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IZA DP No. 11440

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ABSTRACT

Demographic Change and the European Income Distribution

This paper assesses the effect of key demographic changes (population ageing and upskilling) that are expected by 2030 on the income distribution in the EU-27 and examines the potential of tax-benefit systems to counterbalance negative developments. Theory predicts that population ageing should increase income inequality, while the effect of up-skilling is more ambiguous. Tax-benefit systems may stabilize these expected changes though this is largely an empirical question given their typically complex nature. We use a decomposition technique to isolate the effect of projected demographic change on income inequality and poverty from the reaction of the labor market to this demographic change through wage adjustments. Our results show that demographic change is likely to lead to increasing inequality while related wage adjustments work mainly in the opposite direction. Changes to projected relative poverty are minimal for most countries. With a few exceptions, EU tax-benefit systems are able to absorb most of projected increase in market income inequality.

JEL Classification: J11, J21, J22

Keywords: income distribution, demography, labor market, decomposition

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1 Introduction

The labor markets and public finances of EU member states are facing serious challenges from expected demographic changes over the course of the next few decades. Two long-term trends — population ageing and upskilling — increasingly contribute to employment dynamics (OECD, 2014, p.20). These will also shape household income distributions and are likely to have profound effects on income inequalities and poverty levels. Inequality and, to a lesser extent, relative poverty have been increasing in most OECD countries from the mid-1980s to the Great Recession (Tóth, 2014).

Several theoretical studies have shown that a larger share of older people tends to increase overall income inequality (e.g Deaton, 1997; von Weizsäcker, 1988, 1995). This is for several reasons. According to life cycle theory, within-cohort earnings inequality increases as cohort members get older due to the cumulative effect of different levels of human capital investment and learning abilities on incomes over the life course. The ageing of the workforce alone, therefore, results in less equally distributed (cross-sectional) earnings. A greater share of retired people increases population income inequality further due to the fact that retirees have lower incomes compared to workers. An increased proportion of pensioners also puts the public provision of pensions under pressure, more so if productivity growth is not sufficient to compensate for a shrinking workforce.[1] Further interaction effects with labor markets as a shrinking working population, other things being equal, is likely to put upward pressures on wage levels. A call by von Weizsäcker (1996) for more theoretical and, in particular, empirical research on the distributional implications of ageing appears still valid today.

Upskilling will also lead to an increase in average earnings, provided that the larger supply of better educated workers can be absorbed by the economy.[2] The effect of skill upgrading on earnings inequality, however, is ambiguous, depending on the dynamics of the high-skilled wage premium, among other factors. (Atkinson and Bourguignon, 2015). However, the empirical evidence for the OECD and EU countries to date indicates that upskilling has not led to increased wage inequality over the last few decades (Förster and Tóth, 2015, p.1801).

There are few other studies which make projections about future labor markets and/or income distributions. Aziz et al. (2015) use demographic projections combined with a reweighting approach to analyze the effect of demographic change on income distributions in New Zealand in 2010–2060 but abstract from any related wage changes. Their results point to a small increase in market income inequality, while the inequality of disposable

[1] von Weizsäcker (1995) also demonstrates that considering the type of funding arrangements and reactions to avoid fiscal deficits can introduce some ambiguity regarding the effect of ageing on the income distribution.

[2] CEDEFOP (2012) forecasts for 2020 show trends towards more skill-intensive jobs together with upskilling, though with scope for mismatches.

income is stable or decreasing (depending on the measure). They also show that overall and child poverty rates can be expected to decrease by up to 5 percentage points. This illustrates the redistributive capacity of the tax-benefit system in New Zealand. Edwards and Lange (2013) model the US labor force in 2030 and show how returns to education as well as the gender wage gap will be affected by demographic change. Their key finding is that the trend in demand towards more skilled (female) labor will continue to outstrip supply despite rapid increases in the latter. This will lead to a continuation of the increase in the wage skill premium.

The relevance of population ageing and upskilling is likely to be different across countries (OECD, 2014), which, given theoretical ambiguities, highlights the importance of (comparative) empirical work. It is even more important to anticipate such influences at an early stage, in the context of distributional targets such as Europe-2020 (European Commission, 2010).

This study builds on Dolls et al. (2017), which studies the effect of demographic changes between 2010 and 2030 on labor force participation and government budgets. In this paper, we go beyond fiscal measures and assess how income distributions in the EU are likely to be affected by future demographic changes such as population ageing and upskilling. We examine the potential of current tax-benefit systems in the EU-27 to cope with such changes, showing the implications of each tax-benefit system for future poverty and inequality.

Our study is related to that of Aziz et al. (2015) for New Zealand in that we employ reweighting and microsimulation techniques to account for projected demographic changes between 2010 and 2030. We extend their method by also modeling labor market reactions to these population changes through wage adjustments, and assess their combined effect on the income distribution of the EU-27. To the best of our knowledge, no study has attempted this before. We also show the effect of demographic change separately from the effect of wage adjustment to this demographic change, drawing on the approach of Bargain and Callan (2010) to decompose changes in the income distribution. The microsimulation method (Bourguignon and Spadaro, 2006) allows us to simulate projected demographic changes and model wage reactions, and, by holding everything else constant, to isolate their respective impacts.

We rely on two sets of demographic and skills projections, an optimistic and a pessimistic scenario, from Huisman et al. (2013) which make different assumptions about fertility, life-expectancy, educational attainment, migration and household formation. The two main trends driving changes in the composition of the work force are population ageing and the upskilling of the population. Our method of constructing future income distributions involves, in the first stage, reweighting to make currently observed household-level data reflect future population structures. In the second stage, we obtain new partial labor-market equilibrium wage levels by combining changes in the work force resulting from demographic changes with existing detailed estimates of labor demand and labor supply elasticities in the literature. To calculate household disposable incomes, we employ EUROMOD — the EU tax-benefit microsimulation model — which uses EU-SILC data on household demographic and labor market characteristics as well as market incomes for nationally representative samples of households as input.

Our results suggest that demographic change is likely to lead to increasing income inequality while related wage adjustments tend to work in the opposite direction. The combined effect results in a modest increase in income inequality in the EU as a whole, although cross-country differences in this effect can be expected. We also find that inequality is more likely to increase in countries which currently have relatively low inequality levels, potentially leading to a convergence in inequalities at the EU level. Results for relative poverty are more ambiguous with most countries experiencing little or no change in relative poverty. However, for some countries, policy changes may be needed to keep poverty and inequality at acceptable levels.

The paper is structured as follows. Section 2 explains the methodology: how demographic projections were obtained and linked with the income distribution, the framework for estimating adjustments in the labor market through labor supply and demand responses and the decomposition method to assess the effects of demographic change on the income distribution. Section 3 discusses the main demographic trends and the new equilibrium in the future labor market. Section 4 presents our findings on how these developments affect the income distributions in the EU countries. Section 5 discusses the stabilizing properties of tax-benefit systems in the EU-27. Section 6 concludes.

2 Data and methodology

2.1 Tax-Benefit Calculator

We use EUROMOD as a basis for our analysis. EUROMOD is a static tax-benefit calculator for the EU countries, which allows for comparative analysis of tax-benefit systems and their impact on the income distribution in a consistent way through a common framework (Sutherland and Figari, 2013). Based on a representative household sample of with information about their socio-demographic and labor market characteristics as well as market incomes (e.g. earnings), EUROMOD simulates disposable income for each household by applying a set of tax-benefit rules. The latter can refer to existing tax-benefit systems or (user-specified) reform scenarios. EUROMOD has become a heavily applied tool in inequality research.[3]

[3] For recent examples, see Bargain et al., 2017, Figari et al., 2017, Paulus et al., 2017.

EUROMOD input-data are mainly based on the European Union Statistics on Income and Living Conditions (EU-SILC) released by Eurostat, or its national counterparts, where available and when they provide more detailed information. Each country component of the model is thoroughly validated with results documented in a Country Report.[4]

We use version F6.0 of EUROMOD with input datasets based primarily on the SILC 2008 wave (2007 wave is used for France and 2009 wave for Malta) and the Family Resources Survey 2008/09 for the UK. The sample size for each country varies from about 10 thousand individuals for Luxembourg and Cyprus to more than 50 thousand individuals for Italy and the UK.

Our analysis focuses on changes in the distribution of *household disposable income*, equivalised to account for household size and composition by using the modified OECD equivalence scale. Disposable income, as widely used to measure poverty and inequality, is defined as all household incomes net of taxes and social contributions and after the receipt of all types of cash benefits. Household *market income* (or original income) refers to the total amount of labor income (excluding employer social insurance contributions), capital income, private pensions and private transfers, i.e. income before taxes and benefits.

