Erasmus University Rotterdam

International Public Management and Policy (IMP) program

Master thesis

The impact of trade expansion on income inequality: analysing the differences between developed and developing world

Name: Greta Kapustaitė (431481)

1st reader: Prof. Dr. Geske Dijkstra

2nd reader: Prof. Dr. Markus Haverland

Date: 25.07.2016

Word count: 22939

Abstract

The relationship between trade liberalization and within-country income inequality has been observed by a number of researchers, yet in majority of the cases studies have focused on developed states. Due to the fact that gains associated with trade expansion are not equally distributed, as more advanced countries are better able to realize trade-related benefits, there are reasons to expect that trade-inequality effects might differ depending on country's state of development. Consequently, this research aims at contributing to the existing pool of literature by identifying the possible differences in trade impact on within-country income inequality between developed and developing countries. The data used for the purpose of this analysis covers 91 country during the time period from 1999 to 2008. As the results of panel data regression analysis reveal, trade expansion leads to higher inequality, yet an interaction term between trade volumes and variable representing state of development is not significant. Therefore it can be stated that no differences in trade-inequality effects between countries in different stage of development were observed.

Key words: trade, within-country income inequality, income distribution, developing world, developed world.

Acknowledgment

During the process of writing this thesis, a number of people have helped me and supported me. First of all I would like to thank my supervisor, professor Geske Dijkstra, whose guidance, comments and advices from the very beginning were essential and really helped me to move forward with this research. I also want to say thank you to my second reader, professor Markus Haverland, for his comments and recommendations that helped me to improve this thesis. Finally I would like to thank all the members of my thesis circle: Auste Linkeviciute, Nazli Gulijeva, Joost van Damme and Ludo Bolling. Their comments and ideas at the initial stages of thesis writing process made me think about my topic from different perspectives which in turn was really helpful when formulating the central goal of this research.

Table of Contents

List of tables:

List of figures:

List of graphs:

List of appendices:

1. Introduction

Over the years the vast majority of countries all around the world have witnessed a tremendous growth in levels of income inequality. According to OECD reports, the difference between earnings of the richest and the poorest 10% of the population has increased from seven to ten times in most OECD countries since 1980s, and hence the current income gap is the highest in more than three decades. In addition to that, a similar trend has been observed in majority of developing countries (including emerging economies like China, or India) where the difference between the income of rich and poor is said to be five times larger than in developed countries (OECD, 2015). However, it is important to note that such figures reveal only half of the story, as in academic literature, generally three types of income inequality are distinguished: the global inequality (focusing on world income distribution), between–country inequality (based on population weighted mean income) and within-country inequality (reflecting uneven income distribution on a country level) (Milanovic, 2006; Sala-i-Martin, 2002). Looking from the global perspective, findings about the direction of change in global income gap are quite diverse, whereas regarding within-country inequality, the trends are more evident and show growing income gap (Ghose, 2001; Liberati, 2015). Although it has been widely acknowledged that certain level of inequality will always exist, reducing it and achieving more egalitarian income distribution within the country remains important due to the negative effects associated with high income gap. These effects are numerous: inequality threatens country's political stability by dividing the society, limits the potential for economic growth, development, and weakens the effects of growth on poverty reduction (The World Bank, 2007; Jaumotte, Lall, & Papageorgiou, 2013).

In academic literature the issue of inequality has been widely addressed focusing on the potential triggers and one of the common findings of such studies is the effect of economic globalization. More specifically, it has been found that in the context of growingly integrated and interrelated global economy, trade related factors (trade volumes, openness, liberalization, policies) have an impact on economic growth and thus on income levels and changes in inequality levels (Ghose, 2001; Bergh & Nilsson, 2010; Keeley, 2015). In addition, it has been argued that trade liberalization by nature means modifications, thus distributional changes are very likely to occur (Winters, McCulloch, & McKay, 2004). This implies that the more countries are engaged in trade, the bigger the changes in levels of income inequality could get. Since economists agree that high

income inequality is harmful for the economy, the trade-inequality relationship should receive significantly more attention with the majority of countries all around the globe becoming more and more engaged in international trade.

Trade expansion is often associated with significant gains for countries involved in trade-relationship with other parties. It has been argued that more trade will increase national welfare, bring more prosperity and development (Bliss, 2007). However, trade-related benefits are not distributed equally across countries. Since richer states have more financial capabilities and are able to better use the opportunities provided by increasingly globalized economy, benefits from international trade are likely to be high. Whereas in case of poor, underdeveloped countries that lack the needed resources, the benefits of trade expansion might be realized at considerable costs, such as more unequal income distribution. Therefore, considering that in the context of rising international trade volumes some countries gain more than others, the same could be expected in terms of trade-inequality relationship.

As the theoretical implications of Heckscher-Ohlin model suggest, more trade should lead to higher income inequality in developed countries and lower in developing countries. However, the existent empirical evidence shows that the actual trade impact on income inequality in most of the cases is inconsistent with the prediction of the standard trade theories. As a matter of fact, lower-income countries are said to be more vulnerable to the effects of trade liberalization and the trade-inequality linkages seem to be more pronounced as compared to rich countries (Barro, 2000; Ravallion, 2001). This implies that further research on trade-inequality relationship is needed, particularly looking at possible differences in trade effects on different sets of countries, as well as analysing which countries are better able to realize the gains associated with trade expansion and in what instances such benefits come at a higher cost of widening income gap. Understanding the trade-inequality effects is especially important regarding the developing countries which over the past few decades have been actively seeking to become more involved in international trade. Consequently, the focal point of this thesis is trade impact on within-country income inequality and the potential differences in the effects for developed and developing countries

In the following parts of this chapter the aims of the research are presented and a more detailed problem statement is provided. Afterwards, with the formulated central research question and sub-

questions, the relevance of the topic is further explained. Finally the reader is briefly introduced to the research approach and the outline of the consequent parts of the paper.

1.1 Aim of the thesis

In general terms this thesis aims at contributing to the existing pool of literature on trade and inequality by analysing the effect of an increase (decrease) in trade on levels of income inequality in both developing and developed countries. The central goal is to examine whether these effects differ depending on the level of development and identifying additional factors that might help to explicate such differences. Hence, this thesis aims to dig deeper into the dynamics of trade-inequality relationship and expand the existing knowledge with the analysis of more recent data. Are developing countries more vulnerable to the negative effects associated with trade? Can the same trends be observed for all countries on the same level of development? What are contributing factors that could help to explain the differences (if any)? All these questions will be addressed in the following parts of the research while answering the research question which is presented in the next part of this chapter.

1.2 Problem statement

Although in the empirical literature the most common findings suggest that trade leads to increase in inequality, in general studies focusing on this relationship provide quite divergent results and there are several reasons for that. First of all, as mentioned in the previous part, the outcomes might vary depending on inequality definition applied. Within-country inequality is said to be more observable and important from policy and societal perspectives (Cornia, 2003). In addition, there exists multiple ways to define and measure trade: linkages between trade and inequality have been studied from the trade policy perspective (analysing the effect of reduction of tariff and non-tariff barriers) and from the policy outcomes (trade expansion) perspective. Finally, another reason leading to significantly divergent results might be related to the choice and categorization of sample countries (Milanovic & Squire, 2005). As a result, different combinations of commonly used variables produce mixed evidence, which then makes it rather unclear what the real trade-inequality effect is in different countries. Thus it is clear that due to lack of consensus on trade-inequality effects, a further research is needed. Consequently, taking into account issues briefly discussed in this section and recalling the previously presented aims of this research, the following research question is formulated:

What is the difference in trade effects on inequality for developing and developed countries?

1.3 Sub-questions

In order to answer the central research question the following sub-questions will have to be answered:

1. What are the theories and evidence presented in the literature on the effects of trade on income inequality in developing and developed countries?
2. How can the variables be operationalized and how can trade-inequality effects be researched?
3. What are the results of the analysis?

1.4 Academic relevance

The research question that this thesis aims to answer is academically relevant. Using the existent evidence of trade effect on inequality it encourages to proceed a step forward and to examine whether trade impact differs depending on level of country development, as more detailed explanations, or comparisons regarding the differences and similarities in trade-inequality relationship between developed and developing world are currently lacking. Additionally, the research question is academically relevant, because it looks at changes in income distribution at individual country level (within-country income inequality), instead of focusing on global income inequality which up until now has been a more common choice. Furthermore, the question does not mainly focus on rich and developed countries, as has been done in the majority of studies on trade-inequality effects, but also aims to include large number of developing countries and calls for country distinction. Considering that the importance of distinguishing (categorizing) countries based on levels of income, or development has already been emphasized in several previously conducted studies (Barro, 2000; Ravallion, 2001) and based on the fact that such categorization is even present in theoretical predictions (e.g. the H-O model), it can be stated that country distinction might actually be crucial for the results. Therefore, answering the presented research question would certainly contribute to the currently existing pool of knowledge.

1.5 Policy relevance

The formulated question is policy relevant as answering it would increase the current understanding of trade impact on income distribution which is crucial for devising policy measures aimed at reducing inequality. In addition, given that widening gap between rich and poor raises social and welfare concerns, defining the differences between trade-inequality effects in developed and developing countries would allow the more vulnerable states to take stronger measures and learn from good examples of countries that were able to better mitigate these negative effects. Due to the fact that high inequality obstructs economic growth potential, the research question is also relevant from the economic policy perspective. Knowing whether trade impact on income inequality depends on country's development level would be useful for creating policies aimed at helping the more vulnerable countries to better realize the benefits and economic opportunities provided by trade expansion without having to face the high costs associated with rising inequality (slower economic growth, higher poverty, etc.).

1.6 Research approach

The presented sub-questions will be answered in separate chapters. To answer the first sub-question, firstly the theories analysing the relationship between trade and income inequality will be presented, together with the main theoretical assumptions regarding the trade-inequality effects in developed and developing countries. Afterwards, different strands of literature on trade-inequality impact will be reviewed and the main findings and empirical evidence will be discussed. Finally, based on the literature review and theory, the theoretical framework will be built together with theoretical expectations of this research. The second sub-question will be answered by presenting the research design and justification for the choice of the design. In addition to that, data that is going to be used for the actual analysis will be presented, including the description of the variables. Lastly, the third sub-question will be answered by providing the empirical analysis and afterwards discussing and interpreting the results of it.

Regarding the empirical part, in order to answer the research question (more specifically the second and the third sub-questions) a quantitative observational research design is chosen. The observational study is considered to be the most appropriate choice for this purpose as it allows to use the actual measured values of variables reflecting real life situations. Due to the fact that this research aims to analyse trade-inequality relationship and identify the possible differences in trade

effects on income gap in countries on different stages of development over time, this as well has to be appropriately reflected in the empirical part. Consequently a regression analysis using panel data will be conducted. The analysis will cover a large sample of countries (N=91) over a period of ten years (1999-2008). More detailed description of the empirical methods, chosen measurements for each variable and data sources will be provided in chapter 3. In addition, it is important to note that this research aims to address the currently existent gap in trade-inequality studies by including as many developing countries into the country sample as possible. Therefore, around two thirds of all the sample countries are developing according to the World Bank's country classification. A further discussion of country classification will also be provided in the 3rd chapter.

Finally, it is important to note that based on the literature review provided in the 2nd chapter, factors that were previously found to be the most significant in explaining the causality between the trade and inequality will be included into the analysis as control variables. This is relevant considering that one of the aims of this research is to contribute to the existing literature, which essentially requires to take into account the existing evidence. Consequently it is expected, that the combination of chosen research design, clear country classification, rather long time frame of the analysis and incorporating the evidence presented in already existing literature will generate more reliable and generalizable results.

1.7 Outline

The thesis is divided into five chapters. In this chapter the reader is introduced to the topic and the objectives of the paper in the form of the research question and sub-questions. In chapter 2 the literature review is provided introducing the main findings on the relationship between trade and within-country income inequality and applying the existing theories to build a theoretical framework for this research. Consequently the theoretical expectations that will be tested are derived. Additionally in this part the factors that are assumed, or previously found to be important in explaining the relationship between trade and income inequality are identified and further used as control variables. Chapter 3 addresses the second sub-question and provides a more detailed explanation and justification for the choice of the research design. In addition to the definition of the measurements chosen for trade and inequality variables, based on the theories and evidence presented in the second part of the thesis, this chapter also includes information about the relevant control variables and the chosen measurements. The choice for specific datasets and indicators is

also justified in this part. Finally, the last two chapters focus on the actual analysis – chapter four will provide the results of the empirical analysis thus answering the third sub-question, whereas in chapter 5 the explanations of the results and the final answer to the research question will be provided.

2. Literature review and theoretical framework

The aim of this chapter is to answer the first research sub-question presented in chapter 1:

What are the theories and evidence presented in the literature on the effects of trade on income inequality in developing and developed countries?

This is done by firstly reviewing the existing theories and theoretical assumptions regarding the trade impact on within-country income inequality for both developed and developing world. Afterwards, the review of the evidence presented in the literature addressing trade-inequality relationship is provided. Both the arguments suggesting that trade expansion leads to higher within-country inequality, as well as the counterarguments presented in the opposing strand of literature are discussed and the results of the main empirical studies analysing trade-inequality effects in developed and developing world are summarized in a table. Then, based on the theories and existent evidence, implications regarding the differences in trade-inequality effects in countries on different stage of development are made, leading to the theoretical expectations of this research. Consequently, at the end of the chapter a testable hypothesis is formulated.

2.1 Theoretical explanations of trade-inequality effects

2.1.1. The HOS model

The standard theory that many researchers use while analysing the relationship between trade expansion and income inequality is the Heckscher-Ohlin trade model built on the principles of Ricardo's comparative advantage theory. According to H-O theorem, a country will export goods produced using abundant factors of production and import goods produced using scarce factors of production (O'Rourke, 2001; Harrison, McLaren, & McMillan, 2011). Although the theory does not directly address the problem of inequality as originally it was designed to explain the pattern of trans-Atlantic trade, further theoretical extensions provide important implications for analysing trade impact on within-country income inequality. The most relevant extensions were made by Stolper-Samuelson theorem and thus as a result, in the literature analysing trade-inequality effects, the theoretical combination is often referred to as the HOS model.

In very simplistic terms, the HOS model assumes two countries - North (representing industrialized, rich countries) and South (lower income countries), two factors (abundant and

scarce), and two products, and suggests that increased trade volumes lead to changes in factor prices and raises income inequality (Harrison, McLaren, & McMillan, 2011). More specifically, the HOS model assumes that two factors are skilled and unskilled labour. Considering the explanations presented by Bliss (2007), both countries (North and South) have different factor endowments – North is more skilled-labour-abundant, while in the South this factor is scarce. Following the line of argument provided by Stolper-Samuelson theorem, trade expansion increases the demand and thus the returns to the abundant factor in countries involved in trade and decreases the returns from scarce factors due to falling demand (O'Rourke, 2001).

In addition to this there are as well two products and in his explanations, Bliss (2007) uses the examples of computers and bicycles. The production of computers requires more intensive use of the skilled-labour, while the production of bicycles is unskilled-labour-intensive. If the production of both goods is diversified between the countries and they start trading more, the relative price of bicycles to computers would increase in South and decrease in North. As a result, both – the domestic prices of the goods and the ratios of skilled to unskilled labour wage are expected to converge (Bliss, 2007). In this case the theoretical predictions for trade liberalization impact on income inequality become evident: with more openness, less barriers to trade and specialization in both countries, the returns on abundant skilled- labour factor are expected to increase, and in turn inequality in the developed world should increase, while with higher wages for unskilled labour in developing world, more equality could be expected (Wood, 2002; Milanovic, 2006; Harrison, McLaren, & McMillan, 2011). Consequently, as further generalizations of the explanations provided by Bliss (2007) show, trade expansion might lead to wider income gaps when it increases the price of factors owned by countries that already are relatively wealthier, while it might also reduce income inequality by raising prices of resources abundant in poorer countries.

However, in the academic literature it has been argued that the HOS model fails to capture the effects of contributing factors that in many cases might be crucial for explaining changes in inequality levels. For instance, the model assumes full employment (Bliss, 2007), yet in reality this condition is not always satisfied, not to mention that several authors have claimed that trade expansion (especially at the initial stages of trade liberalization) is associated with higher unemployment rates (Goldberg & Pavcnik, 2007; Egger & Kreickemeier, 2012). As stated by Helpman et al. (2010), unemployment is one of the major channels leading to changes in income

levels which in turn has implications for inequality. Additionally, the model does not account for the effectiveness of domestic institutions which is also said to be related to income distribution (Cornia, 2003).

2.1.2. The Convergence Theory

Another theory which is applied in the literature analysing trade impact on inequality outcomes is based on the neo-classical theory of economic growth and known as the theory of convergence, or catching-up. The general implication of the convergence hypothesis is that in the long run, with more free trade and openness, the growth rate and income per capita in developed and developing countries should converge (Fischer & Serra, 1996). At the initial stage of trade liberalization, developing countries are expected to grow faster than developed states, as gradually achieving high growth from a relatively low point could be easier than sustaining or improving the already high levels of growth that are often observed in industrialized countries (Bliss, Trade, Growth, and Inequality, 2007). In addition, developing countries are said to have a bigger growth potential due to the fact that in developed, capital-abundant countries the effects of diminishing returns on capital are stronger than in developing world (Ghose, 2001; Bliss, 2007).

As noted by Benabou (1996), convergence in economic growth rate and income per capita is the first momentum, while neo-classical growth models also show the existence of the second momentum – converge in terms of income distribution. More specifically, it is predicted that countries/regions having the same fundamental elements (the first momentum), eventually move towards more similar patterns of income distribution, where poor countries with highly unequal income distribution would face decline in inequality levels, while the opposite effects are anticipated in rich, developed countries - these countries are expected to face higher within-country inequality (Benabou, 1996; Lin & Huang, 2011). Consequently, based on such predictions regarding the changes in within-country income inequality, it can be stated that trade expansion is beneficial for developing states with initially unequal income distribution (Fischer & Serra, 1996).

It is important to emphasize that the validity of convergence hypothesis is more frequently tested when analysing the dynamics of economic growth and income distribution between developing and developed world, therefore the existent explanations regarding the effects on within-country inequality are rather underdeveloped. Yet, due to the fact that presented theoretical assumptions suggest that the effects of trade-induced convergence on within-country income distribution might

be different for developed and developing states, convergence theory and studies examining convergence with a particular focus on inequality effects are valuable for this research.

However, in the academic literature, the convergence theory and its predicted catching-up effects have been subject to criticism. According to Bliss (2007) in very simplistic terms theory suggests that all the inequality related issues in the developing countries will eventually be solved and it's only a matter of time and correct policy choices, however in reality higher economic growth and trade liberalization are not guarantees of catching-up and lower inequality levels. In addition, the fact that predicted convergence between developed and developing states is said to happen over a longer time period is worth emphasizing, as this basically means that with trade expansion, countries having persistently high inequality levels should not expect immediate positive effects and more equal income distribution. In addition, as early as in 1986, Abramovitz stated that developing countries lack certain prerequisites (such as well functioning institutions, ability to adapt new technologies, attract investments, etc.) that would enable these states to catch-up with the developed world. Therefore divergence rather than predicted convergence is more likely to occur (Abramovitz, 1986).

2.1.3. The Dependency Theory

An opposing argument to the ones already explained is offered by dependency school of thought. According to the dependency theory, developed countries benefit more from free trade (as well as foreign investments) and these gains come at the expense of developing countries. Here developed countries (mainly OECD nations that have high GDP per capita) are often referred to as the centre, while poor, developing states - as periphery (Ferraro, 2008). As it is explained by the theory, countries in periphery are labour intensive and export primary goods to the capital intensive centre, where these goods are used in order to manufacture products that are ready to use. In turn, these products are later sold back in the periphery, but already for a higher price due to the value added over the cycle of production (Ferraro, 2008). Consequently, primary goods become relatively cheaper than manufactured goods, which leads to deterioration in terms of trade of countries in the periphery (Balassa, 1986). In the dependency literature this process is also seen as a transfer of surplus value from the poor periphery to rich centre countries and is described as unequal exchange (Amin, 1972; Balassa, 1986). Dependency is a continuous process and the more countries interact with each other (trade), the more escalated the process of unequal exchange is (Ferraro, 2008). It

is crucial to note, that in the academic literature, import and export dependent forms of development are often referred to as trade dependence, a concept widely used by the dependency theorists Jaffee & Stokes (1986).

