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Top Income Shares and Regional Inequality

- Long-term patterns, 1900-2010

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Abstract

After decades of convergence, income inequality has increased substantially in many European countries, as well as in the US. Additionally, a similar pattern has been observed for regional income disparities as well. This thesis examines the extent to which the top income shares and regional income disparities have moved in tandem on a national level during the 1900-2010 period, in both Europe and the US. While the results varied, there seems to have been a discernable pattern of co-movement in many countries, with a positive relationship between changes in income inequality and regional income disparities after 1980. However, some countries do not exhibit any such pattern, suggesting that there is no necessity for changes in top income shares to be accompanied by similar changes in regional income inequality.

Sincerest thanks to my supervisor, Thor Berger.

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1. Introduction

Income inequality has long been considered one of the most important subjects in the study of political economy, and few social issues are more controversial and have been subject to more debate than the distribution of wealth and income (Piketty 2015, p. 9; Milanovic 2011, p. 3). After a long period of income convergence, income inequality has increased substantially in the last four or five decades, in both Europe and the United States (US). The share of pretax income going to the top decile of the distribution increased from 30 to 35 percent in Europe between 1980 and 2010, and from below 35 to almost 50 percent in the US between 1970-2010 (Piketty and Saez 2014). A similar trend has been observed when it comes to the regional distribution of income as well. In Europe as a whole, regional income inequality have followed a pattern similar to that of interpersonal income inequality, with a long period of declining regional income differences up until around 1980 but diverging afterwards (Rosés and Wolf 2018, p. 3-4). Although narrowing the regional income disparities in Europe has become an important objective for European Union, EU, policy makers, and the share of the EU budget devoted to this aim has been increasing steadily, with an allocation of almost €200 000 million for the first six years of the twenty-first century, the income disparities between European regions has kept widening since the 1980s (Puga 2002; Rosés and Wolf 2018, p. 4). During the 1990-2000 period, for instance, regional income inequality in the EU rose by more than eleven percent (Rodríguez-Posé and Gill 2004). This rising differences in income between regions within European countries have been subject to much debate because of the threat it poses to political stability and social coherency (Iammarino, Rodríguez-Posé and Storper 2018).

1.1 Significance and aim

Although the patterns of income inequality and regional income inequality on an aggregated level seems to follow similar patterns, and much attention has been devoted to these two phenomena separately, there have been no previously published studies that systematically compile the patterns of both interpersonal income inequality and regional inequality on a national level in order to further understand the extent to which they tend to move in similar directions. Thus, to be able to further understand the co-movement of regional and interpersonal income inequality, as well as to facilitate the much needed future research in order to counteract the possible threats that this increasing spatial divergence may pose, this thesis aims at compiling the evolution of income inequality and regional income inequality on

a national level during the 1900-2010 period, particularly the 1980-2010 period due to the peculiarity of the coinciding divergence during these decades, and examine the extent to which these two phenomena have evolved alongside each other. The study will be guided by the following research question: *To what extent have top income shares and regional income inequality on a national level tended to move in tandem during the 1900-2010 period?*

1.2 Thesis outline

The following section reviews the existing literature and relevant theories surrounding the topics of income inequality and regional dispersion of income. After reviewing the literature, as well as clarifying the different concepts and definitions, this section will also provide a framework within which the study will be conducted and additionally put forward some predictions of what the results are expected to show. The third section provides a thorough description of the data that has been compiled in order for the research question to be answered, as well as the conducted data analysis. The fourth section presents the results. After this, section five discuss the findings of the thesis in light of the theories discussed in section two, as well as drawing from additional literature. In addition, this fifth section will discuss the limitations of this thesis. Section six provides some concluding remarks.

2. Theory and Literature

This section reviews the most prominent literature and theories surrounding the topics of income inequality and regional income differences. The first part reviews the more classical works on the two topics, while the following two parts covers the more recent literature and theories on income inequality and regional income inequality respectively. The last part outlines the framework within which the analysis will take place.

2.1 The inverted U-shaped curve

When examining the variations in the income distribution in the long run, Kuznets (1955) finds a strong tendency towards income convergence during the years following 1920. The income share accruing to the richest five percent of the population in the US decreased from 31 to 20 percent between 1929 and the years following the second world war. Between 1929 and 1947, the share accruing to the top five percent in the UK dropped from 33 percent to 24 percent, while at the same time the shares of the poorer 85 percent of the population increased from 46 percent to 55 percent. A similar pattern emerges from the data from Germany. Even though the author recognizes that the data sample is insufficient, covering only the three countries mentioned above, and that the descriptions of the observed patterns can almost be labeled as guesses, he still does an attempt at explaining what have been outlined and the factors involved in these changes. First of all, Kuznets (1955) notes that the decline in income inequality is somewhat of a puzzle. This is because of, as he suggests, two set of factors that should instead be working towards increasing inequality as the process of economic growth continues, namely the cumulative effects of highly concentrated savings, effects of which may be counteracted by inheritance taxes or inflation induced by the government. The latter is due to the fact that the income inequality in the industrial sector is higher than in the agricultural, and with an increasing share of the population relocating to this sector, income inequality would be expected to increase (Kuznets 1955). However, further along the growth process, the lower income groups may be able to claim a larger proportion of the national income. Workers may have better opportunities to adapt and organize, as many of them may now be born in the urban areas, instead of having to migrate into the city. Legislative protection aimed at ensuring the workers in the industrial sector a higher proportion of the income may emerge as a result of democratic institutions (Kuznets 1955). In short, Kuznets (1955) assumes that there is a discernible swing in income inequality, with inequality increasing in the initial stages of industrialization, due to the unfavorable conditions of the lower income

groups as older institutional settings are destroyed while at the same time the higher income groups are enjoying new business opportunities emerging from the new industrial structure. After this, income inequality would stabilize, and then decrease further along the process due to the factors previously mentioned, displaying a pattern similar to an inverted letter 'U' (Kuznets 1955).

The idea of an inverted U-shaped pattern of inequality along the process of national development is not limited to the analysis by Kuznets (1955) as outlined above. In the beginning of his paper, Williamson (1965) hypothesizes that due to a number of disequilibrating and equilibrating effects that varies over time, a similar inverted U-shaped pattern should be expected when it comes to regional income inequality as well. During the initial stages of national development, there are a number of factors that in theory should cause the regional income inequality to deteriorate, such as selective labor migration, favoring of industrial regions on behalf of the central government and a lack of interregional linkages. However, the effects of these factors might change as the process of national development proceeds, reversing the divergent trend. In, short, regional income inequality would increase during the initial stages of development, and as the disequilibrating effects tend to diminish, the per capita income difference between regions should be narrowing (Williamson 1965). In his following cross-sectional analysis covering 24 different countries, the author finds a significant relationship between regional income inequality and the maturity of national development. The higher-income countries exhibit a narrower regional dispersion of income than do the middle-income countries. The relationship becomes weaker in the lower income groups, but Williamson (1965) concludes that regional inequality seems to trace out somewhat of an inverted u-shaped pattern, where the countries of the middle-income groups displays higher averages of regional income inequality than the countries already in the mature stages of development and those of the lower-income groups (Williamson 1965).

2.2 Income inequality into the 21st century

Before moving on to the more recent models of explanation for the observed trends in income inequality, it is important to first clarify the concepts of income and income inequality. Total income is made up of the sum of two components, that is capital income, such as rents or dividends, and labor income, such as wages. Income inequality, as a total, is thus made up of the inequality within these two components, inequality in capital income and labor income inequality (Piketty 2015, p. 263).

