How was Income Inequality Affected by the Eastern Enlargement in the EU?

Cassandra Lindgren

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Supervisor Maria Persson

Abstract: Due to the recent debate about income inequality, the need to find its determinants has never been more important. Economic integration has recently entered the discussion as one possible force for inequality. By looking at the eastern enlargement of the European Union (EU) as an example of economic integration I am able to analyze the relationship between economic integration and within-country income inequality. The focus will be on the Central and East European Countries (CEEC) and the outcome of them being integrated into the EU. The analysis covers the years between 1995 and 2013 where economic integration is decomposed into *potential* integration and *realized* integration. My findings suggest that becoming a member of the EU has increased income inequality for the CEECs, while additional member countries have increased income inequality for the EU15. Therefore, economic integration does seem to increase income inequality in Europe.

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1. Introduction

Everyone seems to be interested in the debate about inequality. Inequality, referring to a gap between the rich and the poor has been up for discussion for a long time but has gained an incredible amount of attention the last couple of years. The U.S Federal Reserve Chair Janet Yellen is "greatly concerned", president Barack Obama wants to raise taxes and said that the current income gap is "the defining challenge of our time", the French economist Thomas Piketty wrote a book and even the Pope has engaged himself in the debate (Deprez, 2015; Brooks, 2014). What is it about the concept of inequality that makes people so concerned? Inequality can refer to a lot of things. It is often used as a term targeting concepts that seem to have a negative effect on individuals. Poverty, class division, racial division and unemployment are some examples. However, the recent debate has focused more on income inequality and its impact on the overall economy. The OECD reported that the income gap between rich and poor is at its highest level since 30 years and that the richest 10 percent of the population in the OECD earn 9.5 times the income of the poorest 10 percent (Cingano, 2014).

The current debate leads us to the determinants of income inequality. Globalization has generally been considered a strong force for economic development and poverty reduction. However, for example Dollar & Kraay (2001) and Milanovc (2005) argues that globalization in terms of trade openness and liberalization does indeed create opportunities for poverty reduction and economic growth but it comes with negative effects such as polarization, power shifting and income inequality. There is a large literature looking into the relationship between globalization and income inequality and the literature mostly point out a negative connection between the two. While globalization seems to increase income inequality, what about deeper integration? Economic integration between countries refers to a conscious political process of removing barriers. Globalization, on the other hand is not a political process but mostly refers to the removal of tariffs and border controls (IMF, 2008). A great example of economic integration is that of the European Union. One of the main goals of the EU is to unify nations by bringing them closer in terms of social, economic and political integration. Today, the union consists of 28 member countries.[1] The largest expansion of the EU so far took place in 2004 and 2007 by stretching out to the Central and East European Countries (CEEC).[2] These countries differed in many ways from the current Western

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[1] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

[2] Central and East European Countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia, Slovenia, Poland and Romania. The two other countries joining were Cyprus and Malta.

members. Emerging from planned economy, dictatorship and closed boundaries to the rest of the world, hopes of economic growth, poverty reduction and reduced income inequality was one of many reasons behind the membership.

In this paper I will use the integration process of the EU with a special focus on the eastern enlargement as an example of economic integration. The purpose of this thesis is therefore to look at the relationship between economic integration and income inequality as well as the outcome of the eastern enlargement especially for the CEECs, but also for the old member countries, the EU15.[3] My analysis covers the years between 1995 and 2013. While previous research on inequality has focused mainly on the impact of globalization, economic development and trade openness (Reuveny & Li, 2003; Rodrik et al., 2004), I will focus on economic integration. My analysis is inspired by the work of Beckfield (2006) and Bouvet (2010) who both looks at different kinds of integration processes in the EU and their effect on income inequality. For my main analysis I will use the approach of Bouvet (2010), who used dummy variables controlling for certain integration processes, to look at *potential* integration which refers to the removal of barriers between economies, making further integration possible. I will be able to assess the impact of economic integration on income inequality for the CEECs but I will also look at the effect on the old member countries. As a robustness check I will look at *realized* integration. This approach is inspired by the work of Beckfield (2006). Realized integration refers to the actual change in flows of goods, factors of production and labor as a result of the removal of barriers. In this paper I will be able to contribute both to the literature on the determinants of income inequality and the literature on the outcome of the eastern enlargement. A further expansion of the EU is just around the corner as several candidate countries are waiting for permission to join. Most of these countries are eastern countries which indicate that further expansions will continue in that direction. European policy makers will therefore benefit from knowing the outcome of the eastern enlargement, as it most likely will happen again.

The paper is structured as follows: In section 2, I will present the dimensions and measures of inequality and further present my dependent variable. Section 3 goes through the integration process of the EU and the CEEC while section 4 presents some previous literature on income inequality. Section 5 lays out the theoretical background allowing me to state my hypothesis.

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[3] I have excluded Slovakia from the CEEC sample due to data availability in the dependent variable. Cyprus and Malta who entered the union in 2007 have also been excluded due to characteristics differing from the CEECs. When I refer to the *old* member countries and a period after the CEEC joined the union, I refer to the EU15. Otherwise, EU will be used.

Section 6 describes the data used as well as the methodology for the analysis and section 7 presents the results. Thereafter, a discussion will follow while I end with my conclusion.

2. Dimensions and measures of inequality

Measures of inequality has been a topic of considerable importance as well as of interest the last couple of decades for both sociologists and economists as some countries seem to become more or less unequal (Allison, 1978). Generally, inequality refers to the unequal distribution of opportunities (Díaz-Giménez et al. 1997). These opportunities could be talents, earnings, income and consumption and so on. The concept of inequality is thus to compare two distributions of an attribute and is measured irrespective of the median or mean value of the population (Atkinson, 1970; World Bank, 2003). Unfortunately, the word inequality in itself does not say much about the ranking of two different unequal distributions but only that they differ in some way from each other. The conventional approach in measuring inequality has therefore been to use some summary statistic of the attribute, such as the variance, the coefficient of variation or measures such as the Gini coefficient to separate between two distributions.

Perhaps the most common attribute of measuring inequality is by using monetary variables such as earnings, income or wealth (World Bank, 2011). Inequality can also be measured for non-monetary variables, such as land, assets or any continuous and cardinal variables (World Bank, 2003). However, a large part of the literature about inequality concerning economic and social variables refers to income inequality (Barro, 2000; Beckfield, 2006; Bergh & Nilsson, 2007; Bertola, 2010; Dollar & Kraay, 2001; Escurra et al, 2005; Heidenreich & Wunder, 2008; Heshmati, 2004; Kentor, 2001; Reuveny & Li, 2003; Wade, 2004). Income is perhaps most easy to measure of the three monetary variables and is generally the most dispersed among populations. Income refers to all kinds of revenue before taxes, such as labor earnings, dividends, unemployment compensation or child support Earnings are usually only referred to labor earnings while wealth is the net worth of households which can be all kinds of material objects owned by individuals (Díaz-Giménez et al., 1997).

2.1 Qualities and measures of inequality

There are several indicators of income inequality. Basic dispersion measures are for example dispersion ratios, which measures the distance between two groups in the distribution of income by dividing the average income of the *x* percent of the richest by the average income of the *x* percent of the poorest. The most common dispersion ratio is the decile ratio which looks at the top and bottom 10 percent of a population (World Bank, 2003). The advantage of this measure is that it is easily

interpreted. On the other hand it is sensitive and vulnerable to extreme values and outliers which can bias the measure. Another basic measure is to look at the share of income of the poorest in relation to the total income in the population.[4] This measure is also easily interpreted, however, it only concerns the poor and is insensitive to what happens in higher parts of the income distribution.

Aggregate measures of inequality are more complex as they take into account more factors. However, they are expected to satisfy a number of qualities. (1) Mean independence: if income were doubled for all individuals, this measure should not change. (2) Population size independence: if the population were doubled but income distribution the same, the measure should not change. (3) Symmetry: if two individuals would change income patterns with each other, the measure should not change. (4) Principle of transfers (Pigou-Dalton): if richer individuals would transfer income to poorer individuals, the measure should decrease. (5) Decomposability: total inequality should be possible to decompose into population groups, income source or other dimensions.

