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The effect of globalization on wage inequality: an application to the European Union before the Great Recession

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Abstract:

This paper aims at relating globalization with wage inequality, explaining if and how this relation is expected to hold differently for different-income countries. We intend to contribute to the literature with an empirical analysis for the countries of the European Union, before the Great Recession, by building and testing a panel data model on two distinct groups: the countries from the "North" (higher GDP *per capita*) and those from the "South" (lower GDP *per capita*).

We found that trade has the effect of enhancing inequality in the "North" countries (confirming the Hecksher-Ohlin-Stopler-Samuelson mechanism), though we could not significantly conclude on its effect in the "South" group. Foreign Direct Investment inflows have the effect of diminishing inequality in the "North", while FDI outflows have the same effect in the "South". These results are not predicted by Feenstra-Hanson theory. We also tested for the effect of technology on inequality and, while we found mixed evidence on how the share of High Tech Exports affects inequality, Gross Expenditure on Research and Development, when significant, increases inequality in the "North" group of countries. By using a composite globalization index, we conclude that trade is dominant over FDI in affecting inequality. Moreover, when we tested for the non-economic aspects of globalization, we found that both political and social dimensions cause wage inequality to increase.

***Keywords*:** wage inequality; globalization; European Union.

***JEL codes*:** F15; F63; O15.

1. Introduction

The now well-established, rather comprehensive, concept of globalization is arguably the best word to characterize cross-border integration in International Economics literature. The growing interconnectedness of economies all over the world, especially in terms of trade and investment, but also in terms of social and political dimensions, has an impact on the life of nearly every person. Therefore, it is natural that "[t]he pros and cons of globalization are vividly debated, and the labor market consequences are among the most persistent concerns." (Andersen and Sørensen, 2011; p. 595). In a world philosophy that purports to be global, it is hardly acceptable an unequal distribution of the benefits from globalization across different layers of the population.

Globalization can be measured and defined in a myriad of different ways, from rising trade openness and higher levels of foreign direct investment flows, to indices covering other economic, political and social dimensions. Examples of the latter include the Maastricht Globalization Index (MGI), Economic Freedom of the World Project (EFW), the Kearney Globalization Index (KGI) and the KOF Index.

In turn, wage differences within a country are a crucial determinant of overall income equality. Several proxies can be used to assess wage inequality: the wage gap between skilled and unskilled workers, the proportion of low-wage earners, the high-low decile or quartile ratios, or indices of wage dispersion like the Theil index of industrial pay inequality.

Given that "[t]here has been an upsurge in income and wage inequalities" in "advanced countries since the late 1970s" (Chusseau *et al.*, 2008; p. 411), there is a natural interest in studying if and how globalization determines wage inequality. Thus this work aims at analyzing this relationship.

Indeed, theoretical economic literature has been concerned with this relationship for quite some time. Given the complex nature of globalization and of the mechanisms it sets off, however, there is not just one straightforward answer to the general question of how it affects inequality. There are several different mechanisms linking different characteristics of international openness to income inequality.

One reference framework for this study is the Heckscher-Ohlin-Stolper-Samuelson theorem, which states that increasing trade between developed and developing countries

causes wage inequality to increase in developed countries and to decrease in developing countries. Another important theoretical framework is the Feenstra-Hanson theorem which predicts that Foreign Direct Investment outflows from developed to developing countries cause increases in wage inequality in both sets of countries. Several other mechanisms, within the economic dimension and in other dimensions of globalization, operate to affect inequality.

One of the goals of this paper is to assess whether the mechanisms predicted in economic theory have gathered substantial empirical support. Moreover, we intend to contribute with an empirical analysis to the study this phenomenon in the context of the European Union and to spark a debate as to the differences in the effect of globalization on two sets of countries, since some of the mechanisms predict different results in more developed and less-developed (developing) countries.

Therefore, Section 2 focuses on a brief literature review, both theoretical and empirical. The theoretical review specifies the concepts and describes the theoretical mechanisms linking (either directly or indirectly) globalization and inequality. The empirical review seeks to compile previous studies and to sum up their conclusions, regarding the validation of the mechanisms in question. Section 3 describes the methodology, detailing the model, the dependent and independent variables, sources of data, as well as the temporal and spatial scope of this study. Section 4 presents and analyzes the results from testing each mechanism. Finally, Section 5 presents the concluding remarks.

2. A brief literature review on the relation between globalization and wage inequality

The concepts

Regarding concepts of globalization and inequality, while we follow an encompassing, multi-variable definition of globalization, we will specifically focus on wage dispersion measures (and not on those related to wealth or disposable income) to capture inequality.

Globalization is not an easily-defined concept, as it includes economic, social and political aspects, all of which are crucial and have impacts on wage determination.

The political dimension is well-illustrated by institutions like the United Nations (UN) and the European Union (EU), examples of a world increasingly interested in working

and finding solutions together. For instance, in the context of the Euro Area (EA), member-states cannot pursue monetary policy decisions individually.

The social components include personal contact between people of different countries and cultural proximity, a reality which is ever more present, for example, through internet use at negligible costs. This makes people around the world to consume similar products and services and, thereby, end up sharing some cultural references with each other, even with people thousands of kilometers away.

Economic globalization will evidently be the facet this work will be most concerned with. It is usually connected with market liberalization, *i.e.*, the process of removal of trade barriers and other "government-imposed restrictions on movements between countries in order to create an open and borderless world economy" (Zhou *et al.,* 2011; p. 2). This increases trade of goods and services across national borders, and leads to higher international capital flows, including Foreign Direct Investment (FDI), which contributes to the fragmentation of the value chain, now spread around a variety of countries.

However, there are also aggregate measures of globalization, such as the already-mentioned KOF Index of Globalization, which measures, through its composite nature, the social and political aspects of globalization as well as the economic ones (Dreher and Gaston, 2008). We will also use these measures to discuss the overall impacts of globalization later on.

The theoretical mechanisms linking globalization and wage inequality

In order to identify the several theoretical mechanisms through which globalization affects wage inequality, we will briefly review some theories that provide a detailed analysis of the impact of international economic relations on income inequality within a country, such as the Hecksher-Ohlin-Stolper-Samuelson theorem (HOSS), the Feenstra-Hanson theorem (FH), and the Skill-Biased Technological Change theory (SBTC).

According to Baldwin (2008), in 1941, Stolper and Samuelson built on the previously published works of Hecksher and Ohlin on trade theory and created what is now referred to as the Hecksher-Ohlin-Stolper-Samuelson theorem (HOSS).

The Hecksher-Ohlin theorem assumes a two-country, two-good and two-factor model, in which both countries have a similar level of technology (arguably, the latter is a feasible assumption, given the increasing dissemination of information and communication

technologies), but each country has relative abundance in one production factor. Trade in goods is the only way through which a country becomes internationally integrated, given that, in this model, production factors cannot move between countries. The HOSS theorem additionally assumes that in autarky both countries produce two goods and use both factors; if they engage in trade, however, each country specializes in the good which uses more intensively the factor that is relatively more abundant in that country (Baldwin, 2008).

According to Baldwin (2008), the contribution of Stolper and Samuelson to this theorem was to take the results by Hecksher and Ohlin on product specialization to conclude, additionally, on the impacts such specialization would have on the relative price of production factors. Taking the two production factors as skilled and unskilled labor, the model predicts that specialization causes relative demand for each factor, to move in opposite ways in the two countries: in the "North" country, which is relatively abundant in skilled labor, the demand for skilled labor would rise while the demand for unskilled labor would fall; in contrast, and symmetrically, in the "South" country, where unskilled labor is more abundant, demand for unskilled labor would rise and demand for skilled labor would fall. Accordingly, this leads to a corresponding rise in the price of the relatively more abundant factor and a decrease in the price of the less abundant factor.

As a result, the HOSS theorem predicts that international trade will cause the wages of skilled workers to rise in the "North" and fall in the "South", while the wages of unskilled workers are expected to rise in the "South" and fall in the "North", leading to higher wage inequality in the "Northern" (more developed) countries and lower wage inequality in the "Southern" (less developed) ones.

Feenstra and Hanson (1997) argue, however, that analyzing only the trade of final goods (as assessed by trade openness) is not enough to account for the effects of globalization on wage inequality. As there is a global value chain that slices the production of final goods into several parts and distributes them across different parts of the globe, it is necessary to analyze the effects of offshoring, measured as Foreign Direct Investment (FDI), specifically that flowing from the "North" to the "South" (in their paper, the countries referred to are the United States and Mexico, respectively). In their model, which we refer to as the Feenstra-Hanson theorem (FH), it is the "Northern" country that offshores a portion of its production to the "South". This portion of the production uses

mostly the skilled workers in the "South", thereby shifting demand from unskilled labor to skilled labor in the "South". However, in the "North", this portion substitutes mostly for the production of unskilled workers, which results in a similar shift: demand for unskilled labor will fall in the "North". This has the effect of increasing wage inequality in both countries: in the "South", by increasing the price of skilled labor, while having no effect on that of unskilled labor; in the "North", by decreasing the price of unskilled labor, while not affecting that of skilled labor.

The Skill-Biased Technological Change theory (SBTC) is also associated with a growing skill premium that "occurs when technical progress increases the total relative demand for skill of the economy (…) for given prices of skilled labour, *H*, and unskilled labour, *L*." (Chusseau *et al.*, 2008; p. 412). According to Chusseau *et al*. (2008), SBTC is usually related to Information and Communication Technologies (ICTs), which have been the fulcrum of technological change since the 1980s. New information technologies are considered to be "more compatible" with high-skilled labor (at least during the adoption phase) and, therefore, in order to make full use of them, the economy must demand relatively more for skilled workers. Barlevy and Tsiddon (2006), in their modeling of earnings inequality, not only consider trend inequality to be mainly influenced by technological change, but also state that there are always workers who are quicker to absorb these new technologies and who become more productive more quickly, citing this as the reason why SBTC is a factor in increasing wage inequality. Mamoon and Murshed (2013; p. 574) also state that "trade flows bring in new technologies and ideas that enhance the productivity of all workers, but especially that of skilled workers", thus bringing about a rise of the skill premium.

