TRADE OPENNESS AND INCOME INEQUALITY IN
DEVELOPING COUNTRIES
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Abstract:
   This paper discusses the distributive consequences of trade flows in developing countries (DCs). On the theoretical side, we argue that the interplays between international openness and technology adoption may constitute an important mechanism leading to a possible increase of income differentials in the liberalizing DCs, trough skill enhancing trade.
   We use a dynamic specification to estimate the impact of trade on within-country income inequality in a sample of 70 DCs over the 1980-1999 period. Our results suggest that total aggregate trade flows are weakly related with income inequality. However, once we disaggregate total trade flows according to their areas of origin/destination, we find that trade with high income countries worsen income distribution in DCs, both through imports and exports. This finding provides a preliminary support to the hypothesis that technological differentials between trading partners are important in shaping the distributive effects of trade openness. Moreover, after testing for the differential impact of trade in middle income countries *vs* low income ones, we observe that the previous result only holds for middle income countries (MICs). We interpret this evidence by considering the greater potential for technological upgrading in MICs both in terms of their higher "absorptive capacity" and in terms of their superior ability in serving the differentiated and high-quality markets of the developed world.

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1. Introduction

Since the beginning of the '80s, several developing countries (DCs) have followed the path of trade liberalisation and have opened their economies towards international markets. Although the actual patterns of this process have differed across regions, on the whole trade flows have significantly increased over the last three decades and the diffusion of technology between countries has become more rapid and widespread.

Whether such a process of globalisation is associated with narrowing or widening income disparities within developing countries is a matter of controversy in the economic literature. The standard trade theory, expressed in the Heckscher-Ohlin model, predicts that DCs should experience egalitarian trends as a consequence of globalisation. One of the most important corollaries of Heckscher-Ohlin's model (H-O) is the Stolper-Samuelson (S-S) theorem. According to this main building-block of the theory of international trade, openness will benefit a country's relatively abundant factor, since trade specialisation will favour sectors intensive in the abundant factor. Taking into account that most DCs – when compared with the world economy – are relatively abundant in unskilled labour and so have a comparative advantage in this production factor, openness should increase the demand for the unskilled workers and their wages, so ending up with an overall decrease in wage dispersion and within-country income inequality.

However, if the basic dichotomic framework depicted by the HOSS framework is extended to account for multiple skill-related categories of workers (Wood, 1994), country groups (Davis, 1996) and traded goods (Feenstra and Hanson, 1996), the main distributive prediction of the HOSS theory is theoretically undetermined and depends on the relative weights and directions of trade flows. Moreover, if the HOSS assumption of homogeneous production functions[1] among countries is relaxed, then international openness may facilitate technology diffusion from High Income Countries (HICs) to Low and Middle Income (LMICs) ones, and it is very likely that the new technologies are more skill intensive in relation to those in use domestically before trade and FDI liberalization. If such is the case, then openness – via technology – should imply a counter-effect to the HOSS theorem prediction, namely an increase in the demand for skilled labour, an increase in wage dispersion and so an increase in income inequality (see Lee and Vivarelli, 2004).

The rather different results from empirical evidence actually support the idea that some other mechanisms, beside the HOSS theory, may be at work. An increasing amount of country-specific empirical works have shown that many DCs experiencing drastic trade liberalisation have, in fact, experienced a generalised increase in the relative demand for skilled labour and hence a rise in inequality. However, the evidence from cross-country empirical papers is mixed and has failed to reach a clear-cut conclusion about the sign and the strength of such a relationship (see Lee and Vivarelli, 2006a and 2006b)

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[1] That is, the same technology and absence of scale economies.

This paper contributes to this literature by presenting new empirical results based on a unique dataset including 70 developing countries over the 1980-1999 period. Most previous cross-country studies on inequality used the World Income Inequality Database (WIID)[2] whose coverage is sparse and unbalanced. The Gini coefficients in WIID are based on different income definitions (income/expenditure, gross/net), different recipient units (individuals/household) and population coverage (urban/rural/all). Even when adjustments are made to improve data comparability[3], these differences may still result in serious data inconsistency. Indeed, the first novelty of this paper is the use of an alternative global inequality dataset – the UTIP-UNIDO database[4] – which ensures data comparability both through time and across countries.

The second novelty of this paper regards the econometric specification and the estimation technique. Given the revealed persistence of the within-country inequality indexes, we use a dynamic specification (a lag of the dependent variable is included as an explanatory variable) which allows us to account for the path-dependent nature of the distributional pattern. The resulting endogeneity problem is addressed by using a Least Squares Dummy Variable Corrected (LSDVC) estimator, a recently-proposed panel data technique particularly suitable for small samples.

Finally, we disentangle import and export flows according to their origin/destination areas. Our results show that both imports and exports from/to HICs significantly worsen income distribution in Middle Income Countries (MICs). We interpret these findings by considering the interactions between a country's economic integration and its technological upgrading.

The remainder of the paper is organised as follows: in section 2, we critically discuss the arguments in favour of the alleged egalitarian impact of trade on within-country income inequality, mainly from a theoretical point of view. Section 3 presents the empirical model and explains the econometric specification (section 3.1). Section 4 describes the data and shows some descriptive statistics. Section 5 presents and discusses the results, while conclusive statements are derived in Section 6.

2. **The literature**

The standard model used by economists to analyse the effect of trade on the relative returns to different factors of production is the HO model, which builds on the Ricardian theory[5] of

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[2] The WIID is a comprehensive database built by the World Institute for Development Economics Research (WIDER), based at the United Nations University in Helsinki. It includes Deininger and Squire's (1996) dataset, and it is regularly extended and updated.

[3] For example, Vivarelli (2004) restricts the analysis to Gini Indexes based on nationally representative surveys and uses dummy variables to check for the remaining differences in the type of surveys; Bensidoun *et al.* (2005) uses only changes in Gini indexes based on the same income concept and reference unit within each country.

[4] The UTIP-UNIDO Database is assembled by the University of Texas Inequality Project (UTIP) and includes two measures of inequality. See section 4 for a description of these data.

[5] David Ricardo's *Principle of Political Economy and Taxation* demonstrated that it was advantageous for a nation to trade with another nation even if the first was more efficient in the production of all goods in absolute terms; what was required was, instead, that one country was relatively more efficient in one product or had a "comparative advantage" in that product.

comparative advantages by predicting patterns of trade and production based on the factor endowment of a trading region. In its simplest version, as reported in Wood (1994), the model assumes two factors of production – skilled and unskilled labour[6] - and two countries, the North (developed countries) and the South (developing countries), each producing two goods (skilled and unskilled labour-intensive)[7]. The related predictions in terms of the distributive consequences of trade openness are well known and have often been invoked to justify trade liberalisation in the developing countries: greater openness should increase the relative demand and prices for unskilled labour and lead to a better distribution of wages in low and middle income/low-skilled labour-abundant countries.

However, some important critiques have been made of this HOSS theoretical framework. In particular it is argued that the HO model and the SS theorem are based on several assumptions that are too restrictive to describe the real world[8]. In fact, if the model is extended to account for many countries characterised by different technologies, then the distributional consequences of trade become unpredictable and may differ from those one would anticipate on the basis of a simplistic North-South interpretation of the SS theorem. In the next paragraphs, we briefly discuss the implications arising if some assumptions of the model are relaxed.

2.1: *Global* or *local* validity of the SS theorem?

Even retaining the central assumptions of the HO model, the inclusion of many countries implies that factor abundance should be assessed in relation not to the world as a whole, but only with respect to the group of countries that have similar endowment proportions and produce the same ranges of goods. These countries are said to constitute a '*cone of diversification*' (Davis, 1996). What matters for the distributive consequences of trade liberalisation is the relative position of the country amongst the other countries within its own cone. In fact, a developing country may be considered as "unskilled abundant" in global terms, but this may not be true in relation to other DCs. If factor abundance is defined in a *local* sense, the distributional consequences of trade can be the exact opposite of what we expect in a traditional HOSS framework (Davis, 1996).