The Gini coefficient

The most commonly used measure of income inequality is the Gini coefficient which measures the within-country inequality (World Bank, 2011). The Gini coefficient is measured as half the average of all pairwise absolute deviations between individuals, relative to the mean income (World Bank, 2003).

$$Gini = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} (y_i - y_j)}{2n(n-1)y}$$

here y_i and y_j are individual incomes with the mean y and n is the total number of individuals. The Gini coefficient can also be calculated from the Lorenz curve. The Lorenz Curve maps the income distribution for a group of individuals or a country. Depending on how uneven the income distribution is, the further away will the Lorenz Curve be from the 45 degree perfect equality line. Graph 1 shows two different Lorenz curves. The thin black line is more unequal than the dashed equality line. Here, 40 percent of the population only holds about 20 percent of total income. The thick black line is the line of total inequality where one individual holds 100 percent of total income. Using the Lorenz framework, the Gini coefficient is determined by the area, A, between the perfect equality line and the Lorenz Curve, in relation to A and B:

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[4] The definition of income poverty is when the income of a household fails to meet an established threshold that differs across countries (UN, 2014).

$$Gini = \frac{A}{A+B}$$

Figure 1: Lorenz curves
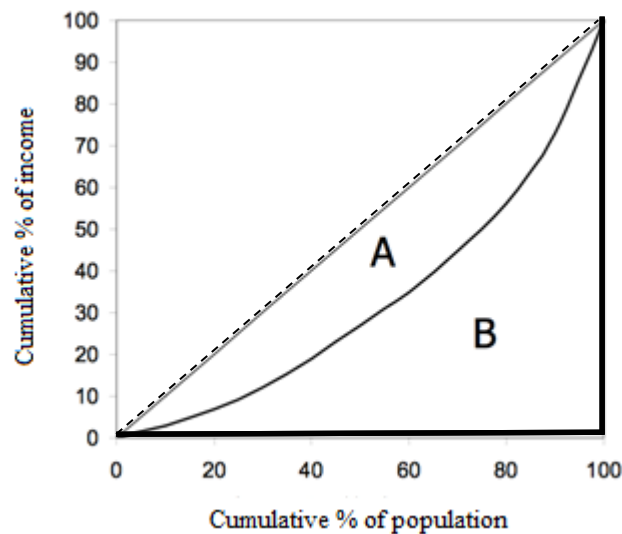
For perfect equality the Gini coefficient becomes a zero as everyone has the same income. For total inequality the Gini coefficient takes on the value of 1 as one individual holds all income and all others none (World Bank, 2011). One of the advantages of the framework using the Lorenz curve is that is generates a single summary statistic of the income distribution. The Gini coefficient is easily computed and easily interpreted and satisfy all the qualities of an aggregate inequality measure, except for one. It fails for the decomposability quality. It has the disadvantage of not being representable for the addition of subgroups and cannot capture the between effects, only within effects. Moreover, many studies might have a special interest of inequality in the lowest or highest areas of the income distribution while the Gini coefficient only gives a measure of the total population. It therefore gives an equal weight to individuals irrespective of them being in the top or bottom of the income distribution (World Bank, 2003). As this study does not focus on any particular area of the income distribution but on overall inequality, this should not be of any problem.

Atkinson Index and Generalized Entropy Indices

The Atkinson index is an inequality measure built on the concept of Equally Distributed Equivalent (EDE) income. For a society to reach the same level of welfare each of its individuals needs to obtain the EDE level of income (De Maio, 2007). The Atkinson index indicates how much income each individual has to give up in order for everyone to have equal incomes. For example, an

Atkinson index of 0.20 indicates that society could achieve the same level of social welfare with only 80 percent of income.

Generalized entropy (GE) indices is another well used family of income inequality measures. It can take values between 0 and infinity, where 0 represents a state of perfect equal distribution while higher values being increases in inequality. An advantage with the GE indices is that they are decomposable and can be divided into subgroups. This enables researchers to obtain both the between- and within country inequality effects.

$$GE(\alpha) = \frac{1}{\alpha^2 - \alpha} \left\{ \frac{1}{N} \sum_{i=1}^{N} \left(\frac{y_i}{y} \right)^{\alpha} - 1 \right\}$$

Both the Atkinson index and GE index uses a sensitivity parameter (α). This parameter decides how sensitive the index will be to either the upper tail of the income distribution (positive and large α) or the lower tail of the income distribution (positive and small α). The Atkinson and GE index therefore allows for analysis in different areas of the income spectrum. However, the GE index has a difficult interpretation unlike the Gini coefficient and is also sensitive to overall changes in the distribution.

All inequality measures mentioned so far are single parameter measures, focusing on one attribute such as income or expenditure. Another branch of literature on the subject of income inequality measures have focused instead on multidimensional inequality measures. These measures are including other variables than only the monetary perspective in inequality analysis. Examples of non-monetary measures are education, health and land. The argument behind is that individuals and households have different characteristics and needs and cannot be explained by only one perspective (Atkinson & Bourguignon, 1982). There are several measures of multidimensional inequality. One of them is an index developed by Maasoumi (1986). In his approach an individual is represented by a utility function of all the different attributes and not only one. This function is called the 'aggregate' attribute and is used to compose a univariate distribution up on which the GE indices then can be applied (Maasoumi, 1986).

There are limitations to most measures of income inequality. However, I am aware of today's broad field of income inequality measures but I have chosen to work with the Gini coefficient throughout this analysis. This is due to its wide use in similar literature and also due to it being straightforward

both in its calculation and interpretation. For future work and when more time is given, other measures of income inequality could be used as robustness checks or be analyzed closer.

3. The integration of the CEECs

Previous work in the field of income inequality tends to focus on the impact of globalization or economic openness. However, as stated above, these two differ from economic integration in the sense that economic integration is a conscious political process to eliminate barriers between countries. Globalization refers more to an increased movement of goods, services, capital and labor across borders and is a historical process that has simplified these kinds of flows by innovation and technological progress (IMF, 2008). Globalization may even refer to for instance the access of internet simplifying trade between countries. Economic openness is usually measured by national trade flows and is an indicator promoting competition in national and international markets (Reuveny & Li, 2003). The integration within the EU refers to much more than the classical shallow integration such as removing tariffs and border controls. It is a deeper kind of integration setting common rules for example for foreign investors, product standards, competition policies and labor and environmental standards (Lawrence, 1996).[5] The aim of this paper will be outcome of the eastern enlargement where main focus will be given to the CEECs. A summary of the creation and the development of the EU will be given in table 1 while the rest of this section lays out the integration process of the CEECs.

Table 1: The development of the European Union

Year	Integration	Countries	
1951	The Coal and Steel Treaty	EU6: Belgium, Germany, France, Italy, Netherlands and Luxembourg	The coal and steel industries were run under a common agreement to prevent single countries making weapons and turn against others.
1957	The Treaty of Rome	EU6	The formation of the European Economic Community (EEC). A step toward a supranational Europe where countries gave up some of their sovereignty for a closer European community. Creation of a common market where people, goods and services could move freely across borders.

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[5] Regional integration is also one of the "deeper" kinds of integration. The European Commission defines it as a process where a group of countries liberalize trade by creating free trade areas or customs unions. It this sense, it is geographically bound. Some argue that the integration process of the European Union is referring regional integration (Baldwin, 2006; Beckfield, 2006; Mansfield & Milner, 1999). Nevertheless, the focus in this paper will not be on regional level, but on a specific group of countries.

