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The Decline of the Middle Class: New Evidence for Europe

*Judith Derndorfer and
 Stefan Kranzinger*

Abstract: This article examines how the middle class has fared in twenty-six European countries between 2004 and 2014 based on European Survey on Income and Living Conditions (EU-SILC) data. We define individuals living in households with a median equivalized disposable household income between 75% and 125% to be middle class. We find that the middle class has decreased in eighteen out of twenty-six countries, which is accompanied by an increase of income polarization. Income redistribution is most influential for explaining differences in the size of the middle class across European countries.

Keywords: middle class, EU-SILC, income inequality, polarization

JEL Classification Codes: D31, D63

Scholars and politicians have long pointed out the importance of a stable and large middle class. Nancy Birdsall, Carol Graham and Stefano Pettinato (2000, 1) consider the middle class to be “the backbone of both the market economy and of democracy in most advanced countries.” The reasons for the economic importance of the middle class range from positive effects on aggregate demand and investments in education (Thewissen et al. 2015), entrepreneurship (Acemoglu and Zilibotti 1997), to rising income levels due to demand for quality consumer goods of middle-class households (Murphy, Shleifer, and Vishny 1989). Others call attention to detrimental economic effects of a shrinking middle class: Raghuram G. Rajan (2011) and Robert B. Reich (2010) argue that growing income inequality fuels household debt when lower- and middle-income households try to smooth their consumption in times of income fluctuations, which leads to greater financial instability.¹ This argument is supported by findings of Robert Scott and Steven Pressman (2011 and 2013) who state that the middle class in the United States is squeezed by income inequality on the one hand and rising interest payments on past debt on the other hand. The idea that a strong middle class

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¹ “In both eras [1920s and 2000s], had the share going to middle class not fallen, middle-class consumers would not have needed to go as deeply into debt in order to sustain their middle-class lifestyle. Had the rich received a smaller share, they would not have bid up the prices of speculative assets so high” (Reich 2010, 25).

Supplemental data for this article can be accessed online at <https://doi.org/10.1080/00213624.2021.1982338>

is also vital for democracy and social cohesion is not a new one. It was already put forward by Aristotle (1959). Aristotle emphasizes that political communities administered by a numerous and strong middle class are favorable over a rule by either one of the two extremes—rule by the poor (extreme democracy) or rule by the rich (oligarchy). More recently, Robert J. Barro (1999) also finds that democracy increases with the share of middle-class income. Norman Loayza, Jamele Rigolini, and Gonzalo Llorente (2012) further show that social policy and quality of governance improve with a rising middle class. Hence, the middle class forms a vital pillar for social cohesion, economic performance, and democracy, but is currently endangered by rising levels of income inequality and income polarization. The aftermath of the financial crisis in 2007 has renewed the interest in income and wealth inequality, as well as the concern about the *hollowing out of the middle class*. Still, research on distributional issues often focuses on either low-income households or top incomes. Those in the middle of the income distribution have received less attention by scholars. The renewed interest in the well-being of the middle class translated into a growing body of literature. Some scholars are concerned with trends in real incomes and living standards for middle-income households and find a considerable variation between countries (e.g., Nolan 2018), while others show that the size of the middle class is declining in numerous countries.² Francis Fukuyama (2012) raises the question of whether liberal democracy can survive the decline of the middle class. He postulates that liberal democracy rests on a middle-class social base, which is being eroded by the current form of globalized capitalism.

Based on the outlined considerations concerning the significance of the middle class, it is worthwhile to carefully study the development of the middle class in Europe. In particular we want to find out whether the middle class across Europe has declined between 2004 and 2014, and if so, whether the lower, the upper-income class, or both increased. Also, we study which education groups form the middle class and whether the educational composition has changed. Last, we try to identify potential causes for a declining middle class.

The most difficult part is to establish how the middle class should be measured. We define the middle class as households living on between 75% and 125% of the national median equivalized disposable household income. First, this is the most established definition in the literature. Second, we believe that households belonging to the middle class should be well above the risk-of-poverty threshold (usually defined as 60% of the median income) and have similar income resources, which translates into an average standard of living in the respective country. Bearing in mind the unavoidable arbitrariness of the thresholds, we verify whether the findings concerning the change of the middle class population share depends on the specific cut-off points.

We add to the literature by focusing on what happened in the middle of the income distribution by employing the EU-SILC (European Survey on Income and Living Conditions) data for our analysis. We incorporate the latest data of the EU-SILC for 2014 and also examine changes of the educational composition of the middle class. We further compute M_1 , first, second polarization curves, as proposed by Michael C. Wolfson (1994) and examine changes in the income distribution by means of a polarization index put forward by Wolfson (1994). As pointed out by Ali Alich, Kory Kantenga, and Juan Solé (2016), who studied income polarization in the United States, it is of great importance to study and compute

² For single country analyses see, for example Blackburn and Bloom (1985), Rosenthal (1985), Bradbury (1986), Horrigan and Haugen (1988), Jenkins (1995), Grabka and Frick (2008) or Grabka et al. (2016). For cross-country analyses see, e.g., Deininger and Squire (1996), Pressman (2007), Pressman (2010), Foster and Wolfson (2010), Kharas (2010), Ravallion (2010), or Bigot et al. (2012).

the polarization index also for other countries. We further examine possible drivers of a declining middle class, based on a framework proposed by Pressman (2007), who analyzed the decline of the middle class investigating structural, macroeconomic and fiscal factors in eleven developed countries between 1980 and 2000.

Our analysis shows that the size of the middle class declines in eighteen out of twenty-six European countries between 2004 and 2014. By examining the polarization curves, we find that in thirteen countries the downsizing of the middle class is independent from the chosen cut-off points. The polarization index increases in all countries where a decline of the middle class was noted, with the exception of Greece. Hence, a *hollowing out of the middle class* is accompanied by a more polarized income distribution (i.e., more individuals moving into lower and higher income classes). In eleven out of the eighteen countries where the size of the middle class declines, more people shifted into the lower tails of the distribution than into the upper tails. Moreover, our results are consistent with the findings of Pressman (2007) and Pressman (2010). We show that income redistribution in form of transfers and taxes is the most important driver for the size of the middle class and that variation between countries is relatively large.

The remainder of the article is organized as follows. First we outline the difficulties of measuring the middle class. Following we describe our data. In the next section we discuss our results. First, we give an overview about the development of the middle class at the European level. Second, we analyze the effect of changing household structure and income redistribution on the size of the middle class. We further examine to what extent government social security and retirement programs for the elderly alter the size of the middle class. Finally, we summarize our main findings.

Measuring the Middle Class

Among economists, the middle class is usually defined in terms of income. Economists, as pointed out by Janet Gornick and Marcus Jäntti (2013), study those who belong to the middle of the income distribution, rather than a class in sociological terms.³ Also in this article, we exclusively refer to the middle-income class, when talking about the middle class.

Various measurement approaches regarding the middle class can be useful in different contexts. The size of the middle class can be either fixed or varying. When taking the size of the middle class as fixed, scholars study, for instance, the middle 60 percent (Easterly 2001; Atkinson and Brandolini 2013). According to this measurement, the size of the middle class cannot—by definition—change over time. Here, the focus lies on the development of the income share of the middle deciles over time.⁴ Since we focus on the changing size of the

³ Other disciplines typically go beyond a definition solely based on income. Markus Grabka et al. (2016) mention other socio-economic factors, such as education, social and occupational status, family background, social networks, leisure behavior or values that can be included in defining an income class. According to Nicole Burzan (2012) the society can be divided along vertical inequalities, such as occupation, education and income, as well as horizontal inequalities, such as gender, age, ethnicity, residential area, lifestyle and values. Moreover, Thomas Piketty (2014) defines the middle class as 40% of the households above the median wealth (P50–P90). Beyond objective measures, researchers also examine the subjective class identity based on survey data. For instance, Mariah D. Evans and Jonathan Kelley (2004) study twenty-one rich and poor countries and find a pronounced propensity to place oneself in the middle of the social hierarchy in all countries.

⁴ For instance, Anthony B. Atkinson and Andrea Brandolini (2013) analyze income shares of the middle 60% and population shares (using different middle-class thresholds) between around 1985 and around 2004. They show that the income share of middle 60% declined to the benefit of the richest 20% in all fifteen countries, except for Denmark. In the same period, the size of the middle class decreased—no matter which cut-off points are chosen—in ten countries.

middle class, we use thresholds for defining our subject of interest. Income thresholds can be either in absolute or relative terms. For developing countries, an absolute income measure is commonly used to define poverty, as well as the middle class. For instance, Abhijit V. Banerjee and Esther Duflo (2008) define the middle class for developing countries as people living on between \$2 and \$10 a day. Another approach for identifying the middle class in developing countries is to study the consumption behaviors of individuals or households instead of income. Martin Ravallion (2010) argues that for high-income countries, definitions are generally based on relative income, typically referring to the median equivalized income.