An important insight was provided by Chilcote (1974), who noted that further industrial development of countries in the periphery depends on exports, as by exporting these countries are accumulating the income needed to purchase imported manufactured goods. Yet, the unequal pattern of centre-periphery exchange obstructs further development and thus developing countries are trapped in a vicious circle, where less integration into the global economy becomes a better option leading to potentially less exploitation and more possibilities for further industrial development. Moreover, due to differences in the prices of exports and imports, developing countries earn less than developed countries, which in turn leads to rising income inequalities. Thus, considering the process of unequal exchange, more integration into the global economy results in more unequal income distribution in the periphery, both internationally (between-countries), and domestically (within-countries) (Bornschier, 1983). Consequently, as one of the general implications of dependency theory suggests, free trade causes impoverishment of countries in the periphery and due to continuation of dependency processes, the patterns of unequal income distribution in these countries are likely to be preserved (Balassa, 1986).

The effects of trade dependency are also said to be dependent on the role of domestic elites and trade orientation. The elites in the developing countries are selfish and interested in maintaining dependency relationship with the capitalists in the centre, which brings them private gains, but these gains come at the cost of continued low standards of living, low income levels for the rest of the society and also harms the development of capitalism in the periphery (Balassa, 1986; Ferraro, 2008). In addition, domestic elites often demand luxury commodities (or consumer durables), which leads to the establishment of industries producing capital-intensive goods in the developing countries (Balassa, 1986). Due to wages set at the level of subsistence, there is no domestic demand for such goods, which in turn strengthens periphery's dependence on exports (trade) and the process of surplus transfer. As stated by Jaffee & Stokes (1986), external trade orientation is a major factor contributing to rising social and income inequalities in the developing countries. Moreover, export dependent countries are more vulnerable to external shocks and have less incentives and capabilities to develop their domestic markets by increasing wages, or introducing

more redistributive policies. Hence, with trade expansion, the distribution of income in the developing countries is expected to become less egalitarian, and within-country inequality levels should rise. On the other hand, dependency theorists do not provide many predictions regarding the effects of trade on inequality in the centre (core) countries, yet based on the theoretical assumptions presented in this part, it is evident that more trade is beneficial for developed countries. Consequently, the opposite effects from the ones predicted in the periphery can be anticipated.

2.2. Evidence

2.2.1 Evidence for theoretical assumptions

The validity of theoretical predictions regarding the trade impact on the levels of within-country income inequality was analysed in a number of studies on trade-inequality topic. Consequently, following the sequence of the theories discussed in previous sub-chapter, currently existent evidence supporting, or contradicting the theoretical assumptions are reviewed in this section.

To begin with, the HOS model and its further extensions provide solid explanations regarding the trade-inequality effects, yet in reality there seems to be little evidence to support the theoretical predictions. A number of studies focusing on trade and inequality have applied the HOS framework, yet the findings provide a complex picture. For instance, the model was used by Matano & Naticchioni (2010) in order to research the effects of trade expansion on wage inequality in Italy during the period from 1991 to 2002. However, although the presented results are consistent with theoretical predictions, the study is focused on one country which makes the findings hardly generalizable and dependent on specific factor endowments as well as country's position in the global economy. In contrast, the counterargument presented in the article by Lee & Vivarelli (2006) state that globalization induced trade liberalization leads to consequences opposite to HOS expectations and indeed, findings suggest that at the initial stages of trade liberalization, income gap in developing countries should increase. Therefore according to the authors, there are no reasons to associate trade expansion with more egalitarian income distribution in developing world.

On the other hand, after reviewing existing theories and evidence of trade effects on inequality in developing countries, Anderson (2005) argues that relative factor endowment (skilled and unskilled labour as assumed by the HOS model) and movements in wage levels is only one of

several channels through which trade liberalization will have an impact on inequality outcomes. Thus, although the author reviews several studies that found evidence supporting the theoretical predictions, there is also a number of studies that suggest the opposite effect, which implies that theoretically described mechanisms through which trade affects inequality might not always be helpful in explaining the overall changes in both developed and developing world. A similar argument has been made by Goldberg & Pavcnik (2007) after comparing the effects of globalization induced trade expansion on income inequality in developing countries in 1980s and 1990s. Authors claim that levels of inequality moved to the opposite directions than theory predicted for several reasons: the first one supports Anderson's argument that changes in labour income is only one channel through which trade liberalization affects income distribution, while the second one is related to the fact that during the last several decades developing countries have witnessed an increase in the share of skilled-labour within a number of industries, and thus with the seemingly changing patterns of factor endowments, the evidence is not always consistent with the Stolper-Samuelson predicted effects, where more trade would favour the less fortunate, unskilled labour force.

Interesting findings were obtained by Das (2005), who conducted a theoretical analysis and applied the model to examine the impact of gradual trade liberalization on within-country inequality comparing the relative wage movements at two stages of trade liberalization – the initial one (close to autarky) and the final stage which is close to free trade. Author does so by comparing the equilibria at both stages and conducting a transitional analysis to see how levels of inequality change while North and South move from one stage to another. As the findings suggest, the theoretical predictions were confirmed at the initial stage, where an increase in inequality was observed in the North (developed countries) while the opposite trend was seen in South (developing countries). However, at the final stage of trade liberalization contrary results were obtained, showing rising inequalities in the developing world. As the author states, this might imply that at some point during the course of trade liberalization there is a reversal in relative wage movements. Thus it is evident that changes in inequality not necessarily follow theoretical expectations, especially when comparing changes in income distribution in developed and developing countries.

As Milanovic (2006) concludes, although theories provide different expectations for trade effects on within-country income distribution in rich and poor countries, the real world evidence shows divergent trends and is inconsistent with theoretical predictions. For instance, the results of several previously conducted studies suggest that with more openness and trade expansion, inequality levels tend to increase in developing countries, but decrease in rich, developed countries (Ravallion, 2001; Wood, 2002; Milanovic, 2005). Furthermore, Cornia (2003) argued that because of the changes in inequality observed during the last several decades, it could be stated that theoretical HOS predictions do not hold for analysing the trends after 1990s. More specifically the author claims that explanations provided by standard trade theory were more applicable when analysing the first wave of globalization (1870-1914), than the second wave (1980-2000) during which inequality was found to be increasing in two thirds of the countries analysed. Consequently it could be implied that while aiming to examine more recent trends of trade-inequality effects, HOS model is even less relevant. In addition, as it was briefly noted in the theoretical part, the HOS predictions lack empirical support partly because full employment assumed by the model is rarely observed in the real world (Goldberg & Pavcnik, 2007), while quality of institutions, which is ignored by the theorem might also have implications on trade-inequality effects, especially in the developing world.

Similarly to HOS model, theoretical assumptions presented by convergence theory also lack support in the existent literature. As it has been stated by Ghose (2001), who conducted a research on the variation in trade performance and the relationship between international trade and inequality during the period 1981-1997 in a representative sample of 96 countries, trade liberalization had an adverse effect on the economic growth rates in a majority of low income countries. Consequently, without convergence in growth rates, no convergence in terms of income distribution was observed, and thus the same conclusion holds regarding the predicted trade-inequality effects on country level. Instead it is argued that within-country inequality has not been declining and the majority of developing countries are not catching up with the developed ones.

However, the analysis also showed that a small number of sample countries actually managed to achieve higher growth rates just as theory would predict, yet the inequality reducing effects were supressed by the population growth (Ghose, 2001). This is related to another observation present in the literature testing the convergence hypothesis - the emergence of the so-called convergence

club, which consists of a group of countries similar to one another (in terms of state of development), that managed to achieve considerably high rates of economic growth (Ghose, 2001; Mayer-Foulkes, 2002; Bliss, 2007). As Ghose (2001) shows, this group comprises of 37 countries that together represent around 70% of the population living in the developing world. Thus from the presented evidence, the following implication can be made: although convergence among a number of populous developing countries in terms of economic growth has been observed, the majority of states in developing world are falling behind and thus the predicted catching-up and trade-inequality effects are not present. Consequently, Mayer-Foulkes (2002) concludes that convergence hypothesis does not even hold in its weakest form, where it would be expected that eventually rich and poor countries would converge to at least similar paths in terms of economic growth, income levels and income distribution.

The weak support for convergence hypothesis can be further illustrated with the results obtained by Uoardighi & Somun-Kapetanovic (2009), who examined the process of convergence and its impact on income inequality in terms of GDP per capita in the Balkan countries during the time period from 1989 to 2008. Authors compare the obtained results with the figures in 27 EU member states and provide conclusions, similar to the ones earlier presented by Ghose (2001): the evidence indicates that both income and inequality levels converged in the Balkan region, yet such trends are absent when comparing these results with the situation in the EU countries. Evidently, such findings again show that less developed countries are not catching-up with the developed ones and instead convergence only takes place within groups of countries in similar development state.

Consequently, the existent evidence suggests that convergence hypothesis fails to explain the observed changes in income inequality levels. Moreover, as studies reviewed here present the results that are often opposite to what convergence hypothesis predicts, it remains unclear, whether developing countries have higher economic growth potential, but are more vulnerable (in terms of inequality) to liberalization effects, or if more trade has the same effect on income distribution regardless of the state of development.

So far very few attempts have been made to empirically analyse trade-inequality relationship from the dependency perspective. Instead, researchers have focused mainly on trade (export and import) dependent forms of development, foreign investment or economic growth. Based on the results of several early attempts to test the validity of theoretical assumptions it can be stated that the existent

evidence is rather contradicting, but still, some implications regarding trade impact on inequality can be made. On one hand, the results of the analysis conducted by Jaffee & Stokes (1986) show support for theoretical predictions, as the increase in levels of foreign investments was found to be leading to higher trade dependence (measured by import, export and total trade-to-GDP ratios) in a sample of 65 developing countries during the period from 1960 to 1977. As authors further suggest, more investments increase economic interaction between countries (trade) and recalling the explanations of the dependency theory provided in previous sub-section, more interaction escalates the process of unequal exchange (deterioration in terms of trade of countries in the periphery). Consequently, higher trade dependence results in rising income inequalities in the developing world (Jaffee & Stokes, 1986).

On the other hand, Balassa (1986), whose explanations were extensively used in theoretical part, states that contrary to the predictions of dependency theory, there is no evidence of unequal exchange between the centre and periphery. Instead, after conducting an econometric analysis, author claims that with more trade, exporting countries in the periphery faced increase in economic growth and managed to improve distribution of income. In contrast, after conducting an empirical analysis covering 72 countries (both in the centre and periphery), Bornschier (1983) states that trade expansion indeed leads to higher income inequality in the periphery and the patterns of income distribution only change if countries manage either to change their economic position in the global economy (move from periphery to the centre), or become less integrated in it, thus linking economic growth with more equality is too optimistic.

Over the years the assumptions presented by dependency theorists received both support and criticism. Yet it is important to note, that this theory offers quite different explanations and predictions over the trade effects on inequality in developing and developed world from the ones presented by standard trade theories. The general implication, that increase in levels of trade benefits developed countries more and serves as an obstacle for further development as well as more equality in the periphery is worth taking into account. Such insights suggest that trade induced changes in levels of inequality are indeed dependent on the state of development and confirms that countries do not benefit from trade equally.

Evidently, a number of theoretical attempts to explain (directly, or indirectly) the impact of trade expansion on inequality have been made. Both the HOS model and the convergence theory suggest

that with trade liberalization, developing and relatively poor countries would benefit, and that income gap within these countries would become narrower. However, the existence of mixed evidence regarding the trade-inequality effects and more specifically the predicted differences in developed and developing countries suggest that it might be worth putting more emphasis on the assumptions provided by the dependency theorists. Although the HOS model present solid arguments explaining mechanisms through which trade impacts income distribution, the literature review so far showed that such theoretical assumptions lack support. In a number of instances discussed, trade expansion led to higher income gaps in the developing world and opposite, or no effects in developed states.

Furthermore, despite the fact that emergence of convergence clubs across countries on a similar state of development was observed, theoretical predictions offered by the convergence theory also lack support: studies reviewed did not present much evidence showing that developing countries are catching up with the developed countries in terms of growth rates, income levels, and most importantly – income distribution. Instead, divergence between countries on different stages of development has been observed, hence the predicted trade-inequality effects (where trade expansion is expected to lower inequality in the developing world) are not present.

On the other hand, studies reviewed so far provide slightly more evidence for the theoretical assumptions derived from the dependency theory. However, as noted in the WTO's World Trade Report (2008), the crucial point is that despite the fact that traditional theories provide quite different forecasts regarding trade induced inequality outcomes, a common prediction is that gains from trade are not equally distributed, and thus differences in trade-inequality effects across countries on different stage of development could be expected.

2.2.4. Further evidence

Furthermore, a number of researches have been done without aiming to test the validity of specific theoretical assumptions. Instead, in such studies trade impact has been examined by applying different methods, measurements and looking into different groups of countries. These studies also provide valuable insights regarding the differences in trade-inequality effects in developing and developed countries that might help to explain why the theoretical predictions do not hold and what other circumstances and factors have to be considered. Yet the presented results are often contradictory.

On one hand, a number of studies suggest that more openness, trade liberalization and the increase in trade volumes are indeed linked to less egalitarian within-country income distribution (Bergh & Nilsson, 2010; Egger & Kreickemeier, 2012; Harrison, McLaren, & McMillan, 2011; Hirte & Lessmann, 2014). On the other hand, the opposing strand of literature suggests that trade expansion reduces income inequality (Jaumotte, Lall, & Papageorgiou, 2013), or does not have any impact (Bussmann, Soysa, & Oneal, 2005; The World Bank, 2007). As Anderson (2005) notes, divergent results might have been obtained due to sample differences, as often either one group of countries, or another is underrepresented in the literature analysing trade-inequality effects. Therefore it is crucial to look at what has been done by the researchers that aimed to investigate the issue from different perspectives and focused deeper on trade induced changes in income distribution particularly in sets of developed countries, developing countries, or compared the dynamics present in both groups of countries analysing equally representative samples.

Examining the effects of different types of liberalization in 80 countries during the period from 1970 to 2005, Bergh & Nilsson (2010) found that two elements of Economic Freedom of the World Index (EFI) (more specifically - freedom to trade internationally and deregulation) have a positive effect on Gini coefficients. In other words, with more openness to trade and less regulations, income inequality levels were found to be increasing. In order to correct for additional effects on income inequality (distributional, human capital), authors include a number of control variables: log of real GDP per capita, share of population older than 25 and having higher education, and dependency ratio. Moreover, it is stated that trade-inequality effects might differ depending on development level and thus the authors re-run their regressions after dividing the sample into two groups depending on the levels of income. Yet, country division leads to the same results – more trade increased inequality, but interestingly, these effects were found to be stronger in developed countries.

Slightly different results were obtained by Rodriguez-Pose (2012), who conducted a research on trade impact on within-country inequality with particular focus on interregional differences, covering a sample of 28 countries (with 15 developed and 13 developing countries) during the period from 1975-2005. The main findings of the panel data analysis indicate that greater openness has positive and lasting effect on inequality outcomes in developing countries. More specifically, in combination with country-specific factors (such as governmental expenditure) it was found that

increase in trade leads to higher within-country inequality and regional polarization. While explaining such results, author emphasizes the importance of government's redistributive capacity, as countries where such capacities are strong, are better able to mitigate the potentially negative effects of trade expansion on inequality. Similarly, after analyzing the impact of trade expansion and openess on within-country interregional inequality in 54 countries during the time frame from 1980 to 2009, Hirte & Lessmann (2014) found that with a 10% increase in trade-to-GDP ratio, inequality levels tend to rise by 2%. Authors further state that similar trade effects should be expected in terms of income distribution on country level. It is important to note, that in both cases discussed in this paragraph, research was conducted on an equally representative sample of countries, which is still rare in the academic literature analysing trade-inequality effects, as due to data availability, the vast majority of studies focus on high income states.

Attempts to address the issue of underrepresentation of developing countries were earlier made by Rudra (2004), who conducted an empirical analysis comparing the impact of welfare spending and increase in openness to within-country income distribution in 11 OECD member states and 35 less developed countries over a period from 1972 to 1996. Controlling for measures of democracy, economic development and population growth, the obtained results suggest that trade expansion worsens income distribution only in developing countries, while no significant effects were found in developed countries. In this case again the vulnerability of developing nations is partially explained by lower government's social expenditure, as it is stated that trade effects on inequality are even more severe when governments do not try to weaken it with the means of social spending. The importance of spending on education and health in developing countries is especially emphasized as a factor contributing to more equal income distribution (Rudra, 2004; Elmawazini, Sharif, Manga, & Drucker, 2013). Additionally, it has been argued that due to certain characteristics common to a majority of developing countries (relatively underdeveloped institutions, delayed integration into globalized economy), there are no sufficient basis to anticipate the same, or similar trade-inequality effects in developed and developing states (Rudra, 2004).

Evidence suggesting that openness and trade expansions is associated with rising income gap in developing countries is also present in studies made by Barro (2000) and Elmawazini et al. (2013). As Barro (2000) explains, trade-inequality relationship is strongly positive in countries where GDP

per capita levels do not exceed the amount of $13,000, but as this amount rises and countries grow richer, the relationship is less and less pronounced until eventually it becomes negative, as observed in OECD countries. This supports the previously made implication suggesting that countries, which are already well-off, have better capabilities to mitigate the negative effects associated with trade than relatively poor states. The same trend regarding trade induced changes in levels of inequality has been observed by Elmawazini et al. (2013) in an empirical analysis on the effects of trade globalization and financial globalization in a set of transition countries during the time frame of 1991-2007. In addition, the obtained results suggest that levels of FDI is a factor worth taking into account when examining trade-inequality relationship, as an increase in FDI was also found to be related to widening income gap in the developing countries.

Consequently, from the literature reviewed in this section so far, it is evident that the argument suggesting the linkage between higher trade volumes and widening income gap received much support. Furthermore, regarding the differences in trade effects, the dominant finding is that trade-inequality relationship is more pronounced in developing world.

On the other hand, the opposing strand of literature suggests that trade expansion reduces income inequality (Jaumotte, Lall, & Papageorgiou, 2013), or does not have any impact (Bussmann, Soysa, & Oneal, 2005; The World Bank, 2007). It is however worth noticing that studies providing such results often focus on globalization effects on income inequality and thus the impact of trade liberalization is tested together with other elements of globalization (technological change, FDI). As the results of a research done by Jaumotte, Lall, & Papageorgiou (2013) suggest, different elements of globalization have diverging effects on within-country inequality. After examining the impact of two main components of globalization - trade openness (measured by trade volumes and average tariff rates) and levels of FDI on Gini coefficients, authors suggest that increase in FDI leads to rising inequalities, while trade expansion is associated with more equal income distribution. Such effects seem to be especially strong in developed countries that increased their imports from developing countries (Matano & Naticchioni, 2010; Jaumotte, Lall, & Papageorgiou, 2013). On the other hand, the links between trade expansion and decline in within-country inequality have also been observed in a research done by Reuveny & Li (2003), who conducted an empirical analysis on the impact of trade and other factors (FDI, capital inflows and democracy)

on inequality in a sample of 69 countries during the time frame of 1960-1996. It is important to note, that in this case trade effects were found to be the same regardless of the state of development.

However, several studies that found no evidence of trade impact on inequality outcomes suggest that it is rather difficult to isolate the effects of trade expansion from the impact of other globalization elements (Bussmann, Soysa, & Oneal, 2005; The World Bank, 2007). As the report published by the World Bank (2007) reveals, in majority of developing countries income inequality has been rising during the last several decades, yet no significant effect of trade expansion has been observed. It is further explained that because increasing integration into the global economy is often seen as a factor contributing to widening income gaps, it is more likely that trade might have an impact in combination with other elements of globalization. Nevertheless, it might also be the case that neither more openness to trade, nor other factors associated with globalization (such as FDI) lead to an increase in income inequality (Mahler, Jesuit, & Roscoe, 1999; Bussmann, Soysa, & Oneal, 2005). As the results of the regression analysis conducted by Bussmann et al. (2005) and covering the data for 72 countries during the 20 years period (1970-1990) show, neither Gini index, nor the share of income received by the poorest quantile of the population in sample countries are affected by increase in trade-to-GDP ratio. It is crucial to note that authors provide the same conclusion regarding both developed and developing world, suggesting that trade-inequality effects do not depend on the state of development.

Evidently, studies that do not find trade to be a factor leading to less equal income distribution, lack consensus. Although arguments suggesting that trade liberalization reduces within-country inequality have been made, due to divergence in obtained results it remains unclear whether the same effects should be anticipated in both developed and developing world. In addition, another finding, stating that trade does not have an impact on inequality outcomes is in most instances presented by studies focusing on globalization effects.

