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на тему: " **ВПЛИВ ФІНАНСОВИХ ТА НЕФІНАНСОВИХ ЧИННИКІВ НА ДОХОДИ НАСЕЛЕННЯ В РІЗНИХ КРАЇНАХ (В Т.Ч. В УМОВАХ КРИЗИ-ПАНДЕМІЇ КОВІД-2019)**"

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INTRODUCTION

Fair income distribution among the population has always been a problem in both developed and developing countries. 1% of the world's population gets 24% of total income, which creates a lack of equality and deteriorates poverty. During the Covid-19 rich people have become richer, while poor - poorer. That is why it is essential to address the problem and define the main significant factors that are influencing existing income distribution.

The relevance

A lot of foreign and Ukrainian economists were making contributions to the factors of income distribution topics. T. Piketty, J. Stiglitz, S.N. Kaplan, S. Kuznets, C. Gini, E. Saez, F. Solt, L.S. Temkin, F.A.Cowell in their researches were discussing theories of sources of income inequality, measurement of the unfair income distribution, and redistribution instruments. As the pandemic is a recent event, there are not many papers on this topic. However, due to the Covid-19 events, the income inequality increased, so it is substantial to research this problem and suggest potential solutions.

The purpose of this research is to model and estimate the effect and direction of the influence of financial and non-financial factors on the income of the population in different countries over time including the period during the pandemic Covid-19.

The tasks for achieving the goal are the following:

1. Analysis of modern measurement instruments of fair income distribution;

2. Review and process available empirical data for conducting statistical research;

3. Analysis of economic development in dynamics based on statistical indicators;

4.   Making a multifactor regression model for the U.S. and Ukraine to confirm or reject the hypotheses regarding inequality factors and their change as a result of the COVID-19 pandemic;

5.   Based on the study, identify existing barriers to the effective use of existing instruments;

6.   Propose practical recommendations for improving the effectiveness of the redistribution mechanisms to achieve income equality.

The object of the study is the factors that contribute to inequality among populations around the world.

The subject of the study is an assessment of the effects of financial and non-financial factors on income in different countries.

In this paper, I will use different **research methods:** descriptive, correlational, and experimental. I will first describe what each method entails and how it can be used to study the research question. Then, I will explain how I will use each method in my paper. In addition, this study includes econometrical methods to identify relationships between variables, test hypotheses, and make predictions. Examples of econometrical methods that are used in this study are regression analysis, time-series analysis, and panel data.

The scientific novelty of the research results is a contribution to the existing theoretical and practical principles by combining data on income inequality among populations that refers to both periods before and after the Covid-19 pandemic.

The practical meaning is that the research results obtained through the modelling of the income distribution factors can be used for the implementation of the new policy. This can be done by local governments or by international organisations, such as the United Nations, which focus on finding solutions through their Framework for Action of Equality.

The thesis consists of the following sections: introduction, theoretical part, analytical research part, part with the project and recommendations, conclusion,

references and appendix. In the theoretical part, the main characteristics are given to the income inequality factors. In addition, in the same section, the indicators for measuring the fairness of the income distribution are explained. In the analytical research part, the data on disposable income per capita and the Gini coefficient are used to compare the indicators in different countries. Charts on different economical indicators are built for a period that takes into account both time before and after the Covid-19 pandemic, so it is seen visually the effect that the crisis has on the world. The last part is about making a regression based on the example of the United States and suggesting potential solutions according to the retrieved results.

PART 1 THEORETICAL BASIS OF FACTORS INFLUENCING INCOME OF POPULATION

1.1. The concept of income and characteristics of influencing factors.

In order to define the factors that have an effect on the household's income, it is essential to give a definition of the income itself. According to the OECD, income is defined as the disposable income of the household for the year. Income is measured in two ways: gross income and net income. Gross income includes all forms of income, including wages, salaries, tips, commissions, interest, dividends, and property income. Net income, on the other hand, is gross income minus taxes and other deductions. Income can also be measured in terms of purchasing power parity (PPP). PPP is a measure of the purchasing power of a currency in terms of the goods and services that can be purchased with that currency. [1]

Different economists define various factors that influence income inequality. Thomas Piketty is a French economist, whose contribution to this topic cannot be underestimated. He has conducted research on income inequality in different regions and countries, such as the United States and France. In his works, he defined the following main factors that influence income distribution: the rate of return on capital and the rate of economic growth. The rate of return on capital, according to Thomas Piketty, is the average annual return on investment, net of inflation, that an individual or firm can expect to earn on their capital over time. T. Piketty explains that if the return on capital is greater than the rate of economic growth, then income inequality will increase. [2]

Another economist, Joseph Stiglitz, who is also a public analyst, in his book "The Price of Inequality" argues that disparity in incomes is going to lead to

catastrophic consequences in the future. He considers inefficient institutions and policies to be the main reasons that cause differences in income. J. Stiglitz mentions that these factors facilitate the process of the wealthy population getting even reacher while avoiding payment of the taxes, making those with low-income poorer. [3]

S.N. Kaplan and J. Rauh cite a number of factors that can contribute to income inequality, including globalization, technology, and changes in the structure of the economy. Globalization and technology can lead to the outsourcing of jobs and the rise of the gig economy, which can create a larger pool of low-wage workers. They also mention that changes in the structure of the economy, such as the decline of manufacturing, can also lead to income inequality. [4]

While some economists were mostly devoting their works to researching the reasons that are the roots of income inequality, others developed the indicators to measure it. The most famous example of such criteria is the Gini coefficient created by sociologist Corrado Gini. The index varies from 0 to 1 and is very simple to interpret: the lower the value of the coefficient - the lower the income inequality in the country. [5] This indicator is usually connected to its visual representation, which is usually referred to as the Lorenz Curve developed by Max O. Lorenz. This American economist was developing ways to numerically evaluate the concentration of wealth measured in percentages. [6]

Generally, the main factors that influence income distribution can be classified into the following groups:

- Economic factors;
- Political factors;
- Social factors.

Economic factors include such indicators as the extent of globalization in the country, the extent of government intervention in the economy, the level of

economic development in a country, the level of education and skills of the workforce, and the level of trade openness.

In the paper, I would like to emphasize one of the processes that affect income distribution the most around the world—globalization. Globalization is the process by which the global economy has become more integrated through areas that include technology, information, trade and investment. [7] On one side, globalization enables trade, providing a wider range of the products available, which increases the competition and decreases prices for the goods and services. [8] More affordable products are positively affecting the distribution of income, making the gap between poor and reach smaller. However, on the other hand, the globalization impact is ambiguous, as it is also contributing to income inequality by pushing it upwards. One example of such an effect is that it has made it easier for multinational corporations to avoid taxes and regulations. This allows them to increase their income, while it stays the same for the other parts of the population. Hence, the income gap decreases and so does the inequality. So globalization has a strong connection with the other economic factor - the extent of government intervention in the economy. If regulations are weak or poorly enforced, the inequality will increase. [9]

One of the negative consequences of globalization is considered to be financial crises, which usually have a negative impact on income inequality. For example, as a result of the Covid-19 pandemic in the United States, 1% of the richest people doubled their wealth, and 10% of the poorest became even poorer. [10] Another consequence of globalization is international migration. It has led to the fact that migrants receive low wages as a result of occupying jobs that do not require much previous experience or knowledge of the local language. The ambiguous part of the migrants' effect on inequality is based on the fact that these people send remittances to their source country. Hence, the inequality decreases in the economy that the migrants originated from, but increases, where they work. [11, 12]

Another important economic factor is the level of economic development in a country, which can be measured by its gross domestic product (GDP), which is the total value of all the goods and services produced in a country in a year. [13] In most developed countries, the higher the GDP the lower the income inequality. [14]

Some researchers point out that if the level of education and skills of the workforce in the country increases, this can contribute to the higher rates of technological progress, which is destroying jobs, increasing unemployment and reducing incomes. On the other hand, the opposite view is that innovation destroys some while creating new jobs. In this case, productivity increases. [15]

One of the processes of globalization is trade between countries. The degree of trade openness of the country is defined as the ratio of exports and imports to GDP. The higher this figure, the more the country trades and the more open the country is in terms of trade. [16]

The results of various studies show a significant impact of foreign direct investment on household income: with increasing foreign direct investment in the country, income inequality in the country decreases. [17]

Political factors influencing income are political decisions about taxation and government spending, the role of government in regulating markets, the political power of special interests, the extent of government social welfare programs, political instability and conflict. The primacy of institutions is behind all the mentioned factors. The state influences the distribution of income and inequality through the tax and social systems. The tools of influence are the tax rate and social benefits (subsidies, tax rebates). Theoretically, these instruments should reduce income inequality among the population, but it is not always the case. One reason is that the rates set or spending decisions are not effective. [18]

When it comes to the involvement of the governments in market regulation, one of the tools that can be used is printing more money. This can cause inflation, which erodes the purchasing power of low-income earners and widens the gap

between rich and poor. Similarly, high taxes on the wealthy can help to reduce inequality.

When the political power is concentrated, this can lead to a situation where a small group of people have a disproportionate amount of resources and power, while the majority of people have very little. This can create a very unequal society where some people have a great deal of wealth and influence, while others have very little. However, research suggests that political power is not concentrated, the proper government social welfare programs can play a role in reducing inequality, particularly when they are targeted at low-income households. [7]

Finally, the social factors are cultural values and norms, race and gender, social stratification, the level of development of a country in terms of the Human Development Index, and the level of social welfare spending. [19]

Cultural values and norms can influence income inequality by dictating what kinds of jobs are available to certain groups of people and how much those jobs pay. They can also influence how much education and training people receive, which can impact their ability to get higher-paying jobs. Additionally, cultural values and norms can impact how much people save and invest, which can affect their financial stability and ability to build wealth over time. [19]

There is significant income inequality between races and genders in the world due to discrimination. White men earn the most money, followed by white women, then black men and finally black women. Hispanic men and women also earn less money than white men and women. White men have the most education and job opportunities, while black women have the least. [20]

Another social factor that is taken into account is the Human Development Index (HDI) is a measure of progress in a country developed by the United Nations. It looks at life expectancy, education and standard of living to get a picture of how well people are doing. All dimensions and indicators of the index

are indicated in detail in Appendix A.1. Countries with a high HDI tend to have less income inequality. [21]

The level of social welfare spending has a direct impact on income inequality. This includes such expenditures as different types of social benefits. The higher the level of social welfare spending, the lower the level of income inequality. [22]

The mentioned economic, political and social factors are global factors, as they can refer to any country. However, as nations differ one from another, there can be also some country-specific factors that can explain unequal income distribution within a country. [23]

1.2. Theoretical approaches to explaining and reducing income inequality.

Income inequality refers to the extent to which income is distributed in an uneven manner among the population. [23] The term itself has especially become popular since the 21st century, so there is an increasing number of different research that has been done since then. Hence, there are a number of different theoretical approaches that can be used to explain and consequently find an efficient solution to reduce income inequality.

The first approach is to look at the distribution of resources and opportunities within society. This approach suggests that income inequality is a result of the unequal distribution of resources and opportunities. In order to reduce income inequality, it is necessary to address the underlying causes of this inequality. This approach is explained in Piketty's work, which has been influential in the development of the field of inequality studies. He suggests the idea that capitalism creates unequal outcomes because it gives an advantage to

those who own capital. Piketty argues that income inequality can be reduced by increasing taxes on capital. [2]

Another approach is to look at the way in which income is earned. This approach suggests that income inequality is a result of the different ways in which people get richer. Income is earned mainly through employment, running a business, investments, and government benefits. This approach can be used to analyse the microdata with the sample based on the different households. Recently the Fraser Institute has published a paper explaining why researching the ways the income is being earned is essential in order to understand inequality within the country. Authors emphasize the difference in value that is being created through different ways of earning money: some people are creating corporations that are worth billions and provide thousands of working place, while others conduct activities that are referred to as "cronyism". [24]

Both approaches in different ways are connected to a range of reasons for income inequality. However, mostly the first approach by T. Piketty is used to address such problems [25]:

1. Income inequality is caused by factors such as education, experience and occupation. These factors lead to different levels of earnings. For example, people with higher levels of education or more experience in a certain occupation tend to earn more than those with less education or experience. A corresponding solution proposed is to provide education and training that helps people improve their skills and earn higher wages. As a result, this leads to a consequent decrease in unequal income distribution. This idea was also proved by the economist J.M. Fournier in 2016. [26]

2. Income inequality is also caused by discrimination and unequal distribution of resources. In order to mitigate this aspect, there should be a promotion of equal opportunities for all, including women and minorities. The government can help by enforcing anti-discrimination laws and by providing equal access to education, healthcare, and other social services. Some sociologists

and economists, such as A.C. Kay, are also proposing different ways that can help to decrease or even eliminate discrimination. [27]

3. Income inequality is often the result of government policies and regulations. Encourage the growth of enterprises and industries that provide high-paying jobs. Provision of social services, such as medical care, and housing assistance to those who need it. Income inequality can also be reduced by increasing progressive taxation and by redistributing wealth through social welfare programs. Income inequality can also be reduced by increasing the minimum wage. The minimum wage should be high enough to provide a decent standard of living for workers and their families. It should also be adjusted periodically to keep up with inflation. H. David says that the minimum wage is one of the most effective tools for reducing wage inequality. He also mentions that it is important to ensure that the minimum wage is high enough to make a significant difference in the lives of workers. [28]

4. Income inequality can also be caused by natural disasters and other unforeseen events. For instance, a war in a country, such as the one ongoing in Ukraine since February 2022. The war increased income inequality because it made it difficult for people on lower incomes to make ends meet. The war also led to an increase in the number of people who were unemployed. The UN has estimated that potentially "war in Ukraine risks seeing 90 per cent of the country "freefall into poverty" and extreme vulnerability". [29] After this happens, there should be immediately implemented a policy that reduces the income gap between rich and poor.

