ERASMUS UNIVERSITY ROTTERDAM
Erasmus School of Economics

Bachelor Thesis Economics and Business Economics

Estimating the relationship between liberalization and within-country income inequality

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Date final version: December 2, 2021

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Abstract

In this thesis, the effect of economic freedom and economic globalization on within-country income inequality is estimated. The used data stem from the Standardized World Income Inequality Database (SWIID), the Economic Freedom of the World (EFW) index, and the KOF globalization index. The dataset consists of observations for 82 countries within the period 1970-2010. The panel data is used to estimate a fixed-effects model. The estimated regression coefficients suggest that an increase of economic freedom significantly increases within-country income inequality. This result appears to be driven by three components of economic freedom, namely size of government; freedom to trade internationally; and regulation. No statistical evidence was found for overall economic globalization. By disaggregating the components of economic globalization, it can be concluded that financial globalization does increase the inequality of the income distribution.

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1 Introduction

At the beginning of the 20th century, inequality within countries had reached a relatively high level. For the current members of the G-20, approximately 15% of total income went to the richest 1% (Roser & Ortiz-Ospina, 2013). After World War II, within-country income inequality started to decrease. This decline lasted until 1980. After this period, especially for the United Kingdom and the United States, inequality began to approach pre-war levels (Piketty & Saez, 2003). Furthermore, Alvaredo et al. (2017) conclude that in this century, the rich have become richer in practically all nations. As a result of these fluctuations, changes in inequality have received extensive attention in politics and the media (see for example Leonhardt (2017)).

Also after the second world war, countries began to open their financial markets and started to trade goods and services beyond national borders (Bordo, 2017). This economic globalization has had positive effects. Poverty around the world has declined, products have become cheaper, gross domestic product (GDP) has increased, and low-income countries have become more developed. During the same period, increased economic freedom resulted in similar effects. On the other hand, economic globalization/freedom also came with trade-offs. Trade resulted in unemployment in certain sectors, mismanagement in financial sectors sparked world-wide recessions, and economic freedom resulted in less redistributive policies or less generous social security systems (Autor et al., 2016; Gwartney & Lawson, 2003; Mishkin, 2007).

This thesis studies the question whether a relationship exists between the topics of the previous two paragraphs. More explicitly, the central question of this thesis is:

To what extent does economic globalization and/or economic freedom across the world affect within-country income inequality, during the period 1970-2010?

Providing an answer to this question is of scientific importance. Articles with similar research questions tend to find contradictory results (see section 2). Furthermore, it appears that the predictions of classic theoretical models do not occur in practice. This thesis can be a valuable contribution to the existing literature because it holds more modern theoretical models into account. Also, the updated datasets contain much more information compared to previous versions. Utilizing these datasets allows for a more in-depth analysis, compared to other articles. Governments might also be interested because the results of this thesis identify which policies help curb income inequality, and which do not.

The outline of this thesis is similar to Bergh and Nilsson (2010). That article also studies the relationship between economic globalization/freedom and inequality by estimating a fixed-effects model. This thesis exploits the same datasets. Differences do exist

however. In 2019, an updated version of the KOF globalization index became available (Gygli et al., 2019). In this version, economic globalization is measured as a weighted average of two components, i.e. trade- and financial globalization. With these two variables, it becomes possible to not only estimate the relationship between economic globalization and income inequality but also to identify which components drive this effect. This allows for a more rigorous analysis. Also, a new edition of the economic freedom of the world (EFW) index results in fewer measurement errors and better comparisons across countries and over time (Gwartney et al., 2021b). The same holds for the latest version of the standardized world income inequality database (SWIID), managed by Solt (2020). Due to the increased quality of these datasets, the validity of this thesis is higher compared to Bergh and Nilsson (2010).

By estimating the model, this thesis attains several significant results. Overall economic freedom is significantly related to within-country income inequality. This result appears to be driven by the size of government; the freedom to trade internationally; and deregulation. There appears to be no significant relationship between more economic globalization and changes in the income distribution. Financial globalization however does increase inequality. Furthermore, these results tend to differ when accounting for the income level of a country.

Section 2 describes the existing literature and formulates five testable hypotheses. Section 3 describes the data and presents descriptive statistics. In section 4, the methodology of this thesis is discussed. Next, section 5 presents the regression results. Section 6 discusses, concludes, and gives recommendations for further research.

2 Literature review

This section presents a critical evaluation of existing knowledge concerning the relationship between liberalization and income inequality. Liberalization is a broad term that refers to economic freedom as well as economic globalization (Bergh & Nilsson, 2010). In the coming subsections, both terms are further defined. Theoretical- and empirical studies are discussed regarding the relationship between liberalization and income inequality. Furthermore, testable hypotheses are formulated that, taken together, contribute to answering the central question.

In order to study the effect of liberalization on income inequality, it is important to understand the meaning of income inequality. Note that income inequality can refer to within-country income inequality; between-country income inequality; or global income inequality. Since the goal of this thesis is to study the effects of liberalization on the income distribution within a population, within-country income inequality must be used.

Specifically, this measures whether the total income of a country is equally or unequally distributed across its citizen. Henceforth, the terms within-country income inequality and income inequality are used interchangeably. This definition also raises the question what qualifies as income. This study defines income as disposable income available for households. To clarify, disposable income measures the amount of money earned by a household plus the balance of taxes/transfers within that household (Solt, 2020).

2.1 Defining economic freedom

Before discussing articles related to economic freedom, it is important to formulate the definition. According to Gwartney et al. (2021b), economic freedom measures an individual's economic sovereignty. More specifically, it measures to what extent people have the opportunity to use their skills and resources, in whatever way they deem appropriate, to improve their lives. As Miller et al. (2021) note, people can decide for themselves which goods and services to acquire in order to lead satisfying lives. Note, this does not mean people can use their capabilities to infringe upon the sovereignty of others. An additional part of the definition thus must be that aggressors who illegally try to obtain the possessions of others can be prosecuted (De Haan & Sturm, 2000). This also means that rather than being imposed something by others, people with economic freedom can always voluntarily decide to participate in transactions. In sum, economic freedom measures the extent to which legally obtained possessions are protected and whether people are free to take part in non-compulsory exchanges. This will remain the definition throughout this thesis.

Five fundamental drivers have been established that determine the extent of economic freedom within countries (Gwartney & Lawson, 2003; Miller et al., 2021). The first component revolves around the legal system. Building good judicial systems is an important objective for every government. A good legal infrastructure can protect the rights of all civilians. This includes the protection of property rights. Adequate judicial systems give societies the confidence to participate in the economy, because they know their possessions and property are protected, thus fostering economic freedom.

Another driver pertains to the presence of government. A large government is characterized by high government expenditures (relative to total GDP), more distributive policies in the form of taxes and transfers/subsidies, and more public companies. This can result in the crowding out of economic activity and diminishing freedom to spend all the money one worked for. Although subsidies and transfers to those in need or to projects that are good for the entire population can be legitimate reasons for a government to interfere, economic freedom still decreases when the size of that government is large.

The stability of the domestic currency is the third driver of economic globalization. If there are no monetary policies present that try to keep inflation to a minimum, the currency might become volatile. When this happens, individuals and firms will be unable to make plans regarding the future (Gwartney & Lawson, 2003). Also, relative market-prices will increase, causing purchasing power to go down. In other words, the value of the money people possess decreases. This negatively affects economic freedom.

