ERASMUS UNIVERSITY ROTTERDAM

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THE EFFECT OF ECONOMIC GLOBALIZATION ON INCOME INEQUALITY

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ABSTRACT

This paper examines the relationship between economic globalization and within-country income inequality accounting for countries' differences in development level. The study focuses on the effect of trade openness, FDI inflows, the remittances received and the import tariff rate on the Gini coefficient using a panel data analysis in a sample of 68 developed and developing countries for the period 1980-2018. I find that trade liberalization increases inequality in both developed and developing countries. FDI inflows are associated with greater inequality within developing countries while the effect is negative for developed ones. Finally, the remittances received are related to increasing inequality in developed countries whereas they are found to reduce it in developing economies.

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1. INTRODUCTION

Globalization has brought about a big debate over the costs and benefits that arise from the integration of the world economy and there is a common claim which states that globalization in the last decades has led to an increase of inequality within countries.

In the 1980s, the average income of the richest top 10% was around 7 times that of the poorest 10% while nowadays the gap has raised and the ratio is around 9.5. Similarly, the Gini coefficient has experienced an increasing trend. In the 1980s it had an average value of 0.29, however, by the late 2000s, it increased by almost 10% achieving an average value of 0.32 (OECD, 2011).

At the same time, world trade has grown by five times since 1980 and the share of trade in world GDP has increased from 36% in 1980 to 55% in 2008. Moreover, the share of FDI in total liabilities has experienced substantial growth from 17% in 1990 to 38% in 2004 (IMF, 2007).

Taking this into account, globalization has been argued to be one of the reasons for raising inequality. In the literature, the effect of economic globalization on income inequality has been widely examined. One of the main findings is that in an interrelated global economy, trade openness and liberalization have an impact on economic growth and therefore on income levels and its distribution, which brings about income inequality. However, the empirical evidence regarding globalization and its link to income inequality is mixed and there is no unanimity.

Globalization is assumed to foster economic growth, which in turn causes distributional changes. The existence of differences in the distribution of gains motivates the idea of raising inequality. That is, while globalization may be increasing the national income of the country, people may be benefiting in an uneven and disproportionately way.

Several studies have been conducted at both within and between country levels. Yet there is a divergence in the main findings and the results have gone in disparate directions given the methodology used. Subsequently, results differ if they use population-weighted data for each country or if instead, they treat countries as equal units in cross-country comparisons. According to Darvas (2019), inequality in China and India has been proven to decrease in the past decades. So, when accounting for the population size, since they are two of the biggest countries in the world and their weight is relatively bigger, it is easier to obtain a reduction in global inequality as a result.

Income inequality[1] refers to the extent to which income is distributed unevenly among the population, so it provides information on the degree of homogeneity between different groups. According to Milanovic (2006), there are three types of income inequality. The first one refers to within-country income inequality, which reflects the unbalanced income distribution at a country level. The second type is the between-country inequality, which deals with convergence and divergence among countries and considers the fact that countries are of unequal size by weighting them by their population. Finally, there is inequality between the world's individuals, that is global inequality, which focuses on the world income distribution.

In this study, I focus on the first concept of inequality measured by the Gini coefficient as the aim is to analyse whether the globalization process has an impact on the income distribution within countries.

I am centred on *economic globalization*, which applies to the global integration of markets, financial systems, commerce, communication and technology. Thus, it concerns the increase of interdependence and worldwide interconnection among economies across the globe with the extensive international flows of goods and services, capital, technology and information and the decrease in the relevance of national borders regarding economic transactions (Gao Shangquan, 2000).

As a proxy for economic globalization, four key globalization indicators are used: the trade to GPD ratio, the FDI inflows to GDP ratio, the amount of personal remittances received as a percentage of GDP and the import tariff rate. Altogether accounts for the level of trade openness and liberalization policies, and the mobility of capital and labor force across countries.

Previous studies have investigated the association between trade liberalization and inequality for the case of various developing countries and developed countries separately. This gives rise to the idea of distinct impacts of globalization according to the initial economic situation of each country.

Consequently, I examine to what extent globalization has affected the inequality in the different countries, and if this effect has been larger for some specific groups depending on their development level. Therefore, I evaluate 38 developed countries as well as 30

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[1] Definition from Inequality.org: https://inequality.org/facts/income-inequality/

developing countries to see if globalization has a statistically different impact among them, allowing for some cross-national comparisons. Hence, this paper contributes to the existing literature by analysing a total of 68 countries with different development levels over the time period 1980-2018.

With this study, I aim to analyse the relationship between economic globalization and income inequality and provide some empirical evidence to test the hypothesis that inequality rises with globalization. Furthermore, I inspect which elements composing economic globalization from the ones introduced in the model have a greater impact on inequality, as well as the dissimilarities in the effect of globalization that may arise when accounting for the differences in development levels.

The remainder of this paper is organized as follows. Section 2 reviews the theoretical framework regarding globalization and income inequality. Section 3 reviews the relevant existing empirical literature from previous studies. Section 4 describes the data and the variables used. Section 5 presents the methodology and the models. Section 6 shows the results and discusses them. Section 7 presents the sensitivity analysis. The last section concludes the study.

2. THEORETICAL FRAMEWORK

2.1 The Heckscher-Ohlin model and the Stolper-Samuelson theorem

Trade is one of the main factors of globalization and it has the potential to bring about distributional income changes within countries. The Heckscher-Ohlin model (H-O model) is vastly used as a framework when analysing the possible relationship between trade and income inequality as it gives an explanation on international trade patterns between countries given the relative factor endowments. It proposes that countries specialize in the goods in which they are more efficient and they have a comparative advantage, depending on the allocation of resources.

As the theoretical implications of the H-O model suggest, a country will export goods produced intensively using the abundant factors of production and import goods produced using scarce factors of production. Therefore, trade increases the real return to the factor that is relatively abundant in each country and it lowers the real return to the other factors. This extension of the model is known as the Stolper-Samuelson theorem, which relates the changes in prices of goods to the changes in the return to factors of production. It states that trade liberalization raises the demand for exported goods and therefore their price, which in turn increases the return to the abundant factor in countries involved in the trade. At the same time, it decreases the return to the scarce factor as its demand falls (Fischer and Serra, 1996).

Trade openness increases the relative price of abundant factors to scarce factors in each country because abundant factors are used intensively in the production of exported goods as they have a comparative advantage. Therefore, trade rises the income of factors of exported goods and lowers the income of factors of imported goods. As a result, if human capital is industry-specific, wages of workers in exporting sectors experience a rise while workers in importing sectors tend to see their wages decrease (Harrison et al., 2011).

In the context of developed and developing countries and assuming that the factors of production are skilled and unskilled labor, developed countries, which have abundant skilled labor force, will experience a rise in wages of skilled workers relative to unskilled workers and thus, inequality will rise since the wage gap increases with trade. Contrary, in developing countries, which are well endowed with unskilled labor, inequality will be reduced as the wages of unskilled relative to skilled labor increase and the wage gap

declines. As a result, more trade is expected to lead to greater income inequality in developed countries and lower it in developing countries (Harrison et al., 2011).

In the same way, Goldberg and Pavcnik (2007) argue that an increase in the price of exported goods that are intensively produced using unskilled labor should rise the return to unskilled labor. Therefore, according to the theorem, wages of unskilled workers increase relative to skilled workers. Contrary, the price of imported goods that are skilled labor-intensive would decrease, thus the return to skilled labor decreases as well and wages of skilled workers decline. Based on the empirical evidence that suggests that developing countries are well-endowed with unskilled labor, the distributional changes due to trade openness are expected to favour the unskilled workers, hence income inequality is reduced within developing countries.

However, as it is explained in the next section, this is not consistent with empirical evidence and several studies have proven that the H-O model and the Stolper-Samuelson theorem fail in describing the relation between trade and inequality.

2.2 The convergence theory

The convergence theory, sometimes referred to as the catch-up effect, is a hypothesis for which poorer economies tend to grow faster than rich economies and consequently, all of them will eventually converge in income per capita terms.

According to Fisher and Serra (1996), under free trade the ratio of average incomes in rich and poor countries converges to one. The intuition behind this statement is that developing countries are able to grow more rapidly during the initial phase of trade openness since they start from a lower growth level, therefore it is easier for them to achieve a greater growth rate than it is for developed countries to maintain an already high one. Besides, developing countries can grow faster and they have more growth potential due to the fact that the return on capital investment is bigger for them while diminishing returns to capital are stronger in capital abundant developed countries.