2.2 Projections and reweighting

We rely on the Netherlands Interdisciplinary Demographic Institute's (NIDI) demographic projections (Huisman et al., 2013) to adjust our micro data such that they reflect population characteristics of the year 2030 (similar to Dolls et al. (2017)). The population projections are based on two different scenarios which are labeled as 'tough' and 'friendly', making different assumptions about international and internal migration, educational attainment, life expectancy and fertility. Both scenarios predict that ageing will be the main demographic trend in the next decades leading to lower growth rates of the working age population and higher dependency ratios, with the tough scenario reflecting more pessimistic assumptions about demographic developments and greater challenges for European policy makers. Table 1 in the Appendix provides a short overview of the main features of both scenarios.

The demographic projections include joint distributions of age, sex, level of educational attainment and household position for the EU-27 until 2030.[5] We incorporate these projections into our representative European household micro data by a reweight-

[4] See https://www.euromod.ac.uk/using-euromod/country-reports.

[5] A cohort component model is used to project the age and sex distribution while education projections are based on KC et al. (2010). A comparison of the NIDI population projections by skill level to those of the European Centre for the Development of Vocational Training (Cedefop), which provides an EU-wide population projection for 2020, shows that the two are well aligned in terms of headcounts (CEDEFOP, 2012).

ing procedure.[6] Our baseline micro data contain personal weights for each individual in our sample in order to adjust for sample design and/or differential non-response. Every country data set is thus representative for the respective population in the base year (i.e. 2008). In a first step, we alter the weights such that they reflect the population size and structure in 2010, keeping labor market conditions constant. This ensures that changes in population characteristics between 2010 and 2030 are solely due to the underlying population scenarios and not caused by potential inconsistencies between our country-level data sources. In a second step, we reweight the 2010 samples such that they precisely reflect the characteristics of each EU population in terms of age, educational attainment and household structure as projected for the year 2030.[7]

2.3 Linking labor supply and demand

Our implementation of the supply-demand link (described in more detail in Dolls et al. (2017)) defines twelve distinct labor markets in each country, differentiated by marital status, gender, and skill level. This ensures a flexible adjustment process as it incorporates the main sources of heterogeneous labor market behavior. Aggregate labor supply is modeled using a rich set of intensive and extensive labor supply elasticities from Bargain et al. (2014) along these dimensions. The elasticities account for the fixed costs of work, labor market restrictions within countries or even states, preference heterogeneity with respect to age, the presence and number of children as well as unobserved heterogeneity components. Table 2 reports aggregated (total) gross wage labor supply elasticities for the different country groups.

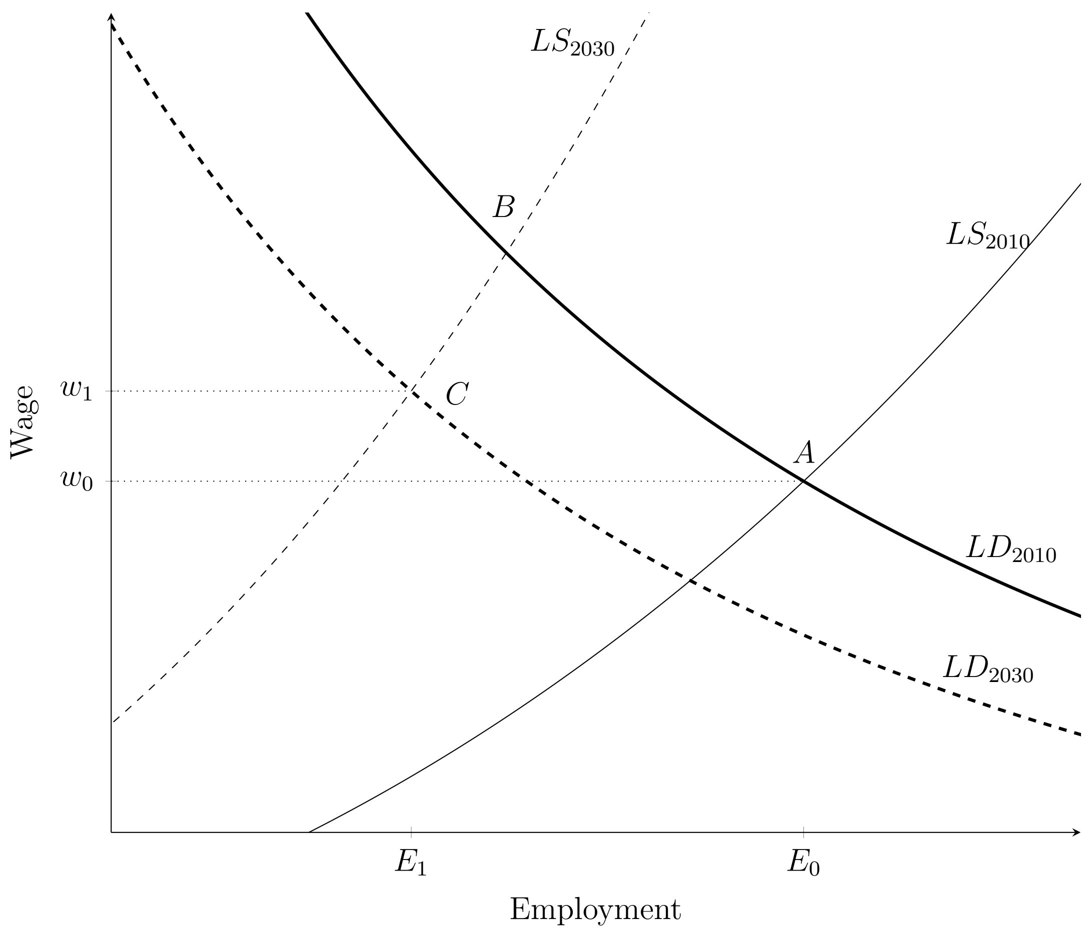
While estimates for males in couples are very similar across country groups and skill levels (mostly just under 0.1), elasticities for other population groups range from about 0.1 to 0.5 (reaching even 0.65 for single males). Differences between skill groups are more pronounced for single males and females with low-skilled workers having the highest labor supply elasticities, followed by high-skilled workers, while those with medium skills have the lowest elasticities. Men tend to be slightly more responsive on the extensive margin, the opposite holds for women. Overall, elasticities for the Eastern European countries are among the lowest, while those for the Anglo-Saxon and Southern country groups are among the highest.

[6] Cf. Deville and Särndal (1992) and DiNardo et al. (1996). Technically, we apply the Stata package `survwgt`, which proportionally adjusts sample weights to meet the target size in a respective stratification. For an application of sample reweighting in the context of tax-benefit microsimulation, see Cai et al. (2006). For applications of reweighting techniques in a different context — modeling an increase in unemployment — see Immervoll et al. (2006) and Dolls et al. (2012).

[7] The household position is differentiated between singles, single parents, children living at home, couples without children, couples with children and other. Our analysis concentrates on differences between 2010 and 2030 and ignores intermediate developments.

The demand side is modelled using wage elasticities obtained from the meta-regression analysis in Lichter et al. (2015). They account for differences in skills, labor market institutions as well as the importance of specific sectors across countries. The variation within countries comes from skill differences leading us to two labor demand elasticities per country grouping (high/medium skilled vs low skilled), as reported in the lower part of Table 2. These elasticities are extrapolated to 2030, making use of a linear time trend in the meta-analysis. The resulting demand elasticities for 2030 are highest for the Eastern and Anglo-Saxon countries (-0.7 to -0.9). As Eastern European countries tend to have less strict laws concerning hiring and separations, this causes lower adjustment costs for firms and may increase incentives to adjust labor demand in response to wage changes. Demand elasticities for the other country/skill groups range between -0.5 and -0.6, and are generally higher for the low-skilled.

Figure 1: Linking Labor Supply and Demand



Source: Dolls et al., 2017. Notes: The figure shows an example in which both the labor force and the population shrink between 2010 and 2030.

Figure 1 illustrates the basic mechanism of our supply-demand-link. Starting with the equilibrium point A in 2010, a decrease in the labor force due to demographic trends (as is observed in many EU countries between 2010 and 2030), shifts the aggregate supply curve to the left.[8] In the absence of demand-side adjustments, the new equilibrium would be at point B, resulting in a higher wage due to the higher scarcity of labor. A demand shift can be expected due to the changing size of the population. As the population is projected to change, the demand for goods and services can be expected to change accordingly, leading to a lower or a higher demand for labor. This is represented, in the example in Figure 1, by a downward shift of the demand curve which moves the equilibrium point B to C. Point C denotes wage and employment level in the equilibrium. The resulting relative wage change $\frac{w_1}{w_0}$ is fed back into the micro-data to obtain counterfactual individual earnings for 2030. In order to account for different elasticities depending on the worker type, this procedure is carried out separately for the 12 combinations of gender, couple status and skill level within each country.

2.4 The decomposition method

We follow the decomposition framework in Bargain and Callan (2010) to decompose changes in the income distribution. Their original application examined changes in actual income distributions in France and Ireland. Further studies have applied it in the analysis of changes in income distributions in the UK (Bargain, 2012a,b); in the US (Bargain et al., 2015) and comparatively for a selection of European countries (Bargain et al., 2017; Hills et al., 2014; Paulus et al., 2017). Our paper provides the first application of this method to future income distributions and covers the whole EU-27.