There are two possible mechanisms through which SBTC can act: it can be factor-biased or sector-biased. If it is factor-biased, according to Chusseau *et al.* (2008), SBTC appears as a change in the productivity of each factor, skilled and unskilled labor, leading to a higher relative productivity of skilled labor. In the case of a sector bias, Chusseau *et al.* (2008) refer technological change as having no impact on the production function itself (*i.e.*, there is no change in the relative productivity of the factors at the firm-level) but, instead, state that this change is felt more keenly in some sectors than in others. In this case, and according to Chusseau *et al.* (2008), the effects of technological change are assumed to be felt more strongly in those industries which are more skill-intensive. Such

SBTC generates higher factor productivity for skilled labor, not at the individual-firm level, but at the economy level. Depending on which of these aspects is at work, the outcome is either a higher skill premium or higher unemployment among unskilled labor. SBTC is, then, another mechanism through which wage inequality between skilled and unskilled workers may increase.

It is true that it is not as directly linked to globalization as the other mechanisms presented are, but we know that ICTs are one of the features that make globalization possible: ICTs make the world more connected and globalization is the channel which makes technology changes spread quickly across many countries and have the above-mentioned effects on the recipient economies. Even when authors point to SBTC as the main cause of growing inequality, it cannot be neglected that, *e.g.*, trade accelerates the process of technological change, since firms with more contact with international realities have easier access to new technologies or, for instance, when firms begin to export, they also upgrade production techniques which rely more on skilled workers (Krugman, 2008). Goldberg and Pavnick (2007) refer to this relationship as "trade-induced Skill-Biased Technological Change".

The mechanisms described above are the most commonly addressed in the literature attempting to assess how globalization may affect the wage gap. Much of the recent literature is concerned with the effects of globalization as a whole, so it makes sense for these mechanisms to be tested together. However, several other mechanisms link globalization with inequality.

Tang and Wood take co-operation costs, *i.e.*, the "cost of moving know-how around the world" (Wood, 2002; p. 55) into account. This know-how "contributes to production partly by increasing the quantity of output, but mainly by improving its quality" (Wood, 2002; p. 55), *e.g.*, improving factor productivity. The Tang and Wood theory assumes that the workers who have this ability (know-how) and who can transmit it to others are all located in the "North" (these are called "*K*-workers", while all the other workers fall under the denomination of "*L*-workers"). The authors posit that it is cheaper for this transfer of knowledge to happen in the "North", because having *K*-workers working in the "South" involves co-operation costs (the main ones being the extra time spent on work and travel, as well as air fares and hotel bills, though the latter are deemed less significant). Therefore, in order for this transfer to happen in the "South", the *L*-workers

in the “South” (skilled and unskilled) would have to be paid less (Wood, 2002). The authors also conclude that “Northern” *L*-workers have higher salaries than “Southern” *L*-workers, because of their proximity and easy access to *K*-workers, which leads to the relatively higher productivity of their work (Wood, 2002).

Therefore, when co-operation costs fall, as they do with “improvements in travel and communications facilities” (Wood, 2002; p. 56), this will result in: i) increased wages for the *K*-workers because they will be in a position to work with more *L*-workers, as it becomes easier for their involvement to be profitable to “Southern” companies (their access to “Southern” production is now easier); ii) increased wages for the “Southern” *L*-workers, since the scarcity of *K*-work in the “South” is a factor contributing to their lower wages; and iii) decreased wages for the “Northern” *L*-workers, since there will exist relative scarcity of *K*-workers in the “North” (compared to the situation before the shift) and their privileged access to know-how is a factor positively contributing to their relatively higher wages. Accordingly, a reduction in co-operation costs, increases wage disparities in the “North” (more developed countries), while it reduces wage disparities across both “Southern” and “Northern” countries for the *L*-workers (Wood, 2002).

Andersen and Sørensen (2011) make a distinction between the effects of increased international trade on different firms, by splitting them into two sectors: the exporting (tradable) sector and the non-tradable one, with no direct contact with foreign markets. In their model, product market integration squeezes protection rents by making market entry easier for foreign firms. This also affects income inequality across workers: lower profitability in the non-tradable sector leads to lower wages. Instead, in the export sector, workers receive some of the additional benefit from lower trade frictions: firms’ profits are higher and, therefore wages increase.

Gourdon (2011) argues that it is not only “North”-“South” trade which widens wage inequality in less developed countries, but also the recent growth in “South”-“South” trade, itself a consequence of globalization and increased trade between nations. The author presents the richer “Southern” countries (“middle-income countries”) as the “North” amid less developed countries, therefore presenting the mechanism through which wage inequality develops in these countries as just a transposition of HOSS theorem: because these countries are now “the more developed countries” in the equation, the HOSS mechanism will work to widen wage inequality within them. Gourdon (2011)

also refers to sector-biased SBTC as a possible factor in widening inequality within "Southern" countries. He argues that, while "North"-"South" trade leads to higher competition and productivity in low-skill-intensive industries, "South"-"South" trade does the same in medium-skill and high-skill industries, thereby increasing wage inequality within "Southern" countries.

Betrán and Pons (2013) refer, in addition to widening trade and SBTC, "institutional factors" such as the decline in the role of education, the supply of skilled labor and the erosion of labor market institutions, related to a loss of power on behalf of trade unions and a reduction in the minimum wage, this wage having been designed to protect low-wage workers and their earnings, as causes for widening wage inequality. As per Betrán and Pons (2013), low-skilled workers were historically more involved in unions and the main concerns of labor unions were labor conditions and wages. Therefore, it follows that a weakened influence of these institutions would pave the way for higher wage inequality between skilled and unskilled workers. As for education, namely government-provided education, it is the only way of transmitting knowledge in need for a future (or present) worker to update skills which could lead them to a higher-paid job. The authors consider that "the more schooling in appropriate contents the population received, the easier it was to work in skilled and higher paid jobs," (Betrán and Pons, 2013; p. 151) which might reduce wage inequality between skilled and unskilled workers by increasing the supply of skilled workers, and would definitely decrease inequality in a more general sense, by having workers who would otherwise be working in low-paid jobs have the opportunity to do more qualified work.

Furthermore, according to Bertola (2008), while early inequality was mainly related with different capital and land endowments, recent changes in inequality are more related to labor income, and the education is more and more relevant when it comes to which opportunities workers have and how much they earn. On the one hand, wages are not the only relevant variable to measure inequality, but they are an increasingly more important one, since, for instance, initial endowments are now less important than before. On the other hand, however, institutional factors prove to be key influences. Lack of investment in education and the decreasing power of labor unions provide less of a chance for social mobility, which would unambiguously decrease wage inequality.

Review of empirical evidence

There are several different mechanisms working to enhance or offset each other when it comes to the impacts of globalization on wage inequality. The theoretical mechanisms described above are expected to have ambiguous effects on wage inequality, especially when it comes to compare more developed ("North") and less developed ("South") countries. It is then up to empirical works to validate these theories for different countries. In what follows, we review the main conclusions found in empirical studies, testing for the three mechanisms most commonly addressed in the literature: HOSS, FH and SBTC.

HOSS mechanism

This framework has mostly been used to compare countries with each other (Dreher and Gaston, 2008; Elmawazini *et al*., 2013), as well as to analyze regions within countries, more often the US states (Chordokrak and Chintrakarn, 2011) and Chinese regions (Han *et al.*, 2012), although some studies for single countries are also found in the literature (*e.g.*, Matano and Naticchioni, 2010, for Italy; Munshi, 2012, for Bangladesh). In most studies, however, the main focus is not how trade affects countries in relation to each other ("North" *vs.* "South"), but rather on how trade has affected one or a set of countries unilaterally (*i.e.*, belonging either to "North" or "South"). For example, Han *et al.* (2012) test the role of the rising levels of international trade in China, a "labor-abundant developing country", and conclude that they have increased inequality.

Empirical tests of the HOSS mechanism have not given unambiguous, consensual, results. While the predicted effect on more developed countries (a raise in the skill premium) exhibits significant empirical support (Dreher and Gaston, 2008; Matano and Naticchioni, 2010; Chordokrak and Chintakram, 2011), there is also a vast part of the literature which argues that the wage gap, and therefore, inequality, has been on the rise in less developed countries and that international trade is one of the more (if not the most) important factors (Gourdon, 2011; Han *et al.*, 2012; Elmawazini *et al.*, 2013).

Goldberg and Pavnick (2007), in a widely cited study, found that, in the 7 developing countries under analysis (all of which are known for having gone through a major trade policy reshaping between the 1970s and the 1990s), skill premium and, in most cases, consequently, wage inequality increased; this clearly points to a non-validation of the HOSS theorem.

Meschi and Vivarelli (2009) conclude that aggregate trade flows have no impact on wage inequality in developing countries. Yet, when they split trade flows according to their origin and destination (as trade with higher-income is the only one likely to spread new technology and know-how, therefore, to be the one that is truly skill-biased, resulting in a higher skill premium), they find that when "lower-income" countries trade with "middle-income" countries, it does lead to higher income inequality in the former. Trade between "lower-income countries" leads, instead, to lower income inequality. These results do not validate the mechanism, for if we consider lower-income countries to be the "Southern" developing countries and middle-income countries to be the "North" in this dichotomy, trade between them should lead to lower inequality in the lower-income countries.

