How do institutional factors affect income inequality?

- An empirical study of 10 OECD countries and 10 developing countries

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Abstract

The purpose of this study is to gain an in-depth understanding of the five institutional factors: democracy, rule of law, freedom to trade, education and corruption, and how they affect income inequality. The analysis covers a total of 20 different countries, 10 OECD countries, and 10 low to medium income countries between the time period of 2000-2017. The study’s dependent variable is the Gini index and the independent variables are different types of measurements for corruption, democracy, rule of law, freedom to trade, and education. Results from the regression analysis have been made in order to get a better understanding in what way these variables affect income inequality. The result of the regression analysis was that four of these five variables had a negative relation with income inequality. With the independent variable “Freedom to trade” stood for the outlying result. Something that is however in line with previous research where the two categories of countries were split into two different regression analyses and showed different results depending on the type of country. We did the same thing and also then we found the same result as the previous research. Our conclusion from this study is that there seems to be a negative connection between income inequality and the five institutional factors.

Keywords: income inequality, rule of law, freedom to trade, democracy, corruption, education, OECD countries, low to medium-income countries.
1. Introduction

A short and brief introduction is given to explain the topic of the essay, followed by the aim of this study, framing of question and method. The last part of the section tells us about the limitations that were part of the study.

The gap between rich and poor can probably be traced back to as far as the stone age in both developed and developing countries. The extent of the increase in income inequality in any country depends on the number of income differences between rich and poor countries. However, in the 20th century, the gap between rich and poor countries has reduced. The government can have an essential role in helping reduce the income inequality through three different strategies: Supporting students from preschool to university with the best education, creating policies that help all people get into the labor force, and finally, taxes and transfers that the government provides to its citizens according to Keeley (2015).

In today’s society, there are many controversies that highlight economic inequality and there are many reasons that make economic inequality interesting. One example is how poverty and unequal living conditions have been increasing in many countries because of the unequal distribution of income (Naschold, 2002). Economic inequality is a global issue that has been discussed by many economists and is presented in a high level of poverty and differences in income distribution, which is why it’s considered to be an interesting topic where it has captured many countries’ economic debate. Economic inequality is important when measuring the distribution of income and investigate the differences in developed and developing countries.

Some researchers like Mankiw (2013) argue that inequality is not a problem and does not increase highly but even if it does it is not considered a problem but instead a natural result in an economy that has different distributions. Also, other researchers like Watson (2015) and Frankfurt (2015) see poverty as a bigger issue than inequality according to Peterson (2017).

Income inequality has risen in OECD countries. The level of inequality has increased highly mostly in Mexico and the USA but also Sweden, which has a low level of inequality, has seen an increase according to Thévenot (2017). In developing countries, a higher level of income
inequality has been shown in countries such as the Philippines, Sri Lanka, and Thailand. The main cause of inequality in the less developed countries goes back to poverty and not only because of the unequal income distribution according to Sundrum (1974).

Economic inequality for the countries in this study can be observed in Figure 1 below, where the Gini coefficient has been used as a measurement to compare income distribution between different countries. The two lines binding the staples together also shows the average Gini Coefficient for each country, the first one showing the OECD countries and the second one showing the non-OECD countries. This is to make the difference between the two groups clearer.

![Average Gini Coefficient per country during period 2000-2017](image)

*Figure 1, Average Gini Coefficient per country. Source: World Bank*

As mentioned, we can here see 20 different countries in which the first 10 countries are OECD countries and the last 10 countries are low to medium income countries, where Rwanda and Mozambique have the highest level of income inequality. We believe that this can be explained by some institutional factors in different countries and in this case the
factors can be trade openness, rule of law, democracy, corruption, and education. Because we believe that institutional factors have a role in affecting income inequality it makes us ask this research question “What are the institutional factors that affect economic inequality?”. We are going to examine the economic inequality in 10 OECD countries and 10 low to medium income countries to see the difference. But first, we are going to look at different institutional factors to see how they contribute to today’s level of inequality and to see how much they affect economic inequality.

1.1 Aim of this study
The aim of this essay is to examine the effect of institutional factors on income inequality. Our goal is to investigate the income inequality in different countries around the world and see if the institutional factors can impact income inequality. The factors we focus on mainly are the rule of law, democracy, trade openness, corruption, and education. Accordingly, this study allows, for the interested reader, an entrance to understand how the institutional factors affect income inequality in different countries both in developed and developing countries.

1.2 Framing of question
-How do institutional factors affect income inequality?

1.3 Method
A quantitative method was chosen for this essay. With previous research, we establish that rule of law, democracy, freedom to trade, education and corruption have different effects on income inequality. We then analyzed the panel data across 20 countries (10 OECD countries and 10 low to medium developed countries) using multiple linear regression during the time period 2000-2017.
1.4 Limitations

Our purpose is to study income inequality, emphasizing the role of institutional factors in decreasing this. Thus, we have the 10 OECD countries and 10 low to medium income countries listed in Table 1 below. In addition, we will study one country in more depth to clarify some of our findings.

