while SSA countries have the lowest income par capita, the highest tariffs and the highest level of inequality, a level estimation will show that countries with low tariffs and high income per capita will have the lowest income inequality. However, such a relationship does not account for the impact of trade liberalization on inequality.

Finally, while the possibility of a spurious relation still persists, one of the strong candidates for the observed relation would be that changes in inequality due to a successful stabilization policy would be attributed to increased openness because of a positive correlation between trade liberalization and concurrent stabilization policies. As shown by Wacziarg and Welch (2003), trade liberalization often occurs during periods of systemic reforms including macro stabilization. The sign and significance for the variables capturing the effects of other ongoing reforms confirm earlier findings (e.g. Dollar and Kraay (2002), Edwards (1997)) since stabilization--here proxied by a reduction in inflation--reduces inequality.[14] However, including this control does not alter the relationship. The results are also robust to the inclusion of the other control variables[15].

[14] We have not considered the possibility that inflation could be endogenous (e.g. Romer (1993) gives evidence that inflation is lower in open economies).

[15] Several factors previously found to be correlated with inequality have the expected coefficients in our formulation: ethno-linguistic fragmentation and less civil liberties increases inequality; financial depth and a high share of mature worker both reduce inequality. Spurious correlation from omitted variable bias could still be present. For example, trade liberalization could increase investment (see evidence in Wacziarg and Welch (2003)) which in turn could be correlated with inequality. Barro

3.2. Trade Liberalization, Endowments, and Inequality

We now add relative endowments. As in previous studies, these are interacted with the openness measure as in previous studies (e.g. Bourguignon and Morrisson (1990), Spilimbergo et al. (1999) and Fisher (2001)). This allows us to test whether the conditional correlation of protection on inequality is sensitive to factor endowments.

$$INQ_{it} = D_i + \alpha_1 \overline{Y}_{it} + \beta_1 TAR_{it-5} + \sum_{m=1,3} \phi_{1m} RE_{imt} + \sum_{m=1,3} \phi_{2m} (TAR_{it-5} * RE_{imt}) + \sum_l \delta_l Z_{it} + \sum_{k=1,3} \gamma_k DS_{ikt} + e_{it} \quad (3)$$

As suggested by HO theory, relative endowment ratios, RE_{mit}, are computed relative to the sample mean per capita endowment. The ratios are weighted by the trade share in GDP to account for the endowments of closed countries that do not compete in the world markets with other factors (to help comparisons, we use the formula in Spilimbergo et al., see annex A4). Since we include fixed effects, we now have a reduced vector of control variables (i.e. we drop ethno-linguistic fragmentation, the share of mature workers and civil liberties, all of which are nearly time invariant).

As a first exercise, we replicated the same specification as Spilimbergo et al. confirming their results (i.e. a result in conformity with HO for human capital but in contradiction with HO for physical capital—see table A5) when using their openness variable ('adjusted' trade ratio instead of tariffs). However, when using tariffs, the results are much closer to those expected from HO theory, namely that increases in inequality are associated with strong endowments in capital following a reduction in tariffs. To our knowledge, this

(2000) finds little correlation between inequality, and growth and investment in his sample, but Lundberg and Squire (2003) find support for a link in a simultaneous examination of inequality and growth.

plausible set of results has not been found in previous studies. However, with tariffs, the significance of human capital endowments disappears.

These results suggest that it might be fruitful to break down labor into three categories: non-educated, i.e. those who have never been to school or have not completed primary school (NO-ED); primary-educated or labor with a basic education (BS-ED); and those that have an education level beyond high-school (SK-ED). Such a breakdown is suggested by the discussion in section 2, and was carried out recently by Bensidoun et al. (2005) in a slightly different context.[16] The index of human capital endowment (average years of schooling) is now replaced by these three different categories of skill levels. We take the NO-ED variable from the Barro and Lee (2000) data set which is available on a five-year basis that corresponds to the 5-year averages used for all our variables.

As shown in Table 4, a convenient way to include these three levels of education is in ratio form: (SK-ED)/(BS-ED) and (SK+BS)/(NO-ED)[17]. We expect that during a trade liberalization, countries with a relatively (to the sample average) strong endowment in (SK-ED)/(BS-ED) to experience an increase in inequality, while, after having controlled for skill endowments, we would expect that countries relatively well-endowed in (SK+BS)/(NO-ED) would experience a decrease in inequality during a trade liberalization.

[16] Bensidoun et al. argue that the Heckscher-Ohlin-Vanek (HOV) model is too restrictive, relying on factor-price-equalization (FPE) and hence identical production techniques in equilibrium. Using a more general approach that relaxes the FPE assumption (but still relies on other restrictive assumptions like homothetic preferences and unchanged production techniques following trade liberalization), they show that factor price changes are correlated with the factor content of trade, leading them to test their model using constructed estimates of the labor-capital content of net exports instead of factor endowments on a similar D-S inequality data set for 53 countries. However, their results are not strictly comparable with ours (different sample with no SSA countries, the use of PPP per capita GDP for NOED in most specifications, and a different definition of variables).

[17] Thanks to Adrian Wood for this suggestion.

As to remaining endowments, Wood (2003) suggests that arable land per worker (AT/L) (as in Spilimbergo et al., Fisher (2001) or Leamer et al. (1999)) is not sufficient to encompass natural resources and suggests using land per worker (T/L). Whereas arable land per worker captures factor intensities in the production of food and raw materials, it does not include mining and fuels which are the less equally-distributed resources. This may explain why several studies find that endowment in arable land does increases inequality during trade liberalization (Spilimbergo et al. and Perry and Olarreaga (2006)). Our preferred specification uses a direct measure of endowments in mining and fuels (MF/L captured by production in minerals, fuels and coal), next to the measure of arable land.

In column 1 we include labor with no education (NO-ED)/L. The results show that inequality is greater in countries with a high share of (NO-ED)/L and that trade liberalization increases income inequality more for countries abundant in NO-ED. The results also suggest that trade liberalization raises inequality more for capital abundant countries, which conforms to HO predictions, again a result that eluded previous studies.

As expected, replacing in column 2 (NO-ED)/L by the primary-educated ratio, (BS-ED)/L, reverses the results: trade liberalization decreases inequality for primary-educated abundant countries if indeed they represent a large share of poor (we explore further the links between trade liberalization and poverty in section 4). Again, as expected by HO theory, trade liberalization increases inequality in capital abundant countries. Robustness to HO predictions still holds when one replaces the primary educated, (BS-ED)/L, by the highly-educated, (SK-ED)/L, in column 3 as trade liberalization increases inequality in highly-educated abundant countries. This result is consonant with Galiani and

Porto's identification of an increasing skill premium in periods of trade liberalization in Argentina.

Though weaker, the pattern of results still holds when we include two kinds of skills , (SK+BS)/(NO-ED) and (SK-ED)/(BS-ED) in column 4 both of which enter with the expected signs (a strong endowment in (SK-ED)/(BS-ED) is associated with more inequality while the opposite holds for (SK+BS)/(NO-ED)). As to natural resources, adding mining and fuels (MF/L) in column 5 reveals a positive correlation between trade liberalization and inequality in countries well-endowed in (MF/L), results echoing those of Perry and Olarreaga (2006). This last specification seems to best capture the interactions between trade liberalization and factor endowments.

Table 5 quantifies the effects of a 5 percentage points reduction in tariffs on Gini coefficient value for different quartiles of the distribution of endowments. As, an example, tariff reduction reduces the value of the Gini coefficient by 1.3% for countries in the bottom quartile of the distribution of (K/L), while it increases inequality by 0.9% for those in the top quartile. A similar pattern holds for (SK-ED)/(BS-ED), with the strongest effect for the ratio (SK+BS)/(NO-ED)). Since countries with a high share of non-educated population are also likely to be poorly endowed in capital, the two effects will tend to cancel each other.

We now summarize the results of several robustness checks (these are available in the corresponding annex tables). Regarding macroeconomic and institutional variables, we used those in Lopez (2003) (Table A8). Results show that original results are robust when using these controls with all the macroeconomic variables having the expected sign (e.g. an improvement in civil liberties or an increase in government expenditure decreases inequality).

Not surprisingly, the results are less robust to the use the alternative indices of trade liberalization given in Table

2b, although sign patterns are close to those described here when we use the Hisocx and Kastner (2002) and Wacziarg and Welch (2003). Results are summarized in Table A9.

Thirdly, we obtain similar results when we apply our preferred specification to quintile from the Wider database (45 countries instead of 61). Results are reported in Table A10. Finally, the results are also robust to the exclusion of a small number of observations signaled as outliers by a test on residuals, and the pattern of signs is broadly similar when developed countries are excluded from the sample.

4. Openness, Inequality and Poverty: Further Results

Arguably, in spite of controls for the type of survey, the data set used so far is of lesser quality than the more recent World Income Distribution (WYD)[18] data set that is drawn almost entirely from household surveys thereby allowing us to define welfare aggregates and recipient units consistently across countries and time. The WYD data set which also provides information on income levels by deciles presents two advantages. First, it allows us to check for the robustness of our results in general, and also to the choice of inequality measure since we can work directly with decile data. Second, it is more appropriate to carry out estimates of the effects of trade liberalization on inequality and especially on poverty, both because the quality of the data is presumably higher, but also because the calculations can also be carried out directly from the household sample mean income per capita, $\bar{m}_{it}$, rather than from GDP per capita from national accounts.[19]

[18] WYD can be downloaded from http://econ.worldbank.org/projects/inequality.

[19] It has been argued that income measures from household survey data that is representative of the entire economy is a more reliable estimate of GDP than the corresponding measures from the national accounts. In particular, even though survey-based estimates of income have their own problems, Deaton (2005) argues that: "If we need to measure poverty in a way that

Following the approach and specification in (3), we regress the share of the j-th decile in country i, θ_{ij} (which is defined as the ratio between the absolute income of the j-th decile, (y_{ijt}), and the sample mean income, ($\bar{m}_{it}$) on $TAR_{i,t-5}$, the same set of relative endowments (RE_{it}), their interaction with $TAR_{i,t-5}$, and a set of controls (Z_{it}). As before, (4) includes a set of country dummies and dummies to control for the source of inequality data leading to the following equation to be estimated for each decile:

$$\theta_{ij} \equiv \frac{y_{ijt}}{\bar{m}_{it}} = D_i + \alpha_{1j}\bar{m}_{it} + \beta_{1j}\, TAR_{i,t-5} + \sum_{m=1,3} \phi_{1m} RE_{imt} + \sum_{m=1,3} \phi_{2m}(TAR_{i,t-5} * RE_{imt}) + \sum_{l} \delta_{jl} Z_{ilt} + DS_{it} + e_{ijt} \quad (4)$$

Table 6 reports the results for the bottom three and top three deciles (cf. full results in Table A11).

