University of Economics, Prague

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Economics of Globalization and European Integration

Trade openness and income inequality in Eastern Europe

MASTER THESIS

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Abstract

The goal of the master thesis titled "Trade openness and income inequality in Eastern Europe" is to analyze the effects on income inequality changes in the population in the period of transformation from centrally planned economies to market economies in the last decade of the twentieth century. The first part of the thesis focuses on the development before the individual countries started to join the European Union. The subsequent liberalization in the early 21st century is evaluated in the second part of the thesis. The multiple regression analysis is used to estimate the effects. The data were provided by the World Bank for the period of from 1989 to 2014. The objective of the thesis is to enlighten the factors which are influencing the changes in income inequality.

Abstrakt

Předmětem diplomové práce "Míra otevřenosti obchodu a důchodové nerovnosti ve Východní Evropě" je analýzou změn v rozložení důchodů ve společnosti po transformaci ekonomik z centrálně plánovaných na tržní po roce 1989. První část práce se zaměřuje zejména na situaci v devadesátých letech před vstupem jednotlivých zemí do Evropské Unie. Následné liberalizaci po roce 2000 je věnována druhá část práce. K analýze je použito regresního modelu. Data byla použita z databáze Světové banky z let 1989 až 2014. Cílem práce je objasnit, které faktory ovlivňují diferenciaci rozložení důchodů v současnosti jak s vlivem pozitivním, tak negativním.

Keywords

Eastern Europe, Gini coefficient, trade openness, transformation, globalization, liberalization

Klíčová slova

Východní Evropa, Giniho koeficient, otevřenost obchodu, transformace, globalizace, liberalizace

Declaration of authorship

I, Matěj Krčma hereby declare that the thesis "Trade openness and income inequality in Eastern Europe" was written by myself, and that all presented results are my own, unless stated otherwise. The literature sources are listed in the Bibliography section.

Prague, May 31st, 2014

signature

Acknowledgments

Foremost, I would like to express my appreciation and thanks to doc. Ing. Ingeborg Němcová, CSc. for her understanding, patience, and guidance.

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ABBREVIATIONS

CIA Central Intelligence Agency

GPD Gross Domestic Product

HDI Human Development Index

SOE State Owned Enterprises

UN United Nations

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INTRODUCTION

The wages in the former Eastern bloc of the communist countries were held to be abnormally equal in the population, in contrast with the situation in the Western world. It was a result of artificial restrictions that were imposed throughout the majority of communist economies.

The aim of the Soviet revolution was to create a fully egalitarian society. However, there was a considerable spread between the countries in terms of the income distribution. Former Czechoslovakia had the lowest Gini coefficient of 19.7 points in 1986 closely followed by Hungary and Poland with Gini coefficients of 22.1 and 24.7, respectively. Russia had the largest gap between the differences in incomes – Gini coefficient of 26.7.[1] The United Kingdom and the Netherlands were averaging around 28 points in the similar period.[2]

The fall of the Soviet Union forced all the communist countries to make a transition to the market economy and confront the nature of the competitive and globalized market. That affected the income distribution along with the increasing share of the international trade in the gross domestic product ratio. Companies that were protected for decades with the planned output and workforce input had to carry out a swift transformation.

In order to compete with the rest of the world and raise the living standards of the citizens a massive privatization of state assets had to be done. The target was to discontinue exports to Eastern European countries and redirect at least partially to the West. That was not a straightforward task. Another crucial point was the price liberalization which caused that enterprises and their products could no longer rely on the fixed price system but became a subject of the supply and demand price creation.

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[1] Daniel Gros, 2004. *Economic Transition in Central and Eastern Europe: Planting the Seeds*. 2 Updated Edition. Cambridge University Press, page 51.

[2] OECD. 2014. *Stat.Extracts*. [ONLINE] Available at: http://stats.oecd.org/Index.aspx?DataSetCode=IDD. [Accessed 22 April 14].

The environment of market economy allows to remunerate the employees according to their skills and level of education, rather than by sectors of industries. Preceding to that, the centrally planned economies favored employees working in mining, metallurgy, and heavy manufacturing. After transition, there were groups that benefited from the shift to the market economy and those who did not. The gains in the insurance industry and the banking sector were the largest. Moreover, the gender gap difference in incomes diminished in early 1990s. Sizeable gains were also awarded to people with high level of education.[3]

Under these circumstances numerous countries in the Central and Eastern Europe with completely different economic and geographical attributes had to find their own way to prosperity. An ineffective allocation of the capital in conjunction with the workforce migration flows had possibly a negative temporary effect on the wage inequalities. Furthermore, the disparity in employment between the secondary and tertiary sectors in the communist countries and developed countries containing a large number of state owned enterprises including a little or none value added predicted a rise in unemployment in these areas of industries.[4]

The period of transition was followed by a radical advancement in technology and globalization of economic systems in the entire world. The way how people share, distribute and receive information changed abruptly. Technology has allowed us to export jobs which were unimaginable to transfer a decade before. Further reinforcing negative effects on labor income in developed countries. Therefore, the question whether income inequality affects the growth and economic development is tremendously complex. The underlying effects that come into play about income inequality are linked to different stages of economic development of a country, democratic system and other geo-economics factors.[5]

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[3] Večerník, J. V., 2001. *Mzdová a příjmová diferenciace v České republice v transformačním* období .Sociologický ústav, Akademie věd České republiky, [Online]. Available at:http://studie.soc.cas.cz/upl/texty/files/181_SP%2001-05%20cely%20text.pdf [Accessed 22 May 2014], page 9-28.

[4] Daniel Gros, 2004. *Economic Transition in Central and Eastern Europe: Planting the Seeds*. 2 Updated Edition. Cambridge University Press, page 69.

[5] Bureau for Development Policy, United Nations Development Programme , 2013. Humanity Divided: Confronting Inequality in Developing Countries. *Why does national inequality matter?*, [Online]. Chapter 2, 41 -

In the period of globalization the openness of economy is becoming more important than ever before. Increasing globalization pressures lead to differentiation of every export based economy. The focus on comparative advantages was essential for all post-communist countries. The main comparative advantage of post-communist countries was relatively cheap and well educated workforce. Especially in engineering, chemical industry and metallurgy.[6]

The intent of this thesis is to estimate whether and in which way did trade openness, growth, average years of schooling, and migration flows influence income dispersion in post-communist countries.

In order to have a slight glimpse of the current trends and situation in the income distribution around the world, the relation between the income inequality and growth is analyzed in the following chapter. The development of income inequality fluctuations is described in Chapter Two. Chapter Three contains theoretical framework and econometric analysis is carried out in Chapter Four and Chapter Five.

62. Available at:http://www.undp.org/content/dam/undp/library/Poverty%20Reduction/Inclusive%20development/Humanity%20Divided/HumanityDivided_Full-Report.pdf [Accessed 08 April 2014]

6 David A. Dyker, S. Radosevic, D. D., S. R, 1997. *Innovation and Structural Change in Post-Socialist Countries: A Quantitative Approach*. 1st ed. Moscow: NATO Advanced Research Workshop, page 112.