The fourth component of economic freedom measures the extent to which goods and services can be traded across international borders. On average, individuals and businesses have become more dependent on imports and exports. Most products are either partly or entirely produced by foreign firms. When governments impose trade barriers, the ability to engage in voluntary transactions with parties beyond the national border goes down. This can cause lower levels of economic freedom.

The last driver measures the number of regulatory policies. These policies can apply to businesses, labour markets, and credit markets. When many regulations exist within the corporate sector, firms could experience difficulties to operate within markets. This could curb competition. Labour market regulations, like paying minimum wages or taking into account dismissal regulations, also reduce economic freedom for these firms. Lastly, credit market regulations could reduce the voluntary exchange of credit. This reduction can emerge through controls on the interest rate and whether credit is readily accessible.

2.2 The effect of economic freedom

Many studies exist that investigate the relationship between income inequality and economic freedom. This relationship however remains ambiguous. Scully (2002) estimates a structural form model by constructing a weighted average of all economic freedom components described above. His results indicate that a larger share of national income goes to the poorest forty percent, relative to the wealthiest twenty percent, when economic freedom increases. In other words, more economic freedom fosters a more equal income distribution. Carter (2007) however concludes the opposite. Carter (2007) builds a dataset containing gini-coefficients and an index measuring overall economic freedom. By using a fixed-effects model, the results demonstrate a positive relationship between economic freedom and income inequality. Carter (2007) notes that the various drivers of economic freedom might have different effects on inequality. The author, therefore, recommends that the aggregate index of economic freedom be broken down into individual drivers, to understand which components cause income inequality.

2.2.1 Size of government

Intuitively, countries with relatively generous welfare systems also experience lower levels of income inequality. Research shows that countries exhibit more equality when governments are large and efficient (Fournier & Johansson, 2016). This is mainly because large governments tend to give more emphasis on progressive taxation and/or public expenditures. By concentrating on OECD countries only, Goudswaard and Caminada (2010) study the effect of public policies on income inequality. This article concludes that taxes and transfers reduce income inequality by on average 27%. Piketty and Saez (2003) look at the evolution of progressive taxes in the United States and the effect it had on income inequality during the 20th century. The tax rate for the people at the top of the income distribution increased from 20% to 91% (in the period 1932-1944). Along with substantial public programs, this resulted in lower income inequality.

Existing literature concludes that these public expenditures can be an important tool for governments to affect inequality. Relatively large public social expenditures tend to be effective, especially for the middle class (Bergh, 2007; Goudswaard & Caminada, 2010). Investments in for example education seem to reduce large income differences within countries (Abdullah et al., 2015). Other types of public programs like free childcare or subsidies intended for the poor can have similar effects (Fournier & Johansson, 2016). As mentioned before, Fournier and Johansson (2016) claim that large governments can reduce income inequality. Large governments are however no automatic guarantee for effective redistribution policies (Bergh & Nilsson, 2010). For poor African countries, studies find that an increase in governmental size results in greater income disparities (Odedokun & Round, 2004). A reason for this is that these governments can be corrupt. Public expenditures and subsidies are therefore more likely to flow to powerful interest groups, usually consisting of affluent people (Fournier & Johansson, 2016).

In summary, the expectation is that an increase in governmental size has a positive effect on within-country income equality. This is mainly due to redistributive policies. Note, it is likely that the effectiveness depends on a country's income level. Taking all this into consideration, the following hypothesis is suggested:

> *H1: An increase in governmental size is related to a decrease in within-country income inequality. This effect is relatively larger in high-income countries compared to low-income countries.*

2.2.2 Rule of law

The next driver of economic freedom pertains to the legal system and whether that system adequately protects property rights. Bhagat (2020) studies the effect of an adequate legal

system on income inequality. He finds that an effective rule of law can significantly reduce income inequality. Based on these results, promoting an effective court of law, and enforcing the protection of property rights can help to reduce income disparities between citizens (Bhagat, 2020).

Turning to property rights in particular, a property right is defined as "the exclusive authority to determine how a resource is used" (Alchian, n.d., para. 3). According to political economists, the protection of property rights is of vital importance for any government (see Acemoglu and Verdier (1998) for a brief discussion). The effect property rights have on inequality is intuitive. If property rights are protected adequately, the value of that property necessarily increases (Bergh & Nilsson, 2010). As a result, inequality between property owners and those who do not own property increases. In contrast, Sonin (2003) finds that insufficient regulations regarding property rights tend to increase inequality, especially in developing countries. In these countries, top income earners are relatively more likely to have become rich due to fraud and theft. Improving the protection of property rights may therefore be more important for the underprivileged groups. Taking the above into consideration, the following hypothesis can be constructed:

> *H2: An effective rule of law reduces within-country income inequality. This effect is relatively more pronounced in developing countries.*

2.2.3 Currency

As Miller et al. (2021) note, the quality of domestic currency fosters economic freedom. People need a non-volatile and trustworthy currency. Inflation plays an important role in this regard. Inflation occurs when the aggregate price-level increases (Cowen & Tabarrok, 2015). In other words, fewer products can be purchased for the same amount of money. High inflation is detrimental to economic freedom because the value of the money people possess goes down. How does inflation relate to income inequality? Easterly and Fischer (2001) note that people at the bottom of the income distribution are more anxious regarding inflation, compared to middle- and top-income earners. This anxiety is justified by the literature. High inflation disproportionally hurts the poor because their assets are badly protected compared to high-income individuals (Mulligan & Sala-i-Martin, 2000). When inflation occurs, the rich are relatively more likely to trade a fraction of their nominal assets in exchange for real assets like real estate, gold, art, et cetera (Fischer & Modigliani, 1978; Mulligan & Sala-i-Martin, 2000). This guards them against the effects of inflation. Fischer and Modigliani (1978) give another explanation why inflation can lead to inequality. According to this article, it is "believed that wages lag behind in inflation, and that inflation therefore implies a shift away from wage-earners, and towards profits" (Fischer & Modigliani, 1978, p. 18). If this theory is correct, this shift could result in a rise in

income inequality, because wage earners are typically poorer compared to those whose income stems from profits.

The empirical literature supports the above-mentioned theories. According to Bulíř (2001), a shift from large inflation rates to lower inflation rates significantly increases the equality of the income distribution. Similarly, other studies provide cross-country evidence that low inflation rates contribute to lower income inequality (Albanesi, 2007; Son & Kakwani, 2008). In conclusion, if governments aim to reduce income inequality, the goal of monetary policies should be to reduce the volatility and increase the reliability of its domestic currency. Therefore, the third hypothesis of this thesis is:

> *H3: Within-country income inequality can be reduced when citizens have access to sound money.*

2.2.4 International trade

The Heckscher-Ohlin model (HO-model) is regarded as an important theoretical trade model. It can be used to describe the effect of international trade on within-country income inequality (Heimberger, 2020). The model creates a dichotomy between developing countries and developed countries. It is plausible to assume that developing countries have a comparative advantage in the production of goods and services that rely on unskilled labour. This is because a relatively large share of the labour force in these countries tend to be uneducated. Assume also that high-skilled workers receive higher wages compared to unskilled workers. The HO-model predicts that countries export goods and services in which they have a comparative advantage. In developing countries, the demand for unskilled workers increases (Heckscher & Ohlin, 1991). This causes the price of these goods to increase. According to the Stolper-Samuelson theorem, this demand increase results in higher wages for unskilled workers (Stolper & Samuelson, 1941). Simultaneously, the salary for skilled labour decreases. In developing countries, freedom to trade internationally can thus result in more equality. The opposite occurs in advanced economies. In these countries, the relatively abundant factor is skilled labour. As described above, this will result in the export of products that uses this abundant factor intensively. Wages for skilled workers increases, while income for unskilled workers decreases. In other words, income inequality increases.