Similarly, Gourdon (2011) concludes that, for developing countries, trade with other developing countries is even more conducive to an increase in wage inequality than trade with developed countries: "*an increase of 1% in the share of south trade relative to north trade increases inter- industry wage inequality by 0.027%*" (Gourdon, 2011; p. 369). His analysis rests on much the same principles as Meschi and Vivarelli's (2009) -within "Southern" countries, "middle-income" countries corresponds to the "North" and "low-income" countries to the "South"-, yet it does not reach the same conclusion: "South"-"South" trade is more penalizing for the "middle-income" countries, as predicted by the transposition of the HOSS mechanism.

Khalifa (2014) also provides evidence for the HOS theorem within developing countries, going further to prove that there is a "skill-abundance threshold", above which a country's skill premium is increased by trade with countries with lower skills.

Other works focusing on OECD countries, however, (for instance, OECD, 2011), suggest that trade has no significant role in affecting wage inequality. Krugman's (2008) review of empirical literature on how US trade with developing countries had affected the country's skill premium also shows a modest effect.

Table 1, below, summarizes some of the most important studies focusing on the effects of international trade on several wage inequality measures. The table details the sample and methodology of each study and the validation (or not) of the HOSS mechanism (last column); empirical results on the latter are decidedly mixed.

Table 1 - Testing the HOSS mechanism

Authors	Sample	Mechanism validation?
Goldberg and Pavnick (2007)	7 developing countries; 21 country-decade observation (1970s, 1980s, 1990s)	NO
Bertola (2008)	14 countries (11 European countries, Japan, Mexico, USA); 1970-2000	NO
Dreher and Gaston (2008)	100 countries (24 OECD; 76 Non-OECD); 1970-2000	YES for OECD; NO for non-OECD
Meschi and Vivarelli (2009)	65 developing countries; 1980-1999	NO
Matano and Naticchioni (2010)	Italy; 199-2002	YES
Chordokrak and Chintrakarn (2011)	48 US States; 1988-2003	NO
Gourdon (2011)	67 developing countries; 1976-2000	YES
Han *et al.* (2012)	6 Chinese regions; 1988-2008	NO
Munshi (2012)	Bangladesh; 1975-2002	YES
Elmawazini *et al.*(2013)	8 South-East Europe and CIS countries; 1992-2007	NO
Khalifa (2014)	25 developing countries; 1980-2000	YES
Baek and Shi (2016)	78 developed and developing countries; 1990-2010	NO for developed; YES for developing
D'Elia and De Santis (2019)	35 OECD countries; 1995-2016	YES for lower-middle income

FH mechanism

This mechanism and ensuing predictions find a strong support in recent empirical literature on the effects of globalization on wage inequality. Indeed, FDI is widely regarded as being a very significant part of the economic dimension of globalization, establishing interactions between developed and developing countries. Several studies find a positive relation between the rise of FDI outflow levels in developed countries and rising inequality (OECD, 2011), while others report a link between growing FDI inflow levels and rising inequality in developing countries (Chen *et al.,* 2011; Figini and Görg, 2011), even as they credit FDI with fostering economic growth in these countries.

Choi (2006) finds that FDI has the effect of raising inequality in all the 119 (developed and developing) analyzed countries, with a special emphasis given to outward FDI, which turned out to have a more pronounced effect on income equality.

In his analysis of "South"-"South" relations and of their impact on inequality in developing countries, Gourdon (2011) also concludes that increasing inflows of FDI do tend to increase wage inequality, since FDI mainly occurs in more skill-intensive sectors. This seems to be a concern only in "upper-middle income countries", *i.e.*, in the richer "Southern" countries, "*where FDI is more important and where skilled labor is more present*" (Gourdon, 2011; p. 369).

Figini and Görg (2011), however, also find that inward FDI has the effect of decreasing wage inequality in developed countries. This does not necessarily go against the FH mechanism, since the effects of inward FDI on developed countries are not predicted by the theory. Chordokrak and Chintrakarn (2011), however, find that, in the US, inward FDI contributes to a rise in wage inequality.

Similarly, Çelik and Basdas (2010) find that FDI inflows contribute to greater equality both in developed and developing countries. However, when they analyze the Asian "miracle countries", they find that inequality rises along with these inflows.

Table 2, below, summarizes the most important studies focusing on the effects of FDI on several inequality measures. From the table details the validation (or not) of the FH mechanism, we conclude that, again, the results are rather mixed.

Table 2 - Testing the FH mechanism

Authors	Sample	Mechanism validation?
Choi (2006)	119 countries; 1993-2002	YES
Çelik and Basdas (2010)	16 countries (5 developed;5 developing;6 Asian "miracle countries"); 1995-2007	NO
Chen *et al.* (2011)	China; 1998-2007	YES
Chordokrak and Chintrakarn (2011)	48 US States; 1988-2003	YES
Figini and Görg (2011)	103 countries (34 OECD; 69 non-OECD); 1980-2002	NO
Gourdon (2011)	67 developing countries; 1976-2000	NO
OECD (2011)	34 OECD countries; 1975-2010	NO
Tomohara and Yokota (2011)	Thailand; 1999-2003	YES
Elmawazini *et al.*(2013)	8 South-East Europe and CIS countries; 1992-2007	YES
Franco and Gerussi (2013)	17 transition economies; 1990-2006	NO
Rivera and Castro (2013)	13 Latin America countries; 1978-2000	YES

Mihaylova (2015)	10 Eastern and Central European countries	NO
Erauskin and Turnovsky (2019)	96 developed and developing countries	YES

SBTC mechanism

Chusseau *et al.* (2008) have done an extensive literature review of empirical studies trying to conclude whether "North"-"South" trade or SBTC are the main factors in growing wage inequality. They conclude that, from initial studies trying to isolate one "guilty party" of growing inequality, both theoretical and empirical literature have evolved towards more complex frameworks and that it is not possible to completely extricate the effects of these mechanisms from one another: they are both conducive to higher wage inequality across countries.

Gourdon (2011) proves that when technological change is geared towards unskilled-labor intensive sectors, "*it decreases wage inequality across industries, for all groups of countries, although it is not significant for upper-middle income countries*" (Gourdon, 2011; p. 370). The issue then happens when technological change is skill-biased, as the title suggests, it is not necessarily a problem of technological advancement in itself.

Almeida and Afonso (2010), using a sample of 25 OECD countries, analyze the relative influence of SBTC and international trade on the wage premium. Even though its relative importance depends on which wage inequality measure the authors use (the effect of SBTC is felt more keenly when the authors use the wage ratio of college graduates to lower-secondary graduates as opposed to the ratio of earnings of college graduates to upper-secondary graduates), SBTC is always a key factor in increasing wage inequality, especially in developed countries.

Esposito and Stehrer (2008), analyzing "transitional economies" (economies in the process of switching from central-planning to a capitalist economic system), namely the Czech Republic, Hungary and Poland, conclude that "*the concentration of SBTC in skill intensive industries explains part of the rise in the skill premium*" (Esposito and Stehrer, 2008; p. 363) in these countries, validating the importance of SBTC in rising wage inequality.

Mamoon and Murshed (2013) argue that, while an initial greater stock of skilled labor causes trade openness to have the effect of diminishing equality in developing countries,

after trade liberalization higher education levels accrued might lead to higher inequality. They suggest that developing countries should invest in primary and secondary education, and not focus only on higher education, since this would bridge the skill gap and lead to greater equality.

Haskel and Slughter (2002) conclude that sector-biased SBTC, rather than factor-biased SBTC, has a more pronounced effect on skill premia: when the technological change takes place in skill-intensive sectors, the skill premium rises and, conversely, when it takes place in unskilled-intensive sectors, it falls.

Results summarized in Table 3, below, show clear support in favor of the SBTC mechanism.

Table 2 – Testing the SBTC mechanism

Authors	Sample	Mechanism validation?
Haskel and Slaughter (2002)	10 OECD countries; 1970s and 1980s	YES
Esposito and Stehrer (2008)	3 European transitional economies; 1995-2003	YES
Almeida and Afonso (2010)	25 OECD countries; 1997-2006	YES
Gourdon (2011)	67 developing countries; 1976-2000	YES
Mamoon and Murshed (2013)	108 developing countries; 1990s	YES

As we can see, economic literature is not unanimous on the impacts of globalization on inequality, even as it takes the overall benefits of globalization as a given. The relationship between globalization and wage inequality is a multi-faceted one, as the variety of mechanisms described above can attest. Hence, we propose to test these mechanisms ourselves using the methodology detailed in the next section.

3. Methodology and data

The sample

Our sample is comprised of the 28 member-states of the European Union (EU) as of 2019. It is our contention that we can, within the universe of the EU, distinguish between countries which are the intra-EU equivalent to "North" and "South" countries, since these definitions are intrinsically comparative.

The "South" sample is comprised of the EU-countries with average (2000-2011) GDP *per capita* (PPP constant 2011) below 30 thousand international dollars (data in Table

A.1, in Annex, taken from the World Bank databank[1]), or that joined the EU from 2004 onwards. This group of includes 15 countries: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovak Republic and Slovenia.

The "North" countries are the remaining 13 countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden and the United Kingdom.

As regards time dimension, we use data covering the period between 1970 and 2007. Smaller time-horizons are defined, due to data restrictions, when testing the HOSS and SBTC mechanisms (1993-2007 and 1982-2007, respectively). We have decided to end the sample period in 2007 in order to avoid possible biases that may occur due to the recent global economic and financial crisis (the Great Recession), and also the sovereign debt crisis which affected some European countries.