This argument is particularly important for middle-income countries (MIC) which are likely to be relatively unskilled-labour-abundant in comparison with high-income trading partners and relatively skilled-labour-abundant in comparison with low-income ones. Thus, when MICs open to trade, they have to face the competition of labour-intensive manufacturing from low-wage, labour abundant low-income countries, and this can change their comparative advantages in

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[6] Wood (1994) justifies the omission of capital and land from the skilled-unskilled labour model, arguing that "*machines and raw materials are internationally traded with low transport costs, building are reproducible and financial flows tent to equalize interest and profit rates. Apart from infrastructure labour is, thus, the only internationally immobile factor of production. [...] The North South difference in relative supply of the two distinct immobile factors (skilled and unskilled labour) provides the main basis for international trade*" [Wood, 1994: pp 41].
[7] Other assumptions in the model are perfectly competitive markets and identical production functions with freely available technology across countries.
[8] Cline (1997), for examples, argues that "from the start, the SS and the factor price equalization theorems faced the major problems that they seemed radically divorced from reality" [Cline, 1997; p. 43]

labour intensive exports[9]. Indeed, in this context trade liberalisation in MICs can cause the contraction of both high skill intensity sectors (replaced by imports from developed countries) and of low skill intensity sectors (replaced by imports from low income countries), possibly resulting in a decrease in demand and wages for unskilled workers and in a wider wage gap.

Feenstra and Hanson (1996, 1997) push this argument a step further and propose a model where there is a continuum of goods ordered along a ladder whose steps are characterised by different levels of skill intensity. The model assumes the production of a simple final good that requires a *continuum* of intermediary goods with varying proportions of skilled and unskilled labour. They assume that the developing region has a comparative advantage in the unskilled labour intensive stages of the production, whilst the developed region is more efficient in the skilled labour intensive parts. Investment and trade liberalisation would shift the production of intermediate inputs (through trade and foreign direct investment) form developed to developing countries. While such products would be characterised as unskilled-labour-intensive from a developed country's perspective, they appear to be skilled-labour-intensive from a developing country's point of view. In this way, average skill intensity and therefore the demand for skilled labour increase both in the North and in the South, inducing a rise in the skill premium in both areas. Zhu and Trefler (2005) have extended Feenstra and Hanson's model to a case without foreign direct investment but with a Ricardian source of comparative advantage added to that based on factor endowment. In their model, technological catch-up by the developing country causes a shift in production of the least skill-intensive Northern goods to Southern countries where they become the most skill-intensive goods produced. This mechanism, similar to the one proposed by Feenstra and Hanson, leads to a rise in the demand for skilled labour in both developed and developing countries. Xu (2003) has also developed a model with a *continuum* of goods where the boundary between traded and non-traded goods is endogenous and determined by trade policy. He shows that trade liberalisation by expanding a developing country's export set can raise wage inequality.

All these models – Davis (1996), Feenstra and Hanson (1996), Xu (2003) – are directly derived from the HO and SS approach, since they borrow the central idea that the return to factors of production is conditional on their relative distribution among countries (Arbache, 2001). However, they stress that factor endowments and factor intensity are *relative* concepts. Other theoretical streams of literature depart radically from the HOSS framework by relaxing the key HO assumption of identical technologies among countries and considering the dynamic effects of trade.

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[9] Wood (1997) proposes this argumentation to explain the dramatic increase of income inequality that Latin American countries have experienced starting from the mid-80s. Cornia (2003) too underlines the importance of this argument in explaining the increase in inequality that many middle-income countries have experienced during the 90s. He stresses that, as a consequence of the entry into the world market of low-skill manufactures from China, Indonesia and other exporters with substantially low wages, the formal sector of middle-income countries "no longer has a comparative advantage in labour-intensive exports and either it informalises its production via a long chain of subcontracting agreements or shifts production towards skill-intensive exports. In both cases, wage inequality is likely to worsen" [Cornia, 2003, p.605].

2.2: The role of technology

If the hypothesis of identical technologies among countries is dropped and one assumes that developed countries and DCs differ in their technology levels[10] and that openness facilitates technology diffusion from North to South, then the final impact of trade in terms of demand for labour and relative wages also depends on the skill intensity of the transferred technology relative to that currently in use. There are many empirical studies showing the skill-biased nature of technological change in the developed economies (see, for instance, Berman *et al.* 1994; Autor *et al.* 1998; Machin and Van Reenen, 1998; Piva and Vivarelli, 2002 and 2004). Without necessarily assuming that developed countries transfer their "best" technologies to the DCs, it is quite reasonable to expect that transferred technologies are relatively skill-intensive, i.e. more skill-intensive than those in use domestically before trade liberalisation. Indeed, to the extent that technology upgrading is linked to international openness, trade liberalisation may increase the demand for skilled labour in developing countries too, reversing the prediction of the SS theorem.

Economic opening may in fact expose developing countries to new ideas and technologies. Some authors underline that technological upgrading may be an endogenous response to international openness. Wood (1995) argues that intensified competition from abroad may induce firms to develop new technologies more biased towards skilled labour (the hypothesis of 'defensive innovation'). In this case, technical change could be intentionally biased towards skilled labour as an endogenous reaction by developed countries' firms to trade with low-wage countries. Thoenig and Verdier (2003) formalise this idea in a model where firms more exposed to the threat of external competition tend to bias their innovation more towards skilled labour and to increase their share of skilled workers in order to reduce the future threat of imitation. While this argument seems more suitable for explaining the increase in inequality in the developed world, it may also be applicable to middle income countries if they face import competition (in their low-skill-intensive sectors) from low income developing countries (Goldberg and Pavcnik, 2007; p. 34).

Pissarides (1997) stresses that even if the technology transferred through trade is neutral, the transitional process of transferring and installing the new technologies may be skill biased. Therefore, a developing country which opens to trade reallocates skilled labour from production to imitation activities (R&D, reverse engineering). This shift causes a rise in the relative earnings of skilled labour. If the transferred technology is neutral, this phenomenon will be only temporary and will cease as soon as workers learn the new technologies. However, if the technology transferred is skill biased, then the relative increase in the demand for skilled labour can be permanent. Indeed, there are different channels through which trade openness may induce technological upgrading. Our focus here will be on the role of imports and exports[11].

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[10] This hypothesis is now common in standard models of international trade such as those provided by Krugman (1979a and 1979b), and Grossman-Helpman (1991).

[11] Foreign direct investments are also important vehicles of international technology diffusion. However, treatment of their role is beyond the scope of this work.

2.2.1: The import channel

Trade liberalisation favours technological upgrading by increasing international flows of capital goods. As long as capital goods incorporate new technologies, the increase in imports of machinery and equipment should help technological diffusion among DCs and raise their relative demand for skilled labour (Acemoglu, 2003).

There is much literature that finds that import flows can in fact contribute to the international transfer of technology by providing DCs' local firms access to new embodied technologies and by creating opportunities for *reverse engineering*.

Coe and Helpman (1995), studying a sample of OECD countries, find that foreign knowledge embodied in traded goods[12] has a statistically significant positive impact on aggregate total factor productivity (TFP) in importing countries. Coe *et al.* (1997) and Mayer (2000) have extended the analysis to DCs and show that imports of intermediate goods raise the TFP in DCs as well. Moreover, Mayer (2000) restricts the definition of import shares by considering only machinery and finds that in this case the impact of foreign R&D is much greater. Schiff and Wang (2006) underline how trade-related technology diffusion can occur through an increase in a country's level of exposure to that technology through trade (quantity), or through an increase in the knowledge content of that trade (quality). They examine the relative contribution of these two components to North-North and North-South trade-related technology diffusion. Interestingly, they find that the "quality" component (proxied by trading partners' R&D stocks) has a greater impact on North-North knowledge diffusion, while the "quantity" (proxied by trade to GDP ratio) plays a more important role in the North-South technology transfer. These results imply that the impact of openness on productivity in DCs is greater than previously stated in this literature. The distinction between the quality and quantity of new technologies is further analysed by Barba-Navaretti and Solaga (2002), who look at the role of imported machinery in transferring embodied technological progress. Their study focuses on the imports of machines from the EU to a sample of neighbouring developing and transition countries in Central-Eastern Europe and in the Southern Mediterranean. They find that imported machinery has a positive impact on total factor productivity and that the impact is greater the higher the technological complexity of imported machinery[13]. Other studies used firm level database to examine imports as a mechanism for technological transfer and find that imports can in fact improve firm technological capabilities (See for example, Blalock and Veloso, 2007).