The predictions of the HO-model for developing countries are not supported by empirical studies. The salary of educated workers increased in developing countries that reduced their trade barriers (Pavcnik, 2017). Goldberg and Pavcnik (2007) analyse representative developing countries that increased the freedom to exchange products across

national borders.[1] Most of these countries experienced an increase in inequality during the last two decades of the 20th century. In advanced countries, the predictions of the HO-model do tend to hold. Edwards (1997) for example concludes that inequality in advanced countries tends to increase when trade restrictions are elevated.

These empirical results raise the question why the theoretical predictions for developing countries do not align with reality. Bigsten and Munshi (2014) argue that this can be the result of offshoring. A decrease in trade barriers increases the relative demand for skilled workers in both developing and developed countries (Feenstra & Hanson, 1995). As a result, skilled workers in all countries receive higher wages.

In sum, the Stolper-Samuelson theorem predicts that an increase in the freedom to trade internationally causes inequality to decrease in developing countries, but increase in developed countries. Offshoring however causes inequality to increase, regardless of the country. Empirical studies concur with this explanation. Accordingly, the third hypothesis can be constructed in the following manner:

> *H4: Freedom to trade internationally will increase income inequality in both developed- and developing countries.*

2.2.5 Deregulation

This dimension measures the amount of regulations in corporate sectors, credit markets, and labour markets. Looking at labour markets in particular, several empirical studies conclude that regulations in these markets help to smooth the income distribution within a country (Calderón & Chong, 2009; Fortin & Lemieux, 1997). Similarly, Koeniger et al. (2007) argue that the existence of dismissal regulations and minimum wages in advanced economies relate to lower wage inequality (Also see Levin-Waldman and Lerman (2017)). Also, in developing countries like Brazil, the minimum wage has caused an increase in income equality since 1994 (Engbom & Moser, 2021).

Turning to credit market regulations, Agnello et al. (2012) note that the removal of credit constraints contributes to a decrease in income inequality. Furthermore, increasing the accessibility of credit by reducing credit constraints for the poor will result in more opportunities for these people (Aghion & Bolton, 1997; Galor & Zeira, 1993). Paradoxically, Claessens and Perotti (2007) note that deregulation of credit markets could increase income inequality. This occurs when most of the benefits that stem from deregulation are obtained by top income earners. This can be present in developing countries where governments can distribute the gains of deregulation to the privileged few in exchange for support.

[1] These countries include Argentina, Brazil, Chile, Colombia, Hong Kong, India, and Mexico.

As described above, labour market regulations and credit market regulations affect income inequality in opposite ways. Therefore, the effect deregulation in general has on the income distribution remains ambiguous. As a result, a hypothesis regarding the effect of deregulation and inequality cannot be constructed.

2.3 Defining economic globalization

The second component of liberalization is globalization. Teeple (2000) observes that many scholars find it difficult to give a concrete definition of globalization. As a result, an all-encompassing definition regarding globalization is still up for debate. Therefore, this thesis gives a relatively broad definition of globalization. Adapted from Kolb (2021), globalization represents the emergence of increasingly stronger linkages between countries, albeit cultural, economic, political, or social. The study of cultural, political, or social globalization however are beyond the scope of this thesis. This thesis will only highlight the effect of economic globalization. Economic globalization measures the increased interconnections between world economies (Milner & Mukherjee, 2009). These connections are a consequence of international trade of goods and services and the existence of international capital markets. From this definition, it can be ascertained that economic globalization is driven by trade globalization and financial globalization.

The first driver of economic globalization is trade. Trade globalization measures to what extent goods and services are exported/imported to other countries. It also measures whether employment within a country is dependent on the amount of international trade. Similarly, financial globalization measures how financial transfers across national borders result in more robust connections between different world economies.

2.4 The effect of economic globalization

By using a fixed-effects model, Dreher and Gaston (2008) conclude that economic globalization has increased the wage gap in advanced economies. Similarly, Ezcurra and Rodríguez-Pose (2013) study inequality at the regional level. Stronger economic linkages appear to be detrimental to the smoothness of the regional income distribution. In contrast, Bergh and Nilsson (2010) draw different conclusions. This article estimates the effect of economic globalization on income inequality. No significant evidence is found that income inequality is exacerbated through economic globalization.

The question remains whether the components of economic globalization are related to the equality of the income distribution. Intuitively, the fourth driver of economic freedom, the freedom to trade internationally, has much in common with trade globalization. Therefore, hypothesis H4 (described in section 2.2.4) is also applicable to this component.

To repeat, it can be expected that trade globalization will increase income inequality in developed- and developing countries.

A variety of theoretical models conclude that stronger financial linkages between countries are related to lower inequality (Heimberger, 2020). Financial globalization can result in the increased attainment of foreign financial assets (Broner & Ventura, 2016). This will lead to more consumption and investments, relative to production and savings, respectively (Heimberger, 2020). This increases GDP and the earnings of low-income households (Beck et al., 2007; Kose et al., 2009). Credit constraints are another important factor. Poor households appear to have difficulty in acquiring credit (Aghion & Bolton, 1997). Increasing financial globalization necessarily results in fewer credit constraints (Stultz, 2005). As a result, households at the bottom of the income distribution will benefit the most, causing inequality to decrease. Mishkin (2009) argues that financial globalization, especially in low-income countries, contributes to a decline in poverty. Sound financial systems can efficiently distribute capital. In other words, capital is distributed where it can be used most productively. Financial openness can help foster the development of these financial systems. At the same time, a mature financial system is less prone to the influences of lobbyists or corrupt governments. However, other scholars point to certain requirements that must be met before inequality decreases. When the financial system is underdeveloped, only high-income earners can access and benefit from globalization. Only when financial systems are sound, can globalization reduce inequality (Greenwood & Jovanovic, 1990). Second, the quality of a country's institutions also matters (Delis et al., 2013; Heimberger, 2020). Mishkin (2007) notes that mismanagement can result in severe financial crises.

Empirical literature does not support the above-mentioned theoretical predictions. By studying 123 articles on the effect of globalization and inequality, Heimberger (2020) concludes that financial globalization results in greater disparities within the income distribution. This could mean that the requirements described above are seldom met. Taking this into account, the final hypothesis can be constructed:

H5: Financial globalization will increase within-country income inequality.

3 Data & descriptive statistics

To test the hypotheses described in section 2, a dataset containing multiple countries which are comparable with each other and over time is used. This dataset is gathered by merging a variety of datasets that stem from different sources. By merging these datasets and dropping countries with many missing values, a balanced dataset remains. Next, the data are averaged over five-year periods in order to decrease the likelihood

that measurement errors or short-term trends bias the results. There are observations for 82 countries over the period 1970-2010. Table 1 presents the sources and gives brief descriptions for all variables. The next subsections describe these variables in more detail.