The model

We propose a general panel data model, using the two samples and covering for the period detailed above. The model general specification can be represented as follows:

$$T_{it} = C_i + \delta_t + \beta X_{it} + u_{it}\,, \qquad (1)$$

with *t = 1970, …, 2007*, and applied to two samples of countries, the 13 "North" countries and the 15 "South" countries (subscript *i*).

The dependent variable, *T*, is the *Theil index* of industrial wage inequality, widely used in the related empirical literature, extracted from a database put together by the University of Texas Inequality Project and based on United Nations Industrial Development Organization (UNIDO) data. We chose this variable instead of the also widely used Gini index because it focuses on actual earned income, instead of overall disposable income, and a wage inequality measure seems to be more adequate to test the alternative theoretical predictions outlined in the previous section.

The Theil's t-statistic (*T*) of industrial pay inequality is computed as:

[1] http://databank.worldbank.org/data/home.aspx.

$$T = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{x_i}{\bar{x}} \cdot ln\frac{x_i}{\bar{x}}\right), \quad (2)$$

where x_i is the income of each individual i, $\bar{x}$ is the average income of the group, and N is the total number of individuals. As T is a measure of entropy, the index measures the disorder in a system: therefore, equality is at its peak when Theil = 0. The higher the index is, the higher the inequality within whichever population is under scrutiny.

Matrix X includes the independent variables, while u is the vector of error terms. Independent variables are used with a period lag since it is reasonable to expect that impacts on inequality are not of a contemporaneous nature.

We use several independent variables related to the alternative dimensions of globalization. *Trade Openness* is our chosen measure of international trade, which we use to test the HOSS mechanism; it is defined as the sum of exports and imports of goods and services in percentage of the country's gross domestic product (GDP). *FDI inflows* and *FDI outflows* (in percentage of GDP) are used to test the FH mechanism. Finally, the percentage of *High Tech Exports* in total manufactured exports and the percentage of *Gross Expenditure in Research and Development* over GDP (*GERD*) are chosen proxies to capture whether the country is technologically advanced (thus testing the SBTC mechanism). *High-tech exports* are defined as exports of products with high R&D intensity (like computers, scientific instruments, etc.) and *Expenditure on Research and Development* refers to how much is currently being spent (including both public and private expenditures) on developing the country's production processes, as a proxy of the technological level of a country, which is presumably a result of how much is being spent to develop it.

We also control for other aspects of globalization using broader measures of globalization. In particular, we use the aggregate *KOF Globalization Index*, a composite index measuring globalization, which includes, besides economic, also social and political aspects of globalization. Specifically, the index is divided into three sections: section A combines several indicators to capture economic globalization, and sections B and C capture, respectively, the social and political aspects of the phenomenon. More detailed information can be found in Table A.2, in Annex.

Moreover, we want to control for several explanatory variables. Trade *Union Density* is used to measure the degree to which labor institutions at work within each country affect wage inequality. Unions are expected to reduce wage inequality, as described by Betrán and Pons (2013), and as referred in the previous section. *Rate of Lower Secondary Education Completion* is used as a measure of the stock of human capital. We use secondary education completion levels and not those of higher education, because "*there is some evidence that secondary education is more important in alleviating wage inequality than higher levels of education*" (Mamoon and Murshed, 2013; p. 577). Finally, in order to capture the level of development, we control for the *lnGDP per capita*, as used for instance by Milanovic and Squire (2007) and Afonso *et al.* (2008.)

Table 4, below, provides the reader with a summary of the data sources used. The period intervals describe the earliest and latest year for which we have data. There are some gaps, especially in the "South" sample.

Table 4 – Data sources

Variable	Period	Source
Theil	1970-2007	TIP-UNIDO database[2]
Trade Openness	1970-2007	World Bank databank[3]
FDI Inflows	1970-2007	United Nations Conference on Trade and Development[4]
FDI Outflows	1970-2007	United Nations Conference on Trade and Development
High Tech Exports	1988-2007	World Bank databank
GERD	"North": 1981-2007 "South": 1996-2007	OECD database[5] World Bank databank
KOF Globalization Index	1970-2007	Swiss Federal Institute of Technology[6]
lnGDP	1970-2007	World Bank databank data
Secondary Education Completion	1992-2007	Eurostat[7]
Union Density	1970-2007	ICTWSS[8]
Theil	1970-2007	TIP-UNIDO database
Trade Openness	1970-2007	World Bank databank
FDI Inflows	1970-2007	United Nations Conference on Trade and Development

[2] http://utip.gov.utexas.edu/.
[3] http://databank.worldbank.org/data/home.aspx.
[4] http://unctad.org/en/pages/Statistics.aspx.
[5] http://oecd-ilibrary.org.
[6] http://globalization.kof.ethz.ch/.
[7] http//ec.europa.eu/Eurostat.
[8] http://www.uva-aias.net/208.

FDI Outflows	1970-2007	United Nations Conference on Trade and Development
High Tech Exports	1988-2007	World Bank databank
GERD	"North": 1981-2007 "South": 1996-2007	OECD databaseWorld Bank databank
KOF Globalization Index	1970-2007	Swiss Federal Institute of Technology
lnGDP	1970-2007	World Bank databank data
Secondary Education Completion	1992-2007	Eurostat
Union Density	1970-2007	ICTWSS

Choosing between fixed and random effects

Since both samples are comprised solely of EU countries, and therefore are not taken from a random sample, we conjecture that the general form is a fixed-effects model rather than a random-effects model. In order to confirm our conjecture, we run the Hausman test; as an example, results are shown in Table 5 for the case of the regression testing All Effects (of globalization) on inequality.

Table 5 - Hausman test for the All Effects regression

	"North"			***"South"***		
	Chi-Sq. Statistic	*Chi-Sq. d.f.*	*Prob.*	*Chi-Sq. Statistic*	*Chi-Sq. d.f.*	*Prob.*
Cross-section random	131.135261	8	0.0000	21.731477	8	0.0054

The results on the Hausman test point towards a rejection of the null hypothesis (which would lead us to a random-effects model). Although reported results apply to the regression testing all the mechanisms together (see regression in Table 19, in section 4, below), similar results were robust for the other regressions.

In addition, we perform the Redundant Fixed Effects tests as to assess the presence of either cross-section or period fixed effects or both; detailed results are shown below, in Table 6, also for the case of the regression including all mechanisms (see regression in Table 19, in section 4, below).

Table 6 – Test for cross-section and period fixed effects for the All Effects regression

	"North"			*"South"*		
Redundant Fixed Effects Tests	*Statistic*	*d.f.*	*Prob.*	*Statistic*	*d.f.*	*Prob.*
Cross-section F	47.149318	(12,205)	0.0000	15.803030	(12,63)	0.0000
Cross-section Chi-square	332.426495	12	0.0000	130.548744	12	0.0000
Period F	0.996445	(25,205)	0.4735	0.550114	(10,63)	0.8476
Period F Chi-square	28.785393	25	0.2730	7.869271	10	0.6416
Cross-section/Period F	16.227127	(37,205)	0.0000	9.255068	(22,63)	0.0000
Cross-section/Period Chi-square	343.451750	37	0.0000	135.609836	22	0.0000

As we can see from the results in Table 6 above, cross-sections fixed effects are found in both these samples, with *p-values* for both samples being well below 10%. Period fixed effects are clearly rejected. Cross-section/period fixed effects are also significant but we can assume these are derived from the results on cross-section effects. Since the presence of cross-section effects is robust, and given the comparability of results between samples and the better underlying overall adjustment, we estimate the model considering solely cross-section fixed effects.

Expected effects of globalization on the Theil Index

Table 7, below, shows the expected effects of each of the globalization-related variables on the *Theil Index*, according to the theories reviewed above.

Table 7 – Theory-based expected effects of globalization on the Theil Index

Variable	Trade Openness	FDI Inflows	FDI Outflows	High Tech Exports	GERD
Mechanism	**HOSS**	**FH**		**SBTC**	
Expected Effect on Theil Index ("North" countries)	(+)	•	(+)	(+)	(+)
Expected Effect on Theil Index ("South" countries)	(-)	(+)	•	(+)	(+)

Most of these variables, in theory, are positively correlated to inequality. Therefore, we are expecting a positive signal on all instances, except when it comes to the influence of trade in the "South" sample.

4. Analysis of results

Overview of wage inequality and trade patterns in the EU

In what follows we propose a brief look at the trends for the chosen inequality variable – *Theil index* of industrial pay inequality. Tables 8 and 9, below, report the (percent) change in the *Theil index* for the period from 1970 to 2007 for the "North" and "South" subsamples, respectively.[9]

Table 8 - Theil Index Evolution - "North"

	1970-1980	1980-1990	1990-2000	2000-2007	1970-2007
Austria	-12%	**22%**	**11%**	-19%	-3%
Belgium	**39%**	-12%	-4%	**26%**	**49%**
Denmark	**9%**	**8%**	**36%**	**4%**	**68%**
Finland	-28%	-7%	**2%**	**40%**	-4%
France	-3%[1]	-7%	**37%**	-9%	**12%**
Germany	-10%	-1%	**2%**[2]	-	-10%[4]
Ireland	**4%**	**22%**	-53%	**25%**	-26%
Italy	-70%	**23%**	**68%**	-16%	-47%
Luxembourg	-20%	**29%**	-29%	**120%**	**62%**
Netherlands	-50%	**33%**	**10%**	**7%**[3]	-22%[5]
Spain	-55%	**41%**	**15%**	-36%	-53%
Sweden	-36%	-1%	**29%**	-	-18%[6]
United Kingdom	-7%	**42%**	**17%**	-27%	**13%**

Notes: (1) Values in bold represent increases in wage inequality.
(2) In some cases, data was not available for all years. Check superscript: 1. 1977-1979; 2. 1990-1992; 3. 2000-2005; 4.1970-1992; 5. 1970-2005; 1970-2000.
(3) Source: University of Texas Inequality Project – based on UNIDO data.