There are many strategies that have been successful in reducing income inequality, including [30]:

1. The income tax credit that provides tax refunds to low and middle-income workers.

2. Minimum wage, which sets the minimum amount that employers can pay employees.

3. Social protection programs, such as food stamps, medical care and housing assistance.

4. Regulations that protect workers' rights, such as the right to join a trade union and to bargain collectively.

5. Progressive taxation, which taxes the rich at higher rates than the poor.

There is a range of different policies that can be used in order to decrease income inequalities. However, it is important to note that no single policy will be effective in all cases. Each country is unique and will require a different approach in order to reduce income inequality.

1.3. Approaches to measuring income inequality

It is essential to define the reasons for the unequal distribution in the country, but it is as well important to choose the best indicators that can evaluate the magnitude of the inequality. Hence, this section presents a theoretical explanation of the main indicators that are used to describe inequality quantitively. These measurements include the Gini index, the Lorenz curve, the Kuznets curve and the Palma ratio. For consistency in the results, much research includes multiple indicators.

1.3.1. Gini index.

Income inequality can be measured in various ways. One common way is to measure the share of income or wealth held by different percentiles of the population. Another common way to measure income inequality is by using the Gini index. The Gini index is a measure of statistical dispersion intended to represent the income or wealth distribution of a nation's residents and is the most

commonly used measure of inequality. It is ranging from 0 to 1, where the higher value of Gini means higher inequality, while the value of 0 shows a perfectly fair income distribution. [31]

Nowadays, income and wealth inequalities are increasing on both global and local levels. Hence, it is essential to measure it and predict to which extent it is going to change during the next decades.

When the Gini index is high, an individual with a higher income gets a larger percentage of the total income of the population.

The main advantage of the Gini coefficient is its ease of interpretation. Another positive side of this indicator is that the decrease in income of the richer population with an increase in earnings of the poorer population will be immediately represented in the Gini index, so it will also move in the same direction as the income of the richer population, it will go down. However, the Gini index should not be used for the comparison of countries that have the same value of the coefficient, as countries can have different income distributions. This indicator is very useful for analysing inequality within one country, but not for comparing two different nations. For one, it does not take into account the distribution of wealth, which is also unequally distributed as income. Additionally, the Gini coefficient does not necessarily reflect the actual standard of living of individuals or households. For example, two households with the same income could have very different levels of consumption if one household has more debt than the other.

While the Gini index measures the extent of unfair income distribution in the economy, the Inequality Possibility Frontier (IPF) is one type of graphical representation of the inequality that sets a limit to possible inequality. [32]

1.3.2. Lorenz curve.

The Lorenz curve is a graphical representation of the Gini coefficient. It shows how the income of the country is distributed within the population. The Lorenz curve was developed in 1905 by Max O. Lorenz. Figure 1.1 is a schematic representation of the Lorenz curve. [33]
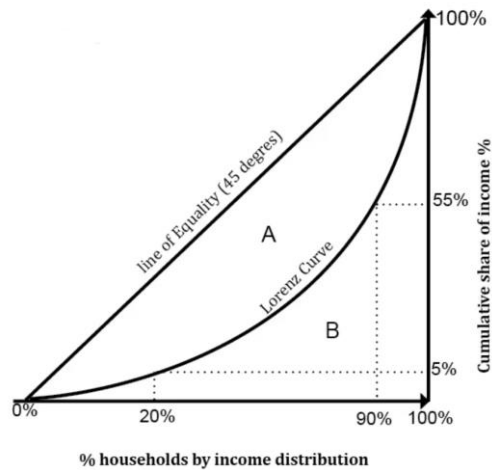

Figure 1.1 – Lorenz curve graph depicting a line of equality

Source: [34]

In the Figure there is an equality line – a situation of perfect equality that corresponds to a situation when the percentage of the population gets the same percentage of total income. Axises represent the percentage of the households by income distribution and cumulative share of income. For instance, in the case of a fairly distributed income, 30% of the population gain 30% of its total income. Nowadays, perfect equality is not possible, but it is a target that the world is aimed at. Hence, the equality line is used as a benchmark to understand how far the economy is from the fair income distribution. The bigger the area A is, the higher the inequality is. Gini coefficient in the Figure can be calculated with the following formula:

Gini index = A / (A+B),

where A, B – areas in Figure 1.1.

The Lorenz curve is an important tool for measuring income distribution within an economy, which graphically portrays the difference in earnings between poor and rich individuals.

1.3.3. Kuznets curve.

Simon Kuznets estimated that with the development of the country, the inequality increases due to enhanced rural labour supply migrating to urban areas. This situation leads to higher competition for the jobs and as a result salary decreases. According to Kuznets theory, once a particular level of earnings is reached, the so-called turning point, the inequality decreases. [35]

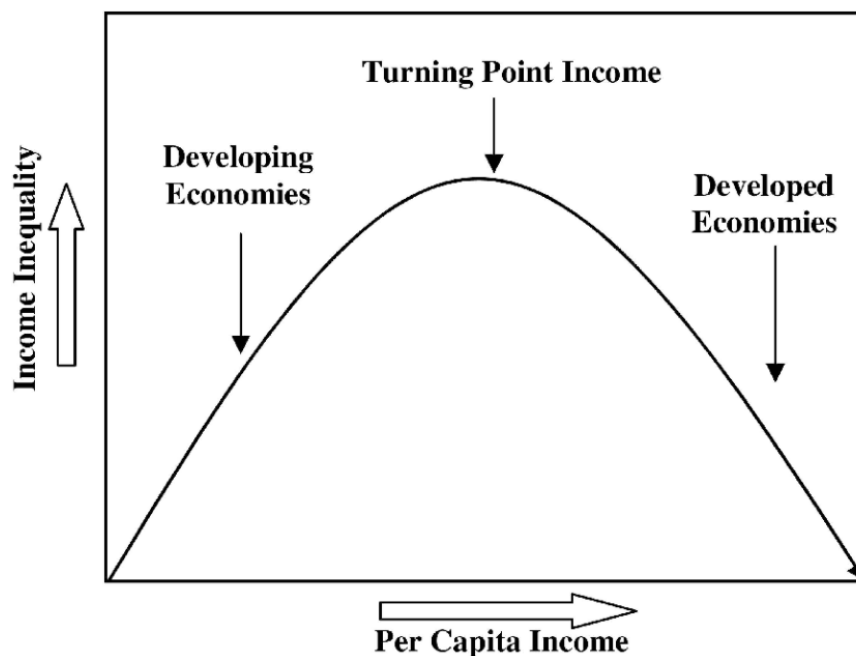The Kuznets theory is displayed in Figure 1.2.

Figure 1.2 – Kuznets curve

Source: [35]

The curve shows the relationship between income inequality and income per capita as a dynamic process. He found that, as a country's economy develops, its income distribution first becomes more equal and then, after a certain point, becomes less equal again. Kuznets hypothesized that this U-shaped relationship between economic development and income inequality was since, as an economy develops, the rural labour force migrates to urban areas in search of better opportunities. This migration initially leads to a more equal distribution of income, as the rural poor move to urban areas and begin to earn higher incomes. However, after a certain point, the migration of rural workers to urban areas begins to slow down, and the urban rich begin to accumulate more and more wealth, leading to a widening of the income gap.

1.3.4. Palma ratio.

The Palma ratio is used as a measure of the inequality in the country. A higher Palma ratio indicates a more unequal distribution of income, while a lower Palma ratio indicates a more equal distribution of income. It is calculated as the ratio of the richest 10% of the population's share of gross national income (GNI) divided by 40% of the poorest share of GNI. The higher the Palma ratio, the greater the inequality. [36] In 2018, the Palma ratio was 7.3. This means that the richest 10% of the population earned 7.3 times the income of the poorest 40% of the population. In 2009, this ratio was 6.6. [37] If the Palma ratio increases, it means that the relative share of income going to the richest 10% of the population is increasing.

This measurement is used to compare the earnings of the rich and poor and consequently see how big is the gap between them. Many economists prefer the Palma ratio to the Gini coefficient because for the second it is not possible to conduct such a comparison. In other words, the Gini index does not take into account income distribution in the country.

PART 2 ANALYSIS OF INCOME DISTRIBUTION INEQUALITY IN THE WORLD

2.1 The structure of household income and its dynamics in the world.

Organisation for Economic Co-operation and Development underlines two different indicators that characterise the households in terms of earnings that they possess at the particular moment. These two measures are household net adjusted disposable income and household net financial worth.

"Household total net worth represents the total value of assets (financial as well as non-financial) minus the total value of outstanding liabilities of households (including non-profit institutions serving households). This indicator only takes into account the value of dwellings, and not other types of non-financial assets. The following financial assets and liabilities are included: currency and deposits; debt securities; loans; equity and investment fund shares/units; insurance, pensions and standardised guarantee schemes; financial derivatives and employee stock options; and other accounts receivable/payable. " [43]

According to the OECD definition, net worth of the household depends on the disposable income. It seems obvious, as the higher the income of the family is, the higher is supposed to be the probability of them to use money to invest in their wealth or just to save up. This will generally depend on the propensity to invest or save that differs a lot dependently on various characteristics.

For deeper understanding the income and wealth level among different countries, in Figure 2.1 both measures are indicated for the OECD countries in 2019.
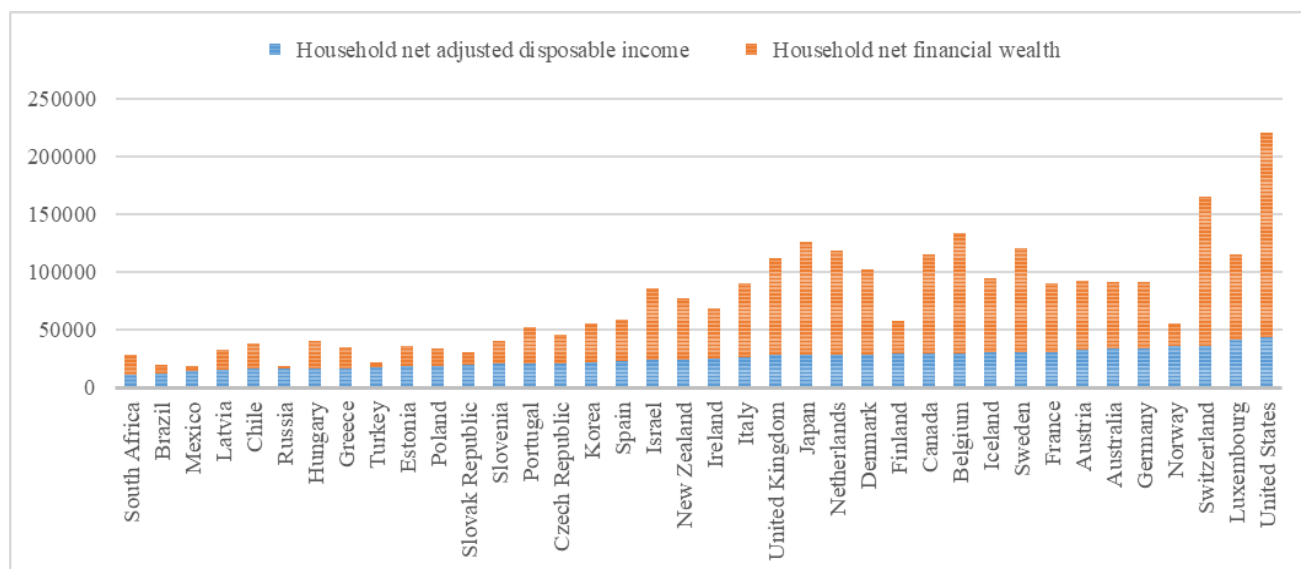
Figure 2.1 – Household net adjusted disposable income and households net financial wealth in the OECD countries in 2019.

Source: [43]

The countries in the chart are ordered according to the household net adjusted disposable income from the lowest to the highest, while the households net financial wealth is variable. All values are calculated in the US dollars. The lowest income indicator is in South Africa, while the highest is in the United States. South Africa has a household net adjusted disposable income on level of 10,782 US dollars, while the US has 44,049. There are a number of potential reasons for such a difference in numbers. One reason may be that the US has a higher overall standard of living than South Africa. Additionally, the US has a much higher GDP per capita than South Africa, which likely contributes to the higher household disposable incomes in the US. Additionally, it is worth noting that South Africa has a much higher poverty rate than the US, which may also contribute to the lower household disposable incomes in South Africa. It is also important to mention that for the United States both measures' values are the highest among the chosen sample of countries.

The average value of net disposable income among OECD countries is 25,113 US dollars that leads to a conclusion that 20 out of 38 countries have a

mean income that is less than the average within these countries. This creates an inequality between the nations mentioned.