2.3 Contributory and explanatory factors

Based on the literature reviewed in the previous parts of this chapter, a number of additional factors that might have certain implications regarding the changes in levels of inequality and differences in trade effects in the developing and developed world can be named. Firstly, it is important to note, that a number of authors incorporated variables such as population growth rate, employment rate, levels of FDI and GDP per capita into their studies on trade-inequality effects. Some of these

variables were said to affect within-country income distribution in combination with trade related variables and thus were included into the studies as controls (population growth, GDP per capita), while others (e.g. unemployment rate) were also used to explain the possible reasons why the standard theoretical expectations might lack empirical support. Higher GDP per capita (richer countries) is often associated with less inequality and in some instances it is also used as a variable representing country's economic development (Rudra, 2004; Rodriguez-Pose, 2012).

For the purpose of this research population growth rate is important, as findings obtained by Ghose (2001) suggest that it is a factor that might slow down or even obstruct the positive (inequality decreasing) effects of international trade on income inequality. Moreover, high population growth rates are associated with higher inequality levels and thus lower probability of achieving more egalitarian within-country income distribution (Rudra, 2004). Consequently, population growth rate should be taken into account, as otherwise there is a risk that changes in this rate would conceal the impact of trade expansion on within-country income distribution (Ghose, 2001), thus in the subsequent parts of this research, population growth rate is added as a control variable.

In addition, there are as well several policy related factors, that researchers have controlled for and used in order to explain the observed differences in trade-inequality effects, and these include: effectiveness of institutions, democracy and governmental expenditure. The importance of effective institutions was emphasized by Cornia (2003), who argued that not taking into account the quality of domestic institutions is one of the reasons why the observed changes in within-country inequality, especially with regards to developing world, are contradictory to the assumptions provided by standard trade theories. Underdeveloped institutions were also named as one of the characteristics of the majority of developing countries, which gives reasons to anticipate trade induced increase in inequality (Abramovitz, 1986; Rudra, 2004; Rodriguez-Pose, 2012). As Rodriguez-Pose (2012) further explains, low quality of institutions in poor countries not only leads to considerably more severe trade induced changes in income inequality, but also serves as a serious obstacle to trade (e.g. countries with well-functioning institutions might be chosen as trading partners instead of developing countries with low quality institutions). Therefore, based on the studies reviewed it is evident that institutional effectiveness is a crucial factor that needs to be accounted for when analysing the relationship between trade expansion and within-country income

distribution, especially when aiming to identify the differences between developed and developing world. Consequently, effectiveness of domestic institutions is selected as a control variable.

Furthermore, a number of studies reviewed accounted for the type of political regime in place while analysing trade-inequality effects (Reuveny & Li, 2003; Rudra, 2004). The general argument made in such cases is that the patterns of income distribution in democratic countries tend to be more egalitarian. More specifically, democracy is said to have an impact on levels of inequality via more equal interest representation (especially for low and middle income groups) which in turn can lead to more redistributive public policies that lower income inequality. In contrast, income distribution in authoritarian states is said to be skewed as all the resources are held by the elite in power (Rudra, 2004). As Reuveny & Li (2003) show, democracy have inequality reducing effects in both developed and developing countries. Rudra (2004) finds that democracy variable is significantly important and has a strong inequality reducing effect over time in developing world, while in case of developed countries that are often considered to be strong, consolidated democratic regimes, the democracy-inequality relationship is not as strong. On the other hand, Bussmann et al. (2005) suggest that strong and older democratic regimes tend to have more egalitarian income distribution than new democracies, or non-democratic countries, and it also takes time until the policies adopted to reduce income inequality actually have effect. Thus the duration of democratic regime might also be an important factor when analyzing trade-inequality relationship. Consequently, based on insights and results provided by other researchers, strength of democratic regime is selected as another control variable for the purpose of this research.

Lastly, several attempts have been made to explain the differences in trade-inequality effects by emphasizing the importance of governmental expenditure (Rudra, 2004; Rodriguez-Pose, 2012). More specifically it has been argued that with the means of social spending, governments are able to reduce the income gap by compensating the part of the population that loses the most because of trade liberalization. However, due to the fact that governments in developing countries often lack redistributive capacities, compensation through social spending becomes less likely as compared to developed states that have more financial capabilities. Yet, Rudra (2004) emphasizes the importance of spending on education, health and welfare, and argues that while all types of social spending lead to more egalitarian income distribution in developed countries, in the developing world only education and health spending is particularly important and leading to less

inequality. Consequently, it is expected that controlling for these types of government spending would allow to better capture trade-inequality effects and differences in developed and developing world.

2.4 Summarizing table

Having discussed the results of theoretical and empirical analyses of trade-inequality effects, in this sub-section a table summarizing the main findings is provided. It is important to note, that for the purpose of this research only the results of empirical, quantitative studies are included into the table. As it can be noticed, not all studies included into the table analyse trade-inequality relationship in both developed and developing countries, however studies focusing on one particular group of countries are also valuable for this research, especially regarding the theoretical expectations part and formulating the hypothesis.

The presented results are mixed and illustrate the previously discussed lack of unanimity in researches analysing trade-inequality effects: some of the studies find no relationship between trade expansion and income inequality, in other instances trade-induced increase, or decrease in levels of inequality has been observed. Yet, a larger number of studies actually find increase in trade levels to be a factor leading to higher within-country income inequality and this is especially the case in developing countries. On the other hand, the fact that some of the studies included into the table find no relationship, or rather weak connection between trade expansion and levels of inequality in the developed world, serves as an indication that indeed trade impact on inequality outcomes might differ between the two groups of countries.

Furthermore, the information provided in the table once again justifies the selection of control variables (discussed in 2.3) as all of the chosen controls were also accounted for by other researchers in their studies. Given that one of the aims of this research is to contribute to the existing pool of literature on trade-inequality effects, using the already obtained evidence and selecting the variables that were previously used and found significant is considered to be an appropriate way to achieve this aim. Additionally, the table presented below will be extensively referred to in the following chapter when explaining the chosen variable measurements (as it is evident, that for some variables, certain measurements were chosen in majority of instances).

Table 1

Summarizing table

Authors	Time period covered	Countries covered	Trade measure/Independent variable	Inequality measure (dependent variable)	Control variables	Method	Results
Ghose (2001)	1981-1997	96 countries (23 developed, 73 developing)	Annual rate of change in trade-to-GDP ratio; rate of investment	Gini index	GDP per capita (average); GDP growth rate; population growth rate	Panel data (OLS regression) analysis; several different equations tested	Trade liberalization increases income inequality (especially when population growth rate is high); emergence of convergence clubs in terms of economic growth
Reuveny & Li (2003)	1960-1996	69 countries	Economic openness (trade flows, levels of FDI, portfolio investment)	Gini index	GDP per capita (PPP); one decade lagged Gini index; level of democracy	Panel data (OLS regression) analysis	Trade lowers income inequality, FDI increases inequality; democracy has inequality reducing effects
Rudra (2004)	1972-1996	46 countries (11 OECD nations, 35 developing countries	Trade to GDP ratio; welfare spending	Gini index	Democracy; population growth; GDP per capita (economic development); urbanization	Fixed effects panel data regression analysis	Trade expansion increases income inequality in developing countries, no effects in developed countries
Bussman et al. (2005)	1970-1990	72 countries (developed and developing)	Economic openness (trade to GDP ratio); FDI (stock to GDP ratio);	Gini index; share of income received by poorest 20% of the population	Duration of democratic regime; labor productivity; population under 15; agricultural share of GDP	OLS regression analysis	Increase in levels of trade and FDI does not affect income inequality in sample countries
Meschi & Vivarelli (2008)	1980-1999	65 developing countries	Trade flows (imports and exports)	EHII (Estimated household income inequality) index	GDP per capita; inflation rate; educational level	Dynamic specification model analysis	Trade with developed countries increases income inequality in developing countries

Authors	Time period covered	Countries covered	Trade measure/Independent variable	Inequality measure (dependent variable)	Control variables	Method	Results
Bergh & Nilson (2010)	1970-2005	79 countries (developed and developing)	KOF Index of economic globalization; Economic Freedom Index	Gini index	GDP per capita; Human capital (population over 25 with higher education); dependency ratio	Panel data (OLS regression) analysis	More freedom to trade internationally increases within-country income inequality
Rodriguez-Pose (2012)	1975-2005	28 countries (13 developing, 15 developed)	Trade to GDP ratio (PPP adjusted)	Gini index; Theil index	Labor mobility; quality of institutions; size of the government; market access; degree of sectoral differences	Static and dynamic panel regression analysis	Increase in trade results in higher inequality (especially regional) in developing countries; weak relationship in developed countries
Elmawazini, Sharif, Manga, & Drucker (2013)	1992-2007	8 countries (South-East Europe and CIS countries)	Trade openness (trade-to-GDP ratio); financial openness (share of FDI to GDP); KOF Index of economic globalization	Gini index	-	Panel data regression analysis (Least Squares Dummy Variables model)	Trade and financial globalization increases within-country income inequality
Jaumotte et al. (2013)	1981-2003	51 country (20 developed, 31 developing)	Trade openness (average tariff rate and trade (non-oil exports and imports) to GDP ratio); financial openness (share of FDI to GDP)	Gini index	Technological development, access to education , sectoral share of employment, domestic financial development (private credit to GDP ratio)	Panel data (OLS regression) analysis	Increase in trade volumes and tariff reduction leads to lower income inequality, while financial openness increases it.

2.5 Theoretical expectations

This chapter aimed at answering the first research sub-question, which was done by reviewing the theories and evidence present in the literature analysing trade-inequality relationship in developing and developed countries. At first the reader was introduced with three theories that provide different assumptions regarding the trade impact on income distribution– the HOS model, convergence theory and dependency theory. The HOS model predicts that with trade expansion, within-country income inequality in the developing world would decline, while the opposite trend is expected in developed countries. Similarly, according to the convergence theory, more trade would be more beneficial for developing countries and lead to higher economic growth and lower inequality. However, in the reviewed empirical studies such theoretical assumptions received very little support. One of the possible reasons is that theoretical predictions assume certain conditions (like full employment in HOS model), that need to be fulfilled in order for the theory to hold.

In contrast, according to theoretical implications derived from the dependency theory, more trade brings benefits only for the developed world, while developing countries suffer from exploitation and face barriers to further development. Consequently, trade expansion would only increase inequality in the developing world. A number of reviewed studies show support for the assumptions provided by the dependency theory, as indeed, in many instances trade liberalisation was found to be related to rising income gap in developing countries. Likewise, the same conclusion could be made from the further evidence discussed and the presented summarizing table, where in majority of cases, trade induced increase in inequality was observed. On the other hand, based on existent mixed results regarding trade-inequality effects in developed countries, it can be stated that developed world is less vulnerable to the impact of trade expansion in terms of income distribution (as in several studies reviewed, weak, or no relationship between trade expansion and within-country income inequality was observed).

Therefore the theoretical expectations of this research follow the predictions of the dependency theory and it is expected that developing countries are more vulnerable to increase in trade and thus will face higher within-country inequality as compared to developed world. In addition, as theory suggests, more trade can even be beneficial to the developed countries in terms of income distribution. Consequently, the following hypothesis is formulated:

H: Trade expansion increases income inequality in developing countries, but not in developed countries.

Due to possible differences in trade impact on inequality, the expected relationships for developing and developed countries are illustrated in figure 1 and 2 accordingly. In addition, as discussed in section 2.3, there are other factors that are said to have an effect on inequality levels in both developing and developed world (institutional effectiveness, democracy, government spending and population growth), and thus such factors are included into the model of this research as controls. All the expected relationships are presented in two figures below:

Figure 1

Developing countries

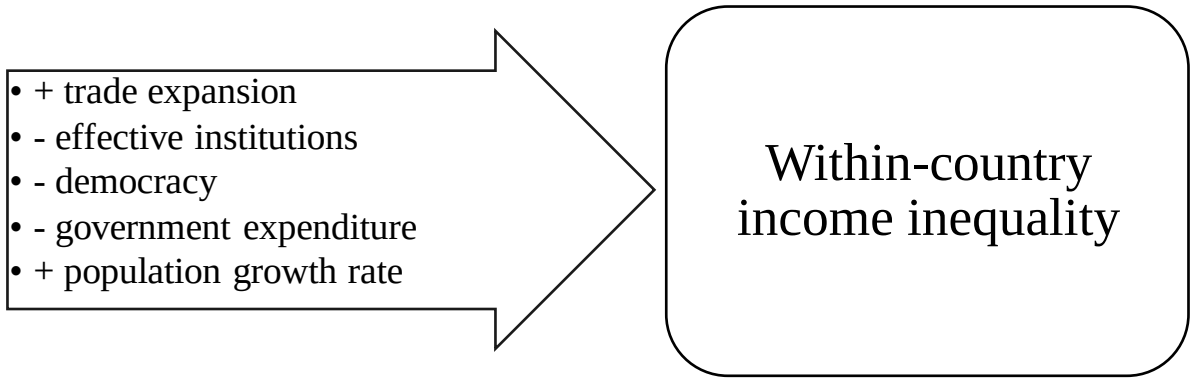
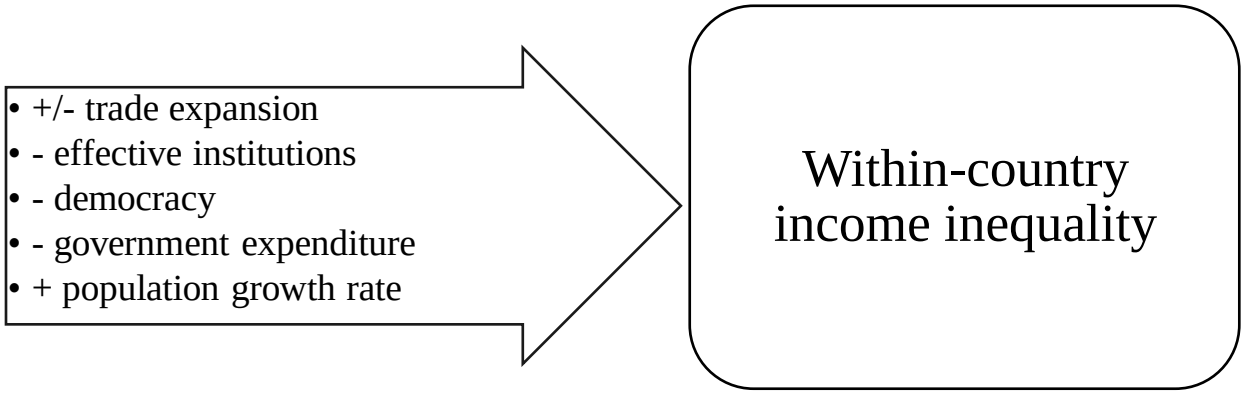


Figure 2

Developed countries



3. Research design

The purpose of this chapter is to answer the second research sub-question presented in chapter 1:

How can the variables be operationalized and how can trade-inequality effects be researched?

This is done by first of all presenting the chosen research design and the models (regression equation for the base model, the main model, and the model used as a robustness check). Then the dependent, independent and control variables are operationalized and the selected measurements are explained together with the data sources. Afterwards the sample of countries is presented. At the end of the chapter validity and reliability of chosen research design and selected indicators is discussed.

3.1 Empirical methods

In order to answer the central research question and test the hypothesis regarding the differences in trade-inequality effects, a longitudinal observational study design is chosen. In observational study design, researchers do not have control over independent variables and thus use the observed, or measured values of the variables (X) reflecting real life situations (Kellstedt & Whitten, 2013). Consequently, the results of observational studies are often considered to be more credible. Additionally, in order to examine trade-inequality relationship and to see whether changes in trade levels result in changes in inequality over time, panel data analysis will be conducted. More specifically, a regression analysis using balanced panel data (consisting of multiple observations over time for each country included into the sample (N)) will be performed. The benefits of panel data analysis are numerous: it allows to have considerably larger data sets, to capture and estimate additional effects, that are often not observed using other types of data (pure time-series, or cross-section), in addition, in panel data analysis lower collinearity and more variability among the variables could be anticipated (Lewis-Beck, Bryman, & Liao, 2004).

Bivariate regression analysis is a commonly used technique when aiming to examine the relationship between the dependent (Y) and independent (X) variables. Yet, in order to control for the possible effects of additional factors (control variables) on the dependent variable (Y), a multivariate regression analysis is a better alternative (Lewis-Beck, Bryman, & Liao, 2004). In order to conduct a linear regression analysis several assumptions have to satisfied: the sample size (N) should be sufficiently large; the relationship between the dependent and independent variables

should be as linear as possible; the measurements of all the variables should be accurate and quantitative (interval or ratio variables); independent variables cannot be linearly related to other independent variables (no multicollinearity); the variables should have normal distribution (Lewis-Beck, Bryman, & Liao, 2004). Additionally, there should be no heteroscedasticity. As it is shown in the following parts of this chapter, several of these conditions are already satisfied: the sample of this research is considered to be large enough (including as many countries as possible into the sample), moreover, all the variables are either ratios, or intervals. In chapter 4 it will be checked whether other conditions are as well met.

As it was already stated in the introductory chapter, one of the aims of this research is to contribute to the existing pool of literature by analysing the latest data available. Additionally, in order to observe the changes in patterns of trade-inequality relationship and better capture the effects of trade expansion on levels of inequality in countries on different stage of development, it is important to have a longer time frame with multiple observations for each country, as all the variables included into this research vary over time. Consequently this analysis covers annual data for a 10 year period, from 1999 to 2008. Both boundaries of the time frame are set based on data availability, as a number of sources provide rather scarce data for developing countries, or lack several observations, which then serves as an obstacle to extending both the time period and the country sample of this research. In total the dataset used for this research consists of 910 observations (10 yearly observations for each country (N=91)).

The analysis will be conducted using GRETL econometric software. The variables included into the main model will be employed in order to run a regression using several different econometric models (pooled Ordinary Least Squares (OLS), fixed effects, random effects, or Weighted Least Squares (WLS)). In turn, the best fit model will be chosen and the results commented. Additionally, robustness check will be performed in order to check whether the obtained results change once the model is modified.

The base model with all the variables (that are operationalized in further parts of this chapter) is now be presented:

1) $$Gini_{it} = \beta_0 + \beta_1 TGDP_{it} + \beta_2 DEM_{it} + \beta_3 GE_{it} + \beta_4 GOVS_{it} + \beta_5 Pgrowth_{it} + \beta_6 DevDummy + \beta_k X_k + \varepsilon_{it}$$

Where 'I' denotes the number of a country, I = [1…. n], and't' denotes a given year t = [1….10]
GINI -> GINI coefficient;
TGDP -> trade to GDP ratio;
DEM -> democracy score
GE -> government effectiveness
GOV -> government spending;
Pgrowth -> population growth rate
DevDummy -> development dummy (level of economic development)

It is important to note that in the presented base model, the effects of trade expansion and level of economic development on inequality are measured separately (for each variable). Yet, the goal of this research is to identify the differences in trade effects on levels of inequality depending on a stage of development, as presented at the end of chapter 2. Consequently, the difference between developed and developing countries needs to be established. One way to do that is to analyse both groups of countries separately and to compare the obtained results. Another option is to analyse the full sample of countries introducing an interaction term (interacting trade and development variables) for the purpose of country distinction into two groups. The advantage of analysing the full sample is that it allows to measure whether the possibly existent differences in trade-inequality effects between developed and developing countries are significant. Therefore, to better reflect the theoretical expectations of this research, an interaction term (INTER) is introduced to the main model; it is constructed by multiplying the trade-to-GDP ratio (TGDP) and dummy variable representing the stage of economic development (constructed based on World Bank's country classification). Consequently, it is expected that having this interaction term (were trade-to-GDP interacts with the level of development) as independent variable would help to identify differences in trade-inequality effects by group (depending on level of development) in a dichotomous way. Further variable explanations are provided in the operationalization part. It is important to note that during the course of empirical research, the main regression equation is employed when certain tests need to be conducted (for instance when testing for heteroscedasticity). The main model of this research is thus the following:

2) $$Gini_{it} = \beta_0 + \beta_1 INTER_{it} + \beta_2 TGDP_{it} + \beta_3 DEM_{it} + \beta_4 GE_{it} + \beta_5 GOVS_{it} + \beta_6 Pgrowth_{it} + \beta_7 DevDummy + \beta_k X_k + \varepsilon_{it}$$

Where 'I' denotes the number of a country, I = [1…. n], and't' denotes a given year t = [1….10]
INTER -> interaction term (1) (product of TDGP and development dummy variable)

Additionally, in order to check whether model estimates change when another measurement of economic development is employed, a robustness check is conducted. Thus for the purpose of this test, another interaction term (INTER2) is constructed. The components of the second interaction term are trade-to-GDP ratio (TGDP) and GDP per capita variable. The difference between the two pairs of interacting variables is that instead of looking for differences in trade-inequality effects depending on which group a country belongs to, an interaction with GDP per capita component allows to check whether the differences in such effects depend on how rich or poor a country is. Alternative models used for robustness check are specified below (both the base model without interaction term (3) and with the added second interaction term (4)):

3) $Gini_{it} = \beta_0 + \beta_1 TGDP_{it} + \beta_2 DEM_{it} + \beta_3 GE_{it} + \beta_4 GOVS_{it} + \beta_5 Pgrowth_{it} + \beta_6 GDPcap + \beta_k X_k + \varepsilon_{it}$

4) $Gini_{it} = \beta_0 + \beta_1 INTER2_{it} + \beta_2 TGDP_{it} + \beta_3 DEM_{it} + \beta_4 GE_{it} + \beta_5 GOVS_{it} + \beta_6 Pgrowth_{it} + \beta_7 GDPcap + \beta_k X_k + \varepsilon_{it}$

Where 'I' denotes the number of a country, I = [1…. n], and't' denotes a given year t = [1….10]
GDPcap -> GDP per capita
INTER2 -> second interaction term (product of TDGP and GDP per capita variables)

3.2 Operationalization

Having introduced the models, in this part the independent, dependent and control variables included into the research are defined, the measurements explained and the choice of the data sources are justified.