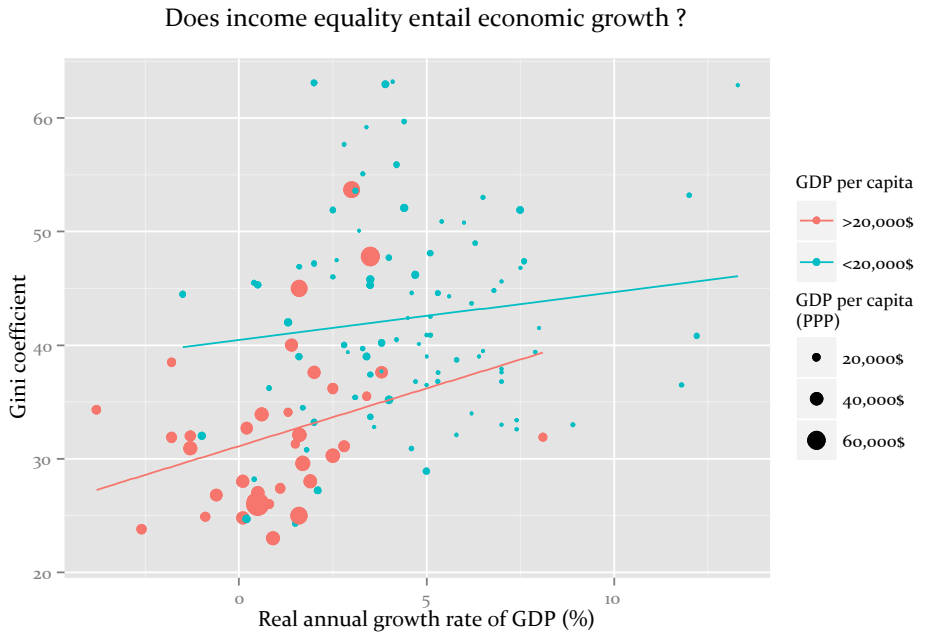
1 STYLIZED FACTS ABOUT INCOME INEQUALITY

To investigate if or how the income inequality influences the growth or welfare of a population, a simple income inequality and growth relationship is analyzed in this chapter, taking into account the variables including GPD per capita, Gini coefficient and HDI index. The data were provided by the CIA, OECD, World Bank, and United Nations online database for the latest period available.

1.1 Does income equality entail economic growth?

How does the income inequality affect the current economic growth? As we can see in following Figure 1.1, the economic growth in developed countries is still in recovery

Figure 1.1: Income inequality and economic growth



Source: CIA Factbook, World Bank

from the Global financial crisis that took place in 2008. However, developing countries are taking advantage of a swift recovery. For clarification, the sample size in the figure is divided into two groups to diversify between the developed and developing countries. Each dot is an individual country. GDP per capita exceeds 20,000 $ in the first group while it is less than 20,000$ in the second one. A linear regression line is added to identify the range of the growth between the two groups.

The size of each dot represents GDP per capita. The larger is the dot, the higher is GPD per capita.

At first glance we can clearly distinguish a cluster of developed countries oscillating around negative growth rates ranging to positive 3%, while some developing countries are enjoying even two-digit growth rates. Income inequality is also apparently different. High GPD per capita countries tend to have more equal distribution of income. That is in consistence with Kuznets. Kuznets proposes that underdeveloped countries initially start with wide distribution of income in society, but as the proportion of the growing middle class starts to rise in comparison with low-income groups, income inequality ratio reaches a stabilization point and narrower distribution of incomes.[7] The space between the two regression lines may be defined as a gap of missing middle class between two samples. Most of the underdeveloped countries have very low income per capita, which furthermore increases the income inequality in the population.

The disturbing fact is that Figure 1.1 suggests somewhat positive relationship between GPD growth and income inequality. Less equal societies exhibit higher growth rates. The reason is that most of the countries are in a stage of industrialization and urbanization, therefore the difference in incomes is widening between the rural and urban population. A similar effect takes places between sectors. The difference between incomes tend to be far wider between the first and second or third sector as suggested by Kuznets.[8]

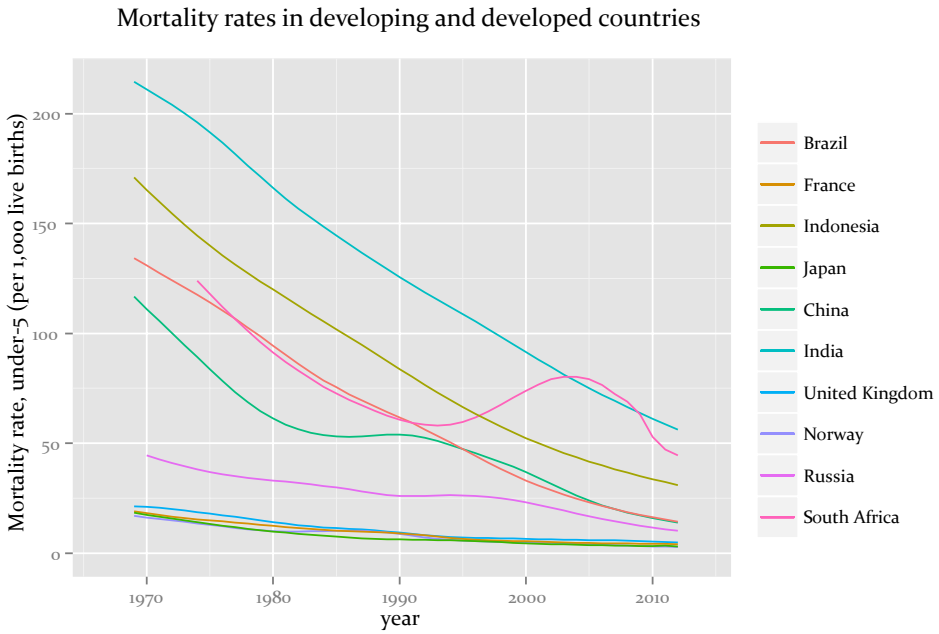
1.2 Longer average life expectancy and mortality rates

Progress on technological development of a country has a positive effect on the quality of the healthcare system. The average life expectancy consequently increases and mortality rates decrease but these effects might in fact increase the inequality in incomes. The increasing proportion of the elderly population is more likely to

[7] Kuznets, Simon, 1955. Economic growth and income inequality. *The American Economic Review*, XLV, page 2-12.
[8] Kuznets, Simon, 1955. Economic growth and income inequality. *The American Economic Review*, XLV, page 12-18.

increase the share of the lower income bracket. Reducing mortality rates are again more likely to increase inequality rather than reduce it. As the mortality rate is decreasing in the developing countries, the share of lower income must be increasing in the total population.

Figure 1.2: Mortality rates in developing and developed countries



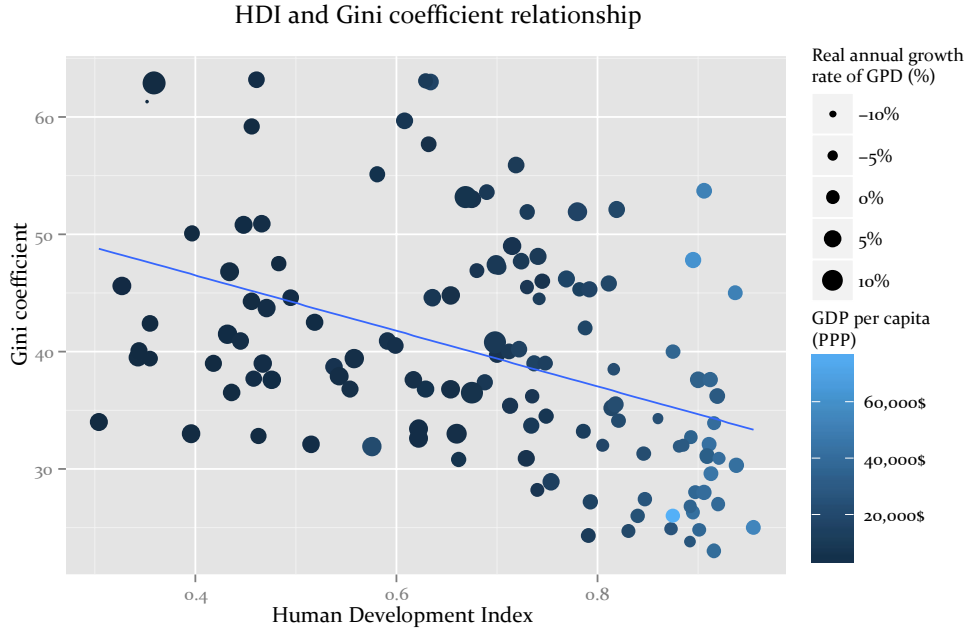
Source: World Bank

Figure 1.2 shows data on mortality rates from India, China, and other countries for reference. We can see that there is still room to lower the mortality rate, but the technology is reaching a plateau comparable to the developed countries. China managed to reduce mortality up to 6 times and India 4 times in the past 40 years. In 2012 the actual mortality rate is 56 deaths per thousand live births in India, followed by 14 deaths per thousand live births in China, and only 4.8 deaths per thousand live births in the United Kingdom. It implies that these factors will have considerably limited effect on income inequality in the future. However, the significant aging population of the today's workforce will have inevitable consequences on income inequality.