3.1 Data

3.1.1 Dependent variable

The gini-coefficient is used to measure within-country income inequality (Sørensen & Whitta-Jacobsen, 2010). This coefficient takes on a value between 0 and 100. A coefficient close to 100 indicates a very unequal society, while a gini close to 0 is an indication that the total income of a country is more evenly distributed within the population. Many datasets exist that measure gini-coefficients. The Luxembourg Income Study Database (LIS) and the World Income Inequality Database (WIID) are often used by researchers (Bergh & Nilsson, 2010). To answer the central question, the dataset must include observations for many countries that are comparable over time and with each other. Although the WIID consists of over 200 countries, the gini-coefficients are not comparable with each other or over time, causing this dataset to be unsuitable (Deininger & Squire, 1996; Gradín, 2021). The LIS solves this problem and does include comparable observations by critically assessing the quality of the available gini-coefficients (Ravallion, 2015). Only observations of the highest quality are included in the database. As a consequence, the LIS does not include observations for many countries. At the time of writing, the LIS contains observations for fifty countries. This sample size is too small for the purposes of this thesis. Fortunately, the Standardized World Income Inequality Database (SWIID) developed by Solt (2020) includes comparable gini-coefficients for 198 countries between 1960 and 2020.[2] The SWIID provides two measures of income inequality, i.e., market income inequality and disposable income inequality. In this context, income is measured as income before taxes/transfers and income after taxes/transfers, respectively. In this study, disposable income inequality is used as the dependent variable.

[2]The SWIID achieves this by obtaining gini-coefficients of the LIS and other available datasets. Next, the LIS-coefficients are matched with the gini-coefficients obtained by other available datasets. Subsequently, a relationship between these matched coefficients is estimated. The missing values of the LIS are then estimated by applying the estimated relationship to the gini-coefficients obtained from other datasets.

Table 1: Data sources

Variable	Data sources	Explanation
Dependent variable		
Gini-coefficient	Solt, 2020	Disposable income gini-coefficient. Disposable income is defined as income after taxes/transfers
Independent variables		
Economic Freedom	Gwartney et al., 2021a	
EFW		Overall economic freedom index
Area1		Size of government index
Area2		Legal system and property rights index
Area3		Sound money index
Area4		Freedom to trade internationally index
Area5		Regulation index
Economic globalization	Dreher, 2006 Gygli et al., 2019	
KOF		De jure economic globalization index
KOF-Trade		De jure trade globalization index
KOF-Financial		De jure financial globalization index
Control variables		
GDP per capita	Feenstra et al., 2015	Log of expenditure side real gross domestic product per capita at chained PPPs (in 2017 US$)
Dependency ratio	The World Bank, 2021	Ratio of the population younger than 15 or older than 64 to the working-age population
Years of schooling	Barro and Lee, 2013	The average number of years citizen receive education

Note: This table gives a brief description of all variables used in the main analyses. It also presents the source of all variables.

3.1.2 Independent variables

Economic freedom is one of the main independent variables. This is measured by the Economic Freedom of the World (EFW) index. The explicit goal of the EFW index is to measure whether governments are able to grant its citizen the freedom to make economic choices while protecting them and their property from aggressors (Gwartney & Lawson, 2003). The dataset contains panel data that are comparable to each other and across time. 162 countries are included spanning a time period from 1970 to 2018. Countries receive an overall score on a scale of 0 to 10. A higher score represents more economic freedom within a country. This overall score is a weighted average of five dimensions, each measuring a specific area of economic freedom.

The first component relates to the size of the government (Area1). Countries with less government interference receive the highest score in this area. The second area measures the protection of property rights and whether solid legal systems are in place that help the

inhabitants of a country (Area2). The third component measures the quality of currency within a country (Area3). If a government fails to act when inflation grows beyond the targeted level, it becomes difficult for firms and individuals to make plans regarding the future. This negatively affects their economic decision-making, thus lowering economic freedom. Next, the fourth area measures whether goods and services can freely be exchanged across international borders (Area4). Civilians and businesses increasingly rely on imports and exports. Obstructions in the form of tariffs or trade barriers can have a negative effect on these international exchanges, resulting in low economic freedom. To achieve a high score in this area, trade barriers and tariffs must, amongst other things, be reduced to a minimum. The final area relates to regulation (Area5). Companies might experience barriers to enter a market when certain regulations are in place. It can also interfere with mutually beneficial market transactions. This has a negative effect on economic freedom. Fewer regulations results in a higher score for this dimension.

Economic globalization - the second main independent variable - is measured by the KOF globalization index. This index contains observations for 203 countries between the period 1970 to 2018 (Gygli et al., 2019). Each observation takes on a value between 0 and 100. A higher index corresponds to a higher level of globalization. Each variable in the KOF distinguishes between de facto- and de jure globalization. De facto globalization expresses the actual amount of globalization in reality. De jure globalization represents the amount of globalization that could have been (Bataka, 2019; Gygli et al., 2019). This study uses the latter as its independent variable.

The economic globalization index is measured by combining the subcomponents trade globalization (KOF-Trade) and financial globalization (KOF-Financial). Previous versions of the KOF index did not differentiate between these subcomponents. This study, therefore, improves upon the article by Bergh and Nilsson (2010), because it has become possible to use the drivers of economic globalization as independent variables. De jure trade globalization measures regulations that facilitate and encourages trade flows between countries. De jure financial globalization measures the openness of a country to international financial flows and investments.

3.1.3 Control variables

All regressions also include three control variables to account for time-varying factors that are related to the dependent and the independent variable. Real gross domestic product (GDP) at chained purchasing power parities (PPPs) is used as the first control variable. GDP is divided by the population, causing this variable to measure real GDP per capita. Also, the data is transformed to the natural logarithm of real GDP per capita. The data can be compared to each other across countries and over time (Feenstra et al., 2015).

Observations for 182 countries in the periods 1950-2019 are available. Next, a variable is included that measures the percentage of the non-working-age population (younger than 15 and older than 64) to the working-age population. This data is taken from the World Bank (The World Bank, 2021). Data is available between the years 1960-2020 for more than 200 countries. The last control variable measures the average years of education the population receives. This variable is taken from the Barro-Lee Educational Attainment Data (Barro & Lee, 2013). 146 countries from 1950 to 2010 are available.

3.2 Descriptive statistics

Table 2 displays descriptive statistics for the dependent, independent, and control variables mentioned above. The mean value of the gini-coefficient is around 40. The table also shows that for the last forty years, economic freedom has been higher than economic globalization. Also, a correlation matrix is presented in table 3 to give some intuition in what way the variables relate to each other. A negative correlation exists for the relationship between the gini-coefficient and EFW/KOF. Lastly, with a coefficient of 0.778, EFW and KOF appear to have a positive relationship. This could mean that economic freedom is high when economic globalization is also high.

Table 2: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Dependent variable					
Gini-coefficient	2683	38.738	9.224	20.300	63.600
Independent variables					
Economic freedom					
EFW	1351	6.632	1.223	2.519	9.019
Area1	1345	6.648	1.445	1.511	10.000
Area2	1382	5.557	1.595	2.013	10.000
Area3	1383	7.647	1.981	0.000	10.000
Area4	1346	6.808	1.916	0.007	10.000
Area5	1353	6.554	1.244	2.201	9.394
Economic globalization					
KOF	3337	51.185	20.373	11.380	94.385
KOF-Trade	3337	47.850	24.284	9.874	97.009
KOF-Financial	3337	54.480	20.839	7.390	93.092
Control variables					
Real GDP per capita	3362	8.937	1.120	6.270	11.262
Dependency ratio	3362	68.517	18.723	26.991	112.796
Years of schooling	738	6.335	3.100	0.196	13.424

Note: The table presents descriptive statistics for all variables used in the main regression models. The table contains: the number of observation; the mean; the standard deviation; and the smallest/largest values.