<table>
<thead>
<tr>
<th>OECD-countries</th>
<th>OECD-countries</th>
<th>Developing countries</th>
<th>Developing countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxembourg</td>
<td>Ireland</td>
<td>Mozambique</td>
<td>Gambia</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Norway</td>
<td>Madagascar</td>
<td>Sierra Leone</td>
</tr>
<tr>
<td>USA</td>
<td>Netherlands</td>
<td>Uganda</td>
<td>Liberia</td>
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<tr>
<td>Denmark</td>
<td>Austria</td>
<td>Ethiopia</td>
<td>Rwanda</td>
</tr>
<tr>
<td>Iceland</td>
<td>Germany</td>
<td>Tanzania</td>
<td>Pakistan</td>
</tr>
</tbody>
</table>

*Table 1, Countries studied*

We then chose the time period 2000-2017 due to the availability of the data for the variables and all countries. Especially for the less developed countries there where some trouble finding data for the entire period, which is why we did not just take the 10 countries with the lowest GDP per capita, instead we took 10 countries out of the 25 countries with the lowest GDP per capita according to the World Bank to represent the developing countries.
2. Previous research

According to Landes (1990), countries are divided into rich and poor due to various reasons. He claims that rich countries are better because they are industrious, well-informed, beneficial, and productive while the poor countries are inactive, weak, and unproductive. Another description could be according to Landes (1990) that the rich countries are rich because they are bad in a way that they are greedy, combative, aggressive and inaccurate while the poor are poor because they are good in a way that they are pure, weak, virtuous and exposed. Landes (1990) concludes that it is unclear which of the two reasons that explain the inequalities between rich and poor countries are better than the other and in case one reason is better it does not eliminate the other.

Barro (2000) concludes that the effect on growth caused by differences in inequality depends on the state of economic development. Income inequality in poor countries inhibits economic growth, while inequality in rich countries encourages economic growth. He shows that the effect of income inequality on economic growth is negative in countries with GDP per capita below 2070 dollars and that it is positive in countries with GDP per capita is above 2070 dollars.

The explanation for the positive relationship between inequality and growth seems to be that, in developed countries, the saving rate of rich people is higher than that of the poor. In the event of income redistribution from rich to poor people, the saving rate of the economy would decrease, which could lead to a decline in economic growth. Another possible explanation mentioned by Barro is that income redistribution could lower the incentives for the rich to work hard, which could also lead to an economic growth decline (Barro, 2000). This leads us to infer that income equality makes economic growth lower and income inequality makes it higher.

On the other hand, the negative relationship between income inequality and economic growth could be explained as follows. In developing countries, the poor tend to be under heavy credit constraints. Therefore, they do not really have the opportunity of investing or even participate in any product activity at all. Barro goes on to say that inequality might also lead to political and social instability, which in turn leads to economic growth decline. As opposed to the positive relationship, this results in us to assume that income inequality
makes economic growth lower and income equality makes it higher (Barro, 2000). This means that there is an inverse relationship between income inequality and economic growth.

Ullah & Ahmad (2016) study the link between corruption and inequality. The conclusion they came to where that corruption as an institutional factor increases income inequality. In this study, it is showed that as corruption increases it affects the income share negatively. There is causality that shows that a high level of income inequality leads to a high level of corruption. Low level of asset distribution makes corruption have less increase in income inequality and in turn, leads to good growth. Ullah & Ahmad (2016) conclude that there is a negative relationship between corruption and income equality and that corruption has various negative effects on income distribution and in that way also affects the growth negatively.

Nassereddine (2012) studies the relationship between democracy and income inequality. He concludes that democracy has a negative effect on income inequality. He took data for 83 countries for the years 1975-1995 from Estimated Household Income Inequality (EHII). When economic freedom is added to the study three different results are achieved. The first result he came to where countries with no trading activity with outside economics do not have an important relation with democracy's effect on income inequality. The second result was that there is a negative effect of democracy on income inequality only on a market-oriented economy country and finally he obtained that these countries are developing countries.

Uslaner (2010) studies the link between the corruption perception index (CPI) and income inequality on cross-national data. He found that countries like Latin America and Africa have an increased level of corruption and in return increase income inequality. He argues that high corruption boosts income inequality and inequality affects corruption through social trust.