1.3 Income (in)equality in the long run

One of the very interesting results that Kuznets presented in his paper was that in the long run, developing economy should reach a more equal distribution of incomes in society. His observations were based on the diminishing shares of the top-income groups and increasing shares of the low-income groups. The data were from the United States, the United Kingdom and Prussia and in all of them the inequality was decreasing before and even after Second World War. Thus it would be appropriate to pose similar question in present. Do the most developed countries have equal distribution of incomes in general? Do the Kuznets' predictions still hold after the period of the Cold War and the Digital Revolution still hold?

Figure 1.3: Income inequality in the long run



Source: World Bank

Figure 1.3 shows the relationship between the Gini coefficient and HDI. As we can see there is a negative relationship between these two variables. Once again, each dot represents one individual country. Developed countries which are defined by lighter blue color are scattered in the right downward corner. Even though that there are some outliers with high Gini coefficient and high GDP per capita, the majority is

located in high HDI and low income inequality area – proving Kuznets' hypothesis right in general.

The two outliers located above 45 points of the Gini coefficient and with GDP per capita higher than 45,000 $ are Hong Kong and the United States. One of the possible explanation for that might be that the United States are constantly attracting a considerable number of immigrants. According to the Homeland Security statistics almost 1 million people receive a legal residency permit every year. Most of them will take place in the lower income bracket. On the other side, the United States are a target for a large number of university-educated workers, which will take place in high income bracket – possibly increasing the income distribution inequality.

2 DEVELOPMENT IN EASTERN EUROPE AFTER 1990

One of the most important facts that we have to take into account when examining the income inequalities in Eastern Europe is the level of development of these countries after the Second World War. Unlike the current developing countries, their GDP per capita values were very similar in comparison with the Western developed countries.

2.1 GDP per capita in Eastern Europe in 20th century

We have to consider that most of the European countries went through the process of both industrial revolutions in an almost identical time period. It implies that the creation of the secondary sector occurred quite earlier than in the current developing countries.

Table 1: Per capita GDP in Europe

Table 1: Per capita GDP in Europe,
($ in 1990 international prices)

	country	1950	1973	1990
	Western Europe	5,217	12,233	16,196
1	Belgium	5,472	12,398	17,962
2	United Kingdom	6,879	12,022	16,503
3	France	4,943	13,035	18,094
4	Italy	3,573	11,475	16,054
5	Spain	2,200	7,653	12,157
	Eastern Europe	3,190	7,332	5,405
1	Bulgaria	1,577	5,296	5,537
2	Czechoslovakia	3,429	7,000	8,464
3	Hungary	2,481	5,596	6,454
4	Poland	2,447	5,334	5,113
5	USSR	2,827	6,101	6,888

Source: Broadberry, Stephen, 2011. Aggregate And Per Capita Gdp In Europe, 1870-2000

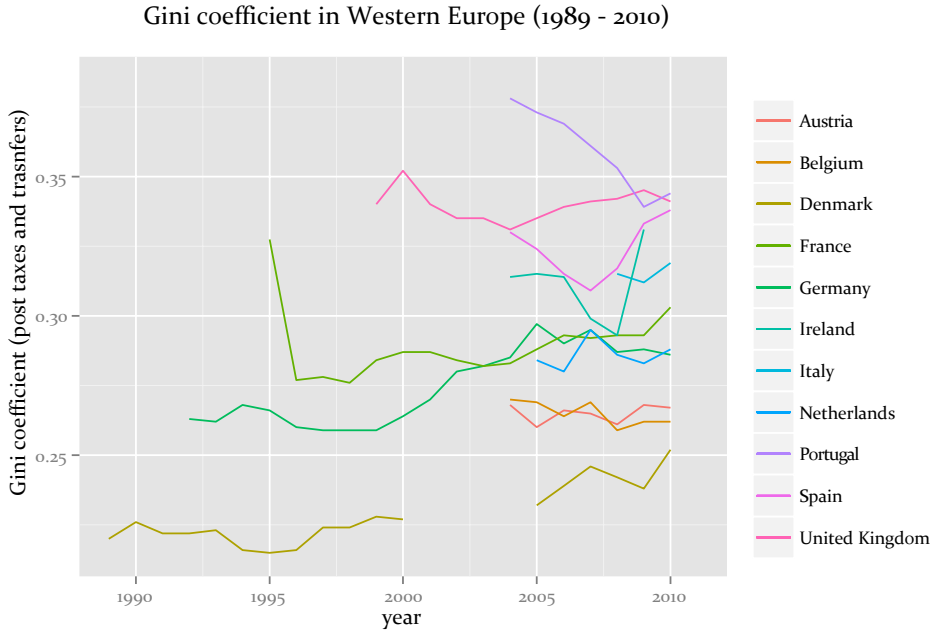
Also, we have to consider that the values in Table 1 are only approximations. The stage of development of individual countries might had been a lot different. The currencies were not convertible and exchange rates were set by central banks. For example, we can see that in the last period the GDP per capita in Eastern Europe did not increase as much as it did in Western Europe.

In the 1950s, there were differences among the countries in Europe concerning their stage of development, but they were hardly significant. On the contrary, the Western countries were averaging about three times higher GDP per capita in the 1990s. Therefore it is very likely that the pattern suggested by Kuznets may be a bit different. The initial distribution will definitely be very egalitarian. Perhaps the pattern will have inverted "U shape". Income inequality probably increased at the beginning and, over time, as GDP per capita was catching up with other European countries, the income inequality started to fall again.

2.2 Income inequality in Europe from 1989 to 2010

Income inequality data are one of the incredibly difficult data to obtain. Thus, there are lots of data points missing in the following dataset. The dataset is divided into two groups in the terms of the former centrally planned economies and market

Figure 2.1: Gini coefficient in Western Europe (1989 - 2010)



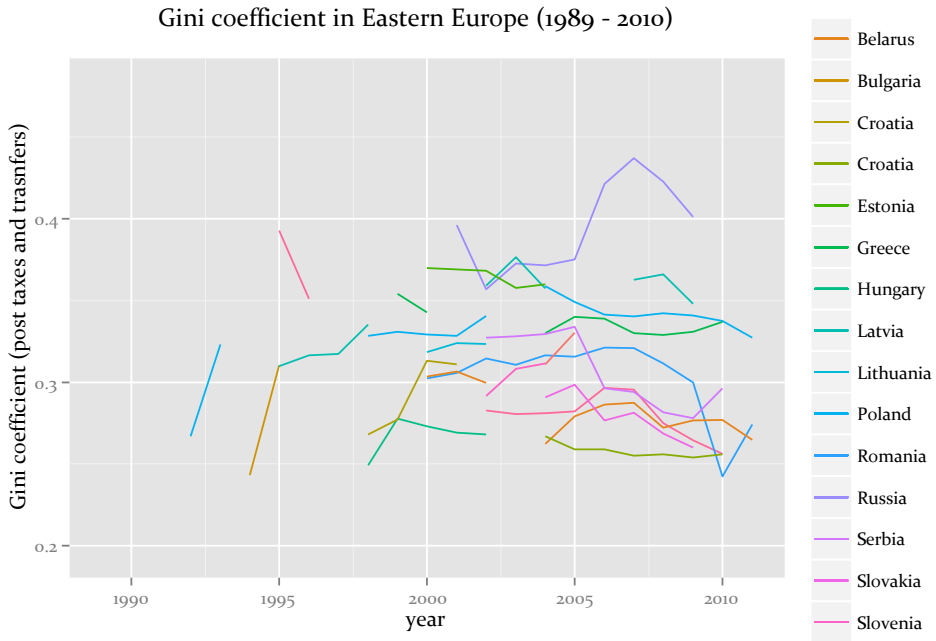
Source: OECD.StatExtracts

economies. As we can see in Figure 2.2, there is hardly any considerable trend among this group. It seems that the inequality slightly increased in the past 20 years but the spread between the mentioned countries is pretty narrow. Denmark has the most equal distribution of about 0.25 points and Portugal is on top of the chart with 0.34

points. The difference is just 0.09 points, the inequality in incomes might have increased in the previous years; however, it keeps stable proportions.