Although income inequality did decline substantially, as Kuznets (1955) suggested, over the

first seven or eight decades of the twentieth century, authors like Piketty and Saez (2014) and Atkinson and Piketty (2007, pp. 9-10) have argued that this convergence was almost exclusively due to declining income from capital for the top income groups. This was in turn a result of the chaotic circumstances during the two World Wars and the Great depression, with high inflation rates, bankruptcies and destruction of capital assets, casting further doubt on the structural explanation that Kuznets (1955) proposed (Piketty and Saez 2014; Atkinson and Piketty 2007, pp. 9-10). In fact, Piketty and Saez (2014) show that income inequality, after this long period of convergence, increased substantially in both Europe and the US. While the share of pre-tax national income accruing to the top decile of the distribution declined significantly in Europe from above 45 percent in 1900 to less than 30 percent in 1980, this share increased thereafter, reaching 35 percent in 2010. Between 1930 and 1970, the income share in the hands of the richest decile of the population declined in the US declined from 45 percent to below 35 percent. However, the recent surge in income inequality has been more extreme in the US than in Europe, with the top decile share of national income reaching almost 50 percent in 2010 (Piketty and Saez 2014). This same pattern of convergence up until 1970 or 1980, and divergence thereafter, has been observed by numerous other scholars, such as Roine and Waldenström (2008) in the case of Sweden. In a comparison between top income shares in four different continental European countries (Germany, France, Switzerland and the Netherlands) and in six countries that are English-speaking (Australia, Canada, Ireland, New Zealand, the UK and the US), Atkinson and Piketty (2007, pp. 539-544) shows that there are important differences between these two groups of countries when it comes to the evolution of income inequality during the twentieth century. They find that the English-speaking countries included in their study shows a relatively clear U-shaped pattern, not an inverted such, of income inequality over the century, with declining top income shares up until around 1980, and then increasing top income shares between 1980-2000. However, in Germany, France, Switzerland and the Netherlands, no such U-shaped pattern can be discerned (Atkinson and Piketty 2007, pp. 539-544). This dissimilarity is further noted by Roine and Waldenström (2015), who also takes the Nordic countries into account. Roine and Waldenström (2015) shows that, similarly to what has previously been mentioned, there have been significant increases in income inequality in the US and in the UK since 1980, but that in the continental European countries, top income shares have remained relatively stable. However, when examining the patterns in the Nordic countries, the authors find that top income shares have increased in a similar manner as in the US and the UK although at a smaller scale (Roine and Waldenström 2015).

Roine and Waldenström (2015) argues that the witnessed trend of increasing income inequality is to a large extent due to increases in wage income, and that these wage increases seems to have occurred almost solely within the upper income groups. This is further noted by Piketty (2015, pp. 297-299), who shows that the income composition has changed substantially between 1900 and 2005 in both France, which serves as a representative example for continental Europe, and the US. In 1900, capital income accounted for a much higher share of the income within the top income groups than it did in 2005. In France, capital income was the main source of income for the top 0.5 percent in 1932, while this was only true for the top 0.01 or 0.001 percent in 2005 (Piketty 2015, pp. 298-299). A similar pattern, although differing in respect to the exact income group, is observed in the US between 1929 and 2007 (Piketty 2015, p. 324). Piketty (2015, pp. 299-302 & 320-325) thus argues that while France has moved from a society where the top income groups have been dominated by people who earn their living on their capital holding, to a society where these groups now are dominated by people with exceptionally high wages, the surge in income inequality in the US can to a great extent be explained by the rise of what he calls ‘super managers’, individuals within the top percentile that hold high positions in large companies with exceptionally high compensations. This rise of super managers is, as Piketty (2015, p. 337-338) suggest, an Anglo-Saxon phenomenon, noticeable in countries like the UK and US, but a rise in the income share of the top percentile have occurred in Europe and Japan as well. In short, Piketty (2015, pp. 355-356 & 538-539) argues that these very high compensations for individuals within the top income groups have been an important driver behind the rising income inequality, and further notes that this may to some extent be explained by social norms and acceptance of high incomes for these particular groups, but that there is also a strong positive correlation between falling marginal taxes and increasing top income shares.

2.3 Regional economic development 1900-2010

Rosés and Wolf (2018, pp. 16-17) describes the long-term trends of growth in gross domestic product (GDP) and its variation in Europe’s regions during the period 1900-2010. GDP per capita have grown at an average of almost 800 percent since the beginning of the twentieth century, and although growth rates has always varied greatly among European regions, this tremendous growth was accompanied by convergence in regional GDP per capita up until 1980. After 1980, however, the regional dispersion of GDP per capita began to diverge. Thus, during the first seven decades of the twentieth century, regional income inequality declined in Europe, only to increase again after 1980 (Rosés and Wolf 2018, pp. 1-4). An interesting

phenomenon here is that the overall growth rates in the European regions began to slow down after 1970, but this was not the case for a small number of high-income areas, consisting mainly of larger urban areas such as capital cities. Instead, the authors argue that since 1980, there has been a growing separation between the European regions, where some prosperous metropolitan areas have remained their dynamism and high growth rates and thus moved ahead of other regions (Rosés and Wolf 2018, p. 19 & 39).

This phenomenon of a number of high-income metropolitan areas moving ahead in Europe is further examined by Iammarino, Rodríguez-Pose and Storper (2018). The authors suggest that a lot of previously prospering regions, many of them rural or smaller urban areas, have in recent decades experienced growing unemployment rates and stagnating incomes, in relative terms. At the same time, larger metropolitan areas have become increasingly dynamic in terms of economic growth and job creation (Iammarino, Rodríguez-Pose and Storper 2018). Rising regional income inequality is however not limited to Europe. Ganong and Shoag (2017) describes a pattern of regional inequality between states in the US that is in many ways similar to that between regions in Europe. In the US, there was a vast period of convergence from the beginning of the twentieth century up until the 1980. The over a century long trend of income convergence between states, with an average annual convergence rate of 1.8 percent, has however stagnated. This is because of, as the authors suggests, the increasing prices of housing in higher income areas that lowers the returns to living for the less skilled population in these areas, thus changing the patterns of migration, with the less skilled population moving away from high-income areas (Ganong and Shoag 2017). This trend of declining regional inequality in the US up until 1980 has also been observed by Klein (2018, pp. 365-377), who further notes that not only has the regional distribution of income ceased to converged, but that the distance between the two states with the lowest and the highest income per capita respectively, that had remained stable throughout the first eight decades of the twentieth century, widened after 1980. When accounting for these changes, Klein (2018, pp. 378-381) agrees with Ganong and Shoag (2017) in that the stagnating convergence is a result of the relationship between income and rising prices of housing, but additionally emphasize the role of skilled labor demand and natural resource abundance (Klein 2018, pp. 378-381).

In light of the theory presented by Williamson (1965), as discussed in section 2.1 of this thesis, the pieces of literature reviewed above show us that although there has been a strong tendency towards convergence in GDP per capita up during the most part of the twentieth century, this came to an end around 1980, after which this convergent trend stagnated and in

some cases was reversed. There is no lack of theories aiming to explain these trends of divergence and convergence. The remaining part of this section will review some of the most prominent ones.