As it is indicated by OECD net financial wealth is calculated as a percentage of household net disposable income. [43] In Figure 2.2 for the same sample of countries net financial wealth is calculated and indicated in the percentage. The higher the value is, the wealthier the household is relatively to other countries and to the income that they earn.
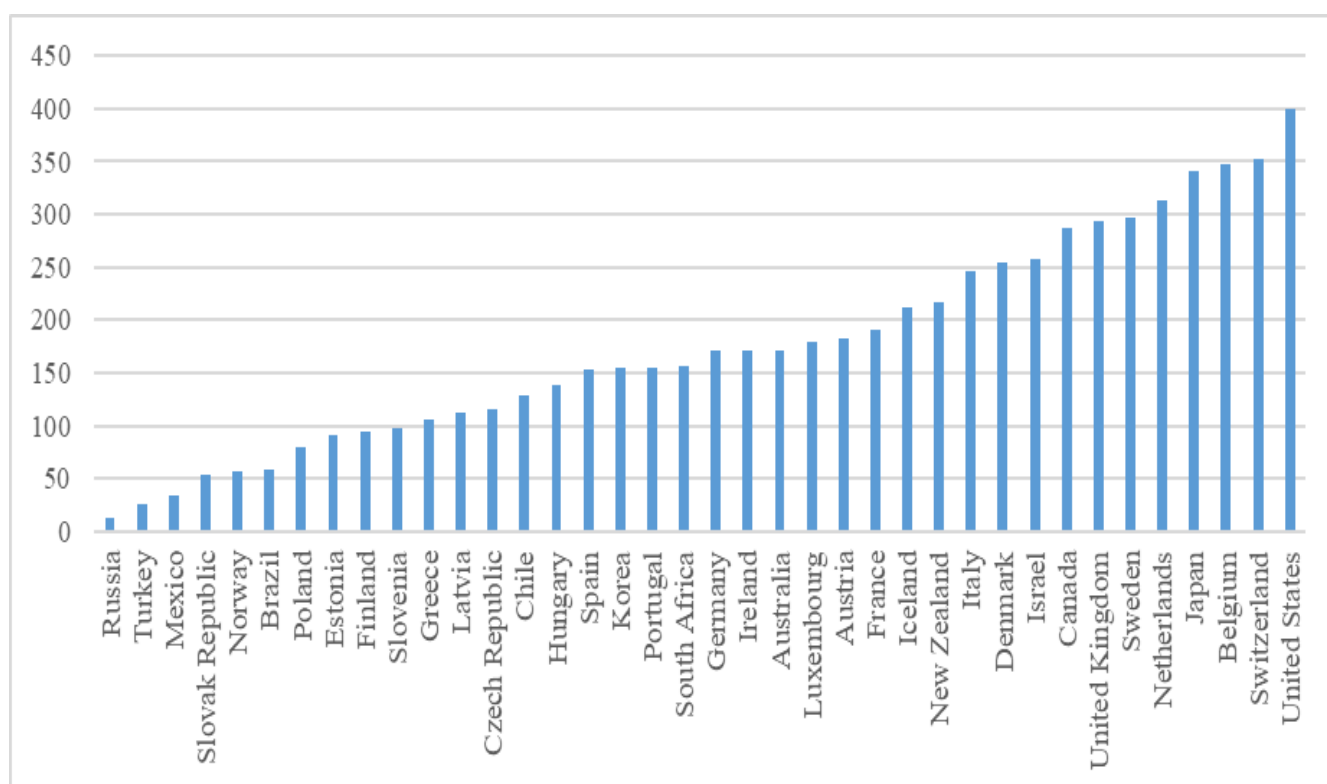

Figure 2.2 – Net financial worth of the households in OECD countries in 2019.

Source: [43]

According to the data in Figure 2.2 the net wealth in the United States reaches 400% of the income of the households. Generally, this indicator is higher for more developed countries, which are also considered high-income countries (countries with the Gross National income (GNI) per capita higher than 12,695 in

current USD). In addition, in the United States mean income per capita is one of the highest in the world, so it is not surprising that the country has a net financial wealth that is the highest value among the OECD countries. In the case of the Czech Republic, for example, the data in the Figure 2.2 show that in 2019 net financial wealth is at the level of 120% of the mean household income. This value is significantly lower than that of the United States, as well as it is at the lower level than the average for the OECD countries, which reaches 170%.

The most common classification of the income of a household provides with a following list of sources: wages and salaries, self-employment, state pension, private pension, disability benefits, other benefits, tax credits, investments. On average, in most countries households depend mostly on the wage as a source of their income. There are a number of reasons for this. First, wages are the most common form of compensation for work, so they are the most likely source of income for most people. Second, wages tend to be more stable than other sources of income, such as investments, so they are a more reliable source of income for households. Finally, wages are typically taxed at lower rates than other sources of income, so they provide a greater after-tax income for households. Data on the distribution between the sources of income can be usually found in Family surveys that are separately conducted for each country. For this research the focus will be mostly on the OECD countries. One example of such a distribution of the income resources is presented in Figure 2.2 that refers to the Unites States households' income during 2015-2019. The structure of the main sources of income differs in the following source and the indicators that are mentioned in the table are: total earnings, income from self-employment and from goods produced for own consumption, current transfers received, and current transfers paid. Current transfers paid are also divided in two categories: taxes and social security contributions paid directly by households, and current transfers paid by households to non-profit institutions and other households.

Disposable income (current prices) is usually referred to the amount of money that households have available for spending and saving after taxes and social security contributions have been deducted from their gross income. [44]

According to the data obtained about the households' income in Table 1.1 we can see that in 4 years there has been an increase from 40,091 to 53,600 US dollars in mean disposable income. The difference between total earnings and sum of income from self-employment and transfers received gives us the amount of the income that comes from the wages. For instance, in 2019 the mean income from wages was 37,720 US dollars, while in 2015 this amount was reaching 30,586.

Table 1.1 Dynamics of the income structure in the United States during the period from 2015 to 2019, in US dollars (current prices).

Indicator / Year		2015	2016	2017	2018	2019
Mean disposable income (current prices)		**40091**	**42635**	**44110**	**49240**	**53600**
Mean disposable income (current prices)	Total earnings (current prices)	40567	42701	43799	45850	49224
	Income from self-employment and from goods produced for own consumption (current prices)	2434	2238	2353	2469	2544
	Current transfers received (Current prices)	7547	7651	7901	8246	8960

	Current transfers paid total (Current prices)	-13114	-13252	-13680	-11930	-13200
	Current transfers paid (Current prices)	Taxes and social security contributions paid directly by households (Current prices)	-13043	-13178	-13620	-11840	-13110
		Current transfers paid by households to non-profit institutions and other households (Current prices)	-71	-74	-64	-91	-91

Source: made by author based on [45]

As a result of the data obtained in Table 1.1, it can be concluded that the population in the US largely depends on the earnings that they get from wages and salaries. Their share in the total mean disposable income reaches 75%. Consequently, the importance of this part of earnings cannot be underestimated also in terms of income inequality.

There has been a huge positive change in the average income in the US through 2015-2019, and it is also essential to take into account the differences in the average income dependently on the age groups. Seven ranges with the corresponding age and mean earnings are in the chart in Figure 2.3.
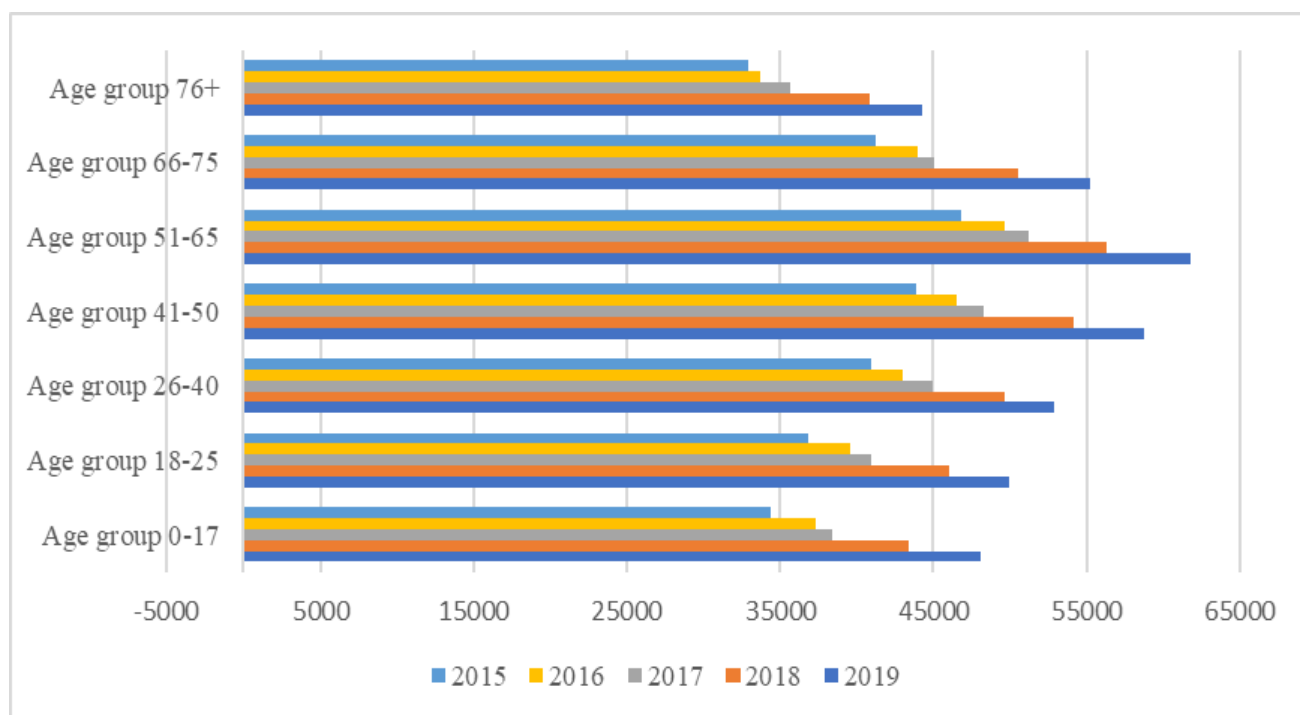

Figure 2.3 – Mean income in the US based in the age groups during the period 2015-2019.

Source: [45]

Household income is the total income received by all members of a household from all sources, including wages, salaries, investments, rents, and government benefits. In economics, the most common term referred to this type of income is household disposable income - earnings available to all members of the household for further consumption.

There are many types of household income, but the three most common are earned income, unearned income, and government benefits. Earned income is income that is earned from working. This can include wages, salaries, tips,

commissions, and self-employment income. Unearned income is income that is not earned from working. This can include interest, dividends, capital gains, pensions, and annuities. Government benefits are payments that households receive from the government. This can include social security benefits, unemployment insurance, and food stamps.

Household income is an important indicator for each country, as it is usually used for the comparison of the well-being of different nations. That is why it is important to take into account the factors that have an effect on this indicator.

In OECD countries the average household net adjusted disposable income per capita is USD 30,490 a year. Figure 2.4 shows the map of the indicator distribution in the OECD countries. The lighter the colour is, the lower net adjusted disposable income per capita is. [38]
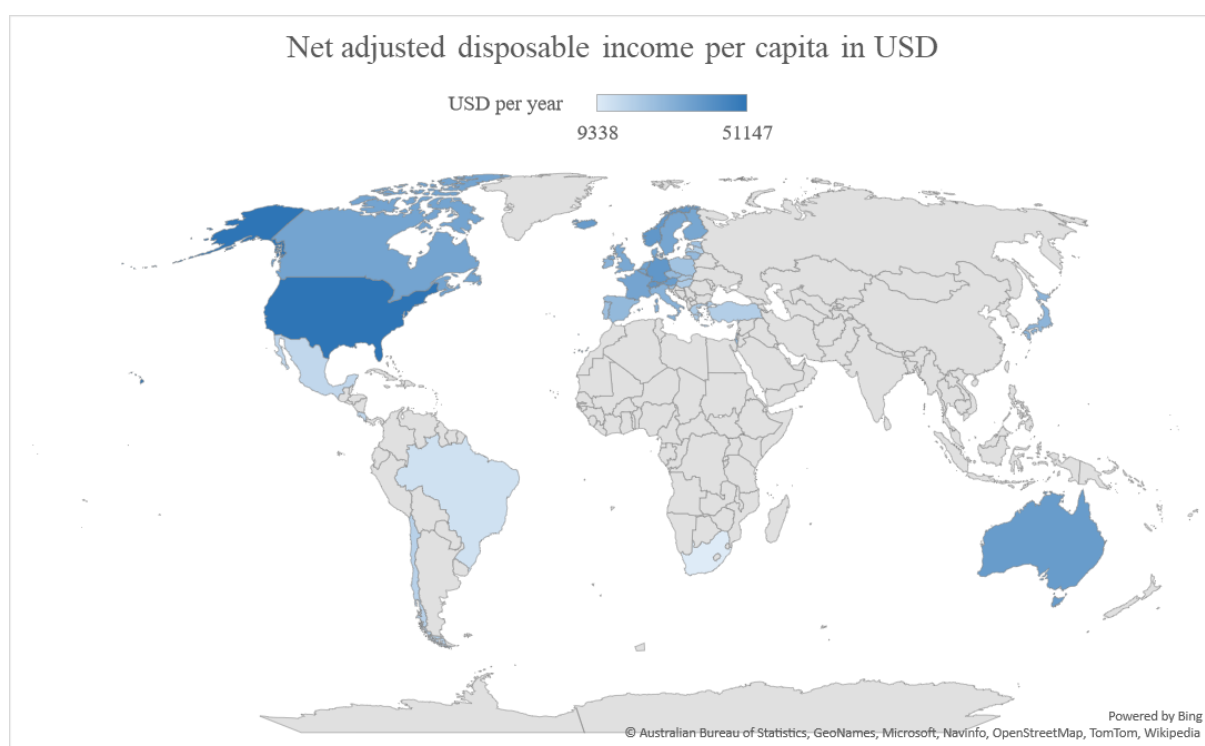

Figure 2.4. – Net adjusted disposable income per capita in USD per year in OECD countries in 2018 or the last available year.