Stable income inequality levels in Western Europe are interesting in contrast with the recent opening of their labor markets. It would be very peculiar to imagine that post-1989 migration flows had virtually no effect on the distribution. The income share held by deciles of the total population should provide better understanding of the problem. We will examine that later in this chapter.

Figure 2.2: Gini coefficient in Eastern Europe (1989 - 2010)



Source: OECD.StatExtracts

The data from Eastern European countries provide much more interesting picture. Although there is a lack of data especially in 1990s we can still identify a sharp increase in inequality in Lithuania, Croatia, Hungary, and so forth. On the other hand, we can observe that in the end of the first decade the income inequality had decreased. It is a bit complicated but there seems to be an inverted "U" shape in the development of the income inequality. The income inequality increased sharply in the early stages of transformation but Figure 2.2 suggests that the income inequality has been falling steadily since 2005. Nevertheless, Eastern Europe still exhibits higher inequality rates than their Western counterpart. The majority of the sample size is above 0.3 points

of the Gini coefficient in comparison with Western Europe where the greater number of countries is located under 0.3 points of the Gini coefficient. To understand the shifts in wealth held by the population in deeper perspective we shall look into the income held by deciles.

2.3 Income share held by deciles of population

The results we received in the previous subchapter imply that the share of lowest 10% of the total population should be increasing and that the top income bracket should be losing their share. The data on the income share held by lowest 10% show the exact opposite despite the evidence shown in the previous subchapter.

Table 2: Income share held by lowest 10%
Table 2: Income share held by lowest 10%
(1990 - 1999, 2000 - 2010, mean value)

country	Income share held by lowest 10%	Income share held by lowest 10%	Δ%
Albania	3.78	3.56	-0.22
Belarus	3.88	3.67	-0.21
Bulgaria	3.66	3.02	-0.64
Croatia	4.02	3.52	-0.5
Czech Republic	4.76	n/a	n/a
Estonia	3.27	2.72	-0.55
Greece	n/a	2.55	n/a
Hungary	4.38	3.85	-0.53
Latvia	3.28	2.72	-0.56
Lithuania	3.53	2.98	-0.55
Poland	3.51	3.19	-0.32
Romania	3.8	3.34	-0.46
Russia	2.42	2.61	0.19
Serbia	n/a	3.41	n/a
Slovakia	4.56	4.06	-0.5
Slovenia	4.13	3.46	-0.67
Ukraine	3.48	3.96	0.48

Source: World Bank, own calculations

The values in Table 2 are divided into two periods with the mean values of the income share held by the lowest income group. According to the World Bank dataset, the income share of lowest 10% of the population actually diminished in the past twenty years. On average the share declined by 0.4%. There were only two countries where

the position of the lowest income bracket has improved. Those are Russia and Ukraine where the share of lowest 10% increased by 0.19 and 0.48, respectively. Based on the mentioned dataset, the income inequality should be increasing. It is very likely that the main change occurred in the middle 80% of the population. To understand these values in the context we have to look up the values for the top income bracket.

The top income group income share is typically much larger when compared to lowest 10%. It is roughly ten times larger. Table 3 is structured in the same way as the previous one. Once more we can see a pattern similar to the previous Table 2 – the share of the top income bracket has increased slightly in the past twenty years, augmenting further the income inequality. The increase varies between the countries

Table 3: Income share held by highest 10%
Table 3: Income share held by highest 10%
(1990 - 1999, 2000 - 2010, mean value)

country	Income share held by highest 10%	Income share held by highest 10%	Δ%
Albania	21.71	25.51	3.8
Belarus	22.02	22.85	0.83
Bulgaria	22.9	23.93	1.03
Croatia	22.21	25.09	2.88
Czech Republic	23.16	n/a	n/a
Estonia	27.94	28.3	0.36
Greece	n/a	26.04	n/a
Hungary	22.81	23.43	0.62
Latvia	24.72	27.94	3.22
Lithuania	25.68	26.41	0.73
Poland	24.69	26.79	2.1
Romania	22.18	24.08	1.9
Russia	33.86	30.53	-3.33
Serbia	n/a	24.43	n/a
Slovakia	19.54	23.77	4.23
Slovenia	23.76	23.84	0.08
Ukraine	25.52	22.80	-2.72

Source: World Bank, own calculations

and there is a lot of data missing but on average the top income group increased their share by 1.12%. The only countries where the highest income bracket actually lost their share is surprisingly Ukraine and Russia, even though that Russia has the highest

Gini coefficient of about 0.40 points. Except for Slovakia and Albania, other countries show minor fluctuations in the mentioned time periods.

Contradictory results between the Gini coefficient and the income share held by the highest and lowest 10% population propose that the substantial improvement in more equal distribution must have occurred in the middle 80% of population.

Before we look at the econometric model to examine the possible reasons of these shifts in the income distribution, there are still several more variables to take into consideration.

2.4 Trade openness, migration, and growth

Prior to the opening of the Eastern European economies exports accounted only for a small fraction of GDP. The countries remained in an isolation for decades and the international trade used to be limited. The primary objective of the central planners was to self-produce the majority of goods needed in every state, thus frequent shortages were common mainly due to the inability of the central planners to allocate efficiently the production factors and capital available.

Table 4: Trade openness of Eastern European countries
Table 4: Trade openness of Eastern European countries

country	Exports (as % of GDP, 1992)	Exports (as % of GDP, 2011)
Czech Republic	38	73
Hungary	32	94
Poland	18	45

Source: World Bank

Table 4 points out how the exports to GDP ratio has changed from the early stage of transformation till today in Czech Republic, Hungary, and Poland. In 1992 exports accounted for 32% of GDP. Twenty years later it is almost 94%. An astonishing result in the time of economic globalization.

2.4.1 Trade openness

The exposure to the international competition must have influenced the labor market directly affecting the income distribution. As previously stated, there was

a substantial chunk of industries with a negative value added. With ongoing liberalization process those industries were in risk of bankruptcy. A huge part of workers was also employed at the manufacturing sector and only a little part in services opposed to Western Europe – a disastrous prospect for employees.