Robbins (1996 and 2003) has called the effect of in-flowing technology resulting from trade liberalisation the 'skill-enhancing trade (SET) hypothesis'. The idea is that trade liberalisation accelerates the flows of physical capital (and embodied technology) to the South, inducing rapid adaptation to the modern skill-intensive technologies currently used in the North. The resulting increased demand for skilled labour may then lead to a widening of wage dispersion in developing countries.

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[12] Foreign knowledge is defined as the sum of trading partners' R&D stocks (that is a measure of knowledge quality), weighted by bilateral trade shares (a measure of knowledge quantity).

[13] They proxy the technological complexity of machinery by its averages unit value.

2.2.2: The export channel

While most of the literature on international technology diffusion focuses on the import channel, there is also evidence pointing out the significant role of exports in shifting the DCs' domestic production toward more intensive technologies. The micro-level evidence shows a positive correlation between firms' export activities and productivity growth. One reason lies in the learning-by-exporting argument, according to which exporting causes efficiency gains. Breaking into foreign markets allows firms to acquire knowledge of international best practice. Moreover, foreign buyers often provide their supplier with technical assistance and product design in order to improve the quality of imported goods, and they may transmit to their supplier located in DCs the tacit knowledge acquired from other suppliers located in advanced countries (Epifani, 2003). Bernard and Jensen (1997) explained that much increased wage inequality in the US is due to skill upgrading within the exporting plants and argued that trade-induced demand shifts have caused a reallocation of resources across plants towards exporting firms.

Yeaple (2005) shows that increased export opportunities make the adoption of new technologies profitable for more firms, thus increasing the aggregate demand for skilled labour and the skill premium. Bustos (2005) builds a model upon the works of Yeaple (2005) and Melitz (2003), arguing that trade liberalisation reduces variable export costs, increasing exporting revenues and inducing more firms to enter the export market, which makes adoption of new technologies profitable for more firms. In addition, it reduces the cost of adoption of new technologies through the elimination of tariffs on imported capital goods and restrictions on technology transfers, making adoption profitable for more exporters. Adoption of skill-intensive new technologies increases the relative demand for skilled labour and the skill premium. She uses this framework to explain the increase in wage inequality experienced by Argentina after trade liberalisation.

A different mechanism of skill upgrading in exporting plants is discussed by Verhoogen (2007), who argues that trade openness leads to an upgrading of average product quality in exporting plants, which in turn generates demand for a better qualified workforce. He finds that the "quality-upgrading hypothesis" is more relevant than the "outsourcing hypothesis" as an explanation for increasing wage inequality in Mexico. This idea is also pursued by Fajnzylber and Fernandes (2004), who point out that exporters may be pressured by their foreign clients to produce according to quality standards that are higher than those prevailing in the domestic market. In fact, they find that exports had a positive impact in the relative demand for skills in Brazil. Other evidence for the inequality-enhancing role of exports can be found in Hanson and Harrison (1999), who document that exporting firms employ a higher share of white-collar workers than non-exporting plants in Mexico.

As summarised by Goldbreg and Pavcnik (2004), the basic idea of these models is that trade openness in the form of exports induces the "quality" upgrading of a firm, where quality can mean either "firm productivity" or "product quality". What is essential for establishing a connection with the trade-inequality debate is that higher quality firms have a higher demand for skills, so that quality upgrading leads to an increase in the skill premium.

Finally, although FDI are beyond the scope of this paper, it has to be noted that transnational corporations located in the DCs are an important source of high quality exports to the industrialised countries; the arguments previously discussed apply "a fortiori" to this aspect of trade.

2.3 Previous empirical evidence

On the whole, relaxing the H-O hypothesis of technological homogeneity and allowing for capital deepening and skill-biased technological change (SBTC) opens the way to an important possible counter-effect in terms of the distributional impact of globalisation. In such a framework, increasing openness may raise the relative wages of skilled labour and consequently income inequality in both developed and developing countries.

The hypothesis of the 'pervasiveness' of SBTC has recently been confirmed empirically by Berman and Machin (2000 and 2004), who find strong evidence for an increased demand for skills - at least for manufacturing sectors of middle-income DCs in the '80s[14] - and relate it to skill-biased technology absorption. The authors find that skill-upgrading is predominantly a within-industry phenomenon, that it is concentrated in the same industries across countries, and that DC indicators are highly correlated with those for OECD countries. Their results seem to suggest that SBTC has in fact been transferred from the developed world to middle income countries, and they support the pervasive nature of SBTC.

Conte and Vivarelli (2007) have studied the impact of technological transfer on the employment of skilled and unskilled labour in a sample of low and middle income countries. By using a direct measure of embodied technological transfer - namely the trade flows from industrialised countries of those goods which reasonably incorporate technological upgrading - they have found that imported skill-biased technological change is in fact one of the determinants of the increase in the relative demand for skilled workers within DCs.

These works suggest a role for technology in explaining the increased demand for skilled labour also in developing countries. However, they do not deal directly with income distribution. The empirical literature treating the impact of international trade on within-country income distribution explicitly is varied and fails to reach a consensus. On the one hand, an increasing number of country-specific empirical works show that the intensification of trade flows is frequently associated with an increase in the relative demand for skilled labour and a consequent rise in the skill premium in developing countries too[15]. On the other hand, the

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[14] Statistically insignificant results emerge for low-income countries.

[15] For instance, Robbins and Gindling (1999) using household survey data for Costa Rica found that wage inequality increased after trade liberalisation. Attanasio et al. (2004) and Goldberg and Pavnik (2001) reached similar conclusion for Colombia, using household survey data. Arbache, Dikerson and Green (2003) showed that in Brazil the influx of new skill intensive technologies, boosted by trade liberalisation, contributed to the rise in the university education premium. For Mexico, several empirical works have shown that trade liberalisation went hand-in-hand with rising wage inequality: using household data Feliciano (2001) found that the increase in wage inequality was much greater in the tradable sectors than in the non-tradable ones. Cragg and Epelbaum (1996) have shown that the skill premium increased by about 68 per cent during the liberalisation period. Using plant level data, Harrison and Hanson (1999) also found evidence for rising wage inequality following the reduction of trade barriers, and Feenstra and Hanson (1997) show that the huge

evidence arising from multi-country empirical works is mixed and the conclusions often depend on the specification adopted and the measurement of the variables of interest[16]. This kind of work is instructive because it allows authors to generalise beyond one specific case study. This literature reveals that only a few empirical studies unambiguously support the predictions of the Stolper-Samuelson theorem and document a decrease in income inequality after trade liberalisation. These include Wood (1994), Bourguignon and Morrisson (1990), Reuveny and Li (2003), Calderón and Chong (2001) and Dollar and Kraay (2001 and 2004). The majority of cross-country studies, instead, either do not register any significant and systematic relationship between openness and income distribution (see e.g. Edward, 1997; Li, Squire and Zou, 1998 and Vivarelli, 2004), or clearly contradict the distributive outcomes of traditional trade theory. For instance, Barro (2000), Lundberg and Squire (2003) and Cornia and Kiiski (2001) have shown that in their samples trade liberalisation is associated with an increase in income inequality. Some other papers (Litwin, 1998; Ravallion, 2001; Easterly, 2005 and Milanovic and Squire, 2005) have revealed that globalisation entails a greater increase in inequality in poorer countries, again in contrast with SS expectations.