Ahmad (2017) searches for what kind of relationship that exists between the legal system and inequality. The legal system considers to be an institutional factor that protects property rights with the help of rule of law and in return, this protection leads to a gap between rich and poor people. He concludes that as the value of protection of property rights increases the income inequality increases and thus a positive relationship between the two variables.
Polpibulayas (2015) article “Trade openness and Income Inequality” uses a panel technique to study the relationship between trade openness and income inequality in developed and developing countries during the period 1960-2005. By using the OLS regression, she concluded that as trade openness increases it increases the income inequality but if the regression is separated into developed and developing countries the results show that as trade openness increases it increases the income inequality in developing countries while decreases income inequality in developed countries. Developed countries are typically more open to trade since they have good and skilled laborers, a good state that leads to better trade policy and has a lower cost of trade in terms of exporting goods and import goods that are not expensive. While in developing countries due to low capacity for producing goods the demand for inexperienced labor leads to an increase in income for unskilled labor.

Lee and De Gregorio (2002) studies the link between educational level and income inequality in panel data between the period 1960-1990 on a cross-country data set. A given distribution of education has an unclear impact on income distribution where income distribution is attached to populations average schooling. They claim that an increase in schooling will reduce income inequality and as education develops it will lead to more unequal income distribution. Individuals that have a high level of education have the chance to earn more income than those with a low level of education. They conclude that as more people get educated, income inequality will decrease.
3. Theory

3.1 Institutional theory

Institutions are regularities in repetitive interactions among individuals. North (1991) describes institutions as “humanly devised constraints that structure political, economic and social interactions”. They provide a framework within which people have some confidence as to how outcomes will be determined. Institutions are not persons; they are customs and rules that provide a set of incentives and disincentives for individuals. He goes on to say that they arise and evolve because of the interaction of individuals, which implies that institutions are endogenous with direct relation to social choices and the evolution of man's knowledge. The basic source of institutional evolution is the growing specialization and division of labor in a society, according to North (1986). Since the interaction of individuals involves transaction costs, this approach is distinguished from the general equilibrium framework of neoclassical economics. In that framework, there are no costs of transacting and hence no institutions. In the real world, however, transaction costs are a large and growing share of gross national product (North, 1986).

Institutions are an important factor when it comes to changes in the economy and affects investments in both physical capital and human capital by two types of institutions, formal and informal. The informal such as norms and conventions, while the formal is mostly state rules. Vitola and Senfelde (2015) divide institutions into three different groups: Economic institutions, political institutions, and value institutions. Economic institutions influence the incitements for investments in physical and human capital. Economic institutions are characterized by the extent of the rule of law and the quality of the regulatory framework. Also, by the level of corruption since it distorts the operation of markets by limiting fair competitiveness. The rule of law is a type of formal institution whereas corruption is an informal institution in the form of norms (Vitola & Senfelde, 2015).

When learning about economics you very often come across a couple of assumptions on how the markets work, no entry barriers, or political connections that help you have a monopoly in any industry for example. Acemoglu and Robinson (2015) say that most of these assumptions rest on very specific types of institutions. Such as legal systems that will enforce contracts, patents, and intellectual property rights that will make it worthwhile for
innovators to innovate. Also, the educational system, a state that provides roads to enable people to take part in economic activities. All such institutions are called “inclusive” economic institutions by Acemoglu and Robinson. Meaning that these kinds of institutions provide secure property rights and such things in a way that is inclusive, or broad-based. However, Acemoglu and Robinson claim that this is not always the case. They say that the direct opposite can be seen in some societies today and that it is not there by mistake. More so that those societies are created in a way that is unequal so that the elite and politically powerful actors in the society are benefiting from it. The kind of institutions in societies like these is what they call “extractive” institutions.

Acemoglu and Robinson (2015) say that both types of societies can reach economic growth. They say that “the claim is that inclusive economic growth, which tends to be the more sustained type of economic growth, is possible under inclusive institutions.”. But economic growth can also be reached under extractive institutions, only it is not going to be long-lasting according to them. So, the take away from Acemoglu and Robinson is that it seems to be best to strive for inclusive institutions to hold up society, at least in the long run. This further means that a society with good inclusive institutions to give everyone incentives to participate in economic activities seems to be the best alternative. As opposed to extractive institutions that will only benefit the elite and powerful actors.

A well-working institution results in maintained ownership, increased respect for contracts, and fewer insecurities between buyers and sellers. The factors that are usually claimed to be responsible for growth such as innovation, education, and capital accumulation are the only representative of growth. Economic and political institutions are the main reason for growth and why economies are developed at different rates (North, 1989).

According to North (1992) institutions are key in the determination of transaction costs. In this sense, institutions that facilitate low transactions costs, boost economic growth. North states that there are four factors that comprise transaction costs. The first being “measurement” which is the cost of measuring the valuable attributes of the goods and services or the performance of agents in exchange that is the fundamental key to the cost of transacting. The second variable is “market size” which affects the partiality or impartiality of transactions. The third variable, “enforcement”, can be defined as the need for an unbiased third party to ensure that neither party involved in the transaction reneges on their part of
the deal. “Ideological attitudes and perceptions” are the last variable and encapsulates each individual's set of values, which influences their interpretation of the world (North, 1992).