Denote y a matrix with household socio-demographic characteristics and market income sources (with each row describing a single household). Let d denote the 'tax-benefit function' which calculates household disposable income on the basis of household characteristics, pre-tax and transfer incomes, and a set of tax-benefit policy parameters with monetary values p (e.g., tax brackets, benefit amounts). We can then express the distribution of disposable income for the population of year l, under the tax-benefit structure of year i and the tax-benefit parameters of year j as $d_i(p^j, y^l)$. We will be focusing on distributional indices I (e.g. inequality, poverty), computed as a function of the (simulated) distribution of disposable income, i.e. $I\left[d_i(p^j, y^l)\right]$.

The total change in a given distributional index between two time periods, $t = 0$ (e.g. 2010) and $t = 1$ (e.g. 2030), can be written as

$$\Delta I = I\left[d_1(p^1, y^1)\right] - I\left[d_0(p^0, y^0)\right] \quad (1)$$

[8] Under the assumption of constant elasticities, any supply/demand curve can be fully characterized by the elasticity and a single observed point of hours.

This can be decomposed into a (direct) policy effect and changes in population characteristics (including market incomes), using a (simulated) counterfactual income distribution $d_0(\alpha^1 p^0, y^1)$ and α^1 to adjust the nominal levels of policy parameters with monetary values.[9]

$$\Delta I = \underbrace{\left\{ I\left[d_1(p^1, y^1)\right] - I\left[d_0(\alpha^1 p^0, y^1)\right] \right\}}_{\text{policy effect}} + \underbrace{\left\{ I\left[d_0(\alpha^1 p^0, y^1)\right] - I\left[d_0(p^0, y^0)\right] \right\}}_{\text{changes in characteristics}} \tag{2}$$

In this analysis, we consider two possible values for α^1. The first, unity, reflects an approach where the two components are assessed without indexing tax-benefit policy parameters in the counterfactual scenario. More precisely, as wage adjustments presented in the next section should be interpreted in 2010 levels, the policy parameters should be understood as kept fixed in real terms for our benchmark. However, when incomes rise faster than prices, the total number of taxpayers (and the number of higher-rate taxpayers) increases. This phenomenon of bracket creep (Immervoll, 2005) is likely to affect the final distribution of post-tax income. Therefore, we employ α^1 equal to the change in average market income between 2010 and 2030, i.e. it measures each component against a scenario where tax-benefit policy parameters are indexed in line with developments in market income.[10] This approach allows an assessment of the effect of demographic change by 2030 against a distributionally neutral benchmark. In what follows, we present only results for α^1 equal to this distributionally neutral factor but results for the decomposition in which $\alpha^1 = 1$ are qualitatively similar. Note that the *actual* total change between 2010 and 2030 can only be assessed once micro-data become available for both periods and 2030 tax-benefit policy rules are known. Here we use projected 2030 market incomes (in real terms), denoting the new population structure and market income distribution after demographic changes (alone) as y_d^1. After wage adjustments, the distribution in the new labor market equilibrium is denoted y_w^1. We seek to quantify changes in the income distribution, on the basis of an α valued at the change in average market income:

$$\Delta I^c = I[d_0(\alpha^1 p^0, y_w^1)] - I[d_0(p^0, y^0)] \tag{3}$$

The last expression corresponds to the second term in equation (2), i.e. the effect of changes in population characteristics on the income distribution.

We decompose this further to separate a *demographic effect* from a *wage effect*. The

[9] Note that decomposition is path-dependent. Here we show only a version assessing policy effects conditional on the end-period data.

[10] Bargain and Callan (2010) argue that gross income inflation is a distributionally neutral factor that seems most appropriate for such decomposition exercises. The choice of the uprating factor is also discussed in Bargain (2012a).

demographic effect shows the change in the disposable income distribution, which is due to demographic change (population ageing, up-skilling, etc.), while the wage effect represents the market reaction to this demographic change through labor demand (and subsequent labor supply) adjustment. Simplifying $d_0 \rightarrow d$ and $p^0 \rightarrow p$, and noting that $\alpha^1 = \alpha_w^1 \alpha_d^1$, the decomposition is presented as follows:

$$\Delta I^c = \left\{I[d(\alpha^1 p, y_w^1)] - I[d(\alpha_d^1 p, y_d^1)]\right\} + \left\{I[d(\alpha_d^1 p, y_d^1)] - I[d(p, y^0)]\right\} \tag{4}$$

$$\begin{aligned}
&= \left\{I[d(\alpha^1 p, y_w^1)] - I[d(\alpha^1 p, \alpha_w^1 y_d^1)]\right\} && \text{(wage effect)} \\
&\quad + \left\{I[d(\alpha_w^1 \alpha_d^1 p, \alpha_w^1 y_d^1)] - I[d(\alpha_d^1 p, y_d^1)]\right\} && \text{(income growth, } w\text{)} \\
&\quad + \left\{I[d(\alpha_d^1 p, y_d^1)] - I[d(\alpha_d^1 p, \alpha_d^1 y^0)]\right\} && \text{(demographic effect)} \\
&\quad + \left\{I[d(\alpha_d^1 p, \alpha_d^1 y^0)] - I[d(p, y^0)]\right\} && \text{(income growth, } d\text{)}
\end{aligned} \tag{5}$$

As tax-benefit functions, $d(p, y)$, are usually linearly homogeneous in p and y, a simultaneous change in nominal levels of both market incomes and monetary tax-benefit parameters should not affect the relative position of households in the distribution of disposable income. The direct consequence of this is that the terms above capturing nominal changes (the income growth effects) should be zero.[11]

Altogether there are five different simulated income distributions. $d(p, y^0)$ is simply the distribution of disposable income in 2010.[12] $d(\alpha_d^1 p, y_d^1)$ and $d(\alpha^1 p, y_w^1)$ correspond to the distribution of disposable income after demographic changes, and, respectively, before and after subsequent wage adjustments. Policy parameters with monetary values are adjusted with α_d^1 and $\alpha^1 = \alpha_w^1 \alpha_d^1$, respectively, to keep them in line with projected market income changes. Finally, $d(\alpha_d^1 p, \alpha_d^1 y^0)$ and $d(\alpha_w^1 \alpha_d^1 p, \alpha_w^1 y_d^1)$, which are used to capture changes in average income levels, are constructed on the basis of the 2010 distribution and the 2030 distribution (without wage adjustments), respectively, scaling both market incomes and monetary parameters (with α_d^1 and α_w^1, respectively). That is, $\alpha_d^1 y^0$ retains the structural characteristics of the base year data (in particular, the distribution of market income) but adopts the average income levels prevailing after demographic changes (and before wage adjustments). In contrast, $\alpha_w^1 y_d^1$ retains the structural characteristics of population after demographic changes (and before wage adjustments) but adopts the income levels prevailing after wage adjustments.

[11] This has been empirically checked for a number of European countries in Bargain and Callan (2010) and Bargain et al., 2017

[12] As the income reference period for the input datasets is either 2007 or 2009, market incomes have first been updated to 2010 levels using appropriate factors for each income source, which reflect growth in their average values.

3 2030 population projections

3.1 Demographic changes

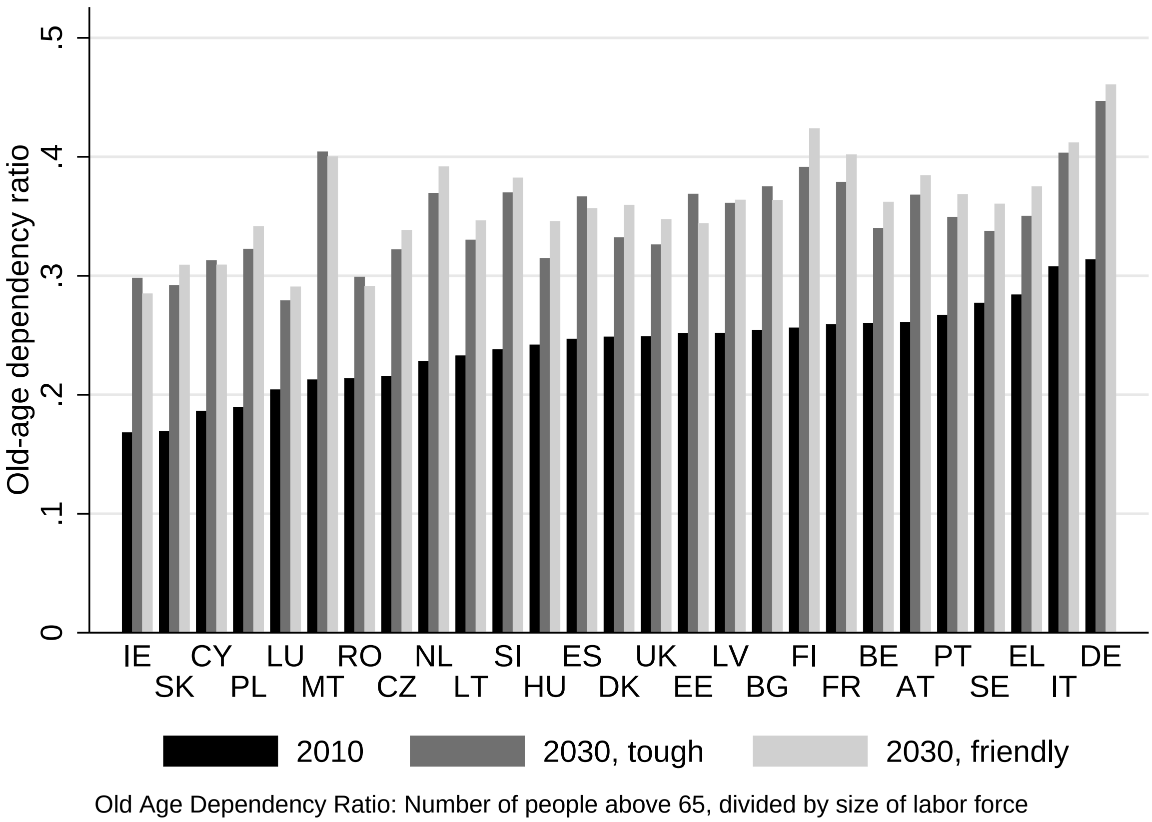
Table 3 describes projected changes to the population between 2010 and 2030. We see that the total EU population in 2030 is projected to slightly decrease in the tough scenario (-3%) and to increase in the friendly scenario (+8%). There are cross-country differences in the effect with large population increases expected in both scenarios in Belgium, Cyprus, Ireland, Luxembourg and Sweden. Conversely, large decreases in the population are projected for both scenarios in Bulgaria, Lithuania and Latvia.