Besides plausible estimates with the FE estimator (Milanovic (2005, footnote 8 argues that because this panel is very short there is insufficient data variability to use such an estimator), the following patterns stand out. First, the previous results are quite robust to the change of sample and to the use of decile data instead of the Gini coefficient. Except for the coefficient for the interaction term between tariffs and raw materials (which now turns out to be insignificant), all other coefficients related to tariffs have the same sign as in Table 4 and are significant. In particular, a reduction in protection is associated with increases in inequality since it reduces (increases) the

---

will convince those who are skeptical of the idea that average growth reaches the poor, there is little choice but to use the surveys", p.18. See Deaton (2005) for a deeper discussion on this issue. In our sample the correlation between g_H and g_{PPP} is $\rho = 0.2917$, and a regression on annual income growth (over 1988 and 1998) measured from the surveys, g_H, and from national income, g_{PPP} is (std. errors in parenthesis):

$$g_H = \underset{(0.357)}{0.029 + 0.706}\, g_{PPP} \; ; R^2 = 0.0851 .$$

income shares of the bottom (top) deciles. Moreover, this effect is accentuated in countries that are relatively abundant in capital (K/L) or in countries abundant in high skill labor (SK-ED)/(BS-ED). Increases in inequality continue to be correlated with reductions in tariffs in countries relatively well endowed in no educated people (SK+BS)/(NO-ED). On the other hand, this income-inequality increasing effect of trade liberalization is mitigated in countries abundant in arable land (AT/L). Finally, the control variables have the same effects as those discussed in section 3.[20]

These results were submitted to several robustness checks (see Tables in the appendix; others available upon request). First, we ran the same regression without taking the logarithm of the variables, obtaining similar results. Regarding reverse causality, we ran the same regression using future trade rather than past values and the results become mostly insignificant, suggesting that reverse causality should not be a problem here.[21] As to control variables, in other specifications, we added government expenditure and/or an index of democracy, resulting in a large reduction in sample size. With few exceptions, estimated values of variables of interest remained quite close to the estimates discussed above (see Table A12). In sum, the results based on decile data are robust and coherent with the results obtained earlier in Table 6.

Since the correlation between tariff reductions and inequality after controlling for endowments is still significant in this shorter time span, we used the coefficient estimates in Table 6 to simulate the average impact of a 5

[20] We also compared the results obtained by using the Theil and Gini coefficients. In all cases except for (K/L) and the GDP per capita (measured here by the mean income), (whereas these two coefficients were not significant in table 4), the sign of Gini and Theil coefficients are the same. Moreover, in all cases (except for the ratio (SK/(BS-ED)) and the two interaction terms (K/L) * (Tariffs) and (RM/L) * (Tariffs), the coefficients are also significant.

[21] We thank Marcelo Olarreaga for this suggestion.

point decrease in tariffs (this corresponds to the average tariff reduction during that period) on the bottom and top three deciles for three aggregated developing 'regions': i) Sub-Saharan Africa (5 countries excluding South Africa), ii) Latin America (15 countries) and iii) East, South and South East Asia (11 countries excluding Japan & Singapore). In each case, regional values are values averaged over countries in the region[22]. The results of this simulation exercise are reported in Table 7.

For each region, the first row reports each decile's share in income before and after the simulated reduction in tariff protection. Row 2 reports the corresponding mean incomes in $1993 PPP and row 3 shows the corresponding growth (over the period) that would be necessary to keep each decile's income at its initial value. Note first that there is great variation in the sample size across regions. SSA only has 10 observations spread over 5 countries (implying a very unbalanced panel) while Latin America has 43 observations spread over 15 countries, an almost balanced panel. Hence the large magnitude of the results for SSA, which are driven by the very low K/L endowment ratio for that region, should be viewed most cautiously. As to Latin America and the combined Asia region, the patterns are quite similar. Regarding the interpretation of the compensatory growth that would be necessary to compensate for the adverse effect of trade liberalization on income inequality in Asia and Latin America, Wacziarg and Welch report an increase in average yearly growth (over a 7-year period) of 0.5 percentage points following the trade liberalizations in their sample suggesting that the growth-induced effects of trade liberalization would not be sufficient to compensate for the adverse distributional implications for the poorest quintile.

[22] Because of the possibility of outliers and influential observations, we checked that the results in table 6 were not sensitive to the exclusion of outliers.

The well-known lack of sensitivity of aggregate measures of inequality to changes in the distribution of income is apparent when inspecting the changes in the values of the Gini coefficients reported in Table 7 (in spite of the large changes in mean decile incomes, Gini coefficient values only change by one percentage point). Because of the many biases likely to remain in these estimates in spite of the inclusion of many control variables, it is difficult to comment with confidence on the additional information provided by the detailed results on the decile data.

As a further check of the orders of magnitude implied by the simulations reported in Table 7, figure 2 reports country-level estimates of the simulated changes in the bottom and top quintiles of the distribution.[23] Several patterns emerge. First, as in Table 7, gains are mostly for SSA countries. Second, gains and losses in the bottom quintile are mostly reflected in changes in the top quintile rather than the middle of the distribution. Third, the linear specification implies much larger simulated changes in percentage terms for the bottom than for the top quintile. In interpreting these country-level results, one should recall that these are contingent on the validity of imposing the same reaction to trade liberalization across countries.

5. Conclusions

Much of previous research on the correlates of inequality has established that inequality is largely determined by factors that are quite different across countries and that change only slowly within countries. Notably, the effects of changes in trade policies, and of globalization more

[23] The simulations are based on average values over the period. Because of the inclusion of fixed effects in our estimations, actual values of mean quintile shares are extremely close to those reported in figure 2, obviating the need to comment on how the model fits the data.

generally, have been difficult to detect. This paper has focused exclusively on within-country variations to trade policy changes while carefully disaggregating factor endowments. Overall, the results suggest that changes in inequality are correlated with changes in tariffs which are quite robust to inclusion of various controls and to changes in sample periods.

Three patterns emerge from these conditional correlations. First, as suggested by factor-proportions theories of international trade, increases in inequality are positively correlated with trade liberalization in countries well-endowed in highly skilled workers and with workers that have very low education levels. Decreases in inequality are positively correlated with trade liberalization in countries that are well-endowed with primary-educated labor. Increases in inequality are positively correlated with trade liberalization in countries relatively well-endowed in mining and fuels production, assets which are very unequally distributed. Similar results are apparent when decile data are used instead of the usual Gini coefficient. Thus, if one extends the factor-proportions theory of trade to include a non-traded sector where those with minimal education are most likely to be employed, trade liberalization in poor countries where the share of the labor force with little education (workers that have not finished primary school) is high is likely associated with increases in inequality as is often pointed out by critics of globalization. Trade liberalization is also associated with increases in inequality in capital-abundant and high-skill abundant countries so that trade liberalization only reduces inequality in countries abundant in unskilled labor.

Second, the results on the pattern of signs are quite robust, and the addition of control variables yields plausible results. We find no evidence of reverse causality. Controlling

for the sources of income distribution data is always significant along expected lines. Finally, a reduction in macroeconomic instability (proxied by a reduction in inflation) also reduces within-country inequality.

Third, simulations suggest potentially significant endowment-related effects associated with trade liberalization. Because of remaining biases, these estimates should be interpreted very cautiously, although we would argue that the relative robustness of the endowment effects to changes in specification justifies looking beyond averages and quantifying effects on the poor.

References

Anderson, E. (2005). "Openness and Inequality in Developing Countries: A Review of Theory and Recent Evidence", *World Development*, vol. 33(7), pp. 1045-1063.

Baldwin, R.E. (2004). "Openness and Growth: What's the Empirical Relationship" chp. 13 in R.E. Baldwin and A. Winters eds. Challenges to Globalization: Analyzing the Economics, The University of Chicago Press.

Barro, R. (2000). "Inequality and growth in a panel of countries", *Journal of Economic Growth*, vol. 5, pp. 5-32.

Bensidoun, I., S. Jean and A. Sztulman (2005). "International Trade and Income Distribution: Reconsidering the Evidence", *CEPII Working Paper* No.2005-17

Birdsall, N. Londono J.L. (1997). "Asset Inequality Matters: An Assessment of the World Bank's Approach to Poverty Reduction", *American Economic Review*, vol. 87(2),pp. 32-37.

Bourguignon, F. Morrisson, C. (1990). "Income Distribution Development and Foreign Trade", *European Economic Review*, vol. 34(6), pp. 1113-1133.

Bourguignon, F. F. Ferreira and N. Lustig, eds. (2005), *The Microeconomics of Income Distribution Dynamics in East Asia and Latin America*, Oxford University for the World Bank

Calderon, C. Chong, A. (2001). "External sector and income inequality in interdependent economies", *Economic Letters*, vol. 71, pp. 225-231.

Deaton, A. (2005) "Measuring Poverty in a Growing World (or Measuring Growth in a Poor World)" The Review of Economics and Statistics, MIT Press, vol. 87(2), pages 395-395.

Deininger, K. Squire, L. (1996). "A New Data Set Measuring Income Inequality", *World Bank Economic Review,* vol. 10(3), pp. 565-592.

Dollar, D. and A. Kraay (2000). "Growth is Good for the Poor", mimeo, March 2000.

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

Edwards, S. (1997). "Trade policy, Growth and Income Distribution", *American Economic Review*, vol. 87(2), pp. 205-210.

Feenstra, R. Hanson, G. (1996). "Foreign Investment, Outsourcing and Relative Wages" in R. Feenstra, G. Grossman and D. Irwin eds.,The Political Economy of Trade Policy: Essays in Honor Jagdish Bhagwati, MIT Press Cambridge.

Fisher, R. (2001). "The Evolution of Inequality after Trade Liberalization", *Journal of Development Economics,* vol. 66, pp. 555-579.

Galiani, S., and G. Porto (2006), "Trends in Trade Reforms and Trends in Wage Inequality", WPS# 3905, World Bank.

Goldberg, P. and N. Pavcnik (2004). "Trade, Inequality, and Poverty: What Do We Know? Evidence from Recent Trade Liberalization Episodes in Developing Countries", *NBER Working Paper* No. W10593, June.

Higgins, M. Williamson, J. (1999). "Explaining Inequality the World Round; Cohort Size, Kuznets Curves, and Openness", *NBER Working Paper* No. W7224.

Hiscox, M.J. Kastner, S.L. (2002). "A General Measure of Trade Policy Orientations: Gravity Model-Based Estimates from 83 nations, 1960 to 1992", *UCSD working* Paper 2002J.

Hertel, T., and L. A. Winters, eds. (2006), *Poverty and the WTO: Impacts of the Doha Development Agenda*, Palgrave McMillan and the World Bank

Hoff, K. (2004) "Paths of Institutional Development: A View from History", mimeo, World Bank.

Hummels, D., J. Ishii and K-M. Yi (2001). "The Nature and Growth of Vertical Specialization in World Trade", *Journal of International Economics*, vol. 54(1), pp. 75-96.

Kremer, M. and E. Maskin (2003). "Globalization and Inequality", (mimeo)

Leamer, E. Maul, H. Rodriguez, S. Schott, P.K. (1999). "Does Natural resources abundance increase Latin American income inequality?", *Journal of Development Economics* vol. 59, pp. 3-42.

Li, H. Squire, L. Zou, H. (1998). "Explaining International and Intertemporal Variations in Income Inequality", *Economic Journal,* vol. 108, pp. 26-43.

Lopez, H.(2004). "Macroeconomics and Inequality", Washington DC: The World Bank.

Lundberg, M. Squire, L. (2003). "The Simultaneous Evolution of Growth and Inequality", *Economic Journal,* vol. 113, pp. 326-344.

Milanovic, B. (2005). "Can we discern the effect of globalization on income distribution: evidence from household surveys", *World Bank Economic Review*.

Milanovic, B. (2005a). Worlds Apart: Global and International Inequality 1950-2000, Princeton University Press.

Miniane, J,. (2004), "A New Set on Capital Account Restrictions", IMF Staff Papers, 81(2),

Nicita, A. (2004). "Who Benefited from Trade Liberalization in Mexico? Measuring the Effects on Household Welfare", PRWP#3265, World Bank.

Perry, G. and M. Olarreaga (2006), "Trade Liberalization, Inequality and Poverty Reduction in Latin America", Mimeo, World Bank

Prichett, L. (1996). "Measuring Outward Orientation in LDCs: can it be done?", *Journal of Development Economics,* vol. 49, pp. 307-335.

Prichett, L., (2000). "Understanding Patterns of Economic Growth: Searching for Hills Among Plateaus, Mountains and Plains", *World Bank Economic Review*, vol. 14(2), pp. 221-50.

Rama, M. (2002). "Globalization, Inequality and Labor Market Policies", *Revue d'Economie du Développement*, vol. 1-2, pp. 43-84.

