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Trade and Income Inequality: an Empirical Analysis of Europe

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I. INTRODUCTION

Since the 18th century, the world has experienced an enormous acceleration in the process of globalization due to improving transportation, communication and technology. The increase and intensification of global interactions have, amongst other things, resulted in a huge expansion of international trade. Anno 2019, the world trade makes up more than 60% of the world's GDP and within Europe this is more than 80% (WorldBank, 2021). The increased trade volumes in the last decades have sparked a heated debate among economists about the costs and benefits of global economic integration, with two competing arguments: one stating that global trade has increased welfare in general and the other being that globalization has resulted in increased inequality levels within countries. The following quote from The Economist perfectly describes the two conflicting views on the matter: *"Growth really does help the poor: in fact it raises their incomes by about as much as it raises the incomes of everybody else…. In short, globalization raises incomes, and the poor participate fully"* (The Economist, 2000)

In the last 40 years trends of raising inequality levels are noticed. The ratio between the wealthiest 10 percent of the world population and the poorest 10 percent has increased from 7 to 9.5. Following the same trend, the Gini coefficient had an average value of 0.29 in the 1980s, but by the late 2000s, it has risen by nearly 10 percent, to an average value of 0.32 (OECD, 2019). All this, while the world has, on average, experienced fast increasing economic growth rates (Worldbank, 2021). Economic growth is considered to be promoted by higher levels of globalization which in terms is related with high levels of trade liberalization (Leitao, 2012).

In general, this thesis seeks to add to the literature on the trade-inequality relationship by examining the impact of increased total trade volumes on income inequality levels in both developed European countries and less developed European countries. The focus of this study is thus Europe. Why particularly Europe has been chosen, is due to several reasons, which shortly will be mentioned now, but discussed later in more detail when the academic relevance will be further elaborated. At first, studying Europe creates an opportunity to see whether trade-inequality relationships found in worldwide studies, will be the same and also significant in Europe, where both the inequality and trade differences between countries are 'smaller'. Secondly, since it is very much debated how trade volumes with major forces like China, India and the United States will influence European countries in the long run, and

whether Europe will be able to keep up, it is very interesting to study how these increasing trade volumes are affecting inequality levels in Europe. By a better understanding of the consequences, it could help policymakers with decisions regarding trade regulations with these major forces. The last reason why Europe is chosen, is the current economic integration within Europe, or better said the European Union (EU).

The main aim is to see how the inequality results vary, based on a countries' stage of development. This thesis will delve further into the trade-inequality relationship by analysing 38 European countries which experience different stages of economic development. This has led to the following research question: *How is the effect of a country's total trade volume on its income inequality different for developed and less developed European economies?*

This paper is academically relevant in multiple ways. First, it is important to note that a lot of theoretical models, empirical analyses and research has been done on this topic. Many economists have tried to capture the relationship between trade and inequality, but there has not yet been a clear consensus as to how the two are exactly related. This paper will therefore try, using more recent and longer data, to add more understanding about the topic in the literature. Secondly, most literature focuses on the general relationship between trade and inequality, leaving out how this effect might be different for developing and developed countries. The articles that do take this difference into account almost all analyse a worldwide panel with a clear contrast between the most developed countries of the world and the poorer developing countries (e.g. Berg and Nilsson (2010); Rodriguez-Pose (2012); Milanovic (2005)). Both inequality and trade differences are very large throughout the countries analysed in these studies. Looking at Europe, the economic development differences are not as big as they are worldwide. Europe does not have the poverty and inequality levels, that African or South Asian countries do. Since 2000, no countries are classified as 'developing' anymore and there are only countries left which are listed as 'economies in transition'. This means that they are in between the developed and developing stage (United Nations, 2000). The difference in the impact of trade on the inequality levels will therefore be harder to trace, but not less relevant. It will be interesting to see whether these smaller differences generate the same correlations and whether these are still significant. Lastly, this thesis is of high relevance in the discussion of the current European integration. Even though the European Union (EU) is under a lot of pressure from many nationalist parties with strong anti-European opinions, the trend of further social and economic European integration has increased a lot

throughout the last years. First it must be noted that more countries are joining the EU, Croatia was the 28th member to join in 2013, leading to more trade liberalization within the EU and more common trade policies regarding trade with non-members. Secondly, even European countries like Belarus and the Ukraine, which have not joined the EU, also experience increased levels of trade (WorldBank, 2021). With these two points in mind, it must be questioned whether equivalent trade policies, aiming at more liberalization, is favorable for both developed and transition economies. There is a lot of debate on whether the positive effects of trade liberalization depend on the stage of development and if these common policies are really favorable for less developed countries as well. So, for the European economies in transition, it is of importance to know whether trade will enhance or reduce income inequality more than it does for developed economies. Moreover, with a more integrated Europe there is more and more realization and acknowledgement that each member state's economic and social success is dependent on developments in other member states, as well as how EU-level establishment and regulations effect inequality in the countries (Filauro & Fischer, 2021). It is thus recognized that social success (where within-country inequality can be seen as one of the pillars), is affected by the level of economic integration (trade). It is then also found that the levels and patterns of inequality are likely to impact people' faith in the EU institutions and in further integration (Milanovic, 2005).

The structure of this thesis will be as follows. The next section reviews important literature that discusses empirical studies about the relationship of trade openness and income inequality levels. It will also elaborate upon the theoretical framework of these studies. Section 3 describes the data, variables, methodology and models that will be used. Section 4 includes the results. It will provide with some descriptive statistics, followed by main findings of this study. Last, the results will be interpreted, the limitations and implications for future research will be discussed and a conclusion will be made.

II. LITERATURE REVIEW

There has been a lot of research about the trade-inequality relationship. Academic theories as well as empirical analyses have tried to capture the relationship between trade and inequality levels in both developed and developing countries. The famous trade theory, the Hecksher-Ohlin (H-O) model will be extensively discussed in this section as well as the Stolper-Samuelson theorem, the Convergence theory and the Dependency theory. Results of most empirical studies seem to fail the predictions made by the H-O model and Stolper-Samuelson theorem. In general, these theories predict that higher levels of trade openness will decrease within-country inequality for developing countries and increase it for developed countries. This section can be divided into three main streams. Namely, literature and theories that found (1) no significant trade-inequality relationship, (2) positive relationship between trade levels and inequality for both developed and developing countries, and (3) significant relationships between trade and inequality but different for developing and developed countries. The following section will discuss the most import findings in the above-mentioned order.

2.1 No significant trade-inequality relationship

2.1.1 Convergence Theory

The convergence theory is a neo-classical theory which is often used when studying growth-inequality relationships. The theory suggests that low-income economies tend to grow at faster rates than high-income economies which allows low-income economies to eventually 'catch-up' with the high-income economies. This effect is often referred to as the 'catch-up effect'. There are several arguments which explain why low-income economies would experience higher growth rates. The first argument is based on diminishing marginal returns, which implies that as an economy's human and physical resources grow, the marginal benefits in terms of economic growth will decline. Developed countries, which are capital-abundant, experience more diminishing returns on capital and so it is argued that in developing countries growth rates are higher (Ghose, 2001). Secondly, it is suggested that capital and technological improvements for low-income economies are easier since they can apply technologies and techniques used by high-income economies whereas they must invent new ones. Which leads to the last argument that low-income economies can benefit from the experiences of high-income economies and learn from it (OpenStax Economics, 2016).

In terms of the trade-inequality relationship, the convergence hypothesis predicts that with higher levels of trade liberalization, the growth rates and income levels per capita in developed and developing countries will eventually converge. Even though this is still focused on inequality levels between countries, it implies that with more trade, income in developing (poorer) countries will increase at a higher rate than the income in developed (richer) countries (Fischer & Serra, 1996).