Coase (1998) describes transaction costs as the cost of using the price mechanism. He says: “In order to carry out a market transaction, it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up a contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on.” Coase’s assumption is that transactions take place in the market at the lowest cost possible. Claiming that the price mechanism helps to allocate resources efficiently, however, this mechanism is affected by transaction costs (Coase, 1998).

According to Williamson (1995), the most important economic institutions are the presence and perfection of markets and the structure of property rights. Property rights are an important institution, a part of the rule of law, and provide incentives for investment in human and physical capital. And the market which acts as a decentralized organization ensures efficient allocation of resources, high-powered incentives, and outstanding adaptability (Williamson, 1995). Without the presence of property rights, there would be almost no incentives at all for investments in physical capital. Without rights to back it up, why would you buy something if you were unsure whether you could keep it or not?

Vitola & Senfelde (2015) is of the view that political institutions should strive for political stability in order to encourage investment while at the same time have a decent level of political competitiveness. They claim that a decent level of political competitiveness is not only beneficial for the political elite but also for the majority of society. The most important political institutions are the form of government and the restrictions aimed at politicians. It is also important that bureaucracies are politically independent and professional. Since job security and a need for a reputation makes the differences between bureaucracies and politicians, this makes bureaucracies more long-run-productivity oriented than politicians (Vitola & Senfelde, 2015).

The values of society have a great impact on the use of production resources. This because of the high trust that promotes the sharing of knowledge and other resources, which encourages innovation and decreases production costs. It has been proven that innovative
businesses are active in cooperation and sharing information (Vitola & Senfelde, 2015). They also claim that higher initiative in society creates a high social and economic activity, leading to higher rates of employment, non-governmental activity, and entrepreneurship. Individualism is another aspect that paves the way for rational behavior and innovation, by decreasing the need to conform to common rules and norms in society (Vitola & Senfelde, 2015).

3.2 Institutional growth theory

In national economics, institutions are explained as the rules and norms that rule society. According to the theory, growth cannot be caused only by the level of education. The technological development is the factor that impacts growth, just like in the endogenous growth model. But the country needs to be able to use the new technology in order to gain any growth from it. Therefore, human capital and physical capital are needed. In the long term, these investments require a good social infrastructure, which is built by the rules and institutions that rule society (Fregert och Jonung 2018). The theory basically means that if you were to observe a country with bad social infrastructure, it will also be a poor country in most cases.

According to Ostrom and Ahn (2002), social capital is needed to be able to gain the maximum amount of output from both physical and human capital. Social capital can be described as institutions and culture and their value as a form of production factors. They consider “social capital to encompass the concepts of trust, norms of reciprocity, networks of civic engagement, rules, and laws. All affect the expectations that individuals have about patterns of interactions that a group of individuals brings to a recurrent activity.” One example that they use to show why social capital is important for modern economies is when it comes to technological innovation. Innovation depends highly on successful research and development, which requires coordinated efforts among scientists and engineers inside a research unit. Ostrom and Ahn say that these coordinated efforts require networks that are a form of social capital. Rules and institutions are also considered as forms of social capital by Ostrom and Ahn (2002), with the main ability to create incentives for parties of transactions to behave trustworthy, as a result, leads to decreased transaction costs. Meaning that the parties in a transaction know that the deal will be kept by both
sides, and therefore makes the transaction easier. A rule of law, a democratic atmosphere, and a well-structured government are valuable social capital for any society (Ostrom & Ahn, 2002).

3.3 Distribution theory

“Justice is the first virtue of social institutions, as truth is of systems of thought.” (Rawls, 1999). It stands clear after that statement that Rawls finds justice as a very important element, even so, that he says that laws and institutions that are unjust must be reformed. No matter how efficient and well-arranged they are. Social institutions and the way they distribute basic rights and duties is the primary subject of justice. Rawls (1999) also takes up a couple of institutions that are more important than others for the sake of justice. These are the legal protection of freedom of thought and liberty of conscience, competitive markets, and private property in the means of production.

The main thought of Rawls’s theory on the distribution of goods in society is first that society should be structured so that the greatest possible level of liberty is achieved for the members. The second one is that inequalities, be it social or economic, are only allowed in one situation. That being when the people who are worst of will be better off than they might be under equal distribution. Also, if this inequality were to exist, it should not make it harder for people without resources to reach positions of power, public office for example (Rawls, 1999).