Within the framework of the neoclassical growth models, suggesting that regions or countries with initially lower levels of income should grow at levels above the average, Barro and Sala-i-Martin (1992) argues that there is strong evidence pointing to that this has been the case among states in the US during the 1840-1988 period. Using data on personal income and gross state product for 48 states in the US, they find that states with initially lower levels of income grew faster than states with higher income level (Barro and Sala-i-Martin 1992)

While examining the economic growth of 73 European regions in seven different countries, Barro et. al. finds that this applies to Europe as well (Barro et. al. 1991)

In a publication from 1991, Krugman (1991) shows that there is, under certain assumptions, a strong tendency for firms to agglomerate in regions where demand is higher, depending on transport costs and scale economies, and may ultimately evolve into a pattern of a core and a periphery. This core-periphery model is the basis for the analytical framework that has been termed the *New Economic Geography (NEG)*, and distinguishes two sets of forces, those working towards spatial agglomeration of economic activity, and those working against it. Basically, as firms want to be located close to larger markets and workers want to be located where consumer goods are more abundant, this may overcome the forces working against economic agglomeration and result in a pattern where the manufacturing sector is concentrated to one single region (Krugman 1991; Fujita and Mori 2005). In an extension of the NEG framework, Puga (1999) argues that the degree of agglomeration and regional distribution of income to a large extent depends on labor mobility across regions. In short, as lower trade costs and agglomeration of economic activity leads to higher wages in that area, workers may relocate here from other regions, causing the spatial concentration to be intensified, but regional income inequality declines. If there is no labor mobility, however, the regional differences in income will remain. Thus, under certain condition, spatial concentration of economic activity does not necessarily lead to income per capita divergence (Puga 1999; Martínes-Galarraga, Rosés and Tirado 2015). While these explanations provide good insight into the possible determinants of regional income convergence and divergence, they offer no clear-cut predictions about the relationship between interpersonal income inequality and the dispersion of income per capita among regions. However, in a recent publication, Manduca (2019) examines this relationship while separating income inequality and income sorting and looking into the importance of these two factors on the regional

income divergence in the US. Manduca (2019) argues that it is a necessity that increasing income inequality will have a spatial dimension to it. Further, the author emphasizes that initial levels of regional income inequality can be exacerbated by macro trends, such as income sorting, i.e. the extent to which individuals within the same income groups are living in the same regions or cities, and rising income inequality. Manduca (2019) calculates the coefficient of variation, in this thesis referred to as CV, for the chosen regional divisions, that is commuting zones, and shows that the increasing regional divergence is to a large part driven by the richer regions and the top income earners of the distribution, to a greater extent than by income sorting. When removing the top percentile of the distribution from the simulation, the author finds that the regional divergence since 1980 would have been halved. In short, Manduca (2019) suggest that initial regional income inequality has been exacerbated by increases in the income shares of the top percentiles of the distribution, to such an extent that the author suggests that level of income inequality determine the degree of regional income inequality (Manduca 2019).

2.4 Framework for analysis

The ultimate aim of this thesis is to examine the extent to which the top income shares and the degree of regional dispersion of income per capita have moved in tandem within several countries in Europe and in the US, particularly during the 1980-2010 period but also since the beginning of the twentieth century. In order for this analysis to be systematically carried out, we need to establish a framework where the different concepts and variables, as well as the relationship between these two, are intelligibly established. The point of departure for the analysis carried out in this thesis stems to a high extent from the findings and arguments proposed by Manduca (2019). If the rising income inequality in the US has accounted for more than fifty percent of the country's divergence in the regional distribution of income, it is plausible to expect a similar pattern to have occurred elsewhere. We thus arrive in a framework containing two main variables, the share of national income accruing to the top income groups in a particular country as well as the CV capturing the degree of dispersion of GDP per capita among regions within that country. Thus, the initial prediction for this study is that we expect the results to display a pattern where the countries displaying increases in income inequality also shows a rising regional income inequality.

3. Methods and Data

This study will apply a comparative case study design using quantitative data in order to answer the research questions stated in the introduction. This third section will in the first part outline the data chosen in order to examine the patterns of interpersonal income inequality and regional dispersion of GDP per capita on a national level, and in the second part describe the data analysis leading up to the results presented in a later section of this thesis.

3.1 Data

Following the approach of Kuznets (1955), Atkinson and Piketty (2007) and Piketty (2015), among many others, the chosen measurement of income inequality for this study is top income shares. In particular, this study relies on data on the share of pre-tax capital income going to the top decile and the top percentile of the distribution in order to capture the long-term trends of income inequality in the selected countries. The following countries are included: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the UK and the US. The data on top income shares was collected from the *World Inequality Database, WID* (<https://wid.world/>), a database that by combining tax data and national accounts provides annual estimates of the income shares accruing to different income groups (Alvaredo et. al. 2016). In order to be able to measure regional income inequality, data was collected from the dataset provided by Rosés and Wolf (2018). This dataset contains regional GDP, expressed in 1990 international dollars, and population estimates for 173 European regions on the NUTS-2 level, a regional division distinguished by the European Commission's statistical office as regions with a population of between 0.8 and 3 million (Becker, Egger and Von Ehrlich 2010), for eleven different benchmark years over the 1900-2010 period (Rosés and Wolf 2018, p. 4). For regional GDP per capita in the United States, data was collected from a third dataset by Klein (2018), where the different states are the units of observation. The reason as to why this thesis has limited itself to the fifteen previously mentioned countries is because these are the countries for which data on regional GDP was available from these two datasets.

3.2 Data analysis

With Microsoft Excel as main tool of analysis for this study, a separate dataset was constructed in order to compile the relevant data from the three datasets mentioned in the previous section. Regional GDP and population data were extracted from the dataset by Rosés

and Wolf (2018) for 14 out of the 16 European Countries available in this dataset. As no regional division had been made by the authors for Ireland and Luxembourg (Rosés and Wolf 2018: 4), these two countries had to be left out of the analysis as there were no regional data to analyze. Next, in order to have the regional GDP per capita for all regions, the nominal GDP available in the dataset was divided by total population in all the different regions and for all the benchmark years. Therefore, in order to capture the dispersion of GDP per capita between regions in every country, the coefficient of variation was calculated using the following formula: $\sigma/\mu * 100$. That is, the standard deviation of GDP per capita in all regions in a particular country is divided by the average GDP per capita of those same regions. This is multiplied by 100 in order to have the coefficient expressed as a percentage. This is done for all of the 14 European countries. This same procedure is used for calculating the dispersion of GDP per capita between all US states for which data is available in the dataset, thus excluding Hawaii and Alaska as data for these two states were not available in the dataset by Klein (2018). However, GDP per capita was already available in the original dataset, and thus there is no need for recalculating the nominal GDP. Thus, we end up with a measure of regional dispersion of GDP per capita in all of the 14 European nations and the US.

The next step was to have the income shares of the top percentile and top decile for the same 14 countries entered into this separate dataset. After downloading the full WID dataset, the share of pre-tax national income going to the top decile and top percentile was collected. The share of pre-tax national income is the total income flows in the hands of the owners of capital and labor, before the working of the tax system. There were two countries within the dataset, for which the CV previously was calculated, that did not contain any inequality data, namely Belgium and Austria. These two countries were thus excluded from the analysis at this point. The top decile and top percentile share of pre-tax national income was collected for the remaining countries. For Sweden, Switzerland, France, Netherlands and Germany, the tax unit was used as the base unit for the income shares. For the US, Spain, Norway and Italy, the base unit was the individual. For Finland and Denmark, the base unit was the tax unit up until 1969, and from 1970 and onwards the individual. In the UK, the base unit was the tax unit until 1989, and from 1990 the individual. The population is made up of individuals over the age of 20 for all countries except the US. From 1970 and onward, the population for the US is comprised of adults between the age of 20-64, and before that of all ages. One thing should be further stressed. While the aim was to collect data for all the eleven benchmark years for which the regional GDP was available, this was not always possible. As will be seen later in

the results section, there are some gaps in the data on top income shares. In some cases, data was available for years very close to the benchmark year. The years for which top income shares were collected may thus differ slightly from the benchmark years, and these are noted with a ‘*’ in the visualizations presented in the results section of this thesis. Additionally, in the case of Portugal, data on top income shares were not available for a sufficient number of years for a proper analysis to be carried out. Portugal was thus excluded from the analysis at this point. After compiling the top decile share, the top percentile shares and the CV, two types of further data analyses were conducted. First, the long-term patterns top income shares, for both the top decile and top percentile, regional dispersion of GDP per capita were compiled. These are presented using visual elements for each country individually. These visual elements allow us to observe the extent to which regional income inequality have tended to move in tandem with interpersonal income inequality in the long run. As for the next type of analysis, the percentage difference in the CV and share of pre-tax national income accruing to the top percentile was calculated for all countries during the period 1980-2010. The results here are presented using two additional visualizations, where the percentage difference in the top percentile income share was plotted on the Y-axis, and the percentage difference in the CV plotted on the X-axis. Additionally, a similar graph was created for the absolute difference in the top percentile income share and CV.