With higher growth rates and income levels in developing countries, nothing yet is said about the within-country income distribution. The validity of the convergence hypothesis is more often evaluated when looking at the patterns of economic growth and cross-country inequality between low-income countries and high-income countries. Benabou (1996) names the first stage of convergence: *the first momentum*, where developing countries catch up with developed countries in terms of growth rates and incomes. The income distribution within countries is part of what is called *the second momentum.* Benabou (1996) states that most versions of the neoclassical growth model also suggest that there is convergence in *the second momentum*. Empirically his results were inconsistent, and he concluded that only countries with the same fundamentals will benefit from within country inequality convergence. Lin and Huang (2011) find overwhelming evidence of convergence in income distribution within a country. Their results indicate that initial high-inequality states improve more on the distribution of income than initially low-inequality states. Also Ravallion (2003) finds evidence for within country inequality convergence, where inequality falls more in countries where inequality is initially higher. As a result of these findings, it can be argued that more trade will decline income inequalities in low-income countries more than it will in high-income countries where inequality is initially lower. However, this would totally depend on the starting phase of the economies, and it cannot be said beforehand which way the relationship between trade and inequality will go.

2.1.2 Empirical evidence

To start, many studies did not find any significant relationship between the trade openness and inequality. Jersuit et al. (1999) investigated the effect on developed countries during the mid-1980s and early 1990s and found that economic globalization is not a critical factor explaining the inequality trends. Dollar and Kraay (2004) found that, on average, growth rates lead to proportionate higher income levels for the poor, but they found no systematic effect of trade openness on inequality nor did they find a significant effect of changes in the

trade volumes. While Bussmann et al. (2005) focused on the effect of Foreign Direct Investment (FDI) on inequality (measured by the income received of the poorest 20 percent), he also found that other economic openness measures, such as the trade-to-GDP ratio, are not linked to higher levels of income inequality.

2.2 Negative trade-inequality relationship

Reuveny and Li (2003) found a clear significant trade-inequality relationship when looked at the impact of both economic openness and democracy on inequality. Inequality was measured with the Gini coefficient, and economic openness included trade flows, foreign direct investment (FDI) inflows and financial capital inflows. The study was done with data from 69 countries during the period of 1960-1996. Since this study looked at the impact of both democracy, trade, FDI and financial capital inflows, they applied a pooled time-series, and cross sectional research design, wherein the result on inequality where negative and significant at 5% for both developing countries and less developed countries. Interesting in this study is that they controlled for past inequality levels which generated positive significant outcomes, suggesting that inequality levels reveal inertia. Meaning that the inequality levels show very little activity in consecutive years.

Jaumotte, Lall and Papageourgiou (2013) did a similar study where they also not only looked at the trade-inequality relationship but also studied the financial market, with FDI in particular. Just as Reuveny and Li (2003) they found a negative trade-inequality relationship but a positive FDI-inequality relationship. Their analyses consisted of 51 countries over a 23-year period. The dataset covered information from 1981 to 2003. Jaumotte, Lall and Papageourgiou (2013) disaggregated the effect of trade into subsections including imports and exports but found no significant effect since the two were correlated at 87 percent. After dropping the imports and all the insignificant disaggregated FDI data, they found that inequality is reduced with roughly 3.4 percent when there is one standard deviation rise in the export coefficient. This study then further disaggregated exports into agriculture, manufacturing and services and found that the inequality is mostly influenced by the change in exports in the agricultural sector. Even though both positive, the effect is larger in developing than it is in developed countries.

2.3 Positive trade-inequality relationship

Most of the empirical research has analysed positive relationships between trade and inequality, where trade in most studies is a factor or consequence of economic globalization. In the following studies significant positive relationships are found for both developed and developing economies. Research differs mostly on basis of the time frame and countries analysed. Beyer, Rojas and Vergara (1999) investigated the relationship in one country, Chile, during the 1990s. It was found that trade liberalization widens the gap between the skilled and the unskilled workers due to new mechanisms found. Those include labour market frictions, offshoring, incomplete contracting and within-industry effects due to heterogenous firms.

2.4 Different trade-inequality relationship for developed and developing economies

2.4.1 Hecksher-Ohlin and Stolper-Samuelson

The most popular theory regarding trade openness and inequality is the H-O theory. This theory explains the relationship between the two by a model of skilled and unskilled workers, where the former is more abundant in developed countries and the latter in developing countries. Countries will export the good which uses the abundant factor intensively and it is assumed that wages for unskilled workers are initially lower in developing countries than they are in developed countries. In this model, trade openness lowers income for unskilled workers in developed countries and thus increases inequality. Wages go down due to downward pressure exerted by the increased trade volumes with developing countries. The same effect predicts that in developing countries wages for unskilled workers will increase, and thus decrease inequality levels (Heckscher, 1919).

The Stolper-Samuelson theorem is considered to be the extension of the H-O theory due to the addition of the prices of goods into the model. The theorem states that trade liberalization will boost the demand for exported products and so raise the prices of these goods. As a result, the return of the abundant factor in the trading countries will be higher. Oppositely, the demand for the scarce factor will fall due to trade liberalization, reducing its price (Fischer & Serra, 1996). Consequently, the relative price of the abundant factors, used intensively in the exported good, rises compared to the scarce factors used in the production of the imported good. (Samuelson, 1948).

2.4.2 Dependency Theory

Where the H-O theory state that trade will benefit the developing countries more in terms of inequality levels than it will benefit (or even hurt) the developed countries, the dependency theory states the opposite. It states that trade liberalization is more favourable for developed countries because their benefit comes at the expense of developing countries. Developing countries are labour intensive and will mostly export primary goods when trade opens up. These primary goods will be manufactured in the developed countries, who will then sell it back to the developing countries at a much higher rate (Ferraro, 2008). As a result, manufactured goods become relatively more expensive than primary goods, resulting in a worsening in terms of trade of the developing countries (Balassa, 1986). Important here is that this theory is mostly focused on inequality levels between countries. The worsening in terms of trade does not explicitly assumes an effect on within country inequality.

2.4.3 Empirical evidence

To start and most importantly for this investigation, is the research of Milanovic (2005). He found evidence that exactly contrasts the predictions of the H-O model. He concluded that with higher levels of trade openness, inequality increases for countries with low-income levels whereas it reduces inequality for countries with middle- and high-income levels. Not only the trade openness but also direct foreign investment was taken here as an independent variable determining inequality. Milanovic (2005) gathered his data directly from household surveys, which will be different from the way that this investigation will be set up.

Two more similar analyses to this thesis, are the two semi opposing multi-country investigations of Bergh and Nilsson (2010) and Rodriguez-Pose (2012). The former examined 80 countries all over the world in the period of 1970 to 2005. Bergh and Nilsson (2010) found a strong positive relationship between economic freedom policies (trade liberalization) and inequality. Most importantly they concluded that this effect was much larger for richer countries and almost insignificant for less developed countries. The latter investigated the same relationship in almost the same time period (1972-1996) but made a slightly different conclusion. Just as Bergh and Nilsson (2010) did, Rodriguez-Pose (2012) found a positive and significant relationship between trade openness and income inequality. However different from the previous mentioned research, it was found that trade regimes have a bigger and longer-lasting impact on the inequality in low- and middle-income countries than in more developed countries. This is explained by government structures and

economic characteristics that tend to enhance the trade-inequality effect. This empirical analysis was based upon a cross-sectional panel data set of 35 less developed countries (LDCs) and 11 advanced industrialized economies all over the world. Since this paper also looks at the difference between countries with different development levels, these two papers are highly relevant. Where these papers apply a cross-sectional panel across the entire world, this paper will focus only on Europe and thereby automatically focus on countries where economic development is somewhat less diverse. The less economic developed countries in Europe are currently classified as “Economies in Transition” and experience higher economic activity than developing countries or low-income countries as mentioned by Bergh and Nilsson (2010) and Rodriguez-Posé (2012).