Capitalism is a well-known economic model and according to Sharpes (2015), there is a strong relationship between capitalism, income inequality, and education. He looks at education in the USA and says that the number of potential students in colleges and universities has decreased as a result of the taxes being reduced because of capitalism. Since the colleges and universities budget has therefore been restrained. Sharpes claims that the spread between rich and poor and rich and the middle classes have increased when it comes to education. Pointing to family income as an important factor for children to be able to get a good education. Sharpes mentioned Goldin and Katz (2010), and their research regarding the subject. They found that wage inequality in the U.S. was a direct result of the failure to invest in higher education (Sharpes, 2015). So, in theory, there seems to be a strong relationship between the level of education and income inequality.
4. Institutional factors

4.1 Rule of law
According to Acemoglu & Wolitzky (2020), the concept of equality before the law means that law should be applied evenly to all the citizens and this conception is also connected to rule of law that is seen as the fair and legal system. When looking at the elite domination, inequality between normal agents and elites occurs because of the threat punishment that comes if they don’t follow the rules which make the normal agents work stronger and harder than elites. Laws that are applied unequally and unequal norms are results of inequality and non-elite agents get hardly punished and are forced to work in case of not making enough effort. From the elites’ point of view, equality before the law must be formed and all types of agents must be concerned with the same punishment and must be treated equally. The advantage of equality before the law is that it cooperates with low-income inequality and increases the normal agent effort.

4.2 Democracy
According to Acemoglu and Robinson (2001), in democratic countries, the poor group imposes high taxation while the non-democratic countries are controlled by the rich group. In order to hinder the revolution that the poor will make, the rich will be obliged to do a commitment to the poor in the form of income redistribution. As inequality increases, the taxes will in return increase also, resulting in a highly unequal country that is likely not to be stable in democracy. People's choice in society is realized only by monetary redistribution from the rich country. Acemoglu and Robinson (2001) use a basic model that says if the political system is a type of non-democratic country then the rich group control the taxes and rule over the poor group in which they take what is offered to them by the rich group or choose to move up to a revolution against the ruled group that can cost them.

4.3 Corruption
Gupta & Davoodi & Alonse-Terme (1998) investigated the impact of corruption on income inequality through different channels like biased taxed system, asset ownership, and human capital formation and find out that there is a positive relationship between corruption and income inequality. Furthermore, when corruption affects income inequality through a biased
taxed system, it could lead to poor tax administration and in return result in high-income inequality. However, the asset is controlled by a small elite group where they can benefit from the resources and pressure on the state for doing the trade policies which leads to high-income inequality between the rich and poor group. Corruption also affects the poor through social programs. When the economy is corrupted and the government use collected programs to make good relations with the rich group, it will obviously reduce income distribution.

4.4 Trade openness
According to Aradhyula, Rahman & Seenivasan (2017) trade openness impact on income inequality became a talking point among policymakers and been the focus of international economics. However the trade openness outcomes to good quality products which lead to economic development and reduced poverty at the same time. Ravallion (2004) claims that trade affects economic development not income inequality and that trade openness can have a negative effect on poor people if the benefit goes to rich people according to Aradhyula, Rahman & Seenivasan (2017). Anderson (2005) explains that trade openness impacts income inequality as well as income distribution. He further claims that most studies show that larger trade openness does not affect much income inequality but only impacts skilled labor in a positive way according to Aradhyula, Rahman & Seenivasan (2017).

4.5 Education
Sylwester (2003) argues that there are different levels of education, for example, high-level education that has an impact on income inequality. Chiswick & Chiswick (1987) describe the relationship between high education and income inequality and concluded that a big share of high-level education increases income inequality but increasing the registration in high levels of education can decrease income inequality according to Sylwester (2003). Jimenez (1986) holds up for both primary and secondary school to achieve less changed income distribution and suggests that reinforcing high levels of education can lead to increased income inequality according to Sylwester (2003).
5. Method

5.1 Regression model

This part represents a multiple linear regression model with which we examine the relationship between income inequality and a couple of variables obtained from the theories and previous studies to represent institutional factors.

Corruption perception index is relevant to measure norms and corruption is considered as an informal institution according to Vitola & Senfelde (2015). Rule of law represents the legal system and property rights and is therefore a type of formal institution (Vitola & Senfelde, 2015).

\[ \text{GINI Coefficient} = \beta_0 + \beta_1 \text{CPI}_{it} + \beta_2 \text{DEMO}_{it} + \beta_3 \text{RULE}_{it} + \beta_4 \text{FREE}_{it} + \beta_5 \text{EDU}_{it} \]

5.2 Data

The data consists of panel data of 20 countries, 10 OECD countries classified by OECD economic outlook, and 10 low to medium income countries classified by GDP per capita. The countries are studied over a time period of 2000-2017. We chose this time period due to the availability of data.
5.3 Choice of variables