Table 3: Correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Gini-coefficient	1									
EFW	-0.377	1								
Area1	0.182	0.342	1							
Area2	-0.622	0.721	-0.087	1						
Area3	-0.328	0.831	0.097	0.496	1					
Area4	-0.300	0.893	0.236	0.596	0.694	1				
Area5	-0.260	0.804	0.137	0.617	0.588	0.635	1			
KOF	-0.539	0.778	0.014	0.736	0.655	0.772	0.564	1		
KOF-Trade	-0.598	0.686	-0.053	0.762	0.546	0.671	0.498	0.935	1	
KOF-Financial	-0.368	0.749	0.098	0.568	0.670	0.753	0.541	0.896	0.680	1

Note: The table shows the correlation matrix for the dependent variable and independent variables.

4 Methodology

In the following section, the methodology used in this study is described. Section 4.1 introduces the regression model, why it is used, and how it is constructed. Section 4.2 discusses the sensitivity analyses, which are necessary in order to determine whether the regression results are robust.

4.1 The regression model

The model used in this thesis is partially adapted from Bergh and Nilsson (2010). That article estimates a fixed-effects model with income inequality as a function of liberalization, where liberalization represents economic freedom or economic globalization. The regression model used by Bergh and Nilsson (2010) can be found below, where countries are expressed by i and time by t:

$$Y_{it} = \alpha_i + \rho T_{it} + \beta X_{it} + \gamma_i + \delta_t + \varepsilon_{it} \tag{1}$$

Y_{it} is the dependent variable income inequality. This is measured by the disposable income gini-coefficients. T_{it} is the independent variable that measures either economic globalization or economic freedom. For economic freedom, each dimension (Area1-Area5) is also included as an independent variable in separate models. A similar approach is taken for the dimensions of economic globalization. X_{it} is a vector that represents the control variables. The main analysis consists of three control variables, namely GDP per capita, the dependency ratio, and the average years of schooling of the population within a country. The regression equation also includes the country fixed-effect γ_i. This accounts for reasonably fixed variations in income inequality between nations. In the past, economic shocks caused inequality to change in multiple countries during the same

time period. To account for these events, the period fixed-effect δ_t is included. The last symbol, ε_{it}, represents the error-term.

Unfortunately, all panels likely contain unit roots (see table 10 in the appendix). In other words, it is possible that all variables used in the regression contain a trend. Not accounting for this trend could result in misleading regression coefficients. To resolve this, every observation is subtracted by the observation of the previous period $(t-1)$. This is also called first-differencing. In mathematical terms, equation 1 must be subtracted by:

$$Y_{it-1} = \alpha_i + \rho T_{it-1} + \beta X_{it-1} + \gamma_i + \delta_{t-1} + \varepsilon_{it-1} \tag{2}$$

Subtracting equation 1 from equation 2 yields the first-differenced regression model:

$$\Delta Y_{it} = \rho \Delta T_{it} + \beta \Delta X_{it} + \Delta \delta_t + \Delta \varepsilon_{it} \tag{3}$$

Note, it is not necessary to include time-invariant control variables. A variable with this property does not change over time, causing it to drop out of the model due to the subtraction.

As stated by most hypotheses described in section 2, accounting for the country-income level can be important. Therefore, countries are classified as either high-income, upper-middle-income, lower-middle-income, or low-income. The World Bank gives a clear classification method based on the gross national income per capita (GNI) of a country (Hamadeh et al., 2021). With this classification, it becomes possible to estimate the fixed-effects model while accounting for the income level.

4.2 Sensitivity analyses

Three sets of sensitivity tests are performed to test the robustness of the regression results. The first set of tests pertain to the independent variables of economic globalization/freedom. Specifically, the same regression as described above is carried out, with the difference that the independent variables pre-date the dependent ones by one period. More formally, a one-period-lagged value of the independent variables is included to explain income inequality. Lagging the independent variables can be useful because it helps identify possible endogeneity issues. To clarify, the direction of the relationship between Y_{it} and T_{it} can be guessed. A different test includes all dimensions of the KOF in the same regression. This is also done for all EFW-indices. Finally, quadratic independent variables are included in the regression model. The second set of tests revolves around the gini-coefficients. One test excludes countries with extreme gini-coefficients. As before, an extreme value is defined as at least two standard deviations away from the mean. As described in section 3, the SWIID also contains a variable that measures market income

inequality. The next test uses this as the dependent variable. The next set of tests revolves around the countries included in the regression. Section 4.1 described models that made a distinction between high-income countries and low-income countries. For the sensitivity analysis, upper-middle-income countries are combined with high-income countries and lower-middle-income countries with low-income countries. Finally, countries in the regions sub-Saharan Africa, Latin America, and East Asia are separately excluded from the regression.

5 Results

In this section, the regression results are obtained by estimating the fixed-effects model. All regression models include period dummies and account for heteroscedasticity by implementing robust standard errors. Secondly, several sensitivity tests are performed in order to determine whether the regression coefficients are robust.

5.1 Regression results

5.1.1 Economic freedom

Table 4 presents the regression results with economic freedom as the independent variable. 82 countries were used for these regressions, while the individual observations range between 523 and 537. Turning to model 1, we see that the coefficient of EFW is positive and significant. This seems to suggest that a rise in economic freedom is related to higher income inequality. Turning to models 2 to 6, it can be ascertained that this result is driven by the components Area1, Area4, and Area5.

As explained in section 3.1.2, countries with small governments receive a higher grade for Area1. With a positive coefficient of 0.175, a decrease in the size of government appears to significantly increase income inequality. This result is in line with the first hypothesis described in section 2.2.1. When accounting for a country's income level, however, the results contradict theoretical predictions. Table 5 displays estimation coefficients exclusively for high-income countries. 35 countries were used for this analysis, with approximately 250 individual observations. In this case, government size is unrelated to inequality. This is also the case for low-income countries (see table 6). With a coefficient of 0.062, freedom to trade internationally also appears to drive inequality. This significant result disappears while accounting for different income levels. Tables 5 and 6 still display positive coefficients, however without statistical significance. Lastly, as described in section 2.2.5, the academic literature has been inconclusive for the driver measuring regulation. By looking at table 4, it becomes clear that deregulation contributes to an

unequal income distribution, as can be seen by the significant coefficient of 0.290. This effect is even higher for high-income countries (see table 5). Moreover, for high-income countries exclusively, deregulation appears to be the sole driver of inequality. Other areas of table 5 are insignificant. In contrast, no significant effect for Area5 exists for low-income countries (see table 6). Turning to the control variables, almost none of the coefficients for tables 4, 5, and 6 appear to be significant. Note that for low-income countries none of the estimated coefficients are significant. This does not necessarily mean that existing literature is wrong regarding the relationship between economic freedom and income inequality. The insignificance of these results could be due to data limitations. To elucidate, observations for only six low-income countries are present in the dataset. This relatively small amount makes performing statistical inference difficult. In section 5.2, a sensitivity test is performed where lower-middle-income countries are included in the regression. This might make the results more reliable.