Pritchett, L. and G. Sethi (1994), "Tariff Rates, Tariff Revenue, and Tariff Reform: Some New Facts", *World Bank Economic Review*

Ravallion, M. (2001). "Growth Inequality and Poverty: Looking Beyond Averages", *World Development,* vol. 29(11), pp. 1803-1815.

Rodríguez, F. and D. Rodrik (2000). "Trade Policy and Economic Growth: A Skeptics Guide to the Cross-National Evidence", in Ben Bernanke and Kenneth Rogoff, eds., NBER Macroeconomics Annual 2000, Cambridge (MA): MIT Press.

Rodrik, D. (2000). "Comments on 'Trade, Growth, and Poverty' by D. Dollar and A. Kraay", draft. Available at http://ksghome.harvard.edu/~.drodrik.academic.ksg/

Romer, D. (1993). "Openness and Inflation: Theory and Evidence", *Quarterly Journal of Economics*, vol. 108(4), pp. 870-903.

Savvides, A. (1998). "Trade policy and income inequality", *Economics Letters*, vol. 61, pp. 365-372.

Spilimbergo, A. Londono, J.L. Székely, M., (1999). "Income distribution, factor endowments, and trade openness", *Journal of Development Economics*, vol. 59, pp. 77-101.

Wacziarg, R. and K. H. Welch (2003). "Trade Liberalization and Growth: New Evidence", *NBER Working Papers* 10152, National Bureau of Economic Research, Inc.

Winters, A. McCulloch, N. McKay, A. (2004). "Trade Liberalization and Poverty: The Evidence So Far", *Journal of Economic Literature*, vol. 42, pp. 72-115.

Wood, A. (1994). North-South trade employment and inequality, Oxford University Press, Clarendon

Wood, A. (1997). "Openness and Wage Inequality in Developing Countries: The Latin American Challenge to East Asia Conventional Wisdom", *World Bank Economic Review*, vol. 11(1), pp. 33-57.

Wood, A. (2002). "Globalization and Wage Inequalities: A Synthesis of Three Theories", *Weltwirtchafliches Archiv*, vol. 138(1), pp. 54-82.

Wood, A. (2003), "Could Africa be Like America", in B. Pleskovic and N. Stern eds, *ABCDE: The New Reform Agenda*, pp. 163-200.

Xu, B. (2003). "Trade Liberalization, Wage Inequality and Endogenously Determined NonTraded Goods", *Journal of International Economics*, vol. 60, pp. 417-431.

Tables to
Trade Liberalization, Inequality, and Poverty: Endowments Matter
by
Julien Gourdon, Nicolas Maystre, Jaime de Melo

Table 1: Countries in the sample[a]

	Sample for the study on 1980-2000		**Sample for the study on 1988-1998**	
Regions	Number of countries	Number of obs.	Number of countries	Number of obs.
Developed	20	66	19	51
Africa & Middle East	14	42	10	23
Asia	10	36	11	29
Latin American	17	54	15	43
Total	**61**	**198**	**55**	**146**

Notes: List of countries are reported in Annex 1 and 2.

[a] Transition and ex-USSR countries are excluded. Countries with less than two observations are also dropped from the sample

Table 2: Data on Inequality and Openness

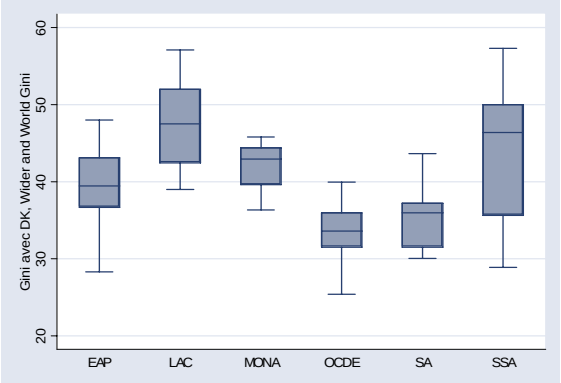
Table 2a: Inequality and Tariffs

Region	Year	Gini	Tariffs	Region	Year	Gini	Tariffs
Developed Countries	1980	33.4	2.9	Latin America	1980	47.6	10.6
	1985	31.8	2.1		1985	48.1	13.6
	1990	33.1	1.7		1990	47.3	10.2
	1995	32.7	1		1995	49.8	7.1
East Asia	1980	40.9	6.7	Middle East	1980	42	19.8
	1985	40.7	8.1		1985	38.7	17.4
	1990	39.3	8.7		1990	38	19.1
	1995	39.2	6.4		1995	37.7	12.2
South Asia	1980	35.7	19.1	Africa	1980	44.6	16.7
	1985	35.9	27.1		1985	46.7	18.2
	1990	36.2	25.3		1990	50.5	18.1
	1995	37.8	15.2		1995	46.3	17.9

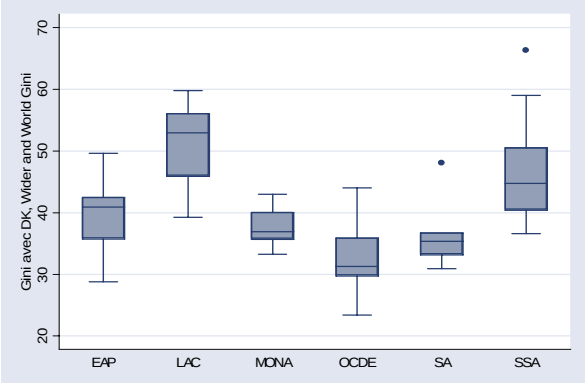
Table 2b: correlation across measure of openness

Correlation	(X+M)/GDP	Index Leamer	Index Prichett	Index Spilimbergo	Wacziarg & Welch	Dollar	Tax Barro & Lee	Index Hiscox Karstner	Black Market Premium
Observations	477	40	477	373	448	70	159	278	165
Tariffs	-0.15	-0.43	-0.08	-0.05	-0.56	-0.33	0.31	0.47	0.02

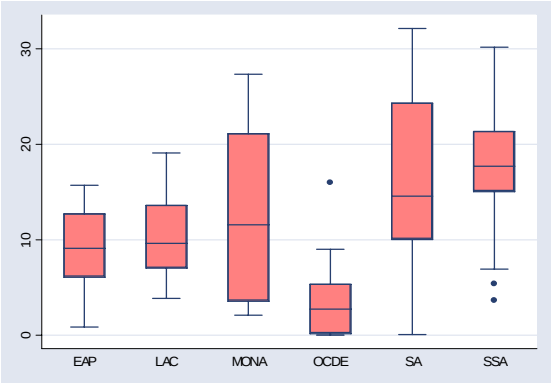
Figure 1: Box Plots on Gini, Tariffs and GDP per capita ($PPP) : 1980 and 1995



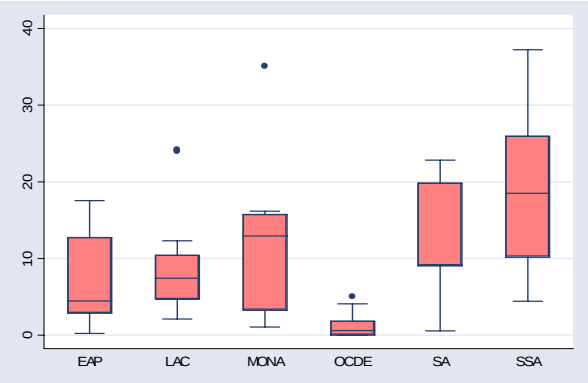
Gini: 1980



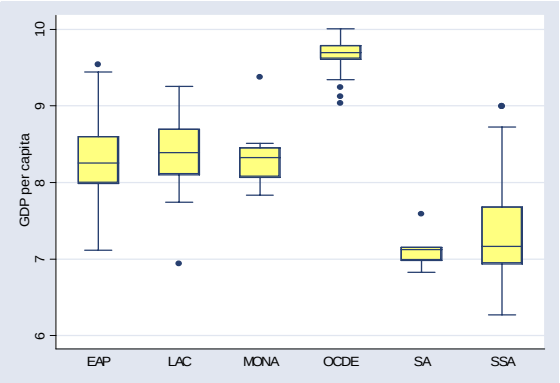
Gini: 1995



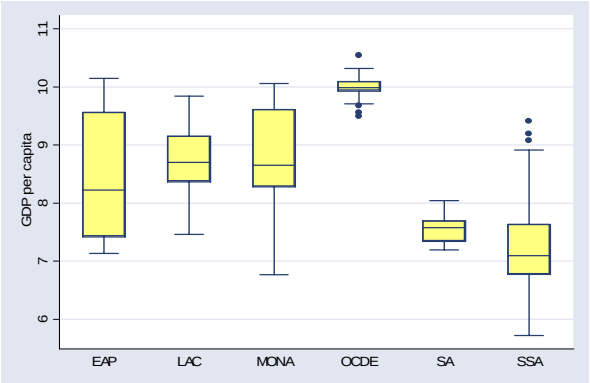
Tariffs: 1980



Tariffs: 1995



GDP per cap. ($PPP): 1980



GDP per cap. ($PPP): 1995

Table 3: Inequality, income and openness

	1	2	3	4	5
	OLS	OLS	OLS	FE	GLS+FE
Dependent variable	lnGini	lnGini	lnGini	lnGini	lnGini
GDPpc	-0.0509	-0.0595	-0.0527	0.0919	0.1298a
	(1.30)	(1.36)	(1.58)	(1.21)	(5.46)
$Tariffs_{t-5}$	-5.1998b	-5.3951b	-4.3213b	2.9037	2.8789b
	(2.28)	(2.27)	(2.07)	(1.24)	(2.46)
$Tariffs_{t-5}$ * GDPpc	0.5953b	0.6076b	0.5168b	-0.3371	-0.3435b
	(2.26)	(2.18)	(2.13)	(1.22)	(2.49)
Education	0.0374	0.0820	0.0057	0.0418	-0.0233
	(0.71)	(1.24)	(0.10)	(0.46)	(0.72)
Mature	-0.4445a	-0.2918a	-0.4124a	0.0490	0.0018
	(5.63)	(3.52)	(5.56)	(0.32)	(0.04)
Ethnicity	0.0268b	0.0328a	0.0310a	0.0000	0.0030
	(2.18)	(2.62)	(2.82)	(.)	(0.09)
Civil Liberties	0.0518	0.0811c	0.0666c	0.0409	0.0690a
	(1.23)	(1.67)	(1.74)	(0.74)	(4.13)
Inflation	0.0629b	0.0123	0.0707a	0.0112	0.0187a
	(2.04)	(0.34)	(3.36)	(0.85)	(2.87)
M2/Gdp		-0.1163a			
		(3.26)			
Gov. expenditure		0.0897b			
		(2.27)			
Gross/Net Income			0.0202	-0.0010	0.0049
			(0.72)	(0.04)	(0.56)
Income/expenditure			0.1785a	0.1102b	0.1248a
			(4.52)	(2.60)	(8.24)
Households/Individuals			-0.0240	0.0586b	0.0446a
			(0.98)	(2.43)	(5.23)
Fixed Effects	No	No	No	Yes	Yes
Constant	5.2384a	5.0059a	4.9787a		
	(17.93)	(14.54)	(18.35)		
Observations	224	172	224	215	215
R-squared	0.44	0.35	0.53	0.15 (0.91*)	
# Countries	75	61	75	66	66

Absolute value of z statistics in parentheses
c significant at 10%; b significant at 5%; a significant at 1%