Source: [39]

The difference between OECD countries is substantial: the minimum indicator is USD 9,338 per year in South Africa, while the maximum reaches USD 51,147 in the United States. Countries in Europe are mostly homogenous and have approximately equal net adjusted disposable income per capita. This is connected to the fact that economies in Europe, and especially within the European Union, are very much alike. That happened through the processes of globalization and integration.

At the same time, what is also still different among OECD countries is the Gini coefficient. In Figure 2.5 net adjusted disposable income per capita is depicted with the corresponding inequality indicator within the same sample of countries.

The left axis represents income per capita in USD per year, and the axis to right is the Gini index which ranges from 0 to 1.
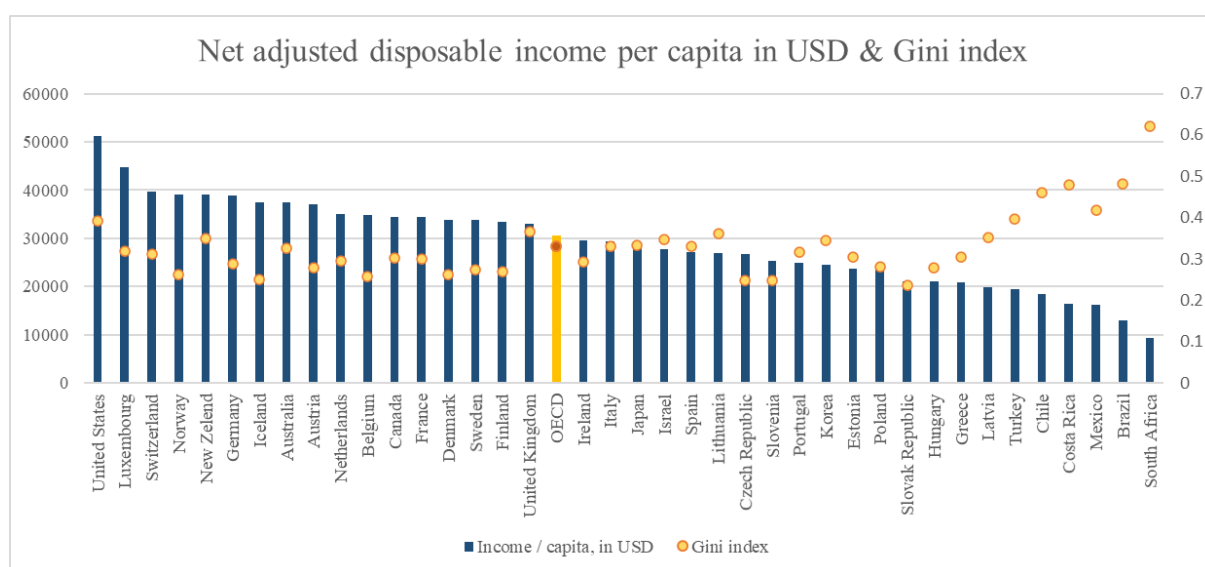

Figure 2.5 – Net adjusted disposable income per capita in USD per year & Gini index in OECD countries in 2018 or the last available year.

Source: [39]

The average Gini coefficient in the OECD countries is equal to 0.33, while the average in the world is estimated at the level of 0.38 according to the Business Insider. [40]

The correlation between the income per capita and the Gini index in the OECD countries is equal to -0.51. Hence, the variables are considered to be moderately correlated. As the value of the indicator is negative, that means that with the increase in disposable income, the inequality decreases, or that with the decrease in disposable income, the Gini index increases. This is especially true for the countries that have income per capita below the particular turning point. In Figure 2.5 correlation between the variables for the countries from the Slovak Republic to South Africa is equal to -0.91. This is a very strong negative correlation and means that poorer countries are more sensitive to unfair income distribution within their nations.

One of the conclusions based on Figures 2.4 and 2.5 is that income among societies is currently distributed unfairly and unequally with the high-income countries having a lower Gini index.

So the next question is connected to the past and the extent to which it has defined the present Gini coefficient. In Figure 2.6 are indicated the pre-industrial values of the Gini index against mean income per year in PPP dollars, and the inequality possibility frontier (IPF).
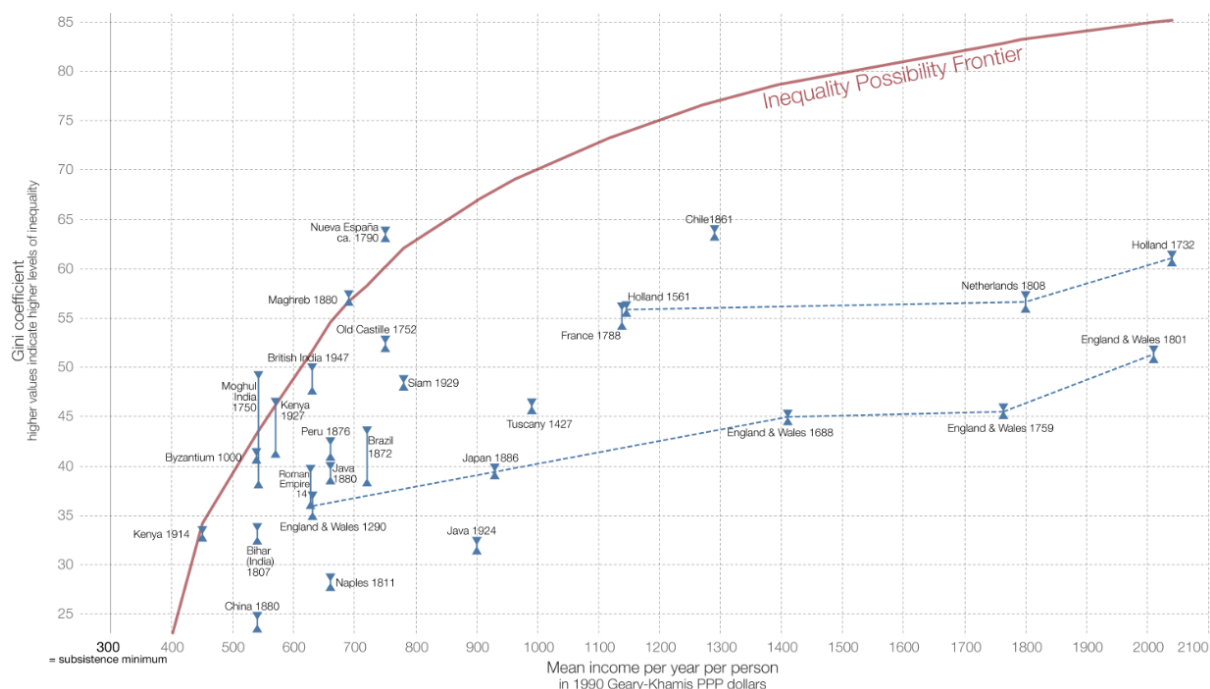
Figure 2.6 – Pre-industrial inequalities: Gini coefficient and the Inequality Possibility Frontier.

Source: [32]

As we can see, for some countries such as the United Kingdom and the Netherlands there has been a simultaneous increase in both income per person and the Gini index through the centuries. However, as these countries are far from the IPF, they are as well far from the maximum level of inequality that is possible at the exact period of time. Overall, most of the nations during the pre-industrial time were clustered close to the IPF, so the inequality level was reaching its maximum.

Brazil used to have the Gini index equal to approximately 0.45 during the 1870s. The last available value of this indicator is 0.48, meaning that the distribution of the income in the past defined the present value.

2.2. The impact of the Covid-2019 pandemic crisis on the income distribution.

The crisis is usually perceived as a negative shock for the countries and it influences almost all aspects of the economy. One of the general indicators that can be used to define the influence of the crisis is real GDP growth. In Figure 2.7 the indicator reaches its worst value in the year 2020 and is equal to -3.1%.

Figure 2.7 – Real GDP growth in the world during the period 1980-2027.

Source: [41]

Compared to the financial crisis of 2007–2008 or the crisis in the 1980s, the ex-post Covid-19 pandemic year is the worst in the last 40 years in terms of real GDP growth. However, it is essential to mention that there has been as well the most rapid indicator's rise in 2021 up to 6.1%, which corresponds to the highest value during the last 40 years. According to the data, a particular trend is been observed: each following crisis is more severe than the previous one, but the period of recovery is faster every time. As evaluated by International Monetary Fund, the forecasted real GDP growth in the years 2022-2027 is on average on the level of 3.4% of positive growth.

The Covid-19 pandemic crisis has also negatively influenced employment in the world. The United Nations (UN) in 2015 established "The Sustainable Development Goals or Global Goals" and estimated corresponding indicators to each goal for reaching a better and more sustainable future. The 8th goal indicated is "Decent work and economic growth" that foresees productive employment and decent work conditions.

As the UN indicated in their report for the year 2020: on average the unemployment rate was estimated at the level of 5.4% in 2019 and it has increased to 6.5% in 2020. There has been a higher jump in the unemployment rate among women and young people. Out of all employed women and youth, the drop was 9% and 5% respectively.

In Figure 2.5 the unemployment rate is compared between different geographical regions in 2019-2020. The chart includes the following regions:

- Oceania that consists of 12 countries (in this dataset Oceania excludes Australia and New Zealand, so there are 12 countries instead of 14): Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

- Eastern and Sounth-Eastern Asia cosists of 11 countries Brunei, Burma (Myanmar), Cambodia, Timor-Leste, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Vietnam.

- Australia and New Zealand.

- Sub-Saharan Africa that consists of 49 different countries. Some of them are Angola, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Ethiopia, Ghana, Kenya, Madagascar.

- Europe and Northern America region includes 51 and 23 countries respectively.

- Latin America and the Caribbean.

● Northern Africa and Western Africa.

As we can see in the chart in Figure 2.8 the unemployment rate for each geographical region has increased. That means that the Covid-19 pandemic crisis has left millions of people without occupation and any means of income.
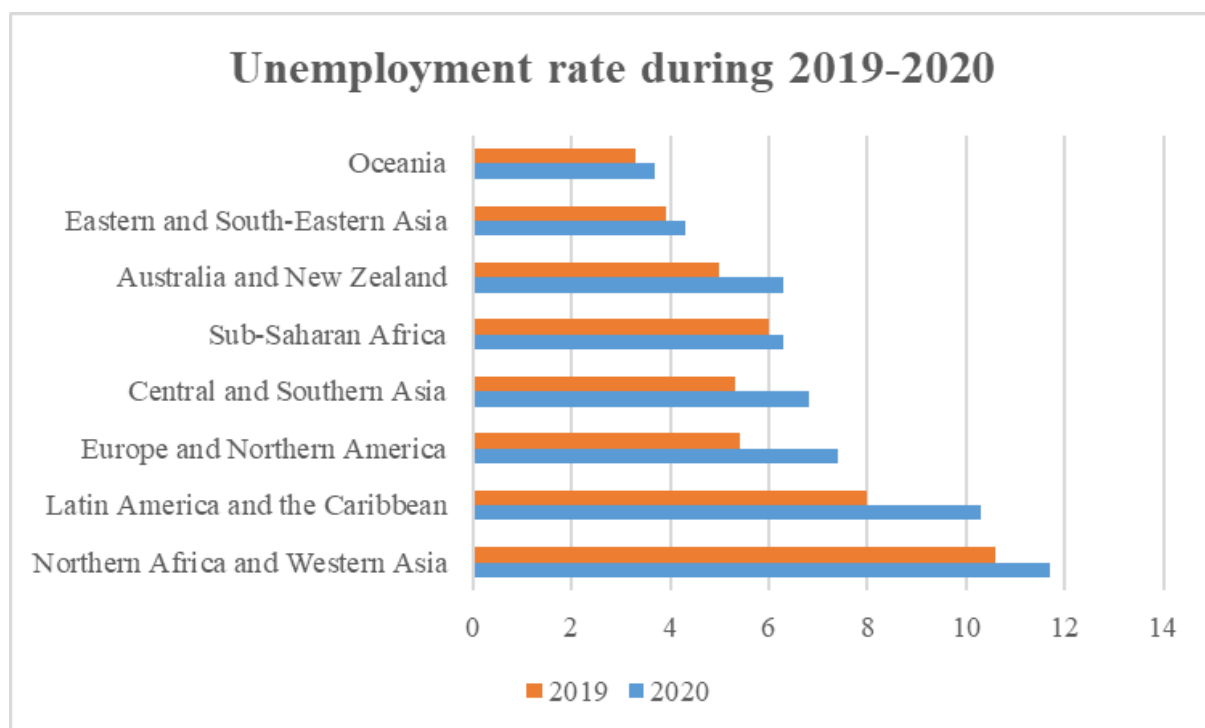

Figure 2.8 – Unemployment rate during the period 2019-2020 in different regions in the world.

Source: [42]

The highest relative increase in percentage has been among Europe and Northern America and corresponds to a 37% increase: from 5.4% in 2019 to 7.4% in 2020. In Latin America and the Caribbean, the rise in unemployment is at the level of 29%: the increase has been from 8% to 10.3%.

Some countries might have more severe consequences in terms of income inequalities due to the increase in unemployment compared to other countries. One of the main reasons for this is the difference in institutions and their capacity to provide a sufficient amount of unemployment benefits. The share of previous

income is used to estimate the amount that is being paid to people who have lost their jobs. However, still, in many even high-income countries, the share of income is not higher than 20-30%, which is not even to make a living. Thus, this is a potential source of deterioration of the inequality situation.

