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Trade Openness and Income Inequality

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Abstract

During the 1980s and 1990s more and more countries opened up their economies to trade and increased their volumes of trade. In the same period of time it has been said that income inequality increased in many parts of the world. The aim of this thesis is to discover whether increased income inequality can be related to trade openness. This relationship is studied using three different hypotheses. The hypotheses are based in Hecksher-Ohlin models of trade, the simple 2x2x2 version as well as an expanded version. Six different measures of trade openness are used, both policy-based and outcome-based measures. Openness in itself is found to be somewhat related with high inequality, at least for the 1990s. The predictions of Heckscher-Ohlin theory, that inequality increases in wealthy countries and decreases in poor countries as a result of increased trade, cannot be supported in this study. Neither can the predictions saying that inequality increases in capital and land abundant countries while decreases in labor abundant countries when they are faced with trade openness. According to this study, the contrary appears to be the case, which also have been found in earlier studies. There is some evidence that skill abundant countries experience higher inequality with openness, as is predicted by Heckscher-Ohlin theory.

Keywords: trade openness, income inequality, Heckscher-Ohlin theory, openness measures

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Abbreviations

GDP	Gross Domestic Product
GDPpc	Gross Domestic Product per capita
HO	Heckscher-Ohlin
HOSS	Heckscher-Ohlin-Stolper-Samuelsson
PPP	Purchasing Power Parity
PWT	Penn World Tables
WB	World Bank
WDI	World Development Indicators
WIDER	World Institute for Development Economics Research
WIID	World Income Inequality Database

1. Introduction

During the 1980s and 1990s more and more countries opened up their economies to trade and increased their volumes of trade. In the same period of time income inequality appeared to increase in some parts of the world[1]. This has been touched upon in global and national public debate, e.g. in the protests against the Seattle WTO-meeting in 1999 where developing countries were in focus, but also in national debates in developed countries in Western Europe and North America regarding fear of competition from low-wage countries. As can be seen from the table 1, income inequality measured by the Gini index[2] in World Income Inequality Database (WIID) has increased from the 1980s to the 1990s in almost all regions of the world. In Sub-Saharan Africa, Latin America and the Caribbean and Eastern Europe and Central Asia the increase in income inequality has been the largest.

Table 1.

GINI INDEX: DECADE AVERAGES PER REGION		
Region	Average Gini 80s	Average Gini 90s
East Asia and the Pacific	36.4	38.2
Eastern Europe and Central Asia	28.2	34.4
Latin America and the Caribbean	47.2	51.3
Middle East and North Africa	39.4	38.0
South Asia	31.8	35.3
Sub-Saharan Africa	46.4	49.4
North America	32.9	34.0
Western Europe	27.8	29.2

Source: Calculated averages from Gini data in WIID (2004). Observations types in accordance with section 3.2.

Within the traditional Heckscher-Ohlin-Stolper-Samuelson (HOSS) framework, trade changes the returns to different factors of production and hence the incomes of the owners of these factors. The HOSS framework predicts increased inequality in capital-rich countries as labor-intensive industries move to labor-abundant developing countries, and decreased inequality in developing countries as the demand for unskilled labor rises.

[1] See for example Cornia and Court (2001)

[2] For a description of the Gini measure, see section 3.2.

But others[3] suggest that developing countries experience increased inequality due to trade liberalization and increased openness. Openness may affect income inequality through different channels. Anderson (2005) identifies some channels through which increased trade openness could affect income inequality. One such channel is relative factor returns. According to Heckscher-Ohlin (HO) theory, demand increases for a country's abundant factors when the country opens up to trade. This would increase the price of these factors, hence increase the returns to the owners of the factors. The increased demand would increase the abundant factors' share of national income. Secondly, if openness has a positive effect on the real incomes of the poorer groups in society, this would enable these groups to make loans and increase their investment in accumulating future assets, thus in the long run contributed to decreased inequality. Thirdly, openness may lead to expansion of industries in certain regions within a country and contraction of production in other regions. This could have an effect on employment and wages in different regions, which in turn would affect income distribution. Fourthly, it could be argued that openness may change the demand for female or male labor. As an example, if textile production expands as a result of openness, it may increase the demand for female labor relative to male labor. If there is a general difference in skill level between male and female labor, and openness causes an increased demand for either skilled or unskilled labor, this too may affect gender inequality. Finally, Anderson (2005) suggests that countries engaged in trade may be more eager to use redistributional policies since some groups are likely to suffer an income loss when the economy is subject to trade. Spilimbergo et al (1999) suggest the opposite, that countries engaged in trade are likely to have liberal governments who are also likely not to redistribute income in their country. Thus, if the benefits of trade are not naturally distributed evenly, these countries would experience increased inequality as a result of trade.

The thesis is organized as follows. Section 2 gives a brief introduction to the concept of inequality and presents the theoretical framework and the three different hypotheses. Section 3 presents the data and discusses measurement of both openness and inequality. Section 4 presents the specified econometric models and the results from the regression analysis, and section 5 concludes.

[3] See for example Cornia and Court (2001)

2. Theoretical framework

2.1 The concept of inequality

The concept of inequality involves three different levels – global (between all citizens of the world, international (between countries) and national (within countries) inequality. In this paper focus is on within-country inequality, which is the type of inequality that can be targeted by national policies. Vertical inequality is inequality between individuals, while horizontal inequality is inequality based on ethnic, religious, social or occupational group identity. High horizontal inequality may cause instability in a country. Perotti and Alesina (1996) have found that income inequality fuels social and political discontent, and hence may lead to socio-political instability. According to their study, socio-political instability tends to decrease investment, which would have long-term economic consequences. In this thesis, an aggregate measure of income inequality will be used. There will be no division between vertical and horizontal inequality in the analysis, which is of cross-country type[4]. It is reasonable to suggest that high aggregate income inequality may have both socio-political and economic consequences as explained above.

Cornia and Court (2001) have suggested that one has to separate between so called "traditional" causes of inequality and "new" causes. Traditional causes are factors such as land distribution, urban bias and inequality in education while new causes are said to be linked to the liberal economic regimes and policies implemented in large scale in developing countries in the 1980s and 1990s. The traditional causes are explained to be responsible for the initial level of inequality in different countries, but the recent increase in inequality in some countries is said to be due to the new causes corresponding to the rapidly changing liberalizing economic regimes. The theoretical effects of trade on income inequality are discussed in the following section.

[4] An analysis of horizontal and vertical inequality would likely demand extensive micro-data for all countries in the sample.

2.2 The Heckscher-Ohlin model

A simple HO model says that countries export those factors (in goods bundles) that they are relatively well endowed with. This increases the demand for their abundant factors and through that raises relative prices of these factors. In general, developed countries can be said to be well endowed with capital[5] and developing countries with unskilled labor. From this theoretical standpoint we can predict that openness would benefit unskilled laborers in developing countries and capital-owners in developed countries. If more factors of production and more countries than in the simple two good - two factors - two countries – model are included comparative advantages become more complicated.[6] Nevertheless, the basic idea of the theory still holds. Depending on the distribution of factors of production between countries we may define different hypotheses from this setting[7].

1. The simplest hypothesis says that greater openness leads to increased inequality in all countries:

$$INC_{it} = \alpha_0 + \underset{(+)}{\alpha_1 openness_{it}} + \alpha_2 Z_{it} + e_{it}$$

INC represents an aggregate measure of inequality, *openness* is a measure of openness (openness to capital flows, openness to trade etc) and *Z* is a set of control variables that are thought to affect inequality. The subscripts *i* and *t* represent country *i* at time *t*. This hypothesis is more loosely related to economic theory than the following two, although it has been argued that openness in general tends to increase the vulnerability of the economy, especially in developing countries. [8] [9]

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[5] An alternative factor of production for this example would be skilled labor.

[6] See for example Leamer (1987) for a HO model including natural resources and Wood (1997) for an expanded HO model with more factors of production and more countries.

[7] See Anderson (2005)

[8] One version of this hypothesis could be the so called Skill Biased Technical Change hypothesis, saying that increased openness during the 80´s increased the demand for high-skilled workers (as a results of the widespread use of new technology, mainly computers) increased inequality (Liard-Muriente 2005).

[9] See Cornia and Court (2001). Their hypothesis involves also openness to capital movements and thus the risks of macroeconomic volatility, which will not be discussed here.

2.The second hypothesis, derived from the basic 2x2x2 HO-model, says that greater openness generates increased income inequality in developed countries, but reduced inequality in developing countries. Developing countries are thought to have more unskilled labor relative to skilled labor (and/or relative to capital), while the opposite is thought to be the case in developed countries. Skill (capital) is assumed to be unequally distributed across the population and the increase in the relative demand for skilled labor (capital) in developed countries as a result of trade would therefore raise income inequality. In developing countries the effect would be the opposite: as the demand for the equally distributed factor unskilled labor increases with trade, inequality falls.

$$INC_{it} = \beta_0 + \beta_1 openness_{it} + \beta_{2it}\, openness * Y_{it} + \beta_3 Z_{it} + e_{it}$$
$$\qquad\qquad (+) \qquad\qquad (+)$$

Y is a measure of the income level of a country, either a quantitative measure such as GDP per capita or a qualitative measure such as (high/low/middle income country, OECD/non-OECD).