Table 5: Share of industries with negative value added (1991)

Source: Daniel Gros, 2004. Economic Transition in Central and Eastern Europe: Planting the Seeds. 2 Updated Edition. Cambridge University Press, page 69

These factors may have contributed to the initial increase in the income inequality before the production factors could have been allocated efficiently at world prices. In some countries the proportion of unsustainable industries was estimated to be even 50%. For illustration, Table 5 presents the shares of unhealthy industries in the individual countries. The interesting fact is that some countries even had more than half of negative value added industries.[9]

Most of them were industries in the manufacturing sector. In 1990s the employment share in services greatly increased at the expense of manufacturing. It was, and still is, a result of shifting capacities to cheaper input manufacturing countries like China or India. In England and Wales the percentage of people employed in manufacturing

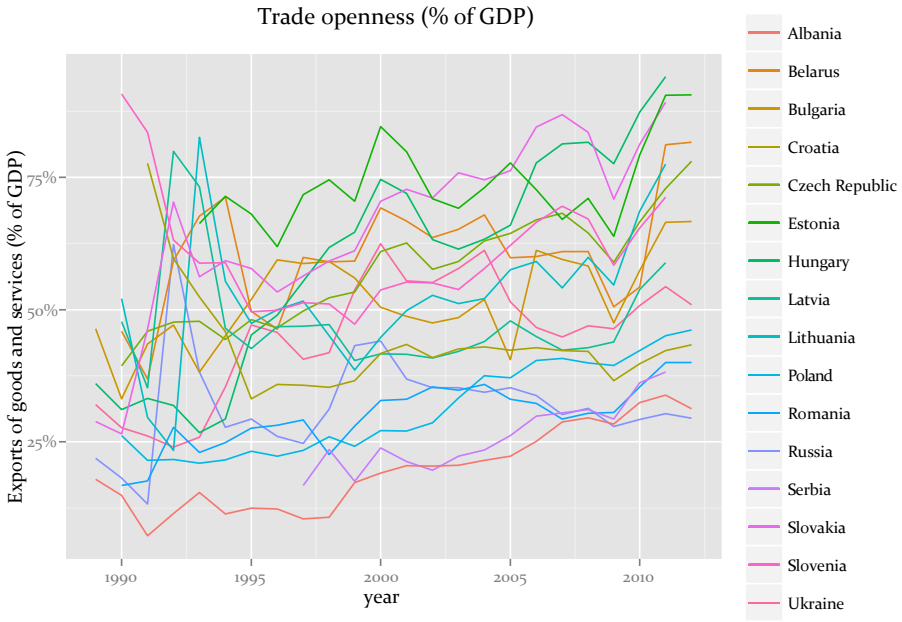
[9] Daniel Gros, 2004. *Economic Transition in Central and Eastern Europe: Planting the Seeds*. 2 Updated Edition. Cambridge University Press, page 69

dropped from 34.7% in 1921 to only 8.9% in 2011. Agriculture experienced similar decline. Advancements in the technological progress allowed the mechanization of labor workforce. The sector share in agriculture fell by 21.4% in the past 170 years in England.[10] The age of personal computers and cost of almost zero to redistribute data throughout the world enabled enterprises to spread their production chains to different countries in race to maximize efficiency in utilizing resources. The tertiary sector thrived in developed countries. It increased its share to 81.1% of working people in 2011. In post-communist countries the share in manufacturing in 1990s was much higher; according to the World Bank the share of employment in manufacturing averaged above 40 %.[11] The underlying problem is that the skills required for working in manufacture may not be very useful in the service sector. For example a person working in the mining industry is very unlikely to find a job in accounting and so on. Another factor is the geographic location of new jobs. It is less probable that they will spawn in same areas where previous jobs were lost. In the short term there have to be some tradeoffs before the long term benefits of international division of labor can be exploited.

[10] Office for National Statistics. 2014. *Employment by Industry Sector*. [ONLINE] Available at: http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Employment+by+Industry+Sector#tab-data-tables. [Accessed 15 May 14].
[11] The World Bank. 2014. *Employment by industry (% of total employment*). [ONLINE] Available at:http://data.worldbank.org/indicator/SL.IND.EMPL.ZS. [Accessed 12 May 14].

Let's return once more to the exports to GDP ratio. Fortunately there is enough data to show how the ratio evolved from early 1990s. If we leave out initial fluctuations, we clearly see slow but steady increase in exports in Figure 2.3. Countries geographically located in Central Europe incline to have higher exports to GDP ratio than the others. The effect of Global financial crisis is evident in 2008 to 2009. There was a sudden

Figure 2.3: Exports of goods and services (as % of GDP)



Source: World Bank

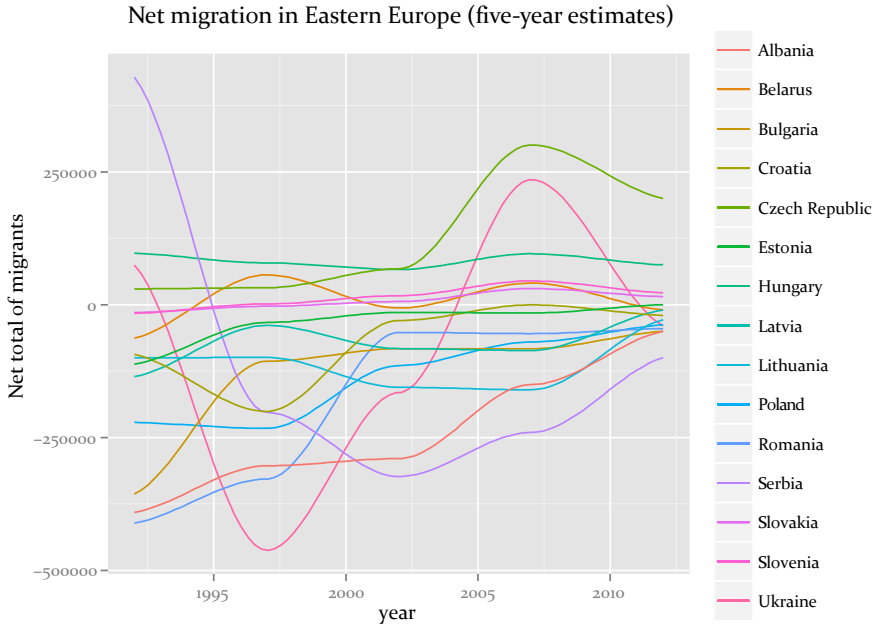
drop of exports in almost every country in the sample set followed by even sharper increase in the exports to GDP ratio. The possible explanation of the sharp increase of exports subsequent to crisis might be the need for further specialization of companies in the more globalized economy. Current international competition and search for larger consumer base no longer favors local producers.

2.4.2 Migration

Migration trends is a factor which would be useful to analyze before we focus onto theoretical models. The reason is very simple. Migration directly affects the amount of production factors by increasing or reducing their numbers.

The most important is to understand what kind of education workers have when they are leaving their country and where they are going. These factors determine if they are more likely to contribute to the lower bracket income, or if they are mostly highly skilled college-educated people that will join the top income brackets.

Figure 2.4: Net migration in Eastern Europe



Source: World Bank

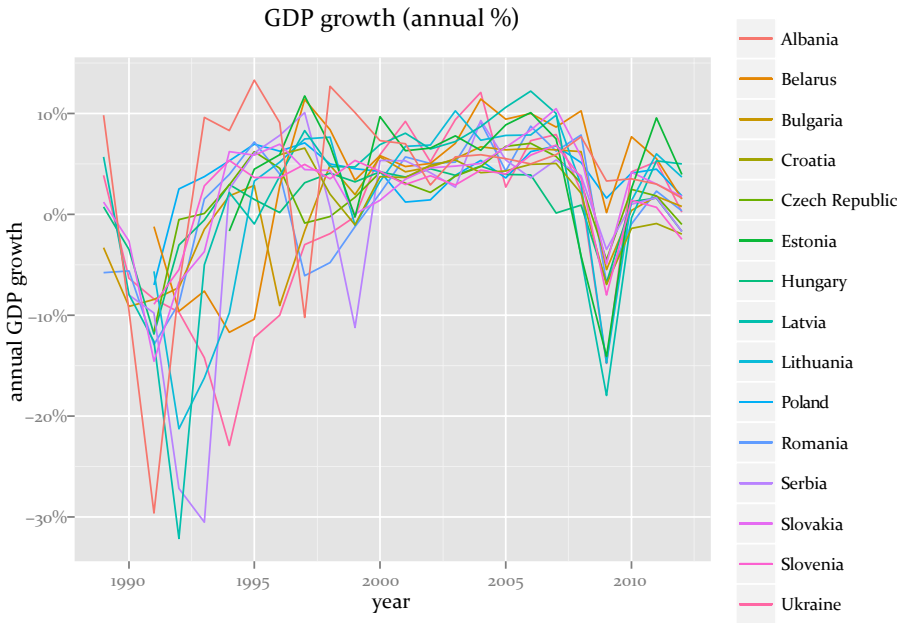
Unfortunately we cannot distinguish the education level in Figure 2.4 which shows the net immigration in eastern European countries. Nevertheless we can identify that the highest outflow of workforce occurred between 1995 and 2000. Since then the outflow has stabilized and we can see that the net migration is converging to zero. It would certainly be beneficial to identify the outflow and inflow effects of migrants on income inequality.