In the labour market, the registered employees in case of job loss will be eligible for unemployment benefits and are more protected by the local legislation. Whereas the same cannot be proved to be true for workers in the informal sector. These people are very fragile and have rarely a consistent source of income. In developing countries, the agriculture sector is the source of informalities. In Figure 2.8 the chart shows the division between agriculture and non-agriculture informal employment in different geographical regions that were also mentioned in Figure 2.9. The year observed is 2019, during the beginning of the Covid-19 pandemic. The indicators in the chart are not essential in the dynamic, so the year 2020 was not taken into account. What is essential is the percentage of employed people in different sectors, as well as the deviation of this percentage from the total employment
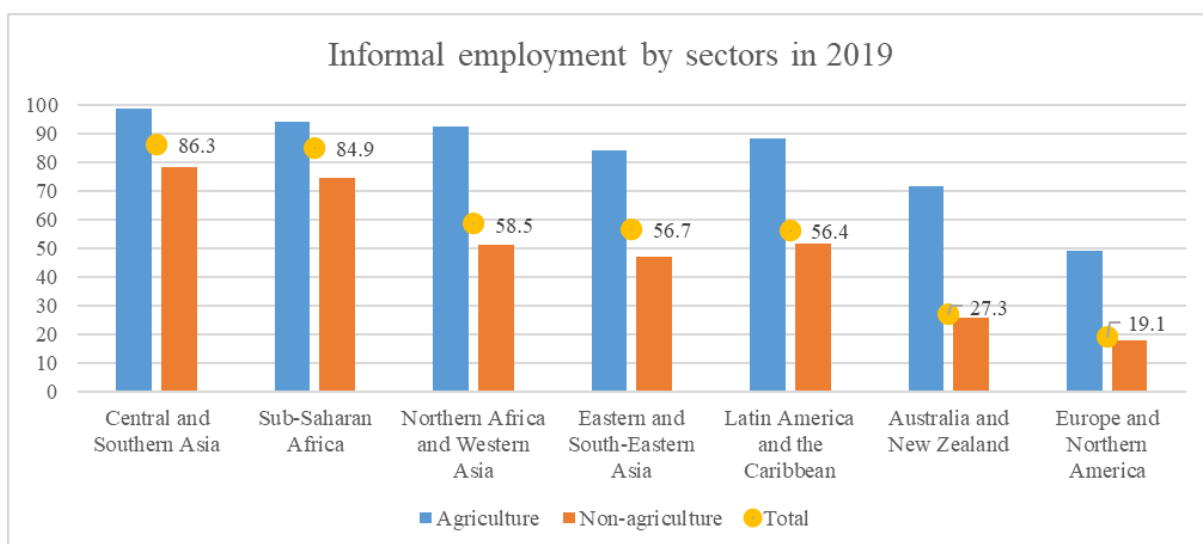

Figure 2.9 – Informal employment by sectors in 2019 by different regions.
Source: [42]

Informal employment in this chart is divided into two following types:

- Agriculture employment, which refers to the percentage of the employed in the agriculture sector and who are not registered.
- Non-agriculture employment, which is the percentage of the employed in non-agriculture and who are not registered.

Overall, during the first months of the Covid-19 pandemic, there were suggestions that the inequality will decrease as low paid workers are often essential, so they are supposed to be paid more. However, eventually, the data shows the contrary - the increase in inequality of income distribution.

The Covid-19 pandemic generally was anticipated to influence the world in the following way the decrease in income per capita in developed countries would be smaller than in the developing countries, where earnings on average are lower. In order to see if this statement is truthful, it is also essential to take into account the stats on Covid-19 to understand the trend in which it was spreading in the world and separately in the countries with relatively high and low incomes.

According to Our World in Data, the confirmed cases per million have been increasing rapidly since the beginning of the pandemic. Covid-19 as an illness has a direct influence on the individual's or the household's income because it disables people from continuous and constant work for an uncertain period of time. In some countries, social security benefits are reaching the level that is sufficient for maintaining an adequate and habitual way of living in terms of expenditures. However, there are also governments that do not provide citizens with these benefits, which leads to a decrease in the average income per capita size. For verifying if it is always true for citizens in more developed countries to receive benefits and continue spendings on a level that they are used to despite the fact that there are a lot of confirmed cases per million in a country, it is essential to check data for the Covid-19 number of cases distinctly for different nations.

In Figure 2.10 we can see how two indicators have been changing ever since the Covid-19 pandemic has begun. These two measures are confirmed cases per million and confirmed deaths per million.
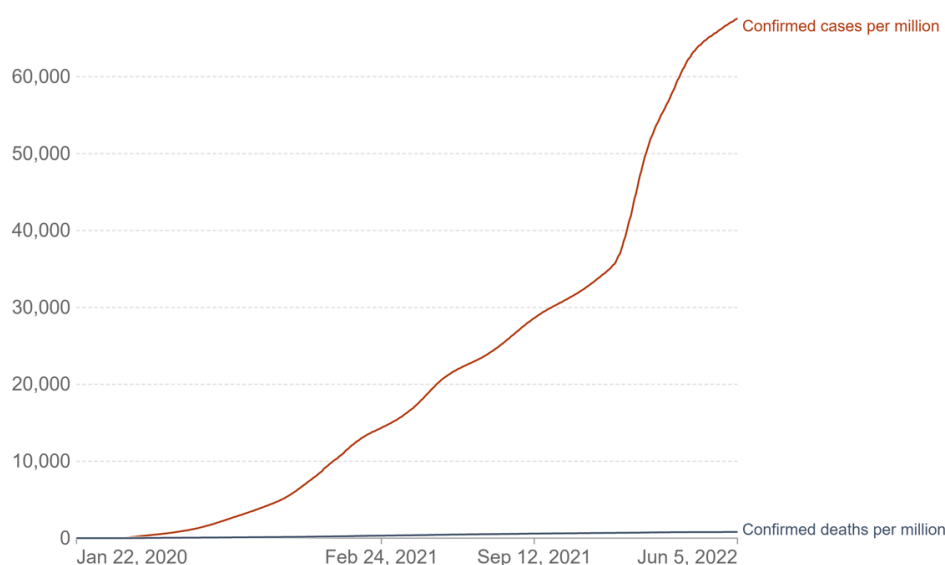
Figure 2.10 – Total confirmed COVID-19 deaths and cases per million people, World.

Source: [46]

As we can see from the chart in Figure 2.10, confirmed deaths per million did not increase as much, as total confirmed cases. While the first indicator has reached 65,500 cases per million, the second is only 800 per million. This means that approximately 1% refers to the death rate based on the calculation of the total cases. In terms of income, it means that some people temporarily were not able to participate in the labor market and get salaries. Covid-19 cases and deaths influence income distribution and average income levels in the world by causing economic hardship and job losses. This can lead to increased poverty and inequality.

In countries where the virus is more widespread, the effects are likely to be more severe. This is because these countries tend to have lower levels of health care and economic development, which makes it harder for people to recover from the virus. Income levels are also likely to be affected by the virus in the long term. This is because the virus will likely cause a recession, which will lead to lower

levels of growth and investment. This will reduce the amount of money that people have to spend, which will reduce average incomes.

"According to the briefing "*Inequality Kills*," published in the beginning of 2022 ahead of the World Economic Forum's Davos Agenda, it is mentioned that inequality is contributing to the death of at least 21,000 people each day, or one person every four seconds. This is a conservative finding based on deaths globally from lack of access to healthcare, gender-based violence, hunger, and climate breakdown. The world's ten richest men more than doubled their fortunes from $700 billion to $1.5 trillion —at a rate of $15,000 per second or $1.3 billion a day— during the first two years of a pandemic that has seen the incomes of 99 percent of humanity fall and over 160 million more people forced into poverty." [47]

The pandemic has resulted in a significant increase in the number of people who are seeking medical care. This has put a strain on the healthcare system, which has been forced to ration care in some cases. The consequences of the Covid-19 on the healthcare system have led to both demand and supply shocks. In some countries, only rich people could get proper medical assistance. This stipulated an increase in unfair supply of the health care, which previously was partially caused by income inequality. Second, the pandemic has also resulted in a decrease in the number of people who are able to access healthcare. This is due to the fact that many healthcare facilities have been forced to close or reduce their hours of operation in order to comply with social distancing guidelines. Finally, the Covid-19 pandemic has also resulted in an increase in the cost of healthcare. This is due to the fact that many healthcare providers are now charging extra for virtual consultations and other services.

The Covid-19 pandemic has also had a significant impact on gender-based violence. This is due to the fact that the pandemic has resulted in a decrease in the number of people who are able to access support services. Additionally, the pandemic has resulted in an increase in the number of people who are

experiencing financial stress, which can lead to increased levels of domestic violence.

The Covid-19 pandemic has also had a significant impact on hunger. This is due to the fact that the pandemic has resulted in a decrease in the number of people who are able to access food. Additionally, the pandemic has resulted in an increase in the cost of food. This is due to the fact that many food suppliers are now charging extra for delivery services.

The World Bank especially emphasizes on the increase in the within-country inequality due to the Covid-19 pandemic. In Figure 2.11 There is the histogram based on Gini index data of a sample consisting of 34 different countries, which are grouped into emerging market and developing economies (EMDEs) and low-income countries (LICs). Gini points in this Figure refer to the changes in income inequality in the simulation in two different situations: with Covid-19 and without it.
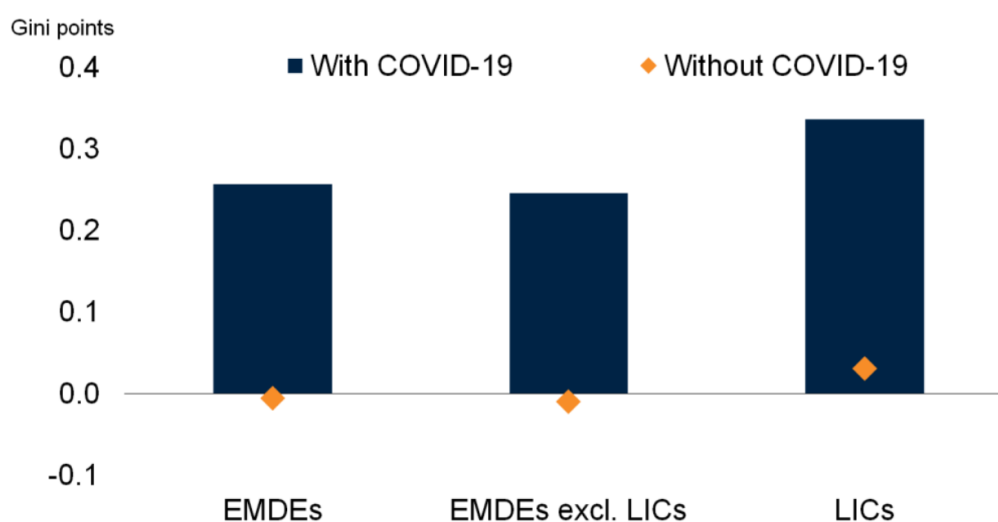

Figure 2.11 – Change in Gini coefficient value in EMDEs and LICs separately with and without Covid-19.

Source:[48]

From the histogram, it can be seen that the Gini index for EMDEs is generally lower than for LICs. For LICs the result of simulations shows that during the year 2020 the Gini coefficient has increased by 0.3 points in a scenario that the world has experienced – with the Covid-19 pandemic ongoing. The important conclusion that the World Bank has underlined is that the Gini index had been slowly, but constantly decreasing from 2000 until the pandemic, so that is why in the alternative scenario without the Covid-19 there was expected to be almost zero change in income inequality.

The World Bank has also evaluated an estimated impact of the pandemic on the Global Extreme poverty in the world. "The new global poverty line is set at $2.15 using 2017 prices. This means that anyone living on less than $2.15 a day is considered to be living in extreme poverty. Just under 700 million people globally were in this situation in 2017." [49]

In Figure 2.12 The chart shows the simulations outputs of different scenarios, where the impact on the extreme poverty is being estimated: June downside projection refers to the worst-case scenario, while June baseline scenario and April projection are updated based on the adjustments of the forecast of the inputs that are used for the chart.
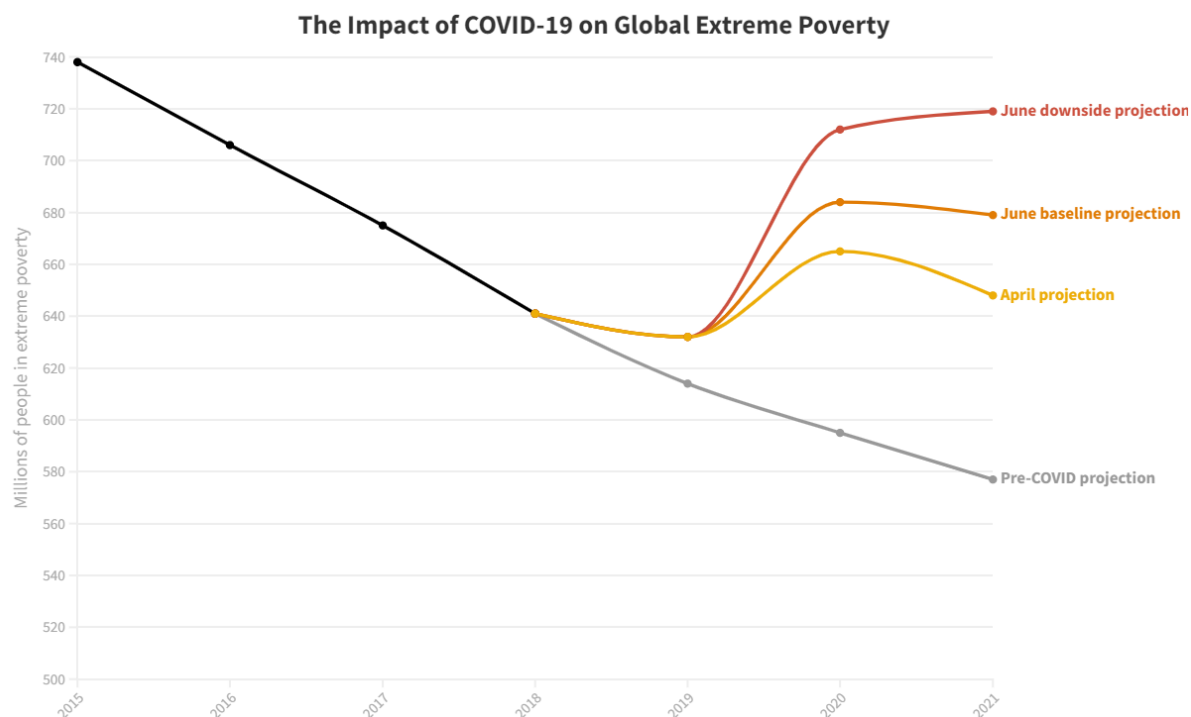
Figure 2.12 – Simulations outputs of different scenarios for estimating the level of the Global extreme poverty caused by the Covid-19

Source: [48]

As we can see in the Figure the Pre-Covid projection is maintaining the trend of decreasing number of people in extreme poverty since 2015 from 738 million people to 641. Eradicating poverty is one of the main goals that the humanity has set at the moment, which became impossible since the Covid-19 has started. Initially the projected in 2021 number was 577 million people, while in the worst-case scenario it was projected to possibly reach the levels of the year 2015.