1973		EU9: United Kingdom, Denmark and Ireland joined	
1979	European Parliament		EU citizens can elecet members of the european Parliament for the first time.
1981		EU10: Greece joined	
1986	The Single European Act	EU12: Spain and Portugal joined	A six year programme was launched to remove the main obstacles for free trade.
1992	The Treaty of European Union	EU12	Treaty signed in Maastricht setting rules for common foreign security policies, closer cooperation in justice and home affairs. Decision to form the Economic and Monetary Union (EMU). The EEC became the European Union.
1993	The Single Market	EU12	Establishment of the single market: fee movement of goods, services, people and money
1994-1998	The Europe Agreement	Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia	The goals of the Eas are to encourage integration of goods markets by eliminating tariffs as well as promoting political integration between the EU and the eastern countries
1995	Schengen Agreement	EU15: Austria, Finland and Sweden joined	Seven of the member countries were affected by the new agreement. Travelers of these nationalities could travel freely across their borders without any passport control.
2002	The Euro entered the market	The Eurozone (in 2014): Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain	The aim of the Eurozone was to reduce trading costs by removing exchange rate risks and to boost the EU market by price transparency and reduced price discrimination.
2004		EU25: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia joined	
2007	Treaty of Lisbon	EU27: Bulgaria and Romania joined	The treaty was designed to increase democratic decision making, efficiency and transparency in the union. It laid out guidelines how to tackle climate change and sustainable development.
2013		EU28: Croatia joined	

Source: Official website of the European Union.
http://europa.eu/about-eu/eu-history/index_en.htm

The CEEC emerged from communist ruled societies, planned economy and dictatorship. This created trade barriers towards the rest of the world as well as slow economic growth compared to the Western European countries (Cadot et al., 1995; Moravcsik & Vachudova, 2003). In 1993, the European Council announced intentions to extend the EU to the east. The new candidates would be the CEECs, who mutually expressed desires to join the union. The benefits of this enlargement would be political, economic as well as cultural. The EU argued for peace and stability as well as access to new markets, thereby boosting economic growth for both new and old member countries (European Commission, 2002). This intention towards the east did not lead straight away to official memberships but instead to the Europe Agreements (EA). The EAs was a treaty between the EU and a non-member country allowing for closer cooperation. The aims of the EAs were to encourage integration of goods markets by eliminating tariffs and promoting political integration. The first country to receive an EA was Hungary in 1994. Thereafter, 9 other CEECs received the agreement during the later half of the 90th century. The EAs were no substitutes for an official membership but more of a preparation for further integration. The effects of the EAs seem to have been reduced trade both within the EU15 and the CEEC, while increased trade between the two. The CEEC also seems to have experience a rather large increase in their GDP and welfare (Egger & Larch, 2011).

The real negotiations for official membership began in 1998 with five of the CEECs (Czech Republic, Estonia, Hungary, Poland and Slovenia). These five countries were chosen based on their capacity of bringing their economic, political and legal systems closer to the EU norms. The second group of countries, Bulgaria, Latvia, Lithuania, Romania and Slovakia needed to bring their economies closer to EU standards before any negotiations could take place. The intention of an eastern enlargement was again met with mixed reactions whether the costs would exceed the benefits. Excluding the eastern countries could on the one hand hinder the eastern economic transition; on the other hand an economic failure in the east could threaten the peace and prosperity in the EU (Baldwin, et al., 1997). Some member countries feared that they would lose regional aid from EU such as France who was worried to lose subsidies for their agricultural sector. Moreover, there were fears of potential large-scale immigration of job seekers. Germany and Austria sharing borders with some of the candidates feared this the most. This fear of large-scale immigration was built upon the idea that cheaper, unemployed workers from the CEECs would take over many of the jobs in EU and reduce wages of the native workers (Bauer & Zimmermann, 1999).

Nevertheless, in 2004 eight of the ten CEECs officially joined the EU followed by the last two, Bulgaria and Romania in 2007. The CEECs integration into the EU has surprised many analysts as the interdependence between the EU and the CEECs is highly asymmetrical. The preaccession

process requires applicant countries to adopt to EU standards, EU laws and systems to be accepted. The requirements for the CEECs have therefore been massive as well as nonnegotiable. Compared to previous enlargements, the EU has not been this complex for any other country (Moravcsik & Vachudova, 2003). The CEECs has been forced to develop a market economy from the ground and to build a modern regulatory state to be capable of implementing EU standards while the majority of the EU15 had half a century to do this. The interdependence becomes even clearer when comparing the collective Gross National Product (GNP) of the ten CEEC with the GNP of the EU. The CEEC only covers between 3 to 5 percent of the EU15, which is less than any other enlargement of the union except for Greece (Baldwin et al. 1997; Moravcsik & Vachudova, 2003). The importance of the CEECs becoming members is rather small from the EU point of view expressed in economic terms. For the CEECs, on the other hand, becoming members means more than just an increased market access. As the initial integration in terms of EAs showed a large increase in their GDP and welfare, a further step in the integration process may have benefited the CEECs even more. Emerging from societies very different from the rest of the EU, a membership could be one way to face some of the challenges of adapting to the Western European standards.

4. Previous Research

There is a large literature covering income inequality from various perspectives. One of the key determinants has been globalization and has therefore been the main focus in the literature. Other determinants such as economic openness or economic development have also been covered (Bergh & Nilsson, 2007; Reuveny & li, 2003; Rodrik et al., 2004). These variables have so far been viewed as the main forces driving national income inequality in advanced capitalist countries. Dreher & Gaston (2008), analyze the relationship between globalization and income inequality. They argue that the current literature is somewhat limited as it focuses on more measurable dimensions of economic globalization and market integration while globalization is instead multifaceted. So instead of only looking at the effects of liberalizing international trade, they include dimensions such as social institutions and political integration. They find evidence that globalization has exacerbated income inequality and that this effect is particularly strong for OECD countries. Meanwhile, they found no impact of globalization on income inequality in less-developed nations. Similarly, Barro (2000) finds that greater openness to trade increases income inequality and that this result is more pronounced in poor countries. Milanovic (2005), also show evidence that the income share of the poor will be smaller in countries that trade more. His conclusion is that the poor, who according to theory should be the beneficiaries from increased trade seems to be the losers. Kentor (2001) and Wade (2004) both argue that globalization is a multidimensional concept. They state that one cannot simply conclude whether globalization is good or bad for countries, but that it needs

to be decomposed into its various components for analysis. Wade (2004), further analyze the global income inequality patterns and concludes that inequality has rather increased that the opposite and that globalization therefore cannot have a positive relationship with income inequality. Much of the literature on the impact of globalization on income inequality points in the direction of increased income gaps between people.

4.1 The relationship between economic integration and income inequality

The North American Free Trade Agreement (NAFTA) is a similar example of deeper integration as the European Union, but is an agreement between Canada, the United States and Mexico that went into force in 1994. NAFTA has created a free trade block and eliminated most tariff and non-tariff trade barriers (NAFTA, 2013). It is one of the world's largest free trade zones which are upheld by a number of institutions and a great example of deeper integration between countries. Esquivel (2011), has analyzed the income inequality patterns in Mexico since 1994 and have found that there has been a large reduction in income inequality. He argues that the widely documented increase in inequality between 1984 and 1994 has been completely reversed. The main contributor to this change has been labor income. Labor income has been an equalizing force in urban areas while public transfers have been most important in rural sectors. Furthermore, public remittances have been a national contributor to the reduction in inequality. Esquivel concludes that these inequality reducing effects are due to a more educated workforce as well as trade with more skill-abundant countries.

Heidenreich & Wunder (2008), analyze the patterns of regional income inequality of the EU between mid-1990s until the entry of the CEEC in 2004. They find that the within-country inequalities have increased by 15 percent over the period while the between-country income inequalities have decreased by 45 percent. The authors argue that on the on hand, increased economic liberalization and integration has pushed up regional income inequality levels and contributed to an increasing economic heterogeneity within countries. On the other hand, the EU as a whole has created a relatively homogenous political, social and economic union which has contributed to the large reduction in between-country income inequality. Furthermore, they look at the determinants of the regional inequality patterns and state that labor market and economic structures has a substantial impact on the regional income levels. Finally, they refer to a future dilemma that lies ahead of the EU: on the one hand the Europeanization of the economy threatens the similar living conditions within the member states, while on the other hand it contributes to the reduction of between-country inequality. Similarly, Ezcurra et al. (2005), analyze the distribution dynamics of regional per capita income in the EU between 1977 and 1999. They refer to

distribution dynamics as inequality, polarization and mobility in regional per capita income distribution. Their results show an overall reduction in regional inequality over the period and the largest part of the reduction could be seen in the end of the 1970s. Regional polarization was also shown to have decreased over the period.