3.2.1 Dependent variable (Y)

The dependent variable of this research is within-country inequality. Due to the fact that the concept of inequality as such is hard to measure, for the purpose of this research Gini index is used as the closest proxy for the dependent variable (within-country inequality). The index shows how the income (or expenditure on consumption) is distributed among households, or individuals

within a country and how it diverges from perfectly equal income distribution. The values of Gini index range from 0 (representing perfect equality where all individuals, or households within a country get the same income) to 1 (representing perfect inequality, where all the income is owned by one individual/household). Alternatively the 0-100 scale for Gini index values is often used. The graphical representation of Gini index is known as the Lorenz curve of income distribution, where the value of Gini index is basically the area between the Lorenz curve and the line representing perfectly equal income distribution (Darity, 2008). When the income is equally distributed, Lorenz curve and perfect equality curve becomes the same, in which case the value of Gini index is 0. This index is considered to be the most widely used measurement of income inequality which is also evident from the summary presented in table 1, where the vast majority of scholars chose this index while analysing the patterns of income distribution.

As Korzeniewicz & Moran (2009) state, Gini index satisfies the conditions crucial for inequality measurement: its values are symmetrical and constrained by the lower and upper boundaries and also, its values are said to reflect changes in redistribution from rich to poor individuals (Pigou-Dalton principle of transfers). In addition, choosing this measurement as a dependent variable for the purpose of this research is considered to be appropriate as according to Rudra (2004) such calculated measures of inequality allows to see whether the poorest part of the society is in a better or worse position in terms of within-country income distribution. Consequently, it will be possible to make implications regarding the trade-inequality effects and to see whether more trade brings more gains, or losses for the poorest segments in both developed and developing countries. The data on Gini index for this research is taken from the Standardized World Income Inequality Database (SWIID). The database includes data from sources like World Income Inequality Database, OECD Income Distribution Database, Eurostat and many more (Solt, 2009). In addition, out of all the alternative options, the SWIID offers the widest coverage (in terms of number of countries and years) and highest comparability, thus it is considered to be a highly suitable choice for inequality studies (Solt, 2009). The SWIID was also used for inequality measure in a number of studies reviewed in literature review part (Bergh & Nilsson, 2010).

Furthermore, in inequality studies, authors alternatively use other measures, such as Theil coefficient, or look at the share of income received by the highest and lowest quintiles/deciles in the population (Bussmann, Soysa, & Oneal, 2005; Rodriguez-Pose, 2012). Regarding the Theil

coefficient, it is not used as commonly as the Gini index mainly because the data sources for this coefficient are lacking, moreover, its interpretation is not as easy and straightforward (Korzeniewicz & Moran, 2009). As for the income shares, in general more data is available for developed countries and not for developing countries, which is a considerable limitation considering the aim of this study.

3.2.2 Independent variable (X)

As shown in the main model equation (2), the variable of interest in this research is interaction term (INTER). One of the components of the interaction is the variable representing trade openness - trade-to-GDP ratio (TGDP). This ratio shows the share of trade volumes (the sum of exports and imports of goods and services) to GDP and is also a common choice of scholars researching trade-inequality relationship (summary table 2.4). In addition, trade-to-GDP ratio is considered to be a measurement of de facto trade/economic openness and integration into the global economy, showing how important country's exports and imports are (Jaumotte, Lall, & Papageorgiou, 2013; Bussmann, Soysa, & Oneal, 2005). However, it is important to note, that the values of this indicator are said to be affected by additional factors, such as trade policy, structure of country's economy, or even country size and geographical location (Bussmann, Soysa, & Oneal, 2005). Yet, based on the studies reviewed in chapter two, it is evident that trade-to-GDP ratio is so far the most often used measure of trade openness and expansion. The data for this variable is obtained from the World Bank's World Development Indicators (WDI) database.

The second component of the interaction term is development dummy variable. Adding a dummy in order to divide country sample into two distinct groups is a common practice in regression analysis. Moreover, using a categorical variable appropriately addresses both the central research question and the hypothesis, where both groups of countries (developed and developing) are named. Therefore, following Rodriguez-Pose, (2012) a proxy (dummy) variable for the state of development is introduced, where developing countries are assigned a value of 0 and developed countries a value of 1. However it is important to note that there also exist certain limitations of using dummy variables. More specifically some information might be lost, as for instance when assigning countries to the same category, existent differences between those countries (if any) would not be reflected. One of the solutions could be using an interval level measurement for the state of development, yet alternatively it is expected that any relationships that could be

unobserved when using the dummy variable for the purpose of country division, will eventually be revealed when conducting a robustness check with an alternative measure of the level of development (explained later in this section).

For the purpose of dividing countries into two groups (developed countries and developing countries) country classification provided by the World Bank is used. Here based on the income levels (GNI per capita) countries are assigned to one of the following groups: low income economies, lower middle income economies, upper middle income economies, high income economies, or high income OECD members (The World Bank, 2016)[1]. Consequently, all countries belonging to the low or middle income groups are considered to be developing, while high income countries are assigned to the category of developed states (The World Bank, 2016). Also, as noted by the World Bank, although the explained country division into developed and developing group is frequently used, it does not necessarily mean that all the countries assigned to a particular group are on the same stage of development, which indicates that there are certain limitations regarding such country division. However, due to the fact that the World Bank country classification is widely acknowledged and used in the academic literature, it is also considered to be an appropriate choice for the purpose of this research.

It is important to note, that for this research countries included into the sample are divided into two categories (developed or developing country group) based on the World Bank Analytical Classification during the entire time frame of the analysis, and thus cases where a country advances to the category of developed states (or from upper middle income to high income according to World Bank's classification) are taken into account. Instances of such countries are the following: Croatia (2008), Czech Republic (2006), Estonia (2006), Hungary (2007), Republic of Korea (2001), and Slovak Republic (2007). A possible solution in this situation is to assign country to a group to which it was attributed for a longer period during the time frame of the analysis. (Rodriguez-Pose, 2012). Consequently, from all the cases that were mentioned, Republic of Korea

[1] As the World Bank defines, countries with GNI per capita not exceeding the amount of $1,045 are considered to be low income economies. Middle income economies then are defined as having the GNI per capita between $1,045 and $12,736, where the lower-middle income countries are separated from the upper-middle income countries at the level of $4,125. Finally, countries with GNI per capita equal to $12,736 or more are considered to be high income economies. (The World Bank, 2016)

is assigned to the category of developed states for the entire time period of this research, while other countries stay in the category of developing states.

Consequently, both of the described variables (trade-to-GDP ratio and development dummy) are multiplied and the independent variable of this research – the interaction term is constructed. It is important to mention that both of the components are also separately added to the main model. In general, interaction term is used in cases where it is assumed that the impact of one independent variable might be dependent on another independent variable. The significance and negative coefficient signs of the model estimates for interacting trade-to-GDP and development dummy variable would then indicate that the more developed a country is, the more likely trade expansion is to reduce inequality. In contrast, in case of less developed countries (developing world) this would serve as an indication that trade expansion is less likely to lower the levels of inequality. In turn, this would signal that the expected differences in trade-inequality effects in developed and developing world indeed exist, which then results in confirming the hypothesis presented at the end of chapter 2.

Furthermore, for the purpose of robustness check, the main model is modified by using an alternative interaction term (INTER2) as an independent variable. The second interaction consists of previously described trade-to-GDP variable and GDP per capita variable. GDP per capita is an alternative measure of the level of country's economic development, which is commonly accounted for when analysing trade-inequality relationship (refer to table 1) (Bergh & Nilsson, 2010; Rudra, 2004; Meschi & Vivarelli, 2008). Adding trade-to-GDP and GDP per capita interaction to the analysis when testing for robustness should reveal whether trade-inequality relationship is more pronounced in richer, or poorer countries. In other words, it is expected that changing the categorical component (development dummy) of an interaction term with GDP per capita variable would allow to check whether the more developed a country is, the lower the likelihood that trade expansion increase inequality, or not. Data for this variable (GDP per capita (current US$)) is gathered from the WDI database.

3.2.3 Control variables

At the end of chapter two, the reader was presented with several other factors that are said to have an effect on within-country inequality and thus were previously included into the analyses made

by other researchers. All of these factors (democracy, effectiveness of domestic institutions, population growth rate and government spending) are included into the model as control variables. Controlling for variables that presumably have an effect on dependent variable (Y) is important for the results of the analysis, as otherwise the obtained estimates might show spurious relationships and thus lead to misleading interpretations (Punch, 1998). Due to the fact that variables like democracy or effectiveness of institutions are difficult to measure, proxy indicators are chosen.

Democracy (DEM)

For the purpose of this research, the proxy indicator chosen to measure the strength of democratic regime are the polity scores provided in Polity IV Project dataset. This measurement is a common choice in inequality studies, as currently the dataset provides annual time-series data for 167 countries during the period from 1946-2013. The characteristic of political regimes and institutions are annually assessed, thus the dataset is regularly updated. Country's level of democracy is evaluated based on the process of executive recruitment (its openness and competitiveness), political participation, competition and the existent constraints (checks) on the executive. The polity, or democracy score values range from -10 (authoritarian countries) to +10 (pure, consolidated democracies). However, when converting the scores into regime categories, autocracies score from -10 to -6, anocracies (partly dictatorship, partly democracy) from -5 to +5, while democracies from +6 to +10 (Centre for Systematic Peace, 2016).

Government effectiveness (GE)

As it was explained in sub-chapter 2.3, effectiveness of domestic public institutions is said to be an important factor affecting trade-inequality outcomes, especially with regards to developing world, and thus it is important to include it into the analysis. Consequently, the chosen proxy measurement is the government effectiveness index from the Worldwide Governance Indicators. This index is said to reflect the degree of perceived quality of public and civil services, the level of independence from various pressures, quality of policy making process, government's involvement and commitment to it (Kaufmann & Kraay, 2016). In addition, the measurement is composed using variables from a large number of representative and non-representative sources. Similarly to other WGI indicators, the government effectiveness index can be presented in two ways: in the units with values ranging from -2.5 (low effectiveness) to +2.5 (high effectiveness),

or in percentage terms ranging from 0 (low effectiveness) to 100 (high effectiveness) (Kaufmann & Kraay, 2016). Due to the fact that between 1996 and 2002 the values for government effectiveness index (as well as for other WGI) were presented every 2 years, in this research the years when the index is missing are assigned with values of previous year. This is considered to be a reasonable solution as in general no major changes were observed during the short term periods (1-2 years) thus the missing values are very likely to be similar to the year before.

However it is important to note, that the government effectiveness index and WGI in general have certain limitations. For instance, as WGI critics argue, due to a variety of data sources that are used to construct the indicators, these measures lack comparability over time, meaning that WGI might not be the best choice when aiming to compare multiple countries during multiple point in time. In addition to that, the WGI are said to lack transparency, as some of the data sources are unclear, or inaccessible to others. Finally, the WGI are rescaled resulting in exactly the same averages (global) during every period of time which is said to have an effect on comparability over time. On the other hand, in their answer to critics, authors of the WGI argue that their methodology allows to combine the data obtained from diverse sources and to make the indicators comparable (Kaufmann, Kraay, & Mastruzzi, 2007). Moreover, when it comes to transparency related critique, authors note that national assessments are often not available to the general public (Kaufmann, Kraay, & Mastruzzi, 2007).

Government spending (GOVS)

The levels of government expenditure (on health and education) is another crucial factor that needs to be accounted for in this research, as high levels of spending are said to be helpful reducing the income gap between rich and poor members of the society (for more explanations refer to 2.3). However, due to limited data availability, it is decided to use spending on health as a proxy variable for governmental spending on both education and health. The positive relationship between both types of spending has been observed in the literature (Rahman, 2011; Al-shihri, 2014), thus it can be implied that countries that spend more on education, will also have high expenditure on healthcare. Consequently, spending on health is considered to be an appropriate proxy for both types of government expenditure. Yet, it is still crucial to note that since proxy variable is not a direct measure (of spending on education in this case), certain limitations exist.

Health spending variable used for the purpose of this research represents a share of GDP spent on healthcare. The data for this variable is taken from the WDI database where the World Bank provides estimated weighted averages based on data from World Health Organization Global Health Expenditure Database.

Some researchers alternatively use the data provided in the International Monetary Fund's Government Finance Statistics (GFS) dataset which also provides figures for different types of social spending (health, education, social protection) (Rudra, 2004). However, compared to GSF, the WDI data on government expenditure covers more countries during the time period of this analysis, which allows to include spending variable without significantly reducing the country sample.

Population growth (Pgrowth)

Another variable added to the model as a control is population growth rate. As it was previously explained, controlling for this factor is important, as high population growth rates are said to be related to higher levels of inequality. This factor was also controlled for in other researches (refer to summary table 1). The data for this control variable is gathered from the WDI database where the annual population growth rate (%) is provided.

3.3 Country sample

A considerable drawback currently existent in the literature on trade-inequality relationship is the fact that the vast majority of studies focus more on developed countries (Rodriguez-Pose, 2012). This is commonly explained by the limited data availability for developing world. Consequently, as it was already noted, the findings so far are not unified and thus it remains unclear which countries are more vulnerable to the effects of trade expansion on income inequality. In order to overcome this drawback and to obtain more generalizable results, this analysis covers a country sample in which developing and developed countries are about equally represented. It is expected that having a country sample that accurately represents both groups of countries would make it easier to observe the differences in trade effects in developed and developing world.

A number of countries were not included into the sample due to the lack of data for the time period of analysis. The final country set consists of 91 countries, where 63 are developing states and 28 are developed states. A table with full list of countries can be found in appendix 1. The final

country division based on the previously explained World Bank's country classification is provided in appendix 2.

3.4 Reliability and validity

Reliability and validity are the two principles significantly important in terms of associating theoretically defined concepts with particular empirical indicators and empirically analysing certain phenomenon (Lewis-Beck, Bryman, & Liao, 2004). As Kellstedt & Whitten (2013) explain, the measures used for evaluating causal relationships and testing hypothesis have to be both reliable and valid. More specifically, the combination of reliable, but invalid measure is not considered to be useful in terms of hypothesis testing, while unreliable measures cannot result in reliable hypothesis testing (Kellstedt & Whitten, 2013). Consequently, both of the features were taken into account when choosing the operational measures for the concepts defined while discussing the relationship between trade and inequality in developed and developing world.

The main requirements for a measure and thus the results to be reliable are the following: it has to be equivalent and repeatable, implying that the same, or very similar results should be obtained if choosing the same or even an alternative measure; in addition, the observations have to consistent in time and space (Lewis-Beck, Bryman, & Liao, 2004; Kellstedt & Whitten, 2013). Therefore, the indicators chosen to measure the dependent, independent and control variables in this research are annually calculated using the same methodology and considered to be stable, which implies that the same results could be anticipated if repeating the analysis for the second time. The only exception regarding methodology is the government effectiveness index, which limitations where already discussed in the operationalization part. In addition to that, the data sources for measuring all the variables were chosen based on the previous choices made by other researchers focusing on trade-inequality relationship, which also serves as an indication of reliability, as data is obtained from widely acknowledged sources.

Regarding the validity principle, it firstly refers to the extent to which chosen indicators accurately measure the theoretical concepts that they intend to measure (Lewis-Beck, Bryman, & Liao, 2004; Kellstedt & Whitten, 2013). A number of indicators chosen for the purpose of this analysis are direct measures of certain concepts (trade levels, government spending), meaning that the exact calculated numbers, or levels are used, while for the remaining ones (levels of inequality, democracy, effectiveness of institutions, democracy) the closest proxies and the most commonly

used measures were selected. Hence, one of the validity conditions is satisfied. Another requirement for internal validity is existence of causal relationship between the independent and dependent variables (Trochim, 2000). The existence of trade-inequality relationship has been discussed by a number of theories and observed in studies reviewed in chapter 2, in addition to that, this research controls for additional factors that might affect levels of within-country inequality. Furthermore, the external validity shows if the results obtained are generalizable to a broader population. This research aims to achieve external validity by covering a representative sample of countries belonging to two groups (developed countries and developing countries) and thus it is expected that the obtained results will be generalizable even for those countries, that due to lack of data availability were not included into the sample. In addition, having representative sample it is expected that the findings indicating certain differences in terms of trade-inequality effects in countries on different stage of development would be thus applicable for the entire group (developed or developing world).

4. Empirical analysis

In this chapter following the detailed explanations provided in the research design part (chapter 3) further steps of the analysis are presented and discussed. Consequently, this part aims to answer the third research sub-question presented in chapter 1:

What are the results of the analysis?

The chapter is structured as follows: firstly, the descriptive statistics of all the variables are provided and it is further checked whether the remaining preconditions for conducting a regression analysis are satisfied (as discussed in chapter 3 it is checked whether there is no problem of multicollinearity, heteroscedasticity, whether the variables are normally distributed and there is a linear relationship between X and Y); then the best fit model is selected out of for alternative econometric models (pooled OLS, fixed effects, random effects, or WLS); finally, the estimates of the most suitable model are analysed and commented looking at the obtained significance of the model, variables and coefficients. Additionally, a robustness check is performed in order to test whether the obtained estimates change when the model is modified.

4.1 Descriptive statistics

Before proceeding to regression models it is important to look at the descriptive statistics of the panel dataset and make some general conclusions about the data that is used for the purpose of this analysis. Table 2 provides summary statistics for all the variables that will be included into the regression models (both the main model and the one used for robustness check). It is important to note that interaction variables are not included into the table, yet the descriptive statistics for the components are provided. Based on the information presented in the table it can firstly be stated that the analysis will be conducted using balanced panel data, as there are no missing observations.

Additionally the mean and the median of the variables should be looked at, as based on the difference between the two values, implications regarding the distribution of the variables can be made. The mean is calculated by dividing the sum of all the observations by the number of observations, while the median is the middle value of all the variable values ordered from the lowest to the highest numerical value (Weiss, 2008). When the values of the mean and median are equal, the variables are said to have a symmetric (and normal) distribution (Pfaffenberger & Patterson, 1987). In contrast, when the values are not equal, or close to equal, the distribution is

skewed (to the right, or to the left). As the numbers provided in table 2 show, none of the variables have equal mean and median, in some of the cases the differences between the two values are quite large (GDP per capita variable). This serves as an indication that variables do not have normal distribution. In addition, the larger differences between the mean and median can also be caused by the fact that the mean is more sensitive to outliers (extreme values of observations) (Weiss, 2008), which are present in the dataset used for the purpose of this research, as the sample includes countries on different stages of development.

In addition to that, two additional characteristics of the distribution are provided – skewness and kurtosis. Skewness is a measure showing how symmetrically the residual values are distributed and it ranges from -1 to +1 (Hair, Anderson, Tatham, & Black, 1998). The values above +1, or below -1 is an indication of heavily skewed distribution, and from the table it can be noticed that this is the case for several variables (trade-to-GDP, democracy, GDP per capita). In case of normal distribution skewness should be equal to zero. On the other hand, kurtosis compares the distribution of residuals with normal distribution and shows how peaked or flat it is. High values of kurtosis means that there are outliers in the dataset, while low values have the opposite meaning (Hair, Anderson, Tatham, & Black, 1998). In case of normal distribution, the value of kurtosis is expected to be around 3, yet as it is evident from the summary statistics table, several variables have very high kurtosis. Based on the discussed characteristics it can be concluded that the statistics presented in table 2 indicate non-normal distribution of the residuals, which is analysed more in-depth in the next section.