In their paper, Fisher and Serra (1996) argue that countries move towards similar income distribution patterns, meaning that developing countries experience a decline in inequality while developed countries suffer an increase in income inequality. Despite developed countries do benefit from the traditional gain from trade, in the long term these gains

disappear as economies converge to each other. As a result, trade openness is more beneficial for developing countries which initially are characterized by higher inequality levels.

2.3 The dependency theory

The dependency theory claims that developed countries benefit more from trade openness and foreign direct investment but this comes at the expense of developing countries as they enrich themselves by transferring resources from poor nations to wealthy nations.

The theory was firstly presented by Raúl Prebisch in the late 1950s. Regarding his point of view, underdevelopment results from an unequal exchange that takes place when countries trade internationally. Poor countries export raw material and primary goods to rich countries, which transform them into final products and sell them back to poor countries. Developing countries purchase the final goods at higher prices as a result of the value added by manufacturing. Those countries are never able to earn enough income to invest in their own production systems since what they earn on the exports is not even sufficient to pay for the imports. Thus, developing countries always earn less than developed countries and their income inequality increases (Ferraro, 2008).

The main idea of the theory is the notion of underdevelopment that refers to a situation in which resources in poor countries are used in a manner that benefits rich countries and not the economies where resources are found. Therefore, poor countries are lagged because initially they were integrated into the world economic system as producers of raw materials and suppliers of cheap labor, lacking the opportunity to compete with dominant countries. Since it is a reinforcing process, the pattern of dependency is likely to be maintained and the inequality within developing states is strengthened.

Dependency theorists claim that resources in developing countries should be used in an alternative way that is in the interest of the poor. So, the needs of the poor must be addressed within a society. However, this may be a difficult problem in the long term as dependency is preserved not only by dominant states but also through the power of elites in the dependent states, who have common values and culture to elites in developed countries (Ferraro, 2008).

This offers an opposite view to the H-O model as it predicts more inequality in developing countries and benefits for developed countries. Regarding the so-called unequal exchange, globalization and therefore greater integration in the world economy, generates higher income inequality within developing countries, with less egalitarian income distributions. The theory is mainly focused on the effects in developing and poor countries. However, as trade is beneficial for developed countries, one would expect the opposite effect on these economies and thus a decline in inequality can be foreseen in developed countries.

2.4 Foreign direct investment

Although trade openness is the most common measure used, studies often include the amount of foreign direct investment (FDI) as well to capture the impact of globalization on income distribution within countries.

Globalization and trade liberalization with the ease of trade barriers opens the possibility to companies in industrialized countries to enter in new markets. Firms engage in FDI which represents a "capital flight" to replace domestic production instead of complementing it. According to Alderson and Nielsen (2002), capital flight (FDI outflow) from developed industrial countries to developing countries leads to greater inequality as it accelerates deindustrialization, which has redistributive income effects. Firms invest abroad seeking lower labor costs and more relaxed tax systems and employment regulations. This ends up in a process of deindustrialization, which brings about greater inequality within developed countries as it shifts a share of the labor force from the industrial sector to the service sector. The industrial sector has on average higher wages and a flatter income distribution, whereas the service sector is characterized by lower wages on average and an internal higher level of inequality. Additionally, as employment in the manufacturing sector decreases, the union power which maintains high industrial wages is weakened and the bargaining position of workers is undermined, thus inequality rises. Moreover, if FDI outflows are addressed to relocate low-skilled jobs to low-wage countries, then the demand for unskilled labor declines which leads to a fall in the wage of unskilled workers relative to skilled ones and thereby income inequality increases.

Alternatively, Mills (2009) claims that globalization has the opposite effect in developing countries, where inequality is reduced as a result of the growth in industrialization, new

opportunities regarding employment and the relative increase in wages of the unskilled labor force compared to skilled workers. Therefore, the level of inequality within developing countries declines due to FDI inflows.

The role of multinational corporations (MNCs) is an important factor linked to FDI. According to Reuveny and Li (2003), MNCs are able to pressure labor unions to reduce wages, thus lower income classes are damaged. The threat of multinationals leaving the host country reduces the wages as well since workers lose bargaining power. Moreover, MNCs tend to repatriate their profits from developing countries, leaving them without the opportunity of reinvesting that money within the country. Also, MNCs use capital-intensive techniques that are destined to skilled labor, hence the return to skilled labor relative to unskilled labor increases and there is greater income inequality. Contrary, they also claim that multinational activity brings several benefits to developing countries. It provides them with more capital and new technology, along with an improvement in corporate governance and management. All of these raise productivity and prompt economic growth, which in turn, they argue, can increase the income of the poor more than proportionally compared to the rich.

In their paper, Feenstra and Hanson (1997) show that capital flows from the North (developed countries) to the South (developing countries) and therefore the outsourcing of multinationals, increase the demand for skilled labor. Assuming that the North specializes in the production of skilled-labor intensive goods and the South in unskilled-labor intensive goods, a flow of capital from the North to the South shifts some input production to the South. The production outsourced is unskilled-labor intensive in the North, but it is considered skilled-labor intensive in the South. As a result, there is a raise in the demand for skilled labor in both regions which leads to greater inequality.

In the same line, Meschi and Vivarelli (2008) also claim that FDI and trade openness lead to a technology transfer from developed to developing countries. Technology is relatively skill-intensive, which generates an increase in the demand for skilled labor. Since the technology upgrading is related to trade, one can conclude that globalization may cause demand for skilled labor to raise in developing countries, then reversing the prediction stated by the Stolper-Samuelson theorem.

2.5 Labor migration

International labor mobility is another key factor of globalization since migration affects equilibrium wages by influencing the aggregate labor supply. Reuveny and Li (2003) argue that migration across countries can have a potential effect on the income distribution given that migration flows have typically been from developing countries, which are assumed to be endowed with unskilled labor, to developed countries, which are skilled-labor abundant. Therefore, since wages of skilled workers are higher than the ones of unskilled workers, unskilled labor flows from developing to developed countries decline income inequality in developing countries and increase it in developed ones. Similarly, Hassler et al. (2003) claim that greater labor mobility decreases the relative supply of unskilled labor to skilled labor in developing countries, which in turn raises the wage of unskilled workers. Thus, inequality is reduced and there is a negative relationship between labor mobility and income inequality. The opposite effect is experienced in developed economies where unskilled labor supply increases and inequality raises.

Additionally, immigrants from developing countries often take lower-wage jobs in developed countries, which makes it possible that unskilled workers in developed countries switch to better-paid jobs. For this reason, the effect on income inequality may be ambiguous.

3.   LITERATURE REVIEW

In this section, the existing empirical evidence on income inequality from several previous studies is reviewed. The general idea is that there is no unanimity regarding the relationship between globalization and income inequality among researchers, who often arrive at divergent results.

The convergence theory is not confirmed in the empirical evidence since the general conclusion is that most developing countries are falling behind and the expected catching-up along with the reduction of inequality is not occurring. As it is claimed in many studies, the convergence hypothesis does not hold and developing countries are not even following a similar economic growth path or have a common trend regarding income distributions as developed countries. Uoardighi and Somun-Kapetanovic (2009) studied the convergence process and the effect on inequality measured in GDP per capita terms in the Balkans. Similarly, they find that developing countries do not catch up with

developed countries and that there is only convergence between groups with a similar level of development.

As has been previously mentioned, there is no consensus regarding the direction of trade's effect on inequality and some claim that the Hecksher-Ohlin model and the Stolper-Samuelson theorem fail in the empirical evidence. Based on the theory on international trade derived from the H-O model, one would expect trade openness to be related to greater income inequality in developed countries and to reduce inequality in developing ones. Despite this, most of the results are not consistent with the aforementioned prediction. According to Milanovic (2005) and Ravallion (2001), trade liberalization tends to raise inequality within developing countries and reduce it in developed countries, which is the opposite as what H-O models states.

Additionally, many studies such as Dollar and Kraay (2004) find no evidence on trade having a systematic effect on inequality, with no significant results of changes in trade volumes affecting the income distribution. Likewise, Bussmann et al. (2005) find that trade to GDP ratio has no effect in neither the Gini coefficient nor the share of income received by the poorest quintile and they conclude that there is no relationship between economic openness and income inequality. Moreover, this finding is consistent in both developed and developing countries, which means that the effects also do not depend on the level of development of the countries.

Several studies such as Harrison et al. (2011), Bergh and Nilsson (2010) and Rudra (2004) find that there is a positive relationship between trade volumes and income inequality within countries. However, Bergh and Nilsson (2010) and Rudra (2004) find opposite results when analysing inequality depending on the level of development. The formers conclude that more trade is related to greater inequality with a stronger effect in developed countries, while the latter suggests that trade liberalization only brings about inequality in developing countries as no significant results are found in developed countries.