* With fixed country effects

Table 4 Inequality, factor endowments and openness

	1	2	3	4	5
	Gini	Gini	Gini	Gini	Gini
GDPpc	0.1401a	0.1006a	0.0227	0.1006a	0.0982a
	(4.55)	(3.21)	(0.92)	(3.20)	(3.06)
MinFuel per Labor (MF/L)					0.1058a
					(7.77)
Ar. Land per Labor (AT/L)	0.1177	0.0364	-0.0731	0.0583	-0.0036
	(1.47)	(0.46)	(1.07)	(0.73)	(0.04)
Capital per Labor (K/L)	-0.0231	-0.0119	-0.0526c	-0.0279	-0.0386
	(0.65)	(0.34)	(1.76)	(0.83)	(1.13)
NoEd. per Labor ((NO-ED)/L)	0.0705a				
	(2.71)				
BasEd. per Labor ((BS-ED)/L)		0.0093			
		(0.28)			
SkillEd. per Labor ((SK-ED)/L)			0.1194a		
			(6.50)		
(Sk..+ Base.Ed)/NoEd ((SK+BS)/NO-ED)				-0.1037a	-0.1380a
				(5.52)	(7.85)
Skill/Base Ed (SK-ED/BS-ED)				0.1010a	0.0925a
				(5.48)	(4.71)
$Tariffs_{t-5}$	0.1537	0.0560	-0.1937	-0.0554	0.0292
	(0.52)	(0.18)	(0.76)	(0.19)	(0.10)
(MF/L) *($Tariffs_{t-5}$)					-0.1371c
					(1.87)
(AT/L) *($Tariffs_{t-5}$)	-0.2946	-0.1728	-0.0368	-0.1427	0.0451
	(0.95)	(0.53)	(0.15)	(0.45)	(0.13)
(K/L) *($Tariffs_{t-5}$)	-0.3619a	-0.3754a	0.2262c	-0.2138c	-0.2233c
	(3.44)	(3.29)	(1.78)	(1.79)	(1.80)
((NO-ED)/L) *($Tariffs_{t-5}$)	-0.6581b				
	(2.06)				
((BS-ED)/L) *($Tariffs_{t-5}$)		0.4821b			
		(2.07)			
((SK-ED)/L) *($Tariffs_{t-5}$)			-0.6010a		
			(4.75)		
((SK+BS)/NO-ED)*($Tariffs_{t-5}$)				0.8495a	1.0653a
				(4.54)	(6.28)
(SK-ED/BS-ED) *($Tariffs_{t-5}$)				-0.9153a	-0.8764a
				(5.63)	(5.31)
Inflation	0.0218a	0.0232a	0.0106c	0.0110	0.0116c
	(3.11)	(3.30)	(1.66)	(1.62)	(1.66)
Gross/Net Income	-0.0189c	-0.0160c	-0.0300a	-0.0130	-0.0145
	(1.74)	(1.67)	(4.72)	(1.16)	(1.31)
Income/Expenditure	0.1221a	0.1181a	0.1138a	0.1042a	0.1063a
	(8.13)	(7.96)	(8.23)	(6.76)	(6.67)
Households/Individual	0.0497a	0.0538a	0.0584a	0.0351a	0.0418a
	(6.82)	(7.32)	(25.67)	(5.48)	(8.02)
Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	198	198	198	198	198
# Countries	61	61	61	61	61

Absolute value of z statistics in parentheses
c significant at 10%; b significant at 5%; a significant at 1%

Table 5: Tariff Reduction, inequality and factor endowments

Variable	Percentile	5 percentage points tariff reduction*
(K/L)	0.25	-1.3
	0.75	0.9
(SK-ED/BS-ED)	0.25	-2.0
	0.75	1.0
((SK+BS)/NO-ED)	0.25	3.2
	0.75	-5.9

* Percentage change in Gini coefficient

Table 6: Inequality, factor endowments and openness

	$\ln\theta_1$	$\ln\theta_2$	$\ln\theta_3$	$\ln\theta_8$	$\ln\theta_9$	$\ln\theta_{10}$	lngini
$Tariffs_{t-5}$	12.1665a	5.0987a	2.3205a	-0.4606a	-0.6598a	-0.1584	-1.2703a
	(7.23)	(7.88)	(5.33)	(3.91)	(4.12)	(0.44)	(4.26)
Mean income	-0.2431a	-0.1385a	-0.1121a	-0.0441a	-0.0284a	0.1398a	0.1181a
	(5.41)	(9.27)	(6.61)	(15.83)	(6.08)	(14.43)	(12.23)
(K/L)	0.4322a	0.2548a	0.1208b	0.0605a	0.0420a	-0.2006a	-0.1481a
	(4.47)	(6.10)	(2.56)	(8.17)	(3.62)	(8.15)	(4.71)
(AT/L)	0.5842	0.1547	0.2295b	0.3923a	0.1908a	-0.6960a	-0.3510a
	(1.52)	(1.06)	(2.02)	(11.50)	(3.27)	(7.59)	(3.88)
(MF/L)	-0.6935a	-0.2021a	-0.0904c	-0.0363a	-0.0146	0.1801a	0.1398a
	(3.90)	(3.05)	(1.72)	(2.89)	(1.22)	(4.45)	(4.40)
(SK-ED/BS-ED)	-0.0676	-0.0362	-0.0342c	-0.0030	0.0332a	0.0080	0.0089
	(0.98)	(1.62)	(1.80)	(0.39)	(4.17)	(0.37)	(0.46)
((SK+BS)/NO-ED)	0.1776b	0.1308a	0.0826a	0.0065	-0.0329a	-0.0608a	-0.0633a
	(2.35)	(4.49)	(3.24)	(0.97)	(5.09)	(2.82)	(3.24)
(K/L) * ($Tariffs_{t-5}$)	3.6249a	1.3255a	0.6735a	-0.3809a	-0.3279a	0.3056c	-0.2167
	(5.73)	(4.93)	(3.85)	(8.14)	(4.73)	(1.94)	(1.56)
(AT/L) * ($Tariffs_{t-5}$)	-9.8692a	-4.1584a	-1.9019a	0.1535c	0.4179a	0.4309	1.1732a
	(5.75)	(6.60)	(4.21)	(1.88)	(2.88)	(1.59)	(4.07)
(MF/L) * ($Tariffs_{t-5}$)	-0.2151	0.0497	0.0154	0.0112	-0.0664	-0.0371	-0.0361
	(0.45)	(0.28)	(0.13)	(0.24)	(1.31)	(0.43)	(0.43)
(SK/(BS-ED)) * ($Tariffs_{t-5}$)	2.4942a	0.9503b	0.7164a	-0.0163	-0.0299	-0.6451a	-0.8820a
	(3.66)	(2.51)	(2.76)	(0.22)	(0.36)	(5.14)	(5.86)
((SK+BS)/NO-ED)*($Tariffs_{t-5}$)	-2.1938a	-0.8410a	-0.6382a	-0.1094b	-0.1267c	0.5939a	0.6060a
	(3.26)	(2.96)	(2.64)	(2.35)	(1.87)	(3.34)	(3.13)
Inflation	-0.1110b	-0.0449a	-0.0142	0.0076a	0.0063	0.0148c	0.0240a
	(2.45)	(2.78)	(1.13)	(3.09)	(0.84)	(1.67)	(2.70)
Income/expenditure	-0.1214a	-0.1069a	-0.0588a	0.0030	0.0031	0.0217c	0.0385a
	(2.83)	(5.57)	(4.74)	(0.55)	(0.48)	(1.65)	(4.12)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	146	146	146	146	146	146	146
# Countries	55	55	55	55	55	55	55

Absolute value of z statistics in parentheses
c significant at 10%; b significant at 5%; a significant at 1%

Table 7: Decile changes in income simulated from a 5 percentage points reduction in tariffs

- **Sub-Saharan Africa [0.464, 0.453]****

Ghana (2)*, Lesotho (2), Kenya (2), Uganda (2), and Zimbabwe (2)

		Decile 1	Decile 2	Decile 3	Decile 8	Decile 9	Decile 10
Africa	A	1.9% - 2.5%	2.9% - 3.2%	3.9% - 4.1%	11.2% - 10.8%	15.6% - 15.2%	38.0% - 38.4%
	B	230 - 301	350 - 385	460 - 493	1291 - 1239	1774 - 1721	4191 - 4233
	C	−2.7%	−1.0%	−0.7%	0.4%	0.3%	−0.1%

- **Latin America [0.482, 0.492]****

Argentina (3), Bolivia (3), Brazil (3), Colombia (3), Costa Rica (3), Dominican Republic (3), Ecuador(3), Jamaica (3), Mexico (3), Nicaragua (2), Panama (3), Paraguay (2), Peru (3), Uruguay (3) and Venezuela (3)

Latin America	A	1.3% - 1.0%	2.5% - 2.3%	3.6% - 3.5%	11.6% - 11.7%	16.6% - 16.8%	38.0% - 38.3%
	B	348 - 284	704 - 650	1007 - 970	3306 - 3345	4763 - 4818	10994 - 11081
	C	2.0%	0.8%	0.4%	−0.1%	−0.1%	−0.1%

- **East, South and South-East Asia [0.358, 0.369]****

Bangladesh (2), China (2), India (3), Indonesia (2), Korea (3), Malaysia (3), Pakistan (3), Philippines (3), Singapore (3), Sri Lanka (3) and Thailand (3)

Asia	A	3.0% - 2.5%	4.3% - 3.9%	5.2% - 5.0%	11.6% - 11.7%	15.1% - 15.2%	29.6% - 29.9%
	B	613 - 495	955 - 868	1184 - 1142	2704 - 2706	3486 - 3513	6692 - 6765
	C	2.1%	0.9%	0.4%	0.0%	−0.1%	−0.1%

Row A corresponds to the relative shift of the share due to a 5 points decrease of tariffs.
Row B corresponds to the shift of the absolute income of the share due to a 5 points decrease of tariffs.
Row C shows the corresponding annual real growth (over the 10 years) that would be necessary to keep each decile's income at its initial value.

*Number of observations in parentheses.
** Gini coefficients before and after simulated tariff reduction in brackets.

Figure 2: Simulated changes in quintile mean incomes of a 5 percentage points reduction in tariffs

Figure 2a: bottom quintile*

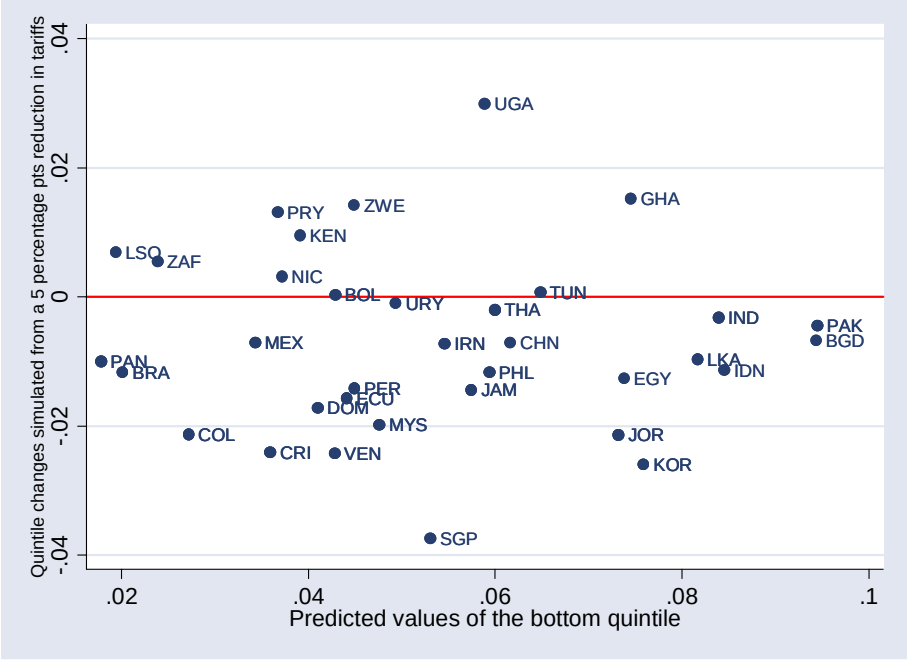
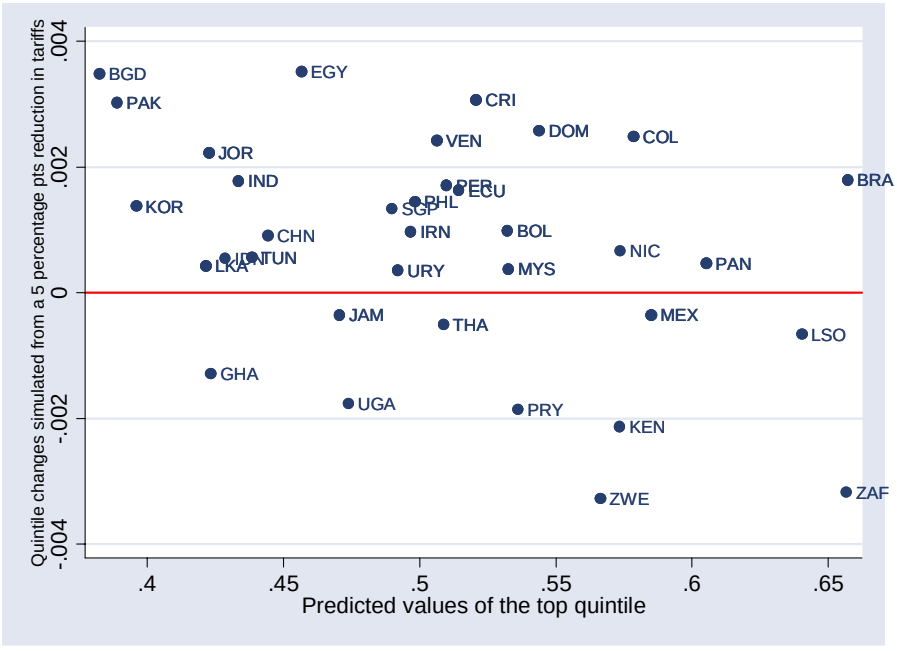