Table 4: Regression results for the relationship between economic freedom and income inequality

	Dimensions of Economic Freedom					
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Control Variables						
GDP per Capita	-0.465	-0.284	-0.339	-0.395	-0.404	-0.449
	(0.432)	(0.415)	(0.428)	(0.435)	(0.416)	(0.432)
Dependency Ratio	0.031	0.027	0.026	0.028	0.030	0.034*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Years of Schooling	0.057	0.057	0.072	0.072	0.061	0.047
	(0.102)	(0.104)	(0.105)	(0.105)	(0.105)	(0.103)
Economic Freedom						
EFW	0.309**					
	(0.119)					
Area1		0.175***				
		(0.064)				
Area2			-0.027			
			(0.081)			
Area3				0.034		
				(0.040)		
Area4					0.062**	
					(0.030)	
Area5						0.290***
						(0.105)
Constant	-0.380	-0.459	-0.477	-0.411	-0.438	-0.448
	(0.485)	(0.499)	(0.499)	(0.477)	(0.500)	(0.502)
Observations	528	523	536	537	525	529
Clusters	82	82	82	82	82	82
Within R^2	0.157	0.156	0.135	0.137	0.143	0.164

*Note: Regression results with disposable income inequality as the dependent variable. The overall economic freedom index as well as its subcomponents (Area1-Area5) are included in separate models. Clusters measures the number of countries used in the regression. All models include period dummies. Robust standard errors are in parentheses; *p<0.1, **p<0.05, ***p<0.01*

Table 5: Regression results for the relationship between income inequality and economic freedom for high-income countries

	Dimensions of Economic Freedom					
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Control Variable						
GDP per Capita	-1.311	-1.416	-1.279	-1.243	-1.362	-1.152
	(0.965)	(0.912)	(0.960)	(0.981)	(0.922)	(0.957)
Dependeny Ratio	0.021	0.004	-0.015	-0.005	0.001	0.02
	(0.045)	(0.042)	(0.035)	(0.039)	(0.041)	(0.033)
Years of Schooling	0.056	0.067	0.095	0.080	0.072	0.016
	(0.137)	(0.141)	(0.145)	(0.143)	(0.146)	(0.137)
Economic Freedom						
EFW	0.505*					
	(0.286)					
Area1		0.146				
		(0.119)				
Area2			-0.305			
			(0.196)			
Area3				0.070		
				(0.086)		
Area4					0.002	
					(0.063)	
Area5						0.605**
						(0.244)
Constant	-0.814	-0.970	-1.093	-0.962	-0.995	-0.662
	(1.023)	(1.044)	(1.025)	(1.016)	(1.044)	(1.010)
Observations	248	246	253	253	249	250
Clusters	35	35	35	35	35	35
Within R^2	0.188	0.174	0.172	0.167	0.160	0.239

*Note: Regression results with disposable income inequality as the dependent variable. The overall economic freedom index as well as its subcomponents (Area1-Area5) are included in separate models. Clusters measures the number of countries used in the regression. Only high-income countries (as classified by the World Bank (2021)) are included in these clusters. All models include period dummies. Robust standard errors are in parentheses; *p<0.1, **p<0.05, ***p<0.01*

Table 6: Regression results for the relationship between income inequality and economic freedom for low-income countries

	Dimensions of Economic Freedom					
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Control Variable						
GDP per Capita	0.251	0.0996	0.245	0.114	0.261	0.293
	(0.817)	(0.693)	(0.871)	(0.880)	(0.436)	(0.919)
Dependency Ratio	-0.074	-0.076	-0.078	-0.085	-0.070	-0.064*
	(0.046)	(0.057)	(0.044)	(0.044)	(0.036)	(0.031)
Years of Schooling	-0.043	-0.031	-0.049	-0.135	-0.219	0.212
	(0.520)	(0.606)	(0.517)	(0.554)	(0.561)	(0.512)
Economic Freedom						
EFW	0.080					
	(0.115)					
Area1		0.093				
		(0.056)				
Area2			-0.102			
			(0.294)			
Area3				-0.030		
				(0.030)		
Area4					0.166	
					(0.090)	
Area5						0.237
						(0.281)
Constant	1.094	1.159	1.142	1.217	1.286	0.753
	(0.581)	(0.664)	(0.661)	(0.660)	(0.624)	(0.625)
Observations	27	26	28	28	27	26
Clusters	6	6	6	6	6	6
Within R^2	0.694	0.681	0.715	0.716	0.749	0.680

*Note: Regression results with disposable income inequality as the dependent variable. The overall economic freedom index as well as its subcomponents (Area1-Area5) are included in separate models. Clusters measures the number of countries used in the regression. Only low-income countries (as classified by the World Bank (2021)) are included in these clusters. All models include period dummies. Robust standard errors are in parentheses; *p<0.1, **p<0.05, ***p<0.01*

5.1.2 Economic globalization

In this section, the regression models performed above are re-estimated, with the distinction that economic globalization is used as the independent variable. Similar to economic freedom, economic globalization consists of different dimensions, trade- and financial globalization. These two variables are also included as independent variables in separate models. Table 7 depicts the regression results for the relationship between income inequality and economic globalization. No statistical significance is found for overall economic globalization. The same holds for trade globalization. With a coefficient of 0.168, financial globalization does appear to be significant. According to theory, a reduction in financial trade barriers should result in more equality. These results seem to be in contrast with the theoretical predictions described in section 2.4. However, this result is comparable to existing empirical articles.

Table 8 provides regression coefficients that clarify whether the effect of globalization on inequality differs by income level. For the first three models, the regression analysis only includes countries classified as high-income. Models 4 to 6 present this effect for low-income countries. For advanced countries, none of the control variables appear to be significant. The coefficient for the independent variable trade-globalization is significant. Paradoxically, this result is negative. In other words, an increase in trade globalization results in more equality. This result is unexpected because hypothesis H4 predicts the opposite result. Compared to model 4 in table 5, the sign of this coefficient differs from the coefficient of Area4, even though these variables measure something similar. When the regression only includes low-income countries, all results appear to be insignificant. As before, the low-income model should be interpreted with caution, because these results are based on only six countries.

Table 7: Regression results for the relationship between economic globalization and income inequality

	Dimensions of Economic Globalization		
Variable	**(1)**	**(2)**	**(3)**
Controle Variables			
GDP per Capita	-0.470	-0.377	-0.546
	(0.414)	(0.418)	(0.398)
Dependency Ratio	0.024	0.020	0.029
	(0.021)	(0.020)	(0.020)
Years of Schooling	0.099	0.095	0.097
	(0.106)	(0.104)	(0.105)
Economic Globalization			
KOF	0.066		
	(0.115)		
KOF-Trade		-0.135	
		(0.095)	
KOF-Financial			0.168**
			(0.078)
Constant	-0.654	-0.624	-0.660
	(0.512)	(0.503)	(0.502)
Observations	537	537	537
Clusters	82	82	82
Within R^2	0.140	0.145	0.151

*Note: Regression results with disposable income inequality as the dependent variable. The economic globalization index as well as its subcomponents (Trade and financial) are included in separate models. Clusters measures the number of countries used in the regression. All models include period dummies. Robust standard errors are in parentheses; *p<0.1, **p<0.05, ***p<0.01*

Table 8: Regression results for the relationship between income inequality and economic globalization for high- and low-income countries