III. DATA AND METHODOLOGY

3.1 Methodology

3.1.1 Fixed effects with panel data

In order to analyze the relationship between trade and inequality over time, a Panel Fixed Effect regression will be conducted. A panel fixed effects regression is favorable when the relationship between two variables must be investigated while controlling for the effect of some other factors. In a panel data situation, a fixed effects regression is a way to estimate relationships between variables, whilst controlling for time-invariant unobserved individual factors that might be associated with the independent variable. This regression will control for country fixed effects since the interest of this study is to look at the differences between countries and not in possible characteristic changes of a country other than the changes in the variables interested in.

Hsiao (2000) states two advantages of using fixed effects in a regression: 1) it is possible to connect individual- and/or time-specific effects with control variables (or explanatory factors), and 2) there is no need to separately investigate the possible correlation patterns between the factors. However, also some disadvantages are mentioned which need to be taken into consideration: 1) the problem called *the classical incidental parameter problem*, which is relevant for this regression since it occurs with a finite number of observations, and 2) panel fixed effects cannot estimate time-invariant coefficients.

Furthermore, Stock and Watson (2008), list the four assumptions of fixed-effects regression models. They take the following model as an example: $Y_{it} = \alpha_i + \beta' X_{it} + u_{it}$, where i = 1,..., n and t = 1,….,T, and X_{it} = a vector of strictly exogenous regressors. Assumption one states that X_{it} and u_{it} are independent from each other and follow an equal distribution. The second assumption states that there must be strict exogeneity: $E(u_{it}|X_{i1}, \ldots\ldots, X_{iT}) = 0$. Third, there must be no perfect multi-collinearity. This is the case when there is no unique solution to the regression, and it cannot be derived which solution is better: $Q_{\tilde{x}\,\tilde{x}} = ET^{-1}\sum_{t=1}^{T}\tilde{X}_{it}\tilde{X}'_{it}$. The last assumption is that the observations of the error terms are uncorrelated with each other, or how Hsiao (2000) calls it *conditionally serially uncorrelated errors*: $E(u_{it}u_{is}|X_{i1}, \ldots\ldots, X_{iT}) = 0$, for $t \neq s$.

Endogeneity

One of the assumptions: strict exogeneity is one of the most important problems to tackle when setting up a good regression model with the data available. This is why this assumption will be discussed separately in a bit more depth. As mentioned, for there to be strict exogeneity the following condition must hold: $E(u_{it}|X_{i1}, \ldots\ldots, X_{iT}) = 0$. The expected value of the error term, given the independent variables, must equal zero. If this assumption does not hold, the coefficient of the independent variable will be biased. This condition depends on three factors which will all be discussed separately.

1. *Omitted variables:* if there are omitted variables which are correlated with the independent variable, they cause a violation of this condition.
2. *Measurement errors of the independent variables:* measurements errors in the independent variable also cause a violation of the exogeneity problem.
3. *Reversed causality:* one speaks of reversed causality if there is a way in which the dependent variable can cause the independent variable. More specifically, can higher inequality levels influence trade volumes? Research shows that this is a problem that needs careful consideration since inequality has found to affect certain aspects of economic growth. One of the studies that confirmed this relationship was of Shin (2012), who found that, besides a clear inequality-economic growth relationship, inequality tends to reduce economic growth for countries in an early stage of development. Countries that are moving towards the steady-state do no experience this effect. Since trade is considered one of the pillars at which economic growth is measured, this study suggest that a reversed relationship is possible. Mo (2000) made roughly the same conclusions with his findings: inequality negatively affects economic growth. These studies both show the possibility of reversed causality being a problem for this research. It needs to be carefully considered and taken into account when analyzing the results.

The Hausmann test will provide further insights to the endogeneity problem. In a regression model the Hausmann test identifies endogenous regressors. They are also called predictor variables and are those values that are influenced by the model's other variables. Since the error term cannot be correlated with any of the variables, endogenous regressors will lead the estimators of the coefficients to fail. It must be determined whether predictor variables are endogenous deciding on the appropriate regression technique and the Hausmann test will do

this. As for panel data specifically, it will determine whether a fixed or random effect model will be more appropriate. It tests whether either the null hypothesis (random effect is preferred) or the alternative hypothesis (fixed effect is preferred) holds. The test thus basically seeks to check whether there is a link between the error term and the model's regressors. Having performed the test, the p-value of the Hausmann test turned out smaller than 0.05 meaning, that the null hypothesis is rejected.

3.1.2 The model

In order to best answer the research question the following model will form the basis of the regression:

$$Inequality_{it} = \beta_0 + \beta_1 TGDP_{it} + \gamma Z_{it} + \beta_3 TGDP * DEV_{it} + \varepsilon_{it}$$

Where, '*i'* denotes the number of a country, '*t'* denotes a given year, '*TGDP'* denotes the trade to GDP ratio, Z_{it} is a vector containing all the time and country specific control variables, '*TGDP*Development'* represents the interaction between the dummy variable of development (takes the value 1 if a country is developed) and the trade to GDP ratio, and ε_{it} represents the error term of the regression.

This model was constructed in three steps, or better: three small adjustments were made to a very basic linear regression:

In the first step, the effect of trade on inequality will be regressed with a linear regression where no other variables are added other than the constant and the error term.

Model (1):

$$Inequality_{it} = \beta_1 TGDP_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where, $\alpha_i = \beta_0 + \beta_2 Z_i$, denoting country-specific intercepts expressing heterogeneities across countries. In this equation Z_i is an unobserved variable that is different for each country but does not change over time. λ_t denotes the time fixed effects.

Next, an interaction term between the development dummy and trade is added to the regression. This term is of high importance for this research since it will indicate any differences between transition countries and developed countries.

Model (2):

$$Inequality_{it} = \beta_1 TGDP_{it} + \beta_2 DEV_{it} + \beta_3 TGDP_{it} * DEV_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

Last, four control variables will be added to Model 2. These control variables are based on the findings from the literature review. They are added to control for competing explanations. This model will help solve some endogeneity due to missing variables in the model. It will adjust for them in order to avoid any omitted variables bias.

Model (3):

$$Inequality_{it} = \beta_1 TGDP_{it} + \beta_2 GE_{it} + \beta_3 GS_{it} + \beta_4 DEM_{it} + \beta_5 PGROWTH_{it} + \beta_6 EDU_{it} + \beta_7 DEV_{it} + \beta_8 TGDP_{it} * DEV_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

Model 3 will be the main model of this research.

3.1.1 Sample size and time frame

The sample size that will be used in this research exists of 38 European countries. The decision of using exactly those 38 countries was based mainly upon the yearly World Economic Situation and Prospects Report.

An essential part of the academic relevance of this paper is found in the time frame of this analysis. This analysis will be based upon a long and recent dataset. The time frame analyzed will be 1995-2015, with no missing data for any of the variables.

3.2 Data and Variables

3.2.1 Independent variable

In order to measure the independent variable: trade, the trade to GDP ratio of countries is used. Total exports and imports are added and then compared to the GDP of the country. One can expect more trade liberalization when this number is higher. One thing to take into consideration is that the trade volumes depend on a lot of country specific factors such as trade policies, a country's geographical location and the size of the economy (Bussmann, Soysa, & Oneal, 2005). However, in the literature, this ratio is still the most common measure representing economic openness and trade expansion. The data for the 38 countries is retrieved from the World Bank.

In the regression, there is also a dummy added which represents the development level of the country. This dummy is equal to 1 if the county is developed, and equal to 0 if it is in economic transition. For the classification of the developed economies and the transition economies, the World Economic Situation and Prospects (WESP) report by the United Nations (UN) report was followed. A limitation of using a dummy in a fixed effects regression is that when the dummy takes on the same value during the 21 years observation, the variable is dropped.

For this reason some robustness checks will be carried out wherein the development stage of a country will be measured by another variable. The UN bases the classification of countries into different stages of development on three main pillars: (1) GNI per capita (measured in US dollars using Purchasing Power Parity (PPP), (2) longevity (measured by life expectancy at birth), and (3) education (measured by a proxy combining actual and expected years of schooling) (Nielson, 2011). The World Bank uses another measure for the classification of countries. It only uses GNI per capita to divide countries in either group I of group II. The UN classification is universally recognized as the most accurate measure since it takes into account more than just income, which is why it is used in the main model of this thesis. However, GNI per capita will be used to perform some robustness checks. The data will be retrieved from the World Bank.