Owing to the fact that the size of the middle class in European countries lies at the core of our research, we use a relative income definition for the middle class. Defining the middle class in relative terms leads us to the problematic issue of setting lower and upper thresholds. Once more, there is a lack of consensus on which thresholds to use. A wide variety of definitions exist: Markus Grabka and Joachim R. Frick (2008) and Régis Bigot et al. (2012) define the middle class as households with an equivalized income between 70% and 150% of the national median income. Other studies, such as McKinley L. Blackburn and David E. Bloom (1985) and Pew Research Center (2015) broaden the definition to 60–225% and 67–200%, respectively. Gerhard Bosch and Thorsten Kalina (2015) and Annamaria Simonazzi and Teresa Barbieri (2016) choose cut-off points of 60% and 200%. Again other scholars study households with an income between 75% and 125%, when talking about the middle class (Thurow 1987; Birdsall, Graham and Pettinato 2000; Pressman 2007 and 2010). The enumeration should highlight the great variation in the literature and the difficulty to choose thresholds. Nonetheless, according to Ravallion (2010) the literature seems to “converge” to a definition introduced by the seminal work of Lester C. Thurow (1987), who defines the middle class between 75% and 125% of the median income. This is also the most common relative threshold used by authors in the book edited by Gornick and Jäntti (2013) about the middle class in affluent countries. For this research, we decided to follow the literature and define the middle class as population share of individuals living in households with a household income between 75% and 125% of the national median equivalized income.

As opposed to defining the lower threshold at 60% of the median, we add a margin of a quarter of the at-risk-of-poverty rate. Thus, with a lower threshold of 75% we imply that the middle class is not at immediate risk-of-income-poverty (Atkinson and Brandolini 2013). This threshold assumes that households have a reasonable level of economic security, which is a major component of belonging to the middle class (Birdsall 2010). However, we are aware that with annual income data we cannot capture the full extent of economic security (for a general discussion on economic security and empirical findings see Rohde and Tang (2018) and Osberg (2018)). First, monthly income can be volatile over a twelve-month period and it is possible that middle-class households experience poverty spells during the year. Second, economic insecurity is not only about the present, but also encompasses past experiences and expectations of possible adverse shocks in the future (Bossert and D'Ambrosio 2013; Osberg 2018). One approach to define the lower threshold of the middle class was proposed by Luis F. Lopez-Calva and Eduardo Ortiz-Juarez (2014). They exploit panel data to establish predicted income associated with a 10% probability of falling into poverty, arguing that middle-class households should have enough income to protect themselves from becoming poor (for a more detailed description see Lopez-Calva and Ortiz-Juarez 2014). Another important factor concerning economic security is wealth, which allows coping with economic hardships, such as unemployment and illness. Thomas Piketty (2014) defines “the middle class of wealth”

as those between the bottom 50%, who have no or very little wealth and the top 10%, who typically own more than half of total wealth. A certain amount of wealth is needed to deal with economic contingencies. Christian E. Weller and Amanda M. Logan (2009) examine several middle class insecurity measures for the United States. They calculate the share of middle class families that have enough savings to cover an unemployment spell, a medical emergency (or both) and have financial wealth exceeding income of three months. Walter Bossert and Conchita D'Ambrosio (2013) go one step further, as they not only include the current level of wealth in their insecurity measure but also study its variations in the past. The importance of personal wealth as a buffer stock for economic security depends heavily on the welfare state. In countries with a generous welfare state, savings are less important than in more liberal welfare states (Fessler and Schürz 2017). Economic security is also closely linked to job security. As Banerjee and Duflo (2008, 26) put it: “[n]othing seems more middle class than the fact of having a steady well-paying job.” Owing to the fact that we use annual cross-sectional income data, we cannot account for insecurity other than adding a margin of not being at immediate-risk-of-income-poverty.

The chosen thresholds permit us to examine the middle of the income distribution, bearing in mind its inevitable arbitrariness. In the results section we control for our choice of thresholds by computing M-curves, polarization curves and a polarization index. We find that our findings considering the decline/increase of the middle class are consistent with the results from the polarization index, with the exception of one country.

Data and Methods

We use micro-level cross-sectional data for twenty-six European countries provided by the EU-SILC between 2004 and 2014.⁵ The harmonized data set allows us to explore differences of the size of the middle class across European countries. Although the use of EU-SILC data offers many advantages, such as comparability among European countries, some remarks of caution are worth noting. Owing to the fact that countries are free to choose the sampling design, some countries obtain income variables from administrative data, while other countries rely on the information given by the respondents. This limits the comparability between “register” and “survey” countries. Additionally, it is worth mentioning that in-kind benefits are not included in the EU-SILC. These benefits provided by the government, including child care, health, education, etc. vary substantially and have an important distributional impact across Europe. Rolf Aaberge, Audun Langørgen and Petter Lindgren (2013) observe that estimated income inequality and the estimated share of people at-risk-of-poverty is significantly smaller when replacing disposable cash income with extended income (i.e., including early childhood education and care, education, health care and long-term care). Considering these findings, we presume that a different picture concerning the share of middle-class households across Europe would emerge when taking in-kinds benefits as extended income into account.

Our main variable of interest is the equivalized disposable household income using the OECD-modified scale, which assumes scale effects in the living standard. The scale was first proposed by Aldi Hagenars, Klaas de Vos, and Asghar M. Zaidi (1994) and assigns a value of 1 to the first adult in the household, 0.5 to each additional adult member, and 0.3

⁵ For the total sample, we changed negative incomes to zero in 9,600 cases. Moreover, income data for Germany is only available until 2013.

to each child aged under fourteen (OECD 2013). Following David Aristei and Cristiano Perugini (2015), we assume that households are the pivotal dimension where decisions of household members such as parenthood, labor supply, or education are interdependently taken. Therefore, the adoption of a household perspective provides a richer informative set than an individual one. If not stated otherwise, we use disposable income, as defined by Eurostat (2014) to examine the share of middle-class population. Disposable income is the total gross household income, diminished by income tax, social insurance contributions, regular wealth tax and regular inter-household cash transfer paid after tax. The Canberra Group (UNECE 2011) emphasizes that disposable income is the preferred variable when analyzing income distribution since it covers the income available to a household for spending and saving. When studying the effect of income redistribution, we additionally examine the size of the middle class before taxes and transfers. This measure is based on equalized factor income, which comprises gross employee cash, pensions from individual private plans and cash benefits or losses from self-employment on the personal level as well as income from rental of a property or land, regular interhousehold cash transfer received, interests, dividends, profit from capital investment in unincorporated business and income received by people aged under 16 on the household level.⁶

To examine the influence of changing household composition on the size of the middle class, we use an approach first introduced by Pirmin Fessler, Peter Lindner, and Esther Segalla (2014). This approach uses household strings, which take the household size, age, and gender (for adults) of up to four household members into account.⁷ For analyzing the impact of government social security and retirement programs for the elderly we define household heads.⁸

Results

The Development of The Middle Class: A European Comparison

The Size of the Middle Class and Mobility

We start our analysis by examining whether a decline of the middle class in Europe can be observed in the data. Figure A.1 reveals several findings: on the left side the population share of the middle class in each country, including the European average (weighted⁹ and unweighted) is shown for the year 2004. On average (weighted) 40.4% of all respondents can be considered middle class in their respective countries. However, we notice large differences regarding the size of the middle class across Europe. The middle class ranges from around one third (Estonia, Lithuania, Latvia, and Spain) up to greater than one-half (Sweden, Iceland, and Norway) in 2004. Moreover, the evolution of the middle class is shown as absolute change in percentage points between 2004 and 2014. First, our findings indicate that on average (weighted) a decline of 1.7 percentage points can be noted. The middle class population share has not decreased throughout Europe, but a decline can be observed in

⁶ Note that factor income for Spain is available since 2005. For Greece, France, Italy, Latvia, and Portugal it is available since 2006.

⁷ Each household member obtains a two-digit age-gender cell. First, all household members are arranged by descending age and divided into one of four age groups (1: below 16, 2: 16–34, 3: 35–64, 4: above 64). Second the gender cells are attributed (1 for male, 2 for female and 3 for children). Last, the age-gender cells of each member are added together to obtain the household string. For instance, a household consisting of one male (36), one female (33) and two children (9 and 11) has the following household string: [31221313].

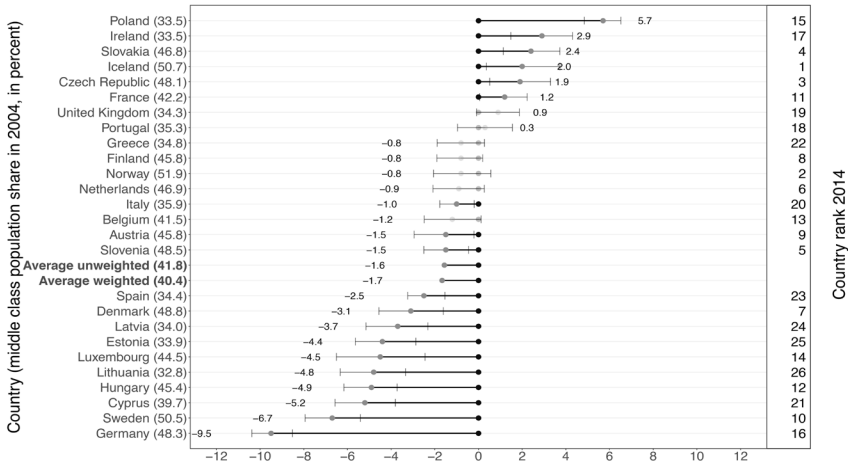
⁸ The household head is defined as the person with the highest income of at least eighteen years of age. When two household members have the same income, the oldest person is chosen to be the household head.

⁹ Accounting for the country's population size.

eighteen out of twenty-six countries. In eight countries the share of middle-class households increased. Figure A.1 further shows the statistical significance according to bootstrap confidence intervals (estimated change $\pm 2 \times$ standard error based on 1,000 simulations). Here we find that the changes are not statistically significant in the United Kingdom and Portugal (rise in middle class population share) and Greece, Finland, Norway, the Netherlands, and Belgium (fall in middle class population share). In the remaining nineteen countries the increase/decrease is statistically significant. Across the whole sample Poland experiences the most substantial rise, with 5.7 percentage points. The increase in the other countries ranges from 0.3 (Portugal) up to 2.9 percentage points (Ireland). Conversely, the largest decline of the middle class is observed in Germany (9.5 percentage points) followed by Sweden (6.7 percentage points) and Cyprus (5.2 percentage points). Last, the rank of each country in the year 2014 is indicated on the right side of figure A.1. The country with the largest middle class population share in 2014 is Iceland (52.7%), followed by Norway (51.1%), and Czech Republic (50%). On the opposing end we find Baltic countries with small and declining middle class population shares. Lithuania has the smallest middle class population share with 28% in 2014 across Europe.

Figure A.1. Change of the Middle Class Population Share from 2004 to 2014 (Disposable Income, in Percentage Points)

Source: Own calculations, EU-SILC



Notes: The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equivalized disposable household income. The bootstrap confidence intervals (estimated change $\pm 2 \times$ standard error) are based on 1,000 simulations. Not statistically significant changes are displayed in light grey. Countries are ranked from largest increase to largest decrease in percentage points.

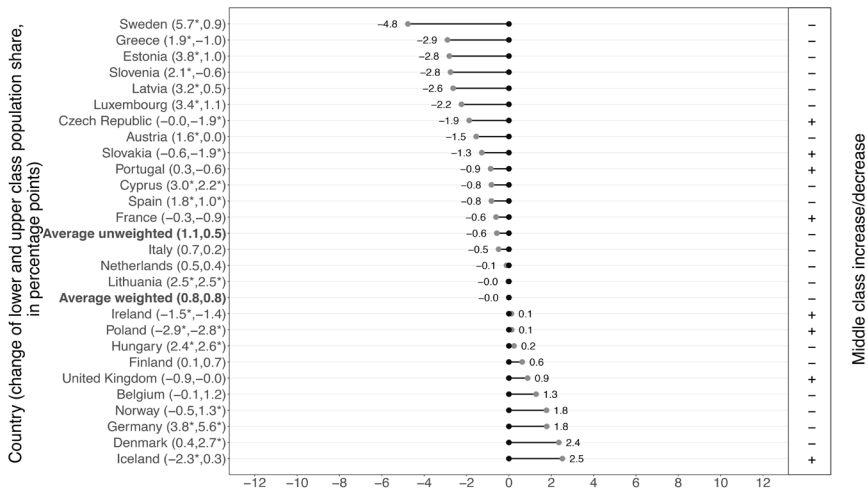
In countries where the middle class declines, it is worth examining whether individuals shift into the lower or upper ends of the income distribution. Therefore, we analyze whether the lower-income class increases more than the upper-income class (downward mobility) or vice versa (upward mobility), when the middle class declines. In countries, where the middle class expands, downward mobility occurs when the change in the population share of the

lower-income class is smaller than the change in the population share of the upper-income class.¹⁰

For instance, in Latvia the middle class population share decreases by 3.7 percentage points, while the lower- and upper-income class increase by 3.2 and 0.5 percentage points respectively. Since the rise in the lower-income class was larger than in the upper-income class, we note a downward mobility for Latvia.

The results are shown in figure A.2 and show upward mobility in ten out of twenty-six countries. In eighteen countries where a decline in the middle class can be noted, six show upward and eleven downward mobility. In Lithuania the lower and the upper-income class increase at the same rate. Moreover, in the eight countries, where the middle class increases, one-half of the countries received a larger share from the lower-income class than from the upper-income class, while the other half received a larger share from the upper-income class than from the lower-income class. Therefore, we cannot conclude an unequivocal trend of upward or downward mobility.

Figure A.2. Upward and Downward Mobility



Source: Own calculations, EU-SILC

Notes: The figure shows the difference between the changes of upper class and lower class population shares. Changes of lower and upper class are indicated in parentheses (lower, upper). Statistically significance based on bootstrap confidence intervals ($\pm 2 \times$ standard error, 1,000 simulations) is indicated with *. Upward mobility is the case when the values are greater than zero, for downward mobility the value must be below zero. The upper class is defined as the population share of individuals living in households with more than 125% of the national median equalized disposable household income, whereas the lower class is defined as the population share of individuals living in households below 75% of the national median equalized disposable household income. Results may show differences due to rounding.

¹⁰ We define lower-income class as individuals living in households with a household income below 75% of the equalized disposable median income, while upper-income class is defined as individuals living in households with a household income above 125% of the equalized disposable median income. Owing to the fact that we use cross-sectional data and not panel data, we do not know the percentage of individuals moving from the middle class to the lower- or upper-income class. We can only compare the size of the changes of the three income classes.

Educational Attainment of the Middle Class

So who is part of the middle class and how did the composition of the middle class change? In order to gain more insight of structural changes across Europe, we evaluate how the educational composition evolved between 2004 and 2014. In particular, we want to know how important education is to make it to the middle- and upper-income class and whether changes can be noted.

We divide individuals into three educational groups: low-educated, medium-educated and highly-educated. The group with a low-level of education comprises individuals, whose highest ISCED (International Standard Classification of Education) level does not surpass a lower-secondary education. Medium-education entails (upper) secondary education and post-secondary non-tertiary education, whereas individuals who attained tertiary education are categorized as highly-educated. In 2004, on average (weighted) almost half (44.1%) of all individuals belonging to the middle class are categorized as medium-educated, 40.2% did not go beyond lower-secondary education, while 15.8% have a tertiary degree. Across Europe, a vast educational expansion can be noted in the last ten years. In all countries the proportion of highly-educated individuals rose. This trend is closely linked to demographic changes. Young people on average have a higher educational level than the older generation. The increasing share of individuals with a tertiary education is also reflected in the composition of the middle class. In 2014, the weighted average across all twenty-six countries of highly-educated individuals in the middle class increases to 21.6%. The share of low- and medium-educated individuals falls by 5.4 and 0.4 percentage points, respectively.

Owing to the educational expansion, it is vital to look beyond mere changes of the educational composition of the middle class population. We therefore investigate the ratio between the share of the three educational groups of each income class and compare it with the overall educational share of the whole population.¹¹ A value smaller (greater) than one indicates on under-representation (over-representation) of the respective educational group in the chosen income class.¹² Across all twenty-six countries, the share of individuals with a low- or medium educational background in the middle-income class resembles—on average (weighted)—the share of individuals with the respective education in the whole population (ratio close to 1). In 2014, low-educated individuals are over-represented in the lower-income class (ratio of 1.48) and under-represented in the upper-income class (ratio of 0.55). Individuals with a medium-educational background are roughly equally distributed between the three income classes. Highly-educated individuals are over-represented in the upper-income class (ratio of 1.67) and under-represented in the lower-income class (ratio of 0.49) and middle-income class (ratio of 0.79). Country-specific differences become apparent when studying the educational composition of the income classes. In Iceland, the difference of the educational composition is relatively small, while in Czech Republic education matters much more for belonging to a specific income class.

We now turn to examining the change of the ratio between 2004 and 2014, which are shown in figure A.3. In general, the changes are more pronounced in the lower- and upper-income class than in the middle class. Therefore, it would be a mistake to neglect what is

¹¹ $educational\ ratio = \frac{share\ of\ population\ in\ income\ class\ with\ education\ e}{total\ population\ with\ education\ e}$

¹² The results for all countries can be found in the online appendix. Evidently, individuals with low-education may well be married to someone with a higher educational attainment and therefore be financially well situated. Changes in assortative mating are not taken into account here.

happening at the bottom and the top of the income distribution. Figure A.3(a) shows that in sixteen countries the ratio of lower-educated individuals represented in the lower-income class increases. This change was accompanied by a decreasing ratio of low-educated in the middle-income class. Only in Austria and Portugal the ratio of low-educated individuals in the middle-income class does not change, whereas it slightly increases in Belgium and Finland. In eight countries the ratio of low-educated individuals increases in the middle-income class, while a decrease is noted in the lower-income class. In the upper-income class the ratio of persons with a low-educational background falls in seventeen countries, remains the same in four countries and only increases in five countries. Hence, it has become more difficult for low-educated individuals to belong to the middle- and upper-income class in 2014 than ten years earlier.

The ratio of individuals with a medium-education in the lower-income class increases in all countries, with the exception of Norway, as shown in figure A.3(b). At the same time, the ratio fell in the upper-income class except for Norway, Iceland, and Luxembourg, where the ratio slightly increases. In the middle-income class, the ratio of medium-educated individuals increases in seventeen countries, remains constant in two and decreases in seven countries. Again, we note that individuals with a medium-education are relatively equally distributed among the three income classes in most countries. Nevertheless, the analysis shows that for this education group it has become more difficult to belong to the upper-income class. At the same time, it has become more probable to belong to the lower-income group with a medium education.

Last, we investigate the changes for the highly-educated group in figure A.3(c). Here, we also find that in almost all countries the ratio of highly-educated individuals increases in the lower-income class, except for the United Kingdom, the Netherlands, and Germany and decreases in the upper-income class, except for the United Kingdom and Germany. In the middle-income class the ratio also increases, with the exception of Austria, Belgium, the United Kingdom, Germany, and Finland. In spite of these changes, the highly-educated still remain over-represented in the upper-income class in 2014 (ratios ranging between 1.34 (Iceland) and 2.14 (Portugal) in 2014), and under-represented in the low- and middle-income class.

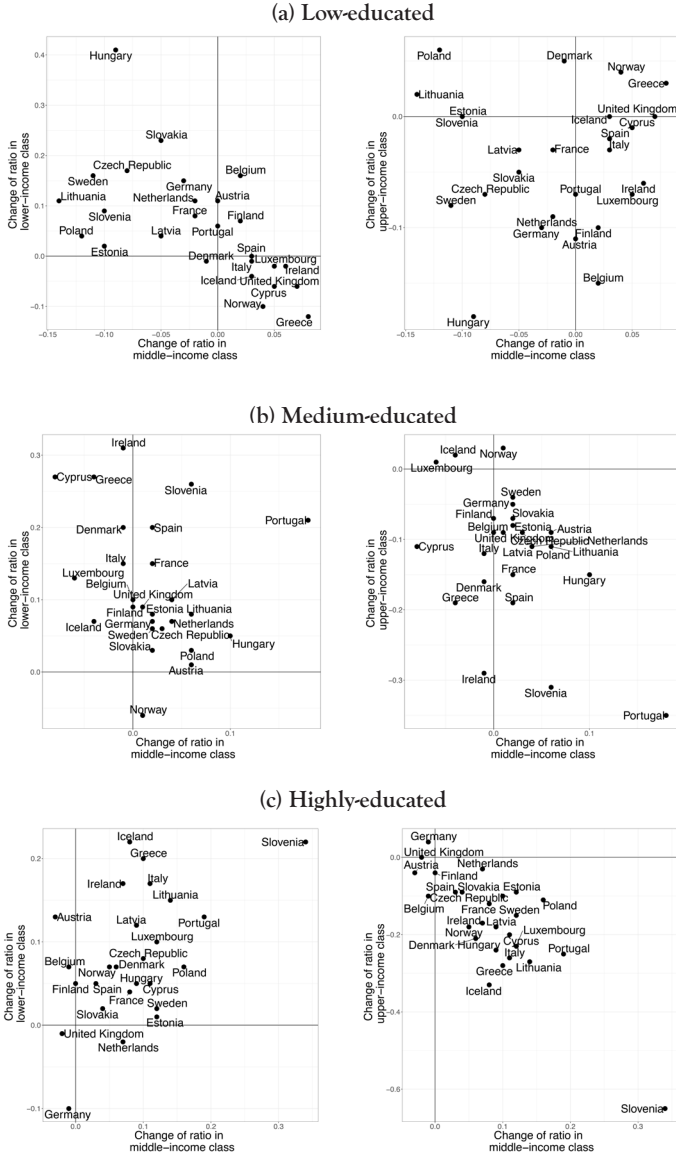
Overall, the changes of the educational attainment are more notable in the lower- and upper-income class than in the middle. The analysis suggests that it has become more difficult for individuals with a low-education to belong to the middle and upper-income class. Those with a medium-educational background are more evenly spread across the three income groups than the two other educational groups. In 2014, medium-educated individuals form the largest group in the middle class in most countries. The importance of medium-educated slightly grew in the middle class. However, it appears that it has become more difficult to belong to the upper-income class with a below tertiary education than in the beginning of the 2000s. Highly-educated individuals are now also more often part of the lower- and middle-income groups than before. This might be due to the educational expansion throughout Europe, resulting in young graduates at the beginning of their careers being part of the lower- and middle-income class.

Income Polarization and the Middle Class

As discussed earlier, the choice of lower and upper limits of the middle class is largely arbitrary. Anthony B. Atkinson and Andrea Brandolini (2013) show that changes regarding

the size of the middle class can vary, depending on which cut-offs are applied. In order to validate our findings concerning the evolution of the middle class, we conduct a robustness check by looking at M- and polarization curves, as well as by computing a polarization index based on Wolfson (1994).

Figure A.3. Changes of the Educational Composition between 2004 and 2014



Source: Own calculations, EU-SILC

Notes: The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equivalized disposable household income. Lower-income class are those below 75% and upper-income class those above 125% of the national median equivalized disposable household income. The educational ratio per income class measures the share of education group in respective income class divided by share of education group of the total population.

We start by computing M-curves, which is a measurement of the mass around the median income.¹³ M-curves allow us to examine whether an income distribution has a larger middle class than another one, irrespective of the chosen cut-off points. When the M-curve of period 1 always lies above the M-curve of period 2, it follows that the middle class is unambiguously larger in period 1 than in period 2, no matter which thresholds are chosen to define the middle class. Figure A.4 shows the M-curve for Germany, while the M-curves of the remaining countries are illustrated in the online appendix. One can clearly see that the M-curve of 2004 lies above the M-curve of 2013, indicating that the middle class of 2013 is unambiguously smaller in comparison to nine years earlier. No such straightforward conclusion can be inferred when the M-curves cross. However, if crossings occur, it is useful to examine the location of crossings. For our purpose, we do not consider it to be problematic when the M-curves cross below 0.6 of the normalized income, which translates into the poverty line of below 60% of the median income. This argument lies on the premise that those living below the poverty threshold are not categorized as middle class.¹⁴ Additional two lines are demarcated at 0.8 and 1.2 in figure A.4. Since the most narrow definition of the middle class determines the cut-off points at 80% and 120% of the median income,¹⁵ any crossings between the two lines are negligible. When the curves lie on top of each other or slightly above each other in one half, it is pivotal to look at the other half to examine whether the middle class unambiguously increases or decreases. We find that in our sample, the middle class of 2014 compared to 2004 is unambiguously smaller in thirteen countries (Austria, Cyprus, Denmark, Estonia, Finland, Germany, Hungary, Latvia, Luxembourg, the Netherlands, Slovenia, Spain, and Sweden). The middle class unambiguously increases in four countries (Poland, Portugal, Slovakia, and the United Kingdom). No such statement can be made in the case of the remaining nine countries, due to the fact that the M-curves of the two years cross. However, looking at the most commonly chosen thresholds we only find conflicting results for Belgium and France. If broader cut-off points are chosen for Belgium (e.g., 60%–200%), we note a slightly increasing middle class population share, which is contrary to our finding. For France, the opposite holds true (i.e., broader thresholds result in a declining middle class population share). Hence, looking at the M-curves provide interesting insights on where changes in the distribution take place.

One possible cause of a declining middle class can be a rise in income polarization. A more polarized income distribution can be attributed to two trends: increased spread and/or increased bipolarity. An increased spread occurs when the rich become richer, while the poor become poorer. The income distribution can also get more polarized by becoming more bipolar (i.e., when the poles become more defined).¹⁶ The first degree of polarization measures the spread, which is linked to the M-curves. The spread measures the length of the median normalized income space related to a given middle-class population range.¹⁷

¹³ In order to derive M-curves, we normalize the income distribution F of the respective country such that the median equals one. The median of an income distribution F is defined as m_x . Moreover we define $R = [z, \bar{z}]$, such that $0 \leq z \leq 1 \leq \bar{z}$ is satisfied. The middle class $M(F; R)$ is the share of population belonging to the income range R .

$$M_f(R) = M_f(\underline{z}) + M_f(\bar{z}),$$

where $M_f(\underline{z})$ is the “lower middle class” and $M_f(\bar{z})$ is the “upper middle class.” When depicting $M_f(R)$ we obtain the M-curve, which can consequently be compared to M-curves of different countries or time periods.

¹⁴ Cf. Ravallion (2010).

¹⁵ Bosch and Kalina (2015) differentiate between lower (60%–<80%), middle (80%–<120%), and upper (120%–<200%) middle class.

¹⁶ See Foster and Wolfson (2010) for a detailed discussion.

¹⁷ To derive the first degree of polarization curve, we first define $Q = [q, \bar{q}]$ for a given population range, which satisfies $\underline{q} \leq 0.5 \leq \bar{q}$. The middle class index M allows for different Q s for a given R , due to different income

For instance, when examining the middle 60%, the spread is computed by subtracting the normalized income of the household at the twentieth percentile from the normalized income of the household at the eightieth percentile. There is an increase of polarization when a larger income spread is needed in order to capture a predefined population range (in our example the middle 60%). Thus, fewer persons/households are located around the median. We can conclude that income distribution in period 1 has an unambiguously smaller spread, when the first degree polarization curve of period 1 is always located below the curve of period 2 and the curves do not cross. A smaller spread translates into a higher concentration of incomes near the middle and thus a larger middle class. Figure A.4 depicts the first polarization curves for Germany in 2004 and 2013. The polarization curves confirm our findings from the M-curves. The first polarization curve of 2013 is always above the one of 2004. Consequently, the spread in 2013 is unambiguously larger than in 2004, indicating a smaller middle class in 2013 for any cut-off points. Figure A.4 further shows the example for the most narrow definition of 80% up to 120%, which translates into a spread of 0.2 from the normalized median income. It is evident from the figure, that the size of the middle class decreases in Germany. Again, one has to be careful if and where curves cross. Owing to the fact that the first polarization curve is closely connected to the M-curves, we find that the spread unambiguously increases in the thirteen countries where the size of the middle class unambiguously decreases. The same holds true for the four countries with decreased spread (increased middle class) and the remaining countries where no clear conclusion can be derived.

The income distribution can also become more polarized when bipolarity increases. This is measured by the second degree polarization curve, which is the area under the first degree polarization curve. Both polarization curves account for an increased spread, whereas the second degree polarization curve additionally is sensitive to bipolarity. To derive the second degree polarization curve, income spreads from the middle to the top and from the middle to the bottom are accumulated.¹⁸ The curve provides insights on the average distance to the median for every middle class in any income distribution. This measure is more sensitive to changes occurring around the median income. When the second degree polarization curve of period 1 is located below the curve of period 2, then the income distribution of period 1 is less polarized than in period 2. The example of Germany in figure A.4 provides evidence that the income distribution of 2013 is unambiguously more polarized than in 2004. The income distributions across Europe became unambiguously more polarized in 12 countries (Austria, Cyprus, Denmark, Estonia, Finland, Germany, Hungary, Lithuania, Luxembourg, the Netherlands, Spain, and Sweden), whereas income polarization unambiguously decreases in four European countries (Czech Republic, Poland, Slovakia, and the United Kingdom). For the remaining countries, no such conclusions can be derived, because the second degree polarization curves cross.

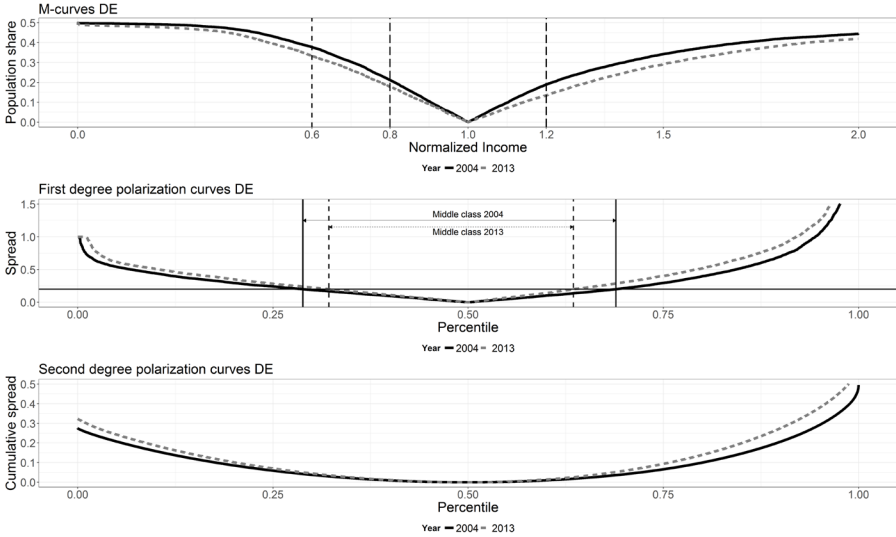
To summarize, it can be said that although our chosen thresholds to define the middle class as households with equivalent disposable income between 75% and 125% of median income are arguably quite narrow, we observe that in most countries our findings

distributions. We now define $S(F; Q)$ that measures the width of the income range (spread) for the given population Q . $S_j(Q) = \bar{y}(q) - \bar{y}(q)$, where \bar{y} is the normalized income of the person at the q^{th} percentile.

¹⁸ The second degree polarization curve is defined as: $B_j(q) = \left| \int_0^{0.5} S_j(p) dp \right|$, for $0 \leq q \leq 1$.

of a declining middle class do not depend on the thresholds (as shown by the M-curves). Across countries with a rising middle class, based on our thresholds, the results are more ambiguous, but still hold for other common definitions, with the exception of France. Last, we find that in most countries with a declining middle class population share is accompanied with income distributions having a greater spread and bipolarity.

Figure A.4. M-curves, First, and Second Polarization Curves in Germany



Source: Own calculations, EU-SILC

Notes: This figure presents M-curves, First and Second Polarization Curves. M-curves illustrate the mass around the median income. The first polarization curve shows the spread, while the second polarization curve indicates the degree of bipolarity of the income distribution.

In addition, we measure income polarization with an index of income polarization provided by Wolfson (1994), which is four times the area beneath the second-degree polarization curve:

$$P = 4 * \left(0.5 - \text{Income Share of Bottom 50\%} - \frac{\text{Gini Coefficient}}{2} \right) * \left(\frac{\text{Mean income}}{\text{Median income}} \right)$$

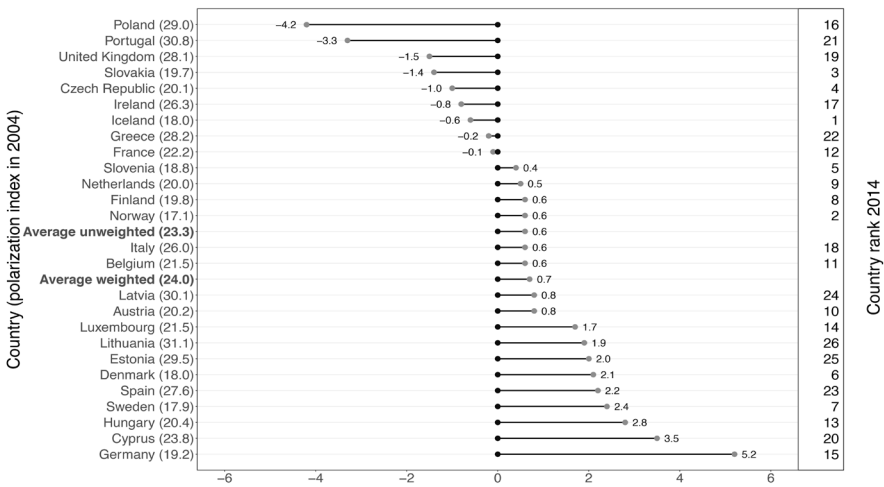
The polarization index ranges from 0 (no polarity) to 100 (bipolarity) and allows us to rank income polarization across countries and time. A higher polarization index is associated with a smaller middle class. It is worth pointing out that the polarization index does not indicate whether any crossings of the polarization curves occur.¹⁹ Consequently, it may well be the case that although the polarization index increases, the middle class of the first period is not unambiguously smaller than the one from the second period. In Europe, the income polarization increases from 2004 to 2014 in seventeen countries and decreases in nine countries, as shown in figure A.5. A rise of the polarization index is accompanied by a downsizing of the middle class (defined as 75%–125% of the disposable equivalized median

¹⁹ Similarly, the Gini index does not provide any information, whether the Lorenz curves of two distributions cross.

income) and vice versa, with Greece being the only exception. In Greece the polarization index decreases as well as the size of the middle class.

Examining the change of the middle class population share (figure A.1) and the change of the polarization index (figure A.5) closely, we note that Portugal experienced the second largest decline of income polarization but only a negligible increase of households belonging to the middle class of 0.3 percentage points. Here the M-curve graphically shows that when broadening the definition of the middle class to 70%–150% of the median income, the increase of the middle class population is 2.4 percentage points. Besides Portugal and Greece, the level of change of the polarization index is a good indicator for the magnitude of change of the middle class.

Figure A.5. Change of the Polarization Index between 2004 and 2014 (in Index Points)



Source: Own calculations, EU-SILC

Notes: The polarization index provided by Wolfson (1994) ranges from 0 (no polarity) to 100 (bipolarity). Countries are ranked lowest to highest polarization index in 2014.

Returning to the specific case of Greece, we want to call the attention to two things: First, it is worth pointing out that the equalized disposable median income decreases by 20.1% nominally and by 35.6% in real terms between 2004 and 2014.²⁰ The nominal and real median income increase between 2004 and 2009. Afterwards, due to the economic crisis, the nominal median income decreases by 37.1% between 2009 and 2014. In real terms, the median income decreases by 41.1% in the aftermath of the crisis. Second, the M-curves show that in the lower half of the income distribution, the curve of 2004 lies above the one of 2014. The contrary is true for the upper half of the income distribution. Thus, the lower middle class decreases, whereas the upper middle class increases. This can be also seen in the first and second polarization curve, where the spread and cumulative spread is greater in 2014 for the bottom 50% but smaller for the top 50%. The Greek case highlights the limitations of relative middle class thresholds during economically turbulent

²⁰ The nominal equalized disposable median income increases in all other countries. In real terms, the median income also decreases in Cyprus (-14.1%), Hungary (-11.7%), Iceland (-44.4%), Italy (-9.4%), Luxembourg (-3.2%), Portugal (-1.1%) and the United Kingdom (-15.1%) between 2004 and 2014.

times. Manos Matsaganis and Chrysa Leventi (2014) and Eirini Andriopoulou, Alexandros Karakitsios, and Panos Tsakloglou (2018), among others, show that for Greece, the rise of relative poverty-rates after 2009 was modest. However, when the poverty rate is anchored at 60% of the median equivalized disposable income (inflation-adjusted) of 2009, the proportion of population that falls below the poverty threshold of 2009 was over 45% in 2013 (Matsaganis and Leventi 2014). Whether income is most appropriate for examining distributional concerns in periods of economic downturns also remains disputed (Sen 1992). Georgia Kaplanoglou and Vassilis T. Rapanos (2018) examine the impact of the economic crisis and austerity measures on changes in consumption inequality for Greece. Concerning the middle class, defined as households between 75% and 125% of equivalized median expenditure, they find that in 2008, 37% of the population are middle class. In 2013, the middle class population share drops to 28% when the thresholds are anchored at the cut-off points of 2008 (inflation-adjusted). A more troublesome finding is that around 58% of the population are considered belonging to the low-expenditure group when the thresholds are anchored. A similar picture emerges from our calculations. When the middle class cut-off thresholds are anchored at 2007, the middle class population share decreases to 30.4% (compared to 34.0% with floating cut-off points). However, 55.5% of the Greek population falls below the lower middle class cut-off point of 2007 (compared to 31.8% otherwise). Andriopoulou, Karakitsios and Tsakloglou (2018) state that the main driver for changes concerning the structure of inequality and poverty was the significant increase in unemployment. In 2014, almost one third of the Greek population lived in households with at least one unemployed household member. Before the crisis, the share amounted to 11.9%. Hence, in times of economic crisis and in particular when real income levels are falling, floating thresholds are not very informative and should be carefully interpreted.

From this section, we can conclude that the thresholds of 75% and 125% reasonably monitor the evolution of the middle class across Europe. With the exception of two countries (Belgium and France) we find no conflicting results concerning a decline or rise of the middle class population share when using other common definitions, even if the comparison of the two M-curves between 2004 and 2014 do not always indicate an unambiguously smaller/larger middle class. The polarization index further confirms that a declining middle class is accompanied by a more polarized income distribution. One caveat of using floating thresholds to measure the evolution of the middle class population share has been illustrated with the case of Greece. Thus, when studying distributional changes within a country computing M- and polarization curves as well as the polarization index can give valuable insights. But it is also important to bear in mind that results based on floating income thresholds are problematic in times of declining median incomes.

The Drivers of a Changing Middle Class

To identify drivers of a declining middle class, this section analyses the effects of household structure and the impact of income redistribution, hence the difference between disposable and factor household income. Last, we analyze whether the size of the middle class changes substantially when only non-elderly households are taken into account. That specific group is of great interest because it allows us to analyze the impact of government social security and retirement programs for the elderly on the size of the middle class.

Household Composition

Table A.1 shows the size of the middle class assuming that the household structure has not changed since 2004. To analyze the effect of changing household composition on the size of the middle class, we standardize the different household structures across countries using an approach introduced by Fessler, Lindner, and Segalla (2014). This approach considers the number of household members and takes all possible combinations of age and gender into account. Thus, we see how much the middle class would have changed between 2004 and 2014, if we assume that the household composition did not change after 2004.²¹ Following Pressman (2007) we first assume that the size of the middle class is the sum of the weighted average of each household type, belonging to the middle class. Based on these weighted averages we then compute the population share of the middle class in 2014.

Table A.1. Middle Class Decline and Household Strings between 2004 and 2014

Country	Original Sample ^a	Constant Household Strings ^a	Difference
Slovenia	-1.5	0.3	1.8
Poland	5.7	4.4	-1.3
Slovakia	2.4	1.1	-1.3
Greece	-0.8	-2.0	-1.2
Norway	-0.8	0.1	0.9
Ireland	2.9	3.8	0.9
Estonia	-4.4	-3.6	0.8
Belgium	-1.2	-0.5	0.7
Czech Republic	1.9	1.3	-0.6
Lithuania	-4.8	-4.2	0.6
Cyprus	-5.2	-4.8	0.4
France	1.2	1.6	0.4
Portugal	0.3	0.7	0.4
Denmark	-3.1	-2.7	0.4
Austria	-1.5	-1.8	-0.3
Netherlands	-0.9	-1.2	-0.3
Latvia	-3.7	-3.4	0.3
Sweden	-6.7	-6.9	-0.2
United Kingdom	0.9	0.7	-0.2
Iceland	2.0	1.9	-0.1
Finland	-0.8	-0.9	-0.1
Italy	-1.0	-0.9	0.1
Germany	-9.5	-9.4	0.1
Spain	-2.5	-2.4	0.1
Hungary	-4.9	-4.9	0.0
Luxembourg	-4.5	-4.5	0.0
Average unweighted	-1.6	-1.5	0.1
Average weighted	-1.7	-1.7	0.0

Source: Own calculations, EU-SILC

Notes: Column (2) presents how the middle class has changed in the original sample between 2004 and 2014, whereas column (3) illustrates how the middle would have changed if we assume a constant household composition after 2004. To calculate a constant household composition we standardize household structures across countries by using household strings, an approach provided by Fessler, Lindner, and Segalla (2014).

Countries are ranked from largest to smallest absolute difference between the original sample and the sample with constant household strings.

^a Change in percentage points

²¹ The middle class in 2014 is calculated as follows: $Middle\ Class\ 2014 = \sum_{i=1}^n (Prop2004_i \times MC2014_i)$ where $Prop2004_i$ is the proportion of the middle class in household group i in 2004 of the total population and $MC2014_i$ is the relative size of the middle class in household group i .

The results show that, on average, changing household structures do not account for changing middle class share. As can be seen from Table A.1, the weighted average of the middle class decreases 1.7 percentage points for the actual and for constant household strings, respectively. On a country level, we observe the most significant result in Slovenia. For the latter we see that with a constant household type composition the middle class would increase by 0.3 percentage points compared to a decrease of 1.5 percentage points between 2004 and 2014. Moreover, assuming a constant household type composition shows that the middle class in Poland and Slovakia would increase by 1.3 percentage points less compared to the original sample. Thus, we see that the actual change of the middle class in these countries is largely affected by changes in the household composition.

The Effect of Income Redistribution on the Size of the Middle Class

Governments have an impact on the size of the middle class through various channels, such as income redistribution in form of transfers and taxes, education and health care (Castles et al. 2012). In the following two sections, we restrict our analysis to the effect of fiscal redistributive measures.

We start out by examining the size of the middle class and its evolution between 2004 and 2014 when the government does not affect the household incomes through taxes and transfers. Figure A.6 shows the change of the middle class population share based on factor income.²² Comparing figure A.1 and figure A.6 reveals that the government substantially affects the size of the middle class. On average (weighted), the middle class would have been

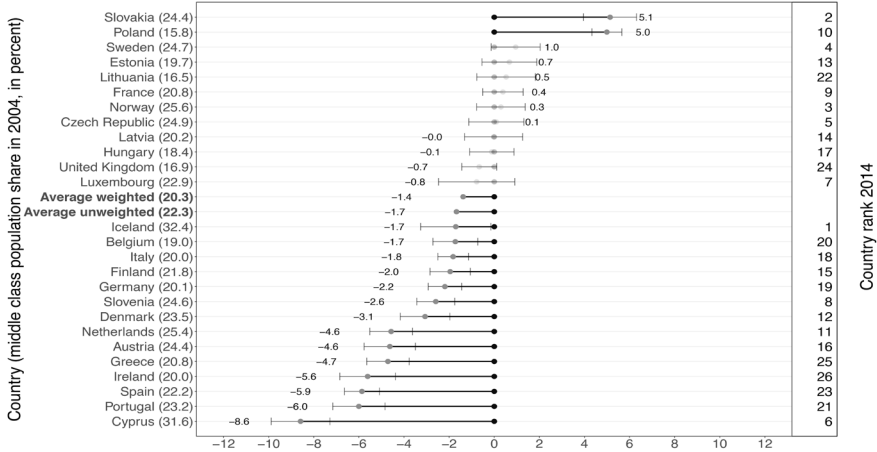
19.8 percentage points smaller in 2014 based on factor income (18.9%) than compared to disposable income (38.7%). Hence, the population share of the middle-income class doubles on average—after transfers and taxes. Without fiscal redistribution the middle class would be significantly smaller in all countries. But, we also note that the influence of income redistribution on the size of the middle class varies significantly between countries. In Denmark the middle class would have been around 25.3 percentage points smaller, whereas the difference in Estonia only amounts to 9.2 percentage points. Thus, our findings show the vast impact of transfers and taxes on the size of the middle class and the variation across European countries.

Having established that the taxes and transfers alter the size of the middle class, we now turn to the changes of middle class population shares by comparing figure A.1 and figure A.6. Ideally, as market income disparities widen, the government tries to off-set or mitigate these trends with redistributive fiscal policies. We therefore examine whether the decline of the middle class would have been more pronounced without the influence of redistributive measures. First, we closely study the countries that experience a decline in the size of the middle class based on factor income. In four of these countries (Iceland, Ireland, United Kingdom, and Portugal) the share of middle-income households increases after governmental income redistribution despite a decline based on factor income. Ireland stands out here, where a significant decrease of 5.6 percentage points before taxes and transfers results in an increase of the middle class population share of 2.9 percentage points after fiscal redistribution. Hence, the income redistribution through taxes and transfers off-

²² Factor income comprises gross employee cash, pensions from individual private plans and cash benefits or losses from self-employment on the personal level as well as income from rental of a property or land, regular interhousehold cash transfer received, interests, dividends, profit from capital investment in unincorporated business and income received by people aged under sixteen on the household level.

sets the polarization of factor income. In the remaining thirteen countries, the share of the middle-class households declines no matter whether we study disposable or factor income.²³

Figure A.6. Change of the Middle Class Population Share from 2004 to 2014 (Factor Income, in Percentage Points)



Source: Own calculations, EU-SILC

Notes: The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equivalized factor household income. The bootstrap confidence intervals (estimated change $\pm 2 \times$ standard error) are based on 1,000 simulations. Not statistically significant changes are displayed in light gray. Countries are ranked largest to smallest middle class population share in 2014. Spain: 2005; Greece, France, Italy, Latvia, and Portugal: 2006

However, without governmental income redistribution the squeezing of the middle class would have been larger in more than two thirds of the countries (Italy, Belgium, Finland, Slovenia, Austria, the Netherlands, Greece, Spain, and Cyprus). Conversely, in Hungary, Luxembourg, and, most notably, Germany, we see that the fall in the middle class is more pronounced based on disposable income than in terms of factor income. In Denmark, with and without fiscal redistribution the size of the middle class falls by 3.1 percentage points. Overall, we find that in thirteen of the seventeen countries where the middle class declines in terms of factor income, the government has a positive impact and either off-sets or mitigates increasing polarization based on factor income. Second, we examine the eight countries where an increase of the middle class population share regarding factor income can be noted. In half of these countries, the increase before taxes and transfers coincides with an increase after fiscal income redistribution (Slovakia, Poland, France, and Czech Republic). In the other half of the countries, a slight albeit statistically insignificant rise of the middle class based on factor incomes is accompanied by a falling share of middle class household after governmental fiscal policies. Sweden, Estonia, and Lithuania experience substantial declines of the middle class size based on disposable income (between -4.4 and -6.7 percentage points) even though the changes before fiscal policies are insignificant and small (below 1 percentage point).²⁴ This suggests that here the decline of the middle class can

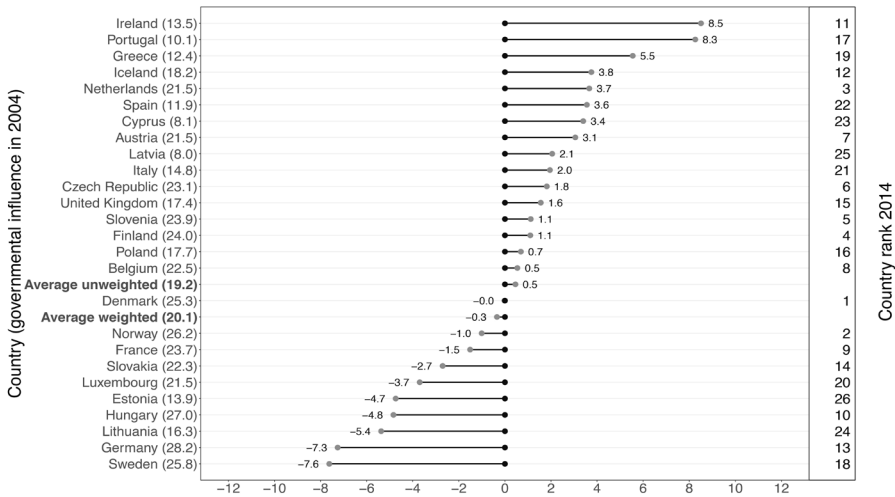
²³ In Latvia, the middle class based on disposable income decreases, whereas the middle class based on factor income remains constant (although not statistically significant).

²⁴ In Norway, the middle class based on factor income slightly increased, but based on disposable income declined. But, both changes are not statistically significant.

partly be attributed to changes in the taxes and transfer system. Last, we discuss the impact of governmental income redistribution, measured as the difference between the middle class population share based on disposable and factor income, and its change over time. As figure A.7 shows, the effect of transfers and taxes increases in sixteen countries, in particular in countries where the size of middle class population based on factor income decreases.

This section has reviewed the influence of fiscal redistributive measures on the size of the middle class. We find that taxes and transfers unambiguously increase the population share of the middle class in all countries. Regarding the capacity to off-set polarization based on factor income, this analysis suggests that changes in fiscal policies may have added to the decline of the middle class in a few countries. However, in most countries we find that taxes and transfers play an important role in mitigating the decline of the middle class.

Figure A.7. Change of the Governmental Influence on Middle Class Population Share from 2004 to 2014 (in Percentage Points)



Source: Own calculations, EU-SILC

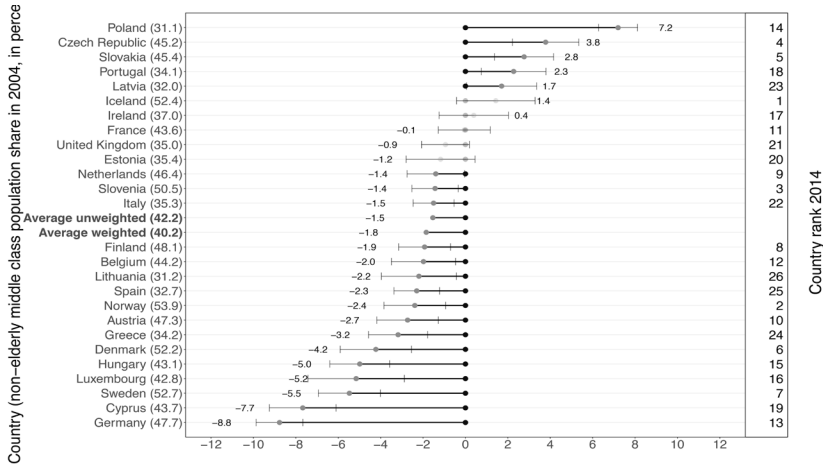
Notes: Governmental influence is measured as the difference between the middle class based on disposable and factor household income. The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equalized disposable/factor household income. Countries are ranked largest to smallest governmental influence in 2014. Spain: 2005; Greece, France, Italy, Latvia, and Portugal: 2006 for governmental influence

The Non-Elderly Middle Class

Figure A.8 and figure A.9 shows the development of the non-elderly middle class for disposable and factor income. On average (weighted) the middle class after taxes and transfers is 40.2% in 2004 and decreases by 1.8 percentage points by 2014. Interestingly, there is not much difference to the results in figure A.1, where we find on average (weighted) that the size of the middle class amounts to 40.4% and a decrease by 1.7 percentage points from 2004 to 2014. Further, as established in the previous section, transfers and taxes increase the size of the middle class in all countries. However, with governmental fiscal redistribution the share of middle class non-elderly households increases on average (weighted) by almost 40%, which

is considerably lower than compared to the sample that includes all households. This points to the fact that old-age benefits play a great role regarding income redistribution.

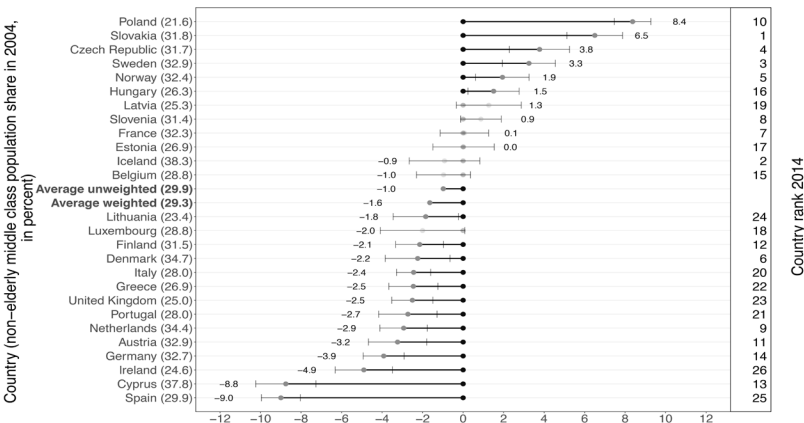
Figure A.8. Change of the Non-Elderly Middle Class Population Share between 2004 and 2014 (Disposable Income, in Percentage Points)



Source: Own calculations, EU-SILC

Notes: The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equalized disposable household income; The bootstrap confidence intervals (estimated change $\pm 2 \times$ standard error) are based on 1,000 simulations. Not statistically significant changes are displayed in light grey; Countries are ranked largest to smallest middle class population share in 2014

Figure A.9. Change of the Non-Elderly Middle Class Population Share between 2004 and 2014 (Factor Income, in Percentage Points)

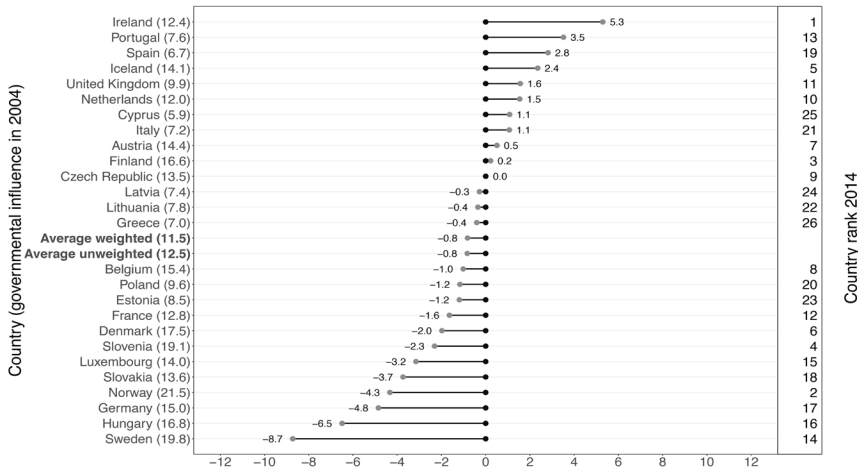


Source: Own calculations, EU-SILC

Notes: The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equalized factor household income; The bootstrap confidence intervals (estimated change $\pm 2 \times$ standard error) are based on 1,000 simulations. Not statistically significant changes are displayed in light grey; Countries are ranked largest to smallest middle class population share in 2014; Spain: 2005; Greece, France, Italy, Latvia, and Portugal: 200

Comparing figures A.8 and A.9 we continue by examining the 16 countries, where the size of the non-elderly middle class based on factor income declines. In Iceland, Ireland, and Portugal the middle class population share after governmental fiscal redistribution is larger in 2014 than in 2004. In the remaining thirteen countries the decline of the middle class based on factor income is mirrored by a decline based on disposable income. Here, we note that in seven countries the change based on disposable income is smaller than it would have been without taxes and transfers (Italy, Finland, the Netherlands, Austria, Spain, Cyprus, and the United Kingdom). Overall, for most countries the trends are similar no matter if the sample is restricted to non-elderly or not. Some countries do exhibit differences: the middle class in the United Kingdom declines before taxes and transfers in both samples. In contrast to a small increase of the middle class based on disposable income for the whole population, we find a slight decline for non-elderly households. Nonetheless, we can confirm the finding that in most countries income redistribution through taxes and transfers mitigates or offsets increasing factor income polarization also for the smaller sample of non-elderly. But, it is worth noting that although the trends are similar, level differences prevail. In most countries the decline of the middle class, based on disposable income, is more pronounced for the non-elderly as compared to the whole population.

Figure A.10. Change of the Governmental Influence on Non-Elderly Middle Class Population Share between 2004 and 2014 (in Percentage Points)



Source: Own calculations, EU-SILC

Notes: Governmental influence is measured as the difference between the middle class based on disposable and factor household income. The middle class is defined as the population share of individuals living in households between 75% and 125% of the national median equivalized disposable/factor household income; Countries are ranked largest to smallest governmental influence in 2014; Spain: 2005; Greece, France, Italy, Latvia, and Portugal: 2006 for governmental influence

We now analyze the trends for the nine countries, where the middle class before taxes and transfers increases. In Poland, Slovakia, Czech Republic, and Latvia the share of non-elderly middle-class households after governmental income redistribution also increase. In Latvia, the non-elderly middle class population share increases by 1.7 percentage points based

on disposable income, whereas for all households, it declines by 3.7 percentage points. In the other four countries, the same trend was already found when considering all households. Now turning to the remaining five countries (Sweden, Norway, Hungary, Slovenia, and France) we find that the increase in the size of the non-elderly middle class based on factor income is not accompanied by a simultaneous increase based on disposable income. While this also holds for all households in Sweden and Norway, this is specific for the non-elderly in Hungary, Slovenia, and France. Again, in these countries we assume that the decline of the middle class after fiscal redistribution can to some extent be attributed to changes in the structure of the taxes and transfer system.

As a last step, we examine the change of governmental influence, which is also depicted in figure A.10. We find that the effect of income redistribution through taxes and transfers for the non-elderly increases in ten out of twenty-six countries (compared to sixteen countries for the whole sample). In all these countries, the decline of the middle class based on factor income was offset or mitigated.

To conclude this section, the analysis of changes for the non-elderly middle class has revealed similar trends across Europe as for all households. But some countries do exhibit different trends when excluding the elderly. Overall, the decline of the middle class is more notable for the non-elderly than for the whole population in most countries.

Conclusion

In this article we use EU-SILC cross-sectional data to analyze how the middle class evolved in twenty-six European countries between 2004 and 2014. Its main conclusion is that the size of the middle class declines in eighteen out of twenty-six European countries. Moreover, our evidence points towards a rising income polarization across Europe, which is accompanied by a declining middle class. Governmental transfers and taxes have a great impact on the share of middle-class households and vary considerably across countries. On average and including all households, income redistribution in form of transfers and taxes double the size of the middle class. The research has further shown that social security and retirement programs for elderly are important for the size of the middle class. We also find that in most countries where the middle class declines, fiscal redistribution is able to mitigate or offset the decline. Regarding the educational composition of the middle class, our analysis suggests that it has become more difficult for individuals with a low-level of education to belong to the middle- and upper-income class. Last, our findings highlight that in times of crisis, when income levels are falling, relative thresholds should be carefully interpreted.

Our results are limited by the choice of a purely income-based definition of the middle class, even though it is essential as a starting point to capture what has been happening in the middle of the income strata across Europe. Future research could broaden the definition by accounting for financial assets, job security, occupation and/or education. This would ideally enhance our understanding of which households are affected by increasing income polarization and how fiscal policies can counteract further polarization.

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