Bouvet (2010), looks at the relationship between the EMU and 197 European regions between 1977 and 2003 to assess the interregional income inequality patterns. He finds a downward trend during the period, indicating that the overall income inequality has decreased. Moreover, he finds that the within-country inequality was relatively stable throughout the period while the between-country inequality has decreased. This reduction in between-country inequality seems to be driven by the cohesion countries (Spain, Portugal and Greece) converging to the rest of the EU. Bouvet then turns to an empirical analysis where he looks at the relationship between the EMU and EU regional policy and interregional income inequality by conducting a panel data analysis with within-country inequality as the dependent variable. To control for the EU integration he creates three dummy variables for each stage of the EMU. The first dummy is the adoption of a common currency, the second is the Maastricht Treaty and the third is the Stability and Growth Pact. Here he finds that the first two dummy variables are associated with an increase in inequality while the third is associated with a reduction. His conclusion is that there seems to be an overall decrease in inequality.

Beckfield (2006), focus on two types of regional integration and their relationship to income inequality for 12 Western European countries between 1973 and 1997. Beckfield's study was the first to look at the effect of regional political and economic integration on income inequality in Western Europe. The two types of regional integration are regional economic integration and regional political integration. By conducting a random as well as a fixed effect analysis for the EU12 he finds that economic and political integration increases income inequality. Beckfield further argues that the central point in his study is that not only national and global processes but also regional integration needs to be taken into account when working with income inequality. He concludes by stating that regional integration is actually more powerful than globalization when it comes to recent trends in income inequality in Western European countries.

To my knowledge, there are only very few attempts made to assess the impact of economic integration on income inequality in Europe. The study by Beckfield (2000) was the first to look at this relationship while Heidenreich & Wunder (2008) and Bouvet (2010) have followed with similar studies. However, Beckfield looked at a time period between 1973 and 1997 while Heidenreich and Wunder focused on the mid-90s until 2004. Bouvet chose to focus on the years

between 1977 and 2003. The time spans of these studies are not stretching far enough to capture the effect from the eastern enlargement in 2004 and 2007. Heidenreich and Wunder do include the CEECs in their sample, but as their analysis end before the official entry of the eastern countries it is unlikely to capture any of the effects from the enlargement. Therefore, there is a gap in the literature regarding the relationship between the European economic integration and income inequality. My analysis will be able to capture the effect the eastern enlargement as my time span stretches between 1995 and 2013. Hopefully, this will shed some more light on the relationship between economic integration and income inequality and tell us more about the outcome of the extension towards the east.

5. Theoretical background

To be able to analyze the relationship between economic integration and income inequality there is need for a theoretical foundation. I will base my hypothesis on two theories. The first is the Heckscher-Ohlin (H-O) model of what happens when countries open up for trade. The H-O is composed by four theorems, however, only two of them will be used in this analysis: The Factor-Price-Equalization Theorem and the Stolper-Samuelson Theorem. The second model is the theory of International Labor Mobility that offers and explanation for what happens when labor can move freely across borders. The discussion of both models is following the work by Krugman & Obstfeld, (2009).

5.1 Heckscher-Ohlin
The Heckscher-Ohlin (H-O) model offers an easy explanation for the effects when countries open up for trade in its two country, two production factors and two goods model.[6] The model points out that comparative advantages or differences in factor endowments are causes of international trade. Countries are equipped with factors in different proportions and tend to focus their industry to the most abundant factor. Therefore, countries will have different relative marginal costs of production and cause countries to export the good which is produced by the country's abundant factor more intensively.[7] The H-O model begins with the example of a closed economy called East.

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[6] The H-O model has been given great contributions and extensions by P.A Samuelson and is therefore sometimes called the Heckcher-Ohlin-Samuelson model. In this analysis, for simplicity I will refer to the model as the H-O model.
[7] The model builds on several assumptions: perfect competition, free trade, no transport costs, international immobility of factors, full employment, constant returns to scale and identical demand functions in both countries.

The Closed Economy

There are two factors of production, high-skilled labor and low-skilled labor, *H* and *L*, and a series of goods, *z*, that is produced in East.[8] The supply of high and low-skilled labor is fixed but East has a comparative advantage of low-skilled labor. The series of goods, *z*, can be arranged in order of decreasing high-skilled intensity of production such that 1 is the most high-skilled intensive and *n* is the most low-skilled intensive.

$$1, 2,...,j, j+1,..., n$$

This means that good *n* will be produced most certainly in East since it has a comparative advantage in low-skilled labor. $\frac{wH^i}{wL}$ is the skill premium and depends on the presence of the two production factors. When trade is absent, wages are determined by the supply of high- and low-skilled labor for each country.

Trade Openness

A large part of the CEEC exports are labor-intensive and concentrated in low-skill sectors. The CEECs are abundant in low-skilled labor and have a comparative advantage in these sectors (Crespo & Fontoura, 2001). The CEECs will therefore represent the East while the EU is its trading partner. The only way these two differ is in their factor supplies. The CEECs has a comparative advantage in low-skilled labor while the EU has a comparative advantage in high-skilled labor. This means that the relative price of low-skilled intensive goods is lower in the CEEC compared to the EU, while the relative price of high-skilled intensive goods is lower in the EU compared to the CEEC. When they open up for trade with each other, profit-seeking firms will look for markets that temporarily have the higher price to sell their good. Therefore, the EU will export the high-skilled intensive good to the CEECs where prices are higher for this type of good while the CEECs will export the low-skilled intensive good to the EU for the same reason. Trade produces a convergence of relative prices where prices of the same good will be equalized between countries to a new world level. The world price of high-skilled intensive goods will be higher than the post-trade price in the EU while lower than the post-trade price in the CEEC. The opposite will hold for low-skilled intensive goods.

(1) Seen from the EU perspective, a rise in high-skilled intensive goods raises the purchasing power of high-skilled labor while lowering the purchasing power of low-skilled labor in terms of both

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[8] Capital and labor can also be used as the two production factors. However, the outcomes will be similar where capital has the same outcome as high-skilled labor and labor has the same outcome as low-skilled labor. As I refer to wage gaps I have chosen to work with high and low-skilled labor.

goods. Wages increase in the high-skilled sector while decrease in the low-skilled sector. Therefore, in the EU, individuals working in the high-skilled intensive sector are better off than those in the low-skilled intensive sector. This will widen the wage gap and increase income inequality.

(2) From the CEEC perspective, a rise in low-skilled intensive goods raises the purchasing power of low-skilled labor while lower it for high-skilled labor. Wages will increase in the low-skilled sector while decrease in the high-skilled sector. The wage gap becomes smaller and income inequality will fall. This will be seen in the skill premium.

> **Stolper-Samuelson Theorem.** Wages in the sector using the country's abundant factor rises while wages in the sector using the country's scarce factor will decline when countries open up for trade.

This change in relative prices will in turn have effects on the factor prices. Trade flows between the CEEC and EU will increase until they both obtain factor price equalization.

> **The Factor-Price-Equalization Theorem.** Countries producing the same goods with the same technologies and the same factor prices will have the same relative prices when opening up for trade.

The H-O model builds upon several assumptions which are simplifications of reality. There is a large diversity of countries in the EU and the model can for example be criticized for assuming perfect competition and identical demand functions for all countries. Therefore, the model might be somewhat limited in its applicability. However, the model can still be used as a theoretical foundation for the analysis regarding the European integration process and brings us to the following hypothesis:

As the CEEC become integrated into the EU, the EU15 should experience increased income inequality while the CEEC should experience decreased income inequality.

5.2 International Labor Mobility

As mentioned above, the integration process of the EU is much more than just eliminating trade barriers. It promotes free movement of goods, services, capital but also of people. Migration is therefore something that needs to be taken into account. The standard H-O model does not include

migration, so I will add a model for international labor mobility to assess the effect when people move across borders.