3.2.2 Dependent variable

For the dependent variable, inequality, the Gini coefficient will be used. The Gini coefficient was developed by Corrado Gini in 1912 and is derived from the Lorenz curve. The Lorenz curve depicts the distribution of income (or wealth) within an economy by showing the cumulative share of income from different parts of the population (Haughton & Khandker, 2009). The Gini coefficient represents the area between the Lorenz curve and the line that indicates a total equal income distribution. The Gini coefficient ranges from 0 to 100 where zero represents perfect equality in a country. It is a ratio analysis tool which makes it simple to be interpreted and it can be used to make cross-country comparisons, showing shifts in the income distribution over time (Darity, 2008). This coefficient is worldwide the most popular measure of inequality. The data for the Gini coefficient are retrieved from the World Bank. Important to note is that the Gini coefficient that will be used is the Gini representing income after tax redistribution. Income after tax redistribution is chosen for this study because government policies in different countries could very well influence inequality levels.

3.2.3 Control variables

With the dependent and independent variable set, several other variables need to be taken into account since they might affect the income inequality within countries. In all the trade-inequality research there are certain recurring factors that are incorporated in the models because they are believed to influence both trade levels and income distribution in countries. Factors were also added because they could explain why empirical analyses failed to meet the theoretical expectations. Five control variables were chosen based on the literature and this section will discuss why they were chosen and how these will be included in the regression as control variables.

Government effectiveness

To start, Cornia (2003) recognised the significance of successful institutions, arguing that failing to consider the quality of domestic institutions is one of the reasons why shifts in within-country inequality, especially in the less-developed countries, contradict the assumptions of the original trade theories. Additionally, according to Rodriguez-Pose (2012) in countries with low-quality institutions, which are more prominent in developing countries, experience higher levels of trade induced income inequality changes as well as they form an important trade barrier. Developing countries with more trusted and better performing institutions are preferred as trading partners over countries that do not have stable institutions. It was thus considered that by adding the effectiveness of domestic institutions as a control variable the effect of trade on inequality would be better captured (Rodriguez-Pose, 2012).

Therefore, the quality and effectiveness of the institutions needs to be considered. What is the nature of the political institutions? Does the society have faith in the political institutions in place? This could have an effect on the income distribution of a country. To capture this in the regression, the variable *GE* will be added and controlled for. For this variable, data from the Worldwide Governance Indicators will be used, which measures the government effectiveness by measuring ‘the rule of law’. The rule of law reflects agents' views of the degree to which they trust society's laws, the quality of contract enforcement, property rights, the police, and the courts, and the risk of crime and abuse (Kaufmann, Kraay, & Mastruzzi, 2010). This variable takes a value between -2.5 and 2.5, where 2.5 represents a perfectly strong governance performance.

Government spending

Rodriguez-Pose (2012) and Rudra (2004) also emphasize the importance of government spending when investigating the trade-inequality relationship. By high levels of social expenditure, countries can redistribute the wealth by compensating that part of the society that suffered due to the increased trade volumes. However, the degree to whether this is effective differs between the developing and developed countries. Developing countries frequently lack redistributive capacity so that compensation for the 'losers' of increased trade is less likely. Rudra (2004) finds that in developed countries all social expenditure leads to a reduction in income inequality while in developing countries only health and education are considered to have a significant effect. All by all, they controlled for government expenditure to better grasp the effect of trade on inequality. This was measured by the expenditure on education and health in particular.

GS will be added as a control variable to represent the government expenditure on health of the country. As discussed in chapter 3, Rudra (2004) found that government expenditure was best measured in terms of education and health. However, since this analysis controls for education separately, this variable will only include government expenditure on health. The data will be retrieved from the World Development Indicator (WDI) database, provided by the World Bank, where expenditure will be measured as the share of GDP spent on healthcare.

Democracy

In addition, Rudra (2004) and Reuveny and Li (2003) also consider the type of political regime in place. This is because in countries with a democratic political regime in place, income seems to be more equally distributed. In democratic countries, the low and middle-income groups are better represented which leads to more redistributive public policies, reducing income inequality. In authoritarian states, the distribution of income follows a very skewed line where the top of the country (the elite) controls all the capital (Rudra, 2004). Reveuny and Li (2003) find that both in developed and developing countries, democracy is positively related to the reduction of inequality levels. Rudra (2004) finds that democracy is only a significant factor in the reduction of income inequality in developing countries, not in developed countries which are almost all strong democratic regimes. It should be taken into account that no European countries are classified as developing countries and that the countries in transition are more developed than the countries in the research mentioned.

However, since Reuveny and Li (2003) found that it also plays a significant role in developed countries, the strength of democratic regime was added as a control variable in their research (Reuveny & Li, 2003).

A control variable named *DEM* will thus be added to the regression to take into account the strength of the democratic regime within the country. The variable will take a value between -10 (authoritarian countries) and +10 (pure democracies). The time-series data is retrieved from the Polity IV Project dataset. This is a popular source in inequality studies.

Population growth

Population growth is suggested to influence the effects of international trade on income inequality. In his research Ghose (2001) finds that rapid population growth might slow down and hold up the positive effects of trade on inequality. Also, high population growth rates are linked to higher levels of inequality and, as a result, a reduced likelihood of reaching a more even within-country income distribution (Rudra, 2004). Thus it is suggested that population growth is added as a control variable in models that study trade-inequality relationships since increasing growth rates could explain part of the inequality effect (Ghose, 2001).

Population growth will be taken into account, by adding a variable named *PGROWTH.* The data for this variable will again be retrieved from the WDI database where this is measured as the percentage of annual population growth.

Education

Education in itself is found to be a very important factor in the income distribution of a country. With higher supplies of skilled workers, countries seem to have more equal income distributions (Lee & Lee, 2018). Alderson and Nielson (2002) find a significant negative relationship between inequality and high levels of secondary school enrolment. The same relationship is found by Meschi and Vivarelli (2008) who conclude that by increasing the supply of skilled workers inequality tends decrease. However, other papers describe the opposite effect happening; Feliciano (1993) and Crenshaw and Ameen (1994). They both concluded that with higher levels of education, wage for the skilled workers tend to increase thus increasing inequality. Even though different conclusions are made in these papers about the direction of the relationship between education and inequality, the papers do seem to agree that there is a significant relationship that needs to be controlled for.

EDU is added to the regression to control for the human capital index concerning the education. This variable focuses on the years of schooling and in particularly secondary schooling. The data is collected from the WDI database and measures the net percentage of children enrolled in secondary school. Since the percentage is taken at a net value, only those children who are in the official age group for attending secondary school are taken into account.

Entering EU

The last control variable that will be added to the dataset is the whether or not countries are a Member State of the EU. Being part of the EU could come with some advantages regarding trade (think of trade arrangement between Member States). Therefore, a dummy will be added that takes the value of 1 if a country is part of the EU, and takes the value of 0 if not. This data will be retrieved from the official website of the EU.

IV. RESULTS

4.1 Descriptive statistics

Before discussing the main findings of the results, it is important to review the descriptive statistics of this dataset. By interpreting the descriptive statistics some basic information and conclusions of the panel data can be drawn, which will help understand the main findings. Table 1 summarizes the statistics of all the variables that will be used in the regression.