4. Results

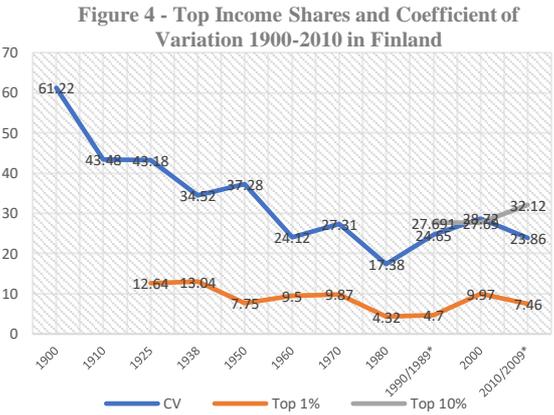
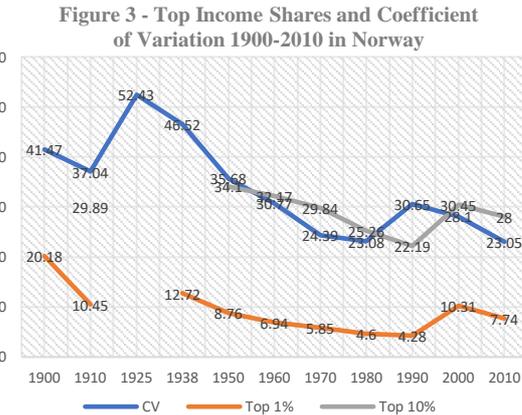
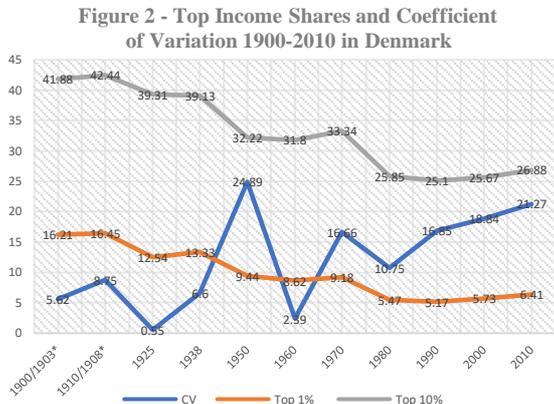
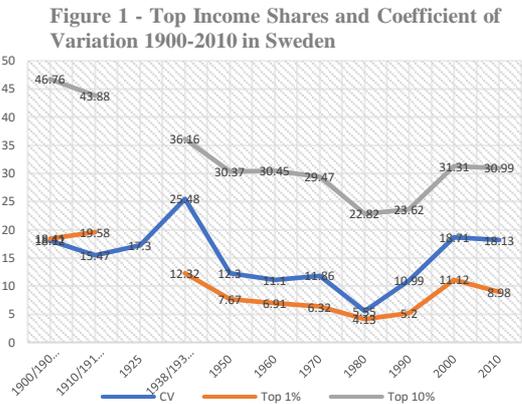
This section reports the findings of the study. The first part will show the long-term patterns of income inequality and regional income inequality for each individual country during the period 1900-2010. The second part will focus on the changes in top income shares and the CV from 1980 to 2010, while the third part will summarize the main findings.

4.1 Long-term trends in income inequality and regional income inequality

Figures 1 to 4 shows the trends top income shares and the CV for the 1900-2010 period in the Nordic countries included in this study, namely Sweden, Denmark, Norway and Finland. All of the three measures are expressed as percent. Keep in mind that the years noted with a ‘*’ applies only to the top income shares.

In Sweden, there seems to have been a relatively clear tendency for income inequality to decrease from the beginning of the twentieth century up until 1980. The share of pre-tax national income in the hands of the top decile dropped from approximately 47 percent in 1903 to 23 percent in 1980. The same goes for the top percentile share, falling from 18 percent to 4 percent during the same period. In addition, we do observe a similar trend in regional inequality during this period. The CV fell from 18.12 percent in 1900 to 5.5 percent in 1980. All three measures increased between 1980 and 2000, to then decline somewhat between 2000 and 2010. This pattern can to some extent be observed in Denmark and Norway as well, at least for top income shares. In Denmark, both the top percentile and top decile income shares declined from the beginning of the twentieth century. The top percentile share fell from 16 percent in 1903 to 5 percent in 1990. The CV, on the other hand, have fluctuated greatly during the twentieth century. As can be seen, it was actually lower in 1900 than it was in 1980, with some major spikes in between. In Norway, the share of the top percentile fell from 20 percent in 1900 to 4 percent in 1990. While data on the top decile share were not available here before 1950, a pattern of decreasing shares can still be observed from 1950 to 1990. The CV also seems to follow this converging trend up until 1980, falling from 41.5 in 1900 to 23 in 1980. One thing deserves to be highlighted here; while both top income shares and the CV increased in Sweden after 1980, this is not the case in Norway and Denmark. It is true that in all three countries, regional income inequality seems to have increased after 1980. However, income inequality did not increase until after 1990 in Norway and Denmark. In this regard, Finland seems to follow the Swedish pattern, with convergence up until 1980, after which both the share of the top percentile and the CV increased, to later decline after year 2000.

However, the limited data that was available for the top decile shows that instead of following the top percentile and the CV, their share increased between 2000-2009. Thus, except in the case of Denmark, we see that up until 1980 or 1990, both income inequality and regional dispersion of GDP per capita declined in a similar manner.



Figures 5 to 10 displays the long-term trends in the continental European countries included here. In France, both top income shares and the CV tend to follow a pattern that is in some ways very similar to the pattern observed in Sweden, Norway and, at least to some extent, in Finland. The top income shares did decline during the 1900-1980 period, and so did the CV. Between 1980 and 2010, all of the three measures increased. However, we do see that between 1938 and 1950, income inequality and regional inequality moved in opposite direction, although in the long run there seems to be a pattern of co-movement between the variables. This long run tendency of convergence cannot be observed in neither Germany nor the Netherlands, where the regional income inequality seems to be a lot more fluctuating. Top income shares did decline in Germany during the 1900-1980 period. The CV, on the other hand, rose from 22 in 1900 to 23 in 1980. While the top income shares grew steadily between 1980 and 2010, the CV rose significantly between 1980 and 1990, only to fall just as

dramatically in the following two decades. Figure 7 displays how the top income shares in the Netherlands declined between 1925 and 1990, and later increased during the two following decades. The CV, however, did fall between 1925 and 1960, but rose significantly in the two following decades. Between 1980 and 1990, the coefficient fell just as dramatically, and increased again after 1990. In Switzerland, all three measures have remained relatively stable throughout the period for which data on top income shares was available. A slight increase in income inequality is discernable after 1980, and this is followed by an increase in regional income inequality as well. As for the rest of the time span, there is no such pattern that can be clearly discerned. As for the last two continental European countries, Spain and Italy, not very much can be said of the long-term trends because of the very limited data on top income shares. We do see that the top percentile, and to some extent the top decile, and the CV in Spain tend to move in similar directions. In Italy, such a pattern is very difficult to discern. Income inequality increased throughout the 1980-2010 period, but the CV did not.