Figure 2b: top quintile*



* Simulated quintile share before tariff reduction on the horizontal axis, and changes in quintile share following the tariff reduction (here, a 5 percentage points) on the vertical axis. For example, the average income share of the poorest 20% of the Dominican Republic (DOM) is reduced from 4% of total income to 2% after the tariff reduction.

Annexes to:

Trade Liberalization, Inequality, and Poverty: Endowments Matter

Julien Gourdon, Nicolas Maystre, Jaime de Melo

Annex 1: List of countries included in the sample 1980-2000(Gini from WIDER)

	Countries	Number of observations
Latin America	Argentina	3
	Barbados	1*
	Bolivia	2
	Brazil	3
	Chile	3
	Colombia	4
	Costa Rica	4
	Dom. Republic	4
	Ecuador	3
	Guatemala	1*
	Guyana	1*
	Honduras	1*
	Jamaica	3
	Mexico	4
	Nicaragua	2
	Panama	4
	Paraguay	2
	Peru	4
	Trinidad & Tobago	2
	Uruguay	3
	Venezuela	4
Total	**17 (21*)**	**54 (58*)**
Developed Countries	Australia	4
	Austria	3
	Canada	4
	Cyprus	2
	Denmark	2
	Finland	3
	France	4
	Greece	4
	Ireland	3
	Italy	4
	Japan	4
	Netherlands	2
	New Zealand	2
	Norway	4
	Portugal	4
	Spain	4
	Sweden	4
	Switzerland	2
	United Kingdom	3
	United States	4
Total	**20**	**66**

	Countries	Number of observations
Africa and Middle East	Botswana	1*
	Burundi	1*
	Cameroon	2
	Egypt	2
	Ghana	3
	Iran	4
	Israel	3
	Jordan	4
	Kenya	3
	Lesotho	2
	Malawi	4
	Mali	1*
	Mauritius	3
	Rwanda	1*
	Sierra Leone	1*
	South Africa	4
	Tanzania	1*
	Tunisia	4
	Uganda	2
	Zambia	1*
	Zimbabwe	2
Total	**14 (21*)**	**42 (49*)**
Asia	Bangladesh	3
	China	1*
	India	4
	Indonesia	3
	Korea Rep.	4
	Malaysia	3
	Nepal	1*
	Pakistan	4
	Philippines	3
	Singapore	4
	Sri Lanka	4
	Thailand	4
Total	**10 (12*)**	**36 (38*)**

* means that countries are excluded in our specifications with country fixed effects.

Annex 2: List of countries included in the sample 1988-1998 (deciles from WYD)

	Countries	Number of observations
Africa and Middle East	Egypt	2
	Ghana	2
	Iran	3
	Jordan	3
	Kenya	2
	Lesotho	2
	South Africa	2
	Tunisia	3
	Uganda	2
	Zimbabwe	2
Total	**10**	**23**
Latin America	Argentina	3
	Bolivia	3
	Brazil	3
	Colombia	3
	Costa Rica	3
	Dominican Rep	3
	Ecuador	3
	Jamaica	3
	Mexico	3
	Nicaragua	2
	Panama	3
	Paraguay	2
	Peru	3
	Uruguay	3
	Venezuela	3
Total	**15**	**43**
Asia	Bangladesh	2
	China	2
	India	3
	Indonesia	2
	Korea	3
	Malaysia	3
	Pakistan	3
	Philippines	3
	Singapore	2
	Sri Lanka	3
	Thailand	3
Total	**11**	**29**

	Countries	Number of observations
Developed Countries	Australia	2
	Austria	3
	Canada	3
	Cyprus	2
	Finland	2
	France	3
	Greece	3
	Ireland	3
	Israel	3
	Italy	3
	Japan	2
	Netherlands	3
	Norway	3
	Portugal	3
	Spain	2
	Sweden	3
	Switzerland	2
	United Kingdom	3
	United States	3
Total	**19**	**51**

Annex 3: List of variables

Label	Content	Sources
Gini	Gini coefficients	WIDER(2004)
ShareX (X = 1,…, 10)	Absolute income level of each decile normalized by the mean income. (X = 1 corresponds to the poorest 10% of the population and X = 10 to the richest 10%)	WYD (2002)
Mean	It corresponds to the mean income derived from household surveys (in current $PPP)	WYD (2002)
GDPpc	GDP per capita in power parity purchase (PPP)	Pen WorldTables (2005)
Capital	Capital per Worker	Easterly and Levine (1999) & Kraay and al. (2000)
Land	Land per labor force Land arable per labor force Crop Land per Labor force /Cereal Land per Labor force/Forest Land per Labor Force	WDI (2004)
Mining & Fuel	Production of minerals, coal and Oil	World Energy Council (2004)
Education	Average years of schooling in the population over 15 years old	Barro and Lee (2000)
No Educated	Proportion of the population over 15 years non educated (or primary not completed)	Barro and Lee (2000)
Primary (Based) Educated	Proportion of the population over 15 years primary educated (completed) (or secondary not completed)	Barro and Lee (2000)
High (Skilled) Educated	Proportion of the population over 15 years High educated	Barro and Lee (2000)
Inflation	Annual growth rate of the GDP implicit deflator. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	WDI (2004)
FDI	Foreign Direct Investment as % of Gdp.	UNCTAD Handbook of Int. Trade and Development Statistics (1996, 1997, 2000)
M2/Gdp	Money and quasi money comprise as % of Gdp.	WDI (2004)
Gov Expenditure	Total expenditure includes both current and capital expenditures as % of Gdp	WDI (2004)
Mature	Share of the population between 40 and 59 years old	Higgins and Williamson (1999)
Civil Liberties	Measure the extent to which people are able to express their opinion openly without fears of reprisals and are protected in doing so by an independent judiciary.	Freedom House
Democracy	Democracy is defined as "general openness of political institutions". The variable ranges from 0 (absence of democracy) to 10 (best)	Monty G. Marshall and Keith Jaggers (2002). Polity IV Dataset.
Ethnicity	Herfindhal index which measure the probability for two individuals to be in a different group each other.	La Porta and al. (1999)
Infrastructure	Quantity (Stock); Principal component analysis on road per km², telephone lines per workers, power Gigawatt per worker Quality: waiting times for phone com., energy losses, paved road	Calderon and Serven (2004)
Tariffs	Import duties comprise all levies collected on goods at the point of entry into the country. In % of Imports	WDI (2004)
Index Dollar	Index of price distortion	Dollar (1992)
Index Pritchett	Adjusted Trade ratio: residual once we account for size and distance	Pritchett (1996)
Index Spilimbergo	Adjusted Trade ratio: residual once we account for size, distance and difference in factor endowment	Spilimbergo and al. (1999)
Index Leamer	Adjusted Net Trade ratio: residual once we account for size, distance and difference in factor endowment	Leamer (1987)
Index Hiscox & Kastner	Fixed country years effect in a gravity model once we account for size, distance and difference in factor endowment.	Hiscox & Kastner (2002)
Black market premium	Black market premium	WDI (2004)
Index Wacziarg & Welch	Index taking value 0 or 1 depending on liberalization	Wacziarg & Welch (2005)
Tax Barro & Lee	Tax on capital and input	Barro and Lee (2002)
(X+M)/Gdp	Output trade ratio	WDI (2004)

Annex 4: Construction of index of relative factor endowment

Let E_{ift} is per capita endowment of country *i* in factor *f* in year *t* and E^*_{ft} the world per capita effective endowment of country *i* in factor *f* in year *t* , computed by weighting every country's endowment by the population and by the degree of openness

$$E^*_{ft} = \frac{\sum_i \left(E_{ift} \times pop_i \times \left(\frac{X+M}{GDP} \right)_i \right)}{\sum_i \left(pop_i \times \left(\frac{X+M}{GDP} \right)_i \right)}$$

The indicators of relative advantage is $A_{ift} = \ln \frac{\left(E_{ift}\right)}{\left(E^*_{ft}\right)}$

Annex 5: Extension of previous results

	(1)	(2)	(3)	(4)	(5)
Econometric Specification	OLS	OLS	OLS+FE	GLS+FE	GLS+FE
Measure Openness	Adj. Trade ratio Gini	Adj. Trade ratio lagged Gini	Adj. Trade ratio lagged Gini	Adj. Trade ratio lagged Gini	Tariffs lagged Gini
GDPpc	0.014	0.482	0.528	0.537	1.287
	(0.05)	(2.09)b	(0.97)	(2.18)b	(4.93)a
GDPpc²	-0.004	-0.035	-0.027	-0.025	-0.073
	(0.25)	(2.63)a	(0.86)	(1.84)c	(4.87)a
Capital (K/L)	0.306	0.125	-0.051	-0.013	0.044
	(4.85)a	(1.83)c	(0.55)	(0.31)	(1.58)
Arable Land (AT/L)	0.086	0.102	-0.087	-0.090	-0.049
	(2.50)b	(3.11)a	(0.98)	(2.30)b	(1.98)b
Education (Ed/L)	-0.369	-0.036	-0.320	-0.253	-0.060
	(2.30)b	(0.19)	(1.76)c	(3.65)a	(0.92)
Open	0.027	0.028	0.021	0.013	0.005
	(3.42)a	(3.30)a	(1.81)c	(3.13)a	(0.89)
Open * (K/L)	-0.051	-0.014	-0.001	-0.003	-0.030
	(4.72)a	(1.34)	(0.18)	(0.84)	(5.15)a
Open * (AT/L)	-0.013	-0.013	0.007	0.006	0.013
	(3.10)a	(2.83)a	(0.55)	(0.96)	(2.38)b
Open * (Ed/L)	0.062	-0.001	0.048	0.035	0.018
	(2.36)b	(0.04)	(2.05)b	(4.02)a	(0.72)
SSA	0.299	0.309			
	(6.17)a	(8.07)a			
LAC	0.336	0.267			
	(9.72)a	(7.97)a			
Gross/Net Income		0.028	-0.024	-0.032	-0.021
		(1.15)	(1.02)	(3.14)a	(2.07)b
Inc/expenditure		0.111	0.120	0.122	0.135
		(3.36)a	(2.98)a	(9.38)a	(9.16)a
Households/Individual		0.033	0.049	0.058	0.026
		(1.30)	(1.97)c	(7.38)a	(2.29)b
Fixed Effects	No	No	Yes	Yes	Yes
Observations	182	202	202	202	202
R-squared	0.61	0.66	0.20*		
# Countries	56	62	62	62	62