Table 1. Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Median	Min	Max
TGDP	798	97.87	47.56	86.95	13.39	408.36
Gini	796	30.14	4.62	29.70	22	43.1
GE	798	0.86	0.93	0.91	-1.19	2.35
GS	798	7.60	1.74	7.57	4.12	11.58
PGROWTH	798	0.17	0.80	0.17	-3.85	2.89
EDU	666	88.20	7.03	89.62	54.59	99.83
DEV	798	0.62	0.49	1	0	1
EU	798	0.62	0.49	1	0	1

The first thing to look at are the values of the mean and median. The mean is calculated by first adding all the observations, and then divide the sum by the number of observations in that variable. The median on the others side is the value of the middle observation when all observations are ranked from high to low (Nijs & Klausen, 2013). Whenever the mean and median have the same value, which is only the case for the population growth variable, the variable follows a normal distribution. If this is not the case, and the mean and median have different values, they have a skewed distribution (Nijs & Klausen, 2013). Even though the values are not the same, they are all not that different. This could indicate that there are no extreme outliers in the data since this would have strong impact on the mean without changing the median. A skewed distribution could be fixed by introducing log values of a variable and using this in your regression instead of the original values. Using log values also simplifies the interpretation of the coefficients.

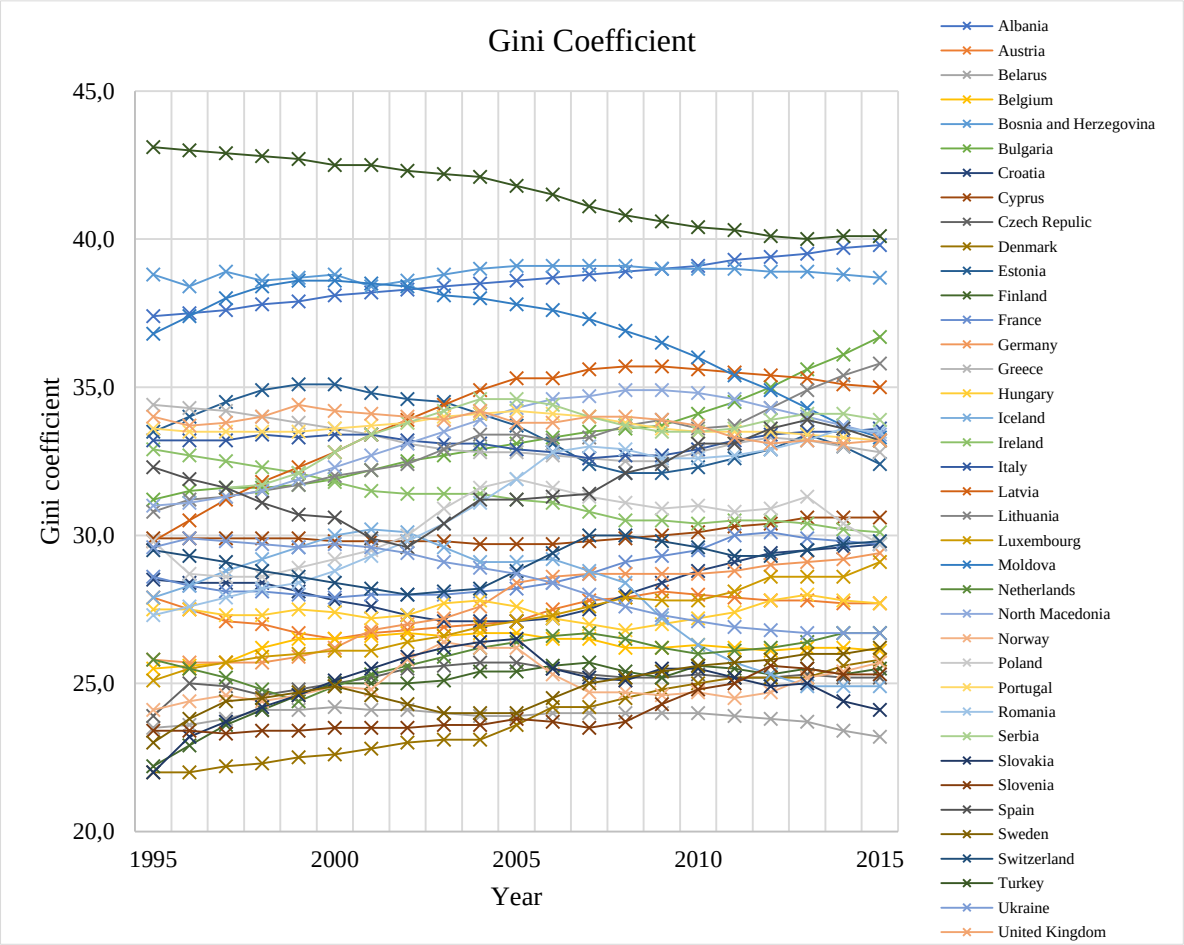
Secondly, the exact same values of the Development dummy and the EU dummy must be analysed. All countries that join the EU are all considered to be developed countries according to the UN classification. To make this clear, Bulgaria joined the EU in 2008 and also transitioned into a developed country. Without suggesting that the one causes the other, it is important to note that the values are exactly the same. It will therefore be unnecessary to add this variable in the main dataset. However, when using GNI per capita, it could be interesting to control for this.

As shown in table 1, the variable EDU, representing the percentage children enrolled in secondary education, includes some missing observations. The dataset includes 798 observations but misses 2 Gini coefficients, and 132 education percentages. This will decrease the scale, and thus accuracy, of the dataset.

The next thing interestingly to observe is the minimum and maximum values of the Gini coefficient, which are 22 and 43.1. The Gini coefficient of 22 indicates the lowest inequality of this dataset, coming from Denmark in 1995. In 2015, the inequality in Denmark has increased to 25.8. The Gini coefficient of 43.1 comes from Turkey in 1995 and is the highest in the data. Compared to the rest of the world, this is still relatively average. Anno 2021, highest inequality numbers come from South Africa (63.0), Namibia (59.1) and Zambia (57.1).

Next, two graphs will be provided in order to gain some more understanding about the Gini coefficient. The trends in time will be analysed and the differences between the developed and transition economies will be noted.

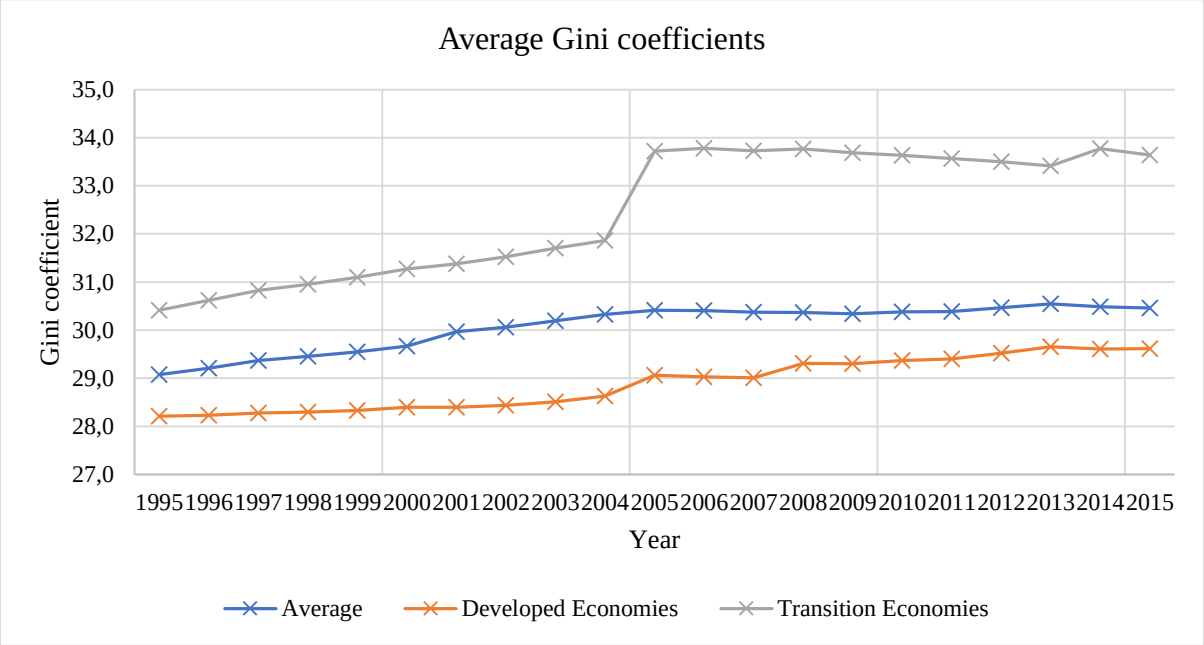
Graph 1. Trends in the Gini coefficient over time