Figure 5 - Top Income Shares and Coefficient of Variation 1900-2010 in France

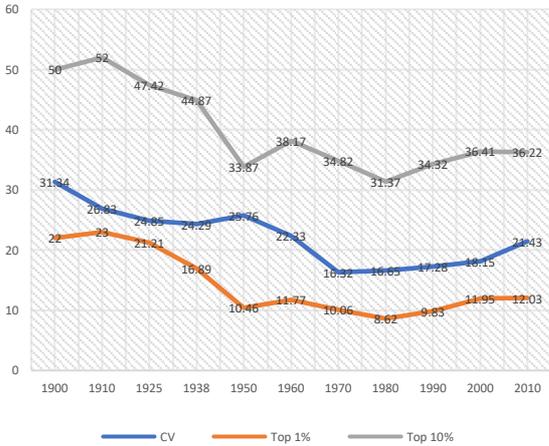


Figure 6 - Top Income Shares and Coefficient of Variation 1900-2010 in Germany

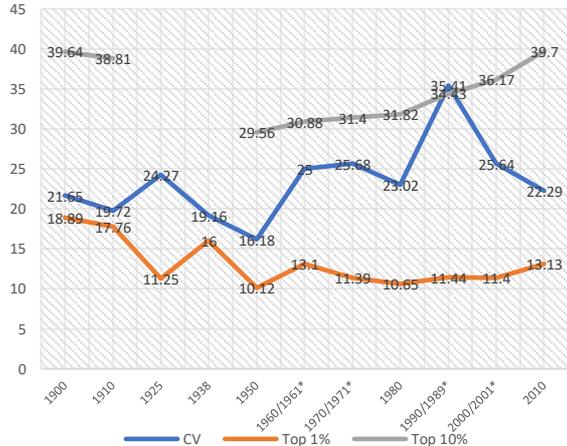


Figure 7 - Top Income Shares and Coefficient of Variation 1900-2010 the the Netherlands

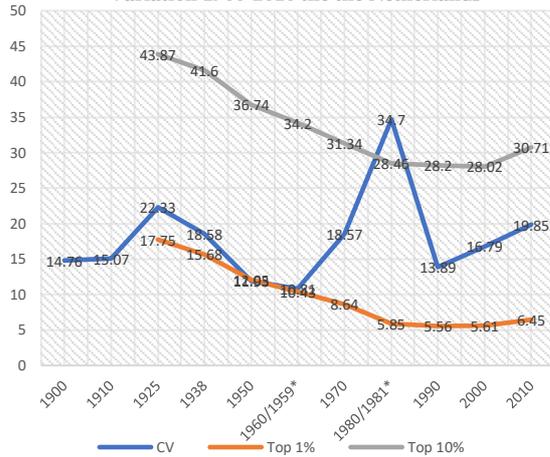


Figure 8 - Top Income Shares and Coefficient of Variation Switzerland

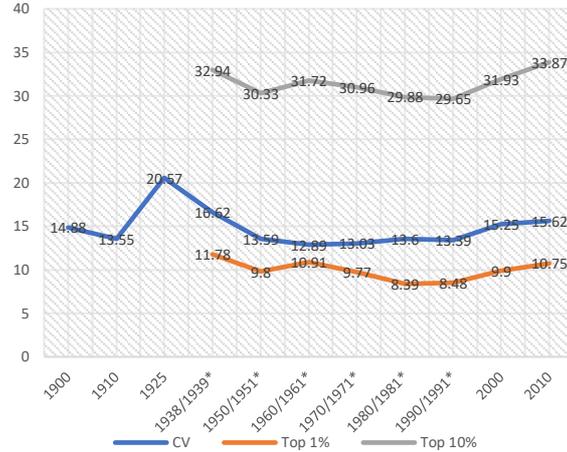


Figure 9 - Top Income Shares and Coefficient of Variation 1900-2010 in Spain

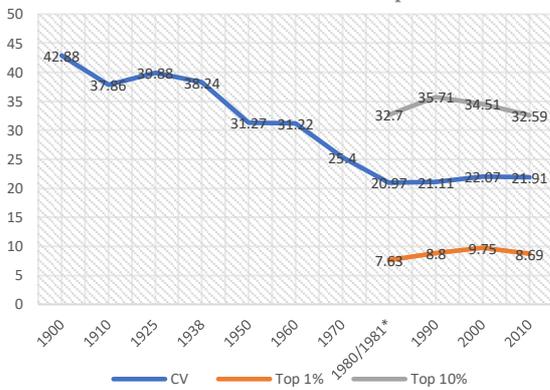


Figure 10 - Top Income Shares and Coefficient of Variation 1900-2010 in Italy

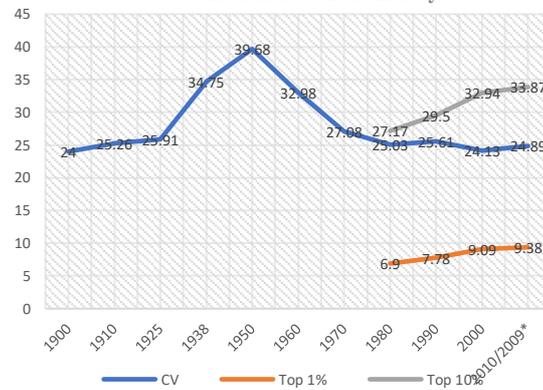
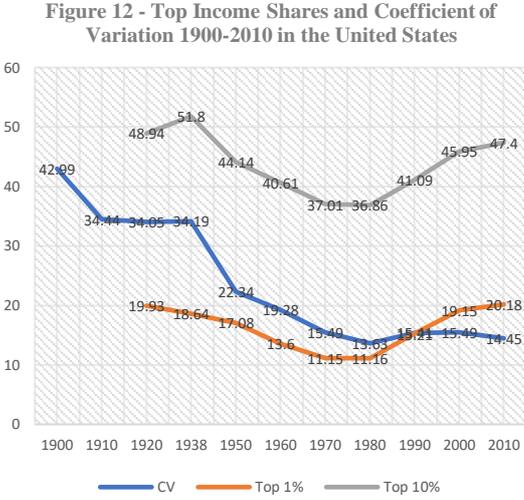
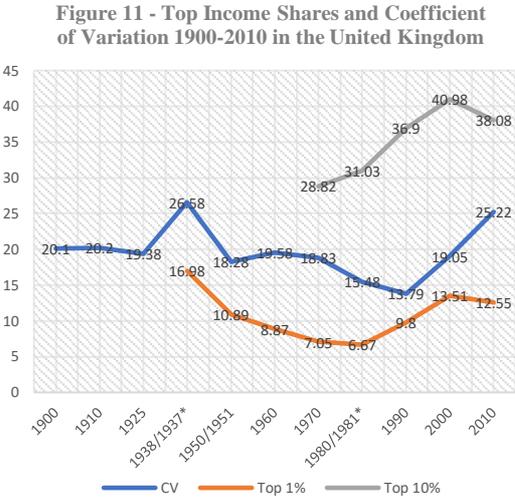


Figure 11 and 12 displays top income shares and the CV in the two Anglo-Saxon countries, the UK and the US. Beginning with the UK, there is no clear tendency for income inequality and regional income inequality to move in the same direction during the time period for which data was available. Between 1938 and 1980, or 1937 and 1981 in the case of income shares, both the coefficient of variation and the top percentile share declined. However, within this period there were decades where the two measures moved in the opposite direction. After 1981, both measures of income inequality rose until year 2000, after which they declined. The coefficient of variation did increase in 1990, after which it was sustained and did not fall when the top income shares did. Last but not least, the US experience is similar in some regards to what we saw in the Nordic countries and France in the beginning of this section. There was a steady decline in both income inequality and regional income inequality between 1920 and 1980, after which all three measures rose. The rise in income inequality was more pronounced than the increase in the CV. However, while there is a clear tendency for the state-level GDP per capita to converge up until 1980, this tendency leveled out in the decades

following, with the CV being only slightly higher in 2010 than it was in 1980. Between 2000 and 2010, however, the coefficient fell while income inequality continued to increase.