3. The third hypothesis says that greater openness will have different effects on income inequality depending on the countries' factor endowments:

$$INC_{it} = \chi_0 + \chi_1 OPEN_{it} + \chi_{2j} openness_{it} * E_{ijt} + \chi_3 Z_{it} + e_{it}$$
$$\qquad\qquad (+) \qquad\qquad (+)$$

E is a set of variables representing factor endowments, each one relative to labor, which interact with the openness measure.

The theory behind this hypothesis is a HO model with many countries[10]. The idea is that the higher the endowment of any factor relative to labor, the greater will be the effect on

[10] See Wood (1999) for an example of such a model.

income inequality of an increase in openness. As unskilled labor is more equally distributed than other factor endowments such as capital, skill and land, increased openness will have more of an effect on income inequality the larger the endowments of other factors relative to labor are. A problem with a hypothesis of this kind is that it demands more from the inequality measure. In order to fully capture the effect of factor endowments, all income (including capital incomes) should be included in the inequality measure, thereby reducing the possible sample of countries. (Anderson 2005)

2.3 Earlier research

Different versions of the three hypotheses identified above have been used in a number of different studies, but the evidence is ambiguous. A summary of earlier evidence can be found in table A in the appendix. White and Anderson (2001), Dollar and Kray (2002), Edwards (1997b) and Higgins and Williamson (1999) found no support for the first hypothesis, that openness by itself is associated with higher inequality. Lundberg and Squire (2003) found support for the first hypothesis using the S&W index but not the trade-GDP ratio, and Barro (2000) found support for it using the trade-GDP ratio.

Edwards (1997b), Higgins and Williamson (1999), Calderón and Chong (2001) and Dollar and Kray (2002) also tested the second hypothesis, that openness is associated with higher inequality in developed countries. They found no support for this hypothesis. On the other hand, Barro (2000) and Ravallion (2001) found that the experience of developed countries differs, but not in the way expected from traditional HO theory. Their studies showed that openness in itself appeared to be associated with increased inequality, but that developed countries appeared to experience decreased inequality with openness.

As for the third hypothesis, that factor endowments determine the effect on income inequality when a country opens up to trade, earlier research have not found much support for the hypothesis. Dollar and Kray (2002) found no significant relationship between the variables, but Spilimbergo et al (1999) and Fischer (2001) found that differing income inequality is associated with countries' different factor endowments.

But just as in the case of the second hypothesis, the evidence contradicted the predictions made by traditional HO theory. Their results suggested that trade openness in relatively skill abundant countries were associated with higher inequality, which is in line with HO theory, while trade openness in relatively capital abundant countries corresponded to lower inequality.

3. Data and measurement

The data used is cross-country data from the 1980s and 1990s. Decade averages are calculated for all variables.

3.1 Openness measures

The different openness measures used in this study are presented in table 2. As has been pointed out in earlier research[11] there is no generally accepted measurement of openness. Spilimbergo et al (1999) distinguish between *incidence-based measures of openness*, based on tariff data and trade policy, and *outcome-based measures of openness*, based on trade data. Calderón et al (2005) make the same distinction between policy or legal measures and outcome or de facto measures of openness. They point out that the benefit of an outcome measure is that it in a way reflects country-specific features. In order to make the analysis as robust as possible I follow Edwards (1997a) example and use a number of measurements of openness in the estimated equations. Of Edwards' (1997a) nine measures I use the following four[12] policy measures, which are updated for the 1990s by other authors:

- Sachs and Warner Openness Index
- Average Black Market Premium
- Average Import Tariff on Manufacturing
- Average Coverage of Non-Tariff Barriers

In addition to the qualitative measures mentioned above a quantitative (outcome-based) measure of openness will be used:

- (Exports+Imports) / GDP[13]

Note that two different ratios are used; one from WB and one from PWT 6.1.

[11] See for example Edwards (1997a)

[12] Two additional measures used by Edwards (1997a) are the often cited *Dollar Index of Openness* often called the *World Development Outward Orientation Index* and the *Heritage Foundation Index of Distortions in International Trade*.

[13] From now called trade/GDP.

Barriers to trade, such as costs involving trade barriers and distance, may still exist even though they cannot be seen in the data used in this analysis. There are political incentives for governments to protect industries using the country's scarce factors. Even if general tariffs and trade barriers are low there may still be high protection on a few industries, such as textiles within Europe. Also, the effective production may in fact be high, even though tariffs appear low, which may distort the results of the analysis. This will not be taken into account in this study.

Table 2.

OPENNESS MEASURES			
Variable	**Expected sign**	**Explanation**	**Source**
Trade/GDP	+	(Exports+Imports)/GDP (%)	1) Penn World Tables 6.1 2) World Development Indicators (World Bank 2006)
S&W	+	Sachs and Warner openness index. Binary classification: 1=open, 0=closed	Sachs and Warner (1995). Updated for the 1990s by Wacziarg (2003)
-1*BM Prem	+	Average Black Market Premium (%). (Average premium of the black market exchange rate compared to official exchange rate.)	Barro and Lee (1994) in Sachs and Warner (1995) and updated for the 1990s by Easterly and Mirvat (2000), reported in Wacziarg (2003))
-1* Avg. tariff	+	Average Import Tariff on Manufacturing (%)	Sachs and Warner (1995) and updated for 1990s by (Wacziarg (2003))
-1*Avg. corenont	+	Average Coverage of Non-Tariff Barriers (%)	Sachs and Warner (1995) (updated by Michalopoulos (1999) and reported in Wacziarg (2003))

3.2 The Gini coefficient

As will be discussed below, the Gini coefficient is not always an adequate measurement of income inequality. In this analysis only the Gini measure will be used. In a more extensive analysis, quintile data should be used. Furthermore, there are many different aspects of "income"; income from labor, income from capital, income from transfers etc. Therefore one needs to be careful when studying inequality data that might take different

incomes into account. Inflation has a large impact on the real value of income, therefore there is reason to use real value of income in the inequality measure.

As has been pointed out by Spilimbergo et al (1999) among others, there is no satisfying measurement of income inequality today. Nevertheless, there are a number of different ways to calculate personal income distribution.[14] The Gini coefficient or the Gini index is the most widely used. The problem with the Gini is that it only provides a general image of the level of aggregate income inequality, and comparing different Ginis does not always accurately show the actual distribution of income. Especially in the case of changing and fluctuating economies, the movements between income groups (quintiles or deciles or the choice of decomposition), the Gini coefficient does not account for all movements between income groups. I intend to use the Gini as it is the measurement of income inequality normally reported in official data, and it may serve its purpose in a general analysis such as this.

The formula for calculating the Gini coefficient is: [15]

$$G = \frac{1}{2n^2\mu}\sum_{j=1}^{m}\sum_{k=1}^{m} n_j n_k \mid y_j - y_k \mid$$

- n = Sample size
- μ = Mean income
- m = Number of distinct income groups
- j , k = respective income groups
- $\mid y_j - y_k \mid$ = Absolute value of difference in paired income level groups

The Gini coefficient takes the value 0 for complete equality and 1 for complete inequality (theoretically, one person owns all income of a country). Normally mean income is used but it has been argued that it is better to use median income in order not to give to much

[14] See for example Sahota (1978)
[15] Definition from Slack and Rodrigue (2005)

weight to extreme values. Note that the Gini data used in this study is a Gini index equal to 100*Gini coefficient, i.e. a value of 100 would signify complete inequality.

The data on income inequality is from the World Income Inequality Database (WIID). It expands the Deininger-Squire database (World Bank (1996)) and includes within-country data on inequality from major regional databases and data made available by selected studies and Central Statistical Offices. The data includes 152 countries, and inequality data is gathered from the 1960s to 2003. Note that data is not available for all countries and years in this period. The version used in this thesis is the WIID2.0a, updated and revised in June 2005. In addition to the reported Ginis in the original data, an additional Gini has been calculated using a new method with decile data and reported in WIID2.0a. (WIDER (2005)). This alternative Gini measure is the one used in this thesis.

Since the Gini coefficient is known not to change significantly from one year to another I have included decade averages even for those countries where only a few observations of the same kind could be found. For developing countries, Ginis calculated from consumption data have been used when possible, since this is recommended by WIDER (2005) as income data may not be accurate if a large part of the population is living from subsistence agriculture.

Methods of collecting income data and coverage within a country may change over time, hence comparisons in Gini over time may be difficult. Therefore I have used a number of criterias for the selected observations. Qualifications for the observations are:

- Person (and not household) as unit of analysis, area and population coverage "all"[16]. In a small number of cases there have been deviations from area coverage and population coverage "all".
- Dummy variables have been added for income data (with consumption data as the base group), gross income data (disposable income data as base group) and monetary income (when there is suspicion that income is not accurately

[16] Area coverage "all" includes urban, rural and metropolitan areas. Population coverage "all" signifies a population sample from all areas of employment.

reported[17]). This is to correct for the generally higher Ginis generated by income data (especially gross income data).

In some cases different equivalence scales[18] have been used (household per capita, OECD household equivalence). The differences between the Ginis for the same years but with different equivalence scales are not large, therefore this has been neglected in the analysis. In some cases, proxies from a year close but outside the decade have been used. This is only in very few cases, where the reliability of the few datapoints is bad and when they are clustered together in the beginning or the end of the decade, and where possible proxies have been available.

[17] See WIDER (2005) for further information.

[18] Since the data selected uses person as unit of analysis, the equivalence scale is the scale by which household or family data is translated into person data.