Alternatively, both Reuveny and Li (2003) and Jaumotte et al. (2013) studies indicate that trade openness is negatively related to inequality, meaning that it is associated with more equal income distributions.

Regarding FDI, Elmawazini et al. (2013) find that it is linked to an increasing income gap in developing countries and Reuveny and Li (2003) show that FDI inflows have a positive and statistically significant impact on income inequality in both developed and

developing countries, denoting that FDI inflows increase inequality within countries. Conversely, Bussmann et al. (2015) find no evidence suggesting that large stock of FDI raises inequality in neither developed nor developing countries. Although they find no significant effect, they suggest that if FDI and trade liberalization lead to economic growth and do not shift income to the rich during the process, then they should be beneficial for the poor in developing countries.

The effect of FDI on income distribution in developing countries is unclear as Dollar and Kraay (2004) argue. On the one hand, FDI may raise income inequality by reinforcing the power of the rich and generating groups of well-paid workers in MNCs who are surrounded by poor workers. On the other hand, as globalization increases competition in domestic markets, consumers and unskilled workers in developing countries can benefit, thus leading to less inequality. Moreover, they claim that the net effect may depend on the local policies as the positive and negative effects derived from the globalization process might cancel out.

Alderson and Nielsen (2002) studied the relationship between inequality and deindustrialization derived from FDI outflows. They claim that the deindustrialization process causes a fraction of labor to move from manufacturing to the services sector. Therefore, they expect an inverse relationship between inequality and the manufacturing share out of total employment. Their results are consistent with this prediction, the share of manufacturing has a significant negative effect on income inequality, which means that as globalization intensifies, fewer people work in manufacturing and inequality increases.

Migration is another relevant factor to be considered in globalization waves. In their model, Alderson and Nielsen (2002) after controlling for FDI outflows, find that the coefficient of the net migration rate is positive and significant, denoting that migration leads to more income inequality. However, Reuveny and Li (2003) state that the effect of labor migration is rather ambiguous as the expectation is that developed countries, which are importing labor, experience an increase in inequality while developing exporting-labor countries are predicted to lower their inequality level.

One important element of worker's lifetime earnings is the education level since the supply and demand of educated people can influence the income distribution (Lee and Lee, 2018). The forecast regarding human capital is that as it is spread throughout the population, it has a negative effect on income inequality. Alderson and Nielsen (2002)

find evidence in their model that confirms this hypothesis. They measure education with the secondary school enrolment ratio and it is found to have a significant negative impact on inequality. In the same direction, Meschi and Vivarelli (2008) also find that an increase in the supply of skilled workers tends to reduce income inequality. Alternatively, Feliciano (1993), whose study is focused in Mexico, concludes that the raise in the returns to education increases the relative wage of skilled labor, thus leading to more inequality. Furthermore, Crenshaw and Ameen (1994) also find an inverse relationship in which higher levels of education are related to greater inequality.

The importance of effective institutions has been a subject of study in the income inequality issue. Not taking the institutions' quality into account can be a potential source of divergent results, especially in developing countries as Rudra (2004) affirms. Rodriguez-Pose (2012) also emphasizes that ineffective governments and low quality of institutions in developing countries act as an impediment to trade considering that other countries may not choose them as a trading partner. Alderson and Nielsen (2002) argue that unions reduce the wage differential and they find evidence that union density has a significant negative effect on the inequality of income. Moreover, Held et al. (1999) claim that more effective governments are able to decrease the income inequality through the improvement of the property right and the tax system and by setting public welfare programs. Conversely, Dollar and Kraay (2004) find no significant effects on inequality concerning institutional factors.

Finally, Dollar and Kraay (2004) remark that the share of income that the poorest receive does not vary systematically as average income changes. This means that variations in the distribution of income are not associated with variations in the average income since there is a one-for-one change. Accordingly, other researchers such as Chen and Ravallion (1997) and Deininger and Squire (1996) also argue that there is no relationship between changes in average income and inequality, and Meschi and Vivarelli (2008) find that GDP per capita has no significant effect on inequality. However, Rudra (2004) and Rodríguez-Pose (2012) do find that higher GDP per capita is related to less income inequality, so rich countries tend to have lower inequality levels.

4. DATA AND VARIABLES

I use a panel dataset which relates the income inequality to a set of variables that affects the income distribution. I include variables that capture both the degree of globalization and other factors that may have an impact on inequality over time.

As a measure of income inequality, I use the *Gini coefficient*, which is the most widely used measure of inequality within a country. It is based on the comparison of cumulative proportions of population against the income they receive and it is derived from the Lorenz curve, which sorts the population according to the income level from poorest to richest (Haughton and Khandker, 2009). It measures how much the distribution of income of a country deviates from a completely equal distribution. So, it ranges from 0 to 1, being zero the case of perfect equality and one denoting perfect income inequality. In the current analysis, the Gini coefficient is used in the form of an index ranging from 0 to 100. The data for the Gini coefficient is retrieved from the Standardised World Income Inequality Database (SWIID), the World Income Inequality Database (WIID) and the Poverty and Equity Database from the World Bank.

The Gini coefficient remains the dominant choice when measuring income inequality within countries. Despite this, some researchers have attempted some other measures, which can lead to divergence of results. In this study I focus on income inequality measured by the Gini coefficient. It is a ratio analysis method and therefore it is relatively easy to interpret and allows for cross-country comparisons, indicating the changes in the income distribution over a time period. Moreover, contrary to other measures such as the income per capita or the GDP per capita, the Gini coefficient is representative of the whole population.

Yet it has some limitations that must be considered. According to Haughton and Khandker (2009), the Gini coefficient cannot be decomposed into different dimensions to show the diverse sources of inequality. It is also not additive, meaning that the total coefficient of the country does not equalize the sum of the different subgroups' coefficients. Furthermore, countries reporting similar Gini coefficient values can have very different distributions of income as the Lorenz curve may differ in its shape and still yield to the same inequality level.

Another issue claimed by Mills (2009), is the difference in the measurement of the coefficient depending whether it is income-based or consumption-based. Consumption-

based coefficients are typically more used in developing countries as income is often difficult to be measured there due to the greater level of self-employment in the primary sector and businesses. Additionally, there are problems while gathering the data since surveys are not fully representative and high-income groups tend to underreport their income, thus underestimating inequality with lower estimates.

Figure 1. Gini coefficient mean comparison between developed and developing countries



Gini coefficient evolution
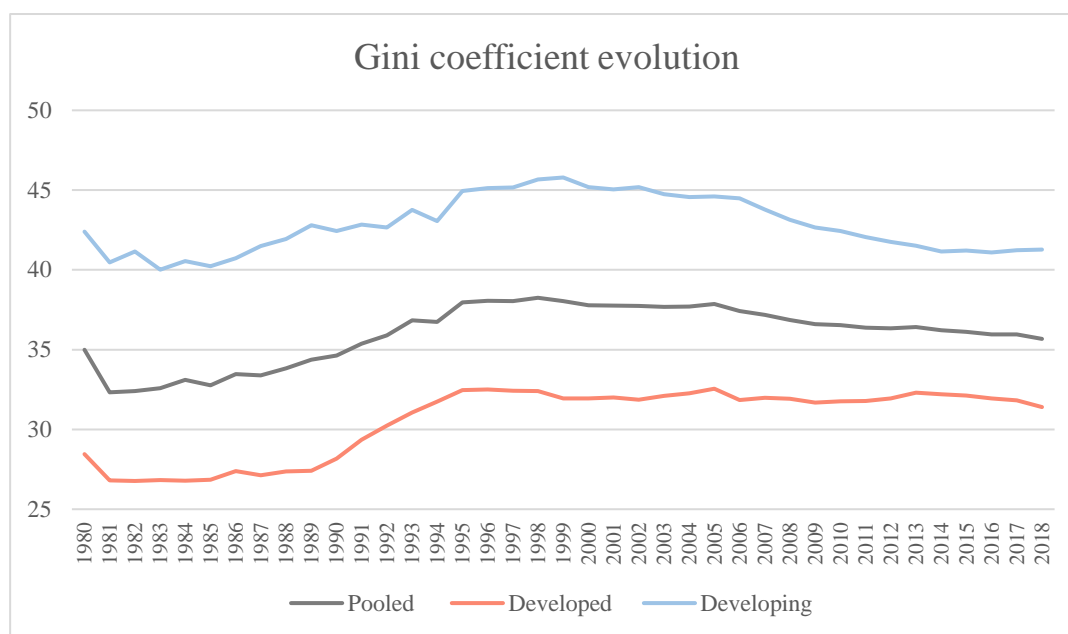
Note: data from WIID, World Bank and SWIID.