Many of these works are characterised by a cross-section (or short panel) methodology and hence the between-country dimension of inequality is dominant (see for example Dollar and Kraay, 2001 and 2004; Easterly, 2005; Edward, 1997 and Litwin, 1998). The task of explaining between-country inequality differentials is a very difficult one, since a number of country-specific factors cannot be properly taken into account.

In contrast, this paper will focus on within-country inequality, which is even more important from a policy perspective. In fact, within-country income inequality trends are crucial in terms of social cohesion and political stability and may be considered a possible target for national economic policies. Moreover, while population-weighted between-country inequality has shown a declining historical trend, the opposite has emerged as far as the within-country component of income distribution is concerned (see Sala-i-Martin, 2002).

Finally, several previous works have pooled together developing and developed countries (see, for instance, Calderón and Chong, 2001; Li, Squire and Zou, 1998 and Ravallion, 2001), neglecting the specificities of two these groups. Instead, in the present paper only developing countries will be studied, and they will be further disaggregated into middle income and low income countries.

3. The empirical model

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increase in FDI flows during the liberalisation process resulted in increases in the share of wages paid to skilled workers. Görg and Strobl (2001), analysing a panel of manufacturing firms in Ghana, also found that returns to skills increased after trade liberalisation. Similar discoveries were made by Robbins (1996) for Argentina, Chile, Colombia, Costa Rica, Malaysia, Mexico, Philippines and Uruguay.

[16] These studies generally vary in their conclusions according to different kinds of factors. First, they cover different countries and time periods. Second, the very definition of globalisation is ambiguous: some papers measure globalisation looking at trade (and/or FDI) outcomes, while others focus on liberalisation policies (incidence-based measures), such as decreasing tariffs or quotas. Third, different econometric specifications have been used. Most researchers estimate the relationship between inequality and openness by regressing levels on levels, while others have focused on changes in both the dependent and the explanatory variables.

As we underlined in section 2, most previous empirical works studying the relationship between trade openness and income distribution have used cross sectional analysis[17]. In contrast, this paper adopts a dynamic specification which takes countries' unobserved heterogeneity into account.

3.1: The tested specification

The adoption of a dynamic specification constitutes an important novelty with respect to the previous literature in this field[18]. This choice is motivated by two reasons. From an econometric point of view, the revealed persistence of the inequality variable (ρ = 0.834)[19] calls for a necessary AR(1) check. On the interpretative side, the lagged value of the dependent variable can account for the path-dependent and viscous nature of inequality, which is affected by a number of structural factors that are very slow to change, such as institutional context, factor endowments, land and asset distribution, urbanisation, etc.

Therefore, the proposed empirical specification will be the following:

$$(1) \qquad EHII_{it} = \alpha + \rho \ EHII_{i,t-1} + \beta \ OPEN_{it} + \sum_{k} \delta_k X_{ikt} + \eta_i + \varepsilon_{it}$$

where i and t denote country and time period, respectively. $EHII$ is the estimated household income inequality (see section 4); $OPEN$ is the openness variable (alternatively: total trade, imports and exports); X_K are a set of control variables; η_i is the idiosyncratic individual and time-invariant country's fixed effect and ε_{it} the usual error term. All variables are expressed in natural logarithms.

As regards openness measures, we decided to use *outcome-based* measures instead of *policy-based* measures. This choice is motivated by several reasons: first, the *ex-post* outcome measures reveal the country's real openness' and its actual capacity to increase the volume of trade flows, while *ex-ante* trade liberalisation policies may capture what is only an intention. Second, policy-based variables are usually binary, indicating whether a country has liberalised or not; it is unlikely that they can capture the various phases of liberalisation, while the effective volume of trade changes over time and can thus capture the different stages of the liberalisation process. Finally, the outcome-based variables are available for a greater number of countries and years.

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[17] Or short panel analysis, where the between dimension is dominant.

[18] To the best of our knowledge, the only paper that has used a dynamic specification to study the relationship between international openness and inequality is that by Calderòn and Chong (2001). However, in their study the between-country dimension is still dominant (estimates are run with 237 observations taken from 102 countries).

[19] AR(1) computed with fixed effect estimator.

Although our dynamic specification permits us to ignore time invariant factors, we still have to include some controls which change over time.

First, the dynamics of within-country income inequality can be affected by per-capita GDP levels, that is by the stage of development of a given economic system. According to Kuznets (1955), the relationship between inequality and economic development follows an inverted-U pattern with inequality rising at the initial stages of development and then falling. The basic idea under Kuznets' demand-pull model is that - during the initial stages of development - growth in demand spurs labour-saving technological change favouring the demand for capital and skills, so increasing income inequality. Eventually, as catching-up proceeds, the labour-saving tendency attenuates and more egalitarian forces, such as an increase in education (and so in the supply of skilled labour), are allowed to have their impact (for recent revisitings of Kuznets' law, see Aghion and Howitt, 1997; Barro, 2000; Grimalda and Vivarelli, 2004).

Second, education should be taken into account. Obviously, an increase in education implies an increase in the supply of skilled labour, a decrease in the relative skilled/unskilled wage and an overall decrease in income inequality. A steady increase in the supply of skilled labour might keep the relative skilled/unskilled wages constant, even in the presence of skill-biased technological change. Therefore it is important to include a proxy for the educational level in the estimating equation.

Finally, we include the inflation rate in the model, to check for the macroeconomic environment, which is likely to affect income distribution. This aspect is particularly important in developing countries, often characterised by highly instable macroeconomic conditions. Inflation erodes real wages and disproportionately affects those within the bottom percentiles of income distribution, thus increasing inequality. A number of papers find that high inflation is in fact associated with higher inequality (see for example, Lundberg and Squire, 2003 and De Melo *et al.*, 2006). Other empirical works also show that inflation is a significant determinant of the poverty rate: see for example the results of Datt and Ravallion (1999) for India, and Easterly and Fischer (2000) who used survey data on more than 30,000 households in 38 countries.

3.2: The econometric method

The inclusion of the lagged dependent variable as one of the regressors in (1) implies an obvious problem of endogeneity. A natural solution for first-order dynamic panel data models is to use GMM (General Method of Moments; see Anderson and Hsiao, 1981; Arellano, 1989; Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). Unfortunately, this method is only efficient asymptotically and is not suitable for small samples. In our case, we only have 70 countries, observed over 20 years and hence the GMM – designed for "small T

and large N" may not be appropriate. Therefore we use the LSDVC[20] estimator, a method recently proposed by Kiviet (1995 and 1999), Judson and Owen (1999), Bun and Kiviet (2001 and 2003) and extended by Bruno (2005a and 2005b) to unbalanced panels such as the one used in this study. This method has been proposed as a suitable dynamic panel data technique in the case of small samples where GMM cannot be applied efficiently.

Let us suppose we have a standard autoregressive panel data model, based on the possibility of collecting observations over time and across individuals; our problem can then be described as follows:

(2)　　$y = D\eta + W\delta + v$

where y is the vector of observations for the dependent variable, D is the matrix of individual dummies, η is the vector of individual effects, W is the matrix of explanatory variables including the lagged dependent variable, δ is the vector of coefficients, and v the usual error term.

The LSDV estimator is the following:

(3)　　$\delta_{LSDV} = (W'AW)^{-1}W'Ay$

where A is the within transformation which wipes out the individual effects.

Since the LSDV estimator is not consistent when the lagged dependent variable enters into the model, a more accurate measuring of its bias can be seen as the first step towards correcting it. The LSDV bias is given by:

(4)　　$E(\delta_{LSDV} - \delta) = c_1(T^{-1}) + c_2(N^{-1}T^{-1}) + c_3(N^{-1}T^{-2}) + O(N^{-2}T^{-2})$

For the analytical expression of the terms in formula (4) see Bun and Kiviet (2003, p.147).

In their Monte Carlo simulations, Bun e Kiviet (2003) and Bruno (2005a) consider three possible nested approximations of the LSDV bias, which in turn are extended to the first, second and third terms of (4)[21]. In this study we will correct for the most comprehensive and accurate one (B_3 in Bun and Kiviet (2003) and Bruno (2005a) notations). Therefore in the following, the LSDV corrected estimator (LSDVC) is equal to:

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[20] Least Square Dummy Variable Corrected.