2.4.3 Growth

The last factor that, in my opinion, influences directly the income inequality is the growth. Kuznets regarded the growth in early 1950s as a shift from agriculture to manufacturing. In the 21st century we can interpret this view to another shift – from

manufacturing to services.[12] The proportion of services in the relatively high income economies is gradually increasing at the cost of manufacturing. If the spread in the income in the tertiary sector is higher than in manufacturing, then the group with a higher inequality is increasing. This would have further negative effects on income inequality.

Figure 2.5: GDP growth (annual %)



Source: World Bank

To summarize this chapter, I can say that Eastern European countries entered the transformation phase with a relatively high GDP per capita and their level of development used to be higher than in other developing countries at that time. Yet there was a significant chunk of industries with no value added and their prospect in competing depended on the execution of the assets privatization. Thus the pattern in the income distribution throughout the transformation period is likely to be different compared to the current developing countries. Furthermore, the openness of economies has increased greatly in the past twenty five years. Few even managed to reach a similar level of trade openness comparable to Western economies. On the

[12] Kuznets, Simon, 1955. Economic growth and income inequality. *The American Economic Review*, XLV, page 12-15.

other hand, there was a huge outflow of workforce from Eastern Europe that has stabilized just recently.

The outcomes and effects of these trends may have been positively or negatively effecting the income distribution. That is why I tried to analyze factors that have changed tremendously in recent years.

3 THEORETICAL MODEL

$$IncomeInequality_{i\,(1989\,-\,1995)} = \beta_0 + \beta_1\, tradegdp_i + \beta_2 growth_i + \beta_3 syrs_i + \beta_4 migr_i + u_i$$

$$IncomeInequality_{i\,(2005\,-\,2011)} = \beta_0 + \beta_1\, tradegdp_i + \beta_2 growth_i + \beta_3 syrs_i + \beta_4 migr_i + u_i$$

Multiple regression is used to estimate the effects. Testing is divided into two periods. The first one ranges from 1989 to 1995 and covers the early stage of economic transition, and the second one intends to cover recent years from 2005 to 2011.

The main hypotheses is that at the beginning of the transformation process, the income inequality had increased due to numerous reasons. One of them was the redistribution system of transfers in society that could no longer work in the system of market economy. After all there were no methods how we could measure those differences between the countries; instead, we will use an exposure to the international trade, which may be a simplistic approach but might yield interesting results. The assumption is that a higher exposure to the international competition wiped out uncompetitive industries in the beginning, which resulted in higher inequality in early 1990s. On the other hand it could generate jobs in the second period. That's why there are two almost identical models but the data for each regression will come from different time periods.

Additional factors include growth, average years of schooling, and net migration flows. I expect the annual growth to contribute to a reduction in inequality in the first time period, but to an increase in the second time period as a result of the increasing share of the tertiary sector. The average years of schooling may be insignificant in both time periods mainly due to very tiny differences in the sample set. The effect of migration will largely depend on which type of education the migrants have when they are leaving or entering the country.

4 DATA

The dataset used in this thesis contains data from publicly available databases of World Bank and OECD. They refer to two time periods as mentioned in previous chapter.

The dataset contains 80 samples of multiple countries from different years, including data specified below.

1. *Income Inequality* is expressed as Gini coefficient. Gini ratio can take values ranging from 0 to 1. Where value 1 represents perfect inequality and 0 represents perfect equality in distribution of income.
2. *Trade to GDP ratio* is measured as exports of goods and services as % of GDP and is reported annually.
3. *Growth* is annual percentage growth rate of GDP in local currency.
4. *Average years of schooling* is average numerical value of completed school years of a population.
5. *Net migration flows* is difference between emigration and immigration flows based on 1 year period.

4.1 1989 to 1995 dataset summary

Table 6 represents a brief summary of data which we will be working with. As we can see, the sample size is only 21 entries large due to the limited amount of information I had to remove the net migration effects from the model for the first

Table 6: 1989 to 1995 dataset summary
Table 6: Sample set summary

Statistic	n	Mean	St. Dev.	Min	Max
Gini coefficient	21	29.009	4.483	23.310	39.500
Trade to GDP ratio	21	44.066	18.617	16.727	82.544
GDP growth (annual %)	21	−3.473	7.214	−22.934	4.480
Mean years of schooling	21	8.910	0.844	7.500	10.900

Source: World Bank, OECD, United Nations, own calculations

period. Thus, the dataset includes four coefficients – the Gini coefficient, the trade to GDP ratio, the annual GDP growth and the mean years of schooling.

We can clearly identify that the trade to GDP ratio varies enormously between the countries. The standard deviation of trade to GDP ratio is almost half of its mean value. The additional indicators show fairly consistent values and the mean years of schooling are almost identical in the whole sample set.

4.2 2005 to 2011 dataset summary

Luckily I was able to gather more data for the second period. Table 7 shows our dataset summary for the period ranging from 2005 to 2011. The dataset again includes the same coefficients. The net migration flows will be treated in a separate regression.

Table 7: 2005 to 2011 dataset summary
Table 7: Sample set summary

Statistic	n	Mean	St. Dev.	Min	Max
Gini coefficient	47	30.427	3.309	24.240	37.570
Trade to GDP ratio	47	47.644	17.232	22.273	86.856
GDP growth (annual %)	47	3.668	5.874	−17.955	10.494
Mean years of schooling	47	10.553	0.699	9.300	11.600

Source: World Bank, OECD, United Nations, own calculations

The development in past 25 years has taken the following trends. If we compare Table 6 with Table 7, we can see that income inequality increased by a single point, but the distribution is narrower. There has been a rising importance of trade internationalization. The exports on GDP increased approximately by 3.578% on GDP. Furthermore, the annual GDP growth is again in positive numbers, even though that most countries have experienced negative growth rates due to the Global financial crisis. The mean years of schooling indicator increased by roughly two years on average but its distribution is even narrower than in 1989 to 1995 period. Therefore we can expect that the mean years of schooling will probably have little or no effect on the distribution of income.

5 REGRESSION RESULTS

The regression results are divided as well into two subchapters for easier understanding. Let's start chronologically with the first period.