Table 2

Summary statistics

Variable	Mean	Median	Min	Max	Std. deviation	Coef variation	Skewness	Ex. kurtosis	Missing obs.
GINI	38.16	37.63	20.35	68.90	9.26	0.24	0.40	-0.27	0
Trade-to-GDP	83.78	71.19	18.76	439.66	52.77	0.63	3.02	13.86	0
Democracy	6.28	8.00	-7.00	10.00	4.90	0.78	-1.54	1.16	0
Government effectiveness	0.34	0.11	-1.51	2.43	0.99	2.92	0.40	-1.09	0
Government spending	3.96	3.68	0.37	8.91	2.01	0.51	0.33	-0.91	0
Population growth	1.07	1.12	-2.85	7.36	1.12	1.05	0.36	1.32	0
Development dummy	0.31	0.00	0.00	1.00	0.46	1.50	0.84	-1.30	0
GDP per capita	12174.10	4024.88	149.37	112851.00	16599.50	1.36	1.96	4.61	0

4.2 Testing the assumptions of multivariate regression analysis

4.2.1 Normality

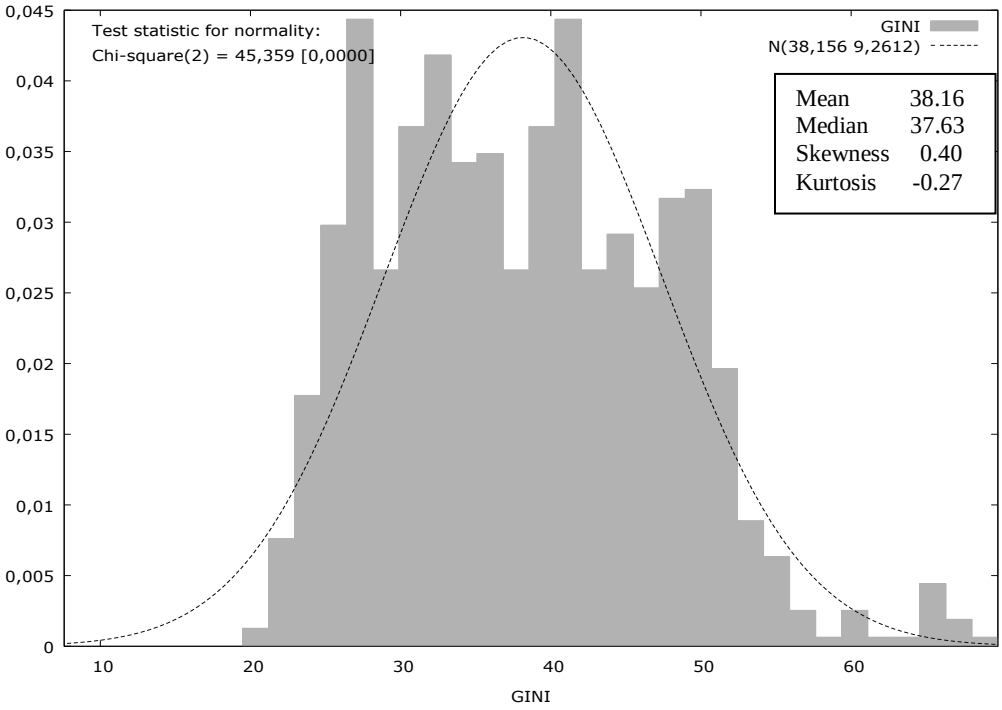
Normality is considered to be one of the fundamental assumptions that have to be satisfied in order to conduct a multivariate regression analysis (Hair, Anderson, Tatham, & Black, 1998). More specifically it is crucial that the variables included into the model would have normal, or close to normal distribution. The concept of normal distribution is defined as: "a bell-shaped statistical distribution that can be entirely characterized by its mean and standard deviation" (Kellstedt & Whitten, 2013, p. 143). In order to test each of the variables for normality, statistical and graphical methods are used. More specifically, for every variable a histogram comparing the observed values with values in case of normal distribution is checked and additionally, results of normality tests conducted in GRETL, as well as previously discussed values of mean, median, skewness and kurtosis are looked at. In case the values of the variables are not normally distributed, a number of transformation options are considered and the transformation which improves residual distribution the most is presented and used further on in the analysis.

Dependent variable (Y)

As it is shown in graph 1, the values of the dependent variable of this research (Gini index) are not normally distributed. Consequently, a transformation is needed. During the process of normalization, a number of possible data transformations (logarithmic, square root, different exponentiation variants) were made. Transforming the values of the dependent variable by using the exponent of 1/3 was found to be improving the distribution of this variable the most, as compared to other possible transformations. Frequency distribution histogram for the transformed variable is provided in graph 2. The results of the normality tests are shown in table 3.

Graph 1

Frequency distribution histogram for GINI



Graph 2

Frequency distribution histogram for transformed GINI

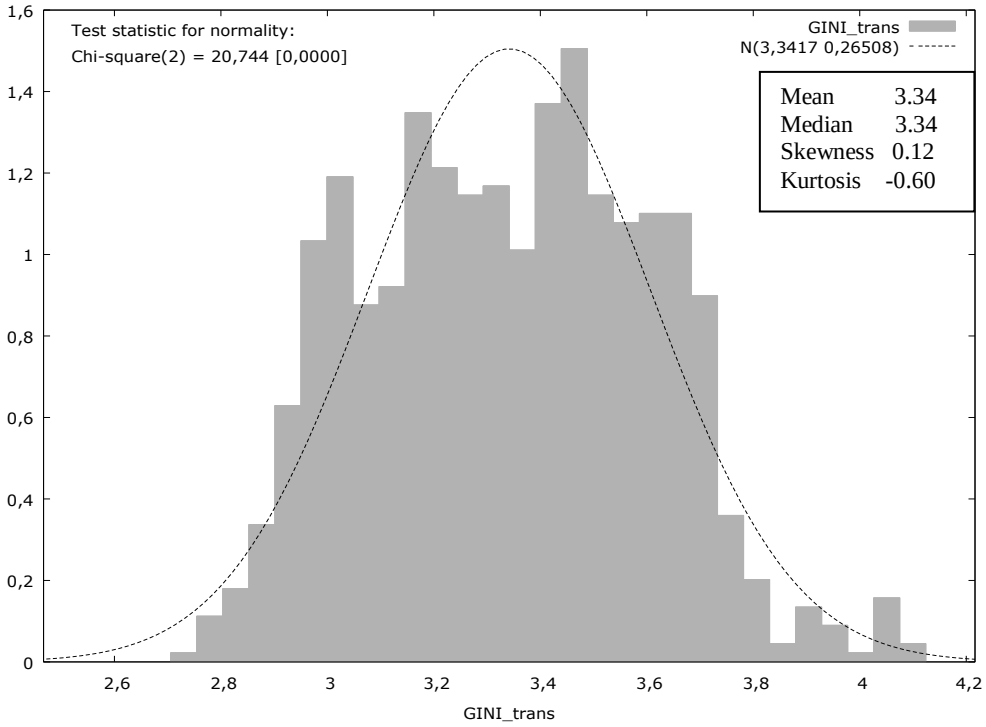


Table 3

Results of the normality tests

Test	GINI p- value	GINI (transformed) p-value
Doornik-Hansen test	1.41381e-010	3.12893e-005
Shapiro-Wilk W	1.24181e-011	1.17124e-007
Lilliefors test	0	0
Jarque-Bera test	1.19281e-006	0.0003729

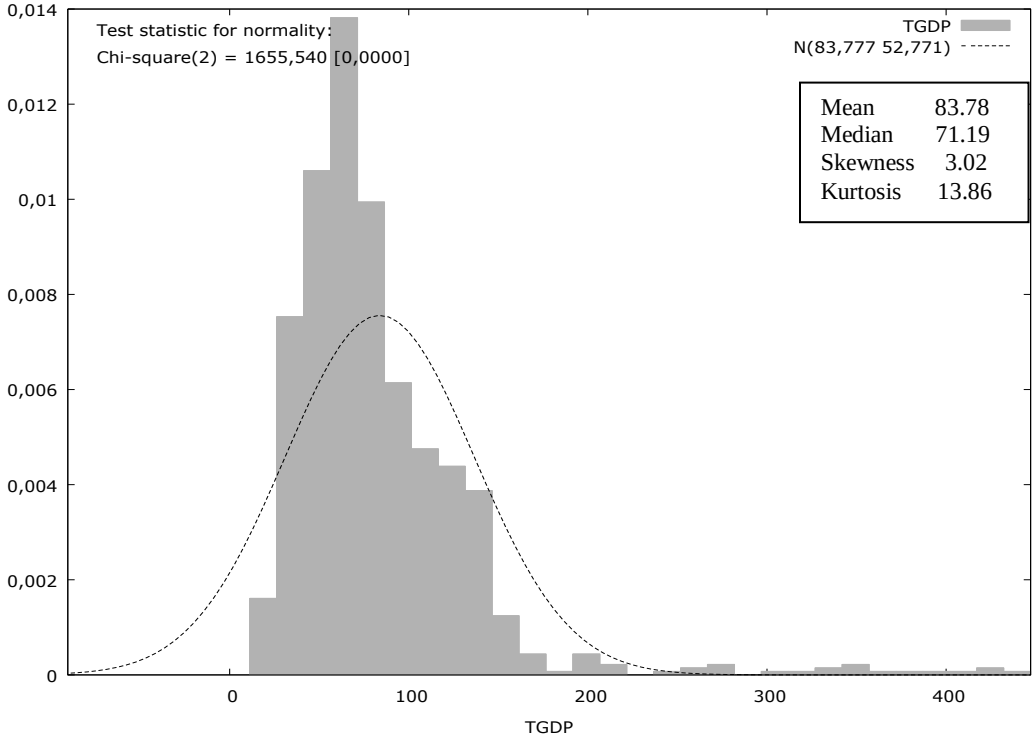
Independent variable (X)

As it was explained, the independent variable of this research is an interaction term which consist of two variables – trade-to-GDP ratio and the development dummy variable. Consequently, in order for the interaction term to have normal distribution, it is important that the values of the components are normally distributed. The development dummy variable is dichotomous (as variable has only two values 1, or 0) and cannot be transformed for normality. However referring to the summary statistics table (table 2) it could be stated that the variable has close to normal distribution, as the difference between mean and median is not large, also neither skewness, nor kurtosis values are extremely high, or low. On the other hand, when more normality cannot be achieved with the means of transformations, it is better to use the original variable (Hair, Anderson, Tatham, & Black, 1998).

Regarding the second component, as the frequency distribution histogram (graph 3) indicates, the values of trade-to-GDP variable are not normally distributed, and thus a transformation is needed. The best results in terms of normality are obtained by using the exponent of (-1/5) (graph 4). Results of normality tests are compared in table 4.

Graph 3

Frequency distribution histogram for trade-to-GDP



Graph 4

Frequency distribution histogram for transformed trade-to-GDP

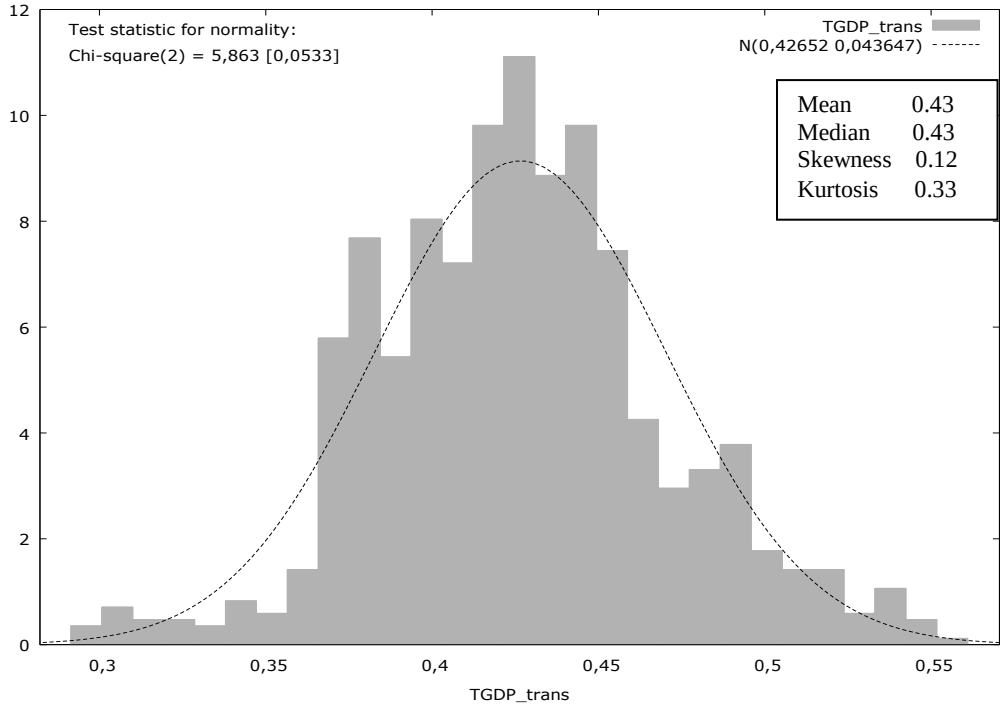


Table 4

Results of the normality tests

Test	Trade-to-GDP p- value	Transformed trade-to-GDP p-value
Doornik-Hansen test	0	0.0533257
Shapiro-Wilk W	4.0656e-035	2.3987e-05
Lilliefors test	0	0
Jarque-Bera test	0	0.0412298

Other variables

The distribution of the values of the remaining variables (democracy, government effectiveness, government spending, population growth and GDP per capita) is also checked for normality. In order to make the values of the variables as normally distributed as possible, the data for these variables are normalized in the following way: government effectiveness variable is transformed by using the exponent of (-1/5); government expenditure variable is transformed by using the exponent of (1/3); for GDP per capita variable a logarithmic transformation is further used for the purpose of robustness check. It is important to emphasize that only the transformation which improves distribution the most is presented and used further. Frequency distribution histograms for all the original variables and transformations are provided in appendix 3.

The two remaining variables are democracy and population growth rate. As for democracy, none of the applied transformations improved the distribution. One of the possible reasons for non-normal pattern of distribution might be related to the fact that majority of the developed countries included into the country sample have high and very similar democracy scores for the entire time frame of this analysis. As Hair et al. (1998) suggest, in case transformations do not improve normality, the original forms of the variables should be used. However, another option is to introduce democracy dummy variable. Therefore for the purpose of this analysis, based on the democracy scores assigned for each country, a dummy variable is constructed, where all autocracies (scores from -10 to -6) and anocracies (partly dictatorship, partly democratic) (scores from -5 to +5) are assigned a value of 0, while all democracies (+6 to +10) a value of 1. Autocracies and anocracies are assigned under the same category in order to distinguish strong, consolidated democratic regimes from other types of political regimes. Regarding the population growth

variable, its original form is used further in the analysis as the distribution of the values of this variable is close to normal (no extreme cases of departure from normal distribution observed). Moreover, none of the transformations improved the normality of distribution for population growth rate variable. Frequency distribution histograms for both variables (originals) are also provided in appendix 3.

Regarding the second interaction term that is used for robustness check, both of the components of this variable (trade-to-GDP and GDP per capita variables) were transformed in order to achieve normal, or close to normal distribution. Consequently, in order to construct this interaction term, the transformed data for the two variables is multiplied.

To sum up, in cases where transformations improved normality, the transformed variables are used further in this analsysis. Additionally, democracy dummy variable is introduced. A table summarizing the results of normality tests and transformations made to each variable is provided in appendix 4.

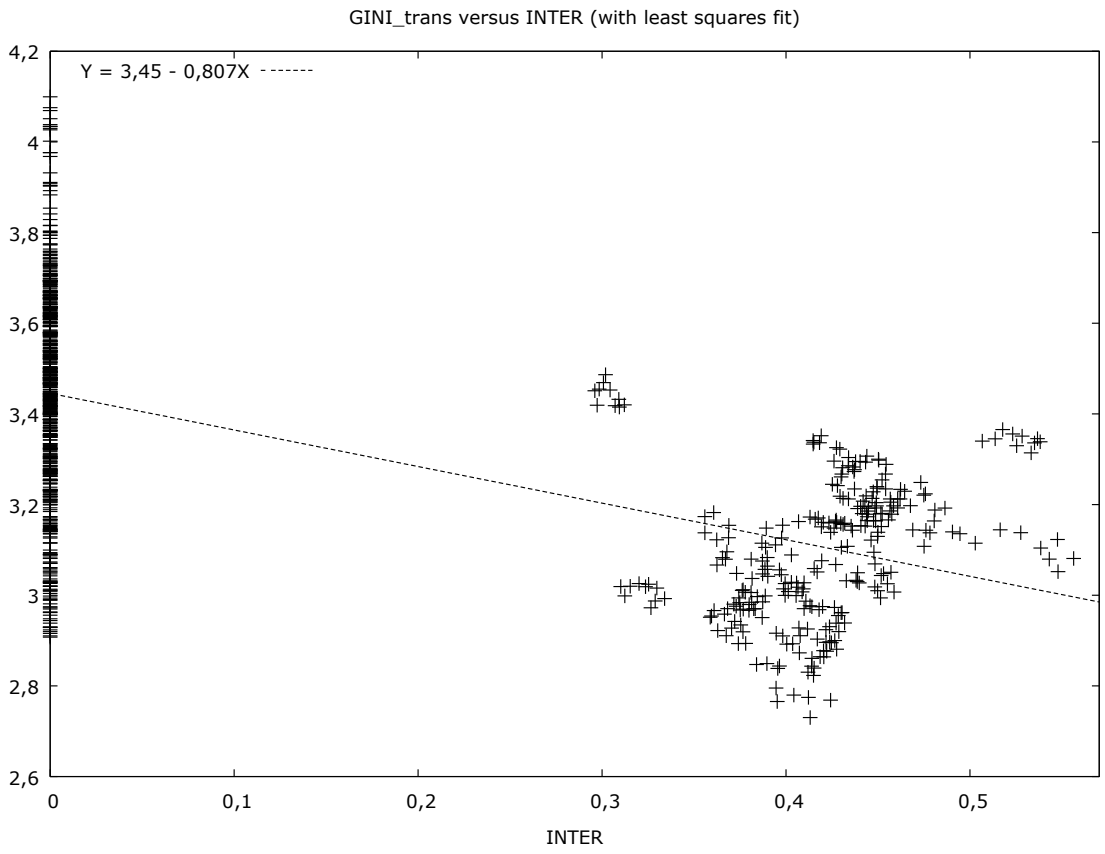
4.2.2 Linearity

According to another crucial assumption of the regression analysis, the relationship between the dependent and independent variables should be as linear as possible. In order to test whether this assumption is satisfied, scatter plot and the correlation coefficient is checked. It is important to note, that due to the fact that some transformations were made for both the dependent and independent variables in order to improve the distribution, the linear relationship assumption is tested using the normalized values of the variables. As the scatter plot presented in graph 5 shows, the relationship between Y and X is non-linear, therefore the linearity assumption is violated. The most probable reason why linearity assumption does not hold is the fact that one of the components of independent variable (INTER) is a dichotomous variable, which has only two values (development dummy variable). Consequently, violation of one of the assumptions indicate that the regression should be ran using the WLS model. However, this issue will be addressed in section 4.3, when selecting the most appropriate model.

Additionally linearity of each dependent-independent/control variable pair can be checked by looking at the scatter plots provided in appendix 5. It is evident that linearity patterns are present in all of the cases, which is also an indication that no further transformations are needed.

Graph 5

Scatter plot for linearity



4.2.3 Multicollinearity

As explained by Kellstedt & Whitten (2013), the issue of multicollinearity occurs when two or more independent (explanatory) variables are linearly related (correlated) to one another. The presence of multicollinearity might lead to misleading results and thus interpretations of the estimates of regression analysis, as when several variables are highly correlated, discovering significant relationships between each independent and dependent (Y) variables becomes more complicated. Variables are considered to be perfectly correlated when correlation coefficients are equal to 1, or -1. Ideally independent variables should not be correlated, in which case each of them would explain a separate portion of variation in the dependent variable (Y) (Pfaffenberger & Patterson, 1987).

As it can be seen from the correlation matrix provided in table 5, government effectiveness variable is highly correlated with several other variables: development dummy (-0.76), GDP per capita (-

0.85) and with the second interaction (INTER2) (0.70). Consequently, in order to avoid distortions of the results caused by multicollinearity, this variable is omitted. The decision to drop the government effectiveness variable can be further justified by the fact that although so far there is no perfect measurement for institutional effectiveness, the chosen measurement (government effectiveness index from WGI) received a lot of criticism in the literature. Hence, due to high correlation, one of the least reliable indicators included into the model of this research is dropped.