	Dimensions of Economic Globalization					
	High-Income			Low-Income		
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Controle Variables						
GDP per Capita	-1.316	-1.271	-1.316	0.147	0.155	0.343
	(0.944)	(0.938)	(0.963)	(0.621)	(0.977)	(0.258)
Dependency Ratio	-0.021	-0.012	-0.015	-0.079	-0.073	-0.096
	(0.038)	(0.035)	(0.038)	(0.045)	(0.040)	(0.051)
Years of Schooling	0.069	0.048	0.084	-0.112	-0.030	-0.062
	(0.142)	(0.139)	(0.145)	(0.656)	(0.688)	(0.506)
Economic Globalization						
KOF	-0.247			0.011		
	(0.173)			(0.072)		
KOF-Trade		-0.313*			-0.254	
		(0.156)			(0.165)	
KOF-Financial			-0.049			0.270
			(0.118)			(0.179)
Constant	-0.904	-0.724	-1.062	1.213	1.107	1.097
	(1.019)	(0.998)	(1.032)	(0.734)	(0.732)	(0.587)
Observations	253	253	253	29	29	29
Clusters	35	35	35	6	6	6
Within R^2	0.173	0.185	0.162	0.709	0.763	0.769

*Note: Regression results with disposable income inequality as the dependent variable. The economic globalization index as well as its subcomponents (Trade and financial) are included in separate models as independent variables. Clusters measures the number of countries used in the regression. Models (1), (2) and (3) include high-income countries (as classified by the World Bank (2021)) in these clusters. Models (4), (5) and (6) include low-income countries (as classified by the World Bank (2021)) in these clusters. All models include period dummies. Robust standard errors are in parentheses; *p<0.1, **p<0.05, ***p<0.01*

5.2 Robustness

This section discusses the findings of the sensitivity checks described in section 4.2. The results are presented in table 9. The table only includes the estimated coefficients for overall economic freedom/globalization and their significant components. The dimensions of the rule of law and sound money are excluded from the table because none of these indices were significant for any robustness test. All tests include period dummies and control variables. The coefficients are then compared to the results of section 5.1 in order to determine whether the results are robust. For convenience, the estimated coefficients of tables 4 and 6 are shown in the first row of table 9.

The first set of tests relate to the dependent variable. The first test excludes countries with extreme gini-coefficients from the analysis. These countries include Botswana and South Africa. The gini-coefficient for both countries suggests extreme within-country income inequality. For economic freedom, excluding these countries from the analysis does

not change the results by much. In contrast, the drivers of economic globalization are affected. Financial globalization becomes insignificant, while trade globalization becomes significant and changes from sign. The next test uses market income gini-coefficient as the dependent variable. Overall, this alteration does not result in different results compared to baseline results. Only the coefficient size of government becomes insignificant. This result seems plausible. As described in section 2.2.1, the size of government can be measured by its fiscal policy. However, market income gini-coefficients (also known as pre-tax gini-coefficients) are measured before redistribution has taken place. Since market income gini-coefficient do not account for the effects of redistribution policies, it is logical that no significant relationship was found.

Turning to the independent variables, including all dimensions of economic freedom in the same regression results in positive and significant coefficients for the size of government and regulation. Freedom to trade internationally becomes insignificant. For economic globalization, both dimensions are significant. Substituting the independent variables with their one-period lag results in similar outcomes compared to the main findings. The only difference is that overall economic globalization become positive and significant. These results seem to validate the view that a change in liberalization causes a change in inequality for the next period. Moreover, this significance seems to suggest that the results are not biased due to endogeneity issues. A cautionary note must be made however. This result only serves as an educated guess regarding the causal direction of liberalization and within-country income inequality. Reverse causality bias or simultaneity bias might therefore still be present (see section 6 for a more comprehensive discussion). Adding a quadratic term to the regression results in significant results for overall economic freedom, size of government, freedom to trade internationally, regulation, trade globalization, and financial globalization. In particular, the results of trade globalization appear to verify the choice of adding a quadratic term. The last test only relates to economic globalization. The de facto variable is used as opposed to the de jure variable. This causes economic globalization and the driver financial globalization, to become significant.

The last set of tests revolves around the inclusion and exclusion of certain countries. Tables 5, 6 and 8 include countries by examining their income levels. For the next two tests, upper-middle-income countries and high-income countries are included in a regression. The results for this test do not seem to differ substantially, compared to baseline findings. The only difference appears to be for economic globalization, where trade globalization becomes negative and significant and where financial globalization loses significance. In the second test, low-income countries and lower-middle-income countries are included. For this test, only the coefficient size of government and economic globalization appear to be significant. Finally, countries situated in certain regions are excluded from

the regression. This does not appear to substantially change the results. Excluding Sub-Saharan African countries causes trade globalization to become significant. Excluding Latin-American countries causes only regulation to remain significant.

Table 9: Regression results for all sensitivity tests

Sensitivity Analyses	**EFW**	**Area1**	**Area4**	**Area5**	**KOF**	**KOF-T.**	**KOF-F.**
Main analysis	0.309**	0.175***	0.062**	0.290***	0.066	-0.135	0.168**
	(0.119)	(0.064)	(0.030)	(0.105)	(0.115)	(0.095)	(0.078)
Dependent Variable							
Excluding countries with extreme gini	0.312**	0.179***	0.064**	0.307***	0.059	0.171**	
coefficients	(0.120)	(0.067)	(0.031)	(0.106)	(0.125)	(0.079)	
Replace with market income gini	0.262**		0.070**	0.197*	0.022	-0.179*	0.147**
coefficients	(0.122)		(0.032)	(0.112)	(0.113)	(0.103)	(0.067)
Independent Variables							
Include all dimensions in the same		0.140**		0.220*		-0.215**	0.209***
regression		(0.067)		(0.116)		(0.099)	(0.079)
Replace the independent variabels	0.245**	0.099*	0.105***	0.281***	0.237*		0.257***
with its lag	(0.108)	(0.058)	(0.034)	(0.081)	(0.138)		(0.089)
Add quadratic independent variables	0.191	0.171***	0.063*	0.265*	-0.059	-0.336**	0.183*
to the regression	(0.133)	(0.064)	(0.037)	(0.155)	(0.183)	(0.136)	(0.097)
	0.147*	0.026	0.014	0.028	0.106	0.158***	-0.019
	(0.074)	(0.028)	(0.009)	(0.088)	(0.084)	(0.059)	(0.046)
Replace de jure globalization with de					0.027**		0.030***
facto globalization					(0.011)		(0.009)
Including/excluding countries							
Combine HIC and UMC	0.346**	0.158*	0.078**	0.443***	-0.079	-0.285**	
	(0.163)	(0.088)	(0.038)	(0.143)	(0.139)	(0.115)	
Combine LIC and LMC	0.154	0.192**			0.311*		
	(0.138)	(0.070)			(0.175)		
Excluding Sub-Saharan African	0.392***	0.189**	0.077**	0.342***	0.040	-0.216*	0.178*
countries	(0.147)	(0.076)	(0.034)	(0.117)	(0.143)	(0.123)	(0.092)
Excluding Latin American and	0.188			0.330**	0.098		0.137**
Caribbean countries	(0.137)			(0.134)	(0.096)		(0.059)
Excluding East Asian and Pacific	0.264**	0.186***	0.065**	0.248**	0.060		0.150*
countries	(0.127)	(0.070)	(0.032)	(0.110)	(0.126)		(0.088)

*Note: The table contains the results for every robustness check described in section 4.2. The table only includes results for overall economic freedom/globalization and its significant dimensions. For the model with quadratic independent variables, the first coefficient displays the standard independent variable, while the latter indicates the result for the quadratic independent variable. The dimensions Area2, Area3 and trade globalization are absent because these are insignificant for every robustness check. Every regression includes the same control variables as before. All models include period dummies. Robust standard errors are in parentheses; *p<0.1, **p<0.05, ***p<0.01*

6 Discussion & conclusion

As described in the introduction, inequality has been increasing in many countries. This thesis researched how liberalization relates to this trend. Explicitly, the central question of this thesis asked to what extent liberalization affects income inequality. Five empirically testable hypotheses were formulated to help answer the central question. The results show that overall changes to economic freedom can significantly affect the income distribution. This result is relatively robust. Concentrating on individual dimensions of economic freedom, three of the five indices drive this result.