The impact of the pandemic on the poverty levels as well as the unemployment levels is highly significant. The increase of poverty levels is evident from the UN report which predicts a possible increase of 87 million people in poverty in 2021. The UN report also predicts that in 2021 there will be an increase of about 130 million unemployed people. This is a clear indication of the pandemic's impact on the poverty levels and the unemployment levels.
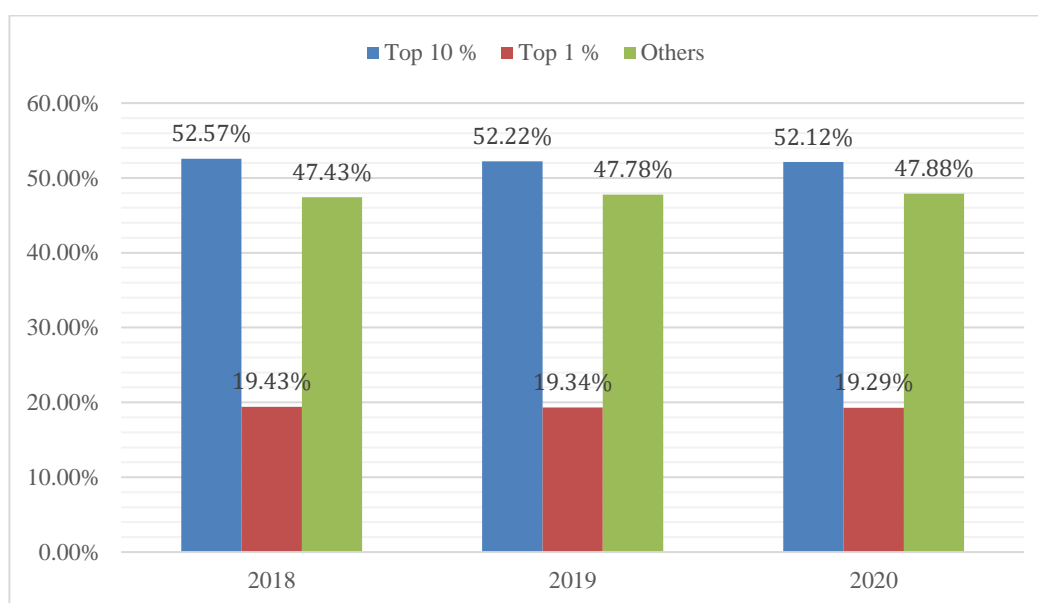
Figure 2.13 – Pre-tax income distribution among top 1%, top 10% and 90% of the rest of the population in the world in 2018-2020.

Source: [50]

Pre-tax national income in this chart is divided into three groups based on the percentile that people belong to according to the income they earn as a percentage of the total global income. The first group includes population with the top 1% of the income, the second – top 10%, and the last one refers to the rest 90% of the population. On average, in the world Covid-19 has not influenced much the distribution among the groups mentioned.

The reasoning behind such a distribution of the global income and its dynamics can be explained by the fact that in the wealthiest countries most of the global wealth is concentrated. At the same time, the income inequality is rather low in such economies, so that they are less volatile to external shocks.

However, if we take into account some areas in the world, where the inequalities are thriving (for instance, countries in the East Africa region), income distribution would dramatically differ from the average values in the world. Due

to the Covid-19 pandemic influence, millions of the citizens in the region were pushed into poverty.

In Figure 2.14 we can see the distribution of pre-tax income in the East Africa in the different years in accordance with the three groups, the same division as for the chart for the average indicators in the world.
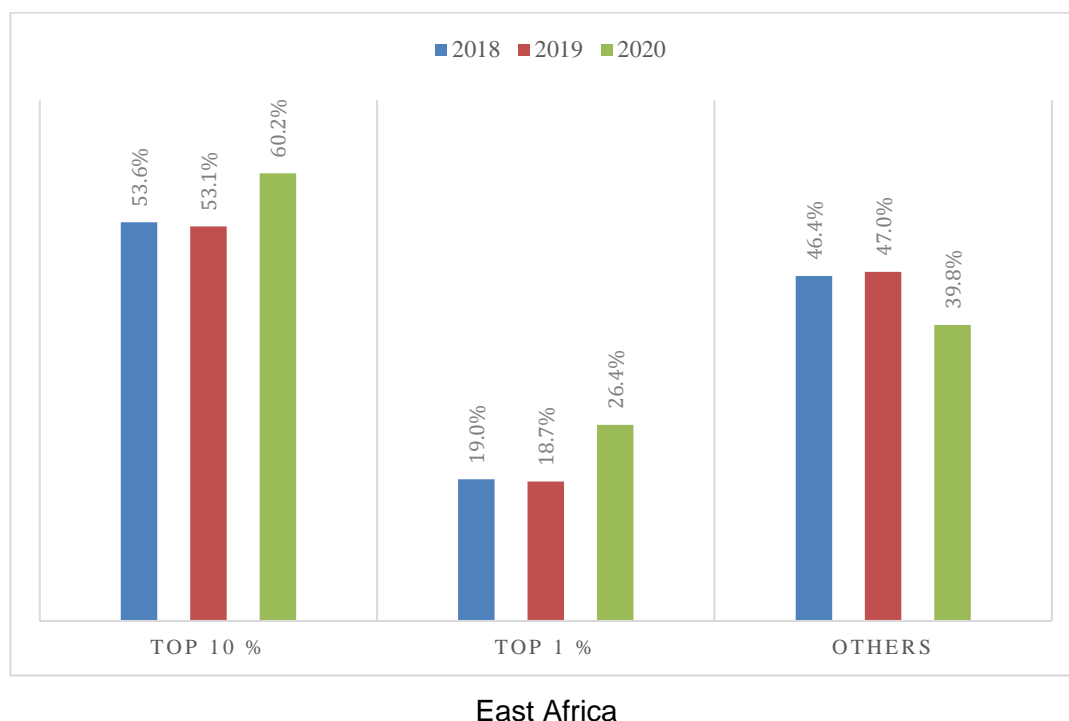

Figure 2.14 – Pre-tax income distribution among top 1%, top 10% and 90% of the rest of the population in East Africa in 2018-2020.

Source: [50]

As we can see in the chart, the dynamics of the income distribution is a complete opposite to the fairness and equality. Due to the pandemic, the consequences are very disappointing, as top 1% of the population have become richer by more than 7% (from 19% in 2018 to 26.4% in 2020), while top 10% - by 6% (from 53.6% in 2018 to 60.2% in 2020). At the same time, 90% of the whole population in Eastern Africa lost more than 6%. In addition, the poorest 50% of citizens earn only 13.3% of the total pre-tax income in the region. [51]

The situation with the income inequality in the region has only deteriorated due to the Covid-19 and it is predicted to be even worse in the long-term. As we can see, the situation in the poor economies is completely different from the average in the world.

PART 3 MODELING THE GINI INDEX AND PROVIDING RECOMMENDATIONS TO REDUCE INCOME INEQUALITY

3.1. Construction of multifactor regression of the influence of factors on the Gini coefficient: example of the United States.

Multifactor linear regression is a statistical approach used to assess the relationships between multiple independent variables and a single dependent variable. There are a number of reasons why multifactor linear regression is a good choice for research on the influence of factors on the Gini coefficient. First, linear regression is a relatively simple and straightforward technique that is easy to understand and interpret. Additionally, linear regression is generally robust to outliers and can handle data with a wide range of distributions. Finally, multifactor linear regression can accommodate multiple predictor variables, which is important in this case because there may be a number of factors that influence the Gini coefficient.

For the model following predictor factors were chosen: gross internal expenditure on R&D, the U.S Individual Income tax, exports and imports of goods and services, and transfer payments.

Generally speaking, the more money that is spent on research and development, the greater the likelihood that new technologies and products will be developed. This, in turn, can lead to increased economic activity and a higher standard of living for the population as a whole. The Gini index is a measure of inequality, so if the money spent on R&D leads to increased economic activity and a higher standard of living for the population as a whole, it is likely that the Gini index will decrease.

Individual income taxes serve to reduce inequality by taking money from the rich and giving it to the poor. Therefore, individual income taxes have a negative impact on the Gini index.

Exports of goods and services influence the Gini index in the US because they are a measure of the country's economic activity. When exports are high, it indicates that the US economy is doing well and this usually results in a lower Gini index.

There is no definitive answer to the question, what is the trend of imports' influence on inequality. It is supposed that they can affect the overall level of economic activity and inequality within a country. It is possible that imports may influence the Gini index by affecting the amount of income inequality within the United States. For example, if imports lead to a greater concentration of income among a smaller group of people, then the Gini index would likely increase. Conversely, if imports lead to a more equal distribution of income, then the Gini index would likely decrease.

Transfer payments in the United States are generally progressive, meaning that they tend to reduce inequality. This is because transfer payments are typically given to low-income households, which helps to close the gap between the rich and the poor. When transfer payments reduce inequality, the Gini index will usually fall.

Multifactor linear regression was constructed using Stata software to determine the factors influencing income inequality in the United States. The equation of the multiple linear regression model is as follows:

$$Gini = \beta\_0 + \beta\_1 * TrP + \beta\_2 * RDLN + \beta\_3 * ImLN + \beta\_3 * ExLN + \varepsilon,$$

where β_i - coefficients showing the degree of change of the dependent variable - Gini;

Gini - Gini index (aftertax);

RDLN - gross internal expenditure on R&D;

Tax - U.S Individual Income tax;

ExLN - natural logarithm of exports of goods and services;

ImLN - natural logarithm of imports of goods and services;

TrP - transfer payments.

Data for the model are obtained from the following sources: OECD, FRED, and World Bank. In the model, there are 28 yearly observations for the different indicators for the US: from 1991 to 2018. Due to limited data availability, some variables (such as the number of immigrants) were excluded. As there are not many years with the corresponding data available for the chosen dependent variable – Gini index, the focus in the modelling will be on narrowing to the main three independent factors that have an influence on the predicted one. Generally, for the regression analysis and modelling, researchers use the rule of thumb that means that for each 10 observations there is one corresponding independent variable. After constructing a regression that included various independent variables, the regression with the highest coefficient of determination was selected. Below are the results of multifactor linear regressions. In the second model, two insignificant independent variables were excluded: transfer payments (TrP) and R&D (RDLN). The output of two different regressions is indicated in Figure 3.1.

	(1)	(2)
	Gini	Gini
TrP	0.00000719	
	(1.30)	
Tax	0.00127^{***}	0.00120^{***}
	(4.57)	(4.48)

RDLN	-0.0265	
	(-1.54)	
ImLN	0.0418**	0.0270***
	(3.67)	(3.92)
ExLN	-0.0301*	-0.0170*
	(-2.11)	(-2.21)
_cons	0.351	0.0739
	(1.53)	(1.61)
N	28	28
R^2	0.826	0.806

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 3.1 – Multifactor linear regression output with the Gini coefficient as a dependent variable.

Source: developed by author using Stata software.

The second model in Figure 3.1 is focused on the three independent variables that have an impact on income inequality in the United States.

The coefficient of determination is a measure of how well a linear regression model predicts the dependent variable based on the independent variable. It is a value between 0 and 1, where 0 indicates that the model does not predict the dependent variable at all, and 1 indicates that the model perfectly predicts the dependent variable. The values of the coefficient of determination and the adjusted coefficient of determination are high in both regressions. R^2 is equal to 0.826 (82.6%), which means that the change in the variance of the

dependent variable (Gini index) that is caused by independent variables is explained by 82.6%. Transfer payments and R&D expenditures do not have a significant impact on income inequality, so they were not included in the second model. The tax rate has a significant impact on the dependent variable at 99%, as the p-value is less than 0.01. The signs of the coefficients in a linear regression indicate the direction of the relationship between the predictor variable and the outcome variable. A positive coefficient indicates that as the predictor variable increases, the outcome variable also increases. A negative coefficient indicates that as the predictor variable increases, the outcome variable decreases. The magnitude of the coefficient indicates the strength of the relationship. The effect of changes in the tax level can be interpreted as follows: with an increase in the tax rate by 1%, the Gini index increases by 0.001269. The result is different from the one that was expected, which can be a sign that taxes are not always efficient as an instrument of decreasing inequalities. This is especially the case in the US. There are a number of ways that taxes can negatively influence inequality in the US. For example, the tax code can be structured in a way that favours the wealthy and penalizes the poor. Additionally, tax breaks and loopholes can be used to shelter income and assets from taxation, which further exacerbates inequality. Finally, the overall tax burden can be disproportionately borne by lower-income households, further exacerbating inequality.