[21] In particular, with an increasing level of accuracy: $B_1 = c_1(T^{-1})$; $B_2 = B_1 + c_2(N^{-1}T^{-1})$; $B_3 = B_2 + c_3(N^{-1}T^{-2})$.

(5) $LSDVC = LSDV - B_3$.

The Monte Carlo experiments (see Kiviet, 1995; Judson and Owen, 1999; Bun and Kiviet, 2001) show that the LSDVC estimator, in small samples, outperforms consistent IV-GMM estimators such as the Anderson-Hsiao and Arellano-Bond.

The procedure has to be initialised by a consistent estimator to make the correction feasible, since the bias approximation depends on the unknown population parameters. Three possible options for this purpose are the Anderson-Hsiao, Arellano-Bond and Blundell-Bond estimators. In this study, we will initialise the bias correction with the Arellano-Bond estimator, here considered as the best established panel data estimator implemented in the STATA econometric package used[22].

Bun and Kiviet (2001) derive the asymptotic variance of the LSDVC for N large. However, the estimated asymptotic standard errors may provide poor approximations in small samples, generating possibly unreliable t-statistics, while bootstrap methods generally provide approximations to the sampling distribution of statistics which are at least as accurate as approximations based upon first-order asymptotic assumptions (see also Bruno, 2005b). Accordingly, in this study the statistical significance of the LSDVC coefficients has been tested using bootstrapped standard errors (200 iterations).

4.   Data and descriptive statistics

The empirical analysis in this paper makes use of a time-series cross-country dataset that provides comparable and consistent measurements of income inequality both across countries and through time. This database was created by Galbraith and associates, and is known as the University of Texas Inequality Project (UTIP) database[23]. It contains two different types of data on inequality: the UTIP-UNIDO and the EHII indexes. The UTIP-UNIDO is a set of measures of the dispersion of pay, built using the between-groups component of a Theil index measured across industrial categories in the manufacturing sector[24] (see Galbraith and Kum, 2003). The EHII is a collection of measures of *Estimated Household Income Inequality* and is built combining the information in the Deninger and Squire (D&S)[25] data with the information in the UTIP-UNIDO data. The D&S database is the standard reference for inequality studies, and most multi-country empirical works on inequality are based on these data. However, the coverage of the D&S is sparse and unbalanced, and Gini coefficients originate from different

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[22] It should be noted that the three alternative procedures are asymptotically equivalent. See Bruno (2005b, pp. 5 and ff.) for instructions on Stata command *xtlsdvc*.

[23] The data are available at http://utip.gov.utexas.edu

[24] The original data come from UNIDO (United Nations Industrial Development Organisation) statistics which provides average manufacturing pay by industries. The comparability and accuracy of the UNIDO compilation of employees and payment measures have recently been endorsed by Rodrik (1999) and Berman (2000).

[25] Deninger and Squire (1996) collected many disparate surveys of income and expenditure inequality and compiled them into a single panel, offering 693 country/year observations since 1947.

sources and refer to a variety of different income and population definitions[26]. This poses important problems of comparability which may undermine the robustness of the results. Instead, the EHII – based on the consistent UTIP-UNIDO data – should overcome such comparability problems.

The EHII is built following a two-step procedure. First, the D&S measure of inequality (in Gini coefficients) is regressed on the UTIP-UNIDO measures of income dispersion, and on a matrix of conditioning variables including dummies for the three types of data source (income/expenditure, household/per capita, gross/net)[27]. Then EHII is computed using the same exogenous variables, where the intercept and coefficients are the deterministic parts extracted from the first-step estimation. See Galbraith and Kum (2003) for a detailed explanation of this procedure.

The resulting EHII dataset contains more than 3,000 observations covering over 150 countries over the period 1963-1999. We restrict the sample to 70 developing countries over the 1980-1999 period. The choice of the countries is guided by the availability of data regarding the other variables we enter in the model, while the limitation of the time span to the 1980-99 period is due to economic and interpretative reasons: these are in fact the years when globalisation – measured in terms of trade flows – registered a substantial increase in most developing countries. Appendix 1 gives the complete list of countries, and reports the initial, final, and mean value of the EHII index in each country, as well as the change in the value of the index in the period considered. Figure 1 shows the evolution of the EHII index over the sample period for the two groups of Middle Income (MIC) and Low Income (LIC) countries[28].

INSERT FIGURE 1

We observe a rising trend in the EHII index in both the series. However, inequality is higher in LICs where the average EHII index was around 45 in 1980 and almost reached 50 in 1999. In MIC inequality levels are lower, but they experienced a significant increase, especially in the decade going from the mid-80s to the mid-90s.

Data on total trade flows are taken from the IMF *Direction of Trade Statistics* (DOTS). This dataset provides aggregate data on imports and exports and also allows us to distinguish trade

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[26] Atkinson and Brandolini (2001) present a critique of the D&S database that focuses, in part, on the fact that many different types of data drawn from different sources are mixed up in the data set. In general, they criticise the use of "secondary" statistics and show how both cross-country comparisons and time-series analyses may crucially depend on the choice of data.

[27] The other variables included in the regression are the ratio of manufacturing employment to population, the share of urban population, and population growth rate. See Galbraith and Kum (2005), p. 126 for a theoretical justification of the choice of variables.

[28] We defined the income groups following the 1987 World Bank Classification which divides economies according to their GNI per capita, calculated using the World Bank Atlas Method (See http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20420458~menuPK:64133156~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html). We chose to use the 1987 classification, because it is the year closest to the median of our data time distribution.

flows according to their origin/destination areas. In particular, we are interested in disaggregating trade flows with other DCs with respect to flows with Industrial Countries (IC).

Following Wood (1994) and Wood and Ridao-Cano (1999), our measure of skill supply (human capital = HK) is built as the ratio between the percentage of the population with basic education and the percentage of the population with no education. When the number of educated people expands relative to the non-educated, we expect a decrease in income inequality. These data are gathered from the Barro-Lee database (See Barro and Lee, 1996 and 2001), which provides information on educational attainment over five-year intervals[29]. In order to match these data with our annual observations on inequality, we interpolated the data available, under the hypothesis that the yearly increase is constant over time for the missing periods.

Other control variables, such as GDP per capita and the inflation rate[30], are taken from the World Development Indicators (WDI) provided annually by the World Bank.

In the next table summary statistics of the data included in the regressions are presented.

INSERT TABLE 1 HERE

4. Results

Table 2 displays the results for the basic specification. Columns differ according to the openness variable included: trade (% GDP) in columns 1/2, imports (% GDP) and exports (% GDP) in columns 3/4 and 5/6 respectively. In this and the following tables, the dynamic specification (1) has been tested using both contemporaneous trade variables only and their lag as well, in order to check for possible long term impacts. Thus, the column with the contemporaneous impact is followed by a column also including the lagged impact together with the long term coefficient (LTI), the value and significance of which is reported in the bottom panel of the tables[31].

INSERT TABLE 2 HERE

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[29] In particular, the data used here refer to the educational attainment of the population aged 25 and over. The variable BASED refers to the percentage of the population who have completed primary education, while the variable NOED includes those with no education and those who have attained some primary education but not obtained the relative certification.

[30] Inflation is measured by the annual growth rate of the GDP implicit deflator and shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.

[31] Only the one year lag is displayed in the tables, since lags of higher orders never came out significant (results available under request). The long term impact (LTI) has been computed as the sum of the estimated coefficients of the contemporaneous and lagged openness variables over: 1- ϱ (long-run multiplier, see Verbeek, 2004, pp.311).

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As can be seen from table 2, contemporaneous trade and imports have a small and barely significant positive impact on WCII in the investigated DCs, while exports have no significant impact; moreover, both lagged and LTI coefficients never turn out to be significant.