Figure 1 shows the mean of the Gini coefficient value for developed (red line) and developing countries (blue line). Additionally, the evolution of the Gini coefficient for the whole sample is also plotted in the black line, which is computed with a simple average between all countries of the analysis. From the graph, it is shown that on average, developing countries have higher income inequality than developed countries, since the blue line is above the red line for the whole time period. Regarding the evolution of the coefficient, it is observed a similar pattern in the first half of the period in both groups, with an initial decrease in inequality and thereafter it rises again surpassing the initial level. However, one can observe a difference between the two groups from 2004 onwards, where developing countries see their income inequality decline while developed countries have on average a stable level of inequality. A final observation is that the level of

inequality in 2018 is similar to the one in 1980 for developing countries, but it has raised by 3 points in the case of developed countries.

Figure 2. Income share held by top 10% mean comparison between developed and developing countries

Income share held by top 10% evolution
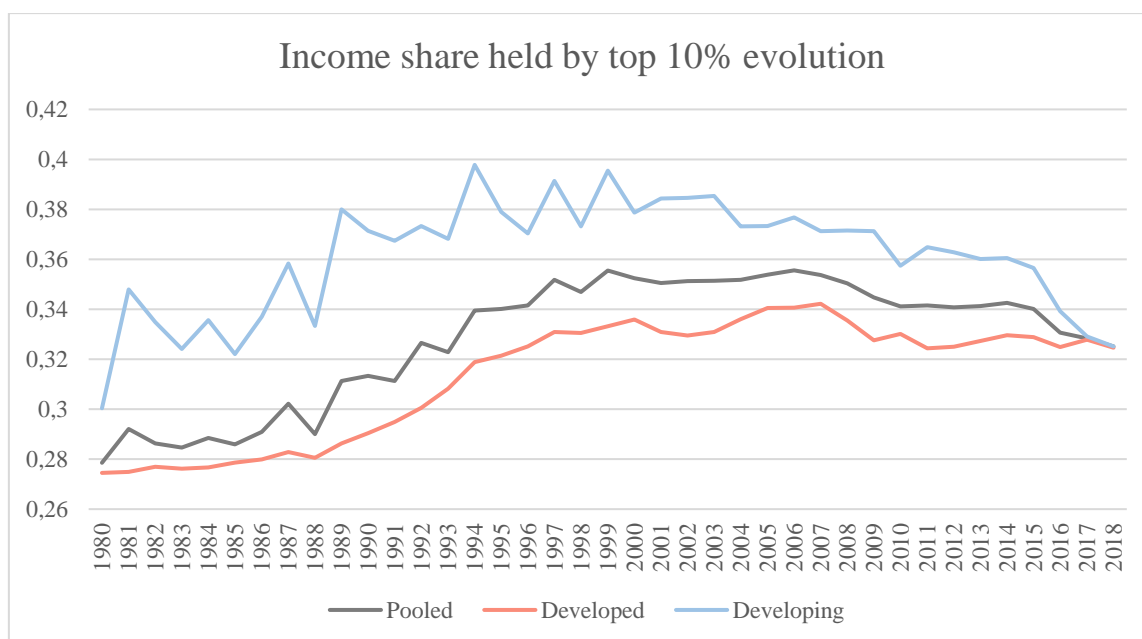
Note: data from WIID.

Figure 2 shows the evolution of the mean of the share of national income held by the top 10% of the population, which is an alternative measure of income inequality introduced to compare it with the evolution of the Gini coefficient. The data for this variable is retrieved from the World Income Inequality Database (WIID).

Again, one can observe that on average, income inequality is higher in developing countries than in developed countries, since the blue line remains above the red line for the whole period. It seems to be more volatile than the Gini coefficient, as it shows large variations during the first half of the time sample, which may be due to a lack of data points, especially for several developing countries. From 1980 until 2000, it experiences a significant increase of 7 percentage points regarding developing countries and a raise of around 6 percentage points in the case of developed countries. However, from 2000 onwards, the variable appears to be more stable. Finally, the level of inequality in 2018 is bigger than the one in 1980 in both developed and developing countries, although the increase is greater for the developed economies.

Figure 3. Comparison of the Gini coefficient for 10 selected representative countries
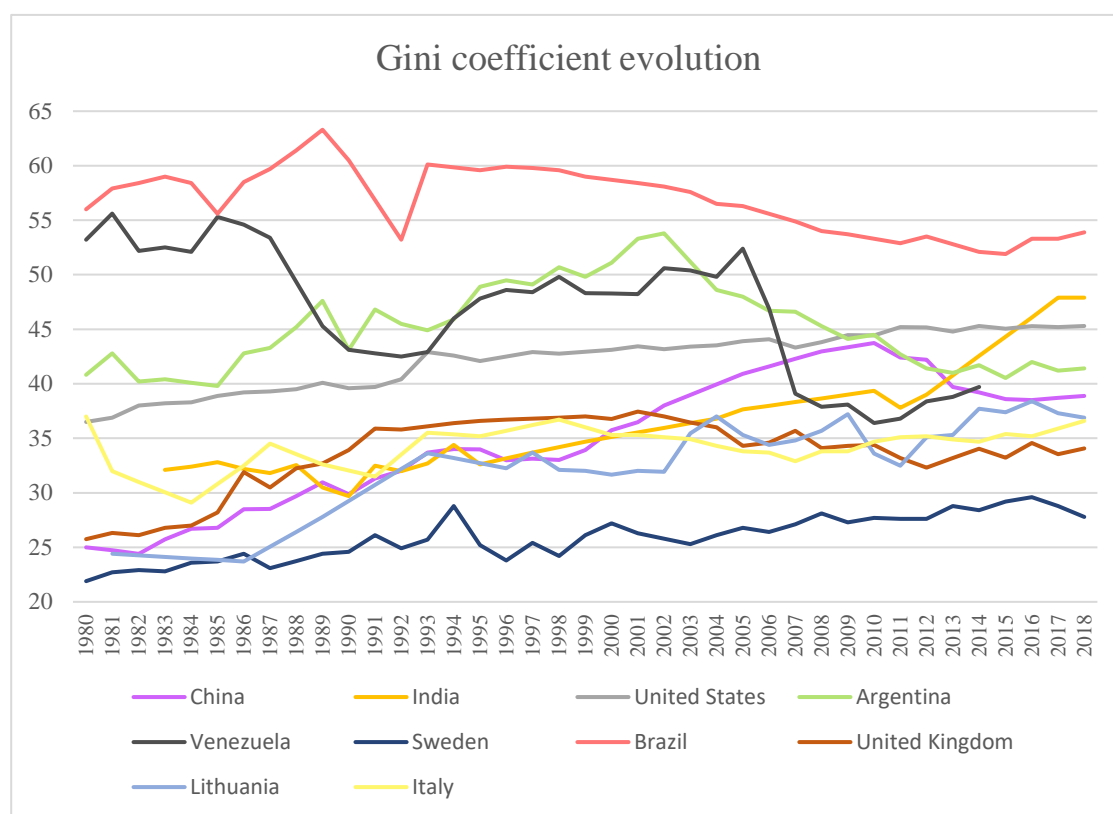
In figure 3 it is depicted the evolution of 10 countries from the sample which have been selected according to their relevance in previous literature and they are representative of different regions of the world.

One can notice that Brazil which started in 1980 as the country with higher inequality, is still the first country in inequality terms by 2018. While Venezuela has experienced a substantial decrease in inequality, especially since 2005. An opposite case is found in India and China, whose inequality has risen by 15.8 points and almost 14 points respectively from 1983 to 2018. The United States and the United Kingdom have similar patterns, with an initial stronger increase in inequality, but the United States has a greater level of inequality for the whole sample. Most developed countries have seen their income inequality increase over time, the most notable case is Lithuania, who experienced a sharp rise until 1993, and in total its Gini coefficient has increased by 12.5 points. Sweden has maintained its position of the most equal one out of the 10 countries, even though there is a slightly positive trend which has led to an increase of almost 6 points in the Gini coefficient index.

As a proxy for economic globalization I use some factors that affect the interrelation between countries and its interdependence, which are included in the analysis as the main independent variables. The four key factors of globalization are: the trade to GPD ratio, the FDI inflows to GDP ratio, the remittances received and the import tariff rate.