The independent variables imports and exports are significant, the signs in front of the coefficients show that they have the opposite effect on the Gini index: increasing imports leads to rising inequality while increasing exports reduces income inequality.

In addition, the model was tested for the following assumptions: normal distribution of residuals, homoscedasticity of residuals, and autocorrelation test. According to the test results, the model does not violate these assumptions.

The normal distribution of residuals indicates that the model is a good fit for the data. In a normal distribution, the data is distributed evenly around the mean, and the mean is equal to the median. The standard deviation is a measure of how spread out the data is. A low standard deviation means that the data is close to the mean, while a high standard deviation means that the data is more spread out. In order to test residuals' normal distribution, two different tests were used: the skewness and kurtosis test for normality, and the Shapiro-Wilk normality test. The null hypothesis (H0) is saying that residuals are normally distributed. The outcome of the tests is in Figure 3.2 and Figure 3.3.

| | | Skewness/Kurtosis tests for Normality | | joint | |
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
resid_Gini	28	0.2377	0.6036	1.81	0.4049

Figure 3.2 – Skewness/Kurtosis test for normality results.

Source: developed by author using Stata software.

According to the results of the Skewness/Kurtosis test for normality, the Probability value is higher than the critical value of 0.05, so the null hypothesis cannot be rejected, and residuals are distributed normally.

Below in Figure 3.3 the results of the second test for normal distribution are indicated.

| | | Shapiro-Wilk W test for normal data | | | |
Variable	Obs	W	V	z	Prob>z
resid_Gini	28	0.96367	1.097	0.191	0.42432

Figure 3.3 – Shapiro-Wilk test for normal data.

Source: developed by author using Stata software.

The results of the Shapiro-Wilk test prove that the null hypothesis is true, which means the residuals are normally distributed.

For the next assumption, the Breusch-Pagan test was used. The null hypothesis is that variance is constant, so the residuals should not be heteroskedastic. In other words, it means that the spread of the residuals is the same at all values of the predictor variable. The outcome of the test is indicated in the Figure 3.4.

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: resid_Gini

    chi2(1)       =       0.12
    Prob > chi2   =    0.7298
```

Figure 3.4 – Breusch-Pagan / Cook-Weisberg test for heteroskedasticity.

Source: developed by author using Stata software.

The Probability value in the test is exceeding the critical value of 0.05, and is equal to 0.73. The conclusion that is based on the result of the test is that variance is constant, so the residuals are homoscedastic.

The next test's null hypothesis that we check, is the autocorrelation of the residuals. Autocorrelation of residuals is the degree of correlation between the values of the residuals and the values of the residuals from previous time periods. If the autocorrelation of residuals is high, it means that the model is not capturing all of the information in the data, and the predictions from the model are not as

accurate as they could be. The results of the Breusch-Godfrey LM test are indicated below in Figure 3.5.

```
Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
1	1.235	1	0.2663

```
H0: no serial correlation
```

Figure 3.5 – Breusch-Godfrey LM test for autocorrelation.

Source: developed by author using Stata software.

According to the result Probability>0.05, so we accept the H0 on a level of confidence of 95%. As a result, variance is constant. Breusch-Godfrey LM test showed that there is no serial autocorrelation, as the Probability value is higher than 0.05.

Based on the linear model tests, the linear model is feasible. The normal distribution of residuals and homoscedasticity of residuals indicates that the linear model is a good fit for the data. The autocorrelation test shows that there is no autocorrelation in the residuals, which means that the linear model is a good fit for the data.

The results of the model are important, because in this case based on the example on the US, it shows that trade openness of this exact country, as well as tax rate are important in defining, how equally the income will be distributed in the country. Some economists believe that trade openness can contribute to income inequality by increasing the gap between rich and poor countries. However, in the model for the US both import and export are influencing the Gini coefficient within one country. The coefficient of determination is a measure of how well a linear regression model predicts the dependent variable based on the independent variable. In this case, the coefficient of determination is high,

indicating that the model predicts the dependent variable well. The tax rate has a significant impact on income inequality, with an increase in the tax rate leading to an increase in income inequality. This is unexpected and may be a sign that taxes are not always efficient as an instrument of decreasing inequalities. There are a number of reasons why tax separately is not effective to reduce inequality. First, it is difficult to tax separate income sources accurately. Second, separate taxation can create incentives for taxpayers to shift income into lower-taxed categories. Finally, separate taxation can lead to higher overall tax rates for some taxpayers.

According to the output retrieved from the modelling, the regression results are as follows for the tax rate:

- With the increase of the tax rate by 1%, the Gini coefficient increases by 0.00120. This is a relatively small increase. However, it shows that in the long run tax is not effective and has a contrary influence from the expected impact. The reasoning behind can also be that the tax rate is not adjusted that often in accordance with the income inequality changes.

As for the import and export indicators, they were taken as natural logarithms, so the interpretation differs from the proposed before for the tax rate. In this case, we have to divide the coefficient by 100. This will be interpreted afterwards as follows: a 1% increase in the independent variable increases (or decreases) the dependent variable by (coefficient/100) units. Bases on this, in the model imports' influence can be interpreted lie this: the coefficient is 0.027. 0.0270/100 = 0.00027. For every 1% increase in the independent variable, our dependent variable increases by about 0.0003. [52] There are a few potential reasons for such effect. First, higher imports can lead to increased competition from foreign firms, which can put downward pressure on wages. Second, higher imports can lead to a decline in the demand for domestic goods and services,

which can lead to job losses and a decline in wages. Third, higher import prices can lead to inflation, which can reduce the purchasing power of workers' wages.

For the export independent variable, the results are different and can be interpreted as follows: as the coefficient is equal to -0.0170, it should be divided by 100 in the first place, so we get -0.000170. For every 1% increase in the independent variable – export, our dependent variable decreases by about 0.00017.

There are a few potential reasons for this:

1) When a country exports more, it is usually because it is producing more. This increased production can lead to more jobs and higher wages, which can reduce income inequality.

2) Exporting can also increase the demand for a country's currency, which can appreciate the currency and make imports cheaper. This makes it easier for people to buy essential goods and services, which can again reduce income inequality.

3) Finally, increased exports can lead to more foreign investment and capital inflows, which can help to finance social programs and infrastructure projects that can further reduce income inequality.

This regressions modelling showed that tax system is not that effective for decreasing income inequality, because it has a contrary effect. The best solution to reach fair distribution is to combine multiple types of policies. As an example, there can be a stimulation of export of the products, which decreases inequality.

3.2. Comparison of the Gini index in developed and developing countries.

The UN have estimated the aim for the 10th Sustainable Development Goal as the reduction of inequalities. The overall trend for the Gini index in the world was decreasing for both developing and developed countries since the 2008 crisis. However, there are evidence that prove that the Covid-19 pandemic deteriorated the situation, worsening the following types of inequalities: income inequality, gender and racial inequalities, unequal access to health care and vaccines.

As in this paper, the main focus is on the income inequalities, it was decided to analyse how the actions of the governments in different countries influence the Gini index. It is substantial to compare, which countries have higher capacities to lower the income inequality. For this, the data was collected on the Gini index before and after tax. The difference between mentioned indicators will show, if the fiscal system and its redistributive function are efficient. Taxes usually can lead to decreased level of income inequality. For the analysis the countries were divided in four groups based on the level of their income in accordance to the World Bank's classification: high-income countries, upper-middle-income countries, lower-middle-income countries, low-income countries. In figure 3.6 the Gini index is plotted for the countries with high-income, which are considered to have Gross National income (GNI) per capita higher than 12,695 in current USD in 2021.
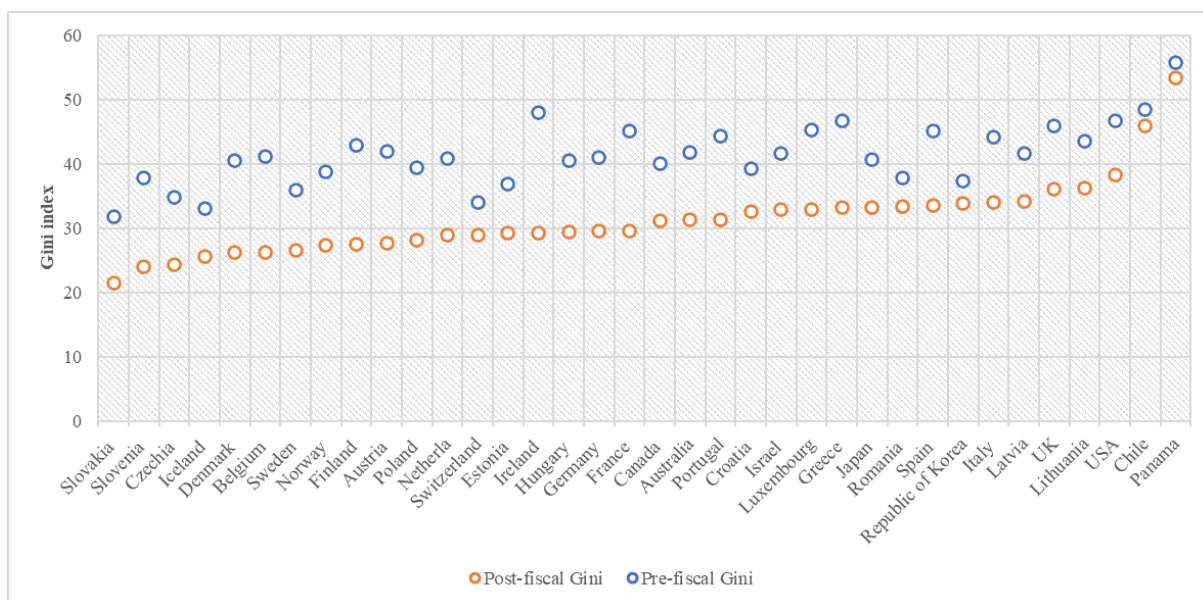
Figure 3.6 – Gini index before and after tax in high-income countries.

Source: developed by author using Microsoft Excel.

As we can see in Figure 3.6, for most countries there is a very strong difference between pre-tax and after-tax of the Gini index. The most successful country in terms of decreasing inequality is Ireland. The pre-fiscal Gini coefficient is 48%, while after tax it is at the level of 29%. The average decrease of income inequality is 10% for high-income countries.

There are some outliers, such as Chile and Panama, which can be explained by differences in institutions between these two countries and other high-income nations. According to the Economist Intelligence Unit Democracy index Panama has got 6.43 out of 10 maximum points for Functioning of the government component, which represents the quality of institutions. The result is quite poor compared to other countries from high-income group. At the same time, Chile has got 5.56 for the Political culture component of the same index.

For upper-middle-income countries, the situation is completely different compared to high-income nations. Upper-middle-income nations have GNI per capita at the level between 4,096 and 12,695 in current USD. The average

decrease of the income inequality is estimated at the level of 3.7%. All countries from this group are plotted in Figure 3.7.
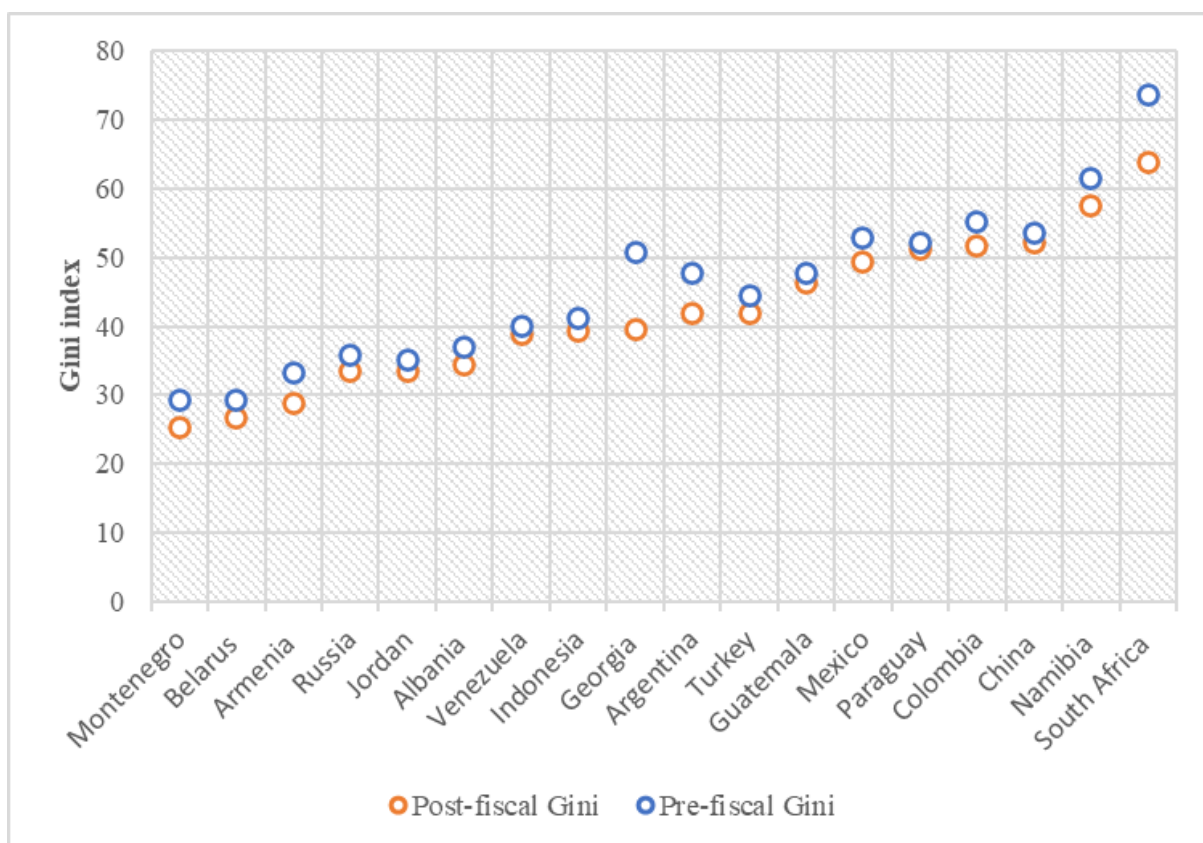

Figure 3.7 – Gini index before and after tax in upper-middle-income countries.