Graph 1 shows the variation in inequality of all the 38 countries throughout the years. There are a few things worth discussing. As mentioned, inequality in European countries is often lower than in non-European countries, but as shown in graph 1, especially the Nordic countries and Eastern Europe experience low inequality. For the Nordic countries (Sweden, Norway and Denmark), low inequality rates could be expected since they are among the wealthiest countries in Europe with aggressive redistributive tax systems. However, this makes it more surprising for countries in Eastern Europe to experience such low inequality rates. In 2015, Graph 1 shows that Belarus experiences the lowest inequality within Europe, followed by Slovakia, Czech Republic and Slovenia. Fuest, Nieheus and Peichl (2013) argue that the low inequality rates in most Eastern Europe countries are due to the effectiveness of the redistributive character of pensions. The inclusion of pensions had a huge impact on inequality rates for the Czech Republic but also for Germany and France. Others argue that their communistic past still plays a role here. Notable is also that not all Eastern countries follow this trend. The Baltic States (Estonia, Latvia and Lithuania) are considered part of

Eastern Europe but experience relatively high inequality rates and are more comparable with Southern European countries like Spain and Portugal. Turkey, Albania and Bosnia and Herzegovina clearly experience the highest inequality rates. In 1995 Moldova started with similar values, but its values decreased substantially more over time than the values of the other three countries.

Graph 2. Comparision of Gini trends in developed and transistion countries



Graph 2 shows the general differences between developed and transition economies. The blue line indicates the average of all the countries in the dataset throughout the time period. Transition economies show, as expected, higher inequality rates than developed economies. In 2005, the transition economies seem to experience a substantial increase in the Gini coefficient. The explanation is found within the dataset used. There are 9 countries in 2005 that were listed as transition economies in the years prior but now entered the pool of developed countries. These countries experienced relatively low inequality rates compared to other transition countries, keeping this average relatively low. Furthermore, there seems to be a slight increase in inequality rates over the years in both developed and transition countries.

4.2 Main findings

The following section of this thesis summarizes the main findings of the analysis and examines them. Table 2 shows the main findings of the three models introduced in the previous section. The first column includes the outcome with only trade included in the

regression. In the second column the four main control variables were added and lastly, column 3 shows the main regression where also an interaction term between development and trade was added.

Table 2. Main results

Dependent variable: *Gini coefficient*	**(1)**	**(2)**	**(3)**
log Trade	2.41***	2.80***	4.09***
	(3.08)	(3.36)	(4.19)
*log Trade*development*		-2.90***	-4.63***
		(-2.03)	(-4.12)
Government effectiveness			0.46*
			(0.67)
Government spending			0.04**
			(0.24)
Democracy			-0.02
			(-0.36)
Population growth			-0.14
			(-0.60)
Education			-0.04**
			(-0.90)
Number of observations	796	796	655
Adjusted R-squared	0.18	0.24	0.28

Note: the t-statistic of every coefficient is shown in parentheses, and the level of significance is indicated by: (*) for significance under 10%, (**) for significance under 5% and (***) for significance under 1%.

As shown in Table 2, some observations are lost when the control variables are added to the regression. This is due to some missing values in the dataset. Secondly, the adjusted R-squared value is reported for the three models. The R-squared value indicates the percentage of variance in the dependent variable (the Gini coefficient) that the independent variables (the trade to GDP ratio and the other control variables) can explain. However, the R-squared statistic will increase with every variable you include in the regression even though this

variable might not be relevant or significant. One must therefore be very careful with interpreting this statistic. For this reason, the adjusted R-squared statistic is reported in Table 2. This is an adjusted version of the R-squared value which is more precise and takes into consideration the impact of added variables that might distort the normal R-squared values. It only increases in value when the new variable adds value to the regression and will decrease if it does not. Since the fixed effects regression is used, the adjusted R-squared value gives more information. It shows three categories: (1) what percentage of variation in Gini coefficient (the dependent variable) *within* countries (fixed effect unit) does the model capture? (2) What percentage of variation in the Gini coefficient *between* countries does the model capture? And (3) what is the weighted average of the two (Blackwell, 2005)? Table 2 only notes the within variation. As shown in Table 2, the statistic increases throughout the models, which means that model 3 best predicts the model. However, the statistic remains relatively low. indicating that this model still includes a large amount of unexplained variation.

When interpreting the results of the main model (model 3), the first thing to discuss is the trade coefficient being 4.09. This coefficient is significant at 1%. Important to note is that this is the coefficient of the log value of the trade to GDP ratio. This is crucial for the interpretation of the coefficient. The coefficient needs to be interpreted as follows: when the trade to GDP ratio increases by 1%, it is expected that the Gini coefficient increases with approximately 0.04. This indicates that when the trade to GDP ratio increases, so will the Gini coefficient. In other words and very generally, more trade leads to higher inequality levels within countries.

Next and most importantly to discuss is the interaction term between development and trade, which is -4.63 at 1% significance. This means that for transition economies, where the development dummy takes the value of 0, the effect is positive and more trade leads to more inequality. For developed countries, with a development dummy of the value 1, the coefficient is negative (-0.54). This indicates that for developed countries, more trade leads to less inequality. The log value suggests that when the GDP ratio increases by 1%, the Gini coefficient of developed countries decreases by 0.0054 (approximately 0.01).

As for the control variables that are adjusted for in the model, both government spending and education are significant at 5% and government effectiveness is significant at 10%. The other

two variables do not change the estimates of the Gini coefficient and only alter the coefficient of the other variables a bit.

Government Effectiveness (GE) has a coefficient of 0.46 at a 10% significance, indicating that with more effective governmental institutions the Gini coefficient is likely to increase. This is the exact opposite of what is expected to happen according to the findings of previous papers. As mentioned, government effectiveness was measured by the 'rule of law' which represents trust in society's laws, quality of contract enforcement, property rights, the police, and the courts, and the risk of crime and abuse. The results suggest that with increasing levels of this trust in the government, inequality increases.

The effect of Government Spending (GS) is also positive but has a slightly lower coefficient (0.04). Government spending was measured purely by a country's expenditure on health. The findings therefore show that more expenditure in the health sector slightly increases inequality levels.

Lastly, the coefficient of the human capital, measured by the secondary education enrolment (EDU), shows that a higher percentage children enrolled in secondary school, seems to reduce inequality. This is the only variable that follows the predictions made in the previous section. The coefficient is -0.04 at a significance level of 5%.

4.3 Robustness checks

Before going to the next section wherein the result will be interpreted and extensively discussed, it is necessary to run a robustness check. The robustness check will evaluate whether a slight change in the model (using another measure for development) leads to different outcomes. As previously stated, the variable indicating the stage of development is replaced with another variable, namely GNI per capita. This also changes the interaction term that now becomes a product of GNI per capita and the trade-to-GD ratio. The revised model is presented below in table 3. It includes both model (2) and (3) (see Section 3).

Note that as the data for the variable GNI per capita took on large numbers, the data was standardized to have a mean close to zero and a standard deviation of 1.

Table 3. Modified model using GNI as development measure

Dependent variable: *Gini coefficient*	**(2)**	**(3)**
Trade	0.23***	0.21***
	(4.04)	(3.55)
*Trade*GNI*	-0.32***	-0.26*
	(-1.20)	(-1.32)
Government effectiveness		0.06
		(0.54)
Government spending		-0.04
		(-0.85)
Democracy		0.05
		(0.84)
Population growth		-0.06**
		(-2.15)
Education		-0.03
		(-0.48)
EU		-0.03
		(-0.61)
Number of observations	766	637
Adjusted R-squared	0.21	0.25

Note: the t-statistic of every coefficient is shown in parentheses, and the level of significance is indicated by: (*) for significance under 10%, (**) for significance under 5% and (***) for significance under 1%.