The variables used in the analysis are seen in the following table. The table presents the variables symbol for the regression model, their full names, years, which unit, and the source variable taken from. After that, a description of all the variables is going to represent.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Variable</th>
<th>Year</th>
<th>Unit</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Gini Coefficient</td>
<td>2000–2017</td>
<td>Score 0-100 where 0 is most equal</td>
<td>World Bank</td>
</tr>
<tr>
<td>ß1</td>
<td>CPI</td>
<td>2000–2017</td>
<td>Scale 0-100 where 100 is least corrupt</td>
<td>Transparency International</td>
</tr>
<tr>
<td>ß2</td>
<td>Democracy</td>
<td>2000–2017</td>
<td>Score (-10)-10</td>
<td>Center for Systematic Peace</td>
</tr>
<tr>
<td>ß3</td>
<td>Rule of Law</td>
<td>2000–2017</td>
<td>Score 0–10 where 10 is best</td>
<td>Fraser Institute</td>
</tr>
<tr>
<td>ß4</td>
<td>Freedom to Trade</td>
<td>2000–2017</td>
<td>0-10 where 10 is best</td>
<td>Fraser Institute</td>
</tr>
<tr>
<td>ß5</td>
<td>Education</td>
<td>2000–2017</td>
<td>0-100 where 100 is best</td>
<td>World Bank</td>
</tr>
</tbody>
</table>

Table 2. Variables studied
5.4 Dependent variable

Gini Coefficient

Gini coefficient is the dependent variable in this study, it measures the income inequality in different countries and is used to indicate whether the country has a more equal income or unequal income.

5.5 Independent variables

Corruption Perception Index

In order to measure and analyze the corruption perception index, we use the index from Transparency International which measures the level of corruption and records data (Christos et al, 2018). Corruption-related data are composed of a group of independent and known institutions (Saisana & Saltelli, 2012). According to Transparency International, there is a scale between 0 and 100 where 0 indicates that the country is highly corrupted and 100 indicates that there is no corruption and the country is clean.

Rule of law

Rule of law comprises of a number of formal principles and institutions, mainly legal system and property rights. This variable is based on the institutional theory and institutional growth theory. Rule of law as an independent variable that is a component in measuring economic freedom and taken from the economic freedom index, Fraser Institute.

Freedom to trade internationally

The measure of trade openness in this study is freedom to trade internationally taken from the economic freedom index, Fraser Institute. According to previous research by Polpibulaya (2015) where she studied 86 countries during the period 1960-2005, concluded that trade openness increases income inequality.

Democracy

This variable is quantified on a polity score that ranges from -10 to +10 and measured by Policy IV. It contains coded annual information on the level of democracy for independent states that have more than 500,000 population and based on state elections for openness to trade. With previous research according to Nassredine (2012), democracy shows a negative effect on income inequality.
**Education**

The Education-variable is collected from the World Bank and represents the total percentage in each country that has at least completed upper secondary school. There is research that points to education being a big reason for income inequality, for example, the article written by Sharpes (2015). We expect this variable to show a negative impact on income inequality.

**5.6 Multicollinearity**

When doing the regressions, we also controlled the variables for multicollinearity. It is measured between -1 and 1 where 0 means that the variables do not correlate at all. According to Studenmund (2017), a value above 0.8 is a problem and means that multicollinearity is very likely. Multicollinearity makes it hard to separate which variable is responsible for which effect.

Table 3 shows the result of the multicollinearity test. In this study, there are some signs of multicollinearity between some of the variables. Education seems to be correlating with the level of democracy to a high degree and the correlation with CPI is in the edge to that 0.8 mark.

<table>
<thead>
<tr>
<th></th>
<th>Gini</th>
<th>CPI</th>
<th>Democracy</th>
<th>Rule of Law</th>
<th>Freedom to trade</th>
<th>Education</th>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Democracy</td>
<td>-0.6228</td>
<td>0.5985</td>
<td>1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule of Law</td>
<td>-0.6491</td>
<td>0.7242</td>
<td>0.4938</td>
<td>1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedom to trade</td>
<td>-0.4020</td>
<td>0.7431</td>
<td>0.5882</td>
<td>0.7465</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>-0.2698</td>
<td>0.7992</td>
<td>0.8847</td>
<td>0.7284</td>
<td>0.6742</td>
<td>1,000</td>
</tr>
</tbody>
</table>

*Table 3: Correlation chart.*
6. Results

6.1 Regression analysis

In the following table, we present the results from the regression analysis made on all 20 countries followed by a brief explanation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini Coefficient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>36,9978</td>
<td>2,2210</td>
<td>0,000   ***</td>
</tr>
<tr>
<td>CPI</td>
<td>-0,7271</td>
<td>0,2969</td>
<td>0,0148  **</td>
</tr>
<tr>
<td>Democracy</td>
<td>-0,0281</td>
<td>0,0262</td>
<td>0,2837</td>
</tr>
<tr>
<td>Rule of Law</td>
<td>-0,9857</td>
<td>0,3608</td>
<td>0,0066  ***</td>
</tr>
<tr>
<td>Freedom to Trade</td>
<td>1,5540</td>
<td>0,3547</td>
<td>0,000   ***</td>
</tr>
<tr>
<td>Education</td>
<td>-0,0599</td>
<td>0,0213</td>
<td>0,0052  ***</td>
</tr>
<tr>
<td>Number of observations</td>
<td>360</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0,4650</td>
<td>0,4650</td>
<td>0,4650</td>
</tr>
</tbody>
</table>

Level of significance: *** <0,01, ** <0,05, *<0,1.