4. Econometric study

4.1 Econometric models

For each of the three hypotheses, equations using decade averages from the 1980s and 1990s respectively will be estimated. In order to increase the sample size, a pooled data set with data from the two decades will be used.

Each equation is estimated for the 1980s and the 1990s respectively and thereafter estimated on the pooled dataset. The three hypotheses are of the types presented in section 2. Variables interacted with openness are summarized in table C in the appendix and controlling variables Z are summarized in table B in the appendix. The equations to be estimated are:

Hypothesis 1)

$$log\ Gini = \alpha_0 + \alpha_1 openness + \alpha_2 inc + \alpha_3 avgr + \alpha_4 infl + \alpha_5 sectot$$

$$+\alpha_6 logGDPpc + \alpha_2 logGDPpc^2 + e \quad (+)$$

inc is a dummy variable equal to 1 if the data used in the Gini index is income data, and 0 if the Gini is calculated from consumption data (WIID 2005a), *avgr* is average yearly growth (WB 2006) for the decade, *infl* average yearly inflation (WB 2006), *sectot* average coverage of secondary education for the population older than 15 years old (Barro and Lee 2000), *GDPpc* average GDP per capita in PPP-adjusted 1996 US$ (PWT 6.1).

Hypothesis 2)[19]

$$log\ Gini = \beta_0 + \beta_1 openness_i + \beta_2 openness*log\ GDPpc + \beta_3\ logGDPpc + \beta_4 inc +$$
$$\qquad\qquad\qquad (+) \qquad\qquad\qquad (+)$$
$$\beta_5 avgr + \beta_6 infl + \beta_7 sectot + e$$

Hypothesis 3)

$$log\ Gini = \chi_0 + \chi_1 openness + \chi_2 openness*logGDP/worker + \chi_3 openness*land/worker$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (+) \qquad\qquad\qquad\qquad\qquad\qquad (+)$$
$$\chi_2 openness*sectot + \chi_3 inc + \chi_3 avgr + \chi_3 infl + e$$
$$(+)$$

GDP/worker (PWT6.1), measured in PPP-adjusted 1996 US$ serves as a proxy for the capital-labor ratio. *Sectot*, average coverage of secondary education for the population above 15 years old (Barro and Lee 2000) is supposed to capture the effect of skill abundance. The three variables *GDP/worker*, *land/worker* (arable land in hectares (WB 2006), total labor force (WB 2006)) and *sectot* are thought to capture each country's endowment of capital, land and skill relative to its endowment of labor.

To increase the sample size and test the robustness of the results, the same equations will be estimated with a pooled dataset from the two decades. In order to make the regressions as robust as possible, a number of different openness measures will be used. For the second hypothesis, a number of different measures of income/development level will be used in the sensitivity analysis.

All standard errors reported are White heteroskedasticity-consistent. For the basic regressions of hypotheses 2 and 3 Wald tests will be used in order to test for the joint significance of the key variables. In tables 8a and 8b in the appendix are correlation matrices of the controlling variables. There appears to be some collinearity between the education variable *sectot* and GDP per capita (and GDP per worker). Nevertheless, both

[19] Note that estimations using alternative income measures are presented in the appendix.

variables are included in the estimated equations. This should be taken into account when interpreting the regression results.

Hypothesis testing involving factor endowments relative to labor interacting with openness needs high quality income data, especially capital incomes need to be included in the data. The WIID database is extensive, but the WIDER state that there is reason to believe that capital incomes have not been adequately reported which may distort the results (WIDER 2005). Table D in the appendix lists all countries included in the pooled data set. It should be noted that there is not available data for all included countries for both decades. Nevertheless, all countries are included in order to increase the sample size.

4.2 Regression results

4.2.1 General results

From table 3 we see that for the 1990s and for the pooled data set, there is some support for the first hypothesis, that openness in itself is associated with higher income inequality. Support for the hypothesis is found using the trade-GDP ratios and the average tariff coverage, but not using the S&W index or the remaining openness measures. Note that such a significant result can only be found after the square of log GDP per capita is controlled for. The result that openness appear to be positively associated with income inequality using the trade-GDP ratio corresponds to the results from Barro (2000) but not to Lundberg and Squire (2003) since they found such a relationship using the S&W index. Nevertheless, a number of studies have not found any support for the second hypothesis[20].

No support can be found for the second hypothesis (that increased openness in developed countries tends to increase inequality while decrease inequality in developing countries). On the contrary, the results suggest that increased openness in developing countries is associated with increased inequality and increased openness in developed countries associated with lower inequality and not the other way around. These results correspond

[20] See section 2.3.

to the ones found in Barro (2000) and Ravallion (2001). The results appear to be robust for different openness measures for the 80s and for the pooled data set but not for the 90s. Interestingly, the trade-GDP ratio from the WB does not generate any significant coefficients on openness and its interaction while the PWT trade-GDP ratio does so.

Neither the third hypothesis can be proved since increased openness is not associated with higher inequality in countries well endowed with capital and land. There is some weak support for that skill abundant countries experience increased inequality with openness, although this result can only be seen for the PWT trade-GDP ratio for the 90s and the two trade-GDP ratios in the pooled data set. Thus it is not robust to different measures of openness. Contrary to what is predicted by HO theory, increased openness in capital abundant countries is associated with lower inequality. This result is found both for the two decades regressions as well as in the pooled data set. For the 90s, and in the pooled data set, the coefficients on land-labor ratios interacted with openness are negative for several of the openness measures. For the 90s, the coefficient is negative and significant using the two trade-GDP ratios, the S&W index and the average tariff coverage. These four measures appear to be the more reliable openness measures. In the pooled data set, the land-labor interaction coefficients are significant using the trade-GDP ratios, average coverage of nontariff barriers and the black market premium. The two latter ones should be interpreted with caution since there is not much available data for average coverage of nontariff barierrs and since the black market premium appear to generate results that differ from the other openness measures. In conclusion, openness in capital abundant and land abundant countries appear to be associated with lower inequality in the 90s and in the pooled data set. Openness in skill abundance on the other hand appears to be weakly associated with higher inequality. Since most developed countries are both capital and skill abundant, the effect of openness appear ambiguous. As can be seen in tables 8a and b in the appendix these two variables are highly correlated which may distort the results. It could be argued from the results that developing countries that are not land abundant would experience higher inequality with openness due to their abundance in unskilled labor. Nevertheless, the estimated effect of

skill/labor proxy variable *sectot* suggests (although its low significance) that this is not necessarily the case.

Wald tests to test the joint significance of the openness interactions in hypothesis 2 and 3 are conducted. For the decade regressions the openness variable and its interactions with factor endowment variables in the third hypothesis are jointly significant for all openness measures except the black market premium in the 80s. The openness variable and its interaction with GDP per capita in the second hypothesis are not jointly significant for as many openness measures as in the case of the third hypothesis. This would suggest that the support for the third hypothesis is relatively stronger. Despite that the Wald test of the openness variable and its interactions with factor endowments suggests that the variables are jointly significant, the coefficients of the education variable interaction and the land/worker interaction are not significant for all openness measures. As can be seen in tables 8a and b the correlation between *sectot* and *logGDP/worker* is quite high, which could explain the lack of significance of the individual variables, but so is also the correlation between *logGDPpc* and *sectot* in the equation of the second type.

Table 3.

SIGNS AND SIGNIFICANCE OF OPENNESS VARIABLES								
Dep. Variable log Gini			Trade/ GDP (PWT)	Trade/ GDP (WB)	Open S&W	-1* Avg. tariffs	-1*Avg. core nontariffs	-1*Black market premium
80s	H1	Openness	n.s.	n.s.	n.s.	+ ***	n.s.	n.s.
	H2	Openness	+ ***	n.s.	+ *	+ ***	+ ***	+ *
		Openness*log GDPpc	- ***	n.s.	- *	- ***	- ***	- *
	H3	Openness	+ ***	n.s.	+ ***	+ ***	+ ***	n.s.
		Openness*log GDP/worker	- ***	n.s.	- ***	- ***	- ***	n.s.
		Openness*land/worker	n.s.	n.s.	n.s.	n.s.	- *	n.s.
		Openness*sectot	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
90s	H1	Openness	+ **	+ **	n.s.	+ ***	-----	n.s.
	H2	Openness	+ **	n.s.	+ *	+ ***	-----	n.s.
		Openness*log GDPpc	- **	n.s.	n.s.	- ***	-----	n.s.
	H3	Openness	+***	+ **	n.s.	+ **	-----	n.s.
		Openness*log GDP/worker	- ***	- **	n.s.	- *	-----	+ **
		Openness*land/worker	- **	- *	- ***	- **	-----	n.s.
		Openness*sectot	+ ***	n.s.	n.s.	n.s.	-----	- ***
80s + 90s	H1	Openness	+ ***	+ ***	n.s.	+ ***	- *	- *
	H2	Openness	+ ***	+ *	+ **	+ ***	+ ***	+ ***
		Openness*log GDPpc	- ***	n.s.	- **	- ***	- ***	- ***
	H3	Openness	+ ***	+ ***	+ **	+ ***	+ ***	n.s.
		Openness*log GDP/worker	- ***	- **	- *	- **	- ***	+ *
		Openness*land/worker	- ***	- *	n.s.	n.s.	- **	- *
		Openness*sectot	+ **	+ *	n.s.	n.s.	n.s.	- **

Note: * significant at 10 % level, ** significant at 5% level, *** significant at 1% level. (-----) too few observations.