As shown in Table 3 there are some changes in the results when the development dummy is replaced by the GNI per capita variable. Most importantly, the signs of the coefficients of the main variable have remained the same. In general, trade still increases inequality with a significant coefficient. As for the interaction term between GNI per capita and trade, it is significant at 10%. The coefficient of the interaction term is much smaller than in the main model, yet it is negative and still bigger than the coefficient of trade (in absolute terms). This indicates that when GNI per capita increases in a country, inequality decreases relatively more when trade increases. Since the stage of development is likely to increase, whenever GNI per capita increases, this yields somewhat the same results as the main model.

Important to note is that this regression yields the results for fixed effects. This regression does not yield any cross-country comparisons. It cannot be concluded that for countries with high levels of GNI per capita, inequality will decrease more with higher trade volumes than in countries with low levels of GNI per capita. It can only be said that if GNI per capita increases within a country, that country will likely experience lower inequality rates when trade volumes increase.

The adjusted R-squared value is just as in the main model, relatively low (0.25 for within variation). The estimators in the main model explain 28% of the variation in the Gini coefficient whereas this modified model only explains 25%.

To conclude, even after changing the regression model to include the GNI per capita variable as a replacement for the development dummy (both independently in the model and as an interaction with trade-to-GDP), the results are comparable to those in Table 2. This confirms the existence of significant relationships, as both model estimations show nearly identical findings even with a different measure of development.

V. INTERPRETATIONS AND CONCLUSIONS

5.1 Interpretation of results

5.1.1 Application of the theoretical models

The first and most important thing that can be concluded from the results, is that they do not follow the predictions of the H-O model. Instead, they show exactly opposite effects. Where the H-O model stated that a country will export the good which uses its abundant factor most intensive. For developed countries, these are considered to be the goods demanding the labour of skilled workers and thus increasing demand for skilled workers. Hereby it is assumed that wages for skilled workers go up, increasing the inequality gap with unskilled workers. The opposite is then predicted for developing countries, where the demand for unskilled workers will increase. The results of the regression show the exact opposite. With more trade inequality in developed countries seems to decrease, while inequality in transition countries increases. It might be that this model, developed in 1919, can no longer be applied in modern days with the current levels of globalization that make for more flexible labour markets, and more transparency.

Part of the Convergence theory aligns with the results of this investigation. As mentioned, the theory suggests that capital and technological improvements for low-income economies are easier since they can apply technologies and techniques used by high-income economies whereas they, must invent new ones. Even though the theory focuses on inequality between countries (beneficial for low-income countries), it is assumed that for transition economies to keep up with the developed world, more capital and technological improvements are needed, causing demand for skilled workers to increase in those countries. This will then lead to higher wages and a bigger wage gap.

In the light of the results, the most important study discussed in section two is that of Milanovic (2005). His conclusions come closest to the findings of this paper. With a very different approach (study based on household surveys, not a panel data regression), he also found opposite trade effects for richer and poorer countries. Where this study used the Gini coefficient to indicate inequality, Milanovic (2005) focused only on how increased trade affected the poorest percentile of the country, and how this effect was different for richer and poorer countries. Panel data studies, both studying developed and developing countries, that came closest to the setup of this research are that of Bergh and Nilsson (2010) and

Rodriguez-Pose (2012). However, these studies both concluded a positive trade-inequality relationship for both (although different in the magnitude of the effect) developed and developing countries.

5.1.2 Justification of the results

Now that the results are established and discussed in the light of the famous trade-inequality theories, it is necessary to look into possible explanations. How can it be that trade increases inequality for transition economies and lowers it for developed economies? What could be possible explanations to why Berg and Nillson (2010) and Rodriguez-Pose (2012) did not find a negative trade-inequality relationship for developed countries? It must be noted though, that the trade-inequality relationship is very depending on the explicit circumstances and that the effects are very context-specific. However, there are certain overall elements that can provide some general explanations to the results.

To start, geographics could possibly play a role in increasing inequality levels in transition economies. Inequality is influenced by the various effects that international trade has on local population, such as rural vs. urban regions. Certain areas in transition economies could have found it difficult to cope with the international competition since economic activity inside a country is often concentrated in specific areas. If countries experience inflexibility within the labour market and the change from rural to urban is rigid, the negative impacts of international trade is likely to worsen regional disparities and thus increase inequality. In transition economies the percentage of rural population is (even though it is changing) still significantly higher than for the developed countries.

Secondly, it is important to look at what role large firms take in the advantages of international trade. The worldwide market dominance of big corporations has ramifications for the effects of trade. Large corporations typically take advantage of trade liberalizations at the cost of local businesses, rural agriculturists and for example fishermen. These players are more prone to the increased levels of competition and usually lack funding and extensive knowledge. This makes it harder for small businesses/local producers to compete if trade increases. This could increase inequality. However, this is not a reason that is specifically bound to transition economies and therefore lacks in explaining why this would be relevant for those countries and not for developed countries.

Next, it could be argued that due to increasing trade volumes transition economies are held to higher standards. Exporters in transition economies are under pressure from customers to raise the quality of their goods and products to meet the higher quality standards of the developed countries. These higher standards come hand in hand with increasing demand for skilled workers, and thus raising their wages. Additionally, higher trade volumes increase the movement of physical capital, resulting in technical upgrades and a higher need for skilled workers and a drop in demand for unskilled workers. This argument can be placed in the context of the Convergence theory. In the agricultural sector for example, increased specialization due to technological improvements and increased competition, has led to a fall in the wages of unskilled workers. The technological advancements have lowered their demand.

The last thing that could explain the different effects of inequality on developed and transition economies is the redistribution of the gains of trade. If it assumed that countries as a whole always gain from trade, the effect on inequality could be explained by the fact that developed countries in Europe often have stronger redistributive tax systems than the transitions economies. E.g. in Portugal and the UK the share of personal taxes paid by the top 10% in 2014 was more than 45%, compared to Bulgaria or Slovakia where this was less than 30% (Cantante, 2020). If trade benefits the country as a whole, but this gain is not redistributed, it makes sense that this would negatively impact inequality levels in countries with less redistribution.

5.2 Limitations

The first limitation of this research was the use of the Gini coefficient. There has been a lot of criticism on the use of the Gini coefficient. It is by far the most acknowledged use for measuring income inequalities but still many economists do not seem to agree that it captures a fair description of inequality. The Gini coefficient provides no insight into the many causes of inequality. Countries could have the same Gini coefficient while their income distribution totally differs.

Secondly, the use of the dummy variable in the model was a limitation in the sense that a dummy variable does not allow for any development diversity between countries. A country was either classified as transitioning or as developed. Both Germany and Romania were considered to be developed in 2015, but the difference in development between the two

countries is large. However, the dummy variable does not take these differences into account. It could be that the effect of trade for Germany is significantly different than it is for Romania due to their development differences. In the robustness check, another measure for development was taken; GNI. However, even though the World Bank uses this measure for the development classification of countries it is not considered to take into account enough variables that determine the development stage of a country.

The last limitation regards the availability of data. If more data would have been available, it would have been interesting to investigate a longer time period. However, in many of the East European countries, data that would go further back than 1995 included many missing values.

5.3 Implications for future research

The limitation of the Gini coefficient that was experienced in this investigation, could be controlled for in future research when more research is conducted on measuring inequality. Some of the questions that econometrists could be asking are: what is the exact distribution within a country? What factors are most determinant in these distributions? And moreover, it could be interesting to wonder how the poorest part of the country lives, in order to determine whether inequality is actually a bad thing. If even the poorest part of society lives in good health and have good access to all the basic needs, is inequality always a bad thing? But these questions go a bit beyond the trade-inequality relationship.