One-Good Model without Factor Mobility

Similarly to the H-O model, the model assumes two factors of production.[9] The CEECs are abundant in low-skilled labor while the EU is abundant in high-skilled labor. Here, it is assumed that only one good is produced, which will be called simply *output.* The output produced in each country is dependent on the quantity of H and L. Since there is no need for trade with only one good, the only way these countries can be integrated is through the movement of workers. However, this model further assumes that only one of the two factors of production can move across borders, in this case the low-skilled labor. Many high-skilled jobs require country-specific education, such as lawyers, auditors or controllers which will make high-skilled labor less likely to move abroad. High-skilled labor will therefore not move across borders. Low-skilled workers in the CEECs will therefore want to move to the EU whenever possible due to higher wages waiting.

International Labor Movement

Suppose that low-skilled workers now can move freely between the CEECs and the EU. Workers will move from the CEEC to the EU for higher wages. This movement will reduce the low-skilled labor force in the CEECs and raise wages while increase the low-skilled labor force in the EU and lower wages.

Figure 2: Causes and Effects of International Labor Mobility

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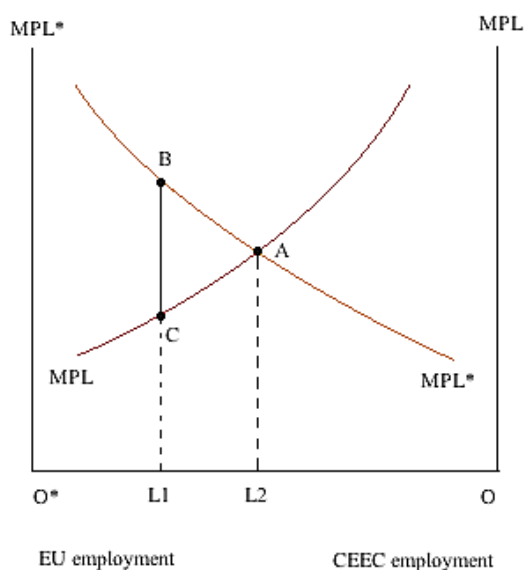
[9] This model assumes the same assumptions as in the H-O.

The low-skilled workers employed in the CEEC are measured from the right and the low-skilled employed in the EU are measured from the left. The left vertical axis shows the marginal product of low-skilled labor in the EU and the right vertical axis is for the CEECs. Initially, there are OL1 workers in the low-skilled sector the CEECs and L1O* workers in the EU. This allocation of workers implies that the real wage rate is lower in the CEEC at point C, than the real wage rate in the EU at point B. When countries integrate and workers can move freely across borders, they will be motivated to move depending on where the higher wage if offered. The low-skilled workers will therefore move from the CEECs to the EU until the real wage rates are equalized at point A with wage W and both countries holding L2 low-skilled workers. The wage gap in the CEECs has declined, as low-skilled labor earns higher wages than before the labor movement. On the other hand, the wage gap in the CEECs has increased, as low-skilled labor now earns less than before.

Despite the gains from migration, some people will be hurt by the change. Those who do not migrate but remain in the CEECs and work in the low-skilled sector will receive lower wages. The model also assumes only one good produced in both economies. When we assume two goods, one high-skilled intensive and one low-skilled intensive, countries can export the good they are more specified in. Here, trade works as a substitute for factor mobility and coincides with the H-O model. In practice, trade is not a perfect substitute to factor movement. Many of the assumptions made are not there in reality. There are barriers to trade, both natural and artificial making perfect competition impossible. Countries have different technologies as well as demands and no country has full employment. One has to be aware of that both the EU and the CEEC are fighting rising unemployment rates. Assuming full employment is a large step away from reality. Nevertheless, the model still has a fundamental message of the implications of free migration. This theory makes the same predictions as the H-O and further supports the hypothesis that:

As the CEEC become integrated into the EU, the EU15 should experience increased income inequality while the CEEC should experience decreased income inequality.

6. Data and Method

The focus in the analysis will be on the impact of economic integration in terms of the eastern enlargement on income inequality. I have decomposed economic integration into potential and realized integration to capture the whole integration process. Potential integration refers to the removal of barriers between countries to make further integration possible, while realized integration is the actual change in flows of goods and factors of production as a consequence of the

removal of barriers. As mentioned earlier, the analysis will focus on potential integration to assess the effects from the eastern enlargement especially on the CEECs but also on the old member countries. Realized integration is used as a robustness check. The data included in the analysis is a strongly balanced panel for the CEEC sample while unbalance for the EU24 sample. Data differs over time, t= 1995, 1996,…, 2013 and countries, i=1,…,24. The main dependent variable used for income inequality is the Gini coefficient. The data is and mostly taken from the World Income Inequality Database (WIID) (2014). Some missing values have been replaced by data from the World Bank Indicators (2015). The WIID has been created by the World Institute for Development Economics Research of the United Nations University (UNU-WIDER). It consists of several inequality statistics from different sources for 160 countries. However, using the WIID one has to be aware of the many sources which can lead to difficulties comparing statistics between countries and over time. I have therefore tried to collect data from the same source and checked that it does not differ too much from the World Bank data. The Gini coefficient takes the value of 1 for perfect inequality where all income is held by one individual and 0 when income is perfectly distributed among individuals (Worldbank, 2011). The Gini Coefficient captures the within-country inequality effect and as the coefficient increases, the more unequal countries become.

Table 2: Summary statistics of the Gini coefficient

Sample	Observations	Mean	Std.Dev.	Min	Max
CEEC	170	31.79	4.57	21.2	39.8
EU15	275	29.22	3.74	20	38.1
EU24	445	30.20	4.26	20	39.8

Table 3: Average Gini of the CEEC

Country	Avgerage Gini
Czech Republic	23.0
Hungary	25.7
Slovenia	27.5
Poland	31.7
Romania	32.5
Latvia	34,0
Lithuania	34.2
Bulgaria	34.3
Estonia	37.0

Table 4: Average Gini for the EU15

Country	Average Gini
Denmark	24.2
Sweden	25.0
Austria	26.3
Finland	26.7
Netherlands	26.8
Belgium	27.4
Luxembourg	27.5
Germany	28.5
France	28.6
Ireland	31.1
Italy	31.5
United Kingdom	32.7
Spain	32.9
Greece	33.9
Portugal	36.1

Table 2 shows from summary statistics for the Gini coefficient.[10] The difference between the mean Gini for the CEEC and EU15 is interestingly not so large. Also, the interval for the Gini coefficient is not so different between the CEEC and the old member countries. Table 3 and 4 ranks the average Gini for the CEEC and the EU15. For the CEECs, Czech Republic has the lowest average coefficient while for the EU15 it is Denmark. Czech Republic actually has a lower coefficient than Denmark, which indicates that income inequality is lower in the eastern country than for the Scandinavian.

6.1 Model specification for potential integration

Potential integration will be represented by an EA-dummy and an EU-dummy. The EA-dummy is to control for the Europe Agreements. The CEEC gained some access to the single market before officially becoming members of the EU by obtaining these agreements. The dummy will take the value of 1 if a country has a Europe Agreement or zero otherwise. The EU-dummy is to control for EU membership and will capture the effect of becoming a member. It takes the value of 1 if a country is a member of the European Union and zero otherwise.

The specification looks as following:

$$Gini_{it} = \beta_1 + \beta_2 EA_{it} + \beta_3 EU_{it} + \delta X_{it} + u_{it} \qquad (1)$$

where EA is the dummy variable for Europe Agreements and EU a dummy variable for EU membership. The error term has the following structure:

$$u_{it} = \mu_i + \gamma_t + \varepsilon_{it} \qquad (2)$$

Here, μ_i is the country-fixed effect varying for i countries, γ_i the time fixed effect varying over time, t, and ε_{it} error-term varying for i countries over time t. To further control for the effects of the old member countries, the following specification will be used:

$$Gini_{it} = \beta_1 + \beta_2 New_{it} + \beta_2 EA_{it} + \beta_3 EU_{it} + \beta_4 (Old * no. EA)_{it} + \beta_5 (New * no. EA)_{it} +$$
$$\beta_6 (Old * no. EU)_{it} + \beta_7 (New * no. EU)_{it} + \delta X_{it} + u_{it} \qquad (3)$$

where *NEW* is a dummy variable for the CEECs joining the union in 2004 and 2007.