4.2 Changes in top income shares and regional inequality 1980-2010

Figure 13a and 13b shows the percentual and absolute differences in the CV and top percentile income shares between 1980 and 2010 for each country in the study. The trend-line in figure 13a shows that there is a positive relationship between the percentual change in pre-tax national income share of the top percentile and the percentual change in the CV. First, we do observe that the top percentile income share increased in all of the countries between 1980 and 2010. Regional dispersion of GDP per capita, however, did not. On the right end of the trend-line, we find Sweden, with a 227 percent increase in the coefficient of variation and a 118 percent increase in the top percentile share of pre-tax national income. On the other end, we find the Netherlands, showing the most aggressive relative decline in the coefficient of variation during this period, with a 43 percent decline. The Netherlands also show the lowest relative increase in top percentile income shares. Between these two extremes, there are countries like Norway or the US, where the relative increase in income inequality is high, but where the CV remained more or less the same or increased only very little. Figure 13b displays the absolute change in the top percentile share and the coefficient of variation between 1980 and 2010. The results here are similar to those shown in figure 13a. We still find Sweden and Netherlands on either side of the line. However, the increases in Sweden are less extreme compared to the relative measure, while the decline in the Netherlands seems even more extreme. We can also observe that many of the countries seems to cluster in the middle, with countries like the UK, Denmark, the Netherlands and the US standing out to a

greater extent. The pre-tax share of national income in the hands of the top percentile increased by 9 percentage points in the US, while the CV only increased by 0,8. The absolute measure also show that the increases in Sweden are not as extreme as was the relative measure.

Figure 13a - Percentual difference in the Top Percentile Income Share (Y-axis) and Coefficient of Variation (X-axis) 1980 - 2010

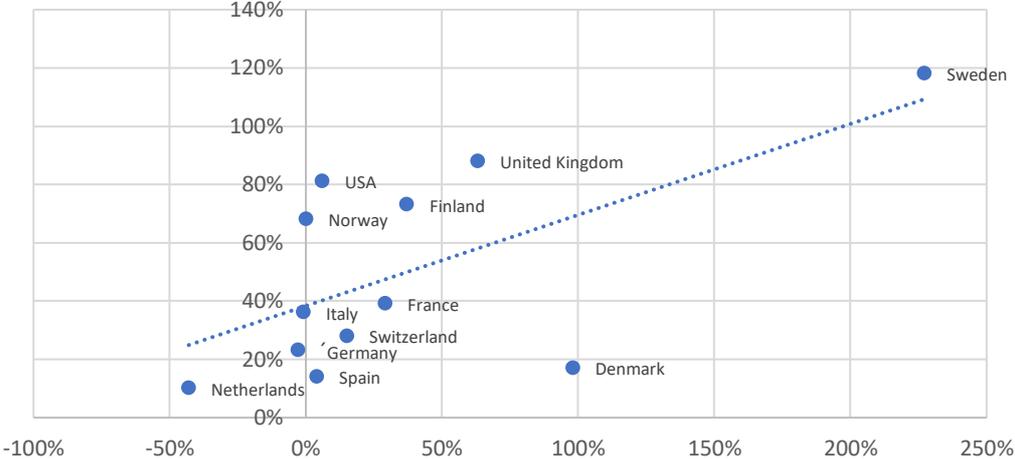
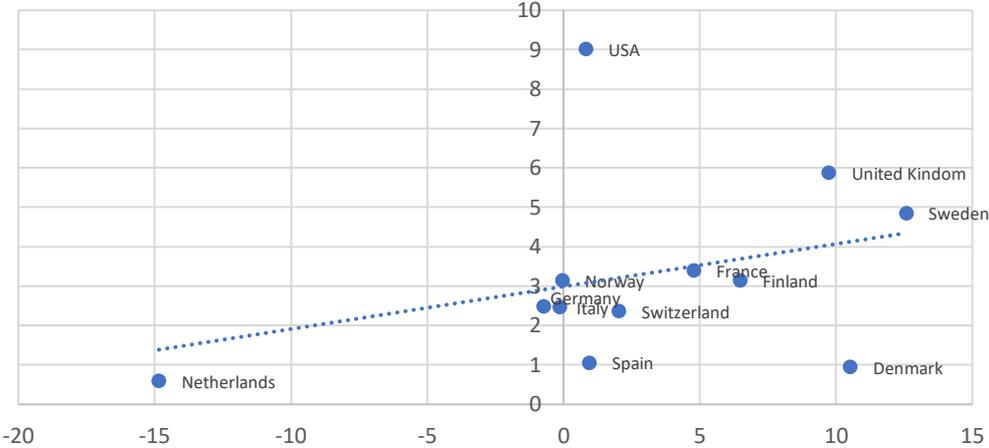


Figure 13b - Absolute difference in the Top Percentile Income Share (Y-axis) and Coefficient of Variation (X-axis) 1980-2010



4.3 Result synopsis

Section 4.1 shows that in many of the countries examined, there have been some tendencies for the different measures to evolve in similar directions, with long period of convergence, followed by divergence. Although, in a number of countries, this has not been the case. Additionally, section 4.2 shows that there has been a relatively clear positive relationship between changes in top income shares and the CV between 1980 and 2010.

5. Discussion

The main objective of this thesis was to investigate the extent to which top income shares and regional dispersion of income per capita have moved in tandem in a number of European countries as well as in the United States. The previous section showed that in the long run, income inequality and regional income inequality have in many countries followed similar patterns of convergence up until the 1980s or 1990s, as anticipated by Kuznets (1955) and Williamson (1965), but divergence thereafter. However, the results were varied. In a number of countries, there were no discernable pattern of such a co-movement. The unexpected results displayed by countries like Denmark, the Netherlands and Germany suggests that there's no necessity that these patterns should move in the same direction. However, we did see a positive relationship between changes in top income shares and changes in the CV between 1980, suggesting that countries with larger increases in top income shares also had higher increases in the CV. This section will discuss these findings in light of the different theories previously reviewed in section two of this thesis, as well as additional literature. This will be done using the same geographical divisions as the results were presented in, with the Nordic countries as one group, the continental European as another and the US and the UK as a third group.

5.1 The Nordic countries

As Roine and Waldenström (2015) suggests, top income shares in the Nordic countries have followed a pattern of convergence up until 1980. The rising top incomes after 1980 in the Nordic countries, especially in Sweden, Finland and Norway, have been more significant than in countries like Germany or France, but the extent of the increase is still moderate compared to the Anglo-Saxon countries, i.e. the UK and the US (Roine and Waldenström 2015). The results presented in the previous section showed that in Norway, Finland and Sweden, top income shares and the CV have to a large extent moved in similar directions.