Source: developed by author using Microsoft Excel.

For upper-middle-income countries outliers are not those, who have the least inequalities' decrease, but, on the contrary, those who have the biggest. Georgia and South Africa are in the minority in this group, having the redistributive effect equal to -11.25% and -9.87% from pre-fiscal to post-fiscal Gini respectively.

For lower-middle income countries (GNI per capita between 1,046 – 4,095 in current USD) the average reduction in the Gini coefficient is no more than 2.6%. From the mentioned classification all nations are depicted in Figure 3.8.
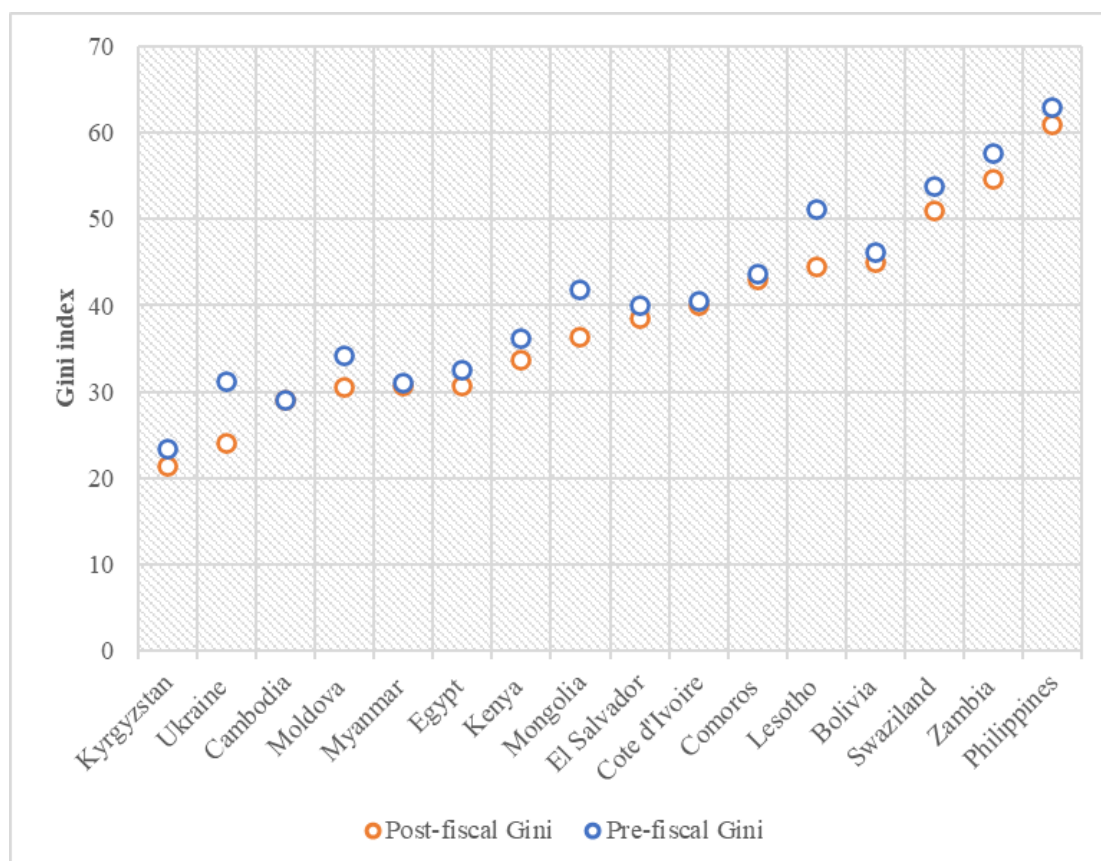

Figure 3.8 – Gini index before and after tax in lower-middle-income countries.

Source: developed by author using Microsoft Excel.

Almost no difference between the pre-tax and after-tax Gini index is noticed in Cambodia and Myanmar, where the decrease is less than 0.5%. Contrary to these countries, in Ukraine and Lesotho taxes are positively influencing income distribution, lowering the inequality by 7.01% and 6.56% respectively.

Low-income countries with GNI per capita lower than 1,046 are plotted in Figure 3.9. The average decrease of the Gini index is 1%, which is much smaller than for the other classifications.
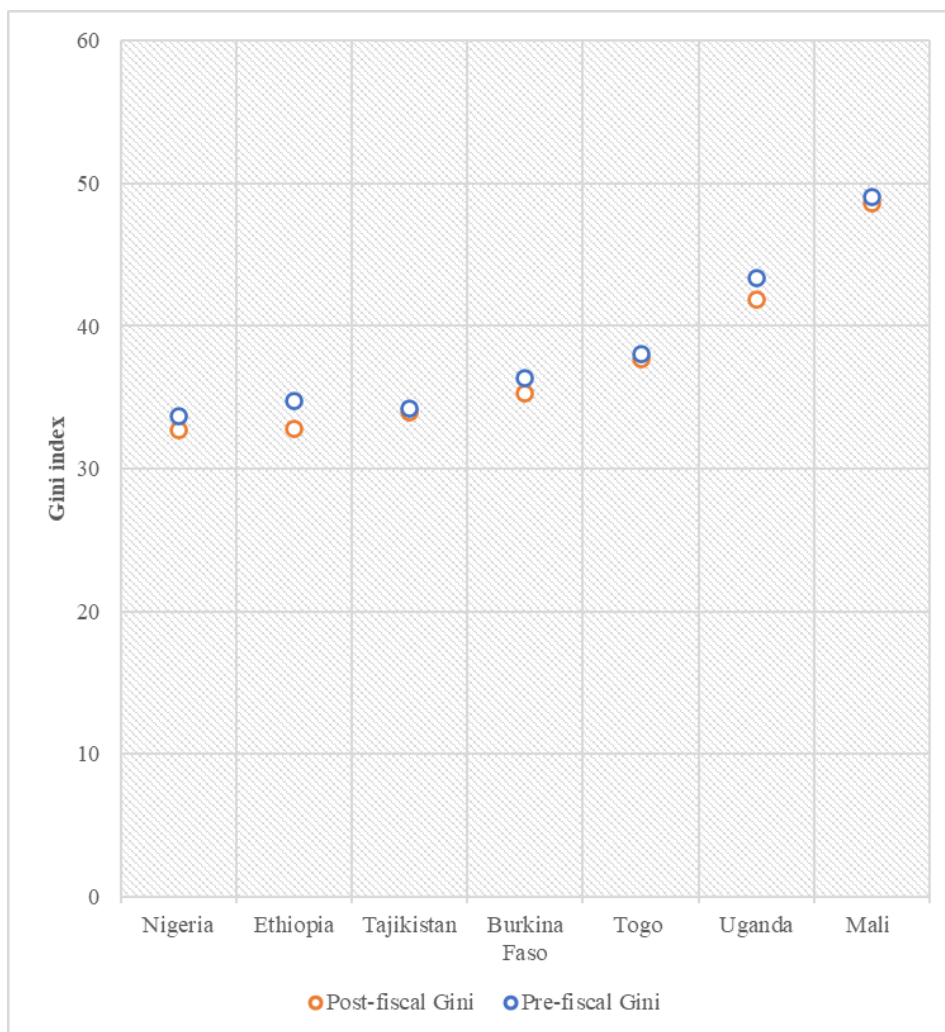

Figure 3.9 – Gini index before and after tax in low-income countries.

Source: developed by author using Microsoft Excel.

Out of all countries, the highest change is in Ethiopia at the level of 2%. However, overall the change before and after taxes is not significant that can lead to a conclusion that in the low-income countries fiscal policy is less efficient than in high-income countries.

To conclude, the comparison between pre-fiscal and post-fiscal Gini coefficients in countries classified by GNI per capita, the higher the income in the country, the more effective the redistributive function of the taxes is. Even though there are some outliers in all groups, overall the trend is visible.

CONCLUSION

There are numerous factors that contribute to income inequalities. Some of these include economic, political and social factors. While some of these factors are out of our control, there are things that we can do to help close the gap. Generally, in the first theoretical part the concept of income and income inequality was presented, as well as the different ways it can be measured. The most common indicators are the Gini coefficient, the Lurenz curve, the Kuznets curve and the Palma ratio. The Gini coefficient was invented by Corrado Gini in 1912. It is the most common measure of inequality and is used by the OECD, the IMF, the World Bank and the UN. The Gini coefficient is a ratio of the areas on the Lorenz curve. The Gini coefficient can range from 0 to 1, where 0 represents perfect equality and 1 represents perfect inequality. The Lorenz curve was developed by Max O. Lorenz in 1905. It is a graphical representation of the distribution of income. It shows the percentage of total income earned by each percentile of the population. The Lorenz curve is often used in conjunction with the Gini coefficient to measure income inequality. The Kuznets curve was developed by Simon Kuznets in 1955. It is a graphical representation of the relationship between income inequality and economic development. The Kuznets curve suggests that income inequality first increases during early stages of economic development, reaches a peak and then begins to decline. The Palma ratio was developed by Gabriel Palma in 2009. It is a measure of income inequality that compares the income share of the top 10% of the population to the bottom 40%. The Palma ratio can range from 0 to 10, where 0 represents perfect equality and 10 represents perfect inequality. In the first part there were mentioned different theoretical approaches to explaining why income inequality exists. It was analysed about how the different factors that can influence a population's income.

In the second part, it was analysed how the structure of household income and its dynamics in the world have been changing rapidly in recent years. One of the most important changes has been the increasing inequality of incomes. This can be seen clearly in the plot of Gini index and net adjusted disposable income per capita in USD per year in OECD countries. The result showed thzt the highet the incom per capita is, the lower the Gini coefficient. The Covid-2019 pandemic crisis has had a major impact on these trends, with unemployment rates rising sharply in many regions of the world. Real GDP growth slowed down significantly in the coming years as a result of the pandemic. The Covid-19 pandemic has had the worst effect on real GDP growth in the last 40 years, worse than the financial crisis of 2007-2008 or the crisis in the 1980s. However, there has been a rapid rise in indicators in 2021, with growth of 6.1%, the highest value in the last 40 years. There is a trend of each successive crisis being more severe than the previous one, but the period of recovery is faster each time. The forecasted real GDP growth for the years 2022-2027 is an average of 3.4% positive growth.

The third part is focused on the construction of multifactor regression of the influence of factors on the Gini coefficient based on the example of the United States. There are many factors that can influence the Gini coefficient, a measure of income inequality. A multifactor regression was used to examine the relative importance of these factors. For example, in the United States, factors such as the gross internal expenditure on R&D, U.S. individual income tax, exports of goods and services, imports of goods and services, transfer payments can all play a role in income inequality. By looking at how these factors influence the Gini coefficient, it was possible to better understand the factors that contribute to income inequality in the United States.

The main significant variables in the multifactor linear regression appeared to be individual income tax, exports and imports. It was essential to divide net

export into two parts, because exports and imports have oppositve influence on the dependent variable.

Based on the results of the regression there were also conducted different tests to validate the feasability of the model. The tests done are following: the skewness and kurtosis test for normality, and the Shapiro-Wilk normality test, Breusch-Pagan / Cook-Weisberg test for heteroskedasticity, Breusch-Godfrey LM test for autocorrelation. In addition, R-squared for the model is very high and is equal to 0.82, which means that the change in the dependent variable was explained by independent variables by 82%.

In the same part, pre-fiscal and post-fiscal Gini coefficient was analysed in different countries based on the World Bank's classification. The results have shown that fiscal policy is much more effective in high-income countries than in upper-middle-income countries, lower-middle-income countries or low-income countries. This is because high-income countries have a higher tax base and a more developed financial system. They also have a more sophisticated government bureaucracy, which enables them to better target and implement fiscal policy measures.

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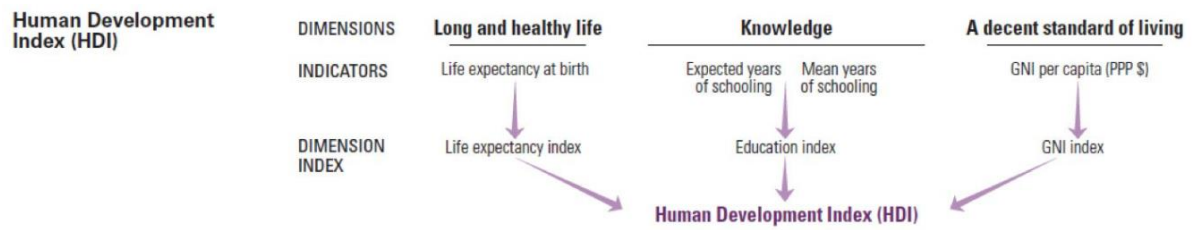
Appendix A

Figure A.1 – HDI index components based on the United Nations

Source: [21]