Firstly, I include a *trade openness* indicator, which is the ratio of the sum of export and imports to GDP, to account for the trade liberalization, as the higher the liberalization is, one expects the country to trade more internationally. This ratio is the most common measure of economic openness used in the literature.

I also add the amount of *FDI inflows* received by each country as a measure of capital mobility and multinational activity, since globalization encourages a capital flight from firms which search lower labor costs or more relaxed tax systems and regulations. I divide the FDI inflows by the GDP to control for size of the country, so the final variable included is the FDI inflows as a percentage of GDP as the relevance of FDI flows depend on their magnitude with respect to the size of each country's economy.

Additionally, the amount of *personal remittances* is introduced to account for some form of labor mobility and migration, which are expected to increase in a globalized world. The variable is used in the model as a percentage of GDP to take country size into account.

Moreover, a measure regarding trade barriers, such as the *import tariff rate[2]*, is included. It is the average of the effective applied rates weighted by the product import shares that correspond to each partner country and the data starts around 1990 for most countries. For European Union members, the tariff rate is the same as they apply a common tariff schedule. Therefore, data for these countries refer to data for the EU as a whole regardless of when the country became a member of the EU and the tariff rates do not represent the tariff schedule applied before the EU membership. The import tariff rate accounts for trade policy changes, meaning that if it is reduced, countries liberalize their economy and become more open, while if it is raised, countries move towards a greater level of protectionism.

In addition to the four key factors of globalization mentioned, several variables are taken into account in the study as they may also have an effect on within-country income inequality and need to be included as controls.

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[2] Metadata definition from the World Bank.

To account for country specific factors, I add the *adjusted net national income per capita*, that is the GNI minus the consumption of fixed capital and natural resources depletion. It is measured in current US dollars; therefore, the logarithm is taken to remove the dimension of the variable. For comparative results, the variables that are quantified in currency units are expressed in a common currency and consequently, they are all included in current US dollars.

Furthermore, a measure for the quality of the government and the nature of political institutions such as the *rule of law* is introduced in the model. According to the Worldwide Governance Indicators, the rule of law captures the perceptions of the extent to which agents have confidence in the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (Kaufmann et al., 2010). The variable is normally distributed, ranging from approximately -2.5 to 2.5, being -2.5 the weakest governance performance and 2.5 the strongest one. Data starts in 1996 and the variable is included using its change from year to year.

Additionally, I use the *human capital index*, which is based on years of schooling and returns to education. The data is retrieved from the Penn World Tables (PWT) and it accounts for some factor productivity across countries. However, the variable has no natural units and therefore there is no natural interpretation in absolute values, only in relative terms. (See Feenstra et al. (2013), PWT 8.0: A user guide on human capital index for more detail on how it is computed).

A dummy variable is used to identify the degree of *development* among countries. It equals 1 if the country is developed and it equals 0 if it is a developing country. It is created according to the classification of the World Economic Situation and Prospects (WESP) by the United Nations, which classifies all countries of the world into one of three broad categories: developed economies, economies in transition and developing economies. For simplicity in the analysis, I decided to have only two categories and reclassify the countries from economies in transition into one of the other two categories depending on the GNI per capita they have. So, countries with upper-middle income fall into the developed category whereas lower-middle-income countries fall into the developing one. This variable is of special interest as it allows to identify differences on income inequality depending on the level of development of the country.

Finally, the level of *inflation*[3] is included to provide a rationale for macro stability and uncertainty factors. It shows the rate of price change in the economy and it is measured by the annual growth rate of the GDP implicit deflator, which is the ratio of GDP in current local currency to GDP in constant local currency.

The data for this set of variables is gathered from the World Development Indicators Database from the World Bank, the UNCTAD Database and the International Monetary Fund Database. In the appendix section, Table 1 can be found, which contains a summary of the descriptive statistics of all the variables included in the model.

The final dataset used for the analysis covers a sample of 68 countries, 38 of them are developed and 30 are developing countries, which have been selected according to the availability of data. The list of the countries included can be found in Table 2 in the appendix section. The time horizon of the study goes from 1980 to 2018, so there is a total of 39 years with annual data. Each country/year constitutes one observation and therefore the total number of observations is 2652.

5. METHODOLOGY

I use panel data on developed and developing countries from several regions of the world to try to identify the effect of economic globalization on income inequality.

Firstly, as the panel data is unbalanced with some missing values, I interpolate linearly between observations, repeating this exercise for the different variables whenever is possible. After the interpolation, the dataset is still not perfectly balanced, so the observations for which there is no data are automatically omitted from the regression.

In the model, the variables included must be stationary. Using the Augmented-Dickey Fuller test, one can check whether the series contain a unit root. The null hypothesis states that there is a presence of a unit root, while the alternative hypothesis is that the variable is stationary or trend-stationary.

Unit roots can generate spurious regressions which lead to problems in statistical inference and therefore all the variables need to be stationary. After conducting the test, I found that all variables are stationary in levels, that is they are I(0), with the only

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[3] Metadata definition from the World Bank.

exception of the human capital index and the adjusted income per capita which are I(1). These two variables are stationary in first differences and therefore, they should be included in the model using their variation from year to year. Moreover, the change in the rule of law, which is already in first differences, is also stationary.

As previously described, I am accounting for country-specific effects as well as time-specific effects with panel data. Hence, the basic specification of the model is as follows:

$$GINI_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \eta_i + \eta_t + \varepsilon_{it}$$

Where X_{it} is a vector containing the main regressors which are a proxy for globalization indicators, Z_{it} is a vector containing all the control variables representing country specific effects, η_i represents the time invariant unobserved country specific effects, η_t are the unobserved time specific effects common to all countries, and ε_{it} is the error term. The subscript i refers to the country, ranging from 1 to 68, and the subscript t refers to the year, ranging from 1980 to 2018.

Variations on the base model are introduced for a further and deeper analysis during this study, by changing some of the regressors or adding more controls.

Panel data allows us to conduct diverse analyses: a pooled OLS, a fixed effects estimation, which is considered a within estimation, and a random effects estimation. The major problem with the pooled OLS regression is that it does not distinguish between the different individuals. Therefore, if individuals are combined by pooling them, the heterogeneity that may exist among them is denied and it is assumed that all individuals are the same. On the one hand, the fixed effects model allows for heterogeneity among individuals (in the current study among the different countries) by allowing each of them to have its own intercept value. In this case the intercept differs across countries but it does not vary over time. On the other hand, in the random effects model all individuals have a common mean value for the intercept, controlling for an unobserved heterogeneity which is constant over time and is not correlated with the independent observed variables.

Before conducting the analysis, it is necessary to determine which is the best estimation method. Firstly, I run the Breusch-Pagan Lagrangian Multiplier test to check whether there is homoskedasticity and therefore I can use the pooled OLS regression, or if conversely there is heteroskedasticity. In the test the null hypothesis implies homoskedasticity. Since the p-value obtained is very small, meaning that the null

hypothesis is rejected and heteroskedasticity is assumed, I should not use the pooled OLS but use one of the specific effects models instead.

Afterwards, I run the Hausman test to decide between the fixed effects and the random effects model. It checks how similar the fixed and random effects coefficients are to each other, with the null hypothesis being the random effects model the appropriate one. I obtain a p-value close to 0 and smaller than 0.05; thus, the results are significant which means that the coefficients differ. Consequently, the suitable model is the fixed effects following the rejection of the null hypothesis.

According to the results from the previous tests, I conduct a fixed effects model analysis, partialling out variables that are time invariant. The different models employed are specified below.

Model 1

$$GINI_{it} = \beta_0 + \beta_1 \, Trade \, Openness_{it} + \beta_2 \, FDI \, Inflows_{it} + \beta_3 \, Remittances_{it} + \beta_4 \, Tariff \, rate_{it} + \eta_i + \eta_t + \varepsilon_{it} \tag{1}$$

Model 1 represents the simplest model, with only four regressors which are the direct variables used as a proxy for globalization. No control variables are included so there may be a problem of omitted variable bias. Yet it is interesting since it provides a first idea of the direction of the effects.

Model 2

$$GINI_{it} = \beta_0 + \beta_1 \, Trade \, Openness_{it} + \beta_2 \, FDI \, Inflows_{it} + \beta_3 \, Remittances_{it} + \beta_4 \, Tariff \, rate_{it} + \beta_5 \, Z_{it} + \eta_i + \eta_t + \varepsilon_{it} \tag{2}$$

Model 2, in addition to the key indicators of globalization, contains the vector Z_{it} which refers to the control variables consisting of the human capital index, the change in rule of law, the income per capita and inflation. In this model, the whole sample is analysed together, without distinction regarding the development level. Again, it is estimated using

fixed effects under the assumption that unobserved variables leading to heterogeneity can be associated with the observed ones.