Sweden is the one country included in this thesis with the most pronounced percentage increase in both regional income inequality and top income shares, as well as one of the countries where we see that the top income shares and the CV displays very similar patterns. While examining the long-term trends in regional inequality in Sweden, although using regions according to the NUTS-3 classification, i.e. smaller regional divisions than used in this thesis, Enflo, Henning and Schön (2018, pp. 294-296) divides the regional economic development into four different periods. The period between 1860 and 1910 was marked by

regional income convergence, which was followed by a divergence between 1910 and 1940. After 1940, there was a strong converging trend until 1980, and since then regional income inequality has widened just like in many other countries (Enflo, Henning and Schön 2018, pp. 294-296). Our results, where the CV was calculated following the NUTS-2 classification, seems to reflect these periods as well. The CV rose between 1910-1938, and fell until 1980, after which the CV increased significantly. When discussing the divergence between 1910 and 1940, Enflo, Henning and Schön (2018, p. 295) suggests that this period fits the theories of the *New Economic Geography*, as discussed in section 2.3 of this thesis. The expansion of the hydroelectricity network made the electricity that was produced in the north accessible in other parts of the country, reducing the relative costs of location further away from where hydroelectricity was produced, and thus facilitating concentration of economic activity closer to larger markets. Stockholm moved ahead from the rest of the country (Enflo, Henning and Schön 2018, pp. 294-296). While the convergence between 1940 and 1980 was in large part due to the institutional conditions of the Swedish model, such as the centralized wage negotiations, the possible explanations for the divergence after 1980, as suggested by Enflo, Henning and Schön (2018, pp. 296-299), deserves a bit more attention. The rise in regional income inequality is much driven by concentration of well performing economic activity to the metropolitan areas, mainly in Stockholm but also Gothenburg and Malmö. 30 percent of the country's total GDP was held by Stockholm in 2010, compared to 20 percent in 1980. The dynamic manufacturing and service industries locate close to universities and skilled labor, while traditional manufacturing located in peripheral regions have been subject to international competition and lower levels of demand (Enflo, Henning and Schön 2018, pp. 296-306). The trends in top incomes shares in Sweden follow almost the exact same pattern as did the CV, although there's an extensive gap in this data between 1910-1938, with falling top income shares between 1938 and 1980, after which there's a significant increase. While noticing the drop in top income shares after the second world war, Roine and Waldenström (2008) notes that the further decline up until 1980 was much due to not only increasing marginal taxes, but also the wage setting policy of that period. If the wage setting policy played an important role for both the reductions in top income shares and the regional income convergence, this may provide some explanations to why these patterns have been so closely related in Sweden during this period. This is an interesting connection, especially as we see an increase in the CV from 1980 and onwards, about the same time as the centralized wage setting system in Sweden began to erode (Lundh 2010, p. 268). After 1980, however, many models of explanation have focused on the role of capital gains (Roine and Waldenström

2008; Roine and Waldenström 2010), and it is difficult to find similarly overlapping explanations to why income inequality and regional dispersion of income have increased in a similar manner after 1980.

Although the existing explanations for the trends observed in Finland are less extensive than for Sweden, Enflo (2018, pp. 110-111) shows that the periods of convergence and divergence are very similar to the periodical divisions of Sweden previously discussed. Additionally, she suggests that the divergence after 1980 was characterized by strong concentration of job creation and economies of agglomeration in areas more proximate to markets (Enflo 2018, p. 110-111). As for the top income shares in Finland, Sullström, Riihelä and Toumala (2010) argues that the increase in the later decades is much due to the changes that have taken place within the tax system. Regional economic development in Norway has been discussed by Modalsli (2018), who suggests that there has been a striking relationship between the patterns of the CV and top income shares in the country. He highlights this feature by arguing that a high degree of income sorting would make such a co-movement expected (Modalsli 2018, p. 240). However, if one looks closely at figure 3 in the previous section, it is possible to observe that while top income shares in Norway did increase rather sharply after 1990, the CV rose already between 1980 and 1990, while the top income shares were still falling. This deserves to be highlighted as it contrasts with what we would expect in light of the explanations proposed by Manduca (2019), and thus a rather unexpected finding. If rising income inequality would be the main driver of regional income disparities, this timing seems dubious. The most unexpected finding within the Nordic countries, however, is the case of Denmark. Figure 4 in the previous section shows that during the most part of the twentieth century, there is almost no co-movement at all, and while the top income shares have fallen similarly to many other countries, the CV have fluctuated greatly with many spikes. However, since 1980, the CV has increased similarly. Previous studies on regional economic development in Denmark have been using the NUTS-3 classification (see Janisse et.al 2018), and the results presented here do differ from that of this thesis. However, Janisse et. al (2018, p. 101) do suggest that much of the divergence in later decades have been driven by the Copenhagen region, which again seems to follow the pattern of metropolitan areas moving ahead of other regions within the country that has been observed in many other countries. However, the case of Denmark is important for this study, as it is one of the prime examples of that there is no necessity for income inequality and regional inequality to display any co-movement in the long run.

5.2 Continental Europe

Top income shares and the CV have moved relatively similar in France during the 1900-2010 period, with a notable exception between 1938-1960. The regional economic development has been discussed by Rosés and Sanchis (2018), who dismiss the theories of Williamson (1965) and the predicted inverted U-shaped pattern as they recognize that regional inequality has increased significantly after 1980 (Rosés and Sanchis 2018, pp. 136-142). They do, however recognize the importance of the Paris-region when explaining this regional divergence, as this region accounts for two thirds of the total regional inequality is because of the differences in income between this region and others (Rosés and Sanchis 2018, pp. 137-138). Here again, we see the importance of the dynamic metropolitan centers as drivers of this divergence, as previously noted by Rosés and Wolf (2018, pp. 19 & 39).

When discussing the Netherlands, it is important to note the significant decline visible in figure 13a and 13b in the results section. The Netherlands displays a 43 percent decline in the CV during the 1980-2010 period. However, there was a dramatic increase in the CV between 1970 and 1980. If one were to measure the change in the CV in the Netherlands between 1990-2010 instead, the CV would have increased rather significantly, from 13.9 to 19.9. The top income shares, on the other hand, have remained relatively stable, with only a very slight increase between 1980 and 2010. In Germany, top income shares seem to have declined during the 1900-1980 period, while the CV have fluctuated greatly. The pattern of the CV has previously been discussed by Wolf (2018, pp. 162-164), who argues that the remarkable increase in the CV around 1990 is much due to the erosion of the GDR. Further, Wolf (2018, p. 164) notes that Germany stands out from the rest of Europe, as the capital has been relatively weak in economic terms. Thus, while there have been observable tendencies for agglomeration economies within the service sector in some regions (Wolf 2018, p. 164), Germany does not fit into the capital driven divergence that have been observed in many other European countries. Both Germany and the Netherlands thus stands out, together with Denmark, as examples of countries where there is no visible pattern of co-movement between top income shares and the CV.

As seen in the previous section of this thesis, both the top income shares and the CV have remained relatively stable in Switzerland, at least since 1938 and before 1990, after which all three measures increased. Dell, Piketty and Saez (2007, pp. 488-491) observes the stability of top income shares as well and additionally suggests that Switzerland is in this regard different from many other countries, as there was no significant convergence in top income shares during and after the world wars. In their discussion about regional dispersion of income in

Switzerland, Woitek and Wüthrich (2018, pp. 318-321) focus on the importance of two regions, namely Ticino and Zurich. In terms of GDP per capita, the region of Ticino has not kept pace with other regions for most of the twentieth century, with a large agricultural sector and relatively high rates of unemployment. The relative GDP per capita in Ticino has thus always been below the Swiss average. Zurich on the other hand has been one of the main centers of the service and financial sectors, which has been the main drivers of economic growth since the 1970s, and Zurich has thus had a relative GDP per capita above the Swiss average (Woitek and Wüthrich 2018, pp. 318-321).