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[10] The Gini coefficients have been scaled up by 100 in the summary statistics for a simpler interpretation.

6.2 Model specification for realized integration

Realized integration is represented by three different variables. The first variable is Foreign Direct Investment (FDI) intensity as percent of GDP and is a useful measure of EU market integration. This variable is taken from Eurostat (2015) and is defined as the average of inward and outward FDI flows divided by GDP. When the index increases over time, the country is becoming more integrated with the international economy.

The second variable is economic openness. This is measured as total imports and exports as percent of GDP and is provided by the World Bank World Development Indicators (World Bank, 2015). Economic openness contributes to the goals of the EU in terms of enhancing economic growth and employment and is therefore an important variable of the European integration process (European Commission, 2010). The variable has further been used as a contributor for income inequality in previous studies (Barro, 2000; Reuveny & Li, 2003; Rodrik et al., 2004) The third variable is immigration as percentage change and is also taken from Eurostat (2015). Both FDI and immigration are representing capital and labor as two factors of production flows between countries. The specifications looks as following:

$$Gini_{it} = \beta_1 + \beta_2 FDI_{it} + \beta_3 Trade_{it} + \beta_4 Immigration_{it} + \delta X_{it} + u_{it} \qquad (4)$$

To control for the effects of the eastern enlargement on the old member countries, the following specification will be used:

$$Gini_{it} = \beta_1 + \beta_2 New_{it} + \beta_3 FDI_{it} + \beta_4 (Old * FDI)_{it} + \beta_5 Trade_{it} + \beta_6 (Old * Trade)_{it} + \beta_7 Immigration_{it} + \beta_8 (Old * Immigration)_{it} + \delta X_{it} + u_{it} \qquad (5)$$

Here the old dummy is interacted with the three variables for realized integration to capture the integration effect on the old member countries.[11]

6.3 Control Variables

The analysis also includes some control variables where all data comes comes from Eurostat (2015) if nothing else is stated. GDP per capita (real GDP per capita in 2005 PPP) is included to control for the relationship between economic development and inequality, as well as the differences in economic development between member countries. The European Union today consists of a

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[11] All the regression variables are summarized in Appendix A

number of countries, classified between low-income countries and high-income countries and is characterize by a large diversity of economies.[12] For example Bulgaria and Romania are classified as low-income economies while Austria and Denmark are classified as high-income economies (World Bank, 2015). Expenditure on social protection as percentage of GDP will also be included as welfare state effort seems to reduce inequality (Kenworthy, 1999; Korpi & Palme, 1998). This variable includes expenditures on social benefits to households and individuals as well as administration costs. Democracy is another covariate that should be added to the analysis. There is a literature on democracy and income inequality where most scholars seem to agree on that democracy reduces income inequality. Democracy creates opportunities for participation by all individuals of a society and promotes equal distribution of income (Reuveny & Li, 2003). The data for the democracy variable is taken from the Polity IV Project database. It contains data on political regime characteristics and transitions which are based on some institutional factors of a political regime. The variable can vary between -10 (hereditary monarchy) and +10 (consolidated democracy) (Polity IV, 2014). Finally, I include a dummy representing the adoption of the euro. Only some of the member countries are members of the EMU and have adopted the currency at different points in time. This dummy is included to control for the integration effect of the euro and will take the value of 1 if a country has adopted the euro or zero otherwise.

I am using the Fractional Logit estimator which is a specification of the Generalized Linear Model (GLM) to estimate my results. The choice of a GLM method is based on the properties of the dependent variable, the Gini coefficient. Since the variable varies between a bounded interval (0 to 1) it is a continuous variable that can be observed at both ends of the boundaries. An Ordinary Least Square (OLS) setup is well suited for data taking infinite values. Therefore, using an OLS with my data could generate estimates that are outside the bounded interval. The error term is also assumed to be normally distributed in an OLS setup. However, a GLM model allows the error term to have different distributions. Papke & Wooldridge (1993) recommend the use of a Bernoulli distribution and argue that data that is bound between 0 and 1 should be treated as a fraction. The Gini coefficient is still related to its regressors through a linear equation, which was laid out above, but through a *link* function. The link function recommended together with the Bernoulli distribution is the logit, which generates a logistic regression model.[13] This is what is called the fractional logit estimator. [14]

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[12] Low-income economies are defined and calculated in accordance to the World Bank Atlas method with a GNI per capita of $1.045 or less in 2013 (World Bank, 2015).
[13] A further explanation about the logit link function, see Appendix B
[14] It would be ideally to further use fixed effect to take into account the unobserved heterogeneity varying over countries and time, however, Woolridge (2012) discusses the incidental parameter problem of using cross-sectional

When running the regressions I cannot exclude the problem of heteroscedastic error terms in the specifications. If heteroskedasticity is present I cannot rely on the t-tests and the significance of my estimates. Robust standard errors will be used to take care of this issue.

7. Results

Before presenting the results it is necessary to mention that it is not the magnitude of the estimates that are of importance in this analysis, but rather the signs. Using the Gini coefficient as my dependent variable it will be somewhat difficult to interpret the effects in terms of either percentage change or unit changes. As I am using the FDI intensity and democracy which both are expressed as an index, a one percentage increase generating a percentage change in the Gini coefficient does not really mean anything of particular. Moreover, since the fractional logit model gives a logistic regression, the magnitudes will again be a bit complicated to interpret. I will therefore focus on the signs of the estimates to see whether income inequality has decreased or increased.

7.1 Results for Potential integration

Table 5 shows the result for the potential integration specification. Results for the CEEC can be seen in column (1)-(3). The EU dummy is positive and highly significant through all regressions. This indicates that when the CEECs officially became members of the EU, income inequality within these countries increased. Thus, EU membership seems to increase income inequality. This is not in line with the hypothesis which stated that income inequality should decrease with economic integration for low-skilled countries. The theory which the hypothesis is based on predicts that increased trade should benefit the low-skilled sector in the CEECs. However, it might be the case that increased trade benefits the high-skilled sector for some reason, widening the wage gaps. Or that there are still some barriers left preventing the free movement of low-skilled labor to tighten the wage gap. The EA variable is not significant in any regression. It seems that the initial process of European integration for the CEECs cannot explain income inequality. However, Egger & Larch (2011), found that the EAs had a large effect on both GDP and overall welfare which should be seen in the income distribution of the population. Unfortunately, my EA dummy does not show any effect at all. A further explanation could be that the removal of barriers from the EAs might not have been enough to have an impact on income inequality. The EAs are in many cases preparations for future membership of the EU. Even though the CEECs obtained several benefits from these agreements, the real effect on income inequality might be what we see in the EU

dummies and further argues that GLM in a panel data work is almost as efficient as using models that fits population-average (such as the xtgee command in STATA). Therefore, I have only included year dummies.

dummy. Once countries officially become members of the union and get full access to goods markets, economic aid, labor markets etc. the integration effect becomes visible on income inequality. The euro variable is insignificant together with democracy and social expenditure. On the other hand, GDP per capita is negative and highly significant, indicating that increasing GDP per capita reduces income inequality within the CEECs.[15]

Table 5: Results for potential integration

	CEEC Specification			EU Specification		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Gini	Gini	Gini	Gini	Gini	Gini
New				-0.116***	-0.116***	-0.218***
				(0.024)	(0.024)	(0.025)
EU	0.014***	0.013***	0.013***	0.002*	0.002*	0.001
	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)
EA	-0.059	-0.059	-0.100	-0.018	-0.018	-0.051***
	(0.037)	(0.037)	(0.062)	(0.011)	(0.011)	(0.013)
Old*no.EA				-0.004	-0.004	-0.008
				(0.026)	(0.026)	(0.010)
New*no.EA				0.005	0.005	0.010
				(0.026)	(0.026)	(0.011)
Old*no.EU				0.005	0.005	0.007**
				(0.008)	(0.008)	(0.004)
New*no.EU				0.006	0.006	0.007*
				(0.008)	(0.008)	(0.004)
Euro	-0.049	-0.048	-0.035	0.009	0.008	-0.011**
	(0.043)	(0.042)	(0.051)	(0.005)	(0.005)	(0.005)
Ln(GDP)	-0.303***	-0.283***	-0.301***	-0.091***	-0.091***	-0.062***
	(0.032)	(0.037)	(0.061)	(0.007)	(0.007)	(0.006)
Democracy		-0.013	-0.008		-0.000	-0.001
		(0.010)	(0.013)		(0.002)	(0.003)
Social expenditure			-0.175			-0.371***
			(0.526)			(0.022)
Constant	-0.565***	-0.496***	-0.600***	0.577***	0.581***	0.636***
	(0.075)	(0.091)	(0.161)	(0.155)	(0.157)	(0.068)
Observations	170	170	128	445	444	387
Deviance	0.904	0.895	0.679	0.470	0.470	0.268
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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[15] It is possible to offer some explanation of the magnitudes by dividing the coefficient with its standard deviation. Dividing the coefficient from column (3) with the standard deviation of GDP per capita (0.446) I obtain -0.675. The standard deviation measures the shift from the mean value of the dependent variable. Thus, a one standard deviation increase in GDP reduces the Gini coefficient with 0.675 standard deviation away from its mean. Instead of interpreting the estimate as a reduction in the Gini coefficient by 30 percent, which does not say much, the magnitude can be shown as a shift away from the mean value.