Model 3

$GINI_{it} = \beta_0 + \beta_1 \, Trade \, Openness_{it} + \beta_2 \, FDI \, Inflows_{it} + \beta_3 \, Remittances_{it} + \beta_4 Tariffrate_{it} + \beta_5 Z_{it} + \beta_6 Trade * Development_{it} + \beta_7 FDI * Development_{it} + \beta_8 \, Remittances * Development_{it} + \beta_9 \, Tariff * Development_{it} + \eta_i + \eta_t + \varepsilon_{it}$ (3)

Finally, Model 3 is the main model of the analysis and the more complete one. It contains the same regressors as in Model 2 and moreover, there is included an interaction term for each of the key globalization indicators with the level of development.

The interactions allow to analyse the effects for the two groups of countries, developed and developing, separately as they might act in different directions. Each of the four main variables (trade openness, FDI inflows, remittances received and import tariff rate) is multiplied by the dummy variable *Development*, which equals 1 if the country is developed and equals 0 if the country is in the developing group. It is interesting to use the whole sample in the analysis and introduce interaction terms as this way one can measure whether the differences between the effects on developing and developed countries are significant.

6.   RESULTS AND DISCUSSION

This section presents the results of the analysis and discusses them by providing some intuition behind the outcomes. The results for the three models are summarized in Table 3 below. Column 1 is the reduced fixed effects model with only the main four key globalization indicators. Column 2 shows the results for model 2 which is an extension of the first model in which I add some control variables. Finally, column 3 is the main model of the study with the interaction terms included.

Table 3. Results

	(1)	(2)	(3)
Trade Openness	0.0304	0.0398	0.0199
	(6.83)***	(8.09)***	(2.55)**
FDI inflows	-0.0178	-0.0006	0.3090
	(-1.79)*	(-0.06)	(6.25)***
Remittances	-0.1568	-0.1559	-0.1681
	(-5.47)***	(-5.02)***	(-4.99)***
Import tariff rate	-0.0444	-0.0004	-0.0482
	(-3.35)***	(-0.02)	(-1.66)*
Human Capital Index		-19.1498	-15.5592
		(-2.82)***	(-2.35)**
Change rule of law		-1.4357	-1.2513
		(-1.60)	(-1.44)
Income per capita		-3.9026	-3.5853
		(-2.60)***	(-2.45)**
Inflation		-0.0033	-0.0010
		(-1.16)	(-0.38)
Trade * Development			0.0285
			(2.73)***
FDI * Development			-0.3240
			(-6.43)***
Remi * Development			0.2553
			(2.39)**
Tariff * Development			-0.6693
			(-5.63)***
Observations	1738	1315	1315
Adjusted R-squared	0.9223	0.9308	0.9355

Note: The t-statistics are reported below each coefficient in parentheses. Additionally, the level of significance is detailed: (*) significance at 10%, (**) significance at 5% and (***) significance at 1%.

From the results, one can notice that the number of observations declines as the control variables are included, which is due to limitations in data availability. Furthermore, the adjusted R-squared increases, being the main model (Model 3) the one with a higher value. The R-squared measures the proportion of the variance in the dependent variable that is explained by the independent variables included in the model and it ranges from 0 to 1. Therefore, the higher the R-squared, the better is the prediction of the model. Nevertheless, as one includes independent variables in the model, the R-squared tends to increase. The adjusted R-squared tries to correct this by accounting for the number of

observations and the amount of regressors added in the model. Yet high values of the adjusted R-squared may not be very informative and should be interpreted carefully.

In the following part, I discuss the results obtained for the main regression model (Model 3) by interpreting whether the signs of the coefficients are plausible and make sense from an economic perspective and by offering an explanation for the differences observed between developing and developed countries.

Trade openness. Trade openness is found to increase income inequality in both developed and developing countries. The coefficient is positive in both cases and it is significant at 5%, while the interaction term with the development level is significant at 1%. However, the effect is greater for developed countries, whose coefficient is twice the size of the one for developing countries. This is consistent with the hypothesis that more globalization is related to greater income inequality, as it implies that the impact of trade on inequality is more important for developed countries, which already have a higher degree of globalization since they are more integrated into the world economy.

According to the theory, international trade increases the return to the factor which is relatively abundant and lowers the return to the factor that is scarce. As developed countries are relatively skilled abundant, trade openness raises the return to skilled labor relative to unskilled labor, increasing this way the wage gap and income inequality. Consequently, I argue that the H-O model and the Stolper-Samuelson theorem are correct for developed countries as they anticipate greater inequality. However, they fail at predicting the results for developing countries, where they foresee a reduction in inequality as developing countries are relatively well-endowed with unskilled labor. Nevertheless, the result shows an increase in income inequality in developing countries as well, suggesting that maybe the H-O model and the Stolper-Samuelson theorem are not suitable for the period analysed, which refers to more recent globalization episodes.

The increase in inequality in developing countries might be because trade implies a transfer of unskilled jobs from developed countries to developing countries, but those work positions are considered skilled-intensive in developing countries. Therefore, demand for skilled labor increases in both areas, which in turn raises income inequality also in developing countries.

In the same line, Verhoogen (2008) and Fajnzylber and Fernandes (2004) argue that exporters in developing countries are pressured by foreign consumers to increase the

average quality of the goods and produce according to the quality standards of developed countries, which are higher than the standards that prevail in developing-country markets. Thus, it generates more demand for better-skilled workers, which increases the wage gap and raises income inequality in developing countries. At the same time, as developing countries trade more with developed ones, they become more exposed to their innovations and modern skill-intensive technology. So, trade openness accelerates the flow of physical capital which leads to a technological upgrading implying greater demand for skilled labor and resulting in a widening of the wage gap and income inequality in developing countries. This argument is also stated by Meschi and Vivarelli (2008).

FDI inflows. Results show an increase in income inequality related to FDI inflows for developing countries, while the opposite effect is found for developed countries where income inequality is expected to decline with FDI inflows. That is both coefficients are highly significant at 1%, but with a positive sign for developing countries and a negative sign in the case of developed countries.

A similar intuition as with trade openness regarding developing countries follows for FDI inflows. FDI inflows into developing countries represent a direct transfer of resources from developed countries together with a transmission of technology. This technology is addressed to the skilled labor force and therefore the demand for skilled workers in developing countries raises relative to unskilled workers, which generates wage disparities and an increase in income inequality. Moreover, generally, the activities outsourced by developed countries can be considered low-skill intensive, but in developing countries they are high-skill intensive. Consequently, this constitutes another channel for which demand for skilled labor increases and ultimately inequality rises in developing countries.

However, in developed countries, the opposite effect is observed and there is a decrease in income inequality related to FDI inflows. By directly investing in developed countries, competition in domestic markets raises, thereby enlarging the productivity levels and achieving economies of scale which leads to a more efficient allocation of resources. The increase in efficiency and productivity and the smaller costs allow for a reduction in prices. Thus, consumers and in general less-skilled workers benefit from globalization and FDI.

Remittances received. The impact of the remittances received on inequality for developing countries is negative, with the coefficient being significant at 1%, while for developed countries the effect is positive and the interaction term is significant at 5%.

In developing countries, there is a great share of migration of unskilled or less-skilled workers since migration typically involves unskilled labor from developing countries to developed countries. The wage and income of unskilled workers are lower and one can assume that they come from poorer families. Therefore, by working abroad in advanced economies where they earn more and by sending back home the money, they see their income and their families' income increase with respect to the rich. Thus, the wage gap is reduced and income inequality within developing countries declines.

The opposite impact holds in developed countries, where generally there is a higher level of education, so a bigger share of migrants corresponds to high-skilled workers. By going abroad to work they earn more than what they were already doing, and assuming that the more skilled workers come from richer families, one can conclude that they contribute to increasing the income gap and therefore inequality raises as their income increases compared to the poor in developed countries.

Import tariff rate. The tariff rate works in the opposite direction as trade openness, as if it is reduced, the country moves from an autarky position to a more open economy. Its negative coefficient, which is significant at 10%, indicates that higher tariff rates are associated with more equal income distribution. Moreover, the interaction term is also negative and significant at 1%.

If tariff rates are increased, it is more costly for countries to trade and therefore trade decreases. According to the hypothesis that globalization increases inequality, one can expect a decline in income inequality in both developed and developing countries since it represents a deglobalization process.