Table 4: Results from model 1

We can see that all the independent variables except the Freedom to Trade, has a negative impact on income inequality. With Rule of Law posting the lowest numbers. This would mean that a better functioning legal system and well-structured property rights lead to
lower income-inequality and therefore lowering the income gap between people. The same thing goes for the level of democracy and education, the higher the better for income equality. The variable for corruption, CPI, shows that a higher score in the index leads to lower income inequality. This is true because CPI is rated from 0-10, where 10 is the lowest level of perceived corruption.

The only variable that shows a positive relationship with income inequality is as mentioned the Freedom to Trade. This would mean that as the freedom to trade internationally between countries increases the level of income inequality does so as well.

All independent variables show a statistical level of significance of at least 95% except for Democracy that has a P-value of 0.2837.
7. Discussion

7.1 Regression analysis

First of all, we can confirm that CPI is statistically significant according to the P-value <0.05. The coefficient is negative which means that CPI has a negative impact on income inequality. CPI as mentioned before measures the perceived level of corruption, the higher the less corrupt. Gini coefficient measures income inequality, where higher is more unequal. That means that this result shows that a decrease in corruption will lead to a decrease in income inequality. This result is not especially surprising when looking at the earlier research made on the subject. Ullah and Ahmad (2016) performed a study on the relationship between these two variables and came to the same conclusion. That there was a negative relationship between corruption and income equality and that corruption has negative effects on asset distribution and in that way also affects the growth negatively.

The variable for Democracy shows a negative relationship with the level of income inequality as well. However, this was the only independent variable that did not show statistical significance. Even though that is the case we are not willing to ignore the result since we have found some supporting research done by Nassereddine (2012). To conclude the research Nassereddine found that democracy has a negative effect on income inequality. Which is the same result that we came to during this study. Vitola & Senfelde (2015) also pointed out that political institutions are of big importance, especially that a decent level of political competitiveness is beneficial for the majority of society. They do not specifically talk about income inequality in relation to political stability, but we would like to think that they somewhat relate to each other. Meaning that we believe that there is support for a high level of democracy to affect income equality in a positive way. There is also an argument for democracy to increase the level of economic growth in a country in terms of being important social capital (Ostrom & Ahn, 2002). This because social capital is needed to be able to gain the maximum amount of output from both physical and human capital. Ostrom & Ahn also mentioned the next variable as being valuable social capital.

That variable is the Rule of Law. Which shows a negative correlation with the dependent variable. Meaning that an increased rule of law-score seems to lead to increased equality.
The P-value is under 0.1 which tells us that this result is of statistical significance. Rule of Law is a measurement for legal systems and property rights. Property rights are as mentioned earlier, an important part of investments in human and physical capital (Williamson, 1995). Without reliable property rights, there are no incentives at all for people to participate in a transaction between one another. The legal system in combination with property rights does not only work as an institution that facilitates low transaction costs but also to give people fewer insecurities when it comes to contract involvement (North, 1989, 1992). These are factors that we think would contribute to increased income equality in the sense that more people have the incentives to work and trade products and services with each other. The result could also be the opposite because more people have the incentives to work harder and maybe, therefore, increase their income above the average level.

The fourth variable used in the regression is the Freedom to Trade Internationally. This is a measurement of economic freedom by the Fraser Institute and measures how free a country is to trade with other countries across the border. This where the only variable used that showed a positive relation to income inequality in our study. The level of significance was the highest possible giving it a three-star rating. The result tells us that an increased level of international trading leads to increased income inequality, which is somewhat surprising at first. When coming back to Polpibulaya’s (2015) article about trade openness we realize that the result is not quite so surprising after all. She found that using an OLS regression (just as we did) in developed and developing countries the result was the same. That increased trade openness led to increased income inequality. However, when she divided the regression into only developed and only developing countries separately the result differed. Showing that developed countries had a decrease in income inequality as a result of the opened trade, and vice versa. Therefore we conducted another regression analysis showed in the table below to follow up on this result and to see if we could replicate Polpibulaya’s result when splitting up the regression analysis into two groups of countries.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Developed Countries</th>
<th>Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>32,0809</td>
<td>22,7018</td>
</tr>
<tr>
<td>Freedom to Trade</td>
<td>-0.1446</td>
<td>2.7837</td>
</tr>
<tr>
<td>Number of observations</td>
<td>180</td>
<td>180</td>
</tr>
</tbody>
</table>

Table 5: Results from Freedom to Trade regression when divided into two groups.

As we can see, we found our result when dividing the regression into two groups to be the same as that of Polpibulaya’s. That an increase in trade openness points to a decrease in income inequality in developed countries and an increase in developing countries.