Due to the very limited data on top income shares in Spain and Italy, it is difficult to discuss the long-run evolution of both these two phenomena. However, Alvaredo and Saez (2009) suggest that the concentration of income in Spain declined between 1930 and 1970, at least when looking at the top 0.01 percent of the distribution. There was a significant fall in top income shares during the 1940s, much due to the circumstances of the dictatorship, after which top income shares did not increase immediately, but rather following the pattern of France and other countries with a couple of stable decades and increasing after 1980 (Alvaredo and Saez 2009). Regional inequality in Spain, has however been thoroughly examined by Martínez-Galarraga et al. (2018), who suggest that regional income inequality has in the long run, between 1860 and 2010, followed the pattern of an inverted U-shaped curve (Martínez-Galarraga et al. 2018, p. 277). While this may fit into the hypothesis that Williamson (1965) proposed, Martínez-Galarraga et al. (2018, pp. 278-285) suggest a number of other possible causes behind the observed trend. The *NEG*-models discussed in section two of this thesis may, for example, account for the long-term pattern (Martínez-Galarraga et al. 2018, p. 278). The long convergence from 1920 until 1980 happened during the years during which Spain experienced high economic growth rates and began with the market integration resulting from the increasing number of paved roads and electrification. The integration process stopped with the civil war and the new regime, which in turn led to the process of convergence coming to a halt. The convergence resumed by the end of the 1950s, together with further economic development (Martínez-Galarraga et al. 2018, pp. 282-284). After 1980, rising productivity differences between Spanish regions and the geographical concentration of the service sector paved way for deteriorating regional income inequalities (Martínez-Galarraga et al. 2018, pp. 284-285). Italy is well known for its regional income differences, especially by its North-South divide (Felice 2018, p. 177). Much of the evolution of regional income inequality in Italy has been explained by unemployment rates, and not differences in productivity as we saw in the case of Spain, as well as differences in social

determinants and institutions between the north and the south of Italy (Felice 2018, p. 199). Top income shares in Italy has been discussed by Alvaredo and Pisano (2010), who indeed notes the difficulties stemming from the lack of top income data before 1974. They do however, suggest an increase in top income shares after 1980, which is much due to income from self-employment as well as rising top wages (Alvaredo and Pisano 2010, pp. 633-643).

5.3 The United Kingdom and the United States

Numerous explanations for the regional income inequality in the United States have been put forward by Klein (2018, pp. 378-383). As seen in figure 11 in the previous section, the long trend of income convergence between states slowed down considerably after 1980.

Considering the role of production factors in accounting for this trend, Klein (2018, pp. 378-379) highlights the role of housing prices and relates to the theory put forward by Ganong and Shoag (2017), as discussed in the literature review in section two of this thesis. Their proposed relationship between prices of housing and income suggests that the migration patterns changes, as the low-skilled population move to less productive areas, and vice versa (Klein 2018, pp. 378-379; Ganong and Shoag 2017). As this would suggest a slowdown in interpersonal income convergence as well (Ganong and Shoag 2017), it comes as no surprise that convergence in regional income inequality came to a halt at the same time as the trend in top income shares reversed. However, regional income inequality did not increase as significantly as income inequality did in the decades after 1980.

Regional income inequality has increased substantially in the United Kingdom after 1990. Geary and Stark (2018, pp. 337-338) argue that the financial regulation made it possible for London to become one of the largest financial centers in the world, causing the London-region to step ahead of the rest of the country in terms of growth. The role of financial deregulation for the increasing interpersonal income inequality have been a widely discussed subject, especially so in the U.S, where it has been argued to be clearly related to the recent surge in income inequality (Lin and Tomaskovic-Devey 2013). While studies on this relationship in the UK are more difficult to find, the possible impact of the financial deregulation on income inequality could possibly partly explain the relatively large increases in income inequality and regional inequality in the UK as seen in figure 13a in the results section.

5.4 Limitations

The results presented and discussed in this thesis should be viewed in light of its limitations. First and foremost, the measurements used deserves to be discussed. There are numerous other ways to measure regional dispersion of GDP per capita, the Theil's index, Hoover concentration index and the Lorenz curve are three examples of such measures (Huang and Leung 2009). The reasons for choosing the CV instead of one of the other measures are twofold. First, the CV is the most commonly used measurement of regional income disparities (Iliev 2018). Second, most of the literature reviewed in section two relied on the CV in order to measure regional income disparities. Thus, for the sake of coherence with the literature and theories reviewed, most notably Williamson (1965) and Rosés and Wolf (2018: 34), using similar measures seemed the most appropriate choice.

Although the Gini coefficient have been the most popular measure of income inequality (Alvaredo 2011), this thesis has relied on top income shares as a measure of income inequality across the distribution. Atkinson and Piketty (2007, pp. 1-2) notes the advantages of using a dataset based on top income shares rather than existing ones, as previously existing databases do not usually provide data that goes further back than the 1970s, something that has been crucial for this thesis. Additionally, Atkinson and Piketty (2007, pp. 1-2) suggests that these databases have been of poorer quality. Measuring income inequality using top income shares do have its drawbacks, as discussed by Leigh (2007) especially as they stem from tax data. The issue of tax evasion, or understating the income that is reported, may pose problems for long-run examinations of patterns in top income shares. If the scope of understating incomes varies over time, this is indeed an issue (Leigh 2007). Other problems of comparability include that the base unit may differ between countries, in some countries data is collected on the basis of the individual, while in other the tax unit. The age span for which income data is collected also differ between countries, making comparisons problematic (Leigh 2007). Despite its drawbacks, this measure of income inequality does track other income inequality measures closely (Leigh 2007). The most important reason for choosing top income shares as the measure of income inequality in this thesis, together with the coherence to the literature and theories review, is the time span. Top income shares have been available in most countries for the absolute majority of the years we are interested in. This would have been difficult if the Gini-coefficient were the chosen measure. Some further limitations should be addressed. Although data on top income shares are available for the most part, there are large gaps in some countries. The implications of this are relatively obvious, because it has not been possible to examine the co-movement between income

inequality and regional income inequality when this has been the case. Additionally, adjacent years to the benchmark years have been used when data on top income shares were not available. This leaves us with a situation where the data on top income shares have been collected for years that differs somewhat from the benchmark years for which data on regional income inequality were analyzed, leaving room for inconsistencies.

5.6 Summary

In light of the relationship between top income shares and regional income inequality suggested by Manduca (2019), much of the results were as expected. In many countries, the long convergence of income inequality up until the 1980s was followed by a similar convergence in regional income disparities. Similarly, increasing income inequality after 1980 was in many countries accompanied by increasing regional income inequality. However, numerous countries do not show this kind of co-movement between these measures. This discussion has reviewed some of the possible explanations as to why these developments have unfolded differently in these countries. In many countries, the recent divergence is much due to larger urban areas growing more than other regions within the country. There are however, exceptions to this. Most of the explanations discussed here do not, however, provide any suggestions as to why income inequality and regional inequality have moved in similar, or opposite directions. In some countries there are factors that has been suggested to have affected both income inequality and regional income differences, for example the effect of housing prices in the US.

6. Conclusion

The ultimate aim of this thesis was to examine the extent to which top income inequality and regional income inequality have moved in tandem on a national level in Europe and the US. Although the results of this thesis have varied, and the countries examined have differed greatly, some final comments should be made. This thesis has shown that in many countries, top income shares and regional income inequality have often developed in similar directions. However, maybe more importantly, the results have also shown that there is no necessity for this to be the case, as some countries do not display this kind of co-movement. Additionally, by identifying some possible explanations as to why income inequality and regional income inequality have moved in similar directions, such as the role of housing prices in the US, this thesis have provided a point of departure for future research in order to further comprehend this phenomenon. Here, looking into the effects of marginal taxes, wage setting policies and, again, housing prices, in a vaster number of countries may prove important. A more thorough understanding as to why the rising income inequality in many countries have been accompanied by rising regional income disparities is important in order to counteract the possibly dismal consequences of increasing regional income differences.

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