4.2.2 Differences 1980s and the 1990s

For the 1980s there appears to be no significant relationship between openness and income inequality. For the 1990s on the other hand, there appears to be some support for the hypothesis since there is a positive significant link between the two variables for three of the five openness measures.[21] This suggests that openness is more strongly related to increased inequality in the 90s than in the 80s. It is worth noting that the difference in results may also depend on the smaller sample size for the 80s so that for some countries there is only available data for one of the two decades.

As mentioned above, there is no support for the second hypothesis either for the 1980s or the 1990s regression. On the contrary, there is a negative relationship between the interaction of openness and GDP per capita that is fairly robust for the 80s. The estimated results for the 1990s point towards the same direction, although the evidence is weaker and not robust different measures of openness. This would suggest that increased openness in developing countries in the 1980s was to a larger extent related to increased inequality (and/or the opposite in developed countries) than in the 1990s. Nevertheless, such results should be interpreted with caution.

There is not any support for the third hypothesis in either the 1990s or the 1980s. Openness in countries that are well endowed with factors that are thought to be unequally distributed such as capital, land and skill, is not generally associated with higher inequality. [22] As mentioned in section 4.2.1, the results suggest opposite effects than those expected. For the 1980s there appears to be some evidence for that capital abundant countries experience decreased inequality with openness. For the 1990s on the other hand this evidence is somewhat weaker and not as robust to different openness measures as in the 1980s. Furthermore, the estimated results suggest that openness interacted with the land-labor ratio is negatively related to income inequality in the 1990s but no such evidence is found for the 1980s. There is also some evidence that the skill variable interacted with openness is positively related to income inequality. This result is not

[21] Note that *Avg. corenont* cannot be used for the 1990s due to lack of data.

[22] As we shall see next there is some support that openness in skill abundant countries during the 90s is associated with higher inequality.

robust to different openness measures, and can only be found for the 1990s and in the pooled data set. It is thus suggested that openness in skill-abundant countries may be associated with increased inequality in the 1990s, but this effect cannot be found for the 1980s. This points towards a higher skill premium in the 1990s than in the 1980s. Any conclusions drawn from the decade comparison above should be made with caution since, as mentioned above, it is possible that differences between the two decades depend on the availability of data.

4. 3 Sensitivity analysis

4.3.1 Hypothesis 1 (Table 4)

If the square of GDP per capita is included as it is in the results reported in the appendix, the coefficient on log GDP per capita becomes positive and its square negative. Both are highly significant. Compared to the results from estimating the equations without the squared GDP per capita, the result on the openness indicator does not change, but the intercept becomes insignificant when the square is included. Since the explanatory power of the equations increase substantially, the squares are included. This indicates that high inequality levels are associated with middle-income countries while high-income countries have generally more equal income distributions. The results on the openness variables reported in table 3 are from estimated equations with the square of log GDP per capita. After the square of log GDP is controlled for, the positive relationship between openness and income inequality becomes somewhat more significant than when only including log GDP per capita.

4.3.2 Hypothesis 2 (Table 5a and 5b)

When testing the second hypothesis, that developed countries experience higher inequality with openness and developing countries lower inequality, different income/development variables are used in the sensitivity analysis.[23]

[23] Note that the coefficients of this analysis are not comparable to the earlier results, since Gini and not its log is used as the dependent variable.

In general the results suggest that openness is associated with lower inequality in countries with a high level of GDP per capita. This relationship is not significant for all openness measures using log GDP per capita in the two decade regressions, but it is significant in the pooled data set. If an OECD dummy is used instead of log GDP per capita (see table 5b in the appendix), the 1980s regression suggest that openness is associated with lower inequality in OECD countries. Consequently, developing countries would experience higher inequality with increased openness. No such significant result is found for the 1990s. In the pooled data set on the other hand, the results found in the 80s regression are significant for all openness measures. This would suggest that developing countries experience increased inequality with openness, and developed countries decreased inequality. Nevertheless, an OECD dummy is a very aggregate measure and must be interpreted with caution.

As is being pointed out by Wood (1999) there is reason to believe that the experience of middle-income countries differs from that of developing countries. In particular, he suggests that the HO predictions of income distribution effects of trade holds, but that many middle income countries in Latin America are not labor abundant, but skill abundant. The effect of factor endowments in determining income inequality after trade liberalization is tested in the third hypothesis, but it may be reasonable to test the second hypothesis for a number of income level dummies instead of the more general developed/developing country classification used above. Nevertheless, it should be noted that there may be a regional difference in that the experience of Latin American countries differ significantly from that of East Asian countries, which is suggested by Wood (1999), so that the effect on middle income countries would be cancelled out.

Attempts to include the square of log GDP per capita in the second hypothesis and interacting it with openness generate insignificant regressions.

4.3.3 Hypothesis 3 (table 6)

The interactions of factor endowments with openness have opposite signs than the factor endowment variables themselves, which correspond to results found by Spilimbergo et al (1999). This would suggest that countries well endowed with capital and land have generally higher inequality[24], but faced with openness, the capital and land abundant countries appear to be associated with lower inequality. A high level of educated labor corresponds to a lower income inequality, while there is some evidence that countries well endowed with skilled labor experience increased inequality with openness. A possible reason for this is that developed countries have generally high education coverage as well as relatively lower inequality, but that openness tends to increase the skill premium as is suggested by Wood (1999), hence increasing inequality.

In order to test the robustness of the measure of capital endowment, log GDP per capita have been used as a proxy for capital/worker. Capital/labor ratios for the 90s have been constructed from the PWT 5.6 and investment data from the WB. There are not many countries included in the capital/labor data in PWT 5.6 and therefore the capital/labor ratios can only be used on the pooled data set, and should still be used with caution. These alternative measures do not change the significance of the openness variables and its interactions.

4.3.4 Control variables

The control variables used in the estimated equations are presented table B in the appendix along with the full representations of the estimated equations. As for the controlling variables, a higher inflation appears to be connected to higher income inequality, even after controlling for different openness measures. It could be argued that inflation is to be seen as a proxy for financial stability or financial development. In other words, countries with highly unstable financial markets tend to experience rapid inflation and also high inequality.

[24] Note that it could be reasonable to include a squared GDP per worker when estimating equations of the third type, since we have seen in the estimations of hypothesis 1 that GDP per capita is associated with higher inequality up to a certain level and thereafter a high level of GDP per capita is associated with lower inequality.

The effect of average growth on income is ambiguous. Average growth appears to be negatively correlated to income inequality so that higher growth is connected with lower inequality but the results are not significant. There have been many studies on this subject (see for example García-Peñalosa & Turnovsky (2006), Hojman (1996) and Perotti and Alesina (1996)), which all have found different results of the relationship between growth and inequality.

The dummy variable for the observation type in the Gini coefficinent is significant. As is to be expected, income data generates higher Gini coefficients than consumption data. Worth noting is that also gross/net income and monetary/non monetary income have been added into the estimated equations. When added, the income observation type variable itself becomes insignificant, while the other is significant. In the estimated equations reported in the appendix only a general dummy variable for income data is included.

The education variable *sectot* is highly significant and negative for all years. This suggests that countries well endowed with skills tend to have more equal income distributions. This is not surprising since many of the richer countries have relatively low Gini indeces but high skill levels.

4.3.5 Regional dummy variables (table 7)

Estimated equations including regional dummies can be found in table 7. As is expected, most controlling variables except the education variable become insignificant when the regional dummies are included in the estimated equations. Not surprisingly, East Asia and the Pacific, Latin America and the Caribbean, Middle East and North Africa as well as Subsaharan Africa are regions that have significantly higher levels of inequality than Western Europe (the base group). The results found for the impact of openness appear in general to be robust to the inclusion of regional dummies when testing hypothesis 3 with different openness measures. The estimated results for the 1990s are more disturbed by the regional dummies than the 1980s and the results of the pooled data set. The general

impacts of openness in hypotheses 1 and 2 found for the 1980s and the pooled data set are in general robust to the inclusion of regional dummies, but not for the 1990s. Above we have seen that there is some evidence in favor of hypothesis 1, a relationship between openness and income inequality, in the 1990s. This result is not robust to the inclusion of regional dummies. Also, the result found when testing the second hypothesis, that openness is related to lower inequality in developed countries in the 1990s, is not found when regional dummies are included (but the results of hypothesis 2 are robust to regional dummies for the 80s and for a pooled data set). Interacting regional dummies with openness yields insignificant results. Importantly, there is a high risk of multicolinearity in the regressions including the regional dummies, and the results should be interpreted with caution. Worth noting is that Wald tests of the joint significance of openness variables in hypotheses 2 and 3 suggest that the joint significance is weaker for both hypotheses when regional dummies have been included in the estimated equations.

5. Summary and conclusions

Firstly, it has been found in this study that openness in general appear to be weakly associated with higher inequality in the 90s but not in the 80s. The result is robust to several openness measures in the analysis, but not to all.[25] Secondly, traditional HO theory says that developed countries would experience increased inequality with openness, while the opposite would be the case in developing countries. No support has been found for such an hypothesis. The analysis here suggests the opposite, that openness is associated with lower inequality in developed countries and higher inequality in developing countries. Thirdly, the effects of openness in countries with different factor endowments are studied. Contrary to the predictions of HO theory, relative capital abundance is associated with lower inequality when facing openness to trade, and relative labor abundance appear to be somewhat associated with high inequality. Relative skill abundance on the other hand appear to be, somewhat weakly, associated with higher inequality. Except for skill abundance, no support is found for the hypothesis that countries well endowed with factors other than labor would face increased inequality with openness.