The first hypothesis (H1) stated that government intervention can lead to a decrease in within-income inequality. With the significant coefficient presented in section 5.1.1, it becomes clear that large and efficient governments indeed help smooth the income distribution. The results of the robustness tests confirm this. Making modifications to the main regression specification does not bring about significantly different coefficients (see table 9). The conclusion of this thesis regarding the size of government thus agrees with previous literature discussed in section 2.2.1. H1 states that this effect is relatively larger in high-income countries compared to low-income countries. No quantitative evidence was found that supports this statement. This differs when the regression accounts for low-income countries, as well as lower-middle-income countries. In this case, the regression coefficient rises to a significant value of 0.192. Doing the same for high income countries and upper-middle-income countries results in a significant coefficient of 0.158. Contrary to the predictions of H1, a large government appears to promote income equality relatively more in lower income countries compared to countries with a higher income level. Turning to poor African countries – whose governments are more likely to be corrupt – excluding them from the regression appears to be detrimental to the significance. The coefficient itself does increase (from 0.175 to 0.189). Similar to Odedokun and Round (2004), this result supports the notion that a large government is inequality increasing when governments are corrupt.

According to previous literature, the fourth driver of economic freedom – the freedom to trade internationally – is positively associated with within-country income inequality. Looking at the results of the main analysis in combination with the results of the robustness tests, increasing the freedom to trade internationally indeed appears to increase inequality. This effect is more pronounced when the observations of Area4 are lagged by one period (the coefficient almost doubles compared to the main analysis). This means that increasing the freedom to trade internationally has a larger impact on inequality in the future compared to the present. The Stolper-Samuelson theorem as well as the theory regarding offshoring predicts that freedom to trade internationally causes inequality to

increase in developed countries (see section 2.2.4). No evidence was found that supports this expectation when including only high-income countries to the regression. Including upper-middle-income countries to this regression does however result in a significant positive coefficient. This result seems to suggest that expectations of both theories are correct for higher income countries. For lower income countries however, the coefficient never becomes significant.

The final significant driver of economic freedom is regulation. Although theoretically the relationship between income inequality and deregulation is ambiguous (see section 2.2.5), the results from table 4 and table 9 show that this relationship is positive, significant, and robust to minor modifications of the main regression. Remember that deregulation in labour markets promotes income inequality, while deregulation in credit markets decreases inequality. The quantitative results appear to suggest that the effect of labour market regulations is much more severe, compared to credit market deregulation. This effect becomes larger when only accounting for developed countries (see table 5). These results thus support the conclusions of Koeniger et al. (2007) in that the existence of dismissal regulations and minimum wages in advanced economies reduces wage inequality.

The results are less definitive for economic globalization. In the main analysis, economic globalization remains insignificant. This is also true when accounting for different income levels. Bergh and Nilsson (2010) find similar results. Including a time-lag however renders overall economic globalization significant. This result suggests that an increase in economic globalization does not immediately result in a change in within-country income inequality. Disaggregating the components of economic globalization results in other notable findings. It appears that financial globalization increases inequality within countries. This corresponds to the conclusions of existing empirical studies 2.4. This result is robust. Again, financial globalization appears to have a bigger impact on inequality in the future compared to the present. Note that trade globalization remains insignificant in the main analysis. This is paradoxical, because the fourth driver of economic freedom, freedom to trade internationally, is significant. Judging by the variable descriptions in table 1 trade globalization and freedom to trade internationally should be measuring something similar. Looking at table 3 however, it becomes clear that these variables are only weakly correlated. Future research should investigate these differences.

Another limitation of this thesis pertains to endogeneity problems. Firstly, many other control variables exist that should be included in the model. Although the fixed-effects model accounts for time-invariant control variables, this is not true for time-varying control variables. Unfortunately, it is not possible to identify, let alone find data on all these variables. As a result, the findings of this thesis probably suffer from omitted variable bias. Future research should focus on identifying additional time-varying control vari-

ables in order to improve validity. Secondly, problems regarding simultaneous causality and reverse causation could bias the results. This thesis studied whether within-country income inequality, T_{it}, causes economic freedom/globalization, Y_{it}. In reality, it could be possible that Y_{it} (also) causes T_{it}. The conclusions of this thesis would be biased if this were to be true. In section 5.2, one of the robustness tests includes lagged independent variables. This is an informal way to guess the direction of the relationship between Y_{it} and T_{it}. A more formal method to study the relationship between the dependent and the independent variable is to perform a Granger causality test (Granger, 1969). Note, this test does not actually prove causation (Granger, 1969; Justesen, 2008). Performing Granger causality tests only makes it possible to gauge the direction of causality.

Finally, scholars should repeat this analysis when new versions of the datasets become available. This might reduce measurement bias. Hopefully, these updated versions include more observations for low-income countries. The effect of liberalization in low-income countries can then be estimated more properly.

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Appendix

Table 10: Unit root test

Variable	Inv. chi-sq.	Inv. norm.	Inv. logit	Mod. Inv. chi-sq.
Dependent variables				
Disp. income gini	349.902***	-7.274***	-7.576***	10.439***
Mark. income gini	327.768***	-6.298***	-6.412***	9.043***
Independent variables				
Economic freedom				
EFW	402.625***	-11.302***	-11.345***	13.176***
Area1	445.777***	-11.905***	-12.324***	15.559***
Area2	402.160***	-10.971***	-11.012***	13.150***
Area3	400.840***	-11.367***	-11.323***	13.077***
Area4	443.180***	-12.161***	-12.659***	15.415***
Area5	522.243***	-13.806***	-14978***	19.781***
Economic globalization				
KOF de jure	329.195***	-8.388***	-8.279***	9.121***
KOF de facto	405.893***	-10.900***	-11.111***	13.356***
KOF-Trade de jure	330.168***	-7.411***	-7.708***	9.175***
KOF-Trade de facto	510.397***	-13.996***	-14.810***	19.127***
KOF-Financial de jure	427.906***	-11.932***	-12.133***	14.572***
KOF-Financial de facto	383.074***	-10.137***	-10.248***	12.096***
Control variables				
GDP per Capita	244.479***	-4.103***	-4.016***	4.444***
Years of Schooling				
Dependency Ratio	797.455***	-17.384***	-22.319***	34.977***

*Note: The table presents unit-root tests for every variable used in this thesis. The test is called the Fisher-type unit-root test for panel data. This test conducts Augmented Dickey-Fuller tests for each panel individually, and then combines the p-values from these tests to produce an overall test. H0 for the Fisher-type unit-root test is: All panels contain unit roots. Ha for the Fisher-type unit-root test is: At least one panel is stationary. If the coefficients are significant, we can reject the hypothesis that every panel in the dataset contains a unit-root. Every test contains a drift term and a lag of 1 period. *p<0.1, **p<0.05, ***p<0.01*