The EU projected total labor force (15–65 years of age), on the other hand, decreases in both scenarios (Table 4), though magnitudes differ substantially: about -1% in the friendly scenario and about -9% in the tough scenario. In the tough scenario, it decreases in all countries except Belgium, Cyprus, Luxembourg, Sweden and the UK. The projected decreases are more drastic for Eastern European countries (Estonia, Latvia, Lithuania, Poland, Romania and Bulgaria) as well as for Germany. A declining work force relative to the total population implies a growing scarcity of workers, which will put upward pressures on wage levels as depicted in Figure 1. As the total population is projected to decrease only slightly or even to increase, depending on the scenario, domestic demand for goods and services is likely to change little or might even increase. This implies a minimal or even rightward shift in the LD_{2010} curve in Figure 1. Hence, declining labor force in both scenarios is likely to lead to structural problems as meeting this aggregate demand will become more challenging.

One key development is the aging of the population. Figure 2 shows that the old-age dependency ratio, calculated as the number of people over 65, divided by the size of the labor force, is set to increase in every country by 2030. The black solid bar, which represents the situation in 2010, shows that there is some heterogeneity in the old-age dependency ratio across the EU-27. It ranges from 18% in Ireland to 31% in Germany. The largest increases in this ratio are to be found in the countries with relatively lower old-age dependency ratios in 2010, such as Ireland, Slovakia, Cyprus, Poland and Malta. These countries can expect the share of old-age dependents to increase by more than 10 percentage points by 2030. Countries which already have large shares of old-age dependents, such as Belgium, Sweden and Greece can expect more modest increases. Overall, there seems to be some cross-country convergence in the old-age dependency ratio.

Another important trend is the upskilling of the population in both scenarios (Table 5). The share of highly skilled individuals among the population aged 15–64 is projected to increase by 5–6 percentage points on average in the tough scenario and by about 11 percentage points in the friendly scenario, while the share of low skilled workers decreases

Figure 2: Old-age dependency ratio



Source: Own calculations. Notes: Countries are ranked by their 2010 values in the ascending order.

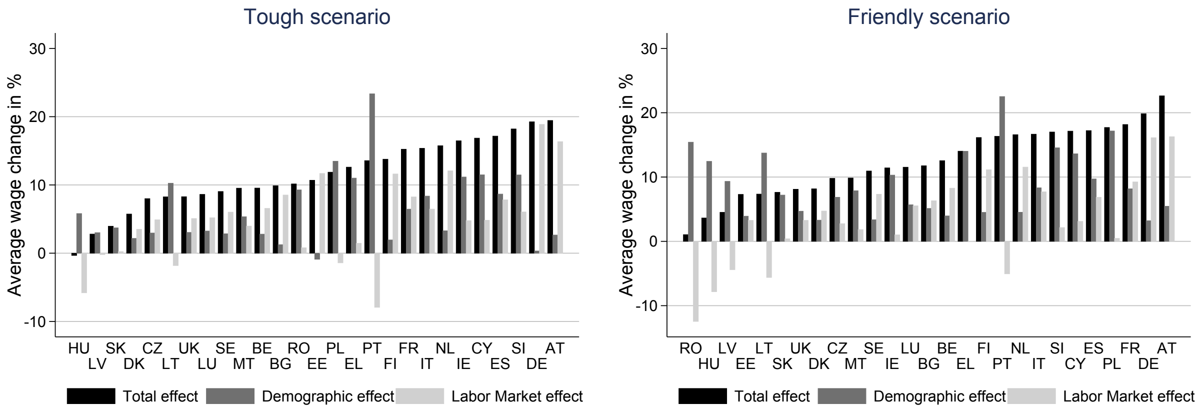
by 5–8 percentage points on average, depending on the scenario. Germany, in the tough scenario, is the only case where essentially no upskilling is taking place. Changes in the share of medium skilled workers are more varied, decreasing more in the friendly scenario. These patterns are consistent across countries but especially pronounced in Cyprus, France, Lithuania and Poland.

3.2 Effects on wages and labor supply

The main insight from the previous subsection is that the workforce is ageing and becoming more skilled. This will affect real wage levels. First, as older (more educated) workers have higher wages than younger (less educated) workers, there is a direct positive effect of demographic change on average wages. Second, there will be wage changes due to labor demand (LD) and (further) labor supply (LS) adjustments to the new population structure. Taking these labor market responses into account, the high-skill premium can be expected to decrease. These developments could affect overall average wages in either direction.

Figure 3 shows projected changes in average real wages (i.e. measured in 2010 prices)

Figure 3: Average wage changes due to demographic change and the labor market response



Note: Own calculations. The average wage change shows the change in average wages for workers between 2010 and 2030. This is decomposed into a demographic effect, which shows the effect of ageing, up-skilling and other demographic changes on wages, ignoring the demand reaction, and a labor market effect which shows the effect of the labor supply shift on wages taking demand side elasticities into account.

in the tough and in the friendly scenario, distinguishing between the direct effect due to demographic change and the effect due to wage adjustment to demographic change. There is no clear correlation between the total change in the average wage (black bar) and the change in the size of the work force (dark gray bar), indicating that the composition of the projected workforce also plays an important role in determining wage reactions to population change. In both scenarios, the changes in average wage range from an increase of less than 5% in Hungary and Latvia to close to 20% in Germany, Spain and Austria. In most countries, the first round effect of demographic change, i.e. ageing and upskilling, drives most of the average wage change. However, countries such as Germany, Austria, the Netherlands, Finland, Estonia, Belgium, Sweden and Malta can also expect large average wage changes due to the behavioral response to these demographic changes.

Underlying employment changes are presented in Table 6, showing the share of people in the labor force working at least part-time in each scenario both before and after wage adjustments. Unlike with wages, it is not clear a priori how demographic changes affect employment levels directly before taking further labor market adjustments into account as older people tend to work less while more educated people tend to work more. Overall, we find rather small and positive changes in employment rates which are slightly higher after accounting for wage adjustments, meaning that the wage increases implied by labor shortages encourage more people (as a proportion of the active population) to work. This implies that, although the total size of the labor force decreases substantially in most countries (Table 4), the proportion of the labor force projected to work is, on average, stable and this is partly due to wage adjustment.

Table 7 shows the total number of labor hours supplied by country in 2010 and in the two 2030 scenarios, before and after wage adjustment. Total hours of work are projected to decrease substantially in most countries in the tough scenario. However, as the friendly scenario projects just a small decrease in the size of the labor force and a slight increase in employment rates, a slight increase in total hours of work is expected in this scenario. In both scenarios, most of the movement comes from demographic change with just small downward adjustments to average hours of work stemming from wage reactions.

4 Effects on income distribution

4.1 Income changes

We now turn our attention to the effect of demographic change and the accompanying wage adjustment on the income distribution, measured against a benchmark where tax-benefit policy parameters evolve in line with average market income.[13] The increase in household original income between 2010 and 2030, which is due solely to demographic change, is denoted α_d^1 (see Section 2.4), while the increase in household original income between 2010 and 2030 which is attributable to wage adjustment corresponds to α_w^1. Table 8 shows the magnitude of these income growth rates between 2010 and 2030 by country.