A possible explanation promoted by Spilimbergo et al (1999) for the surprising result when testing the effect of openness interacted with factor endowments is that liberal governments in capital abundant countries tend to refrain from restricting trade and also from redistributing assets within the country. This is thought to explain the counter-intuitive result of increased inequality in open developing countries. Also, Spilimbergo et al point out that it is possible that the benefits from returns to capital are not as easily exploited in an open economy as in a closed one and therefore openness in capital-abundant countries does not have the expected effect. A plausible explanation for that relative labor abundance appear not to be associated with decreased inequality is that increased work opportunities from trade to do not benefit the poorest part of the population. That some of the results of this analysis suggest that trade openness is

[25] Importantly, it is not robust to the inclusion of regional dummies, but this may be due to collinearity between variables.

associated with higher inequality in developing and labor abundant countries must not be interpreted as an advice against trade for developing countries. There are reasonably long-term dynamic benefits of trade for developing countries that will not be disucssed, even though the risk of increased inequality in developing countries should be taken seriously.

In order to account for changes in openness and inequality over time a panel data analysis may be more useful than a cross-country analysis of two decades. An estimation using changes in income distribution and changes in openness may reveal other results. A large part of the earlier studies presented in section 2.3 have been of panel data type and have not revealed much different results. The explanatory power of the estimated equations is quite low, and there is reason to believe that income inequality depends on other, often country-specific, factors not controlled for in this analysis. Future studies on this topic should take these factors into account.

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Appendix

Table 4

HYPOTHESIS 1												
Dep. Var. Log Gini	1980s						1990s					
	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem
Constant	-2.22 (1.86)	-4.80** (1.84)	-2.65 (1.88)	-3.30* (1.92)	-2.76 (1.97)	-3.60** (1.78)	-1.21 (1.37)	-0.74 (1.45)	-1.11 (1.40)	-2.68* (1.51)	-----	-1.09 (1.39)
Openness	0.0010 (0.0007)	0.0013 (0.0008)	0.080 (0.056)	0.0031*** (0.0010)	0.0013 (0.0011)	0.00011 ($9.51*E^{-5}$)	0.0009** (0.0005)	0.0011** (0.0005)	0.020 (0.074)	0.0078*** (0.002)	-----	$-6.13*E^{-5}$ ($5.51*E^{-5}$)
Log GDPpc	1.510*** (0.451)	2.107*** (0.449)	1.626*** (0.455)	1.829*** (0.463)	1.673*** (0.474)	1.865*** (0.425)	1.297*** (0.332)	1.171*** (0.354)	1.283*** (0.341)	1.728*** (0.363)	-----	1.279*** (0.337)
$(\text{Log GDPpc})^2$	-0.094*** (0.028)	-0.130*** (0.028)	-0.101*** (0.028)	-0.116*** (0.028)	-0.105*** (0.029)	-0.117*** (0.026)	-0.082*** (0.020)	-0.074*** (0.021)	-0.081*** (0.020)	-0.110*** (0.022)	-----	-0.081*** (0.020)
Inc	0.123** (0.059)	0.176*** (0.055)	0.102* (0.058)	0.134** (0.061)	0.133** (0.061)	0.150** (0.059)	0.128** (0.059)	0.118* (0.060)	0.131** (0.058)	0.089 (0.059)	-----	0.141** (0.060)
Avgr	-0.014 (0.011)	-0.017 (0.012)	-0.014 (0.012)	-0.017 (0.012)	-0.023* (0.013)	-0.010 (0.012)	-0.010 (0.012)	-0.0010 (0.012)	-0.0061 (0.012)	-0.0017 (0.011)	-----	-0.0072 (0.012)
Infl	$7.33*E^{-5}$ ($3.93*E^{-5}$)	$4.77*E^{-5}$ ($8.22*E^{-5}$)	$5.64*E^{-5}$ ($8.51*E^{-5}$)	$3.81*E^{-5}$ ($8.12*E^{-5}$)	$-1.10*E^{-5}$ ($9.06*E^{-5}$)	0.0002 ($7.88*E^{-5}$)	0.00011 ($8.73*E^{-5}$)	0.00015* ($8.36*E^{-5}$)	($8.80*E^{-5}$) ($6.34*E^{-5}$)	$7.27*E^{-5}$ ($7.45*E^{-5}$)	-----	$8.88*E^{-5}$ ($6.40*E^{-5}$)
Sectot	-0.0070** (0.0027)	-0.0054* (0.0032)	-0.0073*** (0.0027)	-0.0050* (0.0027)	-0.0060** (0.0027)	-0.0053** (0.0026)	-0.0067*** (0.0018)	-0.0072*** (0.0020)	-0.0065*** (0.0018)	-0.0060*** (0.0019)	-----	-0.0066*** (0.0019)
Adj R-sq	0.431	0.514	0.426	0.470	0.454	0.476	0.450	0.484	0.451	0.542	-----	0.451
N	75	64	73	63	63	72	87	83	87	84	24	87

Dep. Var. Log Gini	1980s + 1990's					
	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem
Constant	-1.62 (1.07)	-1.85 (1.21)	-1.66 (1.07)	-2.708** (1.10)	-1.51 (1.61)	-1.944* (1.057)
Openness	0.00097*** (0.00037)	0.0011*** (0.00042)	0.0438 (0.0417)	0.0038*** (0.00094)	-0.0018* (0.0009)	$-7.33*E^{-5}$* ($3.93*E^{-5}$)
Log GDPpc	1.391*** (0.260)	1.433*** (0.294)	1.409*** (0.261)	1.709*** (0.266)	1.402*** (0.391)	1.486*** (0.256)
(Log GDPpc)^2	-0.087*** (0.016)	-0.089*** (0.018)	-0.088*** (0.016)	-0.108*** (0.016)	-0.087*** (0.024)	-0.093*** (0.016)
Inc	0.122*** (0.039)	0.140*** (0.039)	0.110*** (0.040)	0.129*** (0.039)	0.131*** (0.049)	0.139*** (0.040)
Avgr	-0.012 (0.008)	-0.013 (0.009)	-0.009 (0.008)	-0.011 (0.008)	-0.033 (0.010)	-0.009 (0.008
Infl	0.0001* ($5.89*E^{-5}$)	0.0001* ($5.92*E^{-5}$)	$7.92*E^{-5}$ ($4.99*E^{-5}$)	$6.12*E^{-5}$ ($5.28*E^{-5}$)	$-1.76*E^{-5}$ ($6.81*E^{-5}$)	$6.06*E^{-5}$ ($4.82*E^{-5}$)
Sectot	-0.0070*** (0.0016)	-0.0069*** (0.0018)	-0.0070*** (0.0016)	-0.0058*** (0.0016)	-0.201*** (0.045)	-0.0063*** (0.0015)
80's	-0.103*** (0.087)	-0.108*** (0.035)	-0.113*** (0.034)	-0.107*** (0.032)	-0.087*** (0.024)	-0.105*** (0.032)
Adj R-sq	0.487	0.513	0.471	0.535	0.507	0.486
N	162	147	160	147	87	159

Table 5a

HYPOTHESIS 2												
Dep. Var. Log Gini	1980s						1990s					
	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem
Constant	3.10*** (0.46)	3.43*** (0.58)	3.36*** (0.47)	4.67*** (0.38)	4.84*** (0.49)	4.25*** (0.433)	3.84*** (0.39)	4.04*** (0.38)	3.58*** (0.61)	5.64*** (0.45)	-----	4.67*** (0.30)
Openness	0.0205*** (0.0069))	0.0105 (0.0086)	1.210* (0.662)	0.0444*** (0.012)	0.036*** (0.013)	0.0038* (0.0020)	0.0097** (0.0042)	0.0060 (0.0045)	1.120* (0.653)	0.082*** (0.022)	-----	0.011 (0.017)
Openness*Log GDPpc	-0.0022*** (0.0008)	-0.0011 (0.0010)	-0.144* (0.080)	-0.0057*** (0.0016)	-0.0044*** (0.0015)	-0.00054* (0.0003)	-0.00096** (0.0005)	-0.00052 (0.00052)	-0.144 (0.088)	-0.010*** (0.003)	-----	-0.0014 (0.002)
Log GDPpc	0.0726 (0.055)	0.0323 (0.070)	0.0590 (0.058)	-0.108** (0.049)	-0.123* (0.062)	-0.055 (0.059)	-0.0107 (0.049)	-0.035 (0.047)	0.041 (0.084)	-0.214*** (0.055)	-----	-0.102** (0.041)
Inc	0.101* (0.059)	0.175** (0.069)	0.094 (0.063)	0.086 (0.063)	0.141* (0.073)	0.119* (0.070)	0.121* (0.070)	0.121* (0.071)	0.152** (0.069)	0.122* (0..071)	-----	0.146** (0.070)
Avgr	0.0003 (0.0116)	-0.0034 (0.014)	-0.0057 (0.013)	-0.0063 (0.012)	-0.022* (0.013)	-0.005 (0.013)	0.0009 (0.013)	-0.0033 (0.012)	-0.0016 (0.013)	-0.00069 (0.012)	-----	-0.0010 (0.012)
Infl	0.00026*** ($9.13*E^{-5}$)	0.00021** ($9.11*E^{-5}$)	$9.13*E^{-5}$ ($8.87*E^{-5}$)	$9.97*E^{-5}$ ($8.73*E^{-5}$)	$5.12*E^{-5}$ ($9.77*E^{-5}$)	0.00012 ($7.46*E^{-5}$)	0.00022* (0.0001)	0.00027*** ($9.65*E^{-5}$)	0.00018** ($8.47*E^{-5}$)	0.00013* ($7.86*E^{-5}$)	-----	0.00019** ($7.87*E^{-5}$)
Sectot	-0.0095*** (0.0025)	-0.0104*** (0.0032)	-0.0092*** (0.0027)	-0.0072** (0.0027)	-0.0079*** (0.0028)	-0.0081*** (0.0030)	-0.0077*** (0.0019)	-0.0077*** (0.0020)	-0.0068*** (0.0019)	-0.0059*** (0.0019)	-----	-0.0063*** (0.0019)
Adj R-sq	0.383	0.366	0.345	0.389	0.408	0.317	0.375	0.386	0.338	0.419	-----	0.328
N	75	64	73	63	63	72	87	83	87	84	24	87

Note that including (log GDPpc)2 decreases the magnitude of the coefficient on the openness and the interaction with log GDP per capita, but the significance is the same. The overall explanatory power increases.