Absolute value of z statistics in parentheses
c significant at 10%; b significant at 5%; a significant at 1%
The first column corresponds to the specification from Spilimbergo and al. (1999)

* R-squared "within"

Annex 6: Desegregation in skills and land

	(1)	(2)		(3)	(4)	(5)	(6)
	Gini	Gini		Gini	Gini	Gini	Gini
GDPpc	0.1327a	0.0246	GDPpc	0.0653b	0.0814b	0.1074a	0.0779b
	(3.99)	(0.95)		(2.02)	(2.44)	(3.32)	(2.05)
(AT/L)	0.0933	-0.0478					
	(1.15)	(0.68)					
			CerLand per Labor	-0.0303			-0.0355
				(1.38)			(1.49)
			CroLand per Labor		-0.0625b		0.0065
					(2.23)		(0.16)
			ForLand per Labor			-0.0438	
						(1.08)	
			(MF/L)	0.1210a	0.1469a	0.1085a	0.1367a
				(6.14)	(7.12)	(5.90)	(5.24)
(K/L)	-0.0229	-0.0692b	(K/L)	-0.0527	-0.0673c	-0.0319	-0.0841b
	(0.62)	(2.28)		(1.51)	(1.94)	(0.94)	(2.13)
((NO-ED)/L)	0.0704a		(SK-ED/(BS-ED))	0.1065a	0.1189a	0.0951a	0.1318a
	(2.72)			(5.13)	(5.15)	(4.62)	(5.42)
((BS-ED)/L)	-0.0508	0.0080	((SK+BS)/NO-ED)	-0.1519a	-0.1100a	-0.1375a	-0.1422a
	(1.23)	(0.26)		(7.88)	(5.69)	(7.20)	(6.33)
((SK-ED)/L)		0.1221a					
		(6.74)					
Tariffs $_{t-5}$	-0.0139	-0.1559	Tariffs $_{t-5}$	-0.0530	-0.0793	-0.0546	0.1181
	(0.04)	(0.58)		(0.21)	(0.28)	(0.25)	(0.33)
(AT/L)*Tariffs $_{t-5}$	-0.1385	-0.1017					
	(0.41)	(0.37)					
			(CerLand /Labor)*Tariffs $_{t-5}$	0.2132			0.2002
				(0.57)			(0.50)
			(CroLand/ Labor)*Tariffs $_{t-5}$		0.1666		-0.0792
					(0.74)		(0.33)
			(ForLand/ Labor)*Tariffs $_{t-5}$			0.0755	
						(0.41)	
			(MF/L)*Tariffs $_{t-5}$	-0.1907a	-0.1394c	-0.1185	-0.2310a
				(2.64)	(1.93)	(1.53)	(3.01)
(K/L)*Tariffs $_{t-5}$	-0.4864a	0.2007	(K/L)*Tariffs $_{t-5}$	-0.2219c	-0.1683	-0.2763b	-0.1490
	(4.54)	(1.53)		(1.73)	(1.33)	(2.06)	(1.07)
((NO-ED)/L)*Tariffs $_{t-5}$	-0.2738		(SK-ED/(BS-ED))*Tariffs $_{t-5}$	-0.9231a	-1.0468a	-0.8580a	-1.1334a
	(0.78)			(5.22)	(5.71)	(4.99)	(5.61)
((BS-ED)/L)*Tariffs $_{t-5}$	0.8681a	0.3389	((SK+BS)/NO-ED)*Tariffs $_{t-5}$	1.1404a	1.0335a	1.0867a	1.1537a
	(2.74)	(1.42)		(6.58)	(6.20)	(6.15)	(6.54)
((SK-ED)/L)*Tariffs $_{t-5}$		-0.6887a					
		(4.96)					
Inflation	0.0250a	0.0153b	Inflation	0.0082	0.0182a	0.0116	0.0109
	(3.43)	(2.22)		(1.10)	(3.02)	(1.63)	(1.40)
gross/net income	-0.0167	-0.0331a	gross/net income	-0.0203c	-0.0038	-0.0175	-0.0211c
	(1.49)	(4.20)		(1.73)	(0.36)	(1.63)	(1.70)
income/expenditure	0.1238a	0.1129a	income/expenditure	0.0969a	0.0969a	0.1086a	0.0966a
	(8.41)	(9.45)		(5.98)	(8.44)	(6.52)	(5.93)
Households/individual	0.0488a	0.0577a	Households/individual	0.0370a	0.0343a	0.0432a	0.0353a
	(7.02)	(13.44)		(4.41)	(5.28)	(7.58)	(3.51)
Fixed Effects	Yes	Yes	Fixed Effects	Yes	Yes	Yes	Yes
Observations	198	198	Observations	194	194	198	194
# Countries	61	61	# Countries	60	60	61	60

Annex 7a: Relative Factor Endowments: percentile distribution

Obs.	Percentile	K/L	AT/L	MF/L	SK-ED /BS-ED	(SK+BS) /NO-ED	NO-ED/L	BS-ED/L	SK-ED/L
210	25	0,365	0,481	0,000	0,650	0,536	0,505	0,717	0,406
	50	0,943	0,934	0,171	0,927	1,134	0,937	1,008	1,129
	75	2,473	1,636	1,065	1,285	2,928	1,309	1,321	1,863

Note: Values above (below) unity indicates a country endowment above (below) the sample average.

Annex 7b: Tariff Reduction, inequality and factor endowments (full result table 5)

Variable	Percentile	5 percentage point tariff reduction*
(K/L)	0.25	-1.3
	0.75	0.9
(AT/L)	0.25	0.0
	0.75	-0.3
(MF/L)	0.25	-3.3
	0.75	-0.1
(SK-ED/BS-ED)	0.25	-2.0
	0.75	1.0
(SK+BS)/NO-ED)	0.25	3.2
	0.75	-5.9
((NO-ED)/L)	0.25	-3.0
	0.75	0.1
((BS-ED)/L)	0.25	0.5
	0.75	-1.0
((SK-ED)/L)	0.25	-1.7
	0.75	2.8

* Percentage change in Gini coefficient

Annex 8: Adding macro and institutional variables as control

	(1)	(2)	(3)	(4)
	Gini	Gini	Gini	Gini
GDPpc	0.0892a	0.1240a	-0.1279a	-0.1926a
	(2.80)	(3.60)	(2.75)	(4.19)
(AT/L)	-0.0452	-0.0538	-0.0471	-0.0372
	(0.56)	(0.61)	(0.70)	(0.49)
(MF/L)	0.1039a	0.1053a	0.1387a	0.0604c
	(6.34)	(4.51)	(5.03)	(1.96)
(K/L)	-0.0343	-0.0592	0.0402	0.0034
	(1.01)	(1.58)	(1.12)	(0.10)
(SK-ED/(BS-ED))	0.0973a	0.0776a	0.0495b	0.0489b
	(4.90)	(3.73)	(2.32)	(2.56)
((SK+BS)/NO-ED)	-0.1345a	-0.1214a	-0.1033a	-0.0395b
	(7.61)	(6.28)	(5.35)	(2.02)
$Tariff_{t-5}$	-0.0430	0.1262	0.1322	0.4484c
	(0.16)	(0.40)	(0.50)	(1.70)
$(AT/L)*Tariff_{st-5}$	0.1123	0.0105	-0.2449	-0.3567
	(0.34)	(0.03)	(0.76)	(1.11)
$(MF/L)*Tariffs_{t-5}$	-0.1577b	-0.1861b	-0.3160a	-0.3113a
	(2.12)	(2.34)	(4.79)	(2.90)
$(K/L)*Tariffs_{t-5}$	-0.2400b	-0.2968b	-0.0099	0.3017b
	(1.98)	(1.97)	(0.08)	(2.27)
$(SK-ED/(BS-ED))*Tariffs_{t-5}$	-0.8783a	-0.8483a	-0.5892a	-0.6153a
	(5.38)	(5.80)	(3.94)	(4.37)
$((SK+BS)/NO-ED)*Tariffs_{t-5}$	1.0277a	1.0890a	0.9989a	0.5212a
	(6.10)	(6.84)	(7.07)	(3.54)
Inflation	0.0086	0.0154b	0.0100	0.0163
	(1.20)	(2.11)	(1.35)	(1.54)
Civil Liberties	0.0472a	0.0448b	0.0606a	0.0617a
	(2.63)	(2.39)	(2.75)	(2.74)
Gov. Expenditures (%Gdp)		-0.0286	-0.0516b	-0.0499b
		(1.03)	(1.98)	(2.25)
Infrastructure stock			0.1281a	0.1405a
			(5.52)	(6.15)
Infrastructure quality			-0.0251a	-0.0295a
			(3.96)	(4.52)
Financial depth (M2/Gdp)				-0.0097
				(0.51)
gross/net income	-0.0125	-0.0080	-0.0308a	-0.0457a
	(1.13)	(0.75)	(2.72)	(4.16)
income/expenditure	0.1083a	0.1102a	0.1025a	0.1228a
	(6.72)	(10.28)	(8.40)	(7.43)
Households/individual	0.0419a	0.0272a	0.0481a	0.0175
	(8.22)	(3.51)	(4.68)	(1.37)
Fixed effects	Yes	Yes	Yes	Yes
Observations	198	187	172	138
# Countries	61	58	53	43

Annex 9: Using different measures of Trade Openness

	(1)	(2)	(3)	(4)	(5)	(6)
	Hisc & Kast	BMP	Wacziarg Welch	(XM/Gdp)	Spilim.	Prichett
	Gini	Gini	Gini	Gini	Gini	Gini
GDPpc	0.2139a	0.1412a	0.1083a	0.0876a	0.1052a	0.1480a
	(5.03)	(5.02)	(3.78)	(3.66)	(3.52)	(5.38)
(AT/L)	-0.1000b	-0.0370	-0.0629b	0.2723a	-0.0745c	-0.0611b
	(1.97)	(1.27)	(2.04)	(2.75)	(1.79)	(2.31)
(MF/L)	0.0680	0.0391	0.1093a	-0.0672	0.0014	0.0639b
	(1.25)	(1.11)	(5.94)	(0.93)	(0.04)	(2.22)
(K/L)	-0.1278b	-0.0402	-0.0425	0.1022	0.0729	-0.0605c
	(2.03)	(1.21)	(1.24)	(1.35)	(1.54)	(1.83)
(SK-ED/BS-ED)	0.1479a	0.0156	0.0440b	-0.1327	-0.0939c	0.0124
	(3.90)	(0.61)	(2.32)	(1.27)	(1.68)	(0.81)
((SK+BS)/NO-ED)	-0.1449a	-0.0380b	-0.0728a	-0.0790	-0.1332a	-0.0303b
	(2.78)	(2.10)	(4.60)	(0.98)	(3.61)	(2.43)
$Open_{t-5}$	0.0009	**-0.0116a**	**0.0483a**	0.0206	0.0058	0.0202
	(0.64)	(3.81)	(3.01)	(0.79)	(0.90)	(0.83)
(AT/L)*$Open_{t-5}$	**0.0022c**	-0.0011	0.0241	**-0.0700a**	0.0017	0.0124
	(1.67)	(0.20)	(1.54)	(3.06)	(0.28)	(0.40)
(MF/L)*$Open_{t-5}$	-0.0006	***0.0031b***	***-0.0123b***	0.0302	0.0043	0.0004
	(0.49)	(2.55)	(2.41)	(1.61)	(0.86)	(0.02)
(K/L)*$Open_{t-5}$	-0.0010	**-0.0097a**	**0.0267c**	***-0.0395b***	***-0.0210a***	***-0.0879a***
	(0.63)	(3.20)	(1.93)	(2.42)	(4.32)	(4.71)
(SK-ED/BS-ED)*$Open_{t-5}$	**-0.0036a**	0.0037	***-0.0415b***	0.0388	**0.0241a**	**0.1588a**
	(2.70)	(0.61)	(2.04)	(1.56)	(2.75)	(4.31)
((SK+BS)/NO-ED)*$Open_{t-5}$	**0.0029b**	-0.0022	***0.0330c***	0.0087	***0.0154a***	***0.0491c***
	(2.01)	(0.52)	(1.91)	(0.43)	(3.03)	(1.76)
Inflation	0.0240a	0.0220a	0.0156c	0.0111c	0.0100	0.0200a
	(3.16)	(3.54)	(1.86)	(1.71)	(1.37)	(4.31)
gross/net income	-0.0046	-0.0253a	-0.0254a	-0.0213b	-0.0183c	-0.0195b
	(0.39)	(2.92)	(3.00)	(2.54)	(1.87)	(2.19)
income/expenditure	0.1105a	0.1198a	0.1076a	0.1035a	0.1108a	0.1278a
	(5.32)	(7.24)	(6.25)	(6.13)	(6.26)	(10.05)
household/individual	0.0443a	0.0504a	0.0627a	0.0477a	0.0674a	0.0590a
	(3.54)	(4.13)	(5.98)	(4.19)	(6.47)	(5.79)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	192	188	231	228	228	212
# Countries	55	56	69	68	68	63