The effect of the eastern enlargement on the old countries can be seen from the results in column (4)-(6). The New dummy controls for the non-observed heterogeneity in the CEEC countries. It picks up the special characteristics for these countries, such as post-dictatorship and planned economy that differ from the EU15. The variable shows a negative and highly significant outcome which indicates that CEECs generally have lower income inequality than the EU15. This is interesting as it could coincide with the fact that the eastern countries for a long time were socialist societies built upon the idea of equality. Another explanation could be that these countries have lower income levels than the EU15 and that income inequality is lower due to this.

The EU and EA dummies are somewhat difficult to interpret for the EU24 as the EA dummy only holds for the CEECs and the old member countries already being members of the EU before the beginning of the sample. Both the interaction terms for the number of countries holding EAs are insignificant. This raises questions regarding both the model specification and the construction of the variable. The construction might be incorrect to really capture the impact of EAs and the variable could therefore become an irrelevant variable. On the other hand, the two interaction terms controlling for the effect of number of EU members are positive but only weakly significant. As the estimates and standard errors are similar for both variables in column (6), a test is performed to see whether they differ from each other.[16] The test indicates that both interaction terms are showing the same effect. Thus, the effect of additional number of member countries seems to have a positive effect on the Gini coefficient. As the EU is expanding, income inequality will increase both for old and new countries. It this case, the eastern expansion in terms of additional member countries has raised income inequality in both EU15 countries as well as in the CEECs. Only the interaction term for old countries coincides with the hypothesis that inequality should increase in high-skilled countries. Furthermore, there could be many reasons for why additional countries lead to inequality. One reason could be that regional aid has to be distributed over more countries and that some countries receive less than before. For example, this is what France fear for their agricultural sector. The variable might also pick up the differences in member countries. For example, the EU15 might have been more homogenous in terms of income levels than the EU24 with low-income countries entering.

The euro dummy becomes significant in column (6) but strangely changes sign compared to previous regressions. One explanation could be that social expenditure was an omitted variable in column (4) and (5). The euro variable indicates that sharing the common currency of the EU

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[16] The 'lincom' test in Stata is performed to either reject or accept the null-hypothesis that $\beta_2 - \beta_1$ is zero. The test is significant, indicating that the two variables are showing the same effect.

reduces income inequality. Joining the EMU is a step towards further integration between the EU countries. Therefore, economic integration in this sense reduces income inequality. The GDP per capita variable is again negative and highly significant while social expenditure also becomes significant in this specification. It is negative, indicating that social expenditures reduce income inequality.

Regarding the results for potential integration, the impact of economic integration can only be seen through EU membership and number of EU members. The eastern enlargement seems to have raised income inequality both for the CEECs and the EU15. These findings are in line with much of the previous literature on the impact of European integration on income inequality. For example Heidenreich & Wunder (2008) argues that economic liberalization and integration have pushed up inequality levels and contributed to increased economic heterogeneity within countries. Joining the EU and thereby removing barriers between countries could on the one hand increase trade flows of labor movement but in the presence of increased income inequality coming from widening wage gaps.

7.2 Robustness

As a robustness check I will use realized integration to check whether the impact of economic integration differ from the specification for potential integration. The results can be found in Table 6 and the first three columns are for the CEECs while column (4)-(6) are for the EU24.

Most of the results for the CEECs are insignificant. Immigration is negative and significant in column (1) and (3) which indicates that increased immigration flows reduces income inequality. This result contradicts the result of the EU dummy. While the EU dummy indicated that economic integration should lower income inequality, the immigration variable indicates that when people, labor or factors of production can move more freely across borders income inequality should decrease. The immigration coefficient is, however, in line with theory that low-skilled labor moves to the EU15 driven by higher wages. The immigration variable for the EU24 is also negative, and highly significant. Increased immigration flows into the EU24 lowers income inequality for the member countries. Unfortunately, none of the interaction variables or the rest of the realized integration variables are significant, so it is difficult to draw any conclusion about the impact on the old member countries as well as how increased trade flows affects income inequality. The lack of significance in the specifications could be due to the construction of the variables or the lack of data. As can be seen in the number of observations, they are much fewer than the specification for potential integration which points out the lower data availability for some variables. For example immigration is one variable reducing the number of observations.

Table 6: Results for realized integration

VARIABLES	CEEC Specification			EU Specification		
	(1) Gini	(2) Gini	(3) Gini	(4) Gini	(5) Gini	(6) Gini
New				-0.282***	-0.283***	-0.442***
				(0.080)	(0.080)	(0.089)
Old*FDI				-0.009	-0.009	-0.006
				(0.006)	(0.006)	(0.006)
FDI	0.007	0.006	0.005	0.010	0.010	0.006
	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)
Old*Trade				0.047	0.046	0.057
				(0.057)	(0.057)	(0.060)
Trade	-0.067	-0.069	-0.077	-0.052	-0.052	-0.089
	(0.063)	(0.060)	(0.060)	(0.055)	(0.055)	(0.061)
Old*Immigration				0.047	0.046	0.007
				(0.035)	(0.035)	(0.039)
Immigration	-0.004***	-0.002	-0.003*	-0.005***	-0.005***	-0.007***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Euro	0.047	0.057	0.077	0.043	0.043	-0.044
	(0.068)	(0.068)	(0.069)	(0.027)	(0.027)	(0.027)
Ln(GDP)	-0.746***	-0.722***	-0.659***	-0.662***	-0.661***	-0.423***
	(0.081)	(0.084)	(0.098)	(0.053)	(0.053)	(0.065)
Democracy		-0.029*	-0.022		-0.002	-0.008
		(0.016)	(0.018)		(0.014)	(0.015)
Social expenditure			-0.684			-1.585***
			(0.746)			(0.171)
Constant	0.838***	1.029***	0.952***	1.062***	1.081***	0.935***
	(0.151)	(0.193)	(0.221)	(0.155)	(0.207)	(0.206)
Observations	104	104	101	291	291	268
Deviance	0.434	0.423	0.412	1.139	1.138	0.861
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

All regressions are estimated by adding one control variable at a time to see whether the estimates are changing when specific variables are included in the model. Some variables makes other variables become insignificant or changing its sign. The problem of omitted variable bias occur when one of the variables are either positively or negatively correlated with an omitted variable. In that case, the estimates become over- or underestimated. However, most of the variables included in the model have been used in previous research. Immigration might be the exception as I base its appearance in the model on theory and not previous work. It is not impossible that the estimates becomes over- or underestimated in the presence of this variable. Otherwise, I am confident in the data used in the analysis as it comes from reliable sources and I therefore exclude any systematic measurement problems that can cause biased estimates.