The literature seems to take as granted the fact that inequality is growing. In the "North" sample, the most obvious rising trend in the inequality numbers occurred during the 80s and the 90s. Overall, between 1970 and 2007, only five countries (Belgium, Denmark, France, Luxembourg and the United Kingdom) out of our sample of 13 had a rise in inequality but, as we can see, the fluctuations in-between these years were numerous and affected all countries of the sample. We can also conclude, however, with the help of the descriptive statistics presented in Table A.3 in Annex, that the difference between minimum and maximum values is not very large (0.042).

[9] In our panel analysis, below, we will not be able to use such a long span due to data restrictions on other variables.

Table 9 - Theil Index Evolution - "South"

	1970-1980	1980-1990	1990-2000	2000-2007	1970-2007
Bulgaria	**48%**	-29%	**1223%**	-7%	**1183%**
Croatia	-	**164%**[2]	**14%**	-1%	**197%**[13]
Cyprus	-7%	-27%	-45%	-42%	-79%
Czech Republic	-	-25%[3]	**375%**	-22%	**176%**[14]
Estonia	-	-	-	-7%	-7%[15]
Greece	**29%**	-4%	-15%[6]	-13%[11]	**23%**
Hungary	-53%	**202%**	**183%**	**39%**	**459%**
Latvia	-	-	-73%[7]	**1%**	-72%[16]
Lithuania	-	-	**262%**[8]	-30%	**152%**[17]
Malta	-43%	**8%**	**160%**	**48%**	**136%**
Poland	**10%**	**45%**	**201%**	0%	**379%**
Portugal	**22%**[1]	**43%**[4]	-2%[9]	-14%[12]	**87%**[18]
Romania	-	-	**906%**	-1%	**894%**[19]
Slovak Republic	-	-	**71%**[10]	**16%**	**98%**[20]
Slovenia	-	**189%**[5]	**55%**	**62%**	**625%**[21]

Notes: (1) Values in bold represent increase in wage inequality.
(2) In some cases, data was not available for all years. Check superscript: 1. 1973-1980; 2. 1986-1990; 3. 1987-1990; 4. 1980-1987; 5. 1987-1990; 6. 1990-1998; 7. 1993-2000; 8. 1992-2000; 9. 1994-2000; 10. 1991-2000; 11. 2003-2007; 12. 2005-2007; 13. 1986-2007; 14. 1987-2007; 15. 2000-2007; 16. 1993-2007; 17. 1992-2007; 18. 1973-2007; 19. 1990-2007; 20. 1991-2007; 21. 1987-2007.
(3) Source: University of Texas Inequality Project – based on UNIDO data.

In the "South" sample, we can see that inequality rises substantially by more than in the "North" sample. Between 1970 and 2007, only Cyprus displays a falling trend in inequality. In Bulgaria, the rise between 1970 and 2007 has been of over 1,000%, with many of the other countries also exhibiting rises of over 100%. The difference between maximum and minimum values is also noticeably higher than in the "North" sample, roughly of 0.071 (Table A.3 in Annex). As for the standard deviation, the value in the "South" sample is more than the double of that observed for the "North" sample (0.015526 *vs*. 0.007082).

As we can see, the countries in the "South" sample clearly exhibit a very different pattern from the ones in the "North" sample. This motivates us to study them separately.

Regarding economic integration, and focusing on trade, it is widely known that the EU countries trade mostly with EU counterparts. As we can see in Table 10, below, the importance of intra-EU trade is obvious and present in both samples, although the averages are slightly higher in the "South" sample. This clearly motivates an assessment of the HOSS mechanism within the EU countries.

Table 10 - Main Trading Partners

"North"	% of Intra-EU in Total Exports	% of intra-EU in Total Imports	"South"	% of Intra-EU in Total Exports	% of intra-EU in Total Imports
Austria	74%	80%	**Bulgaria**	61%	58%
Belgium	76%	71%	**Croatia**	63%	66%
Denmark	69%	72%	**Cyprus**	65%	66%
Finland	59%	66%	**Czech Republic**	86%	77%
France	64%	69%	**Estonia**	76%	74%
Germany	64%	65%	**Greece**	62%	59%
Ireland	63%	67%	**Hungary**	82%	68%
Italy	61%	60%	**Latvia**	74%	76%
Luxembourg	88%	78%	**Lithuania**	66%	59%
The Netherlands	80%	51%	**Malta**	46%	71%
Spain	72%	65%	**Poland**	80%	72%
Sweden	59%	70%	**Portugal**	79%	77%
United Kingdom	58%	53%	**Romania**	73%	69%
			Slovakia	88%	74%
			Slovenia	78%	79%
Average	**68%**	**67%**	**Average**	**72%**	**70%**

Notes: (1) Average between 1999 and 2011.
(2) Source: Eurostat.

Testing the HOSS mechanism

We attempted to test the HOSS mechanism by first running the regression using the data for the two samples separately (see results in Table 11). Since we have data restrictions, time horizon covers the period from 1993 to 2007.

Table 11 - HOSS mechanism

	"North"	***"South"***
Trade Openness (-1)	*** 0.006675* *(2.136902)*	*0.005796* *(1.128539)*
Rate of Secondary Education Completion (-1)	*** 0.024144* *(2.098978)*	** -0.070628* *(-2.726026)*
lnGDP (-1)	*-0.003748* *(-0.831207)*	*-0.007056* *(-0.962291)*
KOF B (-1)	** 0.000345* *(3.715705)*	*-9.66E-05* *(-0.450457)*
KOF C (-1)	*** 0.019274* *(2.121034)*	*5.71E-05* *(0.412475)*
No. of Countries	12	15
No. of Observations	141	134
Adjusted R-squared	0.844348	0.865888
F-statistic	48.46517	46.19535
Prob (F-statistic)	0.000000	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

The model exhibits a high value for the adjusted *R-squared*, and the low probability value attached to the *F-statistic* confirms that the estimated relation is, overall, significant.

As mentioned in the previous sections, from our inspection, lagged variables deliver more significance than non-lagged variables, suggesting that the effect of these variables on inequality happens with some delay. This is why we used lagged explanatory variables in this, and most, regressions.

We did not use the Trade Union Density control variable because it exhibits a correlation of over 60% with the *lnGDP* variable in the case of the "North" sample.[10] This correlation does not exist in the "South" sample but we decided to preserve the same regressors in both samples.

We find that trade is only statistically significant in the "North" sample. It exhibits a positive coefficient, consistent with the expected results of HOSS mechanism, at least concerning higher-income countries. However, *Trade Openness* is not statistically different from zero for the "South" sample. Thus, trade does not affect negatively inequality in the "South" countries, as predicted by the HOSS theorem.

Moreover, we applied the same model to the whole sample, including a dummy variable to differentiate between "North" and "South" countries (D = 1 if "South" country). Regression is run including both *X* and *X*D* as regressors. The results are shown in Table 12, below:

Table 12 - HOS mechanism (with dummy variable)

	Both samples	***"South" (additional effect)***
Trade Openness (-1)	*** 0.007781* *(2.119852)*	*-0.001985* *(-0.334770)*
Rate of Secondary Education Completion (-1)	**** 0.022134* *(1.787853)*	** -0.092761* *-3.253050*
lnGDP (-1)	*0.006554* *(1.315597)*	*-0.013610* *(-1.544288)*
KOF B (-1)	*-7.27E-05* *(-0.648666)*	*-2.38E-05* *(-0.099204)*
KOF C (-1)	** -0.000523* *(-2.737605)*	** 0.000580* *(2.465792)*

[10] Tables with correlations between variables are available upon request.

No. of Countries	27
No. of Observations	275
Adjusted R-squared	0.905451
F-statistic	73.88763
Prob (F-statistic)	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

The results of the regression presented in Table 12 generally confirm those of Table 11 for the "North" sample. For the entire sample, developed countries, *Trade Openness* is statistically significant and has a positive coefficient, lending support to HOSS theorem. "South" countries (for which D=1) do not exhibit significant different results from average.

Testing the FH mechanism

Table 13 shows the estimation testing for the validity of the FH mechanism, using two separate samples: "North" and "South". Given data availability, the time-horizon covers now from 1971 to 2007.

Table 13 - FH Mechanism

	"North"	***"South"***
FDI Inflows (-1)	*** *-0.004518* *(-1.688980)*	*0.001011* *(0.077812)*
FDI Outflows (-1)	*0.001709* *(0.363017)*	* *-0.142045* *(-2.735529)*
Union Density (-1)	*-0.002721* *(-1.138774)*	** *-0.023186* *(-2.358218)*
KOF B (-1)	* *0.003047* *(2.062695)*	** *0.000270* *(2.307672)*
KOF C (-1)	* *0.005395* *(2.398646)*	*0.000144* *(1.308143)*
No. of Countries	13	13
No. of Observations	363	146
Adjusted R-squared	0.868778	0.799528
F-statistic	141.9818	35.01727
Prob (F-statistic)	0.000000	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

Both regressions exhibit a fairly good fit and the regressors are overall significant.

In this case, we used the *Union Density* control variable and therefore could not use *lnGDP* because they exhibit high correlation in the "North" sample (see footnote 14) and

the use of the former produces a better overall adjustment. We did not use the Rate of Secondary Completion as the regression works better without it, *i.e.*, there is an improvement in the significance of the relevant independent variables without it.

In order to test the FH mechanism, we used both the inflows and outflows of Foreign Direct Investment, as detailed previously. In the "North" sample, only the *FDI Inflows* are statistically significant: *FDI Inflows* reduce wage inequality. According to our results, *FDI outflows* in the "North" countries have no impact on inequality.