Dep. Var. Log Gini	1980s + 1990's					
	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem
Constant	3.58*** (0.30)	3.87*** (0.32)	3.58*** (0.34)	5.05*** (0.28)	4.79*** (0.36)	4.41*** (0.22)
Openness	0.013*** (0.004)	0.0075* (0.004)	1.039** (0.413)	0.053*** (0.011)	0.031*** (0.010)	0.0015** (0.0006)
Openess*logGDPpc	-0.0013*** (0.0004)	-0.0007 (0.00047)	-0.128** (0.052)	-0.0067*** (0.0014)	-0.0037*** (0.0012)	-0.00020** ($8.37*E^{-5}$)
Log GDPpc	0.0235 (0.0367)	-0.0123 (0.039)	0.042 (0.043)	-0.145*** (0.035)	-0.087* (0.046)	-0.065** (0.031)
Inc	0.110*** (0.043)	0.141*** (0.048)	0.113** (0.045)	0.110** (0.045)	0.146** (0.057)	0.123** (0.048)
Avgr	-0.002 (0.009)	-0.005 (0.009)	-0.0017 (0.008)	-0.0035 (0.0083)	-0.032*** (0.010)	-0.005 (0.008)
Infl	0.00023*** ($7.50*E^{-5}$)	0.00024*** ($6.85*E^{-5}$)	0.00015** ($5.58*E^{-5}$)	0.00013** ($5.25*E^{-5}$)	$1.65*E^{-5}$ ($6.80*E^{-5}$)	0.00017*** ($5.64*E^{-5}$)
Sectot	-0.0088*** (0.0016)	-0.0087*** (0.0018)	-0.0079*** (0.0016)	-0.0067*** (0.0016)	-0.0080*** (0.0020)	-0.0076*** (0.0016)
80's	-0.074** (0.034)	-0.081** (0.037)	-0.112*** (0.037)	-0.089** (0.035)	-0.224*** (0.047)	-0.078** (0.036)
Adj R-sq	0.406	0.409	0.377	0.433	0.468	0.347
N	162	147	160	147	87	159

Table 5b

HYPOTHESIS 2. DIFFERENT INCOME/DEVELOPMENT LEVEL MEASURES												
	1980s				1990s				1980 + 1990s			
Dep. Var. Gini	Log GDPpc	Log GDPpc WB	OECD	HDI-index	Log GDPpc	Log GDPpc WB	OECD	HDI-index	Log GDPpc	Log GDPpc WB	OECD	HDI-index
Constant	16.874 (17.642)	22.806 (18.351)	44.678*** (3.537)	23.356** (9.229)	47.261*** (16.367)	43.469** (17.066)	48.521*** (2.372)	36.692*** (8.065)	16.874 (17.642)	35.401*** (12.236)	48.638*** (2.046)	32.798*** (6.161)
Trade/GDP	0.773*** (0.255)	0.728*** (0.261)	0.043 (0.035)	0.443*** (0.163)	0.406** (0.174)	0.520*** (0.192)	0.008 (0.023)	0.347*** (0.112)	0.773*** (0.255)	0.584*** (0.162)	0.025 (0.020)	0.380*** (0.093)
Trade/GDP*income/ (dev't)	-0.082*** (0.028)	-0.077*** (0.029)	-0.146** (0.071)	-0.005** (0.002)	-0.040** (0.019)	-0.052** (0.022)	-0.059 (0.049)	-0.004*** (0.0015)	-0.082*** (0.028)	-0.060*** (0.018)	-0.103** (0.041)	-0.004*** (0.001)
Income/dev't	3.013 (2.081)	2.198 (2.143)	-0.254 (3.960)	0.295** (0.140)	-0.517 (2.055)	-0.224 (2.149)	-10.578** (4.555)	0.102 (0.126)	3.013 (2.081)	0.089 (1.478)	-4.806 (2.930)	0.182* (0.093)
Inc	4.489* (2.373)	5.030** (2.412)	4.520** (2.325)	4.981** (2.424)	5.881* (3.050)	6.259* (3.178)	6.443*** (2.152)	4.836* (2.800)	4.489* (2.373)	5.517*** (1.818)	4.974*** (1.555)	4.770*** (1.790)
Avgr	0.015 (0.438)	-0.100 (0,454)	-0.564 (0.405)	-0.068 (0.461)	-0.218 (0.517)	-0.211 (0.518)	-0.741 (0.495)	-0.149 (0.499)	0.015 (0.438)	-0.200 (0.352)	-0.5768* (0.319)	-0.182 (0.345)
Infl	0.010*** (0.004)	0.009** (0.004)	0.005 (0.003)	0.009*** (0.003)	0.009* (0.005)	0.010** (0.004)	0.004 (0.003)	0.010** (0.004)	0.010*** (0.004)	0.009*** (0.003)	0.005** (0.002)	0.009*** (0.003)
Sectot	-0.381*** (0.098)	-0.339*** (0.099)	-0.300*** (0.085)	-0.424*** (0.105)	-0.289*** (0.082)	-0.265*** (0.082)	-0.184** (0.083)	-0.309*** (0.085)	-0.381*** (0.098)	-0.304*** (0.063)	-0.241*** (0.059)	-0.359*** (0.065)
80s										-2.884** (1.316)	-4.232*** (1.258)	-3.499*** (1.307)
Adj R-sq	0.394	0.392	0.417	0.387	0.351	0.373	0.486	0.357	0.394	0.411	0.474	0.403
N	75	72	75	72	87	87	87	87	75	159	162	159

Note that the dependent variable is Gini and not its log as for the other regressions.

Table 6.

HYPOTHESIS 3												
Dep. Variable Gini	1980s						1990s					
	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem
Constant	2.33*** (0.57)	2.74*** (0.79)	2.84*** (0.42)	4.71*** (0.44)	5.00*** (0.62)	4.19*** (0.56)	2.71*** (0.47)	3.28*** (0.54)	4.53*** (0.52)	5.37*** (0.71)	-----	4.24*** (0.33)
Openness	0.034*** (0.010)	0.019 (0.015)	2.065*** (0.687)	0.052*** (0.016)	0.039*** (0.014)	0.003 (0.004)	0.028*** (0.006)	0.018** (0.0078)	-0.129 (0.702)	0.070** (0.032)	-----	0.0028 (0.008)
Openess*logGDPper worker	-0.0036*** (0.0012)	-0.0020 (0.0019)	-0.247*** (0.078)	-0.0059*** (0.0019)	0.0039*** (0.0015)	-0.0026 (0.0006)	-0.0032*** (0.0007)	-0.0020** (0.0009)	0.068 (0.092)	-0.0062* (0.0037)	-----	0.0016** (0.0008)
Openess*land/worker	-0.0010 (0.0014)	-0.0006 (0.002)	0.053 (0.048)	-0.0004 (0.003)	-0.0038* (0.0021)	0.0006 (0.0015)	-0.0019** (0.0007)	-0.0013* (0.0008)	-0.304*** (0.103)	-0.013** (0.006)	-----	-0.0024 (0.0017)
Openess*sectot	$(8.17*E^{-5})$ $(8.88*E^{-5})$	$(5.66*E^{-5})$ (0.0001)	0.0082 (0.0058)	0.0006 (0.0021)	$9.97*E^{-5}$ 0.0001)	$2.42*E^{-5}$ $(8.69*E^{-5})$	0.00014*** $(3.86*E^{-5})$	0.00010 $(6.17*E^{-5})$	-0.0106 (0.008)	-0.0003 (0.0002)	-----	0.00038*** $(7.97*E^{-5})$
Log GDP/worker	0.161** (0.065)	0.110 (0.094)	0.127*** (0.047)	-0.099* (0.052)	-0.128* (0.070)	-0.038 (0.065)	0.136** (0.053)	0.070 (0.065)	-0.117* (0.068)	-0.146* (0.082)	-----	-0.025 (0.042)
Land/worker	0.044 (0.042)	0.039 (0.632)	-0.040 (0.046)	-0.029 (0.057)	-0.026 (0.036)	0.011 (0.022)	0.079** (0.038)	0.066* (0.038)	0.273*** (0.102)	-0.123** (0.053)	-----	-0.025 (0.025)
Sectot	-0.015*** (0.0047)	-0.015** (0.006)	-0.015*** (0.005)	-0.008*** (0.003)	-0.008** (0.004)	-0.010*** (0.003)	-0.018*** (0.003)	-0.015*** (0.005)	0.00067 (0.008)	-0.011*** (0.003)	-----	-0.012*** (0.002)
Inc	0.100 (0.065)	0.172** (0.075)	0.111* (0.066)	0.093 (0.068)	0.169** (0.083)	0.117 (0.074)	0.130* (0.074)	0.111 (0.076)	0.127 (0.082)	0.123 (0.085)	-----	0.122* (0.072)
Avgr	0.001 (0.013)	-0.0007 (0.015)	-0.0039 (0.013)	-0.0063 (0.013)	-0.023* (0.013)	-0.0055 (0.016)	0.0054 (0.013)	-0.0018 (0.012)	-0.0006 (0.014)	0.0008 (0.012)	-----	-0.0017 (0.011)
Infl	0.0002** $(7.71*E^{-5})$	0.0002** $(8.31*E^{-5})$	0.00010 $(8.84*E^{-5})$	0.00016 $(8.84*E^{-5})$	$(6.73*E^{-5})$ 0.0001)	0.0001 $(8.69*E^{-5})$	0.00020** $(8.59*E^{-5})$	0.00023*** $(8.54*E^{-5})$	0.00019*** $(7.06*E^{-5})$	0.00014* $(7.03*E^{-5})$	-----	0.00020*** $(7.00*E^{-5})$
Adj R-sq	0.364	0.341	0.332	0.338	0.386	0.274	0.387	0.373	0.358	0.386	-----	0.388
N	73	62	71	61	61	70	87	83	87	84	24	87