Inflation and the supply of education have the expected signs; an increase in the supply of skilled labor[32] tends to diminish inequality, while higher inflation is associated with a worsening of income distribution. However, only the inflation coefficient is significantly different from zero. The impact of GDP per capita is also not significant; however, its negative sign seems to suggest a Kutznet's relationship in its second stage of development, when an increase in GDP leads to a reduction in inequality. Finally, as expected, the lagged dependent variable is always higher than 0.95 and largely significant[33] .

These findings confirm the results of previous empirical works which failed to envisage a significant relationship between openness and within-country income inequality. However, the examination of the total trade flows does not enable us to identify the mechanisms of transmission between international openness and income distribution precisely. As we stressed in section 2, the trade-induced transfer of technology may be an important factor affecting the distributional consequence of trade liberalization. When the developing countries open to trade, they become more exposed to technologies and innovations produced in more advanced countries. Hence, it is trade with richer countries which may involve technological upgrading[34], a general shift of labor demand towards more skilled workers, a consequent increase in wage differentials and so a general worsening of income distribution. In other words, the insignificant (or barely significant) results emerging in table 2 may be affected by important composition effects which deserve further investigation.

Thus, we disaggregated trade flows according to their origin/destination areas, in order to test the possible inequality-enhancing effect of trade with richer countries, both through the import (see section 2.2.1) and the export channel (see section 2.2.2). Table 3 reports the results of this decomposition.

INSERT TABLE 3 HERE

The estimates reveal that trade, imports and exports with/to industrialized countries (ICs) are the only components of trade which worsen income distribution, whereas the same flows towards other developing countries either do not affect WCII or even exert an opposite effect. In more detail, contemporaneous estimates reveal a positive and significant impact of total trade and exports to ICs in increasing WCII in the investigated DCs. While still positive, imports do not reach the statistically significant threshold. Once one year lags are taken into account, lagged impacts seem to prevail and the divide between flows with ICs and those within DCs becomes even more obvious: trade and imports with ICs worsen income distribution, while trade, imports

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[32] We also tried to use a different measure of human capital in order to account for the increase in post-primary education, but no significant changes occurred (results available under request). .

[33] This is a further confirmation of the need for a dynamic specification.

[34] What matters   in terms of technological upgrading is not trade in general, but only trade with developed countries, where the potential for innovation diffusion comes from and where the quality-upgrading demand is originated

and exports with other DCs have the opposite effect[35]. Overall, trade flows with ICs (either contemporaneous or lagged) positively and significantly impact on WCII, while lagged trade flows with other DCs exert an equalizing effect. The role of trade with ICs is confirmed by the positive signs of the LTI coefficients (although they never turn out to be significant at the conventional levels).

We interpret this evidence as a support for the hypothesis that technological differentials between trading partners play an important role in explaining the distributive impact of trade openness (see section 2).

However, these results may be affected by another composition effect; in fact, pooling together MICs and LICs does not allow us to capture the distinctive features of the relationship between trade openness, technology upgrading and inequality in the two groups of countries. MICs and LICs may in fact be affected in different ways by international trade. Indeed, the potential for technological upgrading should be greater in MICs, which are more likely to be characterized by higher 'absorptive capacity' (or "capabilities"), which are considered a fundamental pre-requisite for taking advantage of new technologies (see, for instance, Abramovitz, 1986; Lall, 2004). This may in turn influence the choice of the technologies to import[36]; in other words, MICs have the necessary capabilities in order to use the technologies produced in more advanced countries and to follow a catching-up path. While this process may have a positive impact on growth, it is very likely that it also implies an (at least temporary) increase in the demand and wages for skilled labor (at least until the labor supply adjusts as a result). LICs, instead, are likely to be excluded from this mechanism, and therefore trade with more advanced countries may not have the same adverse consequences in terms of income distribution. In fact, trade with LICs is often confined to the importation of older (or second–hand) capital equipment that requires fewer skills to operate than state–of–the–art equipment (Barba Navaretti *et al.*, 1998[37]). Turning the attention to the export side, MICs are better endowed with the industrial infrastructure needed to serve the sophisticated and demanding markets of the developed countries, so the skill-enhancing impact of exports is likely to affect only this group of counties. In contrast, exports from LICs are mainly concentrated in the primary and extractive sectors and are generally characterised by a low-technology content.

Therefore, we expect the inequality-enhancing effect of trade with more advanced economies to be stronger for MICs. We test this idea in table 4, where the openness indicators of table 3 are interacted with dummy variables indicating whether a country is middle income or low income. In this way, we are able to evaluate the differential impact of the disaggregated trade flows into/from the two groups of countries.

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[35] Notice that the lag plays a role in the import but not in the export flows towards ICs. This might be due to the fact that imported technologies need some time to exert their skill biased effect, while the quality of exporting goods is immediately implying an increase in the demand for local skilled workers.

[36] The idea that countries with different factor endowments use different technologies was first formalised by Atkinson and Stiglitz (1969), who started the 'appropriated technology' tradition. The idea is that certain technologies may be 'inappropriate' due to differences in the ability to implement them, to specific pre-conditions determining the environment where technologies can be developed and adopted, or to differences in the absorptive capacity of institutions, firms and individuals (See Piva, 2003, p.8)

[37] They also found that the 'absorptive capacity' of a country (the ability to master a new technology) affects the choice of the type and age of the imported machineries.

INSERT TABLE 4 HERE

The results from the new estimates support our hypothesis; interestingly, we note that the previous empirical findings only hold for middle income countries. As it can be noted, all the results from table 3 are confirmed both in terms of signs and significances, but only with regard to the variables interacted with MICs, while interactions with LICs never turn out to be significant. Moreover, long term impacts involving MICs always emerge as positive and significant in the case of trade[38].

5. Concluding remarks

This paper has discussed the impact of trade flows on within-country income inequality in developing countries. We have argued that the interplays between trade opening and technology adoption may constitute an important mechanism leading to a possible increase in income differentials in the liberalising developing countries.

Theoretically, if the HOSS assumption of identical technologies across countries is dropped, increasing exposure to international markets can foster the process of technology diffusion across DCs, through both imports and exports. The technologies transferred from more advanced countries are likely to be more skill-intensive with respect to those domestically in use and thus the trade-induced technology upgrading may result in a labour demand shift in favour of skilled labour, ending in a generalised increase in the skill premium and hence in a more unequal income distribution.

We have used a dynamic specification to estimate the impact of trade on within-country income inequality in a sample of 70 DCs over the 1980-1999 period. Our results – consistently with previous evidence – suggest that total aggregate trade flows are weakly related to within-country income inequality. However, we have moved a step forward, disaggregating total trade flows according to their areas of origin/destination. Our hypothesis is that what should matter in terms of income inequality is not trade in general, but only trade with more advanced countries, where the potential for technology diffusion originates. Interestingly, we found that only trade with high income countries worsens income distribution in DCs, through both imports and exports. This finding provides preliminary support for the hypothesis that technological differentials between trading partners are important in shaping the distributive effects of trade openness. Having tested the differential impact of trade in middle income countries *vs* low income countries, we then observed that the previous result only holds for middle income countries. We interpreted this evidence by considering the greater potential for technological upgrading in MICs, in terms of both their higher "absorptive capacity" and their superior ability to serve the differentiated and high-quality markets of the developed world.