Notes:
Signes under indicators in cols. (1) and (2) to be interpreted like those for tariffs.
Signes under indicators in cols. (3)-(6) to be interpreted in opposite to tariffs
Figures in bold correspond to those obtained with the tariff measure.
Figures in italics are opposite to those obtained with tariffs

Annex 10: Inequality, different skill categories and openness in Quintile

	(1)	(2)	(3)	(4)	(5)	(6)
	lnQuint1	lnQuint2	lnQuint3	lnQuint4	lnQuint5	Gini
GDPpc	-0.0586	0.0478	0.0534	0.0411c	-0.0842b	0.1905a
	(0.63)	(0.89)	(1.51)	(1.75)	(2.18)	(4.34)
(AT/L)	-0.6083b	-0.6566a	-0.0208	-0.0186	0.2517a	-0.0831
	(2.40)	(4.18)	(0.22)	(0.36)	(2.75)	(0.69)
(MF/L)	0.1595b	0.0236	0.0536	-0.0238	0.0054	0.1173a
	(2.31)	(0.35)	(1.64)	(1.14)	(0.15)	(4.86)
(K/L)	-0.1108	-0.0530	-0.0650c	-0.1010a	0.0976b	-0.0623
	(1.22)	(0.80)	(1.88)	(3.59)	(2.57)	(1.24)
(SK-ED/BS-ED)	-0.0348	-0.0064	-0.1236a	0.0474a	0.0216	0.0933a
	(0.70)	(0.17)	(7.62)	(2.70)	(1.37)	(4.22)
((SK+BS)/NO-ED)	0.0991a	0.0859b	0.0626a	0.0112	-0.0437b	-0.1657a
	(2.76)	(2.23)	(3.95)	(0.80)	(2.48)	(7.11)
Tariffs $_{t-5}$	**1.5135c**	**-1.3592a**	-0.2337	-0.3170	0.3220	1.1621a
	(1.71)	(2.87)	(0.71)	(1.29)	(1.09)	(3.15)
(AT/L)*Tariffs $_{t-5}$	0.8410	**2.5443a**	-0.0993	0.1128	-0.4616	**-0.7482c**
	(0.95)	(3.70)	(0.23)	(0.43)	(1.07)	(1.85)
(MF/L)*Tariffs $_{t-5}$	*-3.5200a*	-0.6164	0.2850	**-0.4164b**	0.4475	**-1.0352a**
	(5.00)	(1.31)	(0.99)	(2.30)	(1.60)	(3.20)
(K/L)*Tariffs $_{t-5}$	**3.3993a**	**1.7264a**	0.2137	0.1244	**-0.8531a**	-0.0810
	(11.44)	(8.35)	(1.52)	(1.17)	(9.71)	(0.65)
(SK-ED/(BS-ED))*Tariffs $_{t-5}$	-0.1468	-0.2464	**0.4925a**	**-0.3551b**	0.1777	**-0.9173a**
	(0.37)	(0.93)	(2.63)	(2.31)	(1.35)	(5.86)
((SK+BS)/NO-ED)*Tariffs $_{t-5}$	**-1.5432a**	**-1.8995a**	-0.2970	-0.1919	**0.6464a**	**1.6716a**
	(2.95)	(5.23)	(1.46)	(1.41)	(3.44)	(8.41)
Inflation	-0.0561a	-0.0693a	0.0208	0.0039	0.0021	0.0397a
	(4.53)	(2.85)	(0.84)	(0.28)	(0.17)	(3.34)
household/individual	-0.0599	-0.0112	0.0515a	0.0744a	-0.0319a	0.0080
	(1.52)	(0.57)	(4.41)	(9.89)	(2.72)	(0.71)
Income/expenditure	0.1539b	-0.1574	-0.1755a	-0.0318	0.0530	0.1372a
	(2.11)	(1.51)	(3.17)	(1.43)	(1.26)	(7.17)
Gross/net income	-0.1138a	0.0271	0.0705	-0.0401a	-0.0236	0.0384a
	(2.63)	(0.27)	(1.32)	(2.84)	(0.58)	(2.75)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135	135	135	135	135	135
# Countries	45	45	45	45	45	45

Notes:
Column (6) corresponds to the specification of table 5 (column 7) but with the smaller sample of countries
Figures in bold correspond to those obtained with the Gini measure.
Figures in italics are opposite to those obtained with the Gini measure

Annex 11: Inequality, factor endowments and openness (full results of table 6)

	$\ln\theta_1$	$\ln\theta_2$	$\ln\theta_3$	$\ln\theta_4$	$\ln\theta_5$	$\ln\theta_6$	$\ln\theta_7$	$\ln\theta_8$	$\ln\theta_9$	$\ln\theta_{10}$	lngini	lntheil
$Tariffs_{t-5}$	12.1665a	5.0987a	2.3205a	1.4353a	1.0290a	0.3309	-0.1210	-0.4606a	-0.6598a	-0.1584	-1.2703a	-2.0205a
	(7.23)	(7.88)	(5.33)	(5.28)	(3.78)	(1.46)	(0.80)	(3.91)	(4.12)	(0.44)	(4.26)	(2.85)
Mean income	-0.2431a	-0.1385a	-0.1121a	-0.0691a	-0.0685a	-0.0646a	-0.0533a	-0.0441a	-0.0284a	0.1398a	0.1181a	0.2615a
	(5.41)	(9.27)	(6.61)	(8.23)	(11.32)	(10.96)	(10.57)	(15.83)	(6.08)	(14.43)	(12.23)	(11.37)
(K/L)	0.4322a	0.2548a	0.1208b	0.1051a	0.1058a	0.0993a	0.0495a	0.0605a	0.0420a	-0.2006a	-0.1481a	-0.3366a
	(4.47)	(6.10)	(2.56)	(4.22)	(6.00)	(5.93)	(3.37)	(8.17)	(3.62)	(8.15)	(4.71)	(4.89)
(AT/L)	0.5842	0.1547	0.2295b	0.2269a	0.2558a	0.3906a	0.4175a	0.3923a	0.1908a	-0.6960a	-0.3510a	-1.0171a
	(1.52)	(1.06)	(2.02)	(2.85)	(3.57)	(6.74)	(10.56)	(11.50)	(3.27)	(7.59)	(3.88)	(4.87)
(MF/L)	-0.6935a	-0.2021a	-0.0904c	-0.0648	-0.0895b	-0.0839a	-0.1192a	-0.0363a	-0.0146	0.1801a	0.1398a	0.3388a
	(3.90)	(3.05)	(1.72)	(1.45)	(2.25)	(3.19)	(6.41)	(2.89)	(1.22)	(4.45)	(4.40)	(4.42)
(SK-ED/BS-ED)	-0.0676	-0.0362	-0.0342c	-0.0168	0.0050	-0.0074	-0.0023	-0.0030	0.0332a	0.0080	0.0089	0.0012
	(0.98)	(1.62)	(1.80)	(1.00)	(0.33)	(0.73)	(0.26)	(0.39)	(4.17)	(0.37)	(0.46)	(0.03)
((SK+BS)/NO-ED)	0.1776b	0.1308a	0.0826a	0.0368c	0.0321c	0.0349a	0.0383a	0.0065	-0.0329a	-0.0608a	-0.0633a	-0.1184b
	(2.35)	(4.49)	(3.24)	(1.68)	(1.91)	(4.03)	(4.80)	(0.97)	(5.09)	(2.82)	(3.24)	(2.57)
(K/L) * ($Tariffs_{t-5}$)	3.6249a	1.3255a	0.6735a	0.3952a	0.1815	-0.0547	-0.1830a	-0.3809a	-0.3279a	0.3056c	-0.2167	-0.0817
	(5.73)	(4.93)	(3.85)	(3.03)	(1.48)	(0.62)	(2.88)	(8.14)	(4.73)	(1.94)	(1.56)	(0.26)
(AT/L) * ($Tariffs_{t-5}$)	-9.8692a	-4.1584a	-1.9019a	-0.8356a	-0.7953a	-0.3312	-0.1689	0.1535c	0.4179a	0.4309	1.1732a	2.0583a
	(5.75)	(6.60)	(4.21)	(2.99)	(2.72)	(1.59)	(1.05)	(1.88)	(2.88)	(1.59)	(4.07)	(2.97)
(MF/L) * ($Tariffs_{t-5}$)	-0.2151	0.0497	0.0154	-0.0533	-0.0012	0.0028	0.0363	0.0112	-0.0664	-0.0371	-0.0361	-0.1255
	(0.45)	(0.28)	(0.13)	(0.66)	(0.02)	(0.05)	(0.65)	(0.24)	(1.31)	(0.43)	(0.43)	(0.64)
(SK/(BS-ED)) * ($Tariffs_{t-5}$)	2.4942a	0.9503b	0.7164a	0.2813	0.0520	-0.0596	-0.0495	-0.0163	-0.0299	-0.6451a	-0.8820a	-1.8815a
	(3.66)	(2.51)	(2.76)	(1.44)	(0.34)	(0.67)	(0.59)	(0.22)	(0.36)	(5.14)	(5.86)	(5.43)
((SK+BS)/NO-ED)*($Tariffs_{t-5}$)	-2.1938a	-0.8410a	-0.6382a	-0.2377	-0.1932	-0.1861b	-0.2606a	-0.1094b	-0.1267c	0.5939a	0.6060a	1.3169a
	(3.26)	(2.96)	(2.64)	(1.34)	(1.30)	(2.51)	(3.49)	(2.35)	(1.87)	(3.34)	(3.13)	(3.10)
Inflation	-0.1110b	-0.0449a	-0.0142	-0.0210b	-0.0150c	-0.0010	0.0095b	0.0076a	0.0063	0.0148c	0.0240a	0.0494b
	(2.45)	(2.78)	(1.13)	(2.11)	(1.86)	(0.16)	(2.16)	(3.09)	(0.84)	(1.67)	(2.70)	(2.56)
Income/expenditure	-0.1214a	-0.1069a	-0.0588a	-0.0456a	-0.0191c	0.0015	0.0087	0.0030	0.0031	0.0217c	0.0385a	0.0897a
	(2.83)	(5.57)	(4.74)	(4.19)	(1.74)	(0.15)	(1.15)	(0.55)	(0.48)	(1.65)	(4.12)	(3.96)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	146	146	146	146	146	146	146	146	146	146	146	146
# Countries	55	55	55	55	55	55	55	55	55	55	55	55