With few exceptions, total income growth is positive between 2010 and 2030 (i.e. $\alpha^1 = \alpha_d^1 \alpha_w^1$ is greater than 1). We generally see an income decline due to demographic change ($\alpha_d^1 < 1$), which is driven by the large increase in the over-64 population with little employment income. This dominates (direct) wage changes due to the increasing share of older workers and upskilling. This effect is counteracted by strong income growth due to wage adjustment ($\alpha_w^1 > 1$). There is a quite distinctive grouping of countries along regions/welfare typologies. It is primarily Central and Eastern European (CEE) countries (together with Germany and Austria) which show the largest decrease in average original income due to demographics (α_d^1), while Southern European countries (Portugal, Italy and Greece) and Ireland exhibit the largest increases.[14] The income growth rate due to wage adjustment is highest in Austria, Germany, Ireland, the Netherlands, Slovenia and the UK. This can be mostly explained by higher average wages, resulting, among other things, from relatively modest upskilling and thus lower downward pressure on wages of high-skilled workers.

Hungary, Latvia and Malta, in turn, exhibit the most negative income changes. For

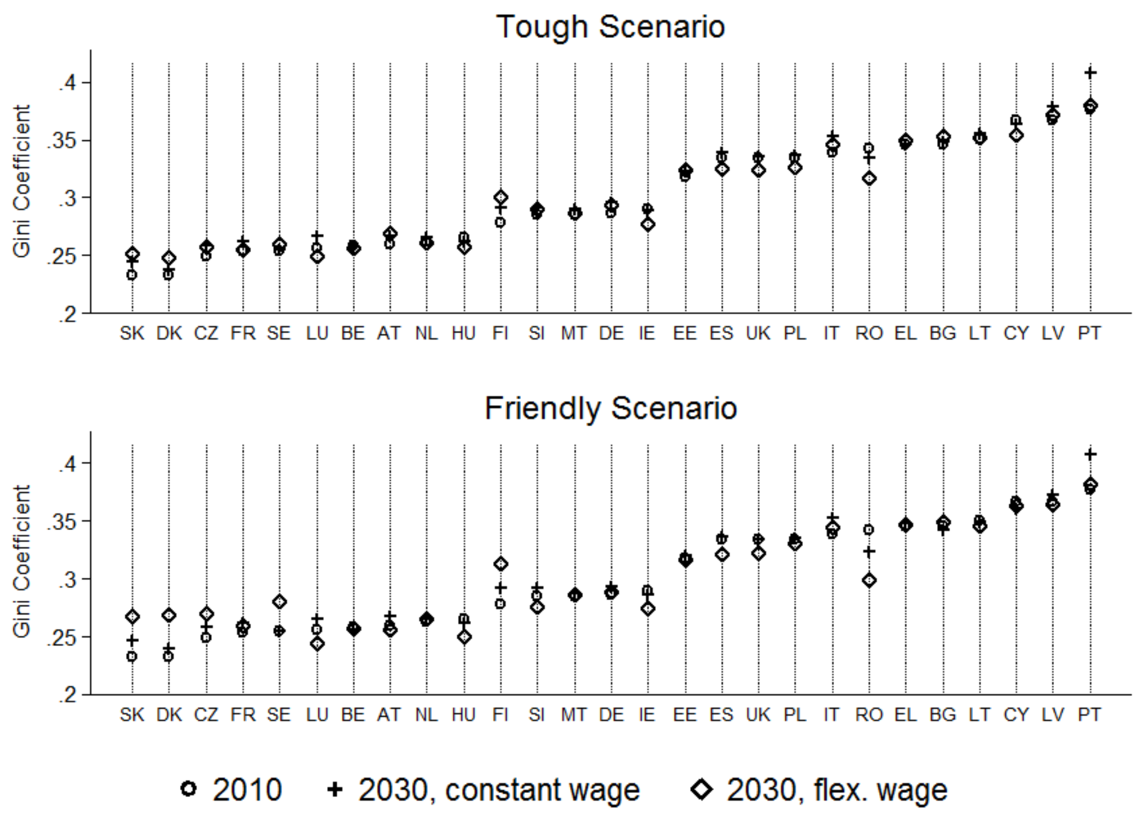
[13] Using a benchmark where tax-benefit policy parameters are fixed in real terms does not alter our conclusions. Results are available upon request.

[14] Note also that countries which have been hit harder in the Great Recession tend to have the highest α_d^1. This could imply that favourable (or less dramatic) demographic projections will allow them to catch up with other countries to some extent.

Hungary and Latvia, this phenomenon can be explained by the projected negative trend in average wages due to the projected change in the skill composition. Malta, in turn, features the largest share of low-skilled workers, who realize modest income increases as the skill composition changes. Other skill groups, in contrast, partly exhibit strongly negative income changes, resulting in an overall negative effect.

4.2 Impact on inequality and poverty

Figure 4: Projected inequality levels between 2010 and 2030 across the EU

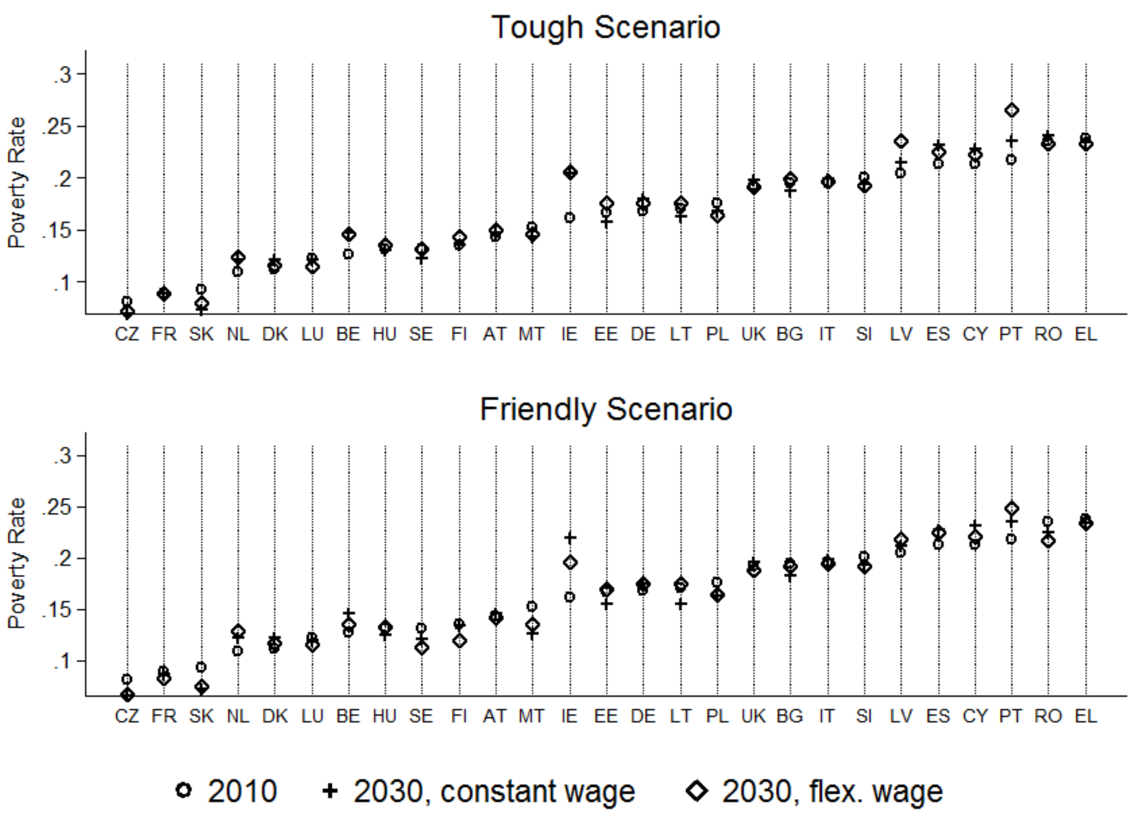


Note: Own calculations using EUROMOD linked to EU-SILC data reweighted to 2030 and adjusted for wage reactions to demographic change. Gini coefficients calculated using equivalized disposable household income. Graphs are sorted in ascending order by inequality levels in 2010. The underlying figures can be found in Table 9 in the Appendix.

The projected impacts of demographic change on income inequality, measured by the Gini coefficient, is depicted in Figure 4 for each EU-27 country. Detailed results are provided in Table 9 in the Appendix. Complementary analyzes for the P90/P50 (which compares the 90th decile of income to the 50th) and the P10/P50 ratio (which compares the 10th decile of income to the 50th) can be found in Tables 10 and 11 in the Appendix, leading to similar quantitative conclusions. The circles in Figure 4 represent the baseline levels of income inequality in 2010. The projected levels for 2030 before wage adjustment are indicated by a cross and, after wage adjustment, by a diamond.