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[38] These findings are consistent with Berman and Machin's results (2000 and 2004): in fact, when studying the international diffusion of SBTC, they found evidence for SBTC being rapidly transferred from developed to middle income countries, while no results emerged for the low income group of countries

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Table 1

Variable	1980s Mean	1980s Std. Dev.	1990s Mean	1990s Std. Dev.
Trade (% GDP)	38.48	23.33	48.58	30.94
Exp (% GDP)	16.47	12.73	20.76	14.51
Imp (% GDP)	22.01	13.41	27.82	18.08
Trade with DCs (% GDP)	12.82	8.13	17.48	12.58
Trade with ICs (% GDP)	25.66	18.54	31.10	21.86
Exp to DCs (% GDP)	5.00	4.15	7.18	6.75
Exp to ICs (% GDP)	11.47	10.80	13.58	10.18
Imp from DCs (% GDP)	7.82	5.35	10.30	7.44
Imp from ICs (% GDP)	14.19	10.07	17.53	13.09
GDP per capita	1907.13	1809.53	2476.03	2292.66
Inflation rate	67.43	614.55	93.58	507.36
HK	1.55	4.38	2.16	4.46

Tab 2: All Sample, different openness measures; dependent variable: EHII

	(1)	(2)	(3)	(4)	(5)	(6)
EHII (-1)	0.973***	0.952***	0.973***	0.953***	0.999***	0.965***
	(17.8)	(14.2)	(18.0)	(14.1)	(19.7)	(18.7)
TRADE	0.0140*	0.0144				
	(1.96)	(1.04)				
TRADE (-1)		-0.000901				
		(-0.057)				
IMP			0.0114**	0.0135		
			(2.06)	(1.22)		
IMP (-1)				-0.000110		
				(-0.0084)		
EXP					0.00591	0.0128
					(0.72)	(0.93)
EXP (-1)						-0.0107
						(-0.76)
GDP	-0.0148	-0.0182	-0.0141	-0.0190	-0.00797	-0.00909
	(-0.89)	(-0.85)	(-0.81)	(-0.87)	(-0.41)	(-0.36)
HK	-0.000545	-0.000994	-0.000543	-0.00100	-0.000387	-0.000899
	(-0.41)	(-0.45)	(-0.41)	(-0.46)	(-0.23)	(-0.44)
INFL	0.00603**	0.00720***	0.00617**	0.00744***	0.00584**	0.00683**
	(2.32)	(2.84)	(2.36)	(3.01)	(2.22)	(2.51)
LTI		0.282		0.282		0.059
		(0.64)		(0.66)		(0.18)
Observations	686	638	686	638	685	637
Countries	70	69	70	69	70	69

Notes: absolute value of z-statistics in brackets (bias correction initialised by Arellano-Bond estimator and bootstrapped
standard errors): * significant at 10%; ** significant at 5%; *** significant at 1%.
LTI is the Long-term Impact, z-statistics in brackets.

Table 3: Disaggregating trade flows according to their origin/destination

	(1)	(2)	(3)	(4)	(5)	(6)
EHII (-1)	0.953***	0.890***	0.971***	0.934***	0.960***	0.909***
	(16.3)	(11.9)	(18.0)	(12.7)	(14.5)	(14.3)
TRADE_DC	-0.0141	0.00470				
	(-1.55)	(0.47)				
TRADE_IC	0.0305***	0.00634				
	(3.05)	(0.40)				
TRADE_DC (-1)		-0.0361***				
		(-3.15)				
TRADE_IC (-1)		0.0393**				
		(2.34)				
IMP_DC			-0.00297	0.0150		
			(-0.36)	(1.54)		
IMP_IC			0.0153	-0.00401		
			(1.56)	(-0.32)		
IMP_DC (-1)				-0.0366***		
				(-3.51)		
IMP_IC (-1)				0.0427***		
				(3.56)		
EXP_DC					-0.00904	-0.00129
					(-1.13)	(-0.19)
EXP_IC					0.0159**	0.0168
					(2.48)	(1.41)
EXP_DC (-1)						-0.0154**
						(-2.20)
EXP_IC (-1)						-0.00299
						(-0.22)
GDP	-0.0203	-0.0270	-0.0168	-0.0288	-0.0103	-0.00813
	(-1.24)	(-1.33)	(-0.95)	(-1.35)	(-0.54)	(-0.34)
HK	-0.000052	-0.0000124	-0.000330	0.000279	-0.000373	-0.000857
	(-0.041)	(-0.0061)	(-0.25)	(0.13)	(-0.23)	(-0.41)
INFL	0.00615**	0.00704***	0.00622**	0.00710***	0.00598**	0.00697**
	(2.36)	(2.75)	(2.35)	(2.89)	(2.29)	(2.58)
LTI		0.414		0.584		0.151
		(1.54)		(0.90)		(1.20)
Observations	686	638	686	638	685	637
Countries	70	69	70	69	70	69

Notes: absolute value of z-statistics in brackets (bias correction initialised by Arellano-Bond estimator and bootstrapped standard errors): * significant at 10%; ** significant at 5%; *** significant at 1%.
IC = Industrialised Countries; DC: Developing countries
LTI is the Long-term Impact, z-statistics in brackets.
The table only reports the LTI calculated on trade, imports and exports with/from/ to Industrialized Countries.

Table 4: Testing the differential impact of trade flows in MIC and LIC

	(1)	(2)	(3)	(4)	(5)	(6)
EHII (-1)	0.945***	0.870***	0.965***	0.917***	0.943***	0.890***
	(15.8)	(12.5)	(17.1)	(13.0)	(13.6)	(14.4)
TRADE_IC*MIC	0.0342***	-0.00594				
	(2.93)	(-0.30)				
TRADE_IC*LIC	0.00979	0.0161				
	(0.49)	(0.55)				
TRADE_DC*MIC	-0.0162	0.0183				
	(-1.49)	(1.45)				
TRADE_DC*LIC	-0.00709	-0.00539				
	(-0.43)	(-0.27)				
TRADE_IC*MIC (-1)		0.0594***				
		(2.68)				
TRADE_IC*LIC (-1)		-0.00229				
		(-0.074)				
TRADE_DC*MIC (-1)		-0.0562***				
		(-4.67)				
TRADE_DC*LIC (-1)		-0.000321				
		(-0.016)				
IMP_IC*MIC			0.0201*	-0.0158		
			(1.93)	(-1.02)		
IMP_IC*LIC			-0.00624	-0.00246		
			(-0.34)	(-0.11)		
IMP_DC*MIC			-0.00570	0.0276**		
			(-0.65)	(2.16)		
IMP_DC*LIC			0.00237	0.00166		
			(0.15)	(0.099)		
IMP_IC*MIC (-1)				0.0595***		
				(4.05)		
IMP_IC*LIC (-1)				0.0205		
				(0.94)		
IMP_DC*MIC (-1)				-0.0530***		
				(-4.57)		
IMP_DC*LIC (-1)				-0.00997		
				(-0.57)		
EXP_IC*MIC					0.0215**	0.0208
					(2.54)	(1.44)
EXP_IC*LIC					0.00258	0.00842
					(0.19)	(0.36)
EXP_DC*MIC					-0.0145*	-0.00218
					(-1.66)	(-0.26)
EXP_DC*LIC					0.00129	0.00184
					(0.11)	(0.16)
EXP_IC*MIC (-1)						0.000526
						(0.035)
EXP_IC*LIC (-1)						-0.0115
						(-0.39)
EXP_DC*MIC (-1)						-0.0212**
						(-2.42)
EXP_DC*LIC (-1)						-0.00375
						(-0.29)
GDP PC	-0.0214	-0.0281	-0.0191	-0.0294	-0.00834	-0.00609
	(-1.32)	(-1.43)	(-1.06)	(-1.33)	(-0.43)	(-0.26)
HK	-0.00000585	0.000163	-0.000259	0.000452	-0.000350	-0.000852
	(-0.0046)	(0.082)	(-0.20)	(0.21)	(-0.22)	(-0.42)
INFL	0.00616**	0.00681***	0.00641**	0.00717***	0.00577**	0.00664**
	(2.32)	(2.65)	(2.40)	(2.94)	(2.19)	(2.47)
LTI		0.410*		0.525		0.194
		(1.77)		(1.14)		(1.63)
Observations	686	638	686	638	685	637
Countries	70	69	70	69	70	69

% continues

Notes: absolute value of z-statistics in brackets (bias correction initialised by Arellano-Bond estimator and bootstrapped standard errors):
* significant at 10%; ** significant at 5%; *** significant at 1%.
IC = Industrialised Countries; DC: Developing countries. MIC: Middle Income Countries; LIC: Low Income Countries
LTI is the Long-term Impact, z-statistics in brackets.
The table only reports the LTI calculated on trade, imports and exports with/from/ to Industrialized Countries when interacted with the MIC dummy.