Dep. Variable log Gini	1980s + 1990s					
	Trade/GDP	Trade/GDP WB	OPEN S&W	-1*Avg. tariff	-1*Avg. Corenont	-1*BM Prem
Constant	2.67*** (0.33)	3.16*** (0.41)	3.61** (0.33)	4.88*** (0.36)	4.94*** (0.46)	4.31*** (0.26)
Openness	0.028*** (0.005)	0.018*** (0.006)	0.918** (0.442)	0.045*** (0.014)	0.033*** (0.010)	-0.0026 (0.0020)
Openess*logGDP/worker	-0.0031*** (0.0006)	-0.0019** (0.0007)	-0.0930* (0.056(	-0.0043** (0.0020)	-0.0033*** (0.0011)	0.0007* (0.0004)
Openess*land/worker	-0.0016*** (0.0006)	-0.0012* (0.0006)	-0.100 (0.062)	-0.0036 (0.0029)	-0.0040** (0.0018)	-0.0020* (0.0011)
Openess*sectot	0.00010** ($7.50*E^{-5}$)	$7.69*E^{-5}$* ($4.56*E^{-5}$)	-0.00034 (0.0045)	-0.00020 (0.0017)	$2.10*E^{-5}$ (0.0001)	$8.70*E^{-5}$** ($4.12*E^{-5}$)
Log GDP per worker	0.136*** (0.037)	0.078 (0.049)	0.028 (0.042)	-0.099** (0.046)	-0.095* (0.053)	-0.040 (0.032)
Land/l	0.066*** (0.024)	0.059** (0.024)	0.093 (0.060)	-0.043 (0.034)	-0.030 (0.031)	-0.007 (0.018)
Sectot	-0.0159*** (0.0027)	-0.014*** (0.0032)	-0.0086** (0.0042)	-0.0102*** (0.0030)	-0.0073** (0.0033)	-0.0099*** (0.0016)
Inc	0.115** (0.046)	0.128** (0.053)	0.107** (0.048)	0.104** (0.048)	0.165** (0.063)	0.122** (0.050)
Avgr	0.002 (0.008)	-0.003 (0.009)	-0.002 (0.009)	-0.004 (0.009)	-0.033*** (0.011)	-0.007 (0.008)
Infl	0.00019*** ($5.78*E^{-5}$)	0.00021*** ($6.08*E^{-5}$)	0.00015*** ($5.45*E^{-5}$)	0.00013** ($5.45*E^{-5}$)	($3.64*E^{-5}$) ($7.16*E^{-5}$)	0.00015*** ($5.64*E^{-5}$)
80s	-0.083** (0.035)	-0.085** (0.038)	-0.111*** (0.038)	-0.096*** (0.036)	-0.243*** (0.048)	-0.065* (0.038)
Adj R-sq	0.416	0.406	0.359	0.407	0.466	0.341
N	160	145	158	145	85	157

Table 7. Included regional dummies. Openness measure: trade/GDP (PWT).

Dep. Variable log Gini	1980's			1990's			1980's + 1990's		
	H1	H2	H3	H1	H2	H3	H1	H2	H3
Constant	-2.56 (1.94)	2.69*** (0.46)	1.86*** (0.47)	-1.22 (1.43)	2.89*** (0.48)	2.17*** (0.55)	-1.76 (1.12)	2.91*** (0.31)	2.23*** (0.33)
Trade/GDP	$9.2*E^{-5}$ (0.0006)	0.0170*** (0.0058)	0.0308*** (0.0080)	0.0004 (0.0004)	0.0054 (0.0041)	0.014*** (0.0062)	0.0003 (0.0003)	0.0079** (0.0035)	0.0171*** (0.0046)
Trade/GDP*log GDPpc		-0.0019*** (0.0006)			-0.00054 (0.0041)			-0.0008** (0.0004)	
Trade/GDP*log GDP per worker			-0.0036*** (0.0009)			-0.0016** (0.0007)			-0.0019*** (0.0005)
Trade/GDP*land/l			0.0004 (0.0017)			-0,0008 (0.0008)			-0.0006 (0.0007)
Trade/GDP*educ/l			0.0001 ($7.3*E^{-5}$)			($6.9*E^{-5}$) ($4.1*E^{-5}$)			$6.90*E^{-5}$ * ($3.7*E^{-5}$)
Inc	0.090 (0.058)	0.051 (0.056)	0.056 (0.060)	0.053 (0.046)	0.034 (0.053)	0.035 (0.056)	0.075** (0.034)	0.046 (0.035)	0.055 (0.037)
Avgr	0.003 (0.012)	0.018 (0.012)	0.016 (0.013)	-0.003 (0.010)	0.0005 (0.010)	0.0020 (0.011)	-0.0014 (0.0071)	0.0050 (0.0077)	0.0060 (0.0079)
Infl	$2.3*E^{-5}$ ($7.3*E^{-5}$)	$8.9*E^{-5}$ ($7.7*E^{-5}$)	$6.4*E^{-5}$ ($9.7*E^{-5}$)	$5.6*E^{-5}$ ($6.5*E^{-5}$)	$5.6*E^{-5}$ ($6.5*E^{-5}$)	$5.7*E^{-5}$ ($6.0*E^{-5}$)	$4.07*E^{-5}$	$5.86*E^{-5}$ ($5.04*E^{-5}$)	$5.1.*E^{-5}$ ($5.3*E^{-5}$)
Sectot (educ/l)	-0.0047* (0.0034)	-0.0064*** (0.0021)	-0.013*** (0.0039)	-0.0038** (0.0016)	-0.0044** (0.0018)	-0.0094*** (0.0032)	-0.0042*** (0.0013)	-0.0054*** (0.0014)	-0.0101*** (0.0025)
Log GDPpc	1.517*** (0.484)	0.0912* (0.0517)		1.161*** (0.346)	0.066 (0.054)		1.32*** (0.28)	0.068* (0.035)	
$(\text{Log GDPpc})^2$	-0.093*** (0.030)			-0.069*** (0.021)			-0.080*** (0.017)		
Log GDP per worker			0.190*** (0.050)			0.151** (0.058)			0.148*** (0.034)
Land/l			-0.025 (0.051)			-0.0017 (0.043)			$7.42*E^{-5}$ (0.029
Easiapac	0.166** (0.074)	0.242*** (0.087)	0.292*** (0.101)	0.178*** (0.061)	0.266*** (0.078)	0.291*** (0.080)	0.176*** (0.042)	0.264*** (0.056)	0.294*** (0.061)
Eeurcasia	-0.131 (0.178)	0.021 (0.169)	0.060 (0.174)	-0.094 (0.130)	0.064 (0.128)	0.095 (0.122)	-0.111 (0.106)	0.045 (0.102)	0.078 (0.099)
Latinamcar	0.274*** (0.095)	0.432*** (0.085)	0.437*** (0.089)	0.341*** (0.070)	0.505*** (0.073)	0.503*** (0.074)	0.302*** (0.056)	0.461*** (0.054)	0.461*** (0.054)
Meastnafr	0.148* (0.079)	0.265*** (0.077)	0.323*** (0.083)	0.099 (0.072)	0.238*** (0.079)	0.238*** (0.077)	0.117** (0.051)	0.250*** (0.051)	0.269*** (0.052)
Sasia	-0.035	0.055	0.086	0.075	0.236**	0.235**	0.026	0.163**	0.180**