Last but not least is the Education variable that showed a negative impact on income inequality. Also, this variable showed a strong level of significance with its P-value well under 0.01. Education in this regression was a variable used to show the percentage of people to at least complete upper secondary school, being gymnasium in Sweden. Something we consider to be a good measurement of the level of education in a country. The result is in line with the theory about capitalism by Sharpes (2015) where he talks about a study made by Goldin and Katz (2010). The mentioned study showed that wage inequality in the U.S. was a direct result of the failure to invest in higher education. The result of that failure is that children with rich parents can afford to go to college and universities to a much higher degree than the middle class and lower-class children. Making inequality even bigger since we assume that higher education usually leads to a higher income and the spiral has begun. Sharpes (2015) also mentioned that highly educated and skilled workers have bigger freedom and will often move to where the higher-paying jobs are, while most lower and middle-class workers often cannot relocate to where the jobs are at the same rate.
7.3 Income inequality and corruption in Rwanda

As we could see in Figure 1, in the beginning, Rwanda was one of two countries with the highest level of income inequality. When diving a bit deeper into the data collected on Rwanda and especially the data regarding the level of perceived corruption, it is a bit interesting to see that Rwanda actually is the country out of the non-OECD countries with the lowest amount of perceived corruption. This can be observed below.

![Average Gini Coefficient and CPI for the non-OECD countries over period 2000-2017](image)

*Figure 2, Average Gini Coefficient and CPI for the chosen developing countries. Source: World Bank & Transparency International*

Rwanda's average CPI score is 3.92 while the second-highest score for the developing countries was shared between Tanzania and Ethiopia with a score of 2.93. Considering what we found during our regression analysis and the previous research done on the subject by Ullah & Ahmad (2016) and also by Uslaner (2010), we find this rather surprising since their conclusion was that corruption increases income inequality.

The result of our regression analysis showed as mentioned that corruption seems to increase income inequality, just as expected. But what about the odd data seen from Rwanda regarding this relationship? In order to see the relationship more clearly, we need to look at
the data from the entire period (2000-2017) and not just the average as we did in the chart above. We then see that the relationship is the same as it was in the regression model using all 20 countries.

![Gini Coefficient and CPI in Rwanda over period 2000-2017](Image)

*Figure 3, Gini Coefficient and CPI in Rwanda. Source: World Bank & Transparency International*

The value for CPI has been modified to 0-100 instead of 0-10 to make the relationship in the chart clearer. When then see that after the year 2006, when the inequality was at its highest and CPI at its lowest, the level of corruption decreased rapidly during the next 7 years. At the same time, the level of income inequality in Rwanda decreased every year. The big change in CPI during the period will affect the average CPI so that partly explains the high average CPI for Rwanda. But still, during the years leading up to the start of that climb, the CPI value was higher most years than the average for all the other non-OECD countries in the study. The average CPI for all these countries was 2,83 or, 28,3 to easier relate to the chart above. This shows that even though these variables show a clear relationship, it does not mean that a low level of corruption in a country necessarily means a low income-inequality in every case. For this particular case, the fact that the year 2000 is only 6 years after the genocide and the same year that their current president, Paul Kagame, was elected is probably a huge factor (Landguiden, 2020). This just goes to show that these variables alone do not always show the entire explanation and that there is a difference between correlation and causality.
8. Conclusion

We used a multiple linear regression model using 1 dependent and 5 independent variables in order to see how institutions can affect income inequality in the world. In order to get as close to the truth as possible, we used 10 OECD countries and 10 poor countries measured in GDP per capita. These 20 countries in combination with the period of the year 2000-2017 gave us 360 observations in our regression model. We used the Gini coefficient to measure income inequality and 5 other variables to represent different institutions and institutional factors in society.

The conclusions we came to was that a higher level of corruption, ineffective legal systems and property rights, a lower level of democracy and a lower level of education all caused the level of income inequality to increase. All these variables gave us the result that we were expecting in terms of the previous research and theories used in the study. For example, the study made by Nassereddine (2012), which also showed that the level of democracy had a negative effect on income inequality. The only result that raised an eyebrow was that the level of freedom to trade internationally increased income inequality in our regression model. But also, this result found support in previous research made by Polpibulaya (2015). That study showed that the result of trade openness was different depending on which countries were studied. When using both developing and developed countries in the model Polpibulaya found that increased freedom to trade caused income inequality to increase as well. So, also this result is expected when having that in mind.

In short, our research shows that more effective institutions seem to decrease the level of income inequality in society. Even though our result is in line with previous research, it seems clear that the result varies from country to country. Especially between countries in different stages of development, as we mentioned concerning Rwanda. It is also unclear if the variables we used is the best representation for different institutions in society. Even though these variables are widely used in studies on the same subject, institutions are not as straightforward to measure as it is for economic growth for example. Therefore, we think that the result in future studies is not unlikely to differ from ours.
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