Table 7: Fixed effect linear regression

VARIABLES	CEEC specification (1) Gini
EU	0.004*
	(0.002)
EA	-0.022
	(0.027)
Euro	-0.008
	(0.027)
Ln(GDP)	-0.101*
	(0.059)
Democracy	-0.003
	(0.010)
Social expenditure	-0.021
	(0.323)
Constant	0.517***
	(0.085)
Observations	128
R-square	0.692
Year dummies	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As a second robustness check, the specification for potential integration is estimated in a linear fixed effect regression. Table 7 shows that the estimates in terms of sign and significance do not change much from the baseline. The coefficients are somewhat smaller. This suggests that my baseline specification is reasonable.[17]

It is also worth taking a look at the deviance for the regressions. The deviance is a goodness of fit statistic often used when performing maximum likelihood. As the GLM uses maximum likelihood estimation, I obtain the deviance and not the classical R-square. The deviance measures the variation from the saturated model which is the correct model. The deviance of the saturated model is 0. In all specifications, the deviance is declining for each regression which indicates that I am coming closer to the correct model.

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[17] A linktest is also perfomed on the baseline specification to see whether link chosen for the model is correct. The test shows that the logisticlink I have chosen is the correct link function.

8. Discussion

My results provide some insights about the impact of economic integration on income inequality. The focus has been on the outcome of the eastern enlargement mostly for the CEECs, but also for the EU15. Based on the results for potential integration, only EU membership coincides with previous findings by Beckfield (2006) and Heidenreich & Wunder (2008). This result points to a negative relationship between economic integration and within-country income inequality in a sense that the former seems to increase the latter. One of the goals of the EU is to reduce poverty and fight inequality. The CEECs probably hoped to absorb some of the Western European welfare by joining the union. Perhaps increased economic growth, access to new markets, open borders or more democratic decision making. However, they may have benefited from all this but to the cost of increased income inequality. From the EU15 perspective, they too seem to have experienced increased income inequality due to additional members. The EU knew that from an economic perspective they would not benefit much from the eastern enlargement. They may have been driven by political means, being influential on more countries or that they really believed they could help these new transition economies. However, the outcome of the eastern enlargement was increased income inequality for both partners.

There are several reasons why the EA dummy is not showing any effect. Some has been discussed in the result section, for example that the removal of barriers between the CEEC and the EU was not enough to have an impact on income inequality. This effect might have been shown later in the EU dummy when the CEECs became official members. The main finding in my analysis is that of increased inequality with EU membership. This finding is, however, not really in line with theory. Both the H-O and the model for International Labor Movement predicts that income inequality should increase for the EU while decrease for the CEECs. In this case, inequality increased for both partners. The theories are all based on the EU being high-skilled while the CEECs being low-skilled. Countries are most likely not strictly abundant in one production factor and not strictly specialized in one sector. The theoretical models rest on many more assumptions which are simplifications of reality. Assuming full employment and absolute free labor movement is not what we see in the world today. There are still many barriers for people to move freely across borders and most countries suffer to some extent from unemployment. The theories only assume two factors of production as well as two goods and may therefore be too simple to explain the complex process of European integration taking place.

The results from realized integration are unfortunately not very significant. Immigration flows seems to reduce income inequality both for CEECs and the whole EU24. However, immigration only measures the change of inflows of people. Since I am interested in the outflow of labor from the CEECs, an emigration variable could have been included too. Nevertheless, the immigration variable indicates that increasing labor flows into the CEECs lowers income inequality. If we assume that a large part of the immigration flows do consist of high-skilled labor which was assumed to be fixed, this should lower the wage gap between the high- and low-skilled sectors. While the results obtained from potential integration were mostly positive and thereby indicating a rise in income inequality, the results obtained from realized integration are negative. This could indicate that initially removing barriers between people will increase income inequality while the result from this removal is lower income inequality. The eastern enlargement probably increased heterogeneity in income levels both between and within member countries in the beginning, while a reduction in inequality is seen through the increased flows of production factors, goods etc. due to the removal of barriers. Unfortunately, the variables for FDI and trade are both insignificant and it is therefore difficult to draw any further conclusions.

The model used in this paper is the fractional logit which is a specification of the GLM. The model does not assume a normal distributed dependent variable such is done in the OLS, but assumes a Bernoulli distribution. Due to the logistic specification, the magnitudes of the results are somewhat difficult to interpret. Generally, the odds ratio is used to interpret fractional data, but as my dependent variable is not a probability I will rely and focus on the coefficient signs. The downfall with this model is that it is not fully compatible with fixed effects. Especially cross-sectional dummies cause parameter problems. This is why I have not included country dummies but only year dummies. On the other hand Wooldridge (2012), suggests that time averages should be included to take care of the unobserved heterogeneity over time. Since I have not done this, but included year dummies instead it is possible that my specification generate biased estimates. It is possible to run a version of the GLM which is close to the classical fixed effect model, however, Wooldrige argues that the GLM is almost as efficient. For future work, this model could have been used instead.

Conclusion

The recent debate about income inequality has lifted economic integration as one possible determinant. The aim of this study was to investigate the relationship between economic integration and income inequality by looking at the expansion of the European Union by the Central and

Eastern European countries. I used panel data for 9 CEECs and the EU15 between the years 1995 and 2013. The integration process of the CEECs has been an ongoing process that began in the mid-90s with access to the single market through the Europe Agreements. They achieved official membership in 2004 and 2007 where the union went from 15 to 27 member countries. By using the fractional logit specification, I was able to obtain estimates of potential and realized integration on the Gini coefficient and provide answers to my hypothesis. It seems that the effect from economic integration is mostly channeled through an EU membership. The eastern enlargement has increased income inequality both in the CEECs as well as in the EU15. Additional member countries seem to raise income inequality for current member countries. This is an important finding since the EU is most likely to expand further to the east. However, the current candidate countries for EU membership are probably more similar to the CEECs than the CEECs were to the EU15. A future EU might therefore be more homogenous than the current union and experience less income inequality.

My contribution to the current literature has been twofold. First, I have shown how income inequality was affected by the eastern enlargement, both for the CEECs and the EU15. Second, I have shown that economic integration is negatively related to income inequality and that my findings indicate that the removal of barriers between countries does seem to be one of the driving forces of increased income inequality in Europe.

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Appendix A

Variable description

Gini = Gini coefficient

EA = dummy for Europe Agreements

EU = dummy for European Union membership

New = dummy for new countries (CEEC) entering 2004 and 2007

Old = dummy for old countries (EU15) before extension 2004 and 2007

Old*no.EA = Old dummy interacted with number of Europe Agreements

New*no.EA = New dummy interacted with number of Europe Agreements

Old*no.EU = Old dummy interacted with number of EU members

New*no.EU = New dummy interacted with number of EU members

Old*Trade = Old dummy interacted with Trade/GDP

Old*FDI = Old dummy interacted with FDI intensity

Old*Immigration = Old dummy interacted with Immigration change

Euro = dummy for adopting the Euro as currency

Trade = trade as share of GDP

FDI = FDI intensity

Immigration = annual percentage change

Social expenditure = social expenditure as share of GDP

Democracy = political regime (Polity IV index)

Ln(GDP) = log of GDP

Appendix B

The classical linear model:

$$y = \beta_0 + \beta_1 x_1 +, \dots, + \beta_p x_p + \epsilon$$

The dependent variable y is a linear function of the regressors. In the classical linear model the error term is assumed to be normal distributed. GLM allows for other distributions where the error term is non-normal. In the GLM, y is still related to the regressions through a linear model, but through a *link* function. The logit function generates a logistic regression model. The dependent variable is a zero-one Bernoulli variable whose success probability (the value of the Gini coefficient) $p(x_1, \dots, x_p)$ depends on a set of regressors $x = (x_1, \dots, x_p)$ by means of:

$$p(x_1, \dots, x_p) = \frac{e^{\beta_0 + \beta_1 x_1 +, \dots, + \beta_p x_p}}{1 + e^{\beta_0 + \beta_1 x_1 +, \dots, + \beta_p x_p}}$$

The logit function is defined as:

$$\text{logit}\left(p(x_1, \dots, x_p)\right) = \log[p(x_1, \dots, x_p)/(1 - p(x_1, \dots, x_p))] = \beta_0 + \beta_1 x_1 +, \dots, + \beta_p x_p$$

In a classical linear regression, the link function is simply the linear model (Wright State University, 2012).