The impact on the Gini coefficient is negative regardless of the level of development, however, it is worth noticing that the size of the effect is greater for developed countries, meaning that changes on the tariff rate policy have bigger effects on income inequality in advanced economies. As developed countries trade more and are more integrated into the global economy, tariff rate changes are more likely to have a greater influence on trade volumes and change the degree of globalization in developed countries, ultimately impacting more their income distribution.

Human capital index. Even though I cannot interpret the size of the coefficient of human capital as the variable does not have natural units and it can only be interpreted in relative terms, the coefficient is negative and significant at 5%, which gives some intuition on how education affects inequality.

The variable has the expected sign and it is in line with previous literature. As education is distributed throughout the population, the supply of skilled workers increases, which then reduces the return to skilled labor and therefore the wage differential between the skilled and unskilled workers declines. Consequently, countries with a higher human capital index show lower levels of income inequality.

Rule of law. The coefficient of the change in rule of law has the expected negative sign, denoting that improvements in the rule of law are related to more equal distributions of income. Nevertheless, it is not significant at any of the conventional levels.

As institutions' quality gets better and government practices are more efficient, property rights are ensured and the rules of society improve. Thus, inequality within the country is reduced as there is more fairness and the government cares more about setting egalitarian goals. Moreover, better policies can reduce income inequality by improving crime and violence levels and the tax system, and by establishing public welfare programs aimed at the poor. To some extent, the rule of law can be associated with the government's moral values and its expenditure, especially on education, health and social welfare, since government spending can be a tool to address the issue of income inequality and compensate for the poor in order to reduce inequality within a country and achieve a more equal income distribution.

Adjusted net income per capita. The coefficient of the adjusted income per capita is significant at 5% and it has the expected negative sign. Hence, there is a negative relationship between income per capita and inequality, which means that the increase in the average income per capita is due to the income of the poor raising more than the income of the rich. Therefore, there is income convergence and within-country inequality decreases. The income of the poor relative to the rich would increase if the demand for unskilled labor increases, thus raising the wage of unskilled workers. Also, the remittances received by the poor families increase their income, affecting the income distribution and inequality.

Inflation rate. Regarding inflation, I find an inverse relationship with income inequality, meaning that an increase in the price level is related to less inequality. Yet, the coefficient is not significant at any of the conventional levels. Moreover, the coefficient has the opposite expected sign since it is a measure of economic uncertainty and according to Goldberg and Pavnick (2007), it usually leads to greater inequality. Trade openness can generate price variation; thus, a positive price shock may decrease inequality since higher prices of exports would raise the return to the factor used intensively, as stated by Mohtadi and Castells-Quintana (2009). In the case of developing countries that use unskilled labor intensively, the wage of unskilled workers increases and therefore the wage gap declines and so does inequality. However, in the current study, there is no differentiation for the impact of inflation on inequality in developing and developed countries. This could be a line of future research.

7. SENSITIVITY ANALYSIS

In this section, I conduct a sensitivity analysis to evaluate the robustness of the results previously obtained. The model is performed for different subsamples, separating the developed countries from the developing ones. Additionally, an alternative measure of income inequality is used as a dependent variable.

Again, all the variables included must be stationary, so it is necessary to check whether the new series introduced in the sensitivity analysis contain a unit root. Using the Augmented-Dickey Fuller test, I found that the new dependent variable, the share of national income held by the top 10% of the population, and the two controls added, the government expenditure as a percentage of GDP and the population growth rate, are stationary in levels, which means that they are I(0) and they do not need further transformation.

First, using the same specification as in Model 2, I undertake two different regressions, one for the subsample of developed countries and another one for developing countries. By doing so, I am accounting for potential different effects for developed and developing countries regarding the control variables as well and not only for the main globalization regressors as in Model 3. Moreover, I include two more control variables, the government expenditure as a percentage of GDP and the population growth rate, which were excluded

in the main analysis due to their lack of significance. Both variables are retrieved from the World Development Indicators Dataset from the World Bank.

On the one hand, governments are able to reduce income inequality as social spending can be addressed to compensate the poor and the sectors of the population that lose the most in the process of trade liberalization (Rudra, 2004). Therefore, an increase in government spending is expected to reduce the inequality among the population. On the other hand, the population growth rate can affect income inequality by having an impact on the age distribution of the labor force. A higher rate represents an increase in the supply of young and unskilled workers. As the supply of unskilled labor increases, their return is reduced and consequently, income inequality rises (Alderson and Nielsen, 2002).

In Table 4 found below the results of the sensitivity analysis are reported for developed and developing countries separately.

Table 4. Comparison between developed and developing countries

	DEVELOPED	DEVELOPING
Trade Openness	0.0118	0.0076
	(2.25)**	(0.76)
FDI inflows	-0.0102	0.2998
	(-1.41)	(4.85)***
Remittances	-0.0376	-0.0736
	(-0.50)	(-1.65)*
Import tariff rate	-0.0335	-0.1994
	(-0.33)	(-4.82)***
Human Capital Index	28.0943	-29.8804
	(3.93)***	(-2.80)***
Change rule of law	0.5809	-1.5159
	(0.64)	(-1.07)
Income per capita	3.5643	-4.9177
	(1.85)*	(-2.16)**
Inflation	-0.0016	-0.0256
	(-0.76)	(-1.99)**
Government Expenditure	-0.1501	0.03886
	(-2.79)***	(0.50)
Population Growth	-0.4242	-0.1866
	(-2.74)***	(-0.30)
Observations	740	572
Adjusted R-squared	0.8713	0.9097

Note: The t-statistics are reported below each coefficient in parentheses. Additionally, the level of significance is detailed: (*) significance at 10%, (**) significance at 5% and (***) significance at 1%.

When computing the analysis separately for the two subsamples, the outcomes are in general terms less significant than when using the whole sample and introducing interaction terms with the level of development.

In the case of developed countries, coefficients have similar signs as in the main model, with the following exceptions. The coefficient of remittances received is now negative but insignificant and the change in the rule of law presents a positive sign but is not significant either. The adjusted net income per capita exhibits a positive relationship with inequality being significant at 10%, and finally, the human capital index is also related to greater inequality as it is highly significant at 1%.

The human capital has the opposite expected sign indicating an association with higher inequality levels. Since the variable reflects the average level of education it could be the case that the poor are not improving their education level with respect to the rich, but the rich, who already have higher education, enlarge it even more. Being a more open economy may raise the price of human capital in developed countries, so households invest less in education as it becomes more expensive. As its price increases, the poor cannot afford the same level of education, and the ones that invest in human capital are the rich, thus increasing their skills and their return. Consequently, the education gap between rich and poor increases, leading to greater income inequality.

However, no significant results emerged from this robustness check concerning the main variables which are a proxy for the level of globalization. Only trade openness is associated with higher Gini coefficient levels as it is positive and significant at 5%. Alternatively, the coefficients of government expenditure and population growth are both negative and highly significant at 1%. The government expenditure variable has the expected sign but the population growth rate is found to have a negative coefficient which is the unconventional sign. Following Campante and Do (2010), an inverse relationship can be established between population growth and inequality. The youth constitute a high fraction of people that can demand changes in government, asking for more benefits and better opportunities. Therefore, when the proportion of youth increases, relative to the total population, the distribution of income can be larger and more equal.

Regarding developing countries, all the coefficients have the same sign as the main model. Yet this time inflation and income per capita are significant at 5%. However, government expenditure, which is positive and therefore has the opposite expected sign,

and the population growth rate, which is negative and has not the expected sign either, are both insignificant.

Furthermore, a second sensitivity analysis is conducted. In this case, I use the share of national income held by the top 10% of the population as an alternative measure of income inequality to examine the robustness of the Gini-based results. The data is retrieved from the World Income Inequality Database (WIID) and it is useful as the share of income accumulated by a fraction of the population ranked by income levels reflects the inequality in the distribution of income. The portions of the population that are ranked at the bottom by personal income receive the smallest shares of the total national income. Therefore, an increase in the share of income held by the top fractions represents an increase in inequality as they constitute already the richest population, which means that they are gaining income share at the expense of poorer income levels.

In this robustness check, I use the same model as in the main analysis, including the same control variables and interaction terms, with the only difference of the change in the dependent variable. The results are reported in Table 5 below.

The model consists of 1178 observations, which is less than in the main model, and the adjusted R-squared is 0.8765, which is also smaller than when using the Gini coefficient as a dependent variable.