The second implication for future research, is based on one of the limitations of this investigation which was found in the classification of countries into different development stages. A very famous categorization determining development is the five stages of Rostow. Herein he sets up five steps which countries need to fulfil in order to become totally developed: 1) traditional society, 2) preconditions to take-off, 3) take-off, 4) drive to maturity and 5) age of high mass consumption (Rostow, 1990). However, one would probably encounter similar problems when focusing on countries within Europe. Development differences are too small to classify them into these categories. A solution would therefor be to step away from a classification into categories and try to measure it with numerical values.

Maybe the most important implication for future research is that of finding suitable control variables. Even though this investigation tried to control for five variables that were found to influence inequality and trade in past analyses, no significant change was found. It is however

unlikely that there are no factors, for which data are available, that can be controlled for to increase the validity of the investigation.

Additionally to the limitations of this research, an implication for future research could be the measure of trade. Milanovic (2005) conducted his research based on household surveys since it was his opinion that the trade/GDP ratio in purchasing power parity terms does not reflect the real trade effects that go hand in hand with inequality. If it is measured how important international trade is for income inequality, this trade must be measured in nominal prices. It matters less what trade does to a country domestically but more to what it directly does to people's earnings. This is determined by how much actual income is earned in this international trade. However, a problem then would be how to create a big panel for data. Milanovic (2005) based his study on household surveys, which is way more difficult to do on a larger scale. Finding a measure that would take both these problems into account could possibly help with further insights.

5.4 Conclusions

This study investigated the relationship between trade and inequality for a country's different stages of development. The analysis was done with 38 European countries which were, per year, classified as a transition economy or a developed economy. The main aim of this study was to see whether the effect of trade on inequality was different for those countries classified as transition economies than for developed economies. The time period that was studied was 1995-2015. It was found that trade increases inequality levels in transition economies and decreases inequality in developed economies.

This is the exact opposite of what is proposed in two most famous theories regarding the trade-inequality relationship: the H-O model and the Stolper-Samuelson theory. It was their prediction that due to an increase in unskilled workers in transition economies, inequality would decrease, and that due to an increase in skilled workers in developed economies, inequality would increase. Even though the results do not find their explanation in these two theories, they do find common ground in the Convergence theory. The conclusion of this study contradicts the findings of Bergh and Nillson (2010) but are precisely in line with those of Milanovic (2005). The results could be explained with three main lines of reasoning:

1) Urban areas are more likely to benefit from international trade and in most the transition economies the percentage of people living in rural areas is higher than for developed economies.
2) Due to more trade liberalization, transition economies are held to higher standards, raising the demand for skilled workers who are expected to be more qualified for the production of these higher quality goods. Also more trade increases movement of physical capital, resulting in technical upgrades in transition economies and thus a higher need for skilled workers who are expected to be more qualified and a drop in unskilled workers whose jobs are more prone to specialization and digitization.
3) Redistribution systems are generally more progressive in developed countries. The gains of trade are more equally spread due to taxing systems, reducing (or at least not worsening) inequality opposed to most transition economies.

Limitations that were found in this investigation mainly concerned the use of the development dummy and thereby the classification of the countries. The Gini coefficient and its limitation and last, the data availability. Implications for future research are then logically connected to these limitations by suggesting other measures for the dependent, control and development variables.

VI. APPENDIX

Table 4. *Classification of Countries per year by 'Developed' or 'Transition' 1995-2005*

Country/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Albania	0	0	0	0	0	0	0	0	0	0	0
Austria	1	1	1	1	1	1	1	1	1	1	1
Belarus	0	0	0	0	0	0	0	0	0	0	0
Belgium	1	1	1	1	1	1	1	1	1	1	1
Bosnia and Herzegovina	0	0	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0	0
Croatia	0	0	0	0	0	0	0	0	0	0	0
Cyprus	0	0	0	0	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0	0	1
Denmark	1	1	1	1	1	1	1	1	1	1	1
Estonia	0	0	0	0	0	0	0	0	0	0	1
Finland	1	1	1	1	1	1	1	1	1	1	1
France	1	1	1	1	1	1	1	1	1	1	1
Germany	1	1	1	1	1	1	1	1	1	1	1
Greece	1	1	1	1	1	1	1	1	1	1	1
Hungary	0	0	0	0	0	0	0	0	0	0	1
Iceland	1	1	1	1	1	1	1	1	1	1	1
Ireland	1	1	1	1	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	1	1	1	1	1
Latvia	0	0	0	0	0	0	0	0	0	0	1
Lithuania	0	0	0	0	0	0	0	0	0	0	1
Luxembourg	1	1	1	1	1	1	1	1	1	1	1
Moldova	0	0	0	0	0	0	0	0	0	0	0
Netherlands	1	1	1	1	1	1	1	1	1	1	1
North Macedonia	0	0	0	0	0	0	0	0	0	0	0
Norway	1	1	1	1	1	1	1	1	1	1	1
Poland	0	0	0	0	0	0	0	0	0	0	1
Portugal	1	1	1	1	1	1	1	1	1	1	1
Romania	0	0	0	0	0	0	0	0	0	0	0
Serbia	0	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	1
Slovenia	0	0	0	0	0	0	0	0	0	0	1
Spain	1	1	1	1	1	1	1	1	1	1	1
Sweden	1	1	1	1	1	1	1	1	1	1	1
Switzerland	1	1	1	1	1	1	1	1	1	1	1
Turkey	0	0	0	0	0	0	0	0	0	0	0
Ukraine	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	1	1	1	1	1	1	1	1	1	1	1

Note: value 1 = developed country and 0 = transition economy

Table 5. *Classification of Countries per year by 'Developed' or 'Transition' 2006-2015*

Country/year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Albania	0	0	0	0	0	0	0	0	0	0
Austria	1	1	1	1	1	1	1	1	1	1
Belarus	0	0	0	0	0	0	0	0	0	0
Belgium	1	1	1	1	1	1	1	1	1	1
Bosnia and Herzegovina	0	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	1	1	1	1	1	1	1	1
Croatia	0	0	0	0	0	0	0	0	1	1
Cyprus	0	0	0	0	0	0	0	0	1	1
Czech Republic	1	1	1	1	1	1	1	1	1	1
Denmark	1	1	1	1	1	1	1	1	1	1
Estonia	1	1	1	1	1	1	1	1	1	1
Finland	1	1	1	1	1	1	1	1	1	1
France	1	1	1	1	1	1	1	1	1	1
Germany	1	1	1	1	1	1	1	1	1	1
Greece	1	1	1	1	1	1	1	1	1	1
Hungary	1	1	1	1	1	1	1	1	1	1
Iceland	1	1	1	1	1	1	1	1	1	1
Ireland	1	1	1	1	1	1	1	1	1	1
Italy	1	1	1	1	1	1	1	1	1	1
Latvia	1	1	1	1	1	1	1	1	1	1
Lithuania	1	1	1	1	1	1	1	1	1	1
Luxembourg	1	1	1	1	1	1	1	1	1	1
Moldova	0	0	0	0	0	0	0	0	0	0
Netherlands	1	1	1	1	1	1	1	1	1	1
North Macedonia	0	0	0	0	0	0	0	0	0	0
Norway	1	1	1	1	1	1	1	1	1	1
Poland	1	1	1	1	1	1	1	1	1	1
Portugal	1	1	1	1	1	1	1	1	1	1
Romania	0	0	1	1	1	1	1	1	1	1
Serbia	0	0	0	0	0	0	0	0	0	0
Slovakia	1	1	1	1	1	1	1	1	1	1
Slovenia	1	1	1	1	1	1	1	1	1	1
Spain	1	1	1	1	1	1	1	1	1	1
Sweden	1	1	1	1	1	1	1	1	1	1
Switzerland	1	1	1	1	1	1	1	1	1	1
Turkey	0	0	0	0	0	0	0	0	0	0
Ukraine	0	0	0	0	0	0	0	0	0	0
United Kingdom	1	1	1	1	1	1	1	1	1	1

Note: value 1 = developed country and 0 = transition economy

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