As for the "South" sample, the results are symmetrical. *FDI Inflows* are non-significant while *FDI Outflows* are highly significant (1%) and exhibit a negative coefficient: when the level of *FDI Outflows* rises, wage inequality decreases.

These results are tricky because they are not aligned with the theory: the FH mechanism predicts a positive coefficient for *FDI Outflows* in developed countries and a negative coefficient for *FDI Inflows* in developing countries. All we can say is that FDI does have an effect on within-country inequality in the EU, even though we cannot conclude for the relations predicted by the FH theorem. Nevertheless, the study by Figini and Görg (2011) exhibits results similar to ours: they also found that growing inward FDI contributed to lower wage inequality in developed countries.

Similarly, as with the HOSS mechanism, we test the FH mechanism using the whole sample, but also including as regressors the product of a dummy variable (D=1 for the "South" countries) with the original variables. In this case, both *lnGDP* and *Trade Union Density* can be used as regressors since correlation is low (see footnote 14). The results are detailed in Table 14.

Table 14 - FH Mechanism (with dummy variable)

	Both samples	***"South" (additional effect)***
FDI Inflows (-1)	*-0.003160* *(-1.474722)*	*0.004330* *(0.352639)*
FDI Outflows (-1)	**** 0.009924* *(1.903848)*	** -0.122637* *(-2.632643)*
lnGDP (-1)	** -0.008509* *(-4.985451)*	*0.003240* *(0.355762)*
Union Density (-1)	*-0.003192* *(-1.506506)*	*** -0.030059* *(-2.245729)*
KOF B (-1)	** 0.000140* *(5.978497)*	*-2.90E-05* *(-0.216369)*
KOF C (-1)	*** 0.000118*	*0.000112*

	(2.577466)	*(0.792496)*
No. of Countries	26	
No. of Observations	503	
Adjusted R-squared	0.884936	
F-statistic	105.3457	
Prob (F-statistic)	0.000000	

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

The results of the regression including the "South" dummy are not entirely concordant with our previous results, in what concerns the "North" sample since *FDI inflows* are shown not to be statistically significant.

FDI outflows, on the other hand, are statistically significant on average and have a positive coefficient (in accordance to FH theory for developed countries), but are shown to have a negative coefficient for the "South" sample, confirming the results shown in Table 13, above, for the "South" sample.

Testing the SBTC mechanism

In Table 15, below, we report the results for the test of the SBTC mechanism using the two separate samples and considering the share of *High Tech Exports* on overall manufactures exports as the relevant explanatory variable. Period data refers to 1993-2007.

Table 15 - SBTC Mechanism

	"North"	***"South"***
High Tech Exports	**** -0.015942* *(-1.769203)*	*-0.017073* *(-1.641096)*
lnGDP (-1)	**** -0.006347* *(-1.666036)*	*-0.004586* *(-0.679597)*
Rate of Secondary Completion (-1)	*** 0.024587* *(2.082222)*	** -0.073174* *(-2.924495)*
KOF B (-1)	** 0.000464* *(4.716347)*	*-8.69E-05* *(-0.412935)*
KOF C (-1)	** 0.000226* *(3.331300)*	*7.39E-05* *(0.519641)*
No. of Countries	12	15
No. of Observations	137	134
Adjusted R-squared	0.852245	0.866380
F-statistic	50.02764	46.38747
Prob (F-statistic)	0.000000	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

The quality of the regression is high, similarly to the previous ones. The percentage of *High Tech Exports* over GDP is statistically significant in the "North", exhibiting a negative coefficient. Therefore, in the "North", technological change seems to have a negative effect on inequality, suggesting that, perhaps in this case, it does *not* work, as the theory states, skill-biased. Could it be that a higher level of investment in high-tech industries is benefitting the lower-skilled, lower-wage workers as much as, or indeed more than, highly-skilled workers?

In order to achieve a more robust result, we estimated, as before, the same equation using the whole sample and including, additionally, the cross products of a dummy (D=1 for the "South" countries) with all the remaining regressors. Results are presented below in table 16:

Table 16 - SBTC mechanism (with dummy variable)

	Both samples	***"South" (additional effect)***
High Tech Exports	*-0.007352* *(-0.785818)*	*-0.009721* *(-0.697635)*
lnGDP (-1)	*0.004990* *(0.971211)*	*-0.009576* *(-1.134376)*
Rate of Secondary Completion (-1)	**** 0.024739* *(1.812170)*	** -0.097913* *(-3.454852)*
KOF B (-1)	*3.28E-05* *(0.273902)*	*-0.000120* *(-0.497133)*
KOF C (-1)	**** -0.000419* *(-1.958056)*	**** 0.000493* *(1.922991)*
No. of Countries	27	
No. of Observations	271	
Adjusted R-squared	0.905064	
F-statistic	72.50038	
Prob (F-statistic)	0.000000	

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

The results in this regression do not show the variable *High Tech Exports* to be statistically significant for the average sample; this may be because of the non-significance in the "South" sample found in the previous table.

In Table 17, below, we test the SBTC mechanism using an alternative variable for technology-enhanced production, GERD. Time horizon covers 1982-2007.

Table 17 - SBTC mechanism (with GERD)

	"North"	*"South"*
GERD (-1)	****0.000698* *(1.679838)*	*0.000142* *(0.031117)*
lnGDP	**-0.008371* *(-5.071339)*	*0.002890* *(0.416872)*
KOF B (-1)	**0.000199* *(5.961419)*	*-8.52E-05* *(-0.365294)*
KOF C (-1)	**4.90E-05* *(1.716381)*	*0.000190* *(1.407856)*
No. of Countries	13	15
No. of Observations	267	142
Adjusted R-squared	0.849686	0.841544
F-statistic	94.97688	42.60205
Prob (F-statistic)	0.000000	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

We did not use the *Rate of Secondary Education Completion* as it exhibits a high correlation with our explanatory variable in the "North" (see footnote 14). *lnGDP* worked better in this particular regression, which is why we used it.

GERD is significant only for the "North". It exhibits a positive coefficient, meaning that a higher level of GERD makes wage inequality to rise in these countries. This is in accordance to the theory, which says that technological progress is skill-biased and will therefore create higher demand for skilled workers, raising the skill wage-premium. Using the "South" sample, our results show that technology appears to be neutral for the relative demand of skilled *vs*. unskilled workers.

As with the previous regressions, we assess the effect of GERD in wage inequality considering the whole sample, with a dummy identifying the "South" countries. We show the results in table 18, below.

Table 18 - SBTC mechanism (with GERD and dummy variable)

	Both samples	***"South" (additional effect)***
GERD (-1)	*0.000359* *(0.851697)*	*-0.000218* *(-0.048772)*
lnGDP	** -0.008527* *(-5.772888)*	**** 0.011417* *(1.650851)*
KOF B (-1)	** 0.000178* *(6.072852)*	*-0.000263* *(-1.148240)*
KOF C (-1)	*** 0.000113* *(2.062490)*	*7.70E-05* *(0.540493)*
No. of Countries	28	
No. of Observations	409	

Adjusted R-squared	0.905882
F-statistic	113.1991
Prob (F-statistic)	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

Using this method, the GERD variable does not appear to be significant, possibly because of non-significance for the "South" sample as recorded before.

Testing all mechanisms

Economic aspects of globalization

In order to achieve more robust results, we also test all mechanisms using the same regression. We tested both samples separately, as well as together with a dummy variable, and used, alternatively, *High Tech Exports* and *GERD* as to capture the SBTC mechanism. We present the results in tables 19 and 20, below.

Table 19 - All Effects (with *High Tech Exports*)

	"North"	***"South"***
Trade Openness (-1)	*0.000113* *(0.044303)*	** 0.022746* *(4.037305)*
FDI Inflows (-1)	**** -0.006685* *(-1.957685)*	*0.007885* *(0.703472)*
FDI Outflows (-1)	*-0.002998* *(-0.606800)*	** -0.129298* *(-2.643481)*
High Tech Exports (-1)	**** 0.010906* *(1.859956)*	*0.004778* *(0.219671)*
LnGDP (-1)	** -0.011119* *(-6.750797)*	**** -0.010055* *(-2.355079)*
KOF B (-1)	** 0.000219* *(3.708790)*	*** 0.000211* *(1.974399)*
KOF C (-1)	** 7.15E-05* *(1.837760)*	** 0.000254* *(3.417030)*
No. of Countries	13	15
No. of Observations	188	200
Adjusted R-squared	0.926365	0.794808
F-statistic	124.8184	37.70593
Prob (F-statistic)	0.000000	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

These regressions also exhibit high *adjusted R-squared* values, as well as very low *F-statistic* probabilities, indicating that the regressions, thus the relation between the variables, are significant.

Table 20 - All Effects (with GERD)

	"North"	*"South"*
Trade Openness (-1)	*** 0.003775* *(2.135412)*	**** 0.012064* *(1.910978)*
FDI Inflows (-1)	** -0.006780* *(-2.909496)*	*-0.002510* *(-0.198470)*
FDI Outflows (-1)	*0.000808* *(0.172516)*	**** -0.076907* *(-1.977)*
GERD (-1)	*** 0.000948* *(2.532222)*	*0.002328* *(-0.351086)*
lnGDP (-1)	** -0.008875* *(-4.678346)*	*** -0.004898* *(-0.627158)*
KOF B (-1)	** 0.000197* *(5.359720)*	*3.29E-05* *(0.145752)*
KOF C (-1)	*4.35E-05* *(1.405201)*	** 0.000253* *(1.784780)*
No. of Countries	*13*	*15*
Adjusted R-squared	*0.881785*	*0.846346*
F-statistic	*99.14698*	*37.98306*
Prob (F-statistic)	*0.000000*	*0.000000*

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

Trade is found significant and with a positive coefficient for both samples for regressions with GERD, similar to the results obtained using the full sample regression testing for HOSS. When *High Tech Exports* is used, it is found to be significant and positive for the "South" sample. We conjecture that the use, in the same regression, of both *Trade Openness* and *High Tech Exports* may make the latter capture the effects of the former.