Figure 1

Inequality Trends

Appendix 1: List of countries and descriptive statistics
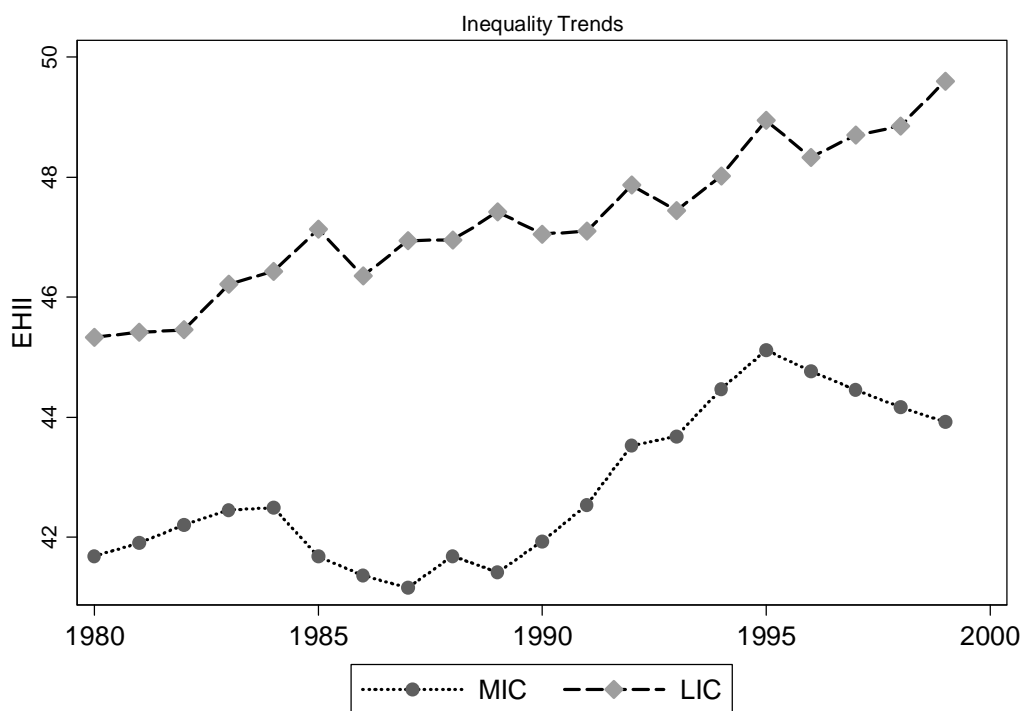
Country	Years	Obs.	Mean value of EHII	Initial Value	Final Value	Change
Algeria	1980, 1984-97	15	38.19	35.52	40.45	4.93
Argentina	1984-90, 93-96	11	43.95	41.13	45.24	4.11
Bangladesh	1980-92	13	44.61	40.45	48.44	7.99
Benin	1980-81	2	47.65	48.39	46.91	-1.48
Bolivia	1980-99	20	48.92	43.73	50.49	6.76
Brazil	1990, 92-95	5	47.02	45.22	47.49	2.27
Bulgaria	1980-98	19	33.01	28.42	41.90	13.48
Burundi	1980, 83, 86-91	8	50.04	47.65	52.62	4.97
Cameroon	1980-84, 89-98	15	53.82	46.73	56.39	9.66
Central African Republic	1980-83, 85-93	13	47.59	41.06	51.98	10.92
Chile	1980-99	20	46.96	44.92	47.46	2.54
China	1980-86	7	31.49	30.19	32.81	2.62
Colombia	1980-99	20	44.29	42.27	44.78	2.51
Congo, Rep.	1981-88	8	51.41	50.05	52.66	2.61
Costa Rica	1984-98	15	41.29	46.94	39.91	-7.03
Croatia	1986-96	11	33.64	30.81	37.10	6.29
Cuba	1980-89	10	31.01	32.53	30.16	-2.37
Cyprus	1980-99	20	39.34	40.59	40.15	-0.44
Dominican Republic	1980-85	6	47.67	48.24	48.28	0.04
Ecuador	1980-99	20	46.29	43.21	49.38	6.17
Egypt, Arab Rep.	1980-99	20	43.99	39.46	47.04	7.58
El Salvador	1980-85, 93-98	12	45.74	42.48	46.29	3.81
Ethiopia	1990-98	9	44.09	40.87	44.88	4.01
Fiji	1980-92, 96-98	16	45.06	43.23	42.75	-0.48
Gambia, The	1980-82	3	46.40	45.59	47.54	1.95
Ghana	1980-87, 93-95	11	52.23	51.65	53.17	1.52
Guatemala	1980-88, 91-95, 97-98	16	50.34	47.48	50.70	3.22
Haiti	1980-88	9	46.03	46.09	45.20	-0.89
Honduras	1981-95	15	46.14	41.82	47.28	5.46
Hungary	1980-99	20	32.66	26.41	39.43	13.02
India	1980-99	20	49.06	50.25	49.60	-0.65
Indonesia	1980-98	19	47.80	50.26	44.49	-5.77
Iran, Islamic Rep.	1980-93	14	37.89	40.06	43.15	3.09
Jamaica	1980, 83-84, 86-92	10	53.04	53.66	55.26	1.60
Jordan	1980-97	18	47.40	45.12	46.44	1.32
Kenya	1980-98	19	48.40	48.37	47.94	-0.43
Korea, Rep.	1980-99	20	37.39	38.83	37.75	-1.08
Liberia	1984-86	3	50.04	49.26	49.23	-0.03

Country	Years	Obs.	Mean value of EHII	Initial Value	Final Value	Change
Malawi	1980-98	19	51.13	46.40	54.97	8.57
Malaysia	1980-99	20	40.14	39.08	38.10	-0.98
Malta	1980-96	17	32.94	32.64	34.55	1.91
Mauritius	1980-99	20	40.04	46.08	38.50	-7.58
Mexico	1980-99	20	43.32	42.07	45.20	3.13
Mozambique	1990-96	7	53.13	50.46	58.91	8.45
Nepal	1986-91, 93-94, 96	9	47.45	46.21	44.26	-1.95
Nicaragua	1980-85	6	42.12	42.93	41.61	-1.32
Pakistan	1980-91, 96	13	47.41	46.20	49.43	3.23
Panama	1980-94, 96-98	18	47.13	43.44	48.56	5.12
Papua New Guinea	1980-89	10	51.20	49.69	52.06	2.37
Peru	1982-92, 94	12	48.16	47.53	50.67	3.14
Philippines	1980-97	18	47.01	43.05	48.04	4.99
Poland	1980-99	20	32.55	28.95	42.50	13.55
Romania	1990-94	5	28.98	24.77	32.12	7.35
Rwanda	1984-86	3	45.93	44.58	45.49	0.91
Senegal	1980-97	18	45.73	40.01	49.61	9.60
Seychelles	1980-86	7	36.39	33.04	37.10	4.06
Slovak Republic	1991-94, 97-98	6	33.57	29.50	36.25	6.75
Slovenia	1987-98	12	28.98	23.27	32.88	9.61
Sri Lanka	1980-95	16	45.47	46.79	44.47	-2.32
Syrian Arab Republic	1980-98	19	43.45	46.31	40.59	-5.72
Thailand	1982, 84, 86, 88-91, 93-94	9	46.60	49.30	41.76	-7.54
Togo	1980-84	5	51.69	52.09	47.22	-4.87
Trinidad and Tobago	1981-95	15	50.38	47.40	53.15	5.75
Tunisia	1980-81, 93-98	8	48.18	44.00	48.36	4.36
Turkey	1980-98	19	45.07	44.48	46.99	2.51
Uganda	1984-89	6	53.40	57.50	51.35	-6.15
Uruguay	1980-98	19	42.51	40.17	46.70	6.53
Venezuela, RB	1980-96	17	44.52	40.25	49.79	9.54
Zambia	1980-82, 90, 94	5	48.95	48.42	49.42	1.00
Zimbabwe	1980-98	19	45.37	44.44	47.44	3.00

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