5.1 Period from 1989 to 1995

Table 8: Regression results 1989 to 1995
Table 8: Regression results

	Dependent variable:		
	Gini coefficient		
	(1)	(2)	(3)
trade to GDP ratio	0.104*	0.088*	0.088
	(0.050)	(0.050)	(0.051)
GDP growth (annual %)		– 0.188	– 0.192
		(0.128)	(0.132)
Mean years of schooling			0.324
			(1.102)
Constant	24.419***	24.459***	21.597**
	(2.374)	(2.305)	(10.018)
Observations	21	21	21
R^2	0.187	0.274	0.278
Adjusted R^2	0.144	0.194	0.150
Residual Std. Error	4.147 (df = 19)	4.026 (df = 18)	4.132 (df = 17)
F Statistic	4.373* (df = 1; 19)	3.400* (df = 2; 18)	2.181 (df = 3; 17)
Note:			*p< 0.1;**p< 0.05;***p< 0.01

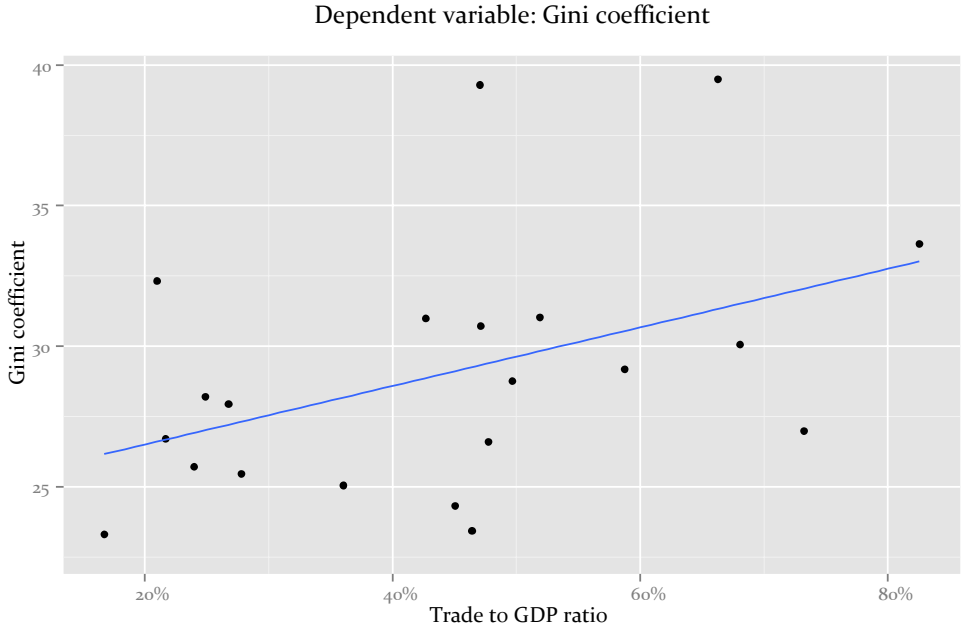
Source: own calculations

The regression results in columns (1) to (3) report different regressions. Further entries in the table are the coefficients, their standard errors, R squared, adjusted R squared, number of observations, F statistics, and p-values.

In the regression (1) we want to check whether the Gini coefficient depends on the value of the trade to GDP ratio or the trade openness of the economy. The regression (1) suggests a slightly positive relationship between income inequality and trade openness in our sample set. For every 1% increase of exports on GDP the inequality

rises by 0.104 points. The hypothesis that the effect of the trade to GDP ratio has no effect on income inequality can be rejected at 10% significance level. However, the actual two-tailed p-value equals 0.0513, thus it is very close to 5% significance level.

Figure 5.1: Gini coefficient and trade openness (1989 to 1995)



Source : own calculations

The visual relationship amongst the trade openness and income inequality can be seen in Figure 5.1. For 40 % increase of the trade-on-GDP ratio we can expect income inequality to rise by four points according to our regression (1) results. R squared is only 0.187 which means that our linear model only moderately fits our dataset, but the pattern is still visible.

The question whether the trade openness is truly the cause of income inequality increase will be discussed in next chapter. In this chapter I would like to focus purely on the regression results and interpretation.

Column (2) shows the regression with the annual growth effects added. The results show a negative relationship. The increase of 1% of growth rate decreases income inequality by 0.188. Nonetheless, the coefficient is insignificant according to our regression results. The two tailed p-value for the growth is 0.1592. The hypothesis that the growth effect is zero can be rejected on 20% significance level. The F-statistics is testing hypothesis if the coefficients growth and trade to GDP are zero. The p-value

of the F-statistics is 3.4 and can be rejected at 10% significance level. The R squared increased by 0.087 but that is caused by adding the second repressor – growth. The adjusted R squared tells us whether the measure of the fit has improved or not with the multiple regressors. The adjusted R squared increased only by 0.007 which can be considered as unimportant. Overall, the annual growth seems to have a minor effect on income inequality.

The regression (3) added the mean years of schooling regressor to the model. From the data summary subchapter we know that the mean years of schooling data have a very narrow distribution. The standard deviation is only 0.844 and the mean value is 8.910. This is one of the reasons why it proved to be insignificant. The F-statistics is no longer different from zero at 10% significance level and the adjusted R squared diminished from 0.194 to 0.150. We can state that the mean years of schooling are not a necessary estimator in the model.

5.2 Period from 2005 to 2011

The regression results from the second period are presented in Table 9. The structure is completely the same as in subchapter 5.1.

Table 9: Regression results 2005 to 2011
Table 9: Regression results

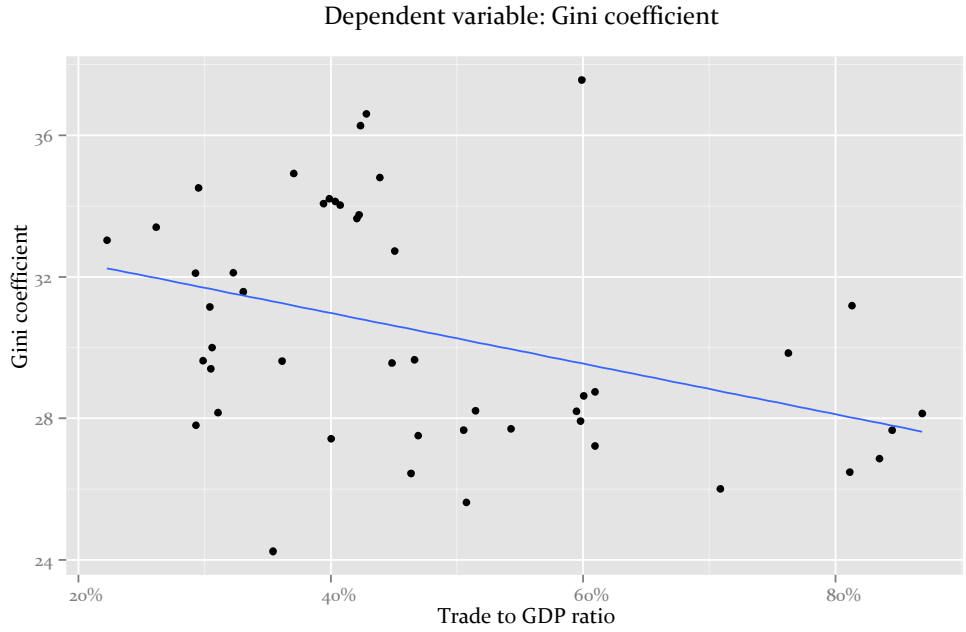
	Dependent variable:		
	Gini coefficient		
	(1)	(2)	(3)
trade to GDP ratio	−0.072***	−0.074***	−0.045
	(0.027)	(0.027)	(0.038)
GDP growth (annual %)		0.042	0.001
		(0.080)	(0.088)
Mean years of schooling			−1.044
			(0.943)
Constant	33.835***	33.790***	43.568***
	(1.344)	(1.358)	(8.932)
Observations	47	47	47
R^2	0.139	0.144	0.168
Adjusted R^2	0.120	0.105	0.110
Residual Std. Error	3.105 (df = 45)	3.130 (df = 44)	3.122 (df = 43)
F Statistic	7.248*** (df = 1; 45)	3.702** (df = 2; 44)	2.890** (df = 3; 43)

Note: *p< 0.1;**p< 0.05; ***p< 0.01

Source: own calcuations

In column (1) we are testing the hypothesis whether the trade to GDP ratio affects the income distribution. From the results we can reject at 1% significance level that the trade to GDP ratio has zero effect on income inequality, which is a quite significant result. A fascinating point is that the trade openness has the opposite effect as compared to 1989 to 1995 period. In first period, the trade openness was increasing income inequality. The current results estimate that for every 10% of the trade increase on GDP we can expect income inequality to fall by 0.72 points. However, the measure of the fit of our model – the R squared value – is lower

Figure 5.2: Gini coefficient and trade openness (2005 to 2011)



Source: own calculations

In Figure 5.2 we can see a shift of effects. Countries with higher exports to GDP ratios tend to have more equal distribution of income, which is perfectly the opposite in comparison with the results from the first period.