On average, European Gini coefficients are projected to increase modestly by 0.6% (0.9%) in the tough (friendly) population scenario between 2010 and 2030. In the majority of countries, the effect of population change before wage adjustment increases income

Figure 5: Projected at risk of poverty levels between 2010 and 2030 across the EU



Note: Own calculations using EUROMOD linked to EU-SILC data reweighted to 2030 and adjusted for wage reactions to demographic change. Graphs are sorted in ascending order by poverty levels in 2010. The underlying figures can be found in Table 12 in the Appendix.

inequality by 1–2 per cent. Higher average wages, however, work in the opposite direct direction, partly counteracting this increase.

Considering the total effect of demographic change on the Gini coefficient, the most affected countries are Denmark, Finland, Sweden, Romania and Slovakia. In the case of Denmark, Finland, Sweden and Slovakia, inequality is projected to increase due to a combination of demographic change and wage reactions. Conversely, Romania can expect inequality to decrease for the same reason. This trend is confirmed in Table 10, which decomposes the ratio of the 90th percentile of income to the 50th. This indicates that much of the movement observed in the Gini index is due to increases (in the Nordic countries and Slovakia) and decreases (in Romania) in inequality at the top of the income distribution. Looking lastly at the detailed decomposition of the ratio of the 10th percentile of income to the 50th in Table 10, we observe that some of the countries with small changes in the Gini index are actually projected to have large increases/decreases in inequality at the bottom of the income distribution. Increases in inequality at the bottom of the income distribution are projected for Portugal, the Netherlands, Italy and Romania while decreases are noted for Spain, Malta and Slovakia.

The projected changes in risk-of-poverty rates by country, where risk-of-poverty is defined as equivalised household disposable income of less than 60% of median income, are visualized in Figures 5 and detailed in Table 12. Poverty ratios are projected to slightly increase (decrease) in the tough (friendly) population scenario. These changes are modest, rarely exceeding 5 percentage points where the baseline average is 16%. Unlike inequality, these effects are driven by two reinforcing effects in both scenarios. On average, both demographic and wage adjustments increase poverty in the tough scenario and decrease it in the friendly scenario.

A couple of country cases deserve a closer look. We project substantial rises in relative poverty for Ireland and Portugal in both scenarios. In Ireland, this increase is driven purely by demographic change while, in Portugal, the increase is due to a combination of demographic change and wage adjustment. We examine projections for the FGT(1) index, the poverty gap, which goes beyond the headcount index by weighting very low incomes higher than incomes just below the poverty threshold (Table 13). The poverty gap is actually projected to decrease in Ireland, despite an increasing poverty headcount, suggesting that a higher number of households find themselves just below the poverty line in 2030, but not far below. The poverty headcount increase for Ireland should be interpreted with this in mind. Portugal, in contrast, shows a strong increase in the poverty gap as well as the poverty headcount, creating by far the most worrying country case in the EU-27. Apart from these outliers, relative poverty is projected to undergo marginal changes in most countries.

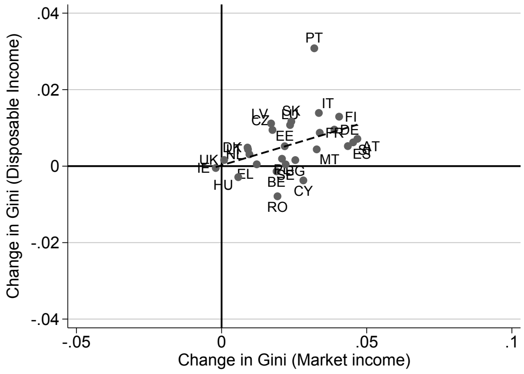
5 The stabilizing capability of European Tax-Benefit Systems

The ability of European tax-benefit systems to stabilise income has been studied by Dolls et al. (2012) who found that stabilisation of disposable incomes ranged from 25 per cent to 56 per cent of the overall change in market incomes. Stabilisation of income inequality has also been studied and found to differ substantially from stabilisation of income (Callan et al. (2018), Paulus and Tasseva (2018)). In this section, we consider the inequality stabilization and redistributive capabilities of each of the tax-benefit systems in the EU-27. To this end, Figure 6 contrasts changes in market income inequality, measured by the Gini coefficient with changes in disposable income inequality between 2010 and 2030. Several important findings emerge from this.

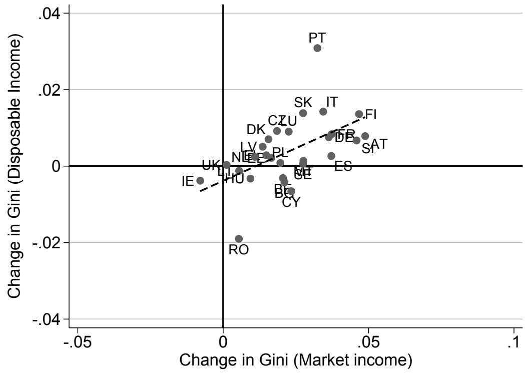
First, demographic changes alone (i.e. with constant wages) almost universally increase market income inequality both in the tough and in the friendly scenario, as the theoretical literature on population ageing generally predicts. Inequality increasing effects are largest (up to 5 percentage points) in larger economies (France, Germany, Spain, Italy) together with Austria, Finland and Slovenia. The UK and Ireland are on the other side of the scale with almost no changes in demography-induced market inequality.

Figure 6: Changes in the Gini coefficient for market and disposable income

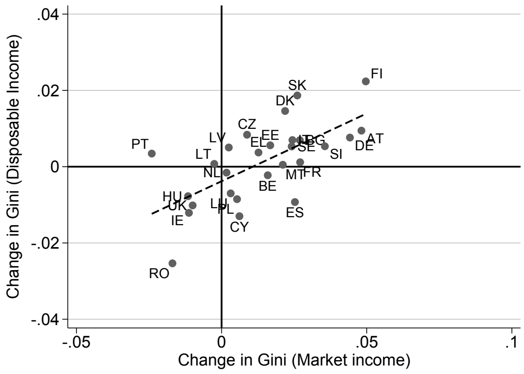
(a) Tough Scenario (constant wage)



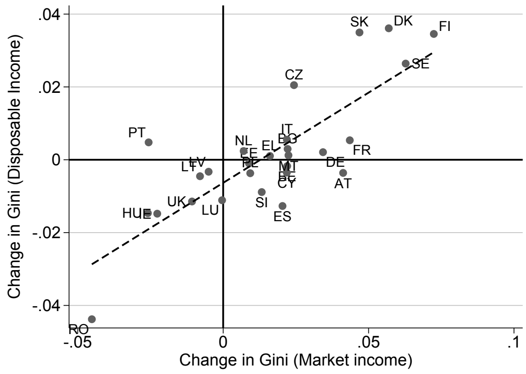
(b) Friendly Scenario (constant wage)



(c) Tough Scenario (with wage changes)



(d) Friendly Scenario (with wage changes)



Note: Own calculations using EUROMOD linked to EU-SILC data for 2010, reweighted to 2030 and adjusted for wage reactions to demographic change. The dashed line represents the linear fit.

Second, disposable income inequality, in contrast, increases much less or even decreases, indicating tax-benefit systems' built-in capacity to absorb some of the 'raw' inequality increase. This is characteristic of all countries except for Portugal, where, basically, all changes in market income inequality translate into disposable income inequality. This is due to the fact that, unlike most other countries, demographic change decreases the share of low-income recipients in Portugal; the increase in inequality hence reflects an overall income increase (see also Table 8). In relative terms, Spain and Cyprus seem better equipped to withstand increases in market income inequality in either demographic scenario.

Third, when taking into account wage adjustments, we find more heterogeneous out-comes in both market and disposable income inequality, with a substantial share of countries now displaying a decline in the Gini for market income. Finland, Denmark and Slovakia are found among the countries with the least redistributive capacity in both scenarios.

6 Conclusions

Given their tremendous impact on society, demographic changes are among the most important policy challenges in the European Union. Population projections suggest that ageing and shrinking labor forces will have important implications, not only for fiscal revenue and social security systems, but also for the income distribution. While the effect of a growing dependency ratio on fiscal sustainability, in particular with regard to the financing of European welfare states, has been addressed by some contributions in the literature (Dolls et al., 2017), very little is known about its effect on the income distribution.

This paper is the first attempt to fill this gap. Theory predicts that population ageing increases income inequality in the population as a whole due to, among other things, increasingly divergent human capital and lower income towards the end of the lifecourse. By contrast, the effect of upskilling on income inequality is ambiguous. We investigate the ability of tax-benefit systems to stabilize these expected changes. We apply a decomposition approach that enables us to separate the pure demographic effect from resulting labor market effects on the income distribution in Europe in the year 2030. We rely on detailed population projections for two different scenarios, 'tough' and 'friendly', containing joint distributions of age, sex, level of urbanization and educational attainment as well as household structure. The scenarios can be interpreted as upper and lower bounds for the severity of demographic change. We take the population projections to our harmonized European micro data by applying a reweighting procedure. Our partial labor market model, linking the resulting labor supply and demand responses, provides us with new wage and employment changes leading to a new labor market equilibrium in each member state. Implementing these steps sequentially, we are able to isolate the effect of demographic change from the accompanying effect of wage adjustments.