In addition the development dummy is highly correlated with the interaction term (1) (0.73) and with GDP per capita variable (0.79). The high correlation with the interaction term (where the dummy variable is one of the components) is tolerated as long as the number of variables included into the main model is not very large. Regarding the correlation with GDP per capita, this does not require any action as both variables will not be included into the single model.

GDP per capita variable is highly correlated with the second interaction used for robustness check (0.85), which is tolerated as GDP per capita variable is used to construct it.

Table 5

Correlation matrix

Variable	Interaction (1)	Trade-to-GDP	Gov. effectiveness	Gov. spending	Democracy dummy	Population growth	Development dummy	GDP per capita (log)	Interaction (2)
Interaction (1)	1.00	-0.45	-0.58	0.29	0.11	-0.03	0.73	0.60	0.29
Trade-to-GDP	-0.45	1.00	0.21	-0.15	0.01	0.21	-0.12	-0.21	0.32
Gov. effectiveness	-0.58	0.21	1.00	-0.62	-0.41	0.30	-0.76	-0.85	-0.70
Gov. spending	0.29	-0.15	-0.62	1.00	0.45	-0.35	0.60	0.69	0.61
Democracy dummy	0.11	0.01	-0.41	0.45	1.00	-0.25	0.32	0.45	0.45
Population growth	-0.03	0.21	0.30	-0.35	-0.25	1.00	-0.17	-0.40	-0.31
Development dummy	0.73	-0.12	-0.76	0.60	0.32	-0.17	1.00	0.79	0.69
GDP per capita (log)	0.60	-0.21	-0.85	0.69	0.45	-0.40	0.79	1.00	0.85
Interaction (2)	0.29	0.32	-0.70	0.61	0.45	-0.31	0.69	0.85	1.00

4.2.4 Homoscedasticity

According to homoscedasticity assumption, the variance of the error term should be constant across all values of the independent variables (predictors) (Hair, Anderson, Tatham, & Black, 1998; Weiss, 2008). When this assumption is violated, the issue of heteroscedasticity occurs. Consequently this might lead to unreliable hypothesis testing. One of the ways to detect

heteroscedasticity using GRETL software is to run the main regression using the pooled OLS model (which is usually tried first in panel data analysis, before proceeding to alternative models) and to perform the distribution free Wald test. The results of this test are presented in table 6 and it is evident that heteroscedasticity is present (p-value equals to 0, which leads to rejecting the null hypothesis of homoscedasticity). The presence of this problem indicates that OLS is not the best unbiased linear estimator (BLUE) in this case and thus an alternative model should be used. The choice of the model is discussed in the next section.

Table 6

Test for presence of heteroscedasticity

Distribution free Wald test for heteroscedasticity:
Chi-square (91) = 289920, with p-value = 0

4.3 Model selection

After testing the validity of the main assumptions of multivariate regression analysis, consequent step is to select the best fit model, using which the hypothesis presented at the end of chapter 2 will be tested. The following econometric models are usually tried to fit the panel data: pooled OLS, fixed effects model, random effects model and WLS model. The standard procedure to select the best model in GRETL is to look at the results (p-values) of panel diagnostics tests, which are performed in pooled OLS model.

However, due to violation of two crucial assumptions (linearity assumption between Y and X, and the observed presence of heteroscedasticity), the most appropriate choice is to select WLS model as the most suitable one to fit the panel dataset analyzed in this research. This model is considered to be one of the remedies for presence of heteroscedasticity and can also be used when linearity assumption is not satisfied (Lewis-Beck, Bryman, & Liao, 2004). In addition, the WLS model is often used in social science research. Furthermore, the results obtained in WLS model are interpreted in the same way as the OLS model estimates (Lewis-Beck, Bryman, & Liao, 2004). Consequently, this model is further used for the results and interpretations.

Additionally it should be mentioned that when analyzing panel datasets, the issue of autocorrelation might occur and thus it is important to test for presence or absence of it. In general terms, autocorrelation can be defined as a situation where the error terms of regression model are

correlated over time (when using time-series data), or space (with cross-sectional data) (Lewis-Beck, Bryman, & Liao, 2004). Presence of autocorrelation is also another indicator that OLS is not BLUE and one of the possible solutions is considering an alternative model (e.g. WLS). However, the WLS model is already chosen as the most suitable one due to reasons discussed earlier in this section and its estimates also need to be checked for autocorrelation. When running the regression using WLS model in GRETL, no additional tests need to be performed in order to detect this issue, as the software automatically omits variables that cause autocorrelation. Therefore, in case one or several variables are automatically omitted from the regression model, this issue will be further discussed in the following sub-chapters.

4.4 The results

In this sub-chapter the results of panel data regression analysis are presented. The coefficients of the variables included into the models and significance of each variables are discussed. However, since the majority of variables were transformed for normality, rather than discussing the actual coefficients (numbers), the directions of the effects that coefficient signs estimate (show) are discussed instead. In the second part of this sub-chapter the robustness check is performed.

4.4.1 Model estimates

In table 7, the estimates (coefficients and significance levels) of the base model (1) and the main model (2) with the added trade-to-GDP and development dummy interaction term are presented (for the full model tables refer to appendix 6). As it can be noticed, both models present similar results (in terms of coefficient signs, coefficients, and significance). However, as the estimates of the main regression model (2) reveal, interacting trade-to-GDP and development dummy variable does not have the expected effect on the dependent variable (GINI). The sign of the obtained coefficient is positive, which is opposite to what was expected. However the variable is not significant, indicating that combination of trade-to-GDP ratio and development dummy variables does not have an effect on levels of GINI index. Consequently, trade expansion does not lead to higher inequality levels in developing countries than in developed countries.

On the other hand, separately trade-to-GDP variable seems to be significant and having the positive impact on the dependent variable, which also confirms the results obtained in a number of studies reviewed in chapter 2 – increase in trade levels has inequality increasing effect. The significance and negative sign of the estimated coefficient for the development dummy variable shows the

expected relationship with GINI index – more development is associated with lower levels of income inequality.

Regarding the estimates for three remaining control variables, democracy dummy is significant, but having an unexpected positive coefficient sign, which suggests that with more democracy, GINI index is also expected to increase. Significant and having positive coefficient government spending variable reveals the expected relationship – increase in this variable lowers the levels of income inequality. Additionally, the only variable that has not been transformed for normality, population growth rate is likewise significant and its positive coefficient indicates that higher population growth is indeed associated with more unequal income distribution.

Finally it is important to look at the values of coefficient of determination, or the R-squared and the adjusted R-squared. Values of this coefficient range from 0 to 1. The higher the value, the more variation in the dependent variable is explained by the model, and the more useful the model is for making predictions and interpretations (Weiss, 2008). Although in essence both figures are similar, the adjusted R-squared takes into account the number of observations, sample size and the number of independent variables included into the model (Hair, Anderson, Tatham, & Black, 1998). In this case both values (for both the base and the main model) are very similar and rather high, which serves as an indication that the combination of independent and control variables chosen for the purpose of this research explains around 85% of variation of the dependent variable. However, it is important to mention that there are several factors that might contribute to higher levels of explained variation. These are: inclusion of a large number of independent variables into regression, or inclusion of independent variables that are highly correlated with the dependent variable Y (Lewis-Beck, Bryman, & Liao, 2004). Consequently, high values of R-squared and adjusted R-squared in most cases should be interpreted cautiously.

Table 7

WLS model table

	WLS model estimates for panel dataset Dependent variable: GINI index	
Variable	(1)	(2)
constant	3.029**	2.993**
time	0.003515**	0.003592**
Interaction term (1)		7.696e-05
Trade-to-GDP	1.078**	1.162**
Democracy dummy	0.08460**	0.08694**
Government spending	-0.1423**	-0.1420**
Population growth	0.07480**	0.07302**
Development dummy	-0.2954**	-0.3051**
N	910	910
R^2	0.8567	0.8533
Adjusted R^2	0.8558	0.8522

4.4.2 Robustness check

Having briefly discussed the obtained estimates of the regression model and before proceeding to the interpretations of the results, it is important to perform a robustness check in order to see whether model modification lead to different results. As it was already explained, in this case the independent variable – interaction term, consisting of trade-to-GDP ratio and development dummy is changed with another interaction term (a product of GDP per capita variable and trade-to-GDP ratio). Consequently, the development dummy variable is taken out of the model and GDP per capita variable is added instead. The modified model table (both for the base model equation without an interaction term and for the model with the added second interaction term) is provided below (table 8) (refer to appendix 7 for the full model tables):

Table 8

WLS modified model table (robustness test)

	WLS model estimates for panel dataset Dependent variable: GINI index	
Variable	(3)	(4)
constant	3.5931**	3.636**
time	0.0061981**	0.006081**
Interaction term (2)		−9.39768e-06
Trade-to-GDP	0.9421**	0.8374**
Democracy dummy	0.0850**	0.0864**
Government spending	−0.2556**	−0.2574**
Population growth	0.05622**	0.05632**
GDP per capita (log)	−0.051098**	−0.04992**
N	910	910
R^2	0.7720	0.7690
Adjusted R^2	0.7705	0.7672

As it can be seen in table 8, modifications did not significantly change the obtained results. Although the second interaction term (interacting trade-to-GDP and GDP per capita components) has a negative coefficient sign, it is still not significant. Thus, even when using an alternative measure of the level of economic development, no relationship between trade-inequality effects and the stage of development was observed.

Separately, estimates for both of the components of the second interaction are significant. Trade-to-GDP variable has a positive coefficient sign, thus, even after modifying the model, increase in trade-to-GDP ratio seems to be leading to more inequality. The negative coefficient sign for GDP per capita variable indicates that in richer countries less inequality could be expected.

Identically to the previous model, all three control variables are significant and having the same signs of estimated coefficients. The results for democracy dummy reveal the same positive effect

on GINI index, which is opposite to what was predicted. Significance and negative coefficient sign for government spending variable again demonstrates the expected relationship to the dependent variable – the higher government spending, the lower the inequality. Estimates for population growth rate also confirm the previously obtained results and the theoretical expectations, as increase in the values of this variable leads to more unequal income distribution.

Finally, the R-squared and the adjusted R-squared of the models presented in table 8 are slightly lower than in previous models. More specifically, the estimates suggest that models presented in table 8 explain around 77% of the variation in the dependent variable – GINI index. However, as the levels of explained variation are high, similarly to the previous case (table 7), the estimated values of R-squared and adjusted R-squared should be interpreted with caution due to existence of additional factors leading to higher explained variation.

Consequently, even after modifying the regression model by adding the GDP per capita variable as a substitute for development dummy (both separately to the model and as an interaction with trade-to-GDP), very similar results to those presented in table 7 were obtained. This serves as a confirmation of existent strong relationships, as even when a different measure for the level of development is used, model estimations show almost identical results.

5. Interpretations and conclusions

In conclusion, this research aimed at analysing trade-inequality relationship and identifying the possible differences in trade-inequality effects in developed and developing countries. In order to do that, the central research question was formulated and presented in chapter 1:

What is the difference in trade effects on inequality for developing and developed countries?

In addition, 3 sub-questions were formulated. Each of the sub-questions was addressed in separate chapters: chapter 2 aimed at answering the first sub-question by presenting the main theoretical assumptions and existent evidence regarding trade-inequality effects and differences between developed and developing world, which led to formulating the testable hypothesis; chapter 3 answered the second sub-question by explaining the chosen research method, presenting the regression equation and operationalization of the variables; in chapter 4 the third research sub-question was answered by conducting the regression analysis using panel dataset and presenting the estimates of the final model, in addition a robustness check was performed.

This chapter aims at providing the final answer to the central research question. Therefore, after commenting on the observed relationships in a rather technical manner in chapter 4, the results need to be interpreted. Afterwards, based on the results and interpretations, the testable hypothesis presented in chapter 2 is either confirmed, or rejected. In addition, this chapter discusses the limitations of the research and provides some policy recommendations as well as suggestions for improvements that could be made in future research on trade-inequality relationship in developing and developed countries.

5.1 Interpretation of the results

Following the description of the final model estimates (refer to part 4.4.1), the interpretation of these results is provided in the same sequence. Thus, starting from the independent variable (Interaction term (1)), after conducting the panel data regression analysis, no relationship between the combination of trade-to-GDP ratio and development dummy variable with levels of inequality was observed. Interpretation in this case is rather straightforward: the level of country's economic development does not determine the effect of trade expansion on within-country income inequality. Contrary to what was expected after conducting a literature review, trade-inequality effects do not differ depending on how developed a country is (which group in terms of

development level a country belongs to), or at least this kind of relationship was not observed during the course of this empirical research. The absence of relationship between the second interaction term (where the variable representing trade expansion interacts with alternative measure of the stage of development) and levels of income inequality was also confirmed by the results of robustness test.

Consequently, the obtained estimates do not support any of the theoretical arguments presented in chapter 2: due to absence of observed relationship, it cannot be stated that trade expansion has inequality reducing effects in the developing world and possibly leads to higher wage gaps in developed countries (as according to H-O and some of the convergence theorem arguments), neither it was found that more trade does more harm in terms of levels of within-country income inequality for the developing countries as compared to developed world (dependency theorem argument about trade-inequality effects). Based on the obtained results and interpretations for the independent variable of this research (combination of the state of development and trade volumes), the testable hypothesis stating that trade expansion leads to higher income inequality in the developing world, but not in developed countries, is rejected.

Instead, the results of this analysis are rather more general, suggesting that increase in trade volumes is more likely to increase levels of inequality than to make the distribution of income more egalitarian (referring to the model estimates for trade-to-GDP ratio). Although this does not reveal anything about the possible differences in trade-inequality effects in different countries, recalling the lack of unanimity regarding trade-inequality relationship currently existent in the literature (chapter 2), such results then support the opinion that in general more trade has negative consequences on income distribution. Therefore, based on the obtained estimates, the same conclusion applies for both developed and developing world.

As for the relationship between the state of development and within-country income inequality, no difference in terms of results obtained in the main regression model and when conducting a robustness test was observed. When using the development dummy variable, results reveal that more development lowers inequality. Recalling that the dummy variable has only two values (either 0 for developing countries, or 1 for developed countries), directly interpreting the results means stating that when a state advances and in terms of level of economic development shifts from the category of developing countries to developed countries group, levels of within-country

income inequality are very likely to decrease. Regarding the alternative measure for development – GDP per capita, results suggest that huge income gaps are more likely to be observed in poorer countries than in rich, developed countries.

Regarding the additional factors that were added to the model based on other studies on trade-inequality relationship, as it was already explained, the results did not change after the model was modified. Consequently, according to the estimates, the more democratic a country is, the higher levels of income inequality could be observed. Such results contradict the theoretical predictions and arguments made in the studies reviewed in chapter 2, where it was stated that consolidated democracies should demonstrate lower levels of inequality. However, regression model estimates for the democracy dummy might be largely influenced by huge differences across the sample countries: although majority of the countries classified as democratic and thus assigned with the dummy value of 1 demonstrate relatively low levels of inequality throughout the time frame of this analysis, in a number of countries, that based on the democracy score (refer to chapter 3 for more detailed explanations about the measurement) were also assigned to the same category of democratic states, inequality levels were much higher (Bolivia, Brazil, Honduras, India, Namibia, Panama, Paraguay, South African Republic).

Model estimates for government spending reveal the expected relationship with income inequality levels. More specifically, higher levels of public spending lead to lower levels of within-country inequality. As it was explained in section 2.3, increasing levels of public spending (especially on education and health, or social spending) is one of the ways how governments might address the issue of income inequality and compensate those earning the lowest income, which in turn should decrease inequality. Recalling the previously mentioned fact that developed countries have better financial capabilities and thus are more able to compensate the poorest part of the society through the means of public spending, this might serve as another explanation why more development (both in terms of development dummy and GDP per capita) was found to be associated with more egalitarian income distribution.

Finally, the results for population growth rate indicate that with higher levels of population growth, within-country income inequality tends to increase. The observed relationship confirms the initial expectations that population growth rate has inequality increasing effects, which was the main reason why it was decided to take into account this factor when analyzing the trade-inequality

relationship (as otherwise the impact of trade expansion on within-country income inequality might be concealed by the effects of population growth rate). In countries with rapidly increasing population, addressing the issue of inequality might indeed be more complicated, as taking the measures such as previously discussed compensation through public spending requires more financial resources. Consequently, countries with high population growth rates (such as India) demonstrate higher levels of income inequality.

5.2 Policy recommendations

Although during the course of this research no differences in trade-inequality effects in countries on different stage of development were observed, the results revealed that separately, increase in trade levels indeed leads to higher inequality, while more development is associated with more equal income distribution. Therefore, trade policies in both developed and developing world should be formulated cautiously and aimed at not only promoting trade and helping to better realize the benefits associated with trade expansion, but also at mitigating the negative (trade-) inequality effects. For instance, when together with rising trade volumes, increase in income inequality is observed, certain governmental interventions, or control mechanisms could be employed.

The observed relationship between public spending and income distribution suggests that governments could address the issue of increasing inequality by devising welfare policies aimed at creating the so called safety nets for the most vulnerable groups in the society. Since developing countries often lack financial resources needed to use public spending as a remedy to high inequality levels, assistance of international organizations could be considered.

Additionally, since the results suggest that when country advances to developed country group, income distribution becomes more egalitarian, long-term policy goal in developing world should be aimed at primarily achieving further stage of development. Consequently, although trade expansion would still have inequality increasing impact in more developed states, it could be expected that more advanced countries have better capabilities to mitigate such effects, which in turn should help reducing levels of inequality. In addition, the importance of population growth rate has to be taken into account by countries that are involved in global trade, as this research showed that both factors are associated with rising inequalities.

5.3 Limitations

One of the limitations of this research is related to the fact that the variable representing government effectiveness had to be omitted from the model due to high multicollinearity. Consequently, the impact of effective institutions on the level of inequality was not controlled for. As the literature review revealed, government effectiveness could be an important factor for the purpose of explaining the differences in trade effects in developed and developing world, as in majority of the developing countries, institutions are rather underdeveloped. In addition, even if this factor would have been included into the model, the chosen measurement (GE indicator) received a lot of criticism, which to some extent indicates its low reliability. However, better measures for institutional effectiveness are currently lacking.

Moreover, one of the reasons why depending on the level of development, no difference in trade impact on within-country inequality was observed, might be related to the previously mentioned limitations of dividing sample countries into two categories (developed and developing countries) based on the World Bank's country classification. This is relevant for the main model, where the dummy variable is used, as when constructing it, high income countries were included into one group, while all other countries (belonging to different categories based on the World Bank's classification) were assigned to the developing countries group. As a result, countries that are on the lowest stage of economic development, and those that are in much better position, but not yet achieved the high income category threshold, were put in the same group. Thus, even if in the poorest countries trade expansion had the predicted effect on levels of within-country income inequality, this might have been concealed by the opposite effects in more developed countries within the same group. However, since during the course of this research a robustness check with an alternative measure of development was performed and very similar results were obtained, it can be concluded that the issue of unobserved relationships due to country categorization (using dummy variable) was prevented.

Finally, another important limitation is data availability for developing countries. This research aimed at including as many countries as possible into the country sample and also at having a longer time frame, including the most recent data available. However, due to lack of available data for the developing world, a trade-off was made, which resulted in having rather large N, but analyzing shorter time period.

5.4 Implications for future research

In the future, when analyzing trade-inequality relationship and possible differences in trade impact on inequality outcomes in developing and developed countries, several improvements could be made: firstly with better data availability for developing countries, the time frame of the analysis could be expanded in both directions, by analyzing even more recent data and by including several years before 1999 (which was a starting point of this research). It is possible that having more observations for each country would reveal some new trends that were not observed in this research.

Secondly, with a more reliable alternative to GE index, institutional effectiveness should be included into the analysis. The importance of government effectiveness in the context of trade-inequality effects was emphasized in several studies reviewed in this thesis (Cornia, 2003; Rodriguez-Pose, 2012), thus when aiming to identify differences between trade impact on wage gap in countries on different stages of development, this has to be taken into account.

Thirdly, referring to development dummy variable, an alternative country classification could be considered. This would allow to avoid having huge differences between the countries assigned to the same category. Consequently, in combination with variables representing trade expansion, using different country classification might help revealing relationships that were not observed in this research.

Finally, since the obtained results contradicted the general argument made in the literature that consolidated democracies have more egalitarian income distribution, an alternative measurement for the strength of democratic regime could be used in further researches, or even different approaches (for instance using the length of democratic regime) could be considered. Most importantly, the fact that a number of democracies in the developing world demonstrate high levels of inequality should certainly be taken into account.