The second column (2) presents the results of the annual growth effects on income inequality. Once again the results are statistically insignificant on 1%, 5%, and 10% significance level. We will have to compute the p-value by ourselves. As a result, we could reject that growth effects on income inequality are zero at 60% significance level. That is not statistically significant by conventional means. On the other hand, it is interesting that the growth has positive effect on income inequality – the opposite as compared to 1989 to 1995 period. Is that a result of an increasing tertiary sector?

Column (3) includes an additional independent variable – the mean years of schooling. Unfortunately, it proved to be insignificant. We can reject the hypothesis that the mean years of schooling effects on income inequality are zero on 30% significance level, which is not a quite significant result. A point worth mentioning here is that more average years of schooling equal to a more balanced income distribution

5.3 Migration effects

One of the aims of the thesis was to estimate the influence of migration, simply because migration lowers or augments the share of available workforce. The impact on income inequality largely depends on whether migrants move into complementary or competitive job positions. Another viable component to incorporate into migration model would be remittances, which are tightly associated with migration flows. Nevertheless, I was not able to gather data that would include the level of education for people leaving and entering individual countries, which would be definitely beneficial to examine. Without this information we can only speculate if migrants are increasing or decreasing income inequality. I used the net migration as an independent variable instead.

Table 10 presents the results of regression of the Gini coefficient on the net migration. The sample set is only 12 observations large due to the scarcity of data concerning the migration flows. The results suggest a negative result between income inequality and the net migration although they proved to be insignificant on 1%, 5 %, and 10% significance level. The two tailed p-value is 0.3103, thus we could reject the hypothesis

Table 10: Net migration regression results
Table 10: Regression results

	Dependent variable:
	Gini coefficient
Net migration (as % percentage of total population)	−1.680
	(1.572)
Constant	30.419***
	(1.250)
Observations	12
R^2	0.102
Adjusted R^2	0.013
Residual Std. Error	3.627 (df = 10)
F Statistic	1.141 (df = 1; 10)
Note:	* p< 0.1; ** p< 0.05; *** p< 0.01

Source: own calculations

that the migration flows have zero effect on income inequality on roughly 30% significance level. The R squared tells us that our model can explain only a tiny

$$\widehat{\text{Gini}} = 30.419 - 1.680 \times \text{netmigr}$$

fraction of variance of income inequality. The negative relationship is a quite unusual result. The more people emigrate from a country, the higher is income inequality.

The simple equation shown above is our linear model. Let us consider an example where there will be 2% of total population emigrating from a country. According to our model and dataset we can expect income inequality to rise by 3.36 points.

As stated previously, the sample set is extremely small to consider that the general outflow of workforce is a cause of increasing income inequality. The intention of using such a tiny dataset was to at least determine the possible positive or negative relationship between income inequality and migration flows. The issues are not just the tiny number of observations but omitted variable bias as well. It was not possible to gather data from all countries in the period of form 2005 to 2011. Despite all these imperfections I thought that it would better to include the net migrations effects regression rather than leaving it out of this thesis.

CONCLUSION

The initial objective of the thesis was to examine the effects of income inequality fluctuations in two periods. As mentioned above, these were 1989 to 1995 and 2005 to 2011. The reasoning behind this decision is quite straightforward. I was expecting in my hypothesis that in the transformation period in early 1990s, income distribution was mainly negatively influenced by the harsh international competition while the economic growth on the other hand was creating new opportunities as a result of catching up the process with neighboring countries. However, in the first period there were lot of other variables influencing the income dispersion. The incomes were shaped by rising returns to education, the gender gap was diminishing, and new enterprises emerged. Thus, a considerable amount of underlying and non-repeatable processes were occurring. A substantial amount of data is omitted from the analysis mainly due to incomparability between individual countries or unavailability. An additional variable that was added was the mean years of schooling. I did not expect the outcome of that variable to be positive or negative. The second period ranging from 2005 to 2011 was chosen as the period of increasing importance of the international trade and tight integration of economies although it was a period of negative growth rates of economies as a result of the recent Global financial crisis. I was expecting the outcomes on income inequality to be quite different. An increasing international competition may have been generating jobs as the population had been adjusting their skills to fit to the current labor market demands. The annual growth may have been shifting the workforce from the second to the tertiary sector on the contrary. If we assume that salaries in services have wider dispersion than in the manufacturing sector, then the group with the higher inequality share is increasing at the expense of another one with a relatively more equal distribution. This idea was well presented by Kuznets who pointed out that the result of the increase in inequality is caused by people moving away from agriculture jobs to work in manufacturing.[13] Could that be happening in these days in the shift of workforce from

[13] Kuznets, Simon, 1955. Economic growth and income inequality. *The American Economic Review*, XLV, page 2-12.

manufacturing to services? The interpretation of the results that I have obtained is the following.

In the first period of the economic transformation most of the independent variables proved to be insignificant on general significance levels, except the trade to GDP ratio. According to our dataset, for every 10% increase of the trade to GDP ratio we can expect income inequality to rise by a single point. As stated previously, it is hard to say if trade openness was a cause of increasing income inequality, nonetheless the model can explain only around 18% of the variance in the sample. Therefore, there is possibility that the increasing exposure to the international trade wiped out the uncompetitive industries and probably led to structural unemployment. However, the realistic cause of the rise in income inequality was the transformation process of post-communist countries. The emerging private companies, the premium awarded by educated workers, but also corruption increased the income inequality.[14] We should consider the first period as an experiment, rather than a model with strong predictive power. There were simply too many different variables and geo-political characteristics which are difficult to quantify and unify.

The second period regression results proved to have the opposite relationships between the independent variables and income inequality in comparison with the first period. The variance in the sample set explained by the model is 10%. Concerning the trade to GDP ratio, the results were quite statistically significant. According to the dataset for every 10% increase of the trade to GDP ratio we could expect income inequality to fall by 0.7 points. It could be the result of greater specialization of countries in their individual comparative advantages. The annual growth regression became positive in the second period. Thus, greater growth equals more unequal income distribution. The above mentioned theory might be a result of the increasing share of the tertiary sector. To be sure about this effect we would have to analyze the dispersion of incomes between these two sectors, which is not within the scope of the thesis. I can only speculate that this effect is accountable for the increasing inequality.

[14] Transition - The First Ten Years: *Analysis and Lessons for Eastern Europe and the Former Soviet Union*. Edition. World Bank Publications, 2001.

Again, the mean years of schooling are insignificant in both periods due to a little difference in data.

The interpretation of the migration effects may be troublesome. The imperfect dataset with only 12 observations cannot be considered as a model with a large predictive power. We can say that there was a huge outflow of workforce in past 25 years but the effect on income distribution is unknown. We would need much more precise data including the level of education, country of origin, and destination. I could not do that unfortunately due to the data constraints.

I think that this thesis fullfilled its aim to estimate the shifts of income distribution in two time periods. However, the data available for this analysis almost certainly suffer from some omitted variable bias. Eastern Europe countries definitely have different attributes that are not accounted in this analysis. The policy of redistribution of transfers in one country can be quite different in comparison with another one. Along with the geography, there are other political factors that may influence the distribution of income. Another shortcoming is the lack of data in the migration flows subchapter. The datasets may be imbalanced and it would be advantageous to use time series models, but the interpolation of missing data would be pure guesswork. Besides these issues, the trade openness and growth did have substantial significance on income distribution changes in our dataset. That could encourage to investigate further these relationships.

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