Our analysis shows that the EU-27 average income inequality, measured by the Gini coefficient, is projected to increase by 1–2 per cent due to demographic change. Our results suggest that accompanying wage adjustments partly offset the increased inequality. Notable increases in inequality are found for Scandinavian countries in particular, which may lead to cross-country convergence in income inequality. Examining other measures of inequality, we find that most of the increase is projected to occur in the top half of the income distribution, whereas income inequality in the bottom half of the income distribution is projected to undergo only marginal changes. Results are more ambiguous for relative poverty, which is projected to increase in the tough scenario but slightly decrease in the friendly scenario. In general, projected changes in relative poverty are small but there are some country exceptions such as Ireland and Portugal.

Two important general messages emerge. First, the challenges countries face vary and not all will be exposed to a considerable increase in market income inequality. However, among those who will, there are some tax-benefit systems better equipped to moderate such increases than others. Second, tax-benefit systems cushion some of the increases in market income inequality so that the increase in disposable income inequality is smaller. Our paper shows that the size of these cushioning effects to a large extent depends on whether we consider the (direct) demographic effect only or also the resulting wage changes. This highlights the importance of accounting for labor market adjustments in an analysis such as the present one.

Acknowledgements

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References

Atkinson, A. B. and F. Bourguignon (2015). Introduction: Income Distribution Today. In: *Handbook of Income Distribution*. Ed. by A. B. Atkinson and F. Bourguignon. Vol. 2A. Handbook of Income Distribution. Amsterdam: Elsevier, xvii–lxiv.

Aziz, O. A., C. Ball, J. Creedy, and J. Eedrah (2015). The distributional impact of population ageing in New Zealand. *New Zealand Economic Papers* **49** (3), 207–226.

Bargain, O. (2012a). Decomposition analysis of distributive policies using behavioural simulations. *International Tax and Public Finance* **19** (5), 708–731.

— (2012b). The Distributional Effects of Tax-benefit Policies under New Labour: A Decomposition Approach. *Oxford Bulletin of Economics and Statistics* **74** (6), 856–874.

Bargain, O. and T. Callan (2010). Analysing the effects of tax-benefit reforms on income distribution: A decomposition approach. *Journal of Economic Inequality* **8** (1) (1), 1–21.

Bargain, O., T. Callan, K. Doorley, and C. Keane (2017). Changes in Income Distributions and the Role of Tax-Benefit Policy During the Great Recession: An International Perspective. *Fiscal Studies* **38** (4), 559–585.

Bargain, O., M. Dolls, H. Immervoll, D. Neumann, A. Peichl, and N. Pestel (2015). Tax policy and income inequality in the U. S., 1979–2007: A Decomposition Approach. *Economic Inquiry* **53** (2), 1061–1085.

Bargain, O., K. Orsini, and A. Peichl (2014). Comparing Labor Supply Elasticities in Europe and the US: New Results. *Journal of Human Resources* **49** (3), 723–838.

Bourguignon, F. and A. Spadaro (2006). Microsimulation as a tool for evaluating redistribution policies. *Journal of Economic Inequality* **4** (1), 77–106.

Cai, L., J. Creedy, and G. Kalb (2006). Accounting for Population Ageing in Tax Microsimulation Modelling by Survey Reweighting. *Australian Economic Papers* **45** (1), 18–37.

Callan, T., K. Doorley, and M. Savage (2018). Inequality in EU Crisis Countries. How Effective were Automatic Stabilisers. unpublished manuscript.

CEDEFOP (2012). Future skills supply and demand in Europe: Forecast 2012. European Centre for the Development of Vocational Training Research Paper No. 26.

Deaton, A. C. P. (1997). The Effects of Economic and Population Growth on National Saving and Inequality. *Demography* **34** (1), 97–114.

Deville, J.-F. and C.-E. Särndal (1992). Calibration estimators in survey sampling. *Journal of the American Statistical Association* **87**, 376–382.

DiNardo, J., N. Fortin, and T. Lemieux (1996). Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach. *Econometrica* **64**, 1001–1044.

Dolls, M., K. Doorley, A. Paulus, H. Schneider, S. Siegloch, and E. Sommer (2017). Fiscal Sustainability and the Demographic Transition: A micro approach for 27 EU countries. *International Tax and Public Finance* **24** (4), 575–615.

Dolls, M., C. Fuest, and A. Peichl (2012). Automatic Stabilizers and Economic Crisis: US vs. Europe. *Journal of Public Economics* **96** (3-4), 279–294.

Edwards, R. and F. Lange (2013). The US Labor Market in 2030: A Scenario Based on Current Trends in Supply and Demand. IZA Discussion Paper No. 7825.

European Commission (2010). Europe 2020: A strategy for smart, sustainable and inclusive growth. European Union.

Figari, F., A. Paulus, H. Sutherland, P. Tsakloglou, G. Verbist, and F. Zantomio (2017). Removing Homeownership Bias in Taxation: The Distributional Effects of Including Net Imputed Rent in Taxable Income. *Fiscal Studies* **38** (4), 525–557.

Förster, M. F. and I. G. Tóth (2015). Cross-Country Evidence of the Multiple Causes of Inequality Changes in the OECD Area. In: *Handbook of Income Distribution*. Ed. by A. B. Atkinson and F. Bourguignon. Vol. 2B. Handbook of Income Distribution. Amsterdam: Elsevier. Chap. 19, 1729–1843.

Hills, J., A. Paulus, H. Sutherland, and I. Tasseva (2014). A lost decade? Decomposing the effect of 2001-11 tax-benefit policy changes on the income distribution in EU countries. ImPRovE Working Paper 13. University of Antwerp.

Huisman, C., J. de Beer, R. van der Erf, N. van der Gaag, and D. Kupiszewska (2013). Demographic scenarios 2010–2030. NEUJOBS Working Paper D10.1. http://www.neujobs.eu/publications/working-papers/demographic-scenarios-2010-2030.

Immervoll, H. (2005). Falling up the stairs: The effects of 'Bracket creep' on household incomes. *Review of Income and Wealth* **51** (1), 37–62.

Immervoll, H., H. Levy, C. Lietz, D. Mantovani, and H. Sutherland (2006). The sensitivity of poverty rates to macro-level changes in the European Union. *Cambridge Journal of Economics* **30** (2), 181–199.

KC, S., B. Barakat, A. Goujon, V. Skirbekk, W. Sanderson, and W. Lutz (2010). Projection of populations by level of educational attainment, age, and sex for 120 countries for 2005-2050. *Demographic Research* **22**, 383–472.

Lichter, A., A. Peichl, and S. Siegloch (2015). The Own-Wage Elasticity of Labor Demand: A Meta-Regression Analysis. *European Economic Review* **80**, 94–119.

OECD (2014). OECD Employment Outlook 2014. Paris: OECD Publishing.

Paulus, A., F. Figari, and H. Sutherland (2017). The design of fiscal consolidation measures in the European Union: distributional effects and implications for macro-economic recovery. *Oxford Economic Papers* **69** (3), 632–654.

Paulus, A. and I. Tasseva (2018). Europe Through the Crisis: Household Incomes, Tax-Benefit Policy Changes and Automatic Stabilisers. unpublished manuscript.

Sutherland, H. and F. Figari (2013). EUROMOD: the European Union tax-benefit microsimulation model. *International Journal of Microsimulation* **6** (1), 4–26.

Tóth, I. G. (2014). Revisiting Grand Narratives of Growing Inequalities: Lessons from 30 Country Studies. In: *Changing Inequalities and Societal Impacts in Rich Countries: Thirty Countries' Experiences*. Ed. by B. Nolan, W. Salverda, D. Checchi, I. Marx, A. McKnight, I. G. Tóth, and H. G. van de Werfhorst. Oxford University Press, 11–48.

Von Weizsäcker, R. K. (1988). Age Structure and Income Distribution Policy. *Journal of Population Economics* **1** (1), 33–55.

— (1995). Public Pension Reform, Demographics, and Inequality. *Journal of Population Economics* **8** (2), 205–221.

— (1996). Distributive implications of an aging society. *European Economic Review* **40** (3-5), 729–746.

Appendix

Table 1: Assumptions underlying the population scenarios

	Scenario	
	tough	friendly
International migration	low	high
Rural-to-urban migration	high	low
Fertility	low	high
Increase in life expectancy	low	high
GDP growth	low	high
Educational attainment	low	high

Note: See Huisman et al. (2013) for more details on the demographic projections.