5.5 Conclusions

In conclusion, this thesis focused on trade induced changes in inequality levels and the differences in the effects of trade expansion on income distribution in developing and developed countries. In addition, this research aimed at addressing the gaps currently existent in the literature analysing trade-inequality effects. Consequently, rather than researching the impact of trade expansion on

income distribution in general, this thesis focused on possible differences in such effects for developing and developed world. Accordingly, this was well reflected in theoretical and literature review part, where the main arguments suggesting that such differences actually exist, were presented. Additionally, the fact that previously the majority of studies on trade-inequality topic focused mainly on developed countries was also taken into account. Therefore this research analysed panel dataset covering a sample of 91 countries (63 developing countries and 28 developed countries) during a ten years period.

Based on the results of the regression analysis, no differences in trade effects on inequality in countries on different stage of development were observed (regardless of the measurement used for the level of economic development). Consequently, the hypothesis presented at the end of chapter 2 was rejected. However, the obtained estimations indicate that separately, trade expansion indeed increases within-country income inequality. In addition, higher stage of economic development and more egalitarian income distribution were also found to be related. Yet, no evidence for the combined effect of trade expansion and economic development was obtained. A number of additional variables included into the final regression model (government spending, population growth) were found to be having the expected impact on levels of inequality, thus confirming the arguments made and evidence obtained by other researchers. On the other hand, the results for democracy control variable contradicted the initial expectations. Finally, the limitations of this research were discussed and suggestions for future improvement as well as policy recommendations were provided.

References

Abramovitz, M. (1986). Catching Up, Forging Ahead, and Falling Behind. *The Journal of Economic History, 46*(2), 385-406.

Al-shihri, F. S. (2014). The Causal Relationship between Health and Education Expenditures in Saudi Arabia. *International Journal of Scientific and Engineering Research, 5*(9), 672-675.

Amin, S. (1972). Underdevelopment and Dependence in Black Africa - Origins and Contemporary Forms. *The Journal of Modern African Studies, 10*(4), 503-524.

Anderson, E. (2005). Openness and Inequality in Developing Countries: A Review of Theory and Recent Evidence. *World Development, 33*(7), 1045-1063.

Balassa, B. (1986). Dependency and Trade Orientation. *The World Economy, 9*(3), 259-274.

Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. *Journal of Economic Growth, 5*(1), 5-32.

Benabou, R. (1996). Inequality and Growth. In B. S. Bernanke, & J. J. Rotemberg, *NBER Macroeconomics Annual 1996* (Vol. 11, pp. 11-92). New York: MIT Press.

Bergh, A., & Nilsson, T. (2010). Do liberalization and globalization increase income inequality? *European Journal of Political Economy, 26*(4), 488-505.

Bliss, C. (2007). *Trade, Growth, and Inequality.* Oxford: Oxford University Press.

Bornschier, V. (1983). World Economy, Level Development and Income Distribution: An Integration of Different Approaches to the Explanation of Income Inequality. *World Development, 11*(1), 11-20.

Bussmann, M., Soysa, I. d., & Oneal, J. R. (2005). The Effect of Globalization on National Income Inequality. *Comparative Sociology, 4*(3/4), 285-312.

Centre for Systematic Peace. (2016). *Polity IV: Regime Authority Characteristics and Transitions Datasets*. Retrieved from Centre for Systematic Peace Web site: http://www.systemicpeace.org/inscrdata.html

Centre for Systematic Peace. (2016). *The Polity Project*. Retrieved from Centre for Systematic Peace Web site: http://www.systemicpeace.org/polityproject.html

Chilcote, R. H. (1974). Dependency Theory: A Reassessment. *Latin American Perspectives, 1*(1), 4-29.

Cornia, G. A. (2003). *The Impact of Liberalisation and Globalisation on Income Inequality in Developing and Transitional Economies.* CESifo Working Paper No. 843.

Darity, W. A. (2008). *International Encyclopedia of the Social Sciences* (2nd ed.). Detroit: Macmillan Reference USA.

Das, S. P. (2005). Gradual Globalization and Inequality between and within Countries. *The Canadian Journal of Economics, 38*(3), 852-869.

Egger, H., & Kreickemeier, U. (2012). Fairness, trade, and inequality. *Journal of International Economics, 86*(2), 184-196.

Elmawazini, K., Sharif, A., Manga, P., & Drucker, P. (2013). Trade Globalization, Financial Globalization and Inequality Within South-East Europe and CIS Countries. *The Journal of Developing Areas, 47*(2), 303-317.

Ferraro, V. (2008). Dependency Theory: An Introduction. In G. Secondi, *The Development Economics Reader* (pp. 58-64). London: Routledge.

Fischer, R. D., & Serra, P. J. (1996). Income Convergence Within and Between Countries. *International Economic Review, 37*(3), 531-551.

Ghose, A. K. (2001). *Global economic inequality and international trade.* Employment Paper 2001/12. Geneva: ILO.

Goldberg, P. K., & Pavcnik, N. (2007). Distributional Effects of Globalization in Developing Countries. *Journal of Economic Literature, 45*(1), 39-82.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis* (5th ed.). New Jersey: Prentice-Hall International.

Harrison, A., McLaren, J., & McMillan, M. (2011). Recent Perspectives on Trade and Inequality. *Annual Review of Economics, 3*(3), 261-289.

Helpman, E., Itskhoki, O., & Redding, S. (2010). Inequality and Unemployment in a Global Economy. *Econometrica, 78*(4), 1239-1283.

Helpman, E., Itskhoki, O., Muendler, M.-A., & Redding, S. (2015). Trade and Inequality: from theory to Estimation. *Review of Economic Studies*.

Hirte, G., & Lessmann, C. (2014). *Trade, Integration, and Interregional Inequality.* CESifo Working Paper, No. 4799.

Jaffee, D., & Stokes, R. (1986). Foreign Investment and Trade Dependence. *The Sociological Quarterly, 27*(4), 533-546.

Jaumotte, F., Lall, S., & Papageorgiou, C. (2013). Rising Income Inequality: Technology, or Trade and Financial Globalization? *IMF Economic Review, 61*(2), 271-309.

Kaufmann, D., & Kraay, A. (2016). *Worldwide Governance Indicators: Documentation*. Retrieved from The Worldwide Governance Indicators: http://info.worldbank.org/governance/wgi/index.aspx#doc

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2007). *Worldwide Governance Indicators Project: Answering the Critics.* World Bank Policy Research Working Paper No. 4149.

Keeley, B. (2015). *Income Inequality: The Gap between Rich and Poor.* Paris: OECD Publishing.

Kellstedt, P. M., & Whitten, G. D. (2013). *The Fundamentals of Political Science Research* (2nd ed.). New York: Cambridge University Press.

Korzeniewicz, R. P., & Moran, T. P. (2009). *Unveiling Inequality: A World - Historical Perspective.* New York: Russell Sage Foundation.

Lee, E., & Vivarelli, M. (2006). The Social Impact of Globalization in the Developing Countries. *International Labour Review, 145*(3), 167-184.

Lewis-Beck, M. S., Bryman, A., & Liao, T. F. (2004). *The SAGE Encyclopedia of Social Science Research Methods.* Thousand Oaks: Sage Publications.

Liberati, P. (2015). The World Distribution of Income and it's Inequality, 1970-2009. *Review of Income and Wealth, 61*(2), 248-273.

Lin, P. C., & Huang, H. C. (2011). Inequality convergence in a panel of states. *The Journal of Economic Inequality, 9*(2), 195-206.

Mahler, V. A., Jesuit, D. K., & Roscoe, D. D. (1999). Exploring the Impact of Trade and Investment on Income Inequality. *Comparative Political Studies, 32*(3), 363-395.

Mayer-Foulkes, D. (2002). *Global Divergence.* Mexico: Centro de Investigación y Docencia Económicas (CIDE) - Division of Economics.

Matano, A., & Naticchioni, P. (2010). Trade and Wage Inequality: Local versus Global Comparative Advantages. *The World Economy, 33*(2), 1757-1787.

Meschi, E., & Vivarelli, M. (2008). Trade and Income Inequality in Developing Countries. *World Development, 37*(2), 287-302.

Milanovic, B. (2005). *Worlds Apart: Global and International Inequality, 1950-2000.* Princeton, NJ: Princeton University Press.

Milanovic, B. (2006). Global Income Inequality: What It Is And Why It Matters? *World Economics, 7*(1), 131-157.

Milanovic, B., & Squire, L. (2005). Does Tariff Liberalization Increase Wage Inequality? Some Empirical Evidence. *World Bank Policy Research Working Paper No. 3571(11046)*. Washington, DC: The World Bank.

OECD. (2015). *In It Together: Why Less Inequality Benefits All.* Paris: OECD Publishing.

O'Rourke, K. H. (2001). *Globalization and Inequality: Historical Trends.* Cambridge, MA: National Bureau of Economic Research.

Pfaffenberger, R. C., & Patterson, J. H. (1987). *Statistical Methods for Business and Economics* (3rd ed.). Homewood, IL: Irwin McGraw-Hil.

Punch, K. F. (1998). *Introduction to Social Research. Quantitative and Qualitative Approaches.* London/Thousand Oaks/New Delhi: Sage.

Rahman, M. M. (2011). Causal Relationship among Education Expenditure, Health Expenditure and GDP: A Case Study for Bangladesh. *International Journal of Economics and Finance, 3*(3), 149-159.

Ravallion, M. (2001). Growth, Inequality and Poverty: Looking Beyond Averages. *World Development, 29*(11), 1803-1815.

Reuveny, R., & Li, Q. (2003). Economic Openness, Democracy, and Income Inequality. An Empirical Analysis. *Comparative Political Studies, 36*(5), 575-601.

Rodriguez-Pose, A. (2012). Trade and Regional Inequality. *Economic Geogprahy, 88*(2), 109-136.

Rudra, N. (2004). Openness, Welfare Spending, and Inequality in the Developing World. *International Studies Quarterly, 48*(3), 683-709.

Sala-i-Martin, X. (2002). *The World Distribution of Income (Estimated from Individual Country Distribution).* Cambridge, MA: National Bureau of Economic Research.

Solt, F. (2009). *The Standardized World Income Inequality Database.* Harvard Dataverse. Retrieved from http://hdl.handle.net/1902.1/11992

The World Bank . (n.d.). *Data: Trade (% of GDP).* Retrieved from World Development Indicators: http://data.worldbank.org/indicator/NE.TRD.GNFS.ZS

The World Bank. (2007). *Global Economic Prospects: Managing the Next Wave of Globalization.* Washington DC: The World Bank.

The World Bank. (2016). *Countries and Lending Groups*. Retrieved from The World Bank Data site: http://data.worldbank.org/about/country-and-lending-groups

The World Bank. (n.d.). *Data: GDP per capita*. Retrieved from World Development Indicators: http://data.worldbank.org/indicator/NY.GDP.PCAP.CD/countries

The World Bank. (n.d.). *Data: Health expenditure, total (% GDP)*. Retrieved from World Development Indicators: http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS

The World Bank. (n.d.). *Data: population growth (% annual)*. Retrieved from World Development Indicators: http://data.worldbank.org/indicator/SP.POP.GROW

Trochim, W. M. (2000). *The Research Methods Knowledge Base, 2nd Edition.* Cincinnati: Atomic Dog Publishing.

Uoardighi, J. E., & Somun-Kapetanovic, R. (2009). Convergence and Inequality of income: the case of Werstern Balkan countries. *The European Journal of Comparative Economics, 6*(2), 207-225.

Weiss, N. A. (2008). *Elementary Statistics* (7th ed.). Boston: Pearson Education.

Winters, L. A., McCulloch, N., & McKay, A. (2004). Trade Liberalization and Poverty: The Evidence So Far. *Journal of Economic Literature*, *42*(1), 72-115.

World Trade Organization. (2008). *World trade report 2008: Trade in a Globalizing World.* Geneva: World Trade Organization.

Appendices

Appendix 1

Country sample

Argentina	Indonesia	Peru
Armenia	Iran	Philippines
Australia	Ireland	Poland
Austria	Israel	Portugal
Bangladesh	Italy	Romania
Belarus	Japan	Russia
Belgium	Jordan	Rwanda
Bolivia	Kazakhstan	Senegal
Brazil	Korea	Sierra Leone
Canada	Kyrgyz Republic	Singapore
Chile	Latvia	Slovak Republic
China	Lithuania	Slovenia
Colombia	Luxembourg	South African Republic
Costa Rica	Macedonia	Spain
Croatia	Madagascar	Sri Lanka
Cyprus	Malawi	Sweden
Czech Republic	Malaysia	Switzerland
Denmark	Mali	Tanzania
Dominican Republic	Mexico	Thailand
Ecuador	Moldova	Tunisia
El Salvador	Mongolia	Turkey
Estonia	Namibia	Uganda
Finland	Nepal	Ukraine
France	Netherlands	United Kingdom
Georgia	New Zealand	United States
Germany	Nigeria	Uruguay
Greece	Norway	Venezuela
Guatemala	Pakistan	Vietnam
Honduras	Panama	Zambia
Hungary	Paraguay	Zimbabwe
India		

Appendix 2

Country division based on the World Bank's country classification

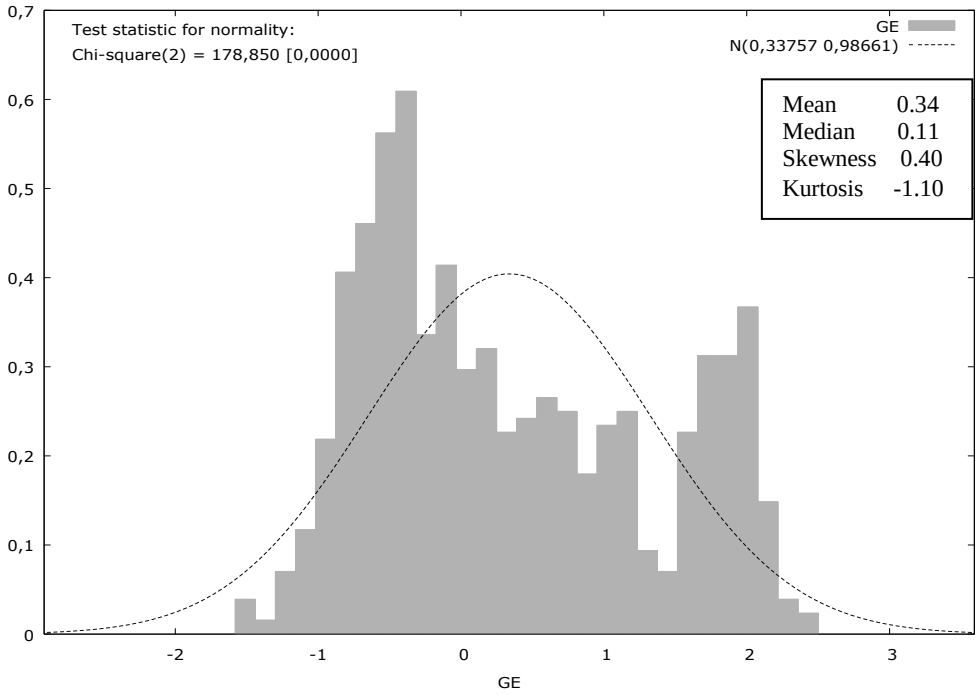
Developed countries	
Australia	Republic of Korea
Austria	Luxembourg
Belgium	Netherlands
Canada	New Zealand
Cyprus	Norway
Denmark	Portugal
Finland	Singapore
France	Slovak Republic
Germany	Slovenia
Greece	Spain
Ireland	Sweden
Israel	Switzerland
Italy	United Kingdom
Japan	United States

Developing countries	
Argentina	Malaysia
Armenia	Mali
Bangladesh	Mexico
Belarus	Moldova
Bolivia	Mongolia
Brazil	Namibia
Chile	Nepal
China	Nigeria
Colombia	Pakistan
Costa Rica	Panama
Croatia	Paraguay
Czech Republic	Peru
Dominican Republic	Philippines
Ecuador	Poland
El Salvador	Romania
Estonia	Russia
Georgia	Rwanda
Guatemala	Senegal
Honduras	Sierra Leone
Hungary	South Africa
India	Sri Lanka
Indonesia	Tanzania
Iran	Thailand
Jordan	Tunisia
Kazakhstan	Turkey
Kyrgyz Republic	Uganda
Latvia	Ukraine
Lithuania	Uruguay
Macedonia	Venezuela
Madagascar	Vietnam
Malawi	Zambia
	Zimbabwe

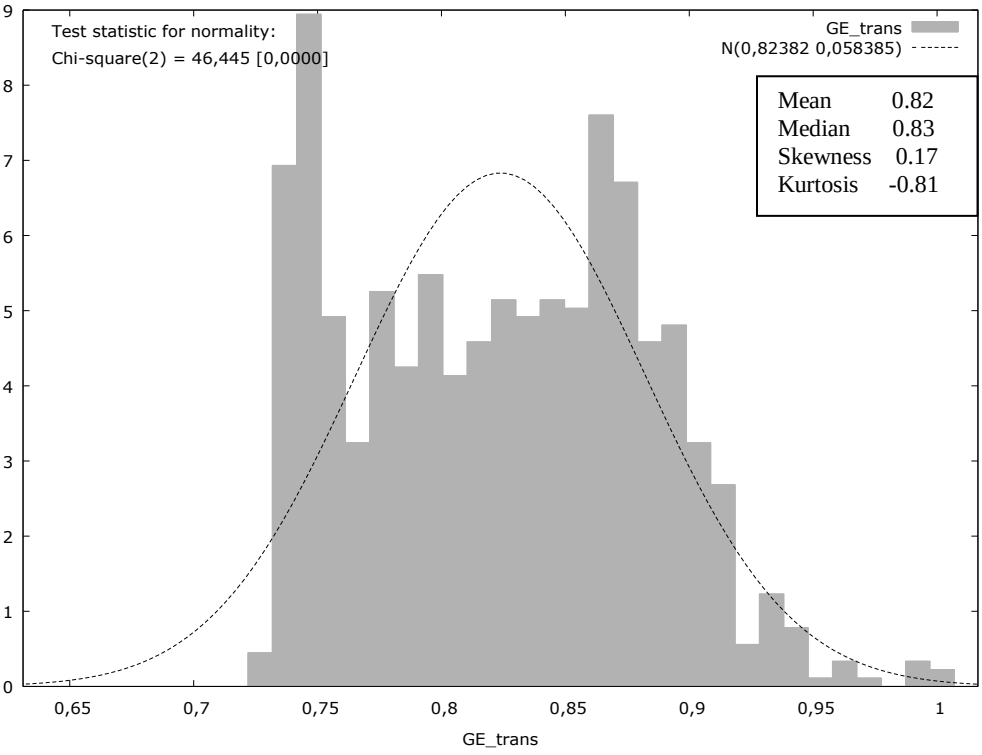
Appendix 3

Normality tests

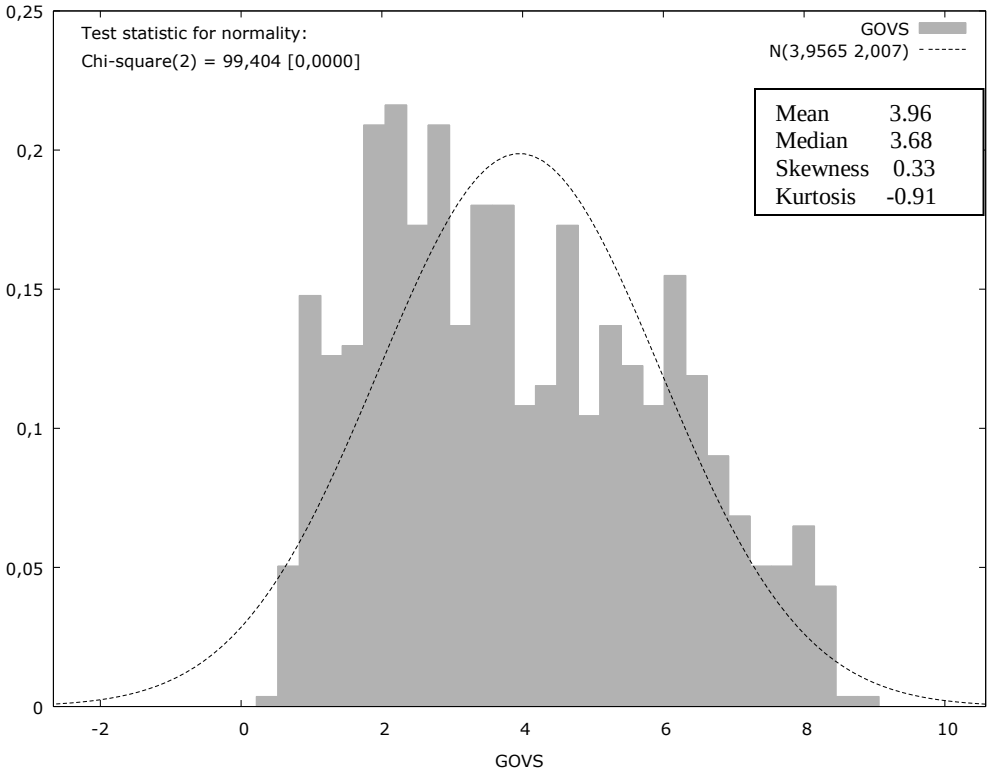
a) *Frequency distribution for the original government effectiveness variable*



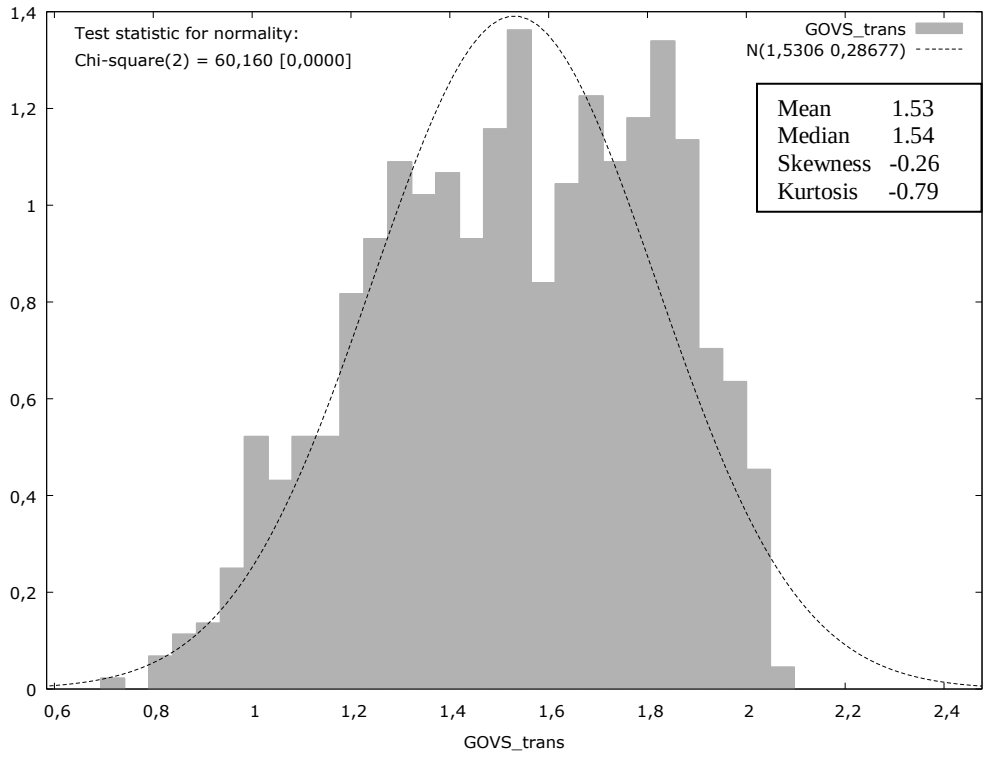
b) *Frequency distribution for the transformed government effectiveness variable (using exponent (-1/5))*



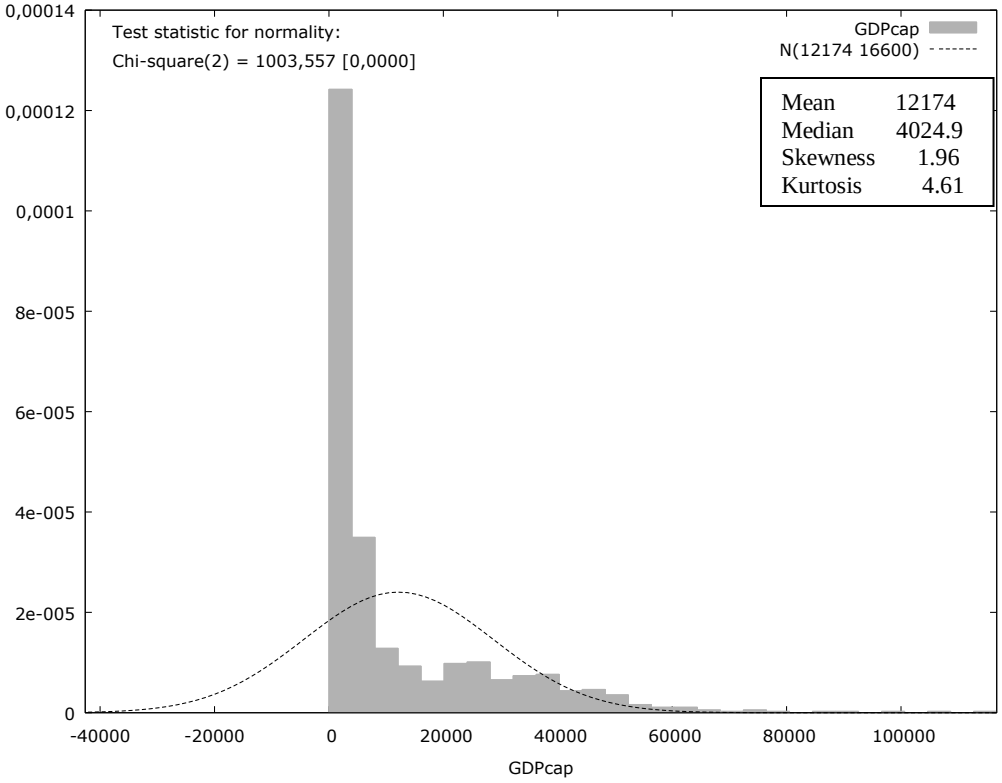
c) *Frequency distribution for the original government spending variable*



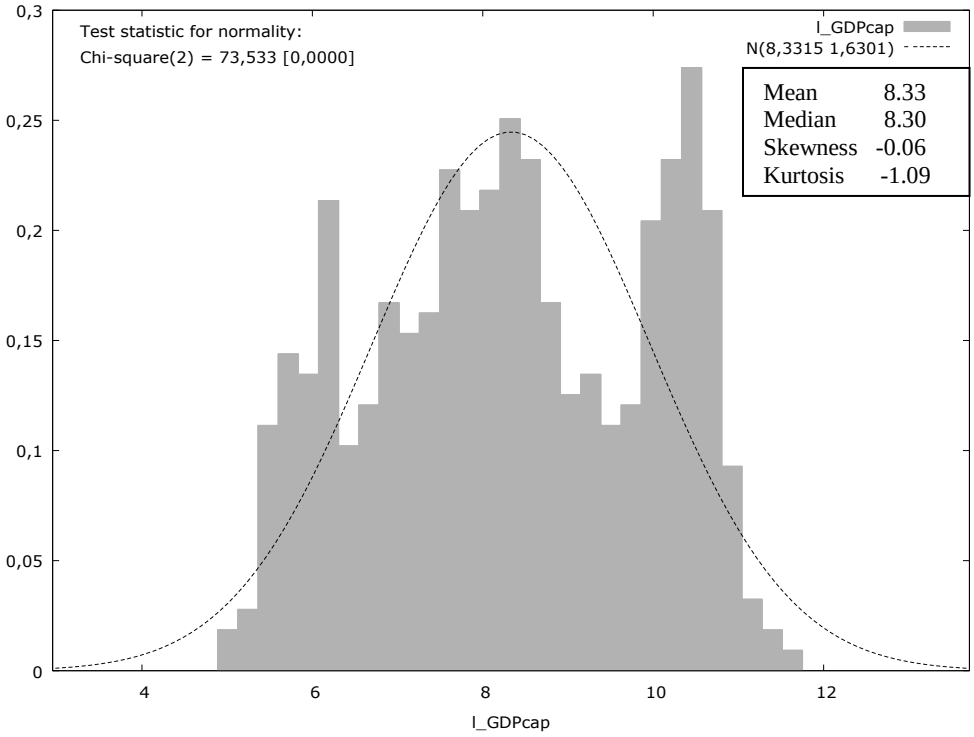
d) *Frequency distribution for the transformed government spending variable (using exponent (1/3))*



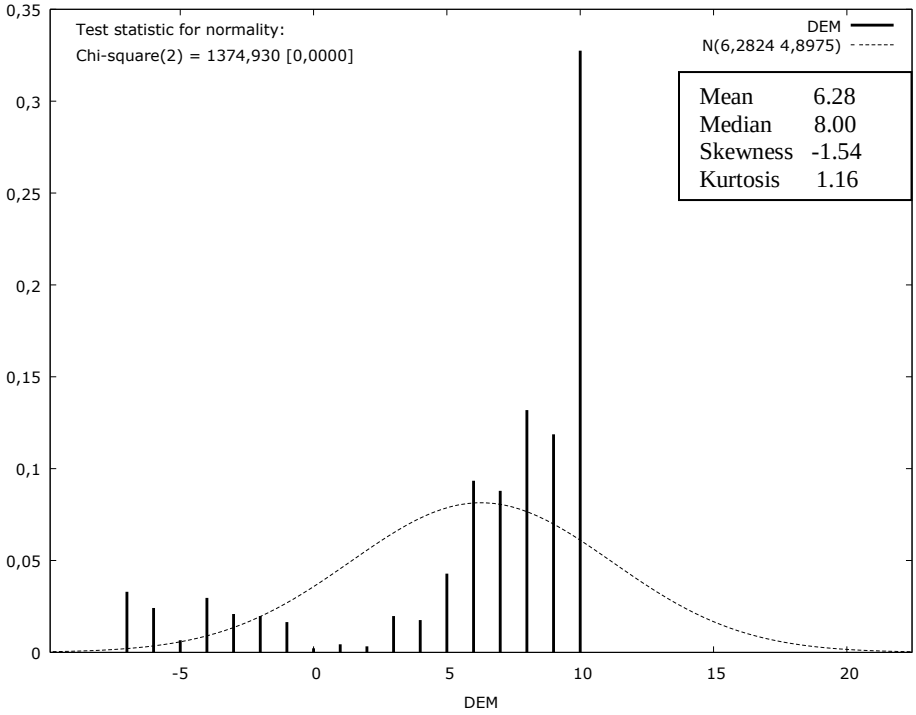
e) *Frequency distribution histogram for the original GDP per capita variable*



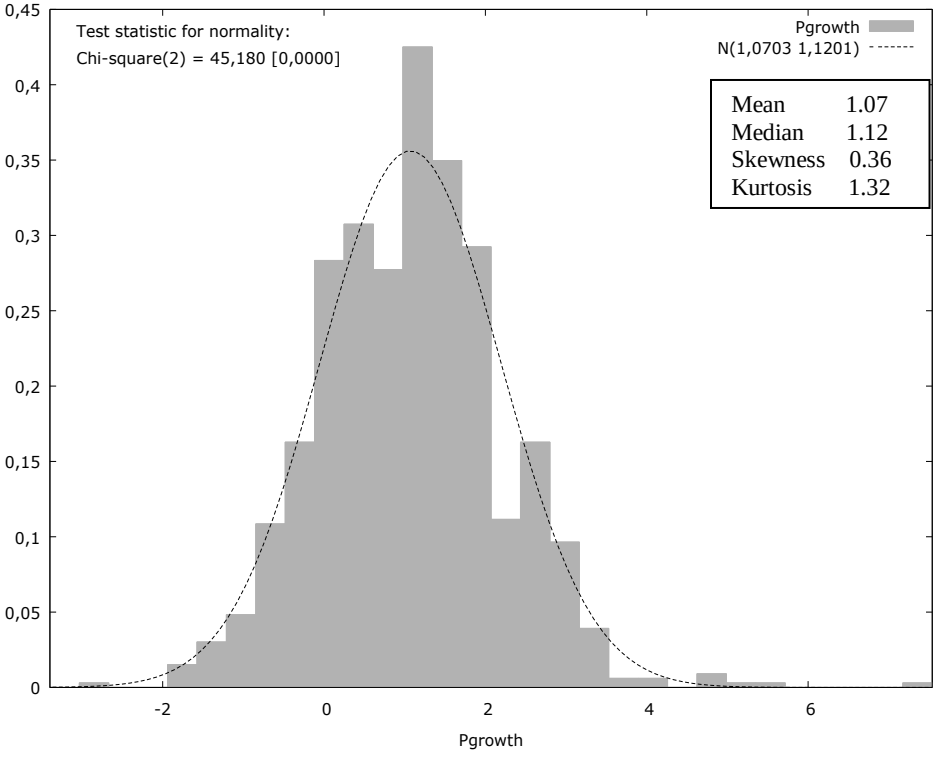
f) *Frequency distribution histogram for the transformed GDP per capita variable (using logarithmic transformation)*



g) *Frequency distribution for the original democracy variable*



h) *Frequency distribution for the original population growth variable*



Appendix 4

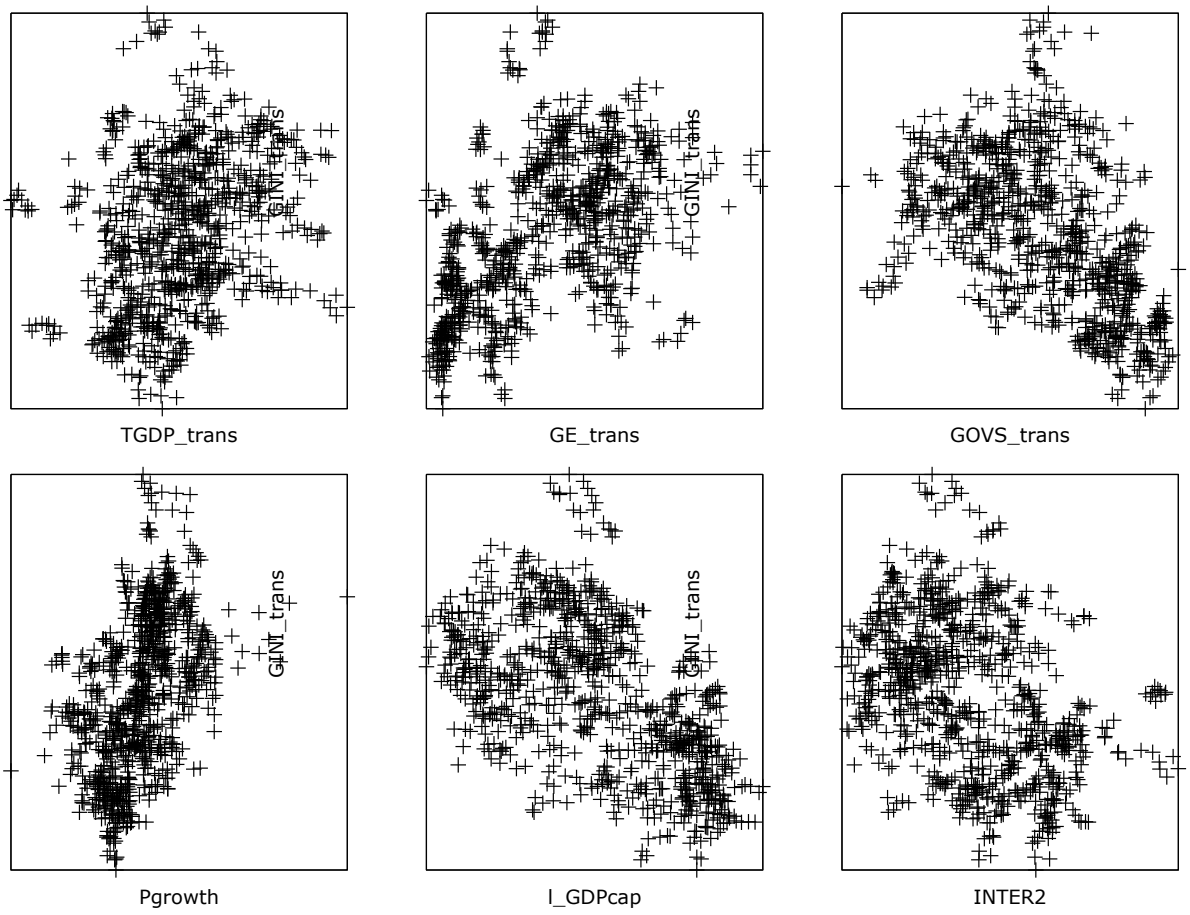
Summary of transformations for normality

	ORIGINAL VARIABLE					TRANSFORMED VARIABLE			
Variable	Test 1[2]	Test 2[3]	Test 3[4]	Test 4[5]	Transformation	Test 1	Test 2	Test 3	Test 4
Democracy	2.74E-299	1.6253E-35	0	5.20602E-90	Dummy introduced	-	-	-	-
Gov. effectiveness	1.4562E-39	1.1698E-19	0	8.1851E-16	GE^(-1/5)	8.2134E-11	1.0758E-14	0	3.763E-07
Gov. spending	2.5983E-22	2.6471E-14	0	4.6009E-11	GOVS^(1/3)	8.6397E-14	5.0087E-11	0	44923E-08
GDP per capita	1.203E-218	6.0762E-36	0	1.638E-302	GDPcap(log)	1.0779E-16	2.6782E-14	0	1.4351E-10
Population growth	1.5466E-10	4.025E-07	0,01	2.63257E-19	No transformation	-	-	-	-

[2] Results of Doornik-Hansen test conducted in GRETL
[3] Results of Shapiro-Wilk W test conducted in GRETL
[4] Results of Lilliefors test conducted in GRETL
[5] Results of Jarque-Bera test conducted in GRETL

Appendix 5

Scatter plots for linearity



Appendix 6

Full model tables

a) *Base model*

Base model: WLS Dependent variable: GINI index					
Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*	
constant	3.02871	0.0356537	84.9478	<0.0001	***
time	0.00351504	0.00096871	3.6286	0.0003	***
Trade-to-GDP	1.07818	0.0670712	16.0751	<0.0001	***
Democracy dummy	0.0846049	0.00845086	10.0114	<0.0001	***
Government spending	−0.142306	0.0146107	−9.7398	<0.0001	***
Population growth	0.0748018	0.0029773	25.1240	<0.0001	***
Development dummy	−0.295395	0.00818939	−36.0704	<0.0001	***
R-squared	0.856791	Adjusted R-squared		0.855840	

b) *Main model*

Main model: WLS Dependent variable: GINI index					
Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*	
constant	2.99285	0.0450295	66.4643	<0.0001	***
time	0.00359157	0.000987656	3.6365	0.0003	***
Interaction term (1)	7.69621e-05	0.000123781	0.6218	0.5343	
Trade-to-GDP	1.16151	0.0922254	12.5942	<0.0001	***
Democracy dummy	0.0869395	0.00863873	10.0639	<0.0001	***
Government spending	−0.14201	0.0151371	−9.3816	<0.0001	***
Population growth	0.0730247	0.00312494	23.3683	<0.0001	***
Development dummy	−0.305101	0.0133438	−22.8647	<0.0001	***
R-squared	0.853317	Adjusted R-squared		0.852179	

Appendix 7

Robustness check

a) *Base model for robustness check*

Model: WLS Dependent variable: GINI index					
Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*	
constant	3.59305	0.0404094	88.9161	<0.0001	***
time	0.00619806	0.000893101	6.9399	<0.0001	***
Trade-to-GDP	0.942109	0.0795295	11.8460	<0.0001	***
Democracy dummy	0.0850241	0.0101441	8.3817	<0.0001	***
Government spending	−0.255559	0.0197254	−12.9558	<0.0001	***
Population growth	0.0562172	0.00324458	17.3265	<0.0001	***
GDP per capita (log)	−0.0510983	0.00383875	−13.3112	<0.0001	***
R-squared	0.772048	Adjusted R-squared		0.770533	

b) *Main model for robustness check*

Model: WLS Dependent variable: GINI index					
Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*	
constant	3.63555	0.0707025	51.4204	<0.0001	***
time	0.00608089	0.000896513	6.7828	<0.0001	***
Interaction term (2)	−9.39768e-06	1.41451e-05	−0.6644	0.5066	
Trade-to-GDP	0.837418	0.159037	5.2656	<0.0001	***
Democracy dummy	0.086418	0.0101679	8.4991	<0.0001	***
Government spending	−0.257358	0.0202311	−12.7209	<0.0001	***
Population growth	0.0563162	0.00329462	17.0934	<0.0001	***
GDP per capita (log)	−0.0499183	0.00433811	−11.5069	<0.0001	***
R-squared	0.768971	Adjusted R-squared		0.767178	