When employing the share of income held by the top 10% as a dependent variable, I find similar results as with the Gini coefficient. Trade openness is associated with increasing inequality as the coefficient is positive, but it is only significant for developing countries, as the interaction term with development is not significant. Regarding FDI inflows and the remittances received, the same relationships are found: FDI is positive and the remittances variable has a negative coefficient for developing countries, while the opposite impact is recovered for developed countries, being FDI negative and the remittances positive. The import tariff rate has an inverse relationship with inequality in both developing and developed countries. However, only the interaction term with development is significant while the coefficient of tariff rate is not significant at any of the conventional levels.

Table 5. Results of the effect of globalization on the share of income held by the top 10%

	Share of income top 10%
Trade Openness	0.0002 (3.07)***
FDI inflows	0.0014 (2.64)***
Remittances	-0.0007 (-2.09)**
Import tariff rate	-0.0003 (-1.08)
Human Capital Index	-0.0489 (-0.69)
Change rule of law	0.0059 (0.64)
Income per capita	-0.0246 (-1.56)
Inflation	0.00001 (0.61)
Trade * Development	-0.00002 (-0.22)
FDI * Development	-0.0015 (-2.81)***
Remi * Development	0.0019 (1.83)*
Tariff * Development	-0.0044 (-3.32)***
Observations	1178
Adjusted R-squared	0.8765

Note: The t-statistics are reported below each coefficient in parentheses. Additionally, the level of significance is detailed: (*) significance at 10%, (**) significance at 5% and (***) significance at 1%.

None of the control variables are found to be significant at any of the conventional levels of significance. Despite this, it is worth discussing the signs of the coefficients. Both the human capital index and the adjusted income per capita are related to lower levels of inequality, decreasing this way the share that is held by the top 10% of the population. This is consistent with the outcome of the main model analysed in the study. Nevertheless, the change in the rule of law and inflation are found to have a positive sign, meaning that they are related to greater within-country inequality. These results are in contradiction with the ones obtained when using the Gini coefficient as a dependent variable.

From the two sensitivity analyses performed, several conclusions can be derived. First, as it has been shown, it is better to use the whole sample and introduce interaction terms instead of conducting the regressions separately depending on the level of development, as results are generally more significant and robust. Second, the introduction of the control variables government expenditure and population growth rate is of special interest, particularly for developed countries where they appear to be highly significant. Yet it is an issue that needs further research as when the variables are introduced in the main analysis, they are insignificant. Finally, comparing the results obtained using the Gini coefficient and the share of income held by the top 10%, I conclude that it is more suitable to use the Gini coefficient as a measure of income inequality as it provides more significant coefficients. The share of income is a more limited variable in the sense that there are a lot of observations missing for several countries. Therefore, not all the 68 countries of the main analysis could be included in the sensitivity analysis, especially many developing countries.

8. CONCLUSIONS

This paper studies the relationship between economic globalization and income inequality within countries, accounting for differences in the development level. The empirical analysis covers a sample of 68 developed and developing countries over the time period 1980-2018 and it focuses on the impact of trade openness, FDI inflows, the remittances received and the import tariff rate on the Gini coefficient. Based on the obtained results I conclude that most of the globalization indicators have a positive impact on income inequality, thus showing an association between economic globalization and within-country inequality.

Trade openness has a similar impact in both developed and developing countries. The coefficient is positive in the two cases meaning that it is linked to greater inequality, yet the effect is more important in the case of developed countries. This result indicates that the Heckscher-Ohlin model and the Stolper-Samuelson theorem predict correctly the results for developed countries while they fail for developing countries, suggesting that maybe these theories do not apply to the globalization wave under study.

Regarding the import tariff rate, the coefficient is negative in both cases. Therefore, reductions in the tariff rate, denoting higher liberalization, are associated with bigger

inequality levels. This is consistent with the hypothesis that globalization and a more integrated world economy with lower tariff rates lead to more inequality. However, this finding is not consistent with the theory of convergence, as developing countries also see their income inequality level increase with liberalization of trade.

In the case of FDI inflows and remittances received I found different results depending on the level of development. On the one hand, FDI is associated with decreasing inequality in developed countries while it is related to greater inequality in developing countries. On the other hand, the personal remittances are found to increase inequality in developed countries and to decrease it in developing ones.

For the control variables, no distinction regarding the development level has been made and therefore, the same conclusions apply for both developed and developing countries. The human capital index and the adjusted net income per capita are the two negative and statistically significant, which denotes that improvements in these measures are identified with lower Gini coefficient levels. At the same time, the change in the rule of law and inflation have a negative coefficient as well, but in this case, there is an absence of relationship with income inequality as they are not significant at any of the conventional levels.

Additionally, a sensitivity analysis has been conducted using the share of national income held by the top 10% of the population as an alternative measure of income inequality. Similar results to the ones using the Gini coefficient arise. Thus, it provides support to the outcomes of the main study as the two findings are consistent regarding the impact of the key globalization indicators.

The main limitation concerning the study is the availability of data. Several countries are not included in the sample due to a lack of data for the time period analysed. It is difficult to obtain accurate data, especially for developing countries and as a result, Africa has no representation in the analysis. Despite the progress in recent years, it is still quite challenging to measure inequality within developing and poor countries due to the low frequency and the lack of comparability of the data. Therefore, large time period samples are not available for this group of countries.

Additionally, as previously mentioned, the use of the Gini coefficient also implies some limitations since it does not give any intuition of the different sources of inequality and it may report similar inequality values even though the income distributions differ.

Although statistically different results are obtained for the two groups of development level, the study could be improved by using a more detailed or complex classification of the countries, since the development indicator is a dummy variable taking values either 0 or 1 for simplicity.

This paper also opens some future lines of research. It makes evident that a data quality upgrade is required in order to enrich the existing empirical evidence and conduct wider and more extensive analyses. At the same time, there may be other forces regarding globalization driving inequality and thus, additional factors can be considered in coming studies to develop a deeper understanding of the relationship between economic globalization and income inequality.

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APPENDIX

Table 1. Descriptive statistics of the variables

Variable		Mean	Standard Deviation	Minimum	Maximum
Gini coefficient	Overall	36.17	9.45	19	63.3
	Between		8.89	24.18	56.85
	Within		3.45	24.11	51.06
Trade Openness	Overall	80.42	57.59	11.54	437.32
	Between		52.56	21.66	351.9
	Within		20.92	-16.88	232.34
FDI inflows	Overall	3.58	6.69	-58.32	86.58
	Between		3.9	0.14	22.74
	Within		5.7	-77.47	77.43
Remittances	Overall	2.008	3.97	0	34.49
	Between		3.61	0.01	19.55
	Within		2.3	-17.48	20.86
Import tariff rate	Overall	5.39	6.94	0	88.43
	Between		4.77	0.46	31.48
	Within		5.01	-18.38	62.33
Human capital index	Overall	0.02	0.01	-0.01	0.16
	Between		0.008	0.004	0.06
	Within		0.01	-0.05	0.12
Change rule of law	Overall	0.002	0.07	-0.3	0.41
	Between		0.02	-0.07	0.07
	Within		0.07	-0.28	0.39
Income per capita	Overall	0.02	0.05	-0.48	0.28
	Between		0.007	0.009	0.04
	Within		0.05	-0.48	0.28
Inflation	Overall	50.51	482.15	-26.29	15444.38
	Between		106.61	0.31	595.77
	Within		469.9	-549.96	14899.13
Development	Overall	0.55	0.49	0	1
	Between		0.5	0	1
	Within		0	0.55	0.55

Source: Data from World Bank, UNCTAD and IMF, SWIID, WIID and PWT.

Table 2. List of countries

DEVELOPED COUNTRIES		DEVELOPING COUNTRIES	
Armenia	Japan	Argentina	Kyrgyz Republic
Australia	Kazakhstan	Bangladesh	Malaysia
Austria	Latvia	Bolivia	Mexico
Azerbaijan	Lithuania	Brazil	Moldova
Belarus	Luxembourg	Chile	Pakistan
Belgium	Netherlands	China	Panama
Bulgaria	New Zealand	Colombia	Paraguay
Canada	Norway	Costa Rica	Peru
Croatia	Poland	Dominican Republic	Singapore
Czech Republic	Portugal	Ecuador	Thailand
Denmark	Romania	Georgia	Turkey
Estonia	Russian Federation	Honduras	Ukraine
Finland	Slovak Republic	India	Uruguay
France	Slovenia	Indonesia	Venezuela, RB
Germany	Spain	Korea Republic	Vietnam
Greece	Sweden		
Hungary	Switzerland		
Ireland	United Kingdom		
Italy	United States		

Source: Data from the WESP by the United Nations classification.