Absolute value of z statistics in parentheses
c significant at 10%; b significant at 5%; a significant at 1%

Annex 12: Inequality, factor endowments and openness (adding democracy and government expenditure)

	$\ln\theta_1$	$\ln\theta_2$	$\ln\theta_3$	$\ln\theta_4$	$\ln\theta_5$	$\ln\theta_6$	$\ln\theta_7$	$\ln\theta_8$	$\ln\theta_9$	$\ln\theta_{10}$	lngini	lntheil
$Tariffs_{t-5}$	14.2378a	5.3814a	2.4655a	1.2369a	0.5164	-0.2524	-0.3386	-0.6646a	-0.2578	0.4735	-0.6193	-0.7905
	(6.91)	(7.48)	(5.76)	(2.78)	(1.30)	(0.89)	(1.53)	(6.32)	(1.39)	(0.97)	(1.36)	(0.86)
Mean income	-0.2533a	-0.0877a	-0.0640a	-0.0491a	-0.0586a	-0.0660a	-0.0498a	-0.0445a	-0.0046	0.1303a	0.0894a	0.2136a
	(5.45)	(4.64)	(4.45)	(3.44)	(4.88)	(9.06)	(8.26)	(7.69)	(0.74)	(8.37)	(6.25)	(7.19)
(K/L)	0.7760a	0.2264a	0.0720c	0.0340	0.0403	0.0333c	0.0402b	0.0731a	0.0651a	-0.1173a	-0.0823b	-0.2068b
	(6.43)	(4.05)	(1.73)	(0.93)	(1.31)	(1.74)	(2.47)	(4.61)	(4.07)	(2.74)	(2.14)	(2.54)
(AT/L)	1.8901a	0.3557c	0.1884	0.1611	0.2866a	0.3886a	0.2847a	0.2859a	-0.1355b	-0.5305a	-0.4416a	-0.9815a
	(4.45)	(1.77)	(1.34)	(1.26)	(2.59)	(5.25)	(4.82)	(6.61)	(2.05)	(3.25)	(2.91)	(2.90)
(MF/L)	-0.8563a	-0.1770b	-0.1273a	-0.0407	-0.0432	-0.0415c	-0.0586a	-0.0158	0.0012	0.0917b	0.0712b	0.1740b
	(5.65)	(2.56)	(3.21)	(1.08)	(1.39)	(1.78)	(3.07)	(1.18)	(0.05)	(2.39)	(2.22)	(2.53)
(SK-ED/BS-ED)	0.2773a	0.0153	0.0044	0.0161	0.0134	-0.0051	-0.0041	-0.0115	-0.0043	0.0160	0.0129	0.0353
	(2.94)	(0.56)	(0.18)	(0.73)	(0.72)	(0.36)	(0.35)	(1.62)	(0.38)	(0.54)	(0.39)	(0.51)
((SK+BS)/NO-ED)	-0.2630a	0.0168	0.0197	-0.0035	-0.0025	0.0181	0.0216c	0.0076	0.0079	-0.0412	-0.0199	-0.0574
	(2.71)	(0.46)	(0.70)	(0.13)	(0.11)	(1.21)	(1.65)	(0.96)	(0.63)	(1.40)	(0.59)	(0.84)
(K/L) * ($Tariffs_{t-5}$)	3.0953a	1.2518a	0.6104a	0.2913b	0.0407	-0.1484c	-0.2519a	-0.4127a	-0.2884a	0.4943a	0.0535	0.4326
	(4.42)	(4.63)	(3.74)	(2.04)	(0.35)	(1.79)	(3.19)	(7.76)	(3.72)	(2.74)	(0.33)	(1.18)
(AT/L) * ($Tariffs_{t-5}$)	-10.4122a	-4.5792a	-2.1675a	-1.0689a	-0.7656b	-0.1613	-0.0119	0.3394a	0.2285	0.0743	0.9123b	1.5211c
	(5.18)	(7.24)	(5.44)	(2.97)	(2.34)	(0.68)	(0.06)	(5.07)	(1.18)	(0.20)	(2.21)	(1.83)
(MF/L) * ($Tariffs_{t-5}$)	-0.2037	0.1767	0.0963	0.0403	0.1173b	0.0877	0.0499	-0.0024	-0.0940	-0.0469	-0.1690b	-0.3116c
	(0.58)	(1.50)	(1.11)	(0.51)	(2.03)	(1.45)	(0.81)	(0.06)	(1.57)	(0.50)	(2.11)	(1.71)
(SK/(BS-ED)) * ($Tariffs_{t-5}$)	0.3677	1.4197a	0.9150a	0.5642a	0.3859a	0.1584c	0.0019	-0.1582	-0.0019	-0.5592c	-0.9422a	-1.9033a
	(0.43)	(3.75)	(4.89)	(5.22)	(3.30)	(1.71)	(0.02)	(1.36)	(0.01)	(1.93)	(4.29)	(3.31)
((SK+BS)/NO-ED)*($Tariffs_{t-5}$)	0.5490	-0.6342b	-0.5323b	-0.3350c	-0.3603b	-0.4076a	-0.2585b	-0.1758b	-0.1831	0.5151c	0.4773b	1.0982b
	(0.71)	(2.08)	(2.48)	(1.79)	(2.27)	(3.64)	(2.30)	(2.48)	(1.60)	(1.85)	(1.98)	(2.10)
Democracy	0.0059	-0.0037c	-0.0007	-0.0013	0.0006	0.0030b	0.0005	0.0013	-0.0002	-0.0021	-0.0014	-0.0033
	(0.61)	(1.78)	(0.40)	(0.69)	(0.35)	(2.23)	(0.50)	(1.41)	(0.17)	(0.95)	(0.85)	(0.96)
Government expenditure	-0.5335a	-0.1611a	-0.1151a	-0.0705a	-0.0523b	-0.0493b	0.0021	0.0155	0.0559a	0.0756a	0.0639a	0.1277a
	(6.17)	(5.68)	(5.44)	(2.63)	(2.07)	(2.46)	(0.15)	(1.28)	(4.01)	(2.86)	(2.93)	(2.97)
Inflation	-0.3836a	-0.0764a	-0.0260	-0.0085	-0.0089	0.0038	0.0073	0.0054	0.0215c	0.0041	0.0275b	0.0586b
	(6.40)	(4.32)	(1.46)	(0.53)	(0.73)	(0.41)	(1.39)	(1.37)	(1.96)	(0.35)	(2.06)	(2.04)
Income/expenditure	0.1206a	-0.0295	-0.0899a	-0.0652a	-0.0372b	-0.0126	0.0056	0.0015	-0.0178a	0.0452a	0.0538a	0.1179a
	(3.45)	(1.15)	(3.41)	(2.72)	(2.17)	(0.91)	(0.56)	(0.31)	(3.10)	(2.73)	(2.61)	(2.74)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114	114	114	114	114	114	114	114	114	114	114	114
# Countries	41	41	41	41	41	41	41	41	41	41	41	41

Absolute value of z statistics in parentheses
c significant at 10%; b significant at 5%; a significant at 1%

Annex 13: List of countries for the three regions and their average endowments used for calculation of the impact of a 5 points decrease in tariffs on inequality and poverty.

- **Sub-Saharan Africa** (expect South Africa)

List of countries:
Ghana, Lesotho, Kenya, Uganda, and Zimbabwe

Variables	# Obs.	Mean	Std. Dev
K/L	10	-2.63	0.90
AT/L	10	0.68	0.12
MF/L	10	0.04	0.08
SK/(BS-ED)	10	-1.73	0.32
(SK+BS)/NO-ED	10	-1.02	0.52

- **Latin America**

List of countries:
Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela

Variables	# Obs.	Mean	Std. Dev
K/L	43	-0.23	0.46
AT/L	43	0.81	0.41
MF/L	43	0.79	1.37
SK/(BS-ED)	43	0.02	0.34
(SK+BS)/NO-ED	43	-0.12	0.56

- **East, South and South-East Asia** (except Japan and Singapore)

List of countries:
Bangladesh, China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka and Thailand

Variables	# Obs.	Mean	Std. Dev
K/L	27	-1.01	0.87
AT/L	27	0.44	0.21
MF/L	27	0.27	0.35
SK/(BS-ED)	27	-0.09	0.58
(SK+BS)/NO-ED	27	0.06	0.98

Annex 14: The evaluation of a 5 points decrease in tariffs on income distribution for three regions (full results of table 7)

- **Sub-Saharan Africa** (expect South Africa) [0.464, 0.453]**

Ghana (2)*, Lesotho (2), Kenya (2), Uganda (2), and Zimbabwe (2)

		Share 1	Share 2	Share 3	Share 4	Share 5	Share 6	Share 7	Share 8	Share 9	Share 10
Africa	A	1.9% - 2.5%	2.9% - 3.2%	3.9% - 4.1%	4.8% - 4.8%	5.8% - 5.7%	7.1% - 7.0%	8.7% - 8.4%	11.2% - 10.8%	15.6% - 15.2%	38.0% - 38.4%
	B	230 - 301	350 - 385	460 - 493	567 - 573	688 - 674	828 - 820	1013 - 973	1291 - 1239	1774 - 1721	4191 - 4233
	C	-2.7%	-1.0%	-0.7%	-0.1%	0.2%	0.1%	0.4%	0.4%	0.3%	-0.1%

- **Latin America** [0.482, 0.492]**

Argentina (3), Bolivia (3), Brazil (3), Colombia (3), Costa Rica (3), Dominican Republic (3), Ecuador(3), Jamaica (3), Mexico (3), Nicaragua (2), Panama (3), Paraguay (2), Peru (3), Uruguay (3) and Venezuela (3)

Latin America	A	1.3% - 1.0%	2.5% - 2.3%	3.6% - 3.5%	4.6% - 4.5%	5.8% - 5.7%	7.2% - 7.2%	9.0% - 8.9%	11.6% - 11.7%	16.6% - 16.8%	38.0% - 38.3%
	B	348 - 284	704 - 650	1007 - 970	1309 - 1266	1644 - 1612	2043 - 2041	2554 - 2545	3306 - 3345	4763 - 4818	10994 - 11081
	C	2.0%	0.8%	0.4%	0.3%	0.2%	0.0%	0.0%	-0.1%	-0.1%	-0.1%

- **East, South and South-East Asia** (except Japan and Singapore) [0.358, 0.369]**

Bangladesh (2), China (2), India (3), Indonesia (2), Korea (3), Malaysia (3), Pakistan (3), Philippines (3), Singapore (3), Sri Lanka (3) and Thailand (3)

Asia	A	3.0% - 2.5%	4.3% - 3.9%	5.2% - 5.0%	6.1% - 5.9%	7.1% - 6.8%	8.2% - 8.2%	9.6% - 9.5%	11.6% - 11.7%	15.1% - 15.2%	29.6% - 29.9%
	B	613 - 495	955 - 868	1184 - 1142	1405 – 1358	1637 - 1581	1910 - 1911	2237 - 2218	2704 - 2706	3486 - 3513	6692 - 6765
	C	2.1%	0.9%	0.4%	0.3%	0.3%	0.0%	0.1%	0.0%	-0.1%	-0.1%

Row A corresponds to the relative shift of the share due to a 5 points decrease of tariffs.
Row B corresponds to the shift of the absolute income of the share due to a 5 points decrease of tariffs.
Row C shows the corresponding annual real growth (over the 10 years) that would be necessary to keep each decile's income at its initial value.
*Number of observations in parentheses. ** Gini coefficients before and after simulated tariff reduction in brackets.