The results for FDI are also consistent with all the results we had so far: *FDI inflows* are found to be significantly negative for the "North" sample, while *FDI outflows* are significant and have a negative coefficient in the "South" sample.

GERD displays a positive coefficient for the "North" sample and is not significant in the "South", confirming our results in the first GERD regressions (Table 14, above). The results for *High Tech Exports*, however, are not in line with the previous results. Here, for the "North" sample, the variable displays a positive coefficient, unlike in the regressions in Tables 15 and 16, above. In the "South," the variable is found to be non-significant.

We did not use Secondary Education Completion Rate as it was too correlated with the GERD variable. We did not use it above so as to make the results comparable.

Regressions using products with the "South" dummy variable (results not reported) yield average results similar to those obtained for the "North" and "South" additional effects are in line with those obtained above for the "South" sample.

Table 21 – All Effects (with KOF Index)

	"North"	***"South"***
KOF A (-1)	*3.54E-05* *(1.294480)*	** 0.000278* *(2.914902)*
High Tech Exports (-1)	*-0.002728* *(-0.466614)*	*0.024571* *(1.143560)*
lnGDP(-1)	** -0.011546* *(-5.981325)*	*** -0.013864* *(-2.567748)*
KOF B (-1)	** 0.000238* *(3.392314)*	*7.66E-05* *(0.655486)*
KOF C (-1)	*6.59E-05* *(1.606805)*	** 0.000262* *(3.175404)*
No. of Countries	13	15
No. of Observations	195	200
Adjusted R-squared	0.867191	0.787150
F-statistic	75.51412	39.73315
Prob (F-statistic)	0.000000	0.000000

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

We also tried a regression in which we tested all mechanisms but did so by using the economic aspects of the KOF globalization index as a stand-in for the trade and FDI variables (*KOF A*, as explained in section 2 and in Table A.2, in Annex), simply in order to determine whether Trade or FDI flows weigh more in the final result in affecting wage inequality: since trade has had a positive coefficient in all our regressions and FDI flows hold negative coefficients for the samples for which they are significant (inflows for the "North" sample and outflows for the "South" sample), it would seem to follow that, if *KOF A* had a positive coefficient, the effect of trade is stronger in the final result and, if it had a negative coefficient, it is FDI the one with the most pronounced influence in inequality.

As we can see in Table 21 above, *KOF A* is found to be non-significant for the "North" sample, but it exhibits a positive value for the "South" sample, indicating trade has a stronger effect on inequality in these countries.

The values for *adjusted R-squared* are above 80% and the probability of the *F-statistic* still equals zero for this regression, as in the previous ones.

Table 22 – All Effects (with dummy variable and KOF index)

	Both samples	***"South" (additional effects)***
KOF A (-1)	** 0.000157* *(3.670239)*	*-8.58E-05* *(-1.323063)*
High Tech Exports (-1)	*-0.009524* *(-1.232299)*	*0.014866* *(1.565883)*
lnGDP(-1)	** -0.001997* *(-2.908064)*	** 0.002414* *(3.050070)*
KOF B (-1)	*0.000111* *(1.045243)*	** -0.000448* *(-3.412042)*
KOF C (-1)	*-8.67E-05* *(0.754758)*	** 0.000371* *(4.449285)*
No. of Countries	28	
No. of Observations	395	
Adjusted R-squared	0.486500	
F-statistic	38.32838	
Prob (F-statistic)	0.000000	

Notes: (1) Significant at 1% (*), 5% (**) and 10% (***); *t-statistics* in parenthesis.
(2) Estimations made under white-diagonal standard error correction for valid statistic inference.

Making the same test with a dummy variable gives us a similar result: *KOF A* is shown to have a positive coefficient, indicating trade weighs more on the final result and that the economic aspects of globalization (in this case, the increased flows of trade, FDI, etc.) have the effect of increasing inequality. This is the result for both samples on average and, possibly because of the "South" influence (in the previous regression, *KOF A* increases wage inequality in the "South" sample). Trade influences inequality more than FDI does, which means that, overall, the economic aspects of globalization have the effect of raising wage inequality in developed countries.

Other aspects of globalization

The other aspects of globalization, social (*KOF B*) and political (*KOF C*), consistently exhibit a positive coefficient for both samples in nearly every estimation, implying that even the aspects of globalization which are not directly related to the economy or economic performance have the effect of causing inequality to rise. This result is more robust, though, for the "North" countries.

Control variables across estimations

The control variables behave largely as expected and exhibit consistent results. The level of *lnGDP per capita* clearly has a negative coefficient, meaning that, as GDP *per capita*

rises, inequality falls. Richer countries, then, should have lower inequality than poorer countries.

The rate of completion of secondary education is found to be significant for the "North" sample but, unlike we expected, its coefficient, when significant, is positive. It seems then that the higher this rate, the higher inequality. Does this mean that, as more and more people achieve relatively higher education levels, they leave those who have not achieved it further behind? The fact that the results for the "South" sample are opposite (when significant, the coefficient is negative) seems to indicate the level of education has different impacts in these two sets of countries: in the "South", higher education may still lead to lower inequality. We tried regressions with the rate of higher secondary and tertiary completion but they led much to the same results.

Union density, which we ended up being unable to use in most regressions, was found to be significant and to display, as expected, a negative coefficient, since unions give workers bargaining power and tend to fight for higher salaries, especially for the low-skilled workers.

5. Final remarks

At the onset of this study, we started with several goals in mind. Relying on the relevant literature, our general idea was that globalization had an effect on within-country wage inequality. Our first step then was to review the existing literature, in order to first clarify the main definitions, namely those of globalization and inequality, and then to understand how the various facets of the former may affect the latter.

We found that the mechanisms through which globalization act are manifold, from International Trade, to FDI and Technological Change (although this last one is only indirectly connected to the growing openness of countries to one another, technological change is highly augmented through globalization, as people from different countries can share their new technologies and contribute to each other's research). Additionally, international pressure to create, *e.g.*, uniform labor laws, among other common institutional frameworks, may also have an effect on within-country inequality. The mechanisms through which these different facets act are also varied and complex. Our first conclusion was, then, that there is not one single effect of globalization on inequality: there are many, and they do not all work in the same direction. For example, according

to the literature, growing international trade is found to have the consequence of decreasing inequality in developing countries whereas it increases inequality in the developed ones (referred to in the literature as Heckscher-Ohlin-Stolper-Samuelson theorem, HOSS). However, growing inflows (outflows) of FDI are expected to increase inequality in developing (developed) countries according to the Feenstra-Hanson theorem (FH).

As such, we reviewed studies in which these theories had been submitted to empirical tests, in order assess if data supports them. As so often happens in economic literature, not all empirical results point in the same direction. Regarding many mechanisms (namely the HOSS), there have been positive and negative results regarding its support, and indeed the negative results have, in some cases, led to the reinterpretation of the theory instead of leading economists to discard it altogether. It is difficult then to conclude, on literature review alone, whether these theories hold. In particular, these mechanisms are bound to work differently depending on which country (or set of countries) we try to apply them to.

Therefore, we decided to test them ourselves. We decided to assess how these mechanisms affect a reality close to us – the European Union (EU) countries, covering annual data from 1970 to 2007, in order to exclude the effects of the Great Recession and, particularly, the European debt crisis. This set of countries has hardly been study in the literature testing for these mechanisms and, even though it encloses developed countries, there are striking differences between them in what regards their stage of development. Therefore, we divided the member-states of the EU into two groups, one which would best capture the "North" as it is defined in economic literature, as the group of countries which are richer and have a larger supply of higher-skilled labor (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom), and the other group representing the "South" (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia).

We chose the Theil Index of industrial pay inequality as our dependent variable because we wanted to isolate the effect of these mechanisms on wages and not study how they interact with overall disposable income. In fact, the theories at stake draw implications

on wage premium and not on disposable income inequality. Moreover, wages are a very relevant source of income for the vast majority of people.

Regarding the international trade mechanism, our results support, for the overall sample of the EU countries, the HOSS theorem. Results appear to be rather robust for the "North" sample, whereas the effects for the "South" are rather weak: indeed, we did not find a negative relation between trade and inequality, but trade openness is not significant in affecting inequality in most of our regressions.

Results on the FDI are the most robust across regressions. FH mechanism predict the effect of *FDI* on inequality but they rely on the assumption that "Northern" countries will be solely the sources of *FDI* while the "Southern" countries act solely as *FDI* receivers; therefore their theory only applies to how developed countries react to growing *FDI outflows* and how developing countries react to growing *FDI inflows*. Even if, when we consider the entire sample, FH results hold (*FDI outflows* increase wage inequality), most of our results show that *FDI flows* tend to reduce inequality in both set of countries: *FDI outflows* are found to reduce inequality in the "South" countries whereas *FDI inflows* reduce wage inequality in the most developed EU countries.

We also tested the SBTC mechanism to assess how technology, usually boosted by globalization, affects wage inequality. Relying on two variables, the share of high technology exports on total exports and the gross expenditure on research and development (GERD), we conclude that whereas results are mixed in the "North" countries for the former variable, the latter consistently contributes to increasing inequality in the most developed countries. We conjecture that when technology is more mature and is successful in improving competitiveness (as increasing exports) it might benefit wage distribution; however, in the early stages of technology development (as measured by GERD), we find evidence for skill-based technology change in the "North" countries, meaning that a higher technological level increases inequality in this case.