	(0.120)	(0.113)	(0.110)	(0.100)	(0.103)	(0.103)	(0.072)	(0.074)	(0.073)
Subsahafr	0.344*** (0.098)	0.347*** (0.102)	0.382*** (0.116)	0.401*** (0.096)	0.483*** (0.115)	0.514*** (0.128)	0.372*** (0.239)	0.428*** (0.076)	0.462*** (0.085)
Northam	0.295* (0.170)	0.168 (0.136)	0.223 (0.170)	0.190 (0.171)	0.101 (0.141)	0.166* (0.099)	0.239** (0.115)	0.136 (0.99)	0.195** (0.088)
80's							-0.085*** (0.027)	-0.063** (0.028)	-0.068** (0.029)
Adj R-sq	0.591	0.583	0.573	0.671	0.628	0.637	0.666	0.629	0.636
N	74	74	72	87	87	87	161	161	159

Table 8a. Correlation matrix 80s (Trade/GDP PWT)

	avgr	Inc	infl	Log GDPpc	Log GDP/worker	OECD	Land/worker	sectot	Trade/GDP
Avgr	1								
Inc	0.03	1							
Infl	-0.34	0.05	1						
Log GDPpc	0.21	0.46	-0.07	1					
Log GDPwork	0.13	0.43	-0.03	0.98	1				
OECD	0.19	0.27	-0.15	0.66	0.60	1			
Land/l	-0.10	0.13	0.11	0-26	0.26	0.29	1		
Sectot	0.33	0.41	-0.11	0.81	0.76	0.58	0.17	1	
Trade/GDP	0.22	-0.14	-0.20	0.11	0.10	-0.129	-0.25	0.09	1

Table 8b. Correlation matrix 90s (Trade/GDP PWT)

	avgr	Inc	infl	Log GDPpc	Log GDP/worker	OECD	Land/worker	sectot	Trade/GDP
avgr	1								
Inc	0.26	1							
infl	-0.19	0.04	1						
Log GDPpc	0.30	0.75	-0.08	1					
Log GDPwork	0.30	0.75	-0.05	0.98	1				
OECD	0.09	0.51	-0.15	0.71	0.67	1			
Land/l	-0.07	0.07	0.07	0.13	0.12	0.19	1		
sectot	0.32	0.59	-0.14	0.82	0.79	0.63	0.04	1	
Trade/GDP	0.21	0.15	-0.11	0.16	0.15	-0.14	-0.17	0.16	1

Table A.

SUMMARY OF EARLIER RESEARCH							
STUDY	**HYPOTHESIS**	**MEASURE OF INEQUALITY**	**MEASURE OF OPENNESS**	**SAMPLE**	**CONTROLLING VARIABLES**	**SPECIAL FEATURES**	**RESULTS**
Barro (2000)	H1 and H2	Gini	Adjusted trade/GDP	Yearly data 1960-1990.	logGDPpc, logGDPpc2, levels of schooling, democracy index, rule of law-index	Regional dummies (Africa and Latin America), control variable for observation type in inequality measure (gross/net, personal/household, income/consumption)	Support for H1. No support for H2, the opposite appears to be the case: increased inequality in open developing countries.
Calderón & Chong (2001)	H2	Gini	Trade/GDP (volume and terms of trade, real exchange rate, capital controls, black market premium.)	5-year averages, 1960-1995.	Lagged Gini, logGDPpc, education variable, measure of liquid liabilities.	Dynamic panel data approach.	No support for H1. No support for H2.
Dollar and Kraay	H1	First quintile	Trade/GDP, S&W-index, WTO membership, capital controls, an import tax/value measure	Yearly data 1950-1999	Financial development measure, GDPpc, inflation, rule of law index, government size, regional dummies.	Also find that openness in countries with higher level of land per worker is associated with a lower inc. share for the poorest part of the population.	No support for H1 or H2.
Edwards (1997b)	H1 and H2	Gini, First quintile	Wolf's index, avg.tariff ratio, avg. black market premia, WB index of outward orientation.	Decade averages for 1970s, 1980s	GDPpc, average growth, inflation, change in coverage of secondary education	Examining change from the 1970s to the 1990s.	No support for H1. No support for H2.
Fischer (2001)	H3	Gini	S&W-index	5-year averages, 1965-1990	Capital per worker, education variable, arable land per worker.	Using a dynamic specific factors model developed by Eaton	No full support for H3; openness leads to increased inequality in skill abundant countries, but decreased inequality in capital abundant countries.
Higgins and Williamson (1999)	H1 and H2	Gini, first and last quintiles	S&W-index, capital controls, trade-GDP ratios, tariffs/quotas on	Decade averages 1960s,	Age-dependency ratio, education variable, financial dev't, GDP per	Dummies for Africa and Latin America, dummies for	No support for H1 or H2.

			imports	70s, 80s and 90s.	worker and its square, political liberty	observation type in income measure	
Lundberg and Squire (2003)	H1	Gini	S&W index, trade/GDP	5 year averages 1960-1994.	Education variable, financial development, GDPpc, gover't spending, political liberty, inflation, terms of trade		S&W: support for H1. Trade/GDP: no support for H1.
Ravallion (2001)	H1 and H2	Gini	Export/GDP	5-year averages, 1947-1994	Black market premium, education variable, financial dev't, political liberty, urban population.		No support for H1. No support for H2.
Spilimbergo et al (1999)	H3	Gini, all quintiles	Adjusted trade/GDP	Yearly data 1965-1992	Capital per worker, skill intensity (education) per worker, arable land per capita, GDPpc, $GDPpc^2$	Interact openness measure with controlling variable. Divide data into regional subgroups.	No full support for H3; openness leads to increased inequality in skill abundant countries, but decreased inequality in capital abundant countries. For developing countries, no effect after controlling for the effect on factor prices.
White and Anderson (2001)	H1	First two quintiles	Trade/GDP	Yearly data 1960-1999	Life expectancy, urban population, ethnic fragmentation measure; GDPpc, inflation, political liberty		No support for H1.

Table is based on Anderson (2005) and additional information in the articles mentioned in the table.

Table B.

CONTROLLING VARIABLES*		
Variable	Explanation	Source
Sectot	Total coverage of secondary education for population above 15 years old (%)	Barro and Lee (2000)
Avgr	Average yearly growth (%)	WB (2006)
Inc	Dummy variable for income data (1=income data, 0=consumption data)	WIID2.0a
Infl	Average yearly inflation (%)	WB (2006)
Log GDPpc	GDP per capita	PWT 6.1
$(\log GDPpc)^2$	Squared GDP per capita	PWT 6.1
REGIONAL DUMMY VARIABLES		
Easiapac	East Asia and the Pacific	
Eeurcasia	Eastern Europe and Central Asia	
Latinamcar	Latin America and the Caribbean	
Meastnafr	Middle East and North Africa	
Sasia	South Asia	
Subsahafr	Sub-Saharan Africa	
Northam	North America	
	Base group = Western Europe	

* Note that among the excluded controlling variables are % rural population, age-dependecy ratio (appeared to have no effect on income inequality) and government spending as % of GDP (for lack of reliable data) (all from WB 2006). Dummy variables on monetary income and gross income (as opposed to desposable income) (WIID 2002a) are excluded.

Table C.

INTERACTIONS WITH OPENNESS			
Variable	**Expected sign**	Explanation	Source
*Openness*log GDP per capita*	+	Openness interacted with income. Used in H2 to test if rich and open countries have higer inequality as predicted by HO theory.	1) PWT 6.1 2) WB (2006)
*Openness*log GDP/worker*	+	Interaction with capital endowment relative to labor. GDP per worker is a proxy variable for capital/labor ratio. (1996 PPP adjusted USD/worker). Used in H3.[26]	Penn World Tables 6.1
*Openness*land/worker*	+	Interaction with endowment of land relative to labor. (hectares per worker). Used in H3.	WB (2006)
*Openness*sectot*	+	Interaction with percentage of the population >15 years old with secondary education. Proxy for skill endowment relative to labor. Used in H3.	Barro and Lee (2000)

[26] Capital-labor ratios have been constructed for the 90s using capital/labor ratios for the 80s from PWT 5.6 and investment data from WB (2006). To increase the sample size GDP per worker is used instead.

Table. D: Country sample, total*

- note that the country samples for the 80s and 90s respectively differ somewhat. All countries with available income data are still included in the samples.

East Asia and the Pacific
Australia
Cambodia
China
Hong Kong
Indonesia
Japan
Korea
Malaysia
New Zeeland
Philippines
Singapore
Taiwan
Thailand
Vietnam

Eastern Europe and Central Asia
Albania
Armenia
Azerbaijan
Belarus
Bulgaria
Croatia
Czech Republic
Estonia
Georgia
Hungary
Kazakhstan
Kyrgyz Republic
Latvia
Lithuania
Macedonia, FYR
Moldova
Mongolia
Poland
Romania
Russian Federation
Serbia-Montenegro
Slovak Republic
Slovenia
Taijikistan
Turkey
Turmenistan
Ukraine
Uzbekistan
(Yugoslavia)

Latin America and the Caribbean
Argentina
Bahamas
Barbados
Bolivia
Brazil
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Guatemala
Guyana
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Trinidad and Tobago
Uruguay
Venezuela

Middle East and North Africa
Algeria
Egypt
Iran
Israel
Jordan
Morocco
Tunisia
Yemen

South Asia
Bangladesh
India
Nepal
Pakistan
Sri Lanka

Subsaharan Africa
Botswana
Burkina Faso
Burundi
Cameroon
Central African Republic
Cote d'Ivoire
Ethiopia
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Rwanda
Senegal
Sierra Leone
South Africa
Swaziland
Tanzania
Uganda
Zambia
Zimbabwe

North America
Canada
United States

Western Europe
Austria
Belgium
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Luxembourg
Netherlands
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom