Inequality in Germany: Myths, Facts, and Policy Implications

Michele Battisti
Gabriel Felbermayr
Sybille Lehwald

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Abstract

In this paper we try to provide an overview of a series of simple descriptive facts on recent trends in economic inequality in Germany. We believe that it is important to be precise in the way in which we define the inequality measure and the sample we use, to avoid generating vague messages that fail to properly inform policy makers and the public. Using mostly administrative data from the IAB and panel survey data from SOEP, we show that some of the conventional wisdom on recent trends on income inequality in Germany does not seem to find strong support in the data. In particular, we find that current low levels of unemployment are likely to imply higher levels of measured inequality among the employed, but are likely to diminish inequality among the working-age population as a whole. Our paper also discusses the importance to carefully distinguish between inequality at the individual and household levels, and separate the role of the welfare state. Finally, while admitting data limitations we briefly analyse recent trends in wealth inequality in Germany, and discuss the possible role of recent macroeconomic policies on wealth inequality.

Michele Battisti
Ifo Institute – Leibniz Institute for
Economic Research
at the University of Munich
Poschingerstr. 5
81679 Munich, Germany
Phone: +49(0)89/9224-1324
battisti@ifo.de

Sybille Lehwald
Ifo Institute – Leibniz Institute for
Economic Research
at the University of Munich
Poschingerstr. 5
81679 Munich, Germany
Phone: +49(0)89/9224-1250
lehwald@ifo.de

Gabriel Felbermayr
Ifo Institute – Leibniz Institute for
Economic Research
at the University of Munich,
University of Munich,
CESifo, GEP Nottingham
Poschingerstr. 5
81679 Munich, Germany
Phone: +49(0)89/9224-1428
felbermayr@ifo.de

Table of contents

Figures

Tables

1. Introduction

Over the last few years, there has been a large debate about inequality in Germany and elsewhere, because it is an important issue for voters and also polarizes in discussions. However, while the topic is important and has been discussed heavily, we feel that the discussion about income inequality is incomplete and misleading at times. There is some evidence that the public is largely misinformed about this issue. Inequality measures reflect different aspects on how an economy and a society work, and it is important to understand some of the tradeoffs involved, as well as the way in which different policy measures may affect different aspects of inequality.

Most economists agree that the economic well-being is well measured by consumption along the life cycle. To the extent that we care about the distribution of consumption between different individuals inside a society, we should then focus on inequality in consumption. Once we start looking at the measurement, however, we notice that life-cycle consumption inequality is typically not available. We then need to agree on what the most suitable proxy is, and there is much less agreement on that. Different concepts of inequality are sometimes confused, and one forgets that the implications of different types of inequality differ. There is often relatively little precision about this, however. For example, an increase in the minimum wage is likely to decrease wage inequality (this is almost mechanically true), which refers to those who are employed. However, its effects on income or consumption inequality are a lot more complex and may not go in the same direction.

Below, we present a series of novel findings concerning wage inequality as well as income and wealth inequality. Concerning wage inequality among the employed, the main data sources that have been used are registry data from the IAB. However, as we extensively discuss below, looking at employed individuals is incomplete. We then use the latest version of the SOEP, because we need to have information on the structure of households and of course we need to include people who do not work in the analysis. We structure our report around a series of observations, which we believe can at least partially contribute to the broad debate about inequality in Germany. First, we present some evidence that perceptions on inequality are important for policy preferences, but are often quite far away from the actual facts. We believe that the prevalence of imprecise perceptions motivates the urgency of further analysis on inequality. We then move on to analysing gross inequality, first for employed individuals, and then for the working age population as a whole.

Next, we look at the role of selection into employment for how we understand inequality over time, observing that there are processes that are likely to increase inequality among the working population, but at the same time may decrease inequality in the population as a whole. We then investigate the role of compositional effects and household formation for the inequality measures that are more frequently cited in the public debate, and find that some of the compositional effects that play an important role for inequality trends are likely to be either positive developments (such as an aging population, and an increased participation of women in the labour force), or developments that are likely to be beyond the control of the German government, such as the decreased importance of manufacturing as share of employment and the increase in services, and the increased substitutability of some of the tasks performed by workers by technology and offshoring.

While gross inequality is important, ultimately individuals' consumption patterns will depend on after tax incomes. We therefore investigate the role of taxation on inequality, first in Germany and then internationally. We find that the German welfare state redistributes more than most other OECD countries, despite the overall size of the government and marginal tax rates being lower than many comparable countries. The effect of the welfare state on inequality, however, does not solely take place though a direct redistribution of resources. Instead, the government uses tax revenues to provide some public goods to the population. Since precise data on the distribution of these public goods in the population do not exist, we provide some crude estimates that overall inequality in household incomes is likely to depend quite strongly on public good provision, which also makes direct cross-country comparisons problematic. In the last part of our report, we focus on wealth inequality, on the limits in measuring it accurately, and on the redistributive consequences of macroeconomic policies, in particular focusing on the possible roles of a long period of extremely low interest rates on the distribution of wealth among German households. We believe that it is useful to investigate the role of non-tradable assets for our measures of wealth. For example, individuals with large expected public pensions might need to save less in private, but still maintain a higher consumption level after they exit the labour force.

2. Perceptions and reality of inequality in Germany

Despite the fact that inequality is a topic that one reads about very frequently in the media, it is not at all obvious that the public debate is based upon reasonable facts. The decision on how much a welfare state should support those with lower incomes is obviously a normative one, which is related to political and moral views about which we cannot comment. However, it is important for that decision to be based on empirical facts rather than conjectures.

There is mounting evidence that a large share of the population in Germany perceives inequality as a problem and views current inequality as excessive. According to data from the Eurobarometer from 2009, over 60 percent of respondents in Germany "totally agree" with the statement "Nowadays income differences between people are far too large". In addition, according to European Social Survey data from 2014 show that around 70 percent of respondents in Germany either "agree" or "agree strongly" that the "Government should reduce differences in income levels". As discussed below, what is less clear is that all of these individuals possess good information on actual inequality when making these assessments.

A survey by Allensbach (which is also discussed in Economist 2013) finds that almost two thirds of respondents in Germany believe that inequality has increased in recent years, when in reality it did not.[1] This is not the only piece of evidence that individuals tend to overestimate the extent of inequality in society. Niehues (2014) uses data from the International Social Survey Programme to investigate inequality perceptions and preferences for redistribution, across several countries.

She states that in Germany it is the common believe that the majority of the population belongs to the bottom of the income distribution. Kuhn (2013) finds this general believe to be even more pronounced in Eastern Germany. These tendencies are also similar in other countries, but often less pronounced. For example, in Switzerland and Scandinavia the majority believes that most of society lives in the middle of the income distribution, which is true in reality. Below, we offer evidence of the difference between perceptions on the income distribution in Germany compared to actual data.[2]

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[1] As we discuss extensively below, the Gini coefficient has not increased. Individuals may have different heuristics or measure in mind, which means that comparing perceptions and reality concerning inequality is not straightforward.

[2] We have added the actual income levels to this chart. This is not a piece of information that was provided to the respondents, who had more qualitative labels such as "Low", "Medium", "High" levels of income.

Figure 1 Inequality in Germany: perceptions and reality
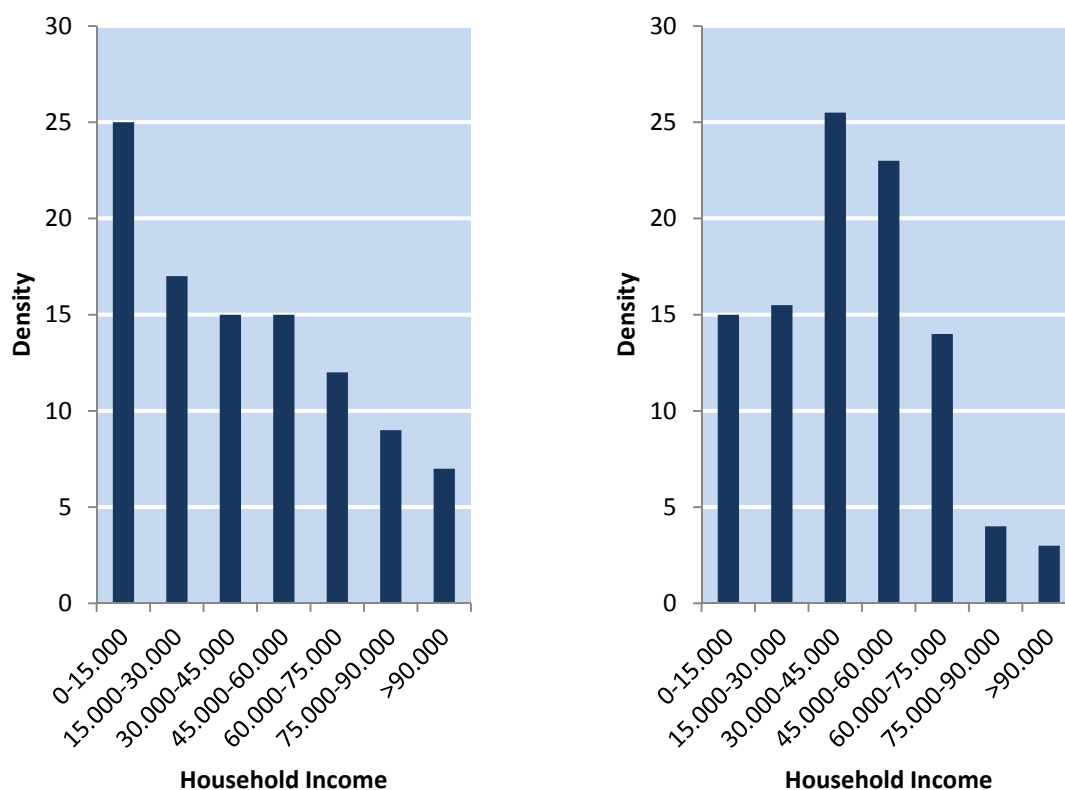
Source: Niehues (2014), ISSP, EU-SILC. Respondents only had access to a scale, not to specific levels of household income.

Averaging all responses,[3] the perceived type of income distribution differs very strongly from the actual income distribution in Germany. People perceive both the share of poor and the share of rich people in society to be much larger than they actually are, and underestimate the size of the middle class heavily. If we calculate the Gini coefficient for each of the distribution, we find that the Gini coefficient on perceived income is around 0.36, while the one that is based on the actual income distribution is around 0.29. The difference between these two values is large, about the same as the difference between the Gini based on net household incomes in Germany and in the United States.

There is evidence that the difference between these distorting perceptions and the reality might be important, in the sense that as one would expect perceptions about inequality drive policy preferences. To partially evaluate this issue, Niehues (2014) tries to explain cross country differences in the share of individuals stating that "income differences are

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[3] These responses refer to the year 2009, which is the last time that the ISSP dataset includes information on people's inequality perceptions.

too large". While actual inequality of disposable incomes can only explain 7 percent of this cross country differences (and the relationship between the two is statistically insignificant), *perceptions* about income inequality can explain 65 percent of the cross country differences in the share of people that perceive current inequality as too large (the relationship between the two variables is strongly statistically significant). These findings are perhaps not too surprising, but nevertheless reveal that the individuals' preference for inequality would be very different if information about actual levels of inequality was more wide-spread. Currently, evidence from the International Social Survey Programme suggest that views on whether inequality should be reduced seem to be driven by perceived levels of income inequality, which in turn, have very little to do with actual levels of income inequality. This discussion suggests that while there seems to be a huge debate on inequality, researchers have not been able to convey the basic facts about income inequality to the public in a correct way.

3. Inequality in labour income among employed individuals

In this section of our study, we use the SOEP and the IAB dataset to investigate recent trends of inequality among employed individuals in Germany. In order to investigate changes in inequality delivered primarily by market forces, we solely focus on gross incomes. We will move on to after tax income concepts later in the study. The chart below plots Gini coefficients over time calculated from labour incomes using SOEP.[4] The Gini coefficient increases through time from 2000 until around 2005. After 2005, inequality in labour income remains roughly flat until the end of the period of our analysis.[5]

Figure 2 Inequality of labour income for employed individuals
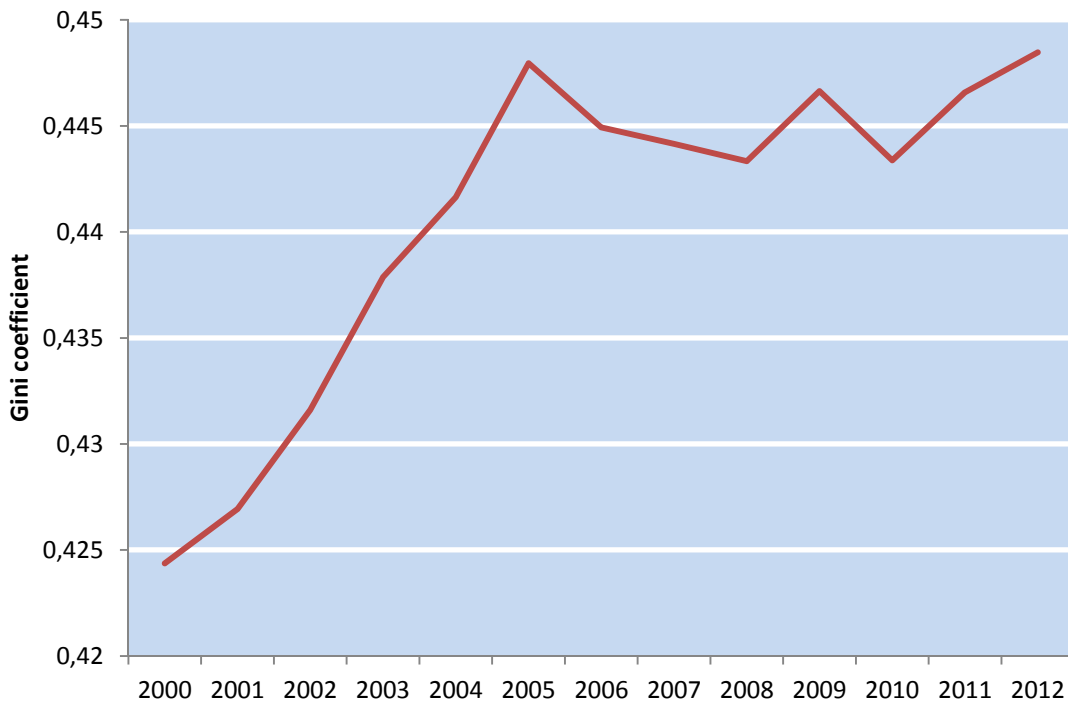
Source: own calculations from GSOEP v30, for individuals aged 16-65. Gini based on gross annual labour income of employed individuals.

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[4] Bartels and Schröder (2016) discuss development of high incomes in Germany since 2001. They investigate recent patterns of top incomes in Germany comparing the results from SOEP with those from tax returns, after having developed comparable income measures and samples. Figure 2-4 from their study show that the self-reported income measures of SOEP are remarkably similar to the patterns that are there in the tax returns dataset. The only exception are trends for the top 1-percent, where income shares in SOEP are significantly smaller than those of the tax returns (figure 2). Tax returns data for the top 1 percent show that this population saw their income share increase between 2003 and 2008, followed by a slight decline during the recession. Figure 3 and 4, which focus on the 95-99 and 90-95 percentiles show that SOEP income variables are very accurate. They show that since 2001 there has been a steady but small increase in the share of gross income that is held by the top 10-percent of observations.

[5] Unfortunately, at the time in which we are writing this study the latest available version of the GSOEP was carried out in 2013, asking for previous-year incomes.

As will be confirmed in other charts below, it seems that around 2005-2006 there has been some event that may have changed a long term trend in income inequality in Germany. When focusing on labour income for employed individuals only, one can argue that the SOEP is not the ideal dataset. The SIAB dataset collects a sample from social security archives of the Bundesagentur für Arbeit. Wages are therefore better measured, and sample size is much larger. The drawback for the current analysis is that the current version of the SIAB only includes observations up to 2010.

Using the most recent SIAB dataset, we calculate growth in real gross wages since 1992.[6] Below, we present evidence concerning wage growth at different points in the wage distribution. While Dustmann et al. (2014 look at West Germany only, use a slightly different sample until 2008, our main message is very much similar to that of Figure 2 in Dustmann et al. (2014) and to that of figure 1 (looking at men only) of Card, Heining, and Kline (2013). The increase in wage inequality in the figure below clearly documents an increase in wage inequality, driven largely by decreasing real wages at the bottom of the wage distribution, especially after 2003. Median wages also tend to fall in the period 2003-2008. These trends have been discussed in several influential papers including Dustmann, Ludsteck, and Schönberg (2009) and Antonczyk, Fitzenberger, and Sommerfeld (2010). Fuchs-Schuendeln, Krueger, and Sommer (2010) offer a comprehensive description of different types of inequality in Germany using several data sources. Whereas, the wage measure of the SIAB is a measure of daily gross wages, and therefore cannot be directly compared to total yearly labour income, which is the variable we use for the Gini patterns we presented above using the SOEP.

On this chart it is clear that the level of the 20th percentile real wage has fallen rather dramatically between 2003 and 2010. These results seem perhaps extreme, but are roughly in line with Card, Heining, and Kline (2013b) and Fitzenberger (2012), who perform similar calculations. The median wage has fallen as well, by around 4 percentage points in real terms between 2003 and 2010. This implies that the wage earned by workers at the 20-percentile wage level is lower. In addition, there seems to be a structural change in 2004. Between 2000 and 2003 we observe an increase in wage inequality across the wage distribution, mostly driven by wage growth at the median and at the top and little movement at the bottom. This tendency changes quite dramatically from 2004 onwards. Now there is very little movement at the top and a large decrease of the wages earned by the 20th percentile of the wage distribution. The most recent version of the SIAB dataset only goes to 2010, so we are not able to construct our analysis for

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[6] For all of the analysis using SIAB, we look at full time workers (employees subject to social security contributions) only, aged 25-65 (for most of the analysis), living in Germany (including former GDR) in any economic sector. Consistent with most comparable studies, we exclude marginally employed workers and apprentices.

more recent years. However, very recently, Möller (2016) uses internal IAB data to look at wage inequality until 2014. He finds some preliminary evidence that between 2011 and 2014 wage inequality (which he measures as the p85/p15 ratio) actually flattened out in West Germany and decreased in Eastern Germany, especially for women. These are interesting findings, albeit it is not clear yet what mechanisms are behind these changes. In the future, we plan to investigate this further, once these data are publicly available.

Figure 3 Wage growth across the wage distribution, 2000-2010
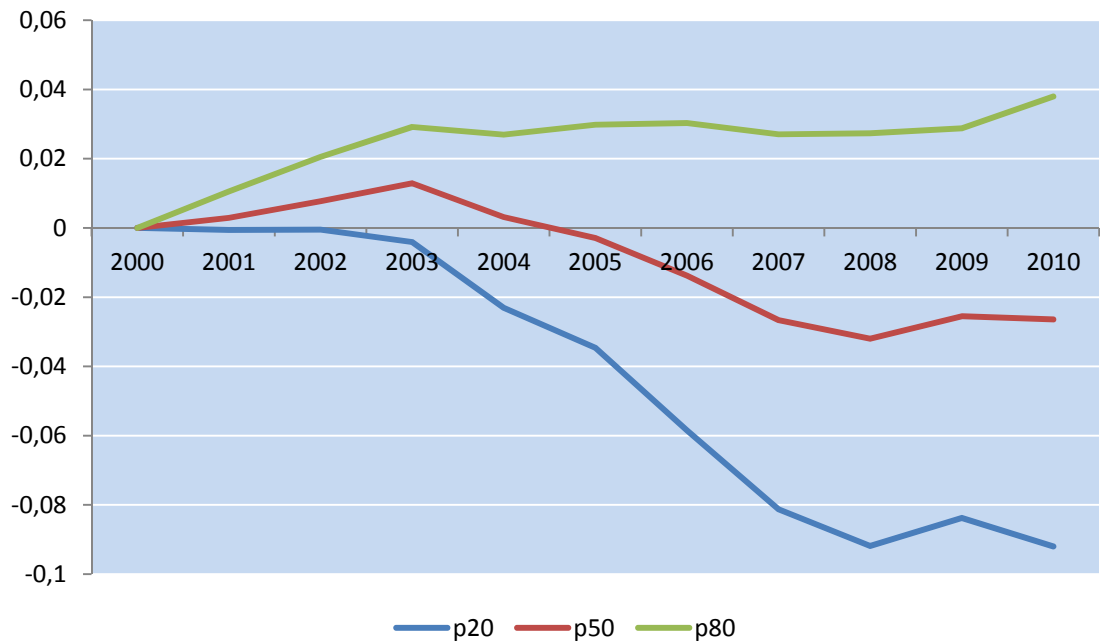
Source: own calculation from SIAB dataset. Full time employees aged 25-65, gross real wages indexed to year 2000.

However, time tables such as the one below are interpreted incorrectly, and misleading implications are then derived. In particular, one cannot stress enough that the table above calculates moments from the wage distribution in each year with the full sample of full-time workers from that year. It does not follow the same workers over time, and so it can lead to misleading interpretations when the sample of full time workers changes over time. To the extent that individuals entering the labour market are different from the average employed person, the patterns of the table above will reflect, at least in part, selection into employment. Once the labour market adjusted to the newly introduced Hartz reforms, employment rates increased substantially in Germany. To a large extent, this is driven by individuals that earn relatively low wages once they work, and are likely to be an important driver of the patterns of the 20th percentile (and to some extent the 50th percentile) wages that we observed in the previous chart.

While we will comment on this further below, we believe that this is an interesting pattern, which is consistent with the idea that the decrease in wages at lower percentile is not driven by existing workers being paid gradually less, but rather by an increase in employment, with the marginal workers that are employed from 2004 onwards more likely to be in part time employment, low wage sectors, lower earning potential, or a combination of them. As we will discuss below, income inequality behaves very differently from wage inequality in Germany in the last decade, which provides further evidence in favour of our thesis that results concerning wages are at least in part driven by selection into employment than to actual changes in retribution of workers over time.

In order to partially address the fact that the wage patterns above are likely to be driven by new entrants into the labour force, below, we present three charts that follow a specific cohort of individuals (aged 25, 35 and 45 in the year 2000) over ten years between 2000 and 2010. For all three cohorts, there is some growth in real wages in the period. This growth seems to be significantly higher for the 80th percentile in the case of the two younger cohorts, while this is not clear for the older cohort.

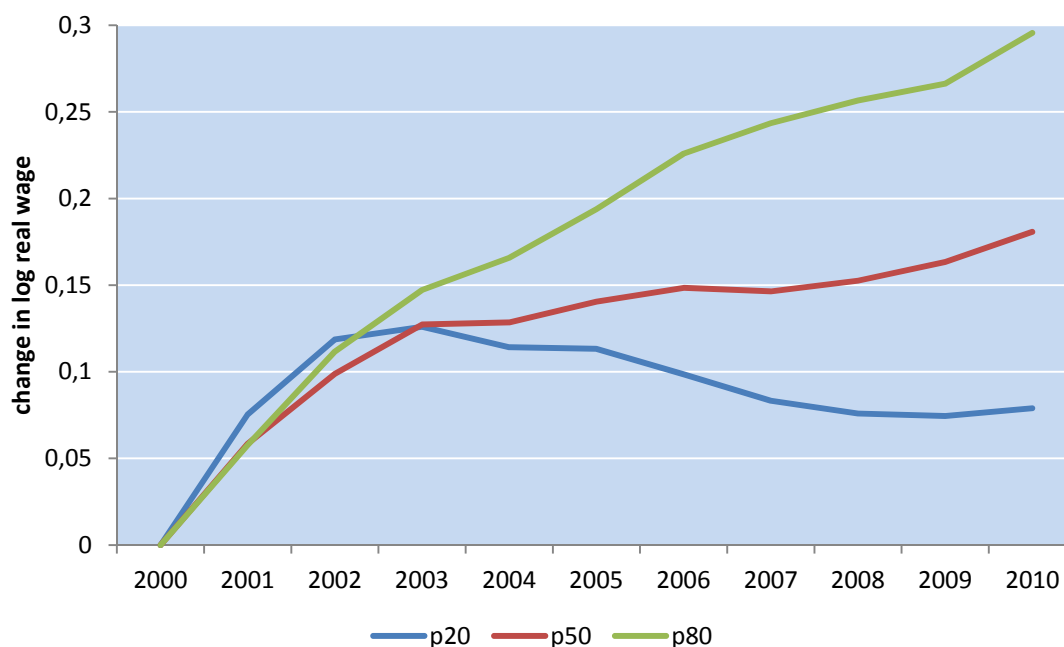**Figure 4 Wage growth for cohort of individuals aged 25 in 2000**

Source: own calculation from SIAB dataset. Full time employees aged 25-65, gross real wages indexed to year 2000.

Figure 5 Wage growth for cohort of individuals aged 35 in 2000
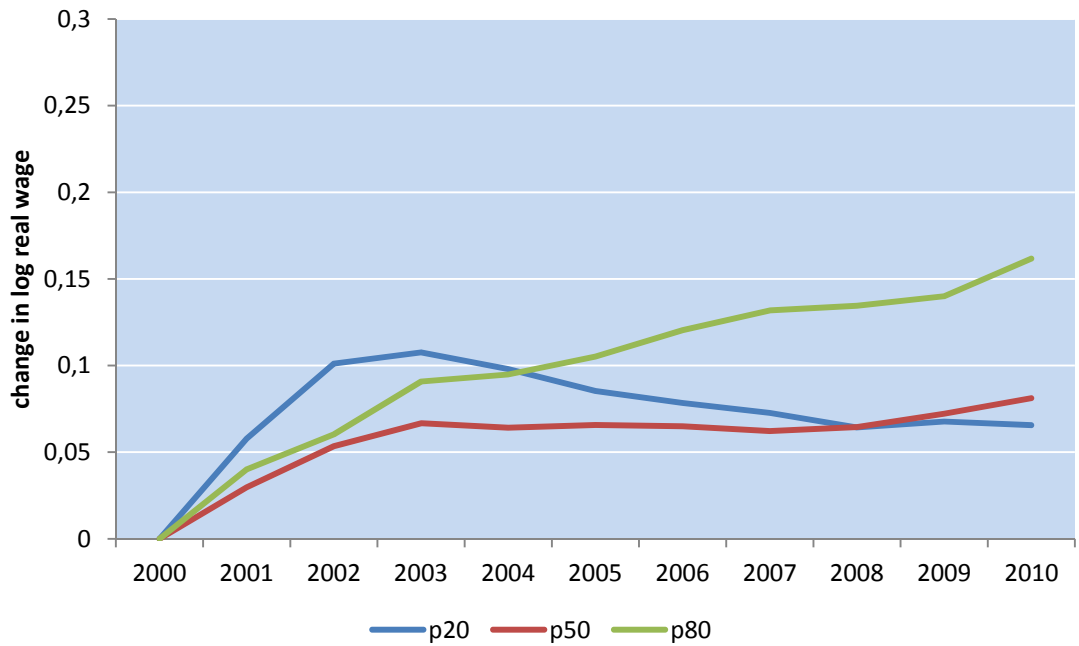
Source: own calculation from SIAB dataset. Full time employees aged 25-65, gross real wages indexed to year 2000.

Figure 6 Wage growth for cohort of individuals aged 45 in 2000
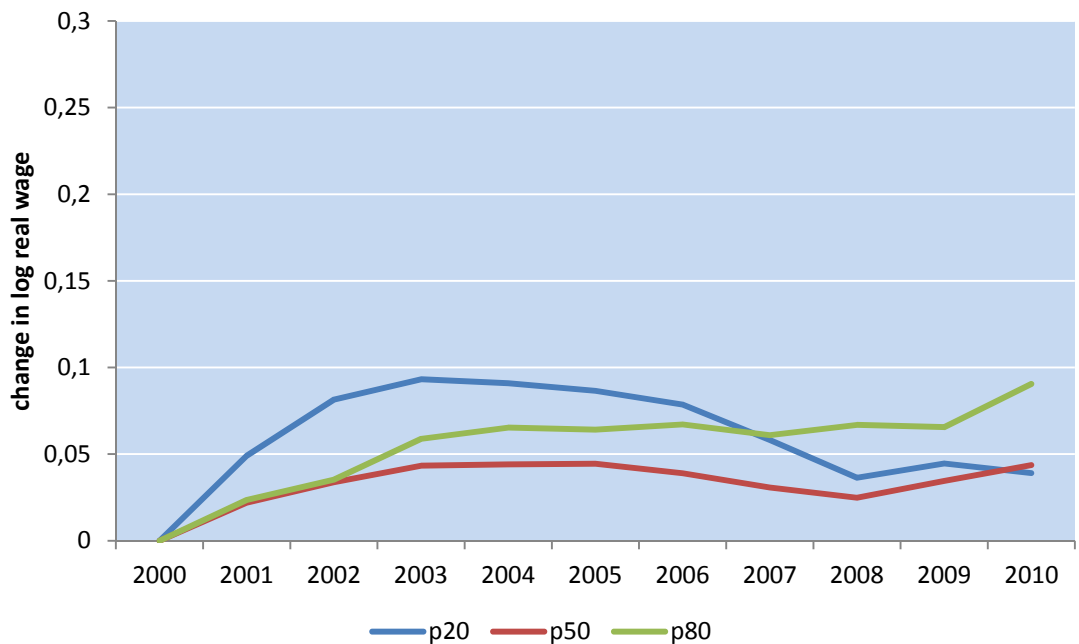
Source: own calculation from SIAB dataset. Full time employees aged 25-65, gross real wages indexed to year 2000.

A large part of the fall in real wages at the 20th percentile of the gross wage distribution is related to new entrants into the labour market during this period of time. This suggests that looking at employed individuals cannot provide a complete picture of inequality, because it will deliver lower measures of inequality (for the employed) when more people are unemployed. Next, we move to inequality measures for the working population as a whole.

4. Inequality among the working age population

By definition, wage inequality concerns workers (and in particular, employees subject to social security, in the SIAB dataset). However, one may rather be interested in the trends concerning income inequality at the household level. A recent report by the DIW (Goebel, Grabka, and Schröder 2015) presents a series of statistics constructed using the latest version of the SOEP dataset.

If one used only information on employed workers, an important pattern would be missing. In this sense, it is also important to keep in mind that how one can evaluate different policy interventions depends on the goal of those policies. For example, let us consider the introduction of a minimum wage. To the extent that any worker may be paid less than the minimum wage before its introduction, a minimum wage will bring about lower inequality among those who work. First of all, because of the increase in the wage of those directly affected by it, and second, a minimum wage may mean that firms will have to pay less to higher-wage workers. As a matter of fact, if our only goal was the Gini coefficient among the employed, we should always want a higher minimum wage. However, this is not at all the case if our goal is to lower income inequality among all individuals, including those who do not work. The introduction of the minimum wage may make it harder for those with skills that are less valuable on the labour market to start working. But even in the absence of such forces, increasing the income of some workers may in itself increase income inequality, depending on initial conditions. Reform that increase labour market flexibility (which has been argued to have increased in Germany as a result of the Hartz reforms) may increase wage inequality while decreasing income inequality once we include people who do not work.

The chart below reports Gini coefficients calculated from gross labour income, using the SOEP dataset. We calculate labour income for employed individuals only (as before, red line on the chart) as well as for all working-age individuals (blue line). Individuals who do not work are now coded as having zero labour market income.
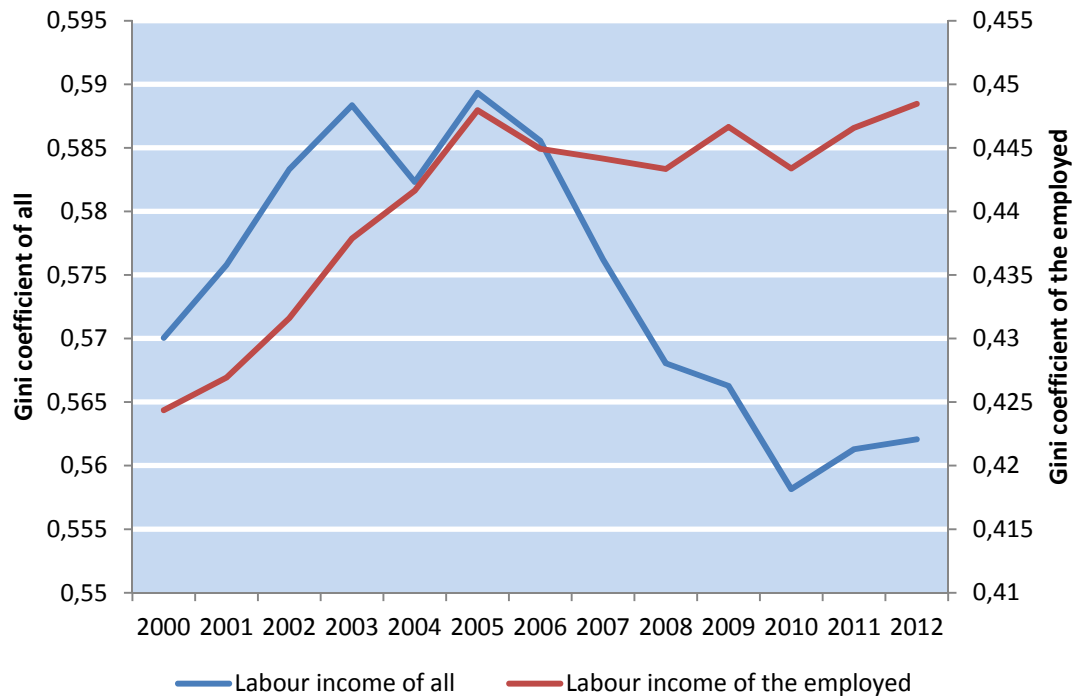
Source: own calculations from GSOEP v30, for individuals aged 16-65.

Up until around 2005, the two lines follow similar trends. After 2005, on the other hand, the Gini coefficient based on labour income that includes all individuals in the working age population decreases strongly, and after 2008 it is lower than its level in 2000. These diverging patterns are due to increased labour market participation, which means that a lower share of the working age population has zero non-labour income. The large difference between the two lines stresses that labour market participation is extremely important for labour income inequality among the working-age population. This implies among other things, that binding minimum wages, while helping some workers, do run the risk of increasing inequality, once we take non-employed individuals into account.

5. Unemployment rates and inequality in the 2000s

The chart below plots the Gini coefficient based upon labour market incomes, which we calculated for the full population ages 18 - 65. We also plot the unemployment rate in Germany for the same years. The correlation coefficient is 0.94, which clearly indicates a strong positive correlation between the two lines. If we believe that inequality in gross labour income is important, then by far the most important driver of it is the extensive margin of the labour market. In particular, after 2005 (when the Hartz reforms came in full effect) as unemployment strongly decreased and more people entered the labour market, the inequality of before tax labour income decreased strongly as well.

Figure 8 Inequality among the working age population and unemployment
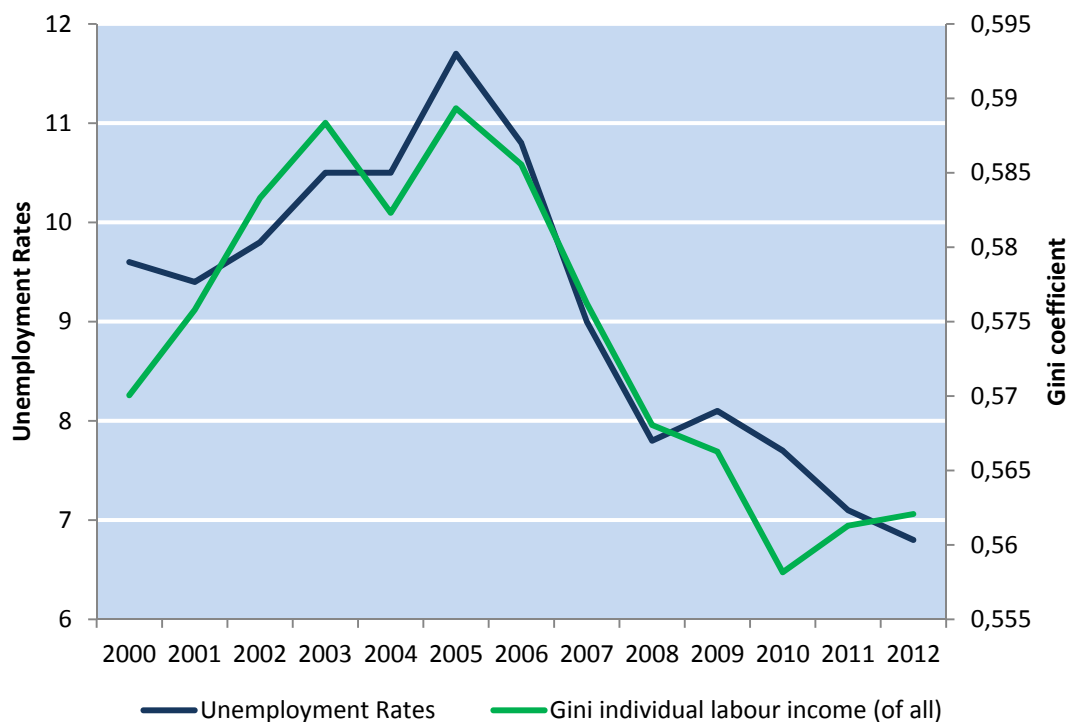
Source: own calculations from SOEP and Destatis data.

We believe that this observation is not only important to understand the development of inequality among the working-age population as a whole, but also to shed light on the fact that unemployed individuals are not likely to have average characteristics, similar to the ones of the working population as a whole. A large increase in employment, such as the one we observe in Germany between 2005 and 2010, is likely to be largely driven

by individuals who have lower educational attainments compared to the average. This illustrates a more general point: looking at statistics for employed individuals only may be misleading if one does not also consider selection into employment, which is typically such that individuals with higher earning potentials are more likely to be employed. Respectively, as unemployment rates decrease the pool of the employed becomes more heterogeneous. This is likely to result in larger heterogeneity in their labour market outcomes as well.[7] Focusing on registered unemployed directly, we present some evidence from official statistics on unemployment rates by qualification of the workers. The next two charts look at Eastern Germany and Western Germany separately. In both West and East Germany, at around 2005 we see a change in the trend by which unemployment rates decrease overall, and this decrease is disproportionally driven by individuals with low qualifications leaving unemployment. These are trends that denote an improvement in labour market opportunities for individuals that have relatively low potential wages and shows once again that solely looking at wage inequality can be misleading.

Figure 9 Unemployment rates by educational attainment, East Germany

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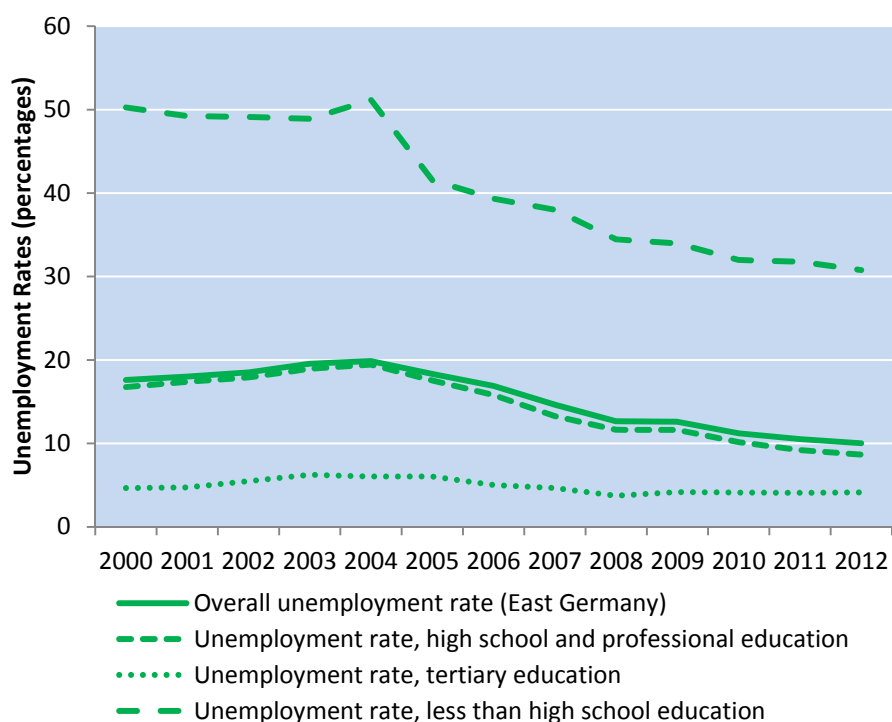
[7] Several papers, including M. M. Grabka, Goebel and Schupp (2012), Schmid and Stein (2013) and Adam (2014) make similar arguments, stressing the importance of strong employment gains since 2006 on the change in the increasing trend in income inequality since 2005.

Figure 10 Unemployment rates by educational attainment, West Germany
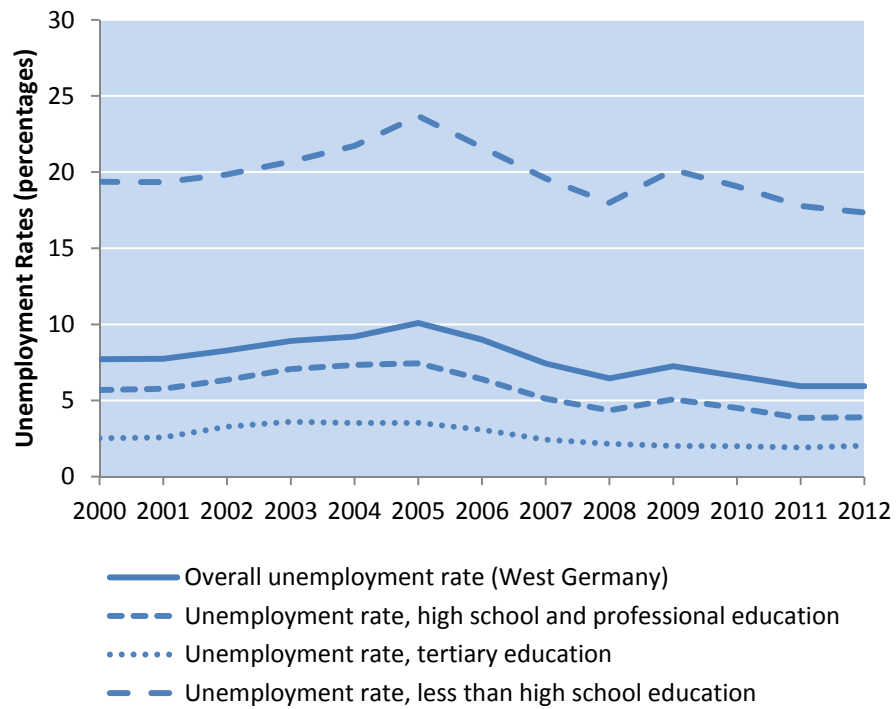
Source: Unemployment rates by qualification, IAB 2013.

6. Inequality at the household level

So far, we have focused on inequality across individuals. In fact, much of the literature on income inequality presents primarily evidence that is calculated at the level of the households. There are at least two good reasons to focus on households. First, individual incomes are likely to be shared among individuals within the same households, and decisions are made within the households that affect individual incomes. For example, a couple may decide for one of them to work part time, and the consequences of that in terms of individual incomes may not reflect differences in consumption inequality, which is what we ultimately care about. Secondly, we are interested in investigating the role of a redistributive welfare state for inequality. In Germany, after tax income concepts only exist at the household level, which is the basic unit for taxation.

Below, we plot Gini coefficients for individual labour income (red line) and for total household income, both before taxes and transfers. When sharing within the household is assumed, there is clear evidence that the household provides a strong inequality-decreasing mechanism: many individuals who have no labour income might live in a household where others work. This means both that Gini coefficients based on household labour income are much lower, and also that they are less variable over time. This is simply because more than one labour income will be combined at the household level.

Figure 11 Inequality in individual and household labour incomes
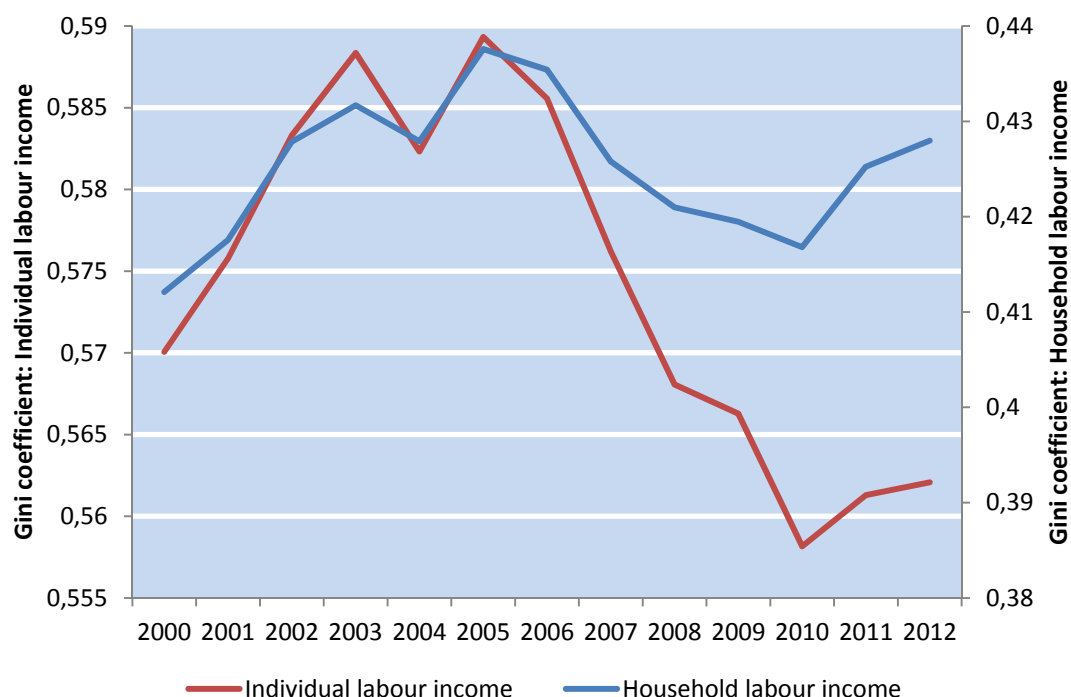
Source: GSOEP, v30, own calculations for individuals aged 16-65.

There is a large literature showing that sharing within the household in not perfect, in that sense that who earns a certain income within the household matters for consumption patterns. Even ignoring these considerations and assuming, strongly, that there is perfect sharing among households' members and no sharing across households, another important issue remains: the composition and characteristics of households changes over time. Peichl, Pestel, and Schneider (2012) investigate exactly this issue, and the authors state that firm household size plays an important role in the way we can interpret changes in inequality in Germany. Their analysis, which uses data up to 2007, stresses those changes in household formation. Ignoring taxes and transfers, they find that as much as 78 percent of the changes in inequality can be explained with changes in household structure. Because of large redistribution, this share falls to 22 percent if we consider after tax incomes. Because changes in the distribution and prevalence of households of different types is part of a long term trend, and at least to some extent may be related to different choices made by individuals, as pointed out by Sinn (2008), they should be treated different from changes in inequality that arise from within-group changes in inequality.

Fessler, Lindner, and Segalla (2014) investigate the role of households' structure on net wealth measures across countries, using the HFCS dataset. They find cross country differences across households to be important for how we think of relative net wealth levels across countries. What is important to point out is that household size itself may depend on income and wealth, for example to the extent that divorce may be less costly (in utility terms) for high income individuals. Below, we present some descriptive evidence showing that household characteristics have changed between 2000 and 2012.

Figure 12 Household types, 2000 and 2012
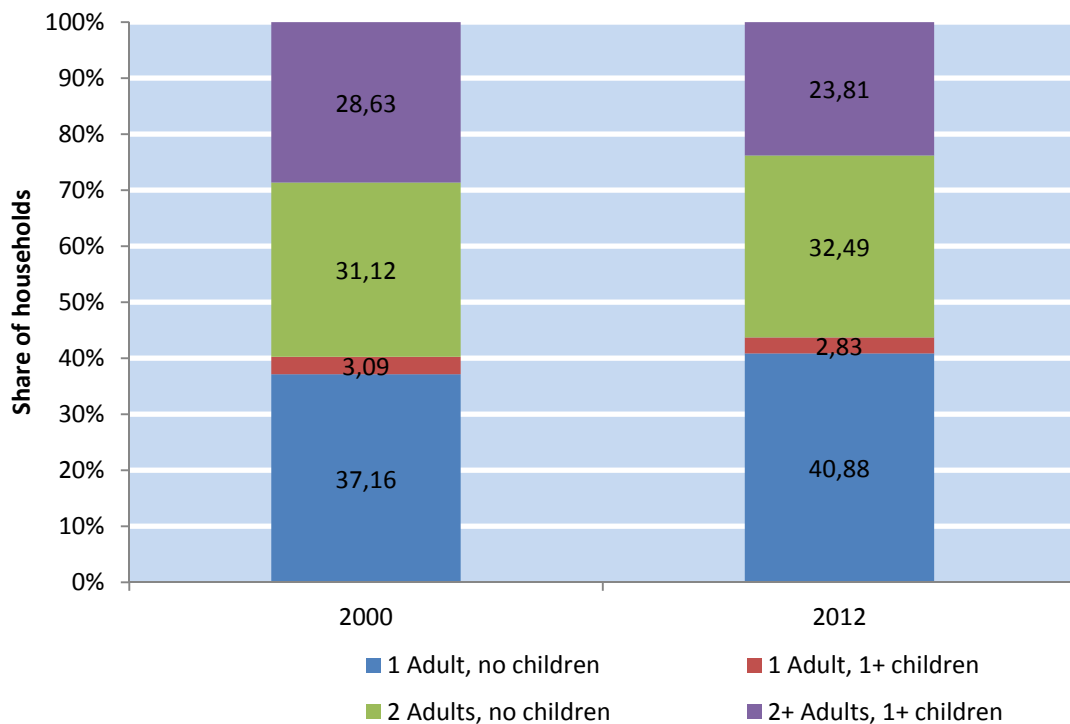
Source: own calculation from GSOEP v30, individuals aged 16-65.

There is a clear, strong trend for households to become smaller on average, over time. In particular, while the shares of both one-person households and households with two adults increased between 2000 and 2012, the share of households made up of two adults and one or more children decreased substantially.[8]

Changes in household characteristics will affect our measures of income inequality, because of the implicit assumption of perfect sharing within the household, and no shar-

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[8] There are of course many reasons for this. It is not only driven by people being less likely to marry and marrying later, but also by overall population aging, which increases the share of elderly living in one or two-person households.

ing across households. Using a simple variance decomposition of the same type that we use in the next section, we find 5.52 percent of the changes in the variance of labour market incomes at the households level between 2000 and 2012 can be explained by changes in household size alone.

# 7. Compositional effects: not all inequality is the same

Below, we present evidence of other compositional changes taking place in Germany in this period. First, we look at changes in characteristics of the working age population over time. For many of these charts we start in 2003 to stress differences that have taken place since the first implementation of the Hartz reforms.

Looking at compositional effects is crucial, and it suggests that not all changes in inequality should be treated the same. Some groups of the population (for example, females, as well as older and more educated workers) tend to have higher wages, but also higher variance in wage outcomes. If the relative importance of these groups in the labour force increases (as it has been the case in Germany over the last few decades), overall inequality will increase even when within-group inequality stays the same. Taking the overall differences as a guidance for policy interventions would be ill-informed unless one distinguishes between increased inequality between very similar workers (effects on returns), and increases in the size of groups that tend to have higher variance from the start (compositional effects). And we believe this is because one should distinguish between the fact that some college graduates are paid much more than others (within group inequality) from the fact that more people are acquiring a college education (which increases overall inequality through compositional effects, but may be a good thing otherwise).

We are not the first to point out that compositional effects may be important for the dynamics of inequality in Germany. Klemm and Weigert (2014) look further back to the mid-1990s and use data from the GSOEP to investigate the importance of compositional changes for wage inequality. Looking at compositional effects stemming from changes in labour market experience and education levels, they estimate that around one fourth of the changes in aggregate wage inequality can be explained by compositional effects. Given that most of the increase in overall wage inequality took place in the 1990s, it is likely that the share of increase in wage inequality that can be explained by composition effects is larger in the last decade. While the public discussion typically focuses on an aggregate level of inequality, whether and what policy interventions may be a sensible response to the observed patterns deserves a more sophisticated look at the forces at work. The part of the rise in wage inequality that is driven by the fact that we live in a society where people live and work longer, are more likely to be well educated, and where women participate more in economic activities, should not trigger the same policy interventions that may be a sensible reaction to increases in wage inequality that is related to higher returns to unobservable skills in the labour market.

The next chart plots full time and part time shares among individuals aged 25-65. While both full time and part time shares increased substantially between 2003 and 2013, the share of individuals not working decreased substantially.

Figure 13 Part time and full time employment, 2003 and 2013
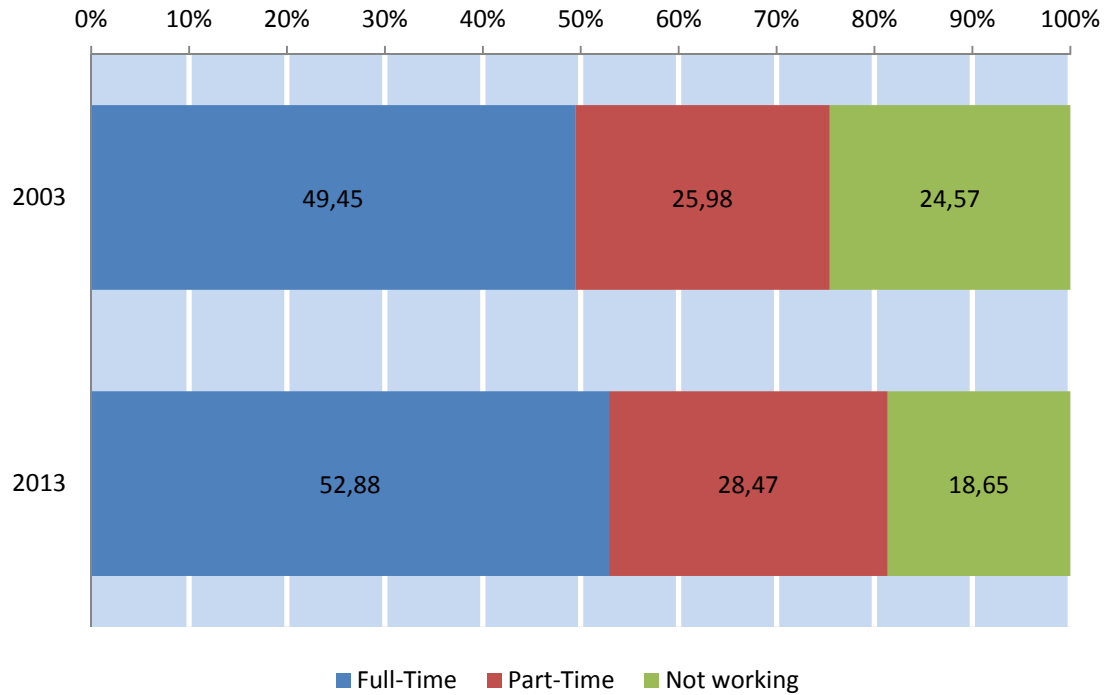
Source: own calculation from GSOEP v30, individuals aged 25-65.

Below, we construct the equivalent chart for groups based on educational attainments. Between 2003 and 2013, among 25-65 year olds there is a significant increase of the share of individuals with more than high school education, and a corresponding decrease in both mid and lower educated individuals.

Figure 14 Educational attainments among 25-65 year olds, 2003 and 2013

	Less than high school	High School	More than high school
2003	15,01	64,16	20,82
2013	14,04	62,1	23,86
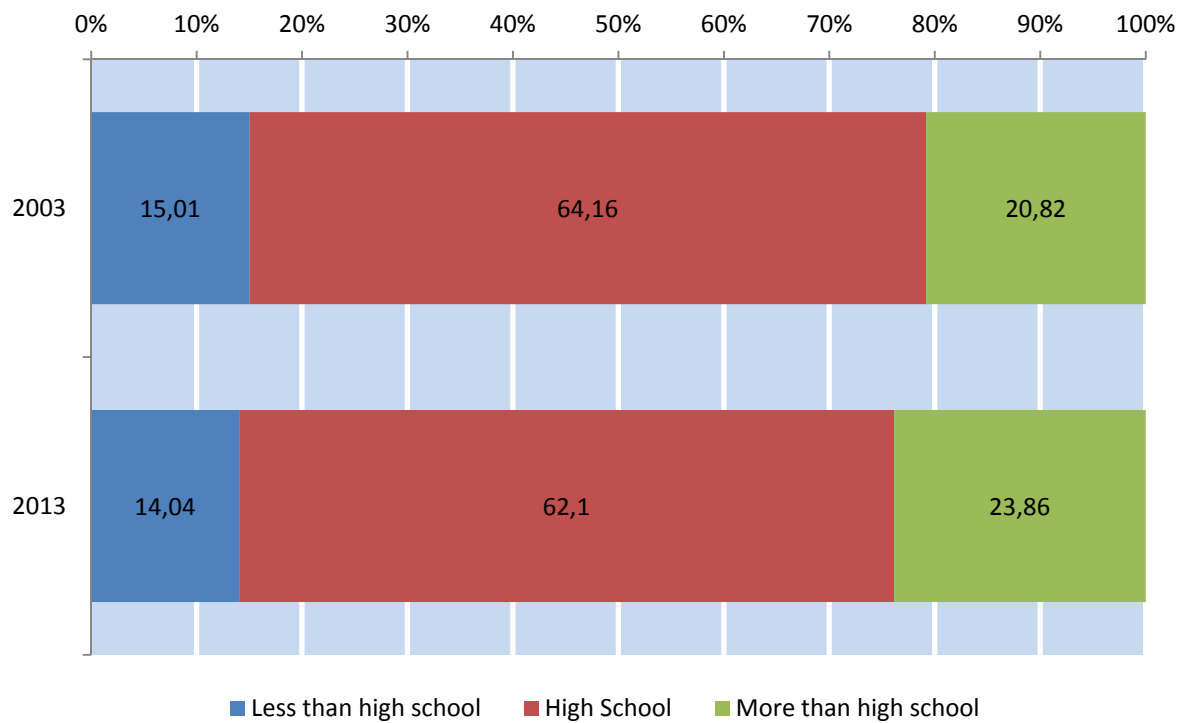
Source: own calculation from GSOEP v30, individuals aged 25-65.

The age structure of the population also changed within the same time period, as we show in the chart below. While the share of individuals aged 25-34 changed relatively little between 2003 and 2013, the share of people older than 50 increased substantially, while the share of 35-49 year olds (among 25-65) fell correspondingly.

Figure 15 Relative importance of different age groups, 2000 and 2013
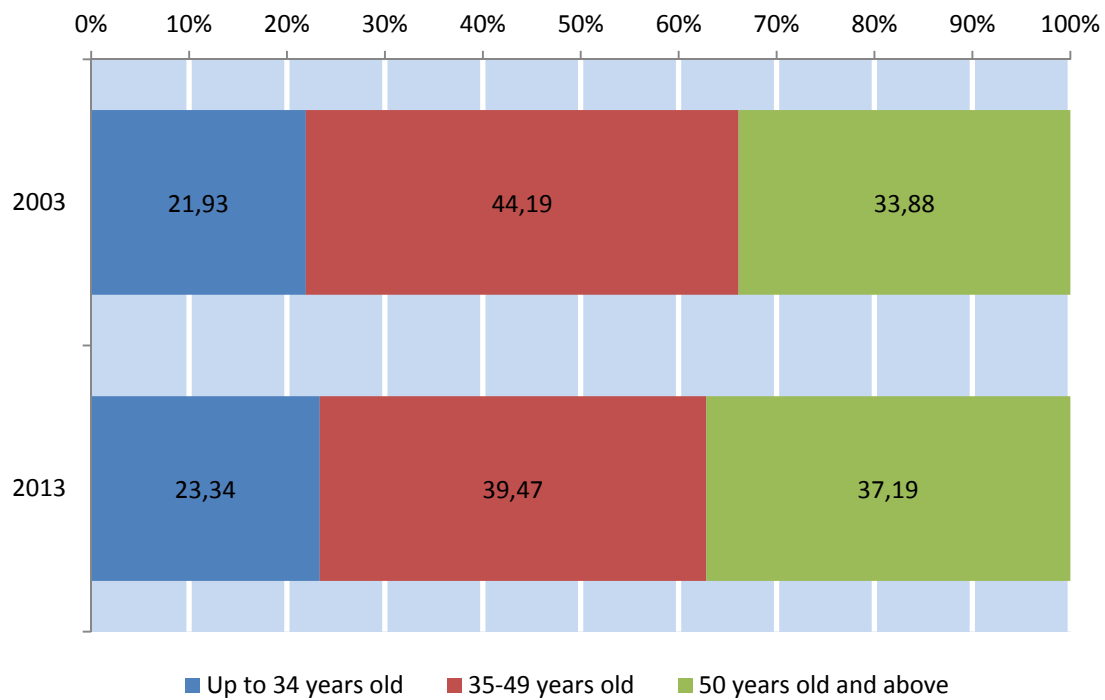
Source: own calculation from GSOEP v30, individuals aged 25-65.

Changes in employment rates and full time/part time status that we just discussed are driven by entry into the labour market of individuals who would otherwise be unemployed. In addition, they are affected by retirement decision. To the extent that older workers have more heterogeneous wages, this is also going to affect our inequality measures. The chart below plots effective retirement age for men and women in Germany between 2000 and 2014.[9]

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[9] The average effective age of retirement is calculated as a weighted average of (net) withdrawals from the labour market at different ages over a 5-year period for workers initially aged 40 and over. In order to abstract from compositional effects in the age structure of the population, labour force withdrawals are estimated based on changes in labour force participation rates rather than labour force levels. These changes are calculated for each (synthetic) cohort divided into 5-year age groups.

Figure 16 Average effective age of retirement in Germany 2000-2014
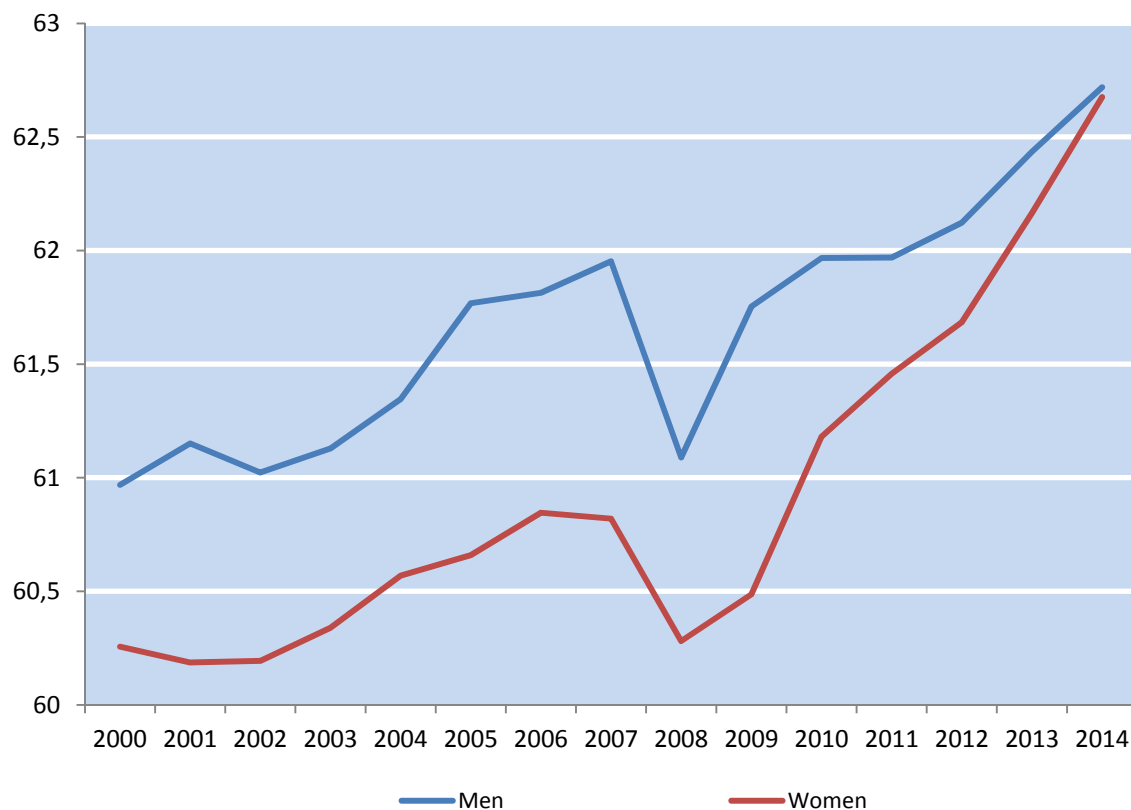
Source: OECD Ageing and Employment Policies data based on the results of national labour force surveys, the European Union Labour Force Survey and, for earlier years in some countries, national censuses.

Between 2000 and 2014 there has been a steady increase (with the exception of a drop due to early retirement programs during the early days of the Great Recession) in the average effective retirement age in Germany.[10] Within this time period, there has also been a full absorption of the gender gap in retirement age: while in 2000 average effective retirement age in Germany is equal to 61.0 years of age for men and 60.3 for women, in 2014 it lies at 62.7 for both men and women. While we will try to identify compositional effects in more details in the next sections, these descriptions alone suggest that delayed retirement is something that one should keep in mind when analysing increased wage inequality, since heterogeneity in labour market compensation tends to be increasing in age. Older retirement age is also an example of a pattern that may increase our measures of inequality, but in light of aging populations, it is hardly a negative de-

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[10] In levels, Germany is among the OECD countries with the highest employment rates among individuals aged 55-64, at 66.3 percent in 2015. OECD data show that within the European Union only Sweden has higher employment rates among people of that group (74.4 percent). The OECD average lags far behind at 58.2 percent.

velopment. Next, we look at the role of changes in the composition of the population of employed individuals only. For this, we go back to the SIAB dataset, which allows us to work with much larger sample size, more precise wage measures and a richer set of controls. Below, we present descriptive statistics from SIAB on full time workers in years 2000, 2003 (the baseline year for some of our analysis). The table presents information on shares for each group, as well as average and standard deviation of log wages.

Table 1 Summary statistics by group, 2000 and 2010

	Shares		Avg (log wages)		S.d. (log wages)	
	2000	**2010**	**2000**	**2010**	**2000**	**2010**
Full sample			4.272	4.255	0.490	0.562
Education low	0.231	0.267	4.043	3.969	0.469	0.520
Education mid	0.669	0.609	4.278	4.268	0.448	0.493
Education high	0.100	0.124	4.764	4.812	0.425	0.534
Age 25-34	0.304	0.252	4.194	4.117	0.442	0.495
Age 35-44	0.338	0.284	4.292	4.296	0.500	0.587
Age 45-54	0.244	0.315	4.306	4.315	0.504	0.572
Age 55-65	0.113	0.149	4.346	4.284	0.520	0.559
Foreign share	0.076	0.076	4.131	4.080	0.487	0.594
Native share	0.924	0.924	4.283	4.269	0.488	0.557
Share of women	0.345	0.345	4.074	4.066	0.500	0.559
Share of men	0.655	0.655	4.376	4.355	0.450	0.538
Share of West Germany	0.830	0.846	4.330	4.307	0.480	0.555
Share of East Germany	0.170	0.154	3.986	3.970	0.434	0.512
Manual tasks	0.058	0.057	3.825	3.758	0.509	0.523
Routine tasks	0.711	0.690	4.240	4.217	0.446	0.514
Abstract tasks	0.232	0.254	4.520	4.506	0.485	0.576
Agriculture, fishing	0.015	0.014	3.824	3.775	0.420	0.447
Manufacturing	0.305	0.281	4.398	4.432	0.439	0.510
Services	0.681	0.705	4.225	4.195	0.498	0.565

Source: own calculations from SIAB dataset, full time employed aged 25-65 only. "S.D.": standard deviation.

This chart is useful to interpret the decomposition results below, and it uncovers some interesting patterns on its own. By first looking at educational attainments as previously documented, the share of highly educated individuals increases over time and that of

medium educated individuals (high school) falls. Average wages of highly educated also increase. The standard deviation of log wages, which is most directly relevant for our inequality measures, grows much more among highly educated than among the other two groups.

Focusing on age groups, there is a clear trend towards a larger share of labour force that consists of older workers. At the same time, among older workers there is a much larger standard deviation in log wages, implying that the higher likelihood for older individuals to be employed, in itself a positive development, has an inequality-increasing effect. While the shares of women and of individuals holding a foreign citizenship do not change very much in the period, the increase of the share of workers employed in former West Germany also has the effect of increasing inequality, which is much lower in former East Germany. Changes in the sector composition of the labour force (which is a process that is taking place in all rich countries and can hardly be stopped by policies) also bring about an increase in inequality, because services, which are attracting an increasing share of individuals have a larger (and increasing) standard deviation compared to the manufacturing sector. The switch from routine to abstract tasks also results in changes in the same direction. The charts below summarise the main messages from the previous chart in a way that can better convey the basic messages.

Table 2 Shares and standard deviations across education groups
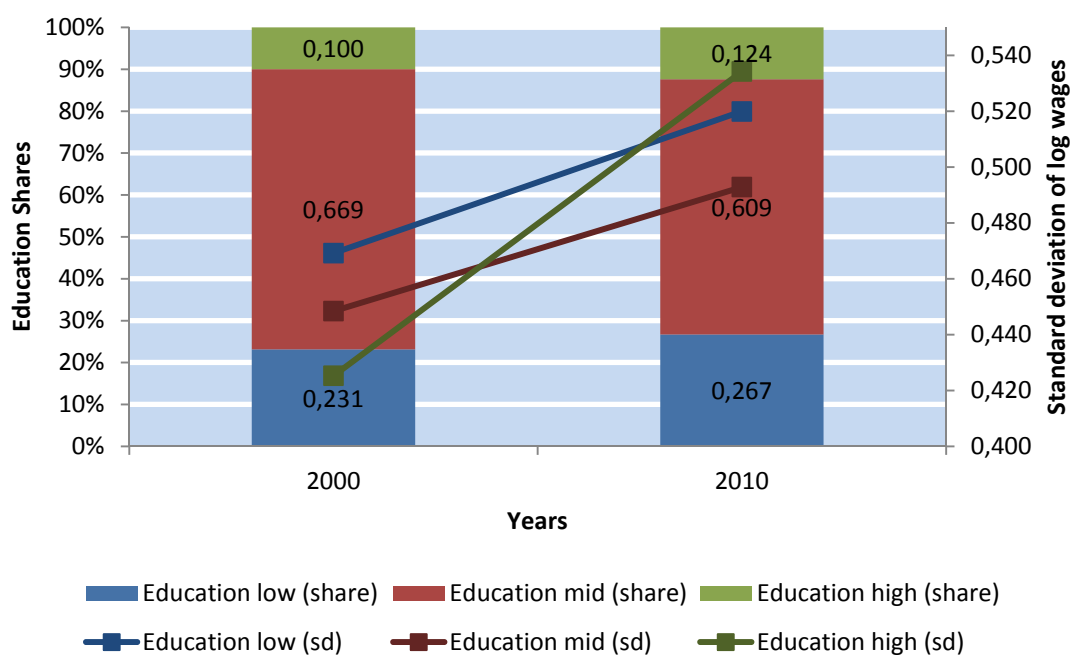
Source: SIAB 7510, individuals aged 25-65 in full time employment.

Table 3 Shares and standard deviations across age groups
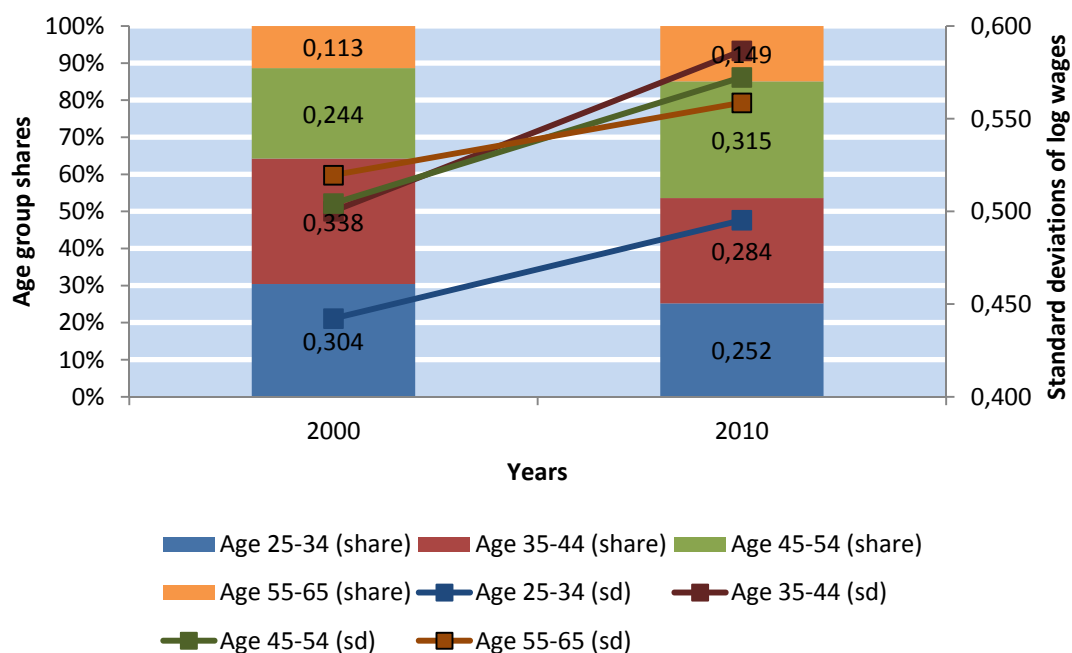
Source: SIAB 7510, individuals aged 25-65 in full time employment.

Table 4 Shares and standard deviations across tasks
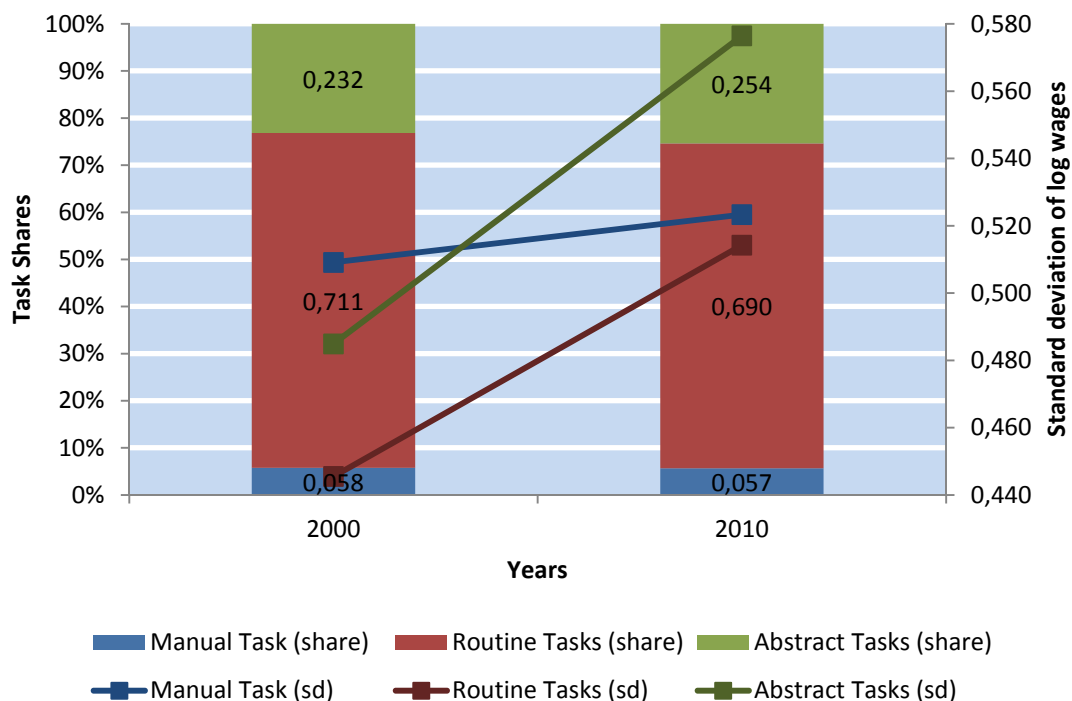
Source: SIAB 7510, individuals aged 25-65 in full time employment.

Table 5 Shares and standard deviations across sectors
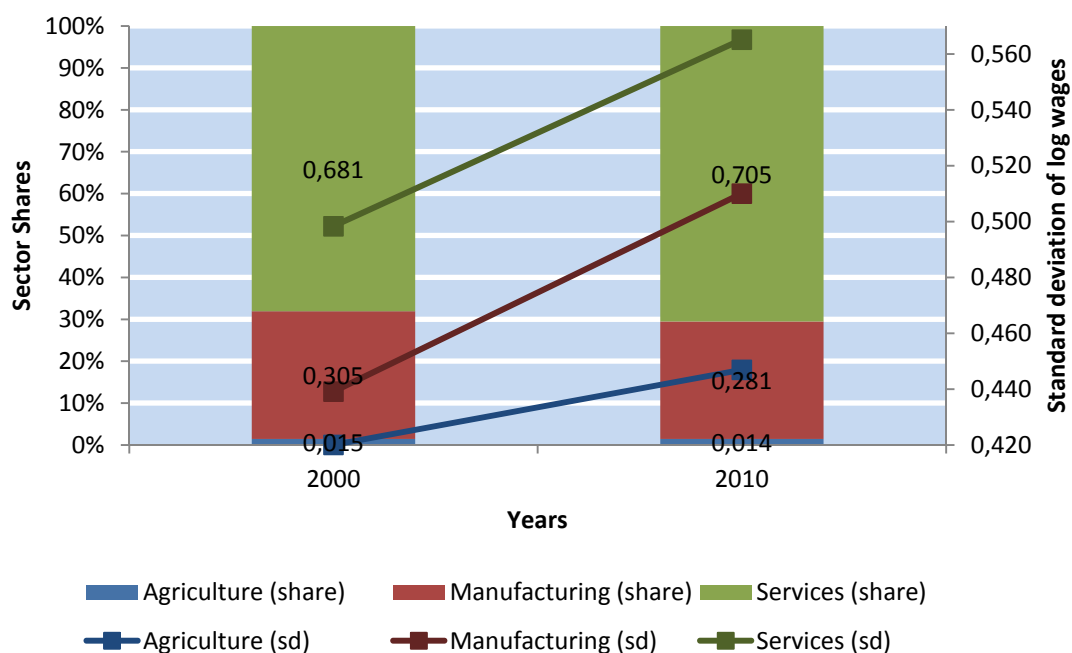
Source: SIAB 7510, individuals aged 25-65 in full time employment.

The main decomposition exercise that we perform is based on a so called recentered influence function (RIF) regression approach which was introduced by Firpo, Fortin, and Lemieux (2009). This decomposition method is based on linear regressions and allows us to quantify the relative importance of single variables on the change in wage inequality, which we measure by the change in the variance of log real wages over time. This implies that we are able to look at the effect of a single characteristic, while holding the other variables constant. Moreover we are able to distinguish between so called composition and wage structure effects to the rise in wage inequality. Composition effects are linked to changes in the underlying distribution of covariates in the population over time. Think for example of shifts in the age-profile of the workforce. As mentioned earlier, we observe a shift towards older workers. Even if there were no changes in returns to age, we could observe an increase in wage inequality simply because the group of older workers shows a relatively high within-group wage inequality. Wage structure effects, on the other hand, are linked to changes in the returns to single characteristics and also capture changes in within group wages. Coming back to our example, we could also observe an increase in wage inequality if returns to age (or experience) change over time, even if the distribution of age groups remains constant. Formally, a recentered influence function regression for period t can be expressed as follows

$$RIF(var)_t = X_t\gamma + \varepsilon_t,$$

where $RIF(var)_t$ is the recentered influence function of the variance of real log wages, X_t is a vector of the covariates and γ is the corresponding vector of parameters. ε_t is a standard error term. Based on the regression results we can then perform a decomposition of the variance of real log wages between two different time periods (t=0 and t=1), which can be formalised as

$$\Delta var_{01} = X_1(\gamma_1 + y_0) + (X_1 + X_0)\gamma_0,$$

where the first term on the right-hand side denotes the wage structure effect and the second tern denotes the composition effect.

Before we come to the results of this RIF-regression approach, we go one step back and discuss the results of a much simpler exercise, where we investigate, for one variable at a time, the role of compositional effects on the difference in wage inequality (which we measure here with the variance in log wages). In particular, we use the following formula to decompose the pooled variance into groups. In this example, we write the formula for two groups for simplicity. Let the two groups be identified by 1 and 2. The corresponding means and standard deviations are denoted by μ_1, μ_2, σ_1 and σ_2. The number of observations of the first and of the second group are N_1 and N_2 respectively. The variables without subscripts refer to the full sample. We can write the variance of the full sample at a certain moment in time as

$$\sigma^2 = \frac{N_1}{N}(\sigma_1^2 + \mu_1^2) + \frac{N_2}{N}(\sigma_2^2 + \mu_2^2) - \mu^2$$

We calculate the overall variance for each time period we are looking at, and then calculate a counterfactual variance that is obtained by applying the shares of the second period while using means and standard deviations of the first period. This exercise will help us isolate the effect of changes in the relative size of the groups.

Table 6 Variance decomposition 2000-2010 (SIAB)

	2000-2010
Overall variance in first year	0.240
Overall variance in last year	0.316
Age (4 groups)	
Counterfactual variance changing compositions	0.312
Share explained by composition (in percent)	94.59
Education (3 groups)	
Counterfactual variance changing compositions	0.275
Share explained by composition (in percent)	46.74
Foreign (dummy)	
Counterfactual variance changing compositions	0.239
Share explained by composition (in percent)	-0.58
Gender (dummy)	
Counterfactual variance changing compositions	0.241
Share explained by composition (in percent)	1.15

Source: own calculations from SIAB dataset, full time employed aged 25-65 only.

This decomposition exercise shows that, among the variables we consider, compositional effects in age (in groups) and education play an important role in the overall changes in the variance of log gross wages that we observe. The shares of foreign and of women do not play a decisive role.

Below, we report the results of our RIF decompositions, which allows us to control for other covariates while investigating the role of each variable on changes in the distribution of wages.

Table 7 Recentered Influence Function Decomposition

	2000-2010
Observable difference in variance between t and t+1	7.64
Composition effects	
West	-0.06
Female	0.00
Tasks	0.16
Education	0.65
Age	0.48
Foreign	0.00
Sector	0.48
Total	1.71
Wage structure effects	
West	-1.48
Female	-0.56
Tasks	0.62
Education	2.65
Age	-1.98
Foreign	0.30
Sector	-1.28
Constant	7.88
Total	6.15

Source: SIAB 7510 dataset, fulltime workers aged 25-65.

Notes:

Variables west, female, foreign are dummy variables; base group is equal to dummy=0; for all other categorical variables the base group refers to the median group (education: low, medium, high -> base group: medium, age: 25-34, 35-44, 45-54, 55-65 -> base group: 35-44; tasks: manual, routine, abstract -> base group : routine; sector: includes 17 categories ->base group is group "manufacturing"); The wage structure effects depend on the definition of the base group. The methodology used here is described in detail in Firpo, Fortin, and Lemieux (2009). All coefficients above are multiplied by 100 for convenience. Reweighting error: -0.04, specification error: -0.18.

The table above shows the results of the RIF-decomposition for changes in the variance of real log wages between 2000 and 2010, numbers are multiplied with 100 to represent

(variance) log points. Around one fifth of the overall change in the variance of log real wages can be explained by changes in the composition of the population. Education, industry (with the well documented move towards services) and age groups are the most important variables through which compositional effects operate. To a smaller extend also changes in the task structure of the population (a movement towards a higher share of abstract tasks and a lower share of routine tasks) have an inequality increasing impact.

The total wage structure effect captures the impact of changes in returns to characteristics and changes in within group wage inequality. It accounts from around 80 percent of the observed overall change in wage dispersion. We find a strong inequality increasing wage structure effect for our education variable, this captures on the one hand the increase in the high-skilled wage premium (unconditional log mean wages for high skilled workers increase from 4.76 in 2000 to 4.81 in 2010, while the return to skill for medium skilled workers, the base group, declined from 4.28 to 4.27 over the same time period). On the other hand this effect also captures the strong increase in within-group wage inequality for low and high educated workers, relative to medium skilled workers. Inequality increasing wage structure effects are also found for the tasks and foreign variable, although the magnitude is much smaller. At the same time we find inequality reducing wage structure effects for the variables age, west, sector and female. Taking the age effect as an example this again reflects a direct effect of changes in returns to age (or experience) and changes in within group wage dispersion. More specifically it captures that the returns to age decreased in most age groups relative to the base group (which is the 35-44 year olds) and that within group wage inequality increased less in all age groups relative to the base group.

Overall the results suggest that a non-negligible part of the observable increase in wage dispersion (about one fifth) is driven by compositional changes in the labour force. This has to be kept in mind when thinking about policy responses to the increase in inequality. This means that a relatively large extent the changes in the overall inequality are driven by changes in the composition of the labour force and in the types of jobs that prevail in the economy. These changes call for a different (if any) policy response to the changes in inequality within narrowly defined groups of workers.

8. Taxation and net inequality

So far, all of the inequality concepts we described relate to before tax incomes. However, it is important to investigate the effect of the existence of taxation for inequality. Because taxes are calculated at the level of the household in Germany, when looking at inequality in after tax income we need to look at total household income. Below, we plot Gini coefficients based on household incomes before and after taxes.

Figure 17 Inequality of household income before and after taxes
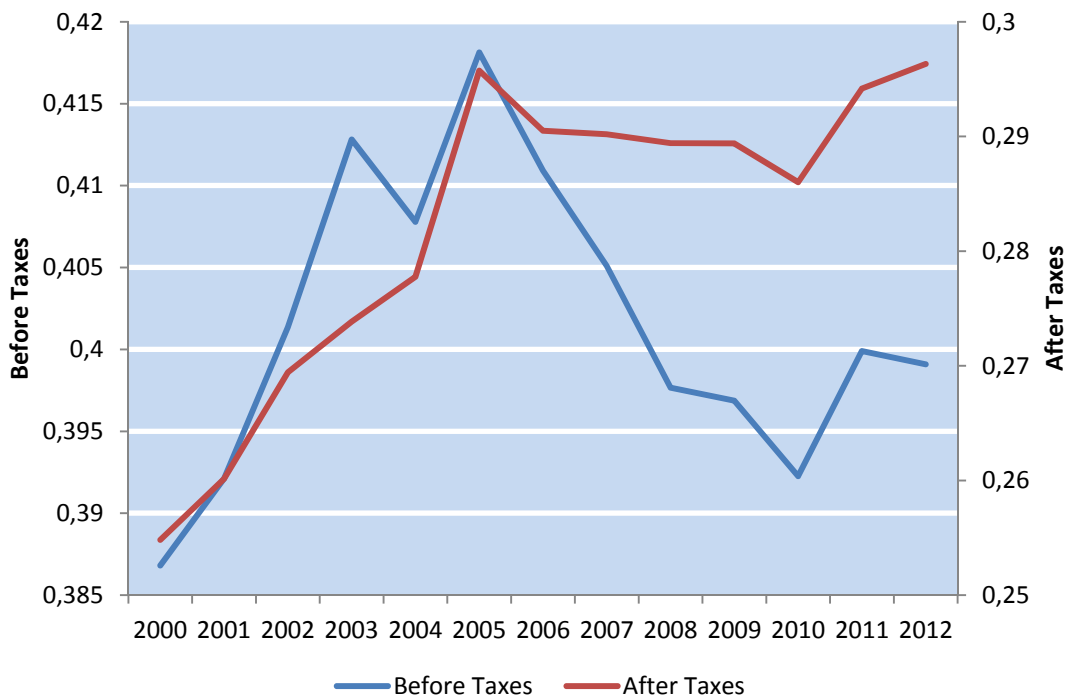
Source: GSOEP, v30, own calculations for individuals aged 16-65.

The red line depicts the Gini coefficient of market income. Since 2005, we clearly observe a decrease in the market Gini coefficient (right axis) until 2010, followed by a moderate increase. The decrease in the Gini coefficient is much larger when we look at before tax incomes than when we look at net incomes. The two trends combined are consistent with the idea that after 2005 the increased employment rates in Germany have meant that more people entered the labour market.

The market incomes of the households of these marginal entrants are affected much more than their after tax incomes, because of the presence of a redistributive welfare state. In other words, before 2005 after tax incomes for those families without (or with a

low) labour income could stay relatively high, while their market incomes were very low. After 2005, many of the individuals in these households entered the labour market, which boosted their total before tax income, while the changes in after tax incomes were more moderate.

9. Germany and other OECD countries

In the previous section, we have introduced taxation into our analysis, and looked at its effects on income inequality. We now evaluate the size and type of redistribution on Germany, compared to similar countries. First, we look at after tax income inequality across selected OECD countries. The figure below reports values of the Gini coefficient in the OECD countries where such comparable data exists, calculated using household disposable income in 2012 (and in 1995, for comparison). The increase in income inequality of the 1990s and early 2000s in Germany resulted in the leaving of the group of countries with the lowest levels of income inequality. The levels of the Gini coefficient in Germany are now closest to those of the Netherlands and France, lower than those of Southern Europe and of the Anglo Saxon countries.

Figure 18 Gini coefficient, selected OECD countries
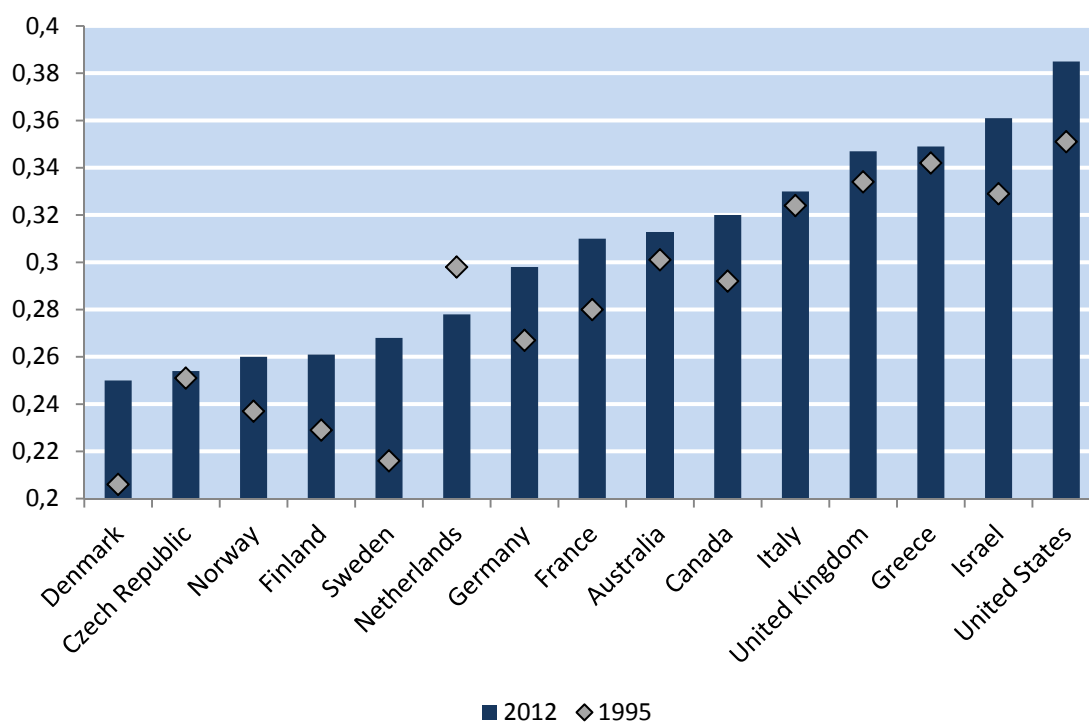
Source: OECD Income Distribution Database. Gini coefficients calculated for household disposable income. For some of the countries, we need to use previous or following years because of data limitations.

Beyond looking at the level of the after-tax Gini coefficient across countries, it is also informative to compare it to the Gini coefficient calculated on market income. The table

below lists a group of selected countries (that are relatively large, rich, and with relatively large governments) by their Gini coefficient calculated from market income as well as from net income. Perhaps surprisingly, Germany is close to the bottom of the chart. Based on market income Germany has much higher levels of inequality compared to similar countries. In particular, it records a Gini coefficient from market income higher than Austria, France, Italy as well as the United Kingdom and the United States.

Figure 19 Before and after tax Gini coefficients, sorted by market income

Source: SWIID dataset and IMF World Economic Outlook data, 2012
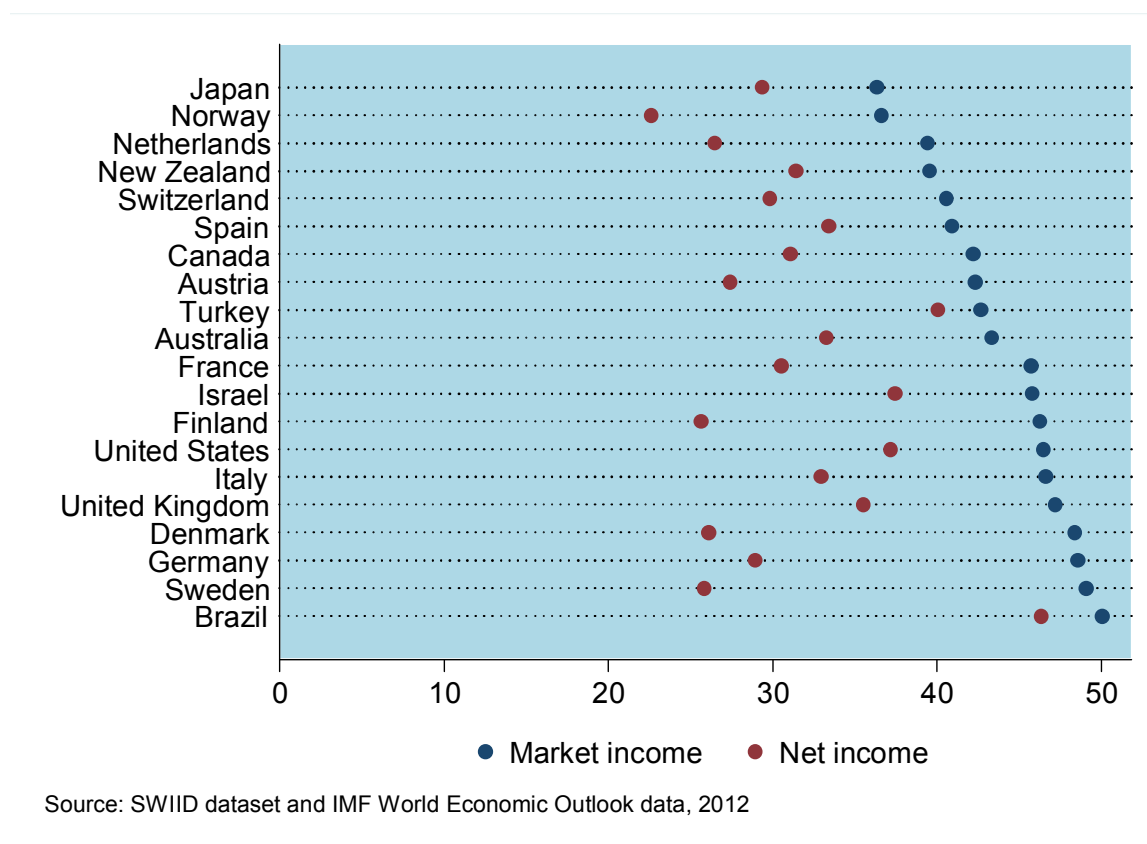
Because of the redistributive role of the government, which is substantial in many of these countries, the Gini coefficient based on net income is lower than that calculated from market incomes. Addressing this endogeneity directly is beyond the scope of this report, but it is interesting to note that there are reasons to believe that Gini calculated on market incomes is at least in part itself a response to the activities of the government. For example, a German firm that wants to hire a electronical engineers needs to offer her a take-home pay that is competitive with that of other countries. In Germany, this implies a higher gross pay than in the US or the UK, because of higher taxes. This underlines a mechanism that may actually limit the full effect of redistributive policies.

If more mobile factors of production face higher taxes, firms may choose to pay other factors of production less in order to offer competitive compensation packges to the employees they are more at risk of losing. Below, we show the Gini coefficients from market and net income again, this time sorting countries based on their Gini calculated from net income, i.e. after taxes and transfers are taken into account.

Figure 20 Before and after tax Gini coefficients, sorted by net income

Source: SWIID dataset and IMF World Economic Outlook data, 2012
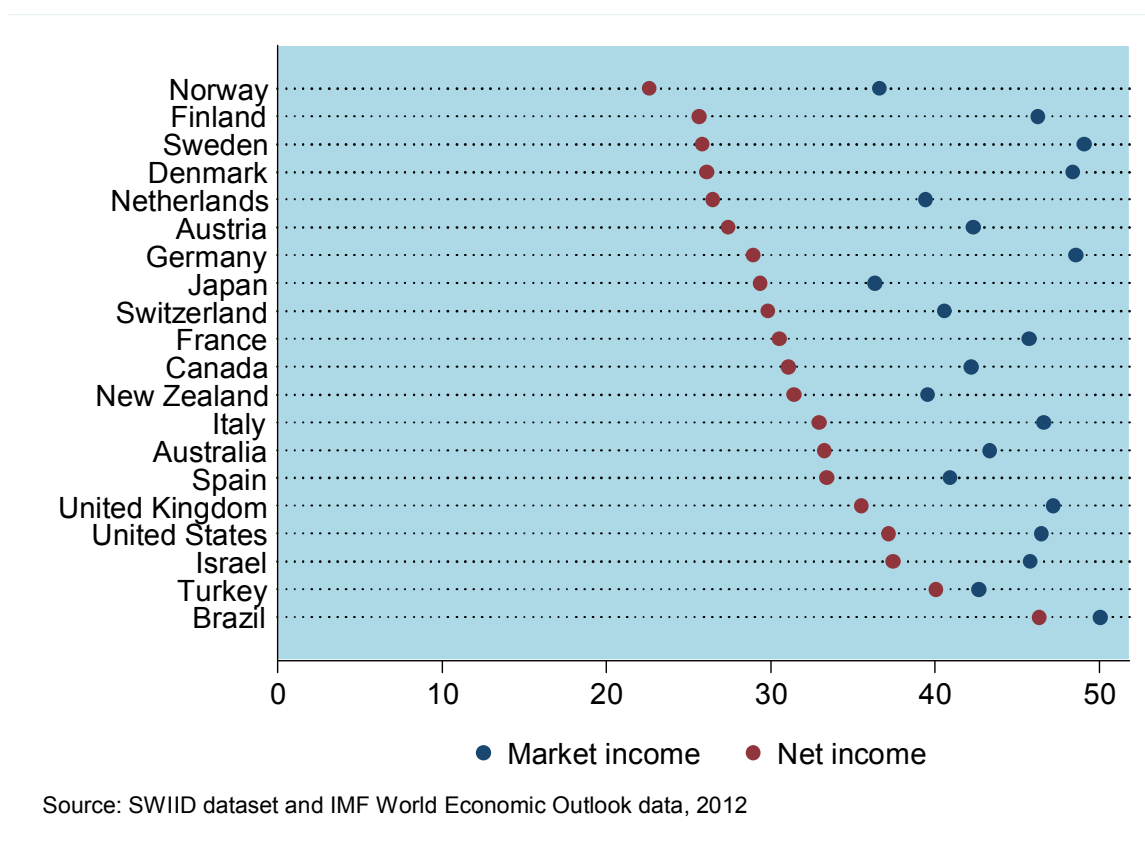
Now, Germany is close to the top of the chart, with inequality levels similar to the Nordic countries, and smaller than any other large OECD economy, most notably smaller than France, Spain, Italy, the United Kingdom and the United States. It is worth noting that this is not the case for all countries. In other words, it is not the case that all countries with high market Gini redistribute a lot (which is what a simple median-voter model would predict). For example, Brazil, Turkey and the United States redistribute relatively little, albeit starting from relatively high inequality levels.

These charts show that the redistribution system in Germany plays a decisive role in shaping the level of net income inequality that we observe. Germany redistributes more than almost all other OECD countries (Fuest 2016). In the simplest specification of a government budget constraint, the government is typically assumed to only redistribute from richer to poorer households, for example with a per-capita transfer and proportional taxation. Redistribution from top to bottom clearly can impact after tax inequality. It comes at a price, however, in the sense that increasing the extent to which income is redistributed is likely to negatively impact economic growth, and this effect is likely to be rising at an increasing rate. The efficiency costs of redistribution, especially in countries such as Germany where levels are already quite high, should be part of the debate on inequality, especially in a global context where future sustainability of the welfare state is challenged from many directions. Next, we construct some simple and rough measures of the extent to which large governments redistribute more.

10. Relative efficiency of government redistribution

Typically, we think of the government redistribution exclusively as a movement of resources from the top to the bottom of the income distribution. In reality, the role of governments in the economy is more complex. We look at the relationship between the size of the government and the difference between inequality before and after taxes and transfers. In the next chart, we measure the size of the government with general government expenditures as share of GDP (on the horizontal axis) and the extent of redistribution with the ratio between the Gini coefficient measured after taxes and transfer and the Gini coefficient before taxes (a large ration means less redistribution).

Figure 21 Size of government and redistribution

Source: SWIID dataset and IMF World Economic Outlook data, 2012
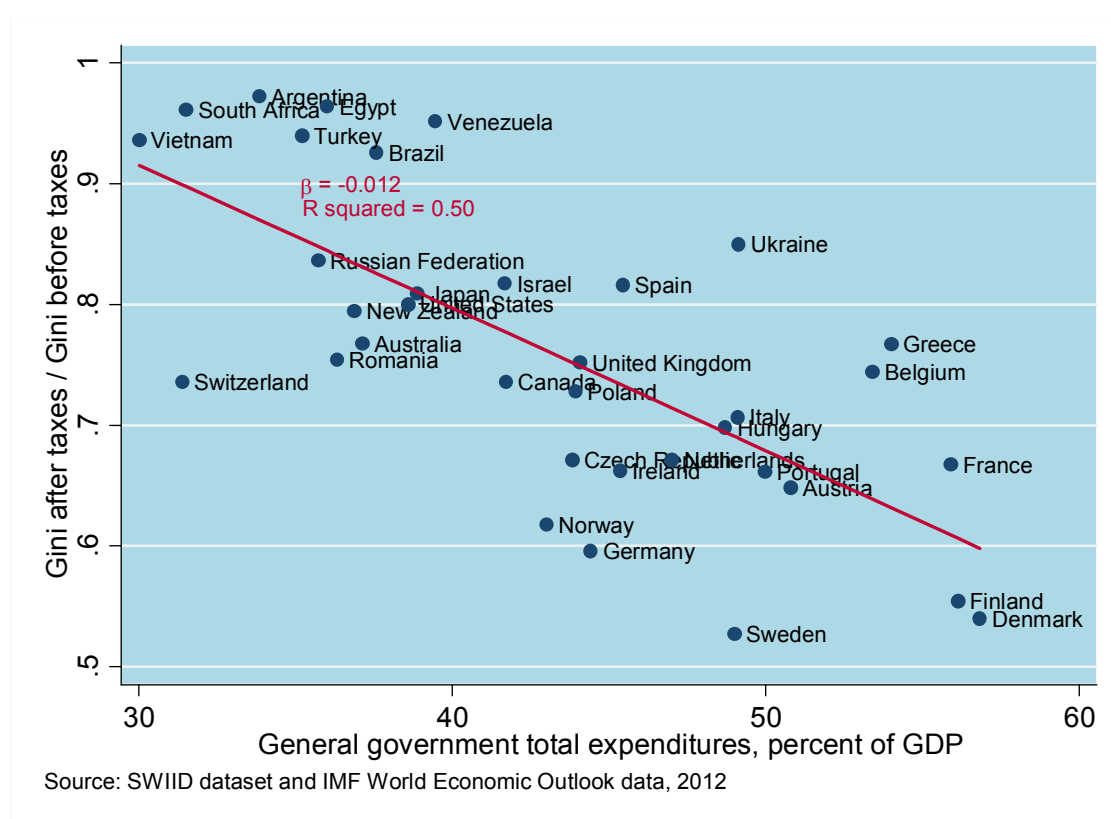
The countries that are on the right in the chart have large governments, while those that are higher on the chart are those with less redistribution. Comparing countries along the vertical axis shows that Germany redistributes a lot, with only the Nordic countries redistributing more. However, comparing countries horizontally shows that Germany,

while redistributing a lot, has a government that is not as large (as share of GDP) as many other countries, including Italy, Austria and France. It is worth noting that despite the fact that we restrict our attention to countries where the government is at least 30 percent of the economy, there are still many countries (including Brazil, Turkey, Argentina and South Africa) that redistribute very little based on the SWIID and IMF data. The red line on the chart is a linear regression line and shows that there is a relatively strong negative correlation between the two variables. However, the chart also shows that many countries (we included only relatively rich countries with a well-working revenue collection system) are not close to that regression line. Countries to the left of that line may be described as relatively "efficient" governments (in terms of redistribution), and Germany is the only large economy in this group. Given its size, the German government seems to be using relatively many public funds for redistribution.[11] Other countries, such as Greece, Belgium and France, have a large government but relatively little redistribution (or perhaps more redistribution that does not go from rich to poor, we are not able to disentangle the two from the chart). This means that their relatively high levels of taxation do not translate into a decrease in after tax inequality. In this sense, the discussion in Economist (2014) may be simplistic, since it implies that size of government and extent of redistribution are the same concepts. For many of the mechanisms through which the role of the government might affect growth, the channel might not be uniquely redistribution, but rather the size of the government in the economy. For example, when the government is a very large employer and pays higher wages than the market, this will make it hard for businesses to find the type of workers they are looking for.

The importance of the government in the economy matters for international competitiveness as well, since higher tax rates are likely to reduce competitiveness. This again suggests that assuming that a large government automatically provides more generous social programs and redistribution to the poor may be incorrect and potentially misleading. Moving towards a simplified tax system may increase the extent of redistribution, limit horizontal inequity and also increase transparency, which is of great importance in a context there currently a large share of individuals feel that they are getting too little and paying too much. So far, our analysis shows that the net income inequality in Germany is not higher than in many other countries, but is higher than in the early 1990s. It does seem, however, that a relatively large section of the German electorate would like to see inequality fall further. It is not our role as researchers to make normative state-

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[11] A word of caution is necessary here: taxes and transfers are not the only way for a government to redistribute consumption/utility across individuals. The provision of public goods including education, health and infrastructure has a redistributive component as well, which is not captured in these charts.

ments on whether the Gini should rise or fall. Rather, we would like to comment on different policy recommendations and what their effects on income inequality may be. Further increasing redistribution, for example increasing top marginal tax rates, would probably reach the desired goals. But this might not come at low costs, given the fact that at higher levels of taxation may negatively affect growth.

From the two tables above, it seems relatively clear that the level of inequality in 'not incomes' in Germany stems, to a very large extent, not from lack of redistribution by the welfare state (which is actually among the most substantial worldwide) but rather from a large level of before-tax income inequality. We believe that market income inequality can also be affected by policy. However, we also claim that those are quite different from the policies that are most often suggested, which usually focus on the tax and transfer system. The distribution of non-market income, on the other hand, has little to do with taxation, and is arguably harder to tackle. While difficult, however, we believe that it warrants further attention. Focusing on pre-tax distribution of incomes may allow to avoid the usual tradeoff between redistribution and growth (whose effects are depicted in the Laffer curve), which one needs to face when addressing inequality only from the perspective of redistribution, implicitly taking pre-tax incomes as given.

On the contrary, one can envision policies that can move out this tradeoff, lowering inequality without affecting (or potentially boosting) overall economic growth. Some of the directions for policies discussed below are also discussed in Keuschnigg (2015). The risks of the current inequality debate is that it very narrowly focuses on policies that may affect net inequality in the short term (without affecting before-tax inequality) and may thereby decrease our attention to other policy areas, which might be very important. Moreover, the current debate sometimes forgets that a decrease in inequality is hardly a goal in itself.

Sectors with high levels of innovation are likely to generate employment, but to the extent that they are particularly successful, may also generate new riches. These, do not need to be detrimental to society's welfare if individual skills are used efficiently. On the other hand, when wealth is generated by previous wealth, and perhaps accumulated in the form of rents from unproductive assets or activities without sufficient market competition, effects on poverty and welfare will not be the same. It is therefore clear that competition and efficiency should directly be regarded in this larger debate, with the goal of keeping the debate pragmatic and not biased by ideology.

In order to evaluate the extent to which the redistribution that we have discussed is achieved through very high taxes on individuals with large incomes, we next plot a

chart that has the same vertical axis as the previous chart, with the highest marginal tax rate on the horizontal axis.

Figure 22 Highest marginal tax rate and redistribution

Source: SWIID dataset and OECD Tax Database. Selected OECD countries, 2012
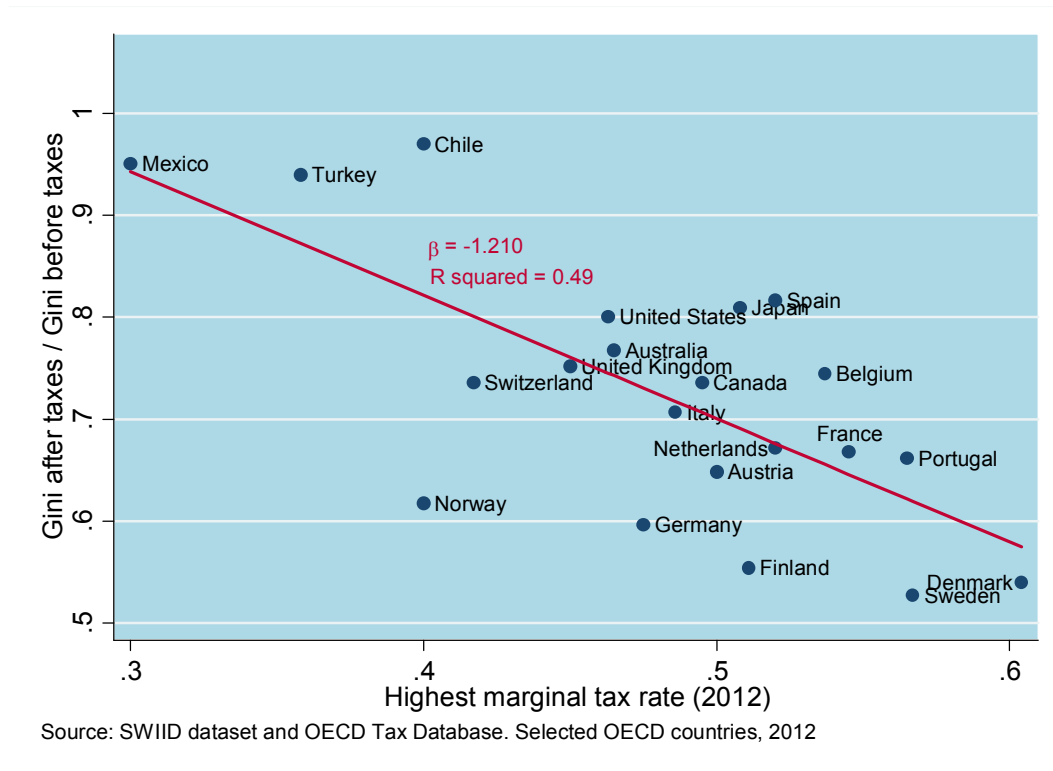
Countries on the right of the above chart are those with the highest marginal tax rates for high-income individuals. Germany's top marginal tax rate is similar to that of Italy and Canada, and only slightly higher than that of the US and the UK. At the same time, Germany is plotted lower on the chart, meaning that with a similar tax rate it seems to achieve more redistribution. Among large European economies, Germany is the only country that is relatively far below the regression line in that chart, while Spain and France, among others, are above the line, with relatively high top tax rates but less redistribution than Germany.

11. The role of public goods

The previous section pointed out that the government acts as a redistributor of income between different segments of society. This is not the only activity modern governments engage in. In particular, in Germany and elsewhere, the government provides some public goods to the population. To the extent that the financing or the utilization of these public goods differs across individuals, public goods provisions have distributive effects. This also implies that looking at the income Gini coefficient alone can be misleading for policy advice, since it ignores that there may be policies that redistribute in kind and that may be more efficient than others in achieving lower consumption inequality, which is in the end what matters the most.

For example, in Germany public health insurance is paid as a percentage of labour income. Therefore, individuals with larger incomes pay more into the system, and may get the same (or less, to the extent that richer individuals are healthier) services, which implies that the system is progressive in nature. Whilst progressive, it does not typically get counted for inequality measures since services are provided in kind rather than in cash. Using data from the World Bank's World Development Indicators (WDI), it is clear that many of the public goods that are provided by the government in Germany have a redistributive nature. The two most prominent examples are government expenditures for health and education.[12] According to the WDI data, Germany spends 19.42 percent of all government expenditures on health (data from 2013) and 11.03 percent on education (data from 2011).[13] Even if we focus on health and education only, we can conservatively estimate the yearly per capita expenditures by the government for health and education to be around 3,750 Euros (in 2012). If we view these expenditures as a demogrant (which is certainly not the case in a static sense, but it is not a bad approximation of the actual expenses that individuals would have were the government to step back) and were to calculate the Gini coefficient on net incomes again including these expenditures, the overall Gini coefficient in Germany on net income would decrease

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[12] According to data from DeStatis, in Germany overall expenditures on education are around 4.1percent of GDP, which is actually lower than public expenditures as a share of GDO according to the OECD data. This is clearly a data inconsistency, probably due to the fact that education expenditures pertain to different levels of government, and are therefore not easy to calculate. Nevertheless, it underlines that the vast majority of expenditures on education is borne by the government (and therefore the tax payer). There are clear differences between Germany and other OECD countries such as the UK and the US in this respect, which have an effect on inequality although they are not going to be included in the way we typically calculate inequality.

[13] These values are significantly higher than those for the Euro Area as a whole, and of the OECD as a whole. Private health expenditures, on the other hand, in Germany are just over 55 percent of OECD average in Germany (as share of GDP), which suggests that if public expenditures were to be cut, private expenditures would have to increase, which would of course hurt relatively poor households more. And they are substantial amounts for the median family. The Germany statistical agency estimated the costs to the state of each student up to university (master level) to be around 143,000 Euros (Statistisches Bundesamt 2015).

from 0.288 to 0.247 in 2012, a 14.2 percent decrease, a larger change than the increase in the same Gini coefficient since 2000. Next, we investigate the effect of including health and education in our measure of disposable household income, and look at how this affects the measures of the Gini coefficient. In the first panel, we plot the two Ginis using the same vertical axis. In the second panel, we allow them to have different vertical axis to evaluate their relative trends as opposed to their levels.

Figure 23 Gini Coefficient based on Net Households Income
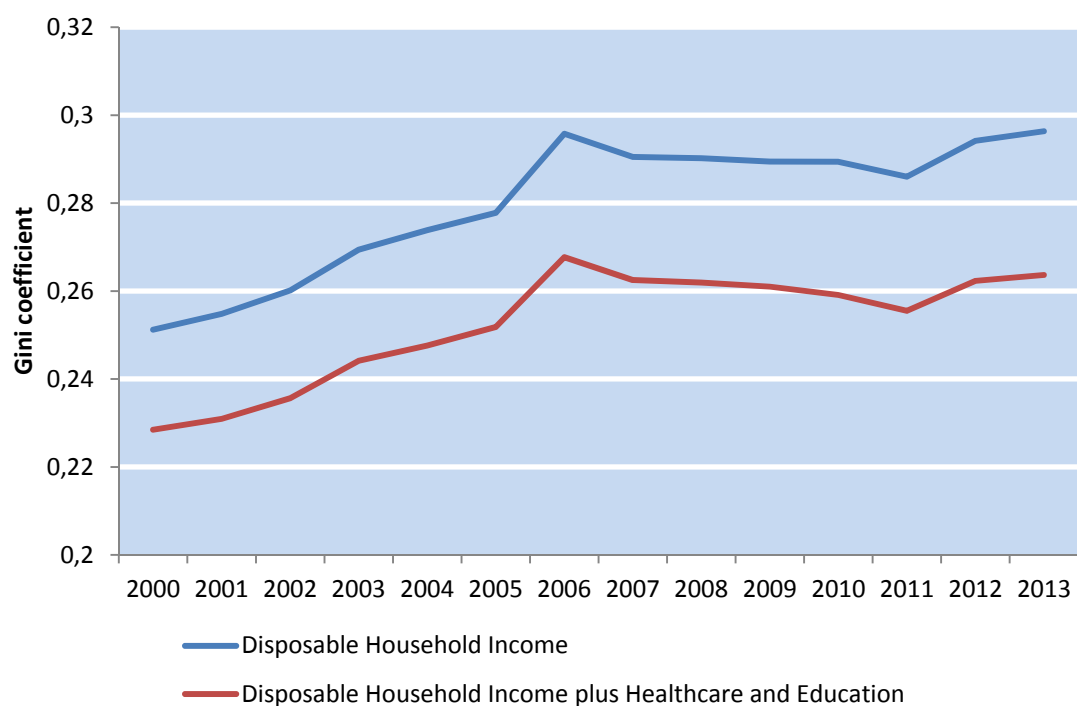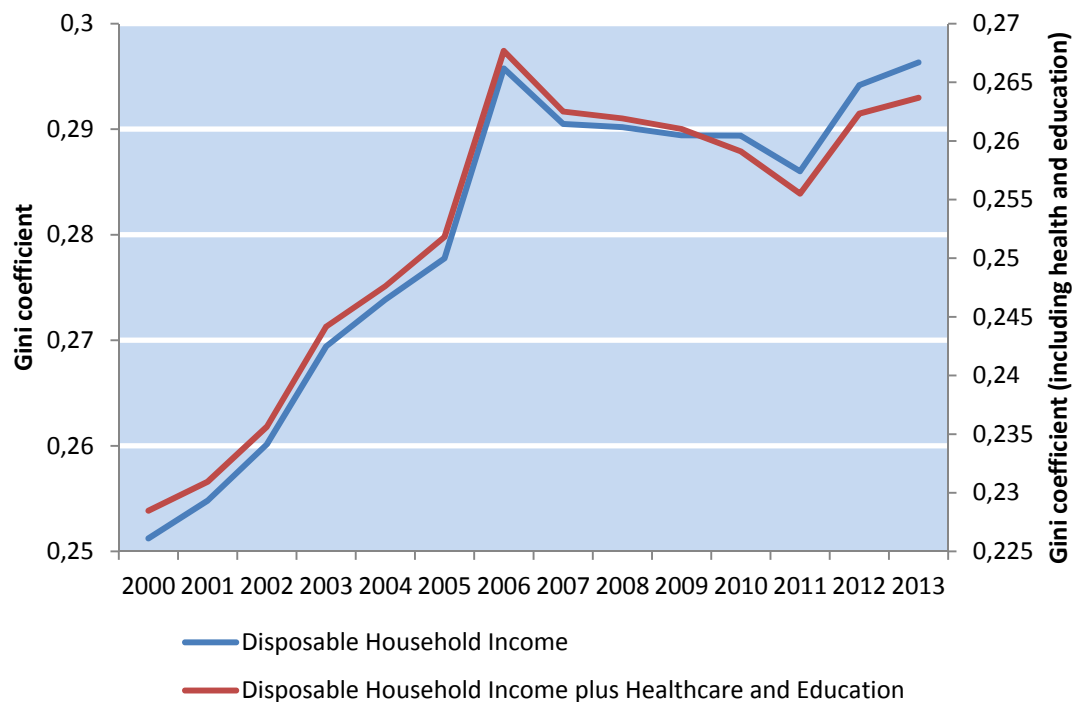
Source: World Bank World Development Indicators, SOEP v30.

Gini coefficients based on after-tax household are much lower than Gini's that excludes them. The Gini coefficient that includes health and education decreases somewhat more after 2005/2006, compared to the Gini that excludes them. This reflects an increase in the government expenditures in health and education as a share of per capita income in this period.

In reality, expenditures on health and education do not benefit each individual and each household in the same way. For example, in a cross sectional sense, health expenditures are disproportionally going towards the old and the poor (who are more likely to have poorer health), and expenditures on higher education are more likely to favour relatively rich families, who are more likely to send their kids to university in Germany, with higher coefficients of intergenerational transmission of educational attainments failing to decrease despite massive interventions, as discussed in Heineck and Riphahn (2009).

In a static sense, this means that we are ignoring the provision of public goods across different groups in the population, and the fact that consumption inequality may be different for two countries that have the same level of income inequality because of this, in the case in which some goods or services are provided by the government directly only in one of those countries. This matters dynamically as well, in the sense that changes in public goods provisions, which are very likely to affect consumption inequality in reali-

ty, is something that we would not notice in the inequality statistics that we typically use. We are not pointing out these issues as an intellectual exercise, but because we believe that they matter greatly in the public discourse. In particular, we believe that a narrow focus on decreasing income inequality though redistributive monetary transfers runs the risk of ignoring the issues around public goods, as well as equality of opportunities and economic incentives, which are likely to be crucial for future prosperity, as well as for future inequality.

12. Wealth inequality and measurement issues

While most economists agree that the ultimate objective would be to analyse consumption inequality, the debate around inequality focuses primarily on income inequality. The reason for this is primarily that income can be more readily and relatively precisely measured. From the perspective of economic theory, our focus should actually be on wealth, since forward-looking individuals will decide their consumption paths based on their level of lifetime wealth. Wealth is however rather difficult to measure. Recently, however, there are some attempts at measuring it, thereby offering some indications about wealth inequality in Germany.

Fuchs-Schuendeln, Krueger, and Sommer (2010) use data from the Income and Expenditure Survey (EVS), which is a cross sectional dataset carried out every five years, to get information on consumption and wealth (until 2003).

Even more recently, Grabka and Westermeier (2014) use SOEP data to describe recent wealth inequality in Germany.[14] While it is very hard to compare countries in this respect given that wealth data is collected differently, they argue that Germany has high levels of wealth inequality compared to many other countries in Europe. In particular, they find a Gini coefficient of around 0.78 in 2012. Around 28 percent of respondents report zero or negative wealth. In addition, they report large differences between West and East Germany. A discussion of recent trends in wealth inequality in Germany is also available in Grabka (2015). Grabka and Westermeier (2014) use data from the GSOEP to investigate the distribution of wealth across German households. They find that over half of the households report either zero or slightly negative wealth. They then find the 75th percentile of the net wealth distribution to be around 100,000 Euros (of year 2011), the 90th percentile to be around 200,000 Euros and the 95th percentile around 300,000 Euros.

We believe that what we can learn from the SOEP about wealth inequality in Germany is limited. First, findings from the SOEP seem to have an excessive share of households with no wealth. It is hard to be convinced that low home ownership rates and the fact that durables and valuables are excluded (which is by itself problematic) are sufficient to explain this. Second, the amount of information that is available about the types of assets and liability that make up the given wealth level is very limited. This means that with the SOEP we are not going to be able to evaluate how different policy environments may affect the wealth of different households differently.

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[14] In the SOEP, there is information on wealth at the individual and at the household level for 2002, 2007 and 2012.

We therefore turn to a different dataset: the "Household Finance and Consumption Survey" (HFCS) dataset.[15] Some of the findings from the HFCS dataset are also discussed in Bundesbank (2013). This dataset (only a cross section at this stage, but that will be further developed into a panel over time) includes information on assets and liabilities of households across the Euro area. The sample for Germany, which is the one we use for our analysis, includes 3565 households (from around 2100 we have full wealth information), with data collected in 2010-2011. The dataset is prepared using multiple imputations to address the issue of non-random non-response, which is large in this context.

Using a weighted multiple imputation procedure, we find that the overall average household wealth is around 195,000 Euros, the 5th percentile of that distribution is around -1600 Euros, the 10th percentile is very close to zero, the 25th percentile is around 600 Euros. The median household has a wealth of around 50,000 Euros, while the 75th percentile has around 200,000 Euros, the 90th percentile 450,000 and the 95th percentile 650,000 Euros. Because of sample size considerations, we divide our sample in four groups only, one for each of the four quartiles of the distribution of net wealth. Below, we show some of the quantiles of the net wealth distribution. For the following tables, we only divide the sample into four quartiles in order to be able to work with sufficiently large sample sizes for all of the statistics that we are looking at.

Table 8 The distribution of wealth in the HFCS

Percentiles of the net wealth distribution	Net wealth
5th percentile	-1616
10th percentile	64
25th percentile	6600
Median	51358
75th percentile	209820
90th percentile	442320
95th percentile	661240

Source: Own calculations from the HFCS dataset.

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[15] We thank the European Central Bank for allowing us to use this restricted-access dataset.

While still heavily skewed, this distribution gives substantially more net wealth to relatively poor households compared to SOEP data from the same year. Using the GSOEP, M. M. Grabka and Westermeier (2014) report a larger share of households at zero wealth. Using HFCS data, we find the 10th percentile to be around zero, and the median to be around 50,000 Euros. Looking at the high percentile, however, it is still clear that these amounts might be too low. This shows that measuring wealth precisely is very hard, because of serious issues around misreporting, non-response as well as the complications around possible misinterpretations (on the part of the respondents, but there is also no clear consensus among researchers) of the components of wealth that ought to be included.

While they include a large set of assets and liabilities, including real and financial assets, information on home ownership, vehicles etc., the measure of net wealth available in the HFCS dataset does not include public and occupational pension plans, and non-monetary transfers such as public goods provision. These can be substantial, especially for some segments of the population. As we will discuss below, for the section of the population that is in the first quartile of net wealth (as defined above) public pensions and other forms of compulsory savings mechanisms are likely to dwarf private wealth accumulation. Our next paragraph will discuss these issues in more details. Within this caveats in mind, we can look at average household incomes across the net wealth distribution.

Table 9 Wealth and income in the HFCS

Wealth group	Household income
Full sample	43531
0-25	19936
25-50	32597
50-75	43626
75-100	67293

Source: Own calculations from the HFCS dataset.

Perhaps not surprisingly, this shows that household net wealth is a lot more dispersed than household's income. This is consistent with Grabka and Westermeier (2014) and others. For example, if we compare the second quartile with the fourth quartile (of the

net wealth distribution) we find that household income is on average about twice as large, and the net wealth differs by a factor of 20. This of course has to do with the fact that one is a flow variable and one is a stock that accumulated over time, and also with the fact that different households might be in a different position along the life cycle.

Compared to the SOEP dataset, the HFCS dataset has much richer information on the type of assets and liabilities of each household. For example, we can look at the distribution of real assets across the population.

Table 10 Asset ownership across wealth classes

Wealth group	Total real assets (incl. Vehicles, valuables, businesses)	Share owning main residence	Current home value (for owners only)
Full sample	218283	41.82%	211527
0-25	13390	1.50%	107297
25-50	23798	14.79%	66313
50-75	107039	61.01%	123520
75-100	445261	89.24%	284492

Source: Own calculations from the HFCS dataset.

As the table shows, there are large differences in the value of real assets across the net wealth distribution. While there are many factors at work, ownership of the main residence plays a large role. While over 89 percent of the households that are in the top quartile of net wealth own their main residence, less than 15 percent of those in the second quartile do and only 1.5 percent of those in the first quartile. The current value of the main residence is informative, but of course when interpreting it we need to bear in mind that these values are only available for those who own. Next, we look at additional variables concerning the existence of a mortgage on the main home.

Table 11 Debt across wealth classes

Wealth group	Share with outstanding balance on mortgage	Outstanding balance on mortgage (if any)
Full sample	16.35%	88061
0-25	2.90%	152163
25-50	9.60%	69612
50-75	24.72%	81880
75-100	24.44%	88602

Source: Own calculations from the HFCS dataset.

Conditional on owning a house, richer households are actually more likely to be paying a mortgage on it. Next, we move on to the distribution of financial assets of different types across households that differ by net wealth.

The next table investigates the distribution of different types of assets among individuals depending on their position in the wealth distribution. Households in the first quartile of the net wealth distribution tend do not own mutual funds, bonds or stocks. On the other hand they are quite likely to report to have non collaterised loans, which they often report that they took out to cover living expenses (39 percent) or to buy a vehicle (24 percent). At the opposite end of the net wealth distribution, households over the 75th percentile by net wealth are more likely to own stocks, mutual funds and bonds.

Table 12 Asset classes across wealth groups

Wealth group	Share owing mutual funds	Share owning bonds	Share owning stocks	Share with loan
Full sample	16.56%	5.02%	10.42%	21.14%
0-25	1.95%	0.00%	0.62%	35.35%
25-50	10.48%	0.40%	8.14%	19.15%
50-75	14.69%	5.80%	10.31%	14.26%
75-100	32.25%	11.95%	23.37%	5.69%

Source: Own calculations from the HFCS dataset.

As discussed in Bernoth, König, and Beckers (2016) this implies that changes in prices of specific types of assets tend to have strong distributional consequences. The statistics

we have presented depict a distribution of the type of assets that is more complex than a standard textbook economic models would suggest, where typically there are capitalists that own capital and owners who may be net debtors, and where therefore low interest rates are likely to decrease inequality. Stiglitz (2015) discusses some of these issues and in particular focuses on the distributional consequences of changes in the interest rates. In his model, low interest rates may actually increase inequality in a world where rich capitalists own equity and poor life-cycle savers are more likely to be life-cycle savers holding interest-bearing bonds. They are also less likely to own assets, or to have large mortgages.

The HFCS dataset has much more detailed and comprehensive information on wealth compared to alternative datasets. However, it is unable to count for some non-tradable claims for future income streams, most notably public pensions. Pension claims are typically ignored in all studies concerning wealth inequality, and they are more important in Germany than elsewhere (Fuest 2016). For many households, pension claims are indeed by far the largest asset they own. Since future pensions are unknown, let us look at the example of somebody who was born in 1951 in West Germany, earns the average wage in each year in his/her adult life, and retires at age 65 in 2016. We predict this person to earn 1301 euro of pension per month, after tax.[16] Using data from the World Health Organization, life expectancy in German life is 80.9 years. This implies that the individual we just described will live for 16 years after retiring, on average. Assuming that his/her pension fully responds to inflation, the total worth at the time of retirement is close to 250,000 Euros (Fuest 2016 reports an average amount of twelve times the gross annual income on average, which is even higher than our rough calculation). According to HFCS data, the income of the first quartile is around half of average income. Pensions have a progressive nature so the expected claims to future public pensions will be higher than 125,000 Euros. Over many years, this is a substantial amount, but given that different individuals will have very different amounts of expected pensions, this is something that affects wealth inequality substantially. In turn, this also suggests that differences in ownership of assets across individuals may in part reflect the response to the expectation of future pension payments, or lack thereof. This of course tends to matter for current retirees, but also for younger individuals that will retire in the future, since changing their expected pensions will affect their ability to borrow and their consumption patterns currently. Because this is typically excluded in our calculation of net wealth, the inequality literature tends to ignore these dynamics. This means that the net wealth of somebody who have no pension claims and therefore more savings, and somebody who has no savings but will receive a pension in the future, will look ex-

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[16] This is based on our own calculations based on freely available data on pensions and tax rates.

tremely different in the normal wealth calculations, but may in fact be similar. In the future, the possibility for public pensions to remain at current level is not likely, with private pensions playing an increasingly important role. If public pensions were to be lowered, this would once again not be recorded on our wealth inequality measures, but would be of great importance, especially for poorer households.

Below, we use wealth information from the SOEP to try to directly account for the expected value of pensions (using current pensions received at the individual level, life expectancy and interest rates). We calculate the Gini based on wealth once pensions and capital ownership are taken into account.

Figure 24 Gini coefficients of wealth inequality, individuals aged 60-70
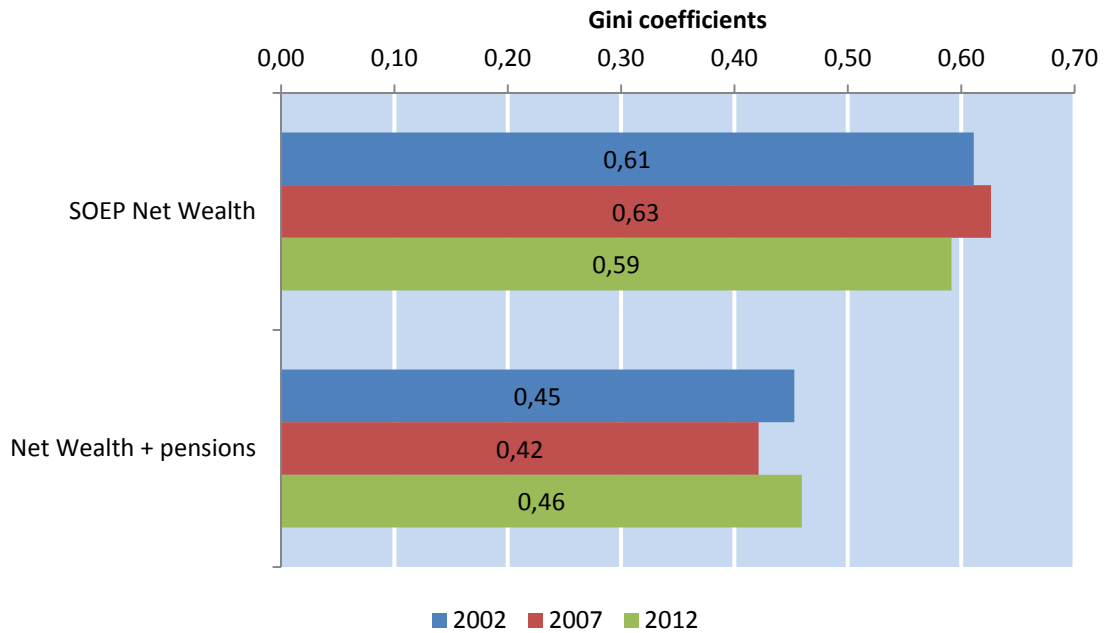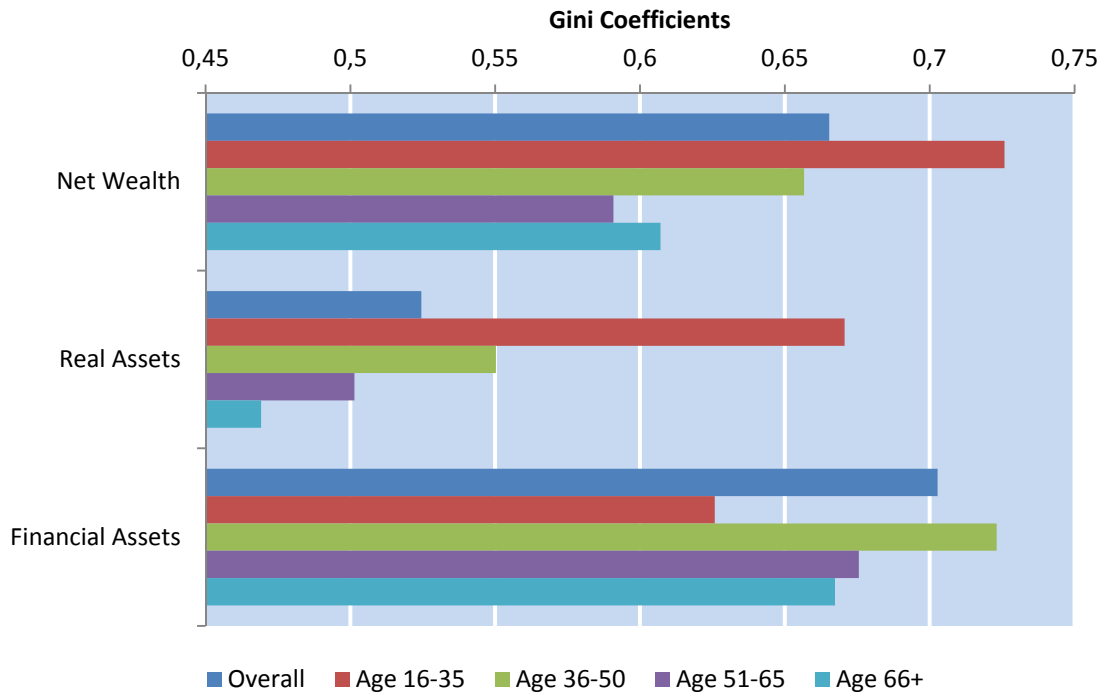

Source: own calculations SOEP v30.

We focus on individuals aged 60-70, for whom expectations on future pensions have relatively low uncertainty. The chart above shows that pension claims make up a large part of net wealth for many individuals and the Gini coefficients are significantly lower once pension claims are taken into account. Of course pension claims are not alienable and different from other types of wealth, but it may nevertheless be sensible to expect that individuals that expect larger public pensions in the future may save less at an earli-

er stage in life, and therefore that for some low savings will not translate in low consumption after retirement.

Finally, we look into the issue of different types of wealth. Using the data from the SOEP at face value although we know that they may not be perfect, we look at the Gini coefficients for overall net wealth, and then separately for real assets and financial assets. We find real assets to be less unequally distributed compared to financial assets. We also find, perhaps surprisingly, inequality in real assets to be highest among young individuals, and lower among older individuals, probably because large home ownership shares among older individuals.

Figure 25 Gini coefficients of real and financial assets

Source: own calculations from SOEP v30.

13. ECB policy and inequality

If households that are at different points of the net wealth distribution systematically hold a different share of their wealth in certain types of assets, macroeconomic policy changes, such as those affecting interest rates, will have distributional effects, because different types of assets respond differently to interest rates. In a context in which banks increasingly invest in already existing assets , such as fixed supply (most predominantly real estate) most, if not all of the beneficial effects for lenders will disappear because it will be passed on to prices. In addition, larger debtors are unlikely to come from the bottom of the wealth distribution. Holzhausen and Sikova (2015) also use the HFCS dataset to look at the effects of low interest rates (as those generated by the large Quantitative Easing intervention of the ECB) on overall incomes, asset values, as well as distributional consequences. For the EU as a whole, and in a more pronounced fashion for Germany, they find interest losses to be much larger (as a share of income) for low income households. In Germany, while interest losses they are close to one percent of annual income for the lower quintile, they are around 0.4 percent of annual income for the top quintile. Losses are much smaller in other EU countries including France, Spain and Greece. Interest gains on loans are higher for higher income groups in absolute value, but the difference among income groups is not very large in Germany (Holzhausen and Sikova 2015, page 29). When we net out interest gains and interest losses, effects are very heterogeneous across countries.

In Germany, low interest rates seem to be about regressive redistribution, i.e. 'from the bottom to the top', i.e. increased wealth inequality.[17] Germany is indeed the only country where effects for the first two quintiles of the income distribution are negative, while they are positive for the top two quintiles. Holzhausen and Sikova (2015) do not comment on this, but our view is that is has a lot to do with differences in the types of assets that different groups of individuals own, and in particular with the housing market. German households that are at the lower end of the wage distribution are much less likely to have a mortgage compared to Spanish and Dutch households (as our calculations on home ownership show), and therefore do not stand to gain from lower interest rates. Therefore, in the case of German households, the negative effect that goes through lower interest income on deposits dominates. The low interest rates policy of the European Central Bank seems to have heterogeneous effects on inequality, depending on the level at which we concentrate. Using the HFCS dataset, Bernoth, König, and Beckers (2016)

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[17] Our analysis looks at the effects of interest rates on the value of different assets. We believe that commenting on the effects of low interest rates operating through potentially higher economic growth would be purely speculative.

also investigate the effects of the ECB monetary policy on the distribution of wealth. Increases in asset prices tend to benefit richer households disproportionately. Indeed, they show that households over the 75th percentiles are the only group that has stock ownership large enough to be strongly affected by stock prices. Households with medium and medium-high net wealth are much more strongly affected by housing prices.

Looking at the Euro area as a whole, it may have had overall positive income effects in the Euro area (negative effects in Germany, however). There may have been also been inequality-decreasing effects *between countries*, with richer countries such as Germany losing and relatively poor countries such as Spain, Greece and Italy gaining. However, the distributional effects within countries seem to have worked differently. In particular, in countries such as Germany, poorer households have lost, while households above the 60th income percentile have gained. The message from this is also that the distributional effects of macroeconomic policies are likely to be very different across countries, because the distribution of asset ownership (both quantity and type) across income groups varies greatly across countries. Looking at Germany alone, one would conclude that Quantitative East increases inequality. However, in other countries this is not the case. In order to evaluate the effects of such policies, initial conditions of each economy is crucial.

14. Discussion and policy implications

While inequality is a central topic both in the scientific and in the political discussion in Germany, we believe that the debate is at times incomplete or even misleading. In this report, we present a set of empirical facts concerning inequality in Germany in its different aspects, including wage, income and wealth inequality, the role of compositional effects on the way we measure inequality. We believe that there are some trends in the labour market and in the economy as a whole that may imply that our measures of inequality is higher than it would otherwise be, but that either cannot be stopped, or are even desirable for a society. These include for example population ageing, higher educational attainments and higher labour market participation of sections of individuals that are less qualified. The evidence we present is a positive use, but we believe that it suggests that many of the policies proposed to tackle inequality starting from a narrow view of it are likely to be ineffective or damaging.

Much of the debate on inequality does not specifically address the relationship between inequality and efficiency, and typically views classical redistributive policies as the main (or only) channel through which inequality can be affected. As Keuschnigg (2015) also points out, viewing the efficiency/equity as a tradeoff in all cases and for all contexts is naïve and may be misleading. There may be policy aimed at increasing allocative efficiency of an economy, which may at the same time decrease inequality, by increasing opportunities to those that do not have them or regulating those who may have positional rents. A natural example is education policy, as discussed in Keuschnigg (2015). The introduction of tuition fees paired with generous student loans and grants for bright students from low socio-economic backgrounds may increase efficiency and decrease inequality at the same time. Education, training and competition are of crucial importance. To the extent that they lay an important role for before-tax income inequality, there seems to be room for improvement in Germany. Upward social mobility is possible insofar as talented children from parents from a disadvantaged background are given the information and opportunity to attain the highest levels of education. In a context where technological change tends to favour workers with higher levels of education, the strong correlation between educational attainments across generations is one of the main sources of higher levels of inequality in before tax incomes. Failing to recognize talent irrespective of parental background is also wasteful from a societal standpoint, and is a clear example that, unlike policies aiming at static income distribution, once we focus on before tax inequality one can move out the tradeoff between inequality and growth, rather than having to navigate it. The economic literature seems to have

reached a consensus that interventions in early education might have the highest returns (see Nores and Barnett 2010 for a review of international evidence from this literature). Most recently, Waldfogel (2015) discusses a number of US and European studies that improvements in pre-school availability are indeed stronger for children coming from disadvantaged background, implying that early interventions of this type have positive outcomes in terms of equality of opportunities and efficiency. In Germany, additional public funding for early education might be necessary. The funding for these programs does not need to come from additional taxation. Rather, the funding could come from cost savings coming from means-tested tuition fees for higher education, where tuition-free systems are often found to be regressive.

Competition polices are also likely to play an important role in generating the before tax income inequality. This is also a policy area where the same policy recommendations that may decrease before tax income inequality might also promote overall economic growth, and especially inclusive growth, where the gains from economic growth are not concentrated in rent-seeking activities. To the extent that top incomes are the results of a lack of competition, they are unlikely to be beneficial for upward mobility and ultimately for overall welfare. However, rather than confiscatory indiscriminate taxes for all high incomes, it is important to focus on the mechanism behind income generation, trying to fight rent-seeking activities and monopolistic practices where they exist, without negatively affecting healthy wealth creation through productive activities. A recent study by New Social Market Economy (INSM) has found that while Germany ranks very well in composite measures of inequality, it ranks only 14th (among 28 OECD members) on equality of opportunity, in particular in the areas of female labour force participation and equality of opportunity in the education system. And this once again is an example of how focusing on cross sectional inequality and tax redistribution alone is not very helpful.

We believe that any serious analysis of inequality in Germany should not analyse inequality based on net incomes in isolation. Agreeing on goals and then deciding on policies that may help us to reach them requires a careful interpretation of the trends we observe empirically. Looking at before tax income inequality is also important because it suggests that if we are able to find policy instruments that will decrease before tax income inequality over time, we will then be able to free up resources for other activities that the welfare state may cyrry out, and lower the extent of taxation without affecting the welfare of those in the lower part of the income distribution. Cingano (2014) offers a useful review of the economic mechanisms through which higher inequality might hurt economic growth. His considerations suggest that policies aiming at lowering before tax inequality might boost investment by individuals in the lower

part of the income distribution, including human capital investments. However, and this needs to be stressed, the effects of some of the policies discussed below are likely to occur over long periods of time, wich is perhaps the reason why they are less appealing to politicians. Nevertheless, they are of great importance for future competitivity and for the sustainabiliy of the welfare state. Economist (2014) also discusses the relationship between inequality and growth, and points out that it is likely that some ways of redistributing income are more healthy than others, and may actually promote growth. At the same time, it is likely that very highly redistributive countries have shorter and weaker growth spells.

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