When replacing the economic characteristics of globalization (*i.e.* trade and FDI) with a composite index such as the KOF economic component, we conclude that it increases wage inequality on average and thus we may conjecture that the effect of trade dominates in affecting inequality relatively to those attached to FDI flows.

Moreover, testing for other non-economic aspects of globalization, as captured by the KOF index, we found rather robust results showing that globalization, at both political and social levels, causes wage inequality to increase.

Our conclusions relying on EU data confirm that the relation between globalization and wage inequality is not straightforward. Some aspects of it lead to a rising skill premium (like trade and technological progress) and others (like FDI), instead, cause the skill premium to diminish.

One limitation of this work is that we failed to fully mimic globalization flows between the "North" and the "South" countries of the EU. Indeed, even still most of the trade is of intra-EU nature, we should take into account only the bilateral trade between the "North" and the "South" countries and not the overall trade of a given country. This implies that, some of the trade is intra sub-samples or that, in trading with non-EU countries, some "South" countries indeed act as "North" relative to their main partners.

The same criticism applies to FDI flows, since "South" countries are likely to receive inflows from the "North" but also act as investors, thus as "North", in non-EU countries. This partially justifies the impact of FDI outflows in reducing inequality in the "South".

Further refinement in data treatment in future research work is expected to make more clear the effective differences between the "North" and the "South" EU countries, lending robustness to the test of the different mechanisms operating from globalization to wage inequality. Another relevant question that remains to be answered is the impact that the Great Recession, and particularly the European sovereign debt crisis, could have on our results and conclusions.

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Annex

Table A.1 – GDP *per capita*, PPP (constant 2011 international $)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Luxembourg	80,39	81,44	83,89	84,26	86,70	89,87	92,81	97,41	94,98	88,06	89,15	88,85	88,15
Ireland	39,70	41,02	42,52	43,39	44,40	46,08	47,32	48,26	46,27	42,87	42,19	42,95	43,91
Denmark	40,70	40,84	40,90	40,95	41,78	42,68	43,99	44,49	43,88	41,17	41,56	41,83	42,06
Netherlands	39,22	39,68	39,45	39,40	40,14	40,87	42,19	43,75	44,36	42,52	42,94	43,15	41,47
Austria	37,72	37,90	38,35	38,50	39,25	39,92	41,18	42,54	42,96	41,18	41,79	42,89	40,35
Belgium	36,74	36,91	37,24	37,39	38,45	38,90	39,68	40,52	40,60	39,15	39,61	39,84	38,75
Sweden	34,91	35,26	36,02	36,72	38,13	39,18	40,63	41,67	41,09	38,69	40,88	41,76	38,75
Germany	35,86	36,35	36,29	36,13	36,56	36,83	38,24	39,54	40,04	38,08	39,67	40,98	37,88
Finland	32,93	33,60	34,14	34,74	36,07	36,99	38,48	40,36	40,29	36,67	37,73	38,62	36,72
France	34,13	34,50	34,57	34,63	35,26	35,63	36,26	36,86	36,62	35,29	35,72	36,26	35,48
Italy	34,67	35,29	35,40	35,22	35,60	35,76	36,43	36,86	36,19	34,05	34,53	34,63	35,39
United Kingdom	31,42	31,98	32,58	33,71	34,58	35,45	36,16	37,11	36,54	34,39	34,69	34,80	34,45
Spain	30,07	30,80	31,12	31,50	31,97	32,57	33,32	33,85	33,61	32,04	31,83	31,73	32,04
Cyprus	28,78	29,62	29,87	29,92	30,47	30,91	31,57	32,70	33,50	32,66	31,91	31,23	31,09
Greece	24,25	25,19	25,98	27,43	28,53	29,09	30,59	31,58	31,44	30,45	29,04	27,05	28,38
Malta	26,12	24,95	25,46	25,33	25,03	25,78	26,26	27,29	28,30	27,34	27,94	28,32	26,51
Slovenia	22,11	22,72	23,56	24,24	25,29	26,25	27,70	29,44	30,45	27,76	28,02	28,16	26,31
Portugal	25,06	25,37	25,43	25,10	25,43	25,58	25,90	26,47	26,43	25,63	26,12	25,83	25,69
Czech Republic	19,49	20,17	20,64	21,43	22,44	23,92	25,53	26,84	27,44	26,05	26,62	27,05	23,97
Hungary	17,74	18,44	19,32	20,12	21,14	22,02	22,91	22,97	23,22	21,68	22,00	22,41	21,16
Slovak Republic	15,34	15,90	16,64	17,44	18,33	19,55	21,18	23,40	24,72	23,47	24,43	25,13	20,46
Estonia	14,32	15,32	16,42	17,81	19,05	20,86	23,10	24,95	23,98	20,63	21,21	23,31	20,08
Croatia	15,39	15,90	16,68	17,57	18,30	19,07	20,02	21,06	21,50	20,03	19,63	20,21	18,78
Lithuania	11,94	12,85	13,84	15,38	16,70	18,30	20,05	22,28	23,17	19,98	20,67	22,41	18,13
Poland	14,29	14,46	14,68	15,26	16,08	16,67	17,72	18,93	19,90	20,25	21,01	21,75	17,58
Latvia	11,52	12,61	13,58	14,70	16,15	18,06	20,45	22,68	21,94	18,30	18,62	19,97	17,38
Romania	9,83	10,53	11,27	11,93	13,10	13,74	15,03	16,21	17,78	16,71	16,65	17,12	14,16
Bulgaria	9,19	9,76	10,41	11,05	11,85	12,68	13,57	14,74	15,76	14,99	15,15	15,52	12,89

Source: World Bank databank

Table A.2 – Composition of the KOF Index

	Indices and Variables	Weights
A.	**Economic Globalization**	**[36%]**
	i) Actual Flows	(50%)
	Trade (percent of GDP)	(21%)
	Foreign Direct Investment, stocks (percent of GDP)	(27%)
	Portfolio Investment (percent of GDP)	(24%)
	Income Payments to Foreign Nationals (percent of GDP)	(27%)
	ii) Restrictions	(50%)
	Hidden Import Barriers	(24%)
	Mean Tariff Rate	(28%)
	Taxes on International Trade (percent of current revenue)	(26%)
	Capital Account Restrictions	(22%)
B.	**Social Globalization**	**[38%]**
	i) Data on Personal Contact	(33%)
	Telephone Traffic	(25%)
	Transfers (percent of GDP)	(4%)
	International Tourism	(26%)
	Foreign Population (percent of total population)	(21%)
	International letters (per capita)	(24%)
	ii) Data on Information Flows	(35%)
	Internet Users (per 1000 people)	(36%)
	Television (per 1000 people)	(37%)
	Trade in Newspapers (percent of GDP)	(27%)
	iii) Data on Cultural Proximity	(32%)
	Number of McDonald's Restaurants (per capita)	(45%)
	Number of Ikea (per capita)	(45%)
	Trade in books (percent of GDP)	(10%)
C.	**Political Globalization**	**[26%]**
	Embassies in Country	(25%)
	Membership in International Organizations	(28%)
	Participation in U.N. Security Council Missions	(22%)
	International Treaties	(25%)

Source: The Swiss Federal Institute of Technology

Table A.3 - Descriptive Statistics - "North" sample

	Mean	Median	Std. Deviation	Min.	Max.	No. of Observations
Theil index	0,014222	0,013650	0,007082	0,003000	0,045000	454
Trade Openness	0,603179	0,488304	0,304747	0,176160	1,833062	465
FDI Inflows	0,024856	0,009878	0,066744	-0,550747	0,746971	440
FDI Outflows	0.028768	0.010324	0.077802	-0.042346	1.429486	445
High Tech Exports	0,181933	0,164332	0,098717	0,051073	0,478399	238
GERD	1.799544	1.833384	0.709264	0.400864	4.129996	310
lnGDP per capita	10,27798	9,993841	0,926193	9,117460	12,69527	494
Secondary Education Completion	0,391474	0,367500	0,128256	0,213000	0,72000	190
Trade Union Density	0,455365	0,452231	0,209830	0,075760	0,874420	470
KOF A	0.5975361	0.588100	0.150761	0.347000	0.925000	421
KOF B	0.5397171	0.544200	0.1786965	0.218400	0.921900	421
KOF C	0.6324330	0.641400	0.2008373	0.119500	0.941400	421

Table A.4 - *Descriptive Statistics – Sample 2 (South*)

	Mean	Median	Std. Deviation	Min.	Max.	No. of Observations
Theil index	0.023166	0.021600	0.015526	0.002800	0.073700	382
Trade	0.753967	0.721185	0.333080	0.798400	1.565062	362
FDI Inflows	0.033218	0.020401	0.042154	-0,097454	0,294167	397
FDI Outflows	0.005692	0.000598	0.012925	-0.013324	0.106411	349
High Tech Exports	0.105482	0.052037	0.141416	0.004005	0.717415	241
GERD	0.717786	0.63358	0.312124	0.218100	1.558110	163
lnGDP per capita	9,602834	9,216693	1,815076	7,150529	14,63861	403
Secondary Completion	0,366057	0,302500	0,188705	0,162000	0,807000	158
Trade Union Density	0,415097	0,360735	0,229374	0,000000	1,000000	196
KOF A	0.711683	0.721950	0.166651	0.406900	0.991600	494
KOF B	0.689790	0.727250	0.147933	0.334800	0.918000	494
KOF C	0.860922	0.923050	0.129834	0.453400	0.982600	494

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