Table 2: Labor Supply and Labor Demand Elasticities

<table>
<tr><th></th><th colspan="3">Skill Level</th></tr>
<tr><th></th><th>High</th><th>Medium</th><th>Low</th></tr>
<tr><td>Labor supply elasticities</td><td></td><td></td><td></td></tr>
<tr><td>Single Male</td><td></td><td></td><td></td></tr>
<tr><td>Continental</td><td>0.15</td><td>0.11</td><td>0.23</td></tr>
<tr><td>Nordic</td><td>0.27</td><td>0.21</td><td>0.34</td></tr>
<tr><td>UK/IRL</td><td>0.46</td><td>0.14</td><td>0.65</td></tr>
<tr><td>Southern</td><td>0.27</td><td>0.18</td><td>0.27</td></tr>
<tr><td>Eastern</td><td>0.15</td><td>0.17</td><td>0.24</td></tr>
<tr><td>Single Female</td><td></td><td></td><td></td></tr>
<tr><td>Continental</td><td>0.23</td><td>0.14</td><td>0.38</td></tr>
<tr><td>Nordic</td><td>0.19</td><td>0.11</td><td>0.36</td></tr>
<tr><td>UK/IRL</td><td>0.32</td><td>0.20</td><td>0.51</td></tr>
<tr><td>Southern</td><td>0.26</td><td>0.29</td><td>0.48</td></tr>
<tr><td>Eastern</td><td>0.09</td><td>0.10</td><td>0.24</td></tr>
<tr><td>Married Male</td><td></td><td></td><td></td></tr>
<tr><td>Continental</td><td>0.09</td><td>0.08</td><td>0.10</td></tr>
<tr><td>Nordic</td><td>0.11</td><td>0.09</td><td>0.14</td></tr>
<tr><td>UK/IRL</td><td>0.09</td><td>0.06</td><td>0.11</td></tr>
<tr><td>Southern</td><td>0.06</td><td>0.08</td><td>0.07</td></tr>
<tr><td>Eastern</td><td>0.08</td><td>0.08</td><td>0.08</td></tr>
<tr><td>Married Female</td><td></td><td></td><td></td></tr>
<tr><td>Continental</td><td>0.28</td><td>0.30</td><td>0.27</td></tr>
<tr><td>Nordic</td><td>0.18</td><td>0.17</td><td>0.22</td></tr>
<tr><td>UK/IRL</td><td>0.20</td><td>0.23</td><td>0.19</td></tr>
<tr><td>Southern</td><td>0.40</td><td>0.49</td><td>0.36</td></tr>
<tr><td>Eastern</td><td>0.11</td><td>0.12</td><td>0.11</td></tr>
<tr><td>Labor demand elasticities</td><td></td><td></td><td></td></tr>
<tr><td>Continental</td><td colspan="2">-0.53</td><td>-0.62</td></tr>
<tr><td>Nordic</td><td colspan="2">-0.48</td><td>-0.55</td></tr>
<tr><td>UK/IRL</td><td colspan="2">-0.66</td><td>-0.92</td></tr>
<tr><td>Southern</td><td colspan="3">-0.58</td></tr>
<tr><td>Eastern</td><td colspan="3">-0.66</td></tr>
</table>

Note: Supply Elasticities based on estimations from Bargain et al. (2014). The values refer to the mean value by country group. Where possible, elasticities are country-specific. If a specific country is not covered in Bargain et al. (2014), it is assigned the mean value within the country group. Demand elasticities are from Lichter et al. (2015), by adding an interaction between skill and country group to the main specification and setting the time trend to 2030. Due to insufficient empirical estimates, skill groups for the demand side had to be partly aggregated.

Table 3: Projected Total Population

	Million People			% Change	
Country	Base	tough	friendly	tough	friendly
AT	8.4	8.3	9.1	-1.2	8.7
BE	10.8	11.7	12.5	8.1	15.1
BG	7.6	5.8	7.2	-22.9	-4.5
CY	0.8	0.9	1.0	10.4	23.9
CZ	10.5	10.1	11.2	-3.8	6.5
DE	81.8	72.3	80.8	-11.6	-1.2
DK	5.5	5.7	6.0	2.5	7.9
EE	1.3	1.1	1.4	-15.4	5.9
EL	11.3	10.9	11.8	-4.0	4.4
ES	46.0	44.8	52.0	-2.6	13.0
FI	5.4	5.5	5.8	2.6	7.6
FR	62.8	66.2	69.5	5.4	10.6
HU	10.0	9.2	9.7	-8.3	-2.7
IE	4.5	4.7	5.3	4.2	18.0
IT	60.3	60.6	67.6	0.5	12.1
LT	3.3	2.8	3.1	-15.2	-5.9
LU	0.5	0.6	0.7	21.4	30.4
LV	2.2	1.8	2.1	-21.4	-5.1
MT	0.4	0.4	0.4	-9.5	4.6
NL	16.6	17.0	18.1	2.6	9.0
PL	38.2	34.8	38.3	-8.8	0.3
PT	10.6	10.0	11.1	-5.8	4.0
RO	21.5	18.0	21.9	-16.0	2.0
SE	9.3	10.3	11.0	10.6	17.5
SI	2.0	2.1	2.3	0.6	10.8
SK	5.4	5.3	5.7	-3.2	5.2
UK	62.0	67.5	70.8	8.8	14.2
Mean				-2.7	7.9
Population-weighted mean				-2.3	7.4

Note: Own calculations based on population projections in Huisman et al. (2013) applied to EU-SILC data for 2030.

Table 4: Projected Total Labor Force

	Million Workers			% Change	
Country	Base	tough	friendly	tough	friendly
AT	5.7	5.2	5.6	-7.7	-0.9
BE	7.1	7.3	7.6	1.5	6.3
BG	5.2	3.7	4.6	-28.6	-12.3
CY	0.6	0.6	0.6	0.4	12.4
CZ	7.4	6.6	7.2	-10.9	-3.5
DE	53.9	43.8	47.9	-18.7	-11.1
DK	3.6	3.5	3.6	-3.3	-0.1
EE	0.9	0.7	0.9	-22.3	-2.2
EL	7.5	7.0	7.4	-7.6	-2.0
ES	31.4	28.9	33.2	-8.0	5.8
FI	3.6	3.3	3.4	-7.6	-5.2
FR	40.7	39.6	40.9	-2.7	0.5
HU	6.9	6.1	6.2	-10.9	-9.1
IE	3.0	2.9	3.4	-3.2	11.5
IT	39.7	38.0	41.5	-4.1	4.8
LT	2.3	1.8	2.0	-21.2	-14.4
LU	0.3	0.4	0.4	16.3	22.7
LV	1.5	1.2	1.4	-25.5	-12.6
MT	0.3	0.2	0.3	-19.6	-8.0
NL	11.1	10.4	10.8	-6.8	-2.8
PL	27.2	22.9	24.5	-16.0	-10.2
PT	7.1	6.5	7.0	-8.3	-1.9
RO	15.0	12.1	14.6	-19.3	-2.8
SE	6.1	6.3	6.6	3.4	8.2
SI	1.4	1.3	1.4	-8.6	-1.0
SK	3.9	3.5	3.7	-10.3	-5.1
UK	41.0	41.7	43.2	1.8	5.5
Mean				-9.2	-1.0
Population-weighted mean				-8.7	-1.4

Note: Own calculations based on population projections in Huisman et al. (2013) applied to EU-SILC data for 2030.

Table 5: Skill Shares

Country	Shares			Change in % Points					
	Base			tough			friendly		
	low	med	high	low	med	high	low	med	high
AT	22.8%	60.9%	16.3%	-4.4	1.9	2.5	-7.1	-2.2	9.3
BE	32.6%	36.7%	30.7%	-8.6	2.4	6.2	-10.5	-0.6	11.1
BG	25.4%	55.2%	19.5%	-1.4	-1.9	3.3	-7.5	-2.5	10.0
CY	28.7%	39.5%	31.8%	-8.0	-1.5	9.5	-12.1	-1.8	14.0
CZ	14.6%	71.0%	14.4%	-1.6	-2.8	4.4	-4.6	-5.7	10.3
DE	21.0%	56.6%	22.5%	-0.4	-0.5	0.9	-4.2	-3.8	8.0
DK	30.9%	40.6%	28.5%	-7.4	-0.6	8.1	-9.3	-4.5	13.8
EE	18.3%	52.0%	29.7%	1.7	-3.9	2.2	-4.5	-4.7	9.2
EL	38.5%	40.5%	21.0%	-9.3	4.1	5.2	-11.1	0.6	10.4
ES	48.4%	23.9%	27.7%	-8.7	2.2	6.5	-12.0	-0.5	12.5
FI	23.4%	45.6%	31.1%	-5.8	1.0	4.9	-7.9	-4.0	11.8
FR	31.8%	41.9%	26.3%	-8.5	-0.4	9.0	-10.2	-3.9	14.0
HU	24.3%	58.5%	17.2%	-4.7	0.6	4.1	-6.9	-3.0	9.9
IE	29.5%	37.6%	32.9%	-7.1	0.9	6.1	-7.8	-2.0	9.7
IT	46.2%	40.8%	13.0%	-11.5	7.5	4.0	-9.7	0.3	9.3
LT	16.5%	56.4%	27.1%	0.2	-10.7	10.5	-5.4	-10.0	15.4
LU	29.1%	40.6%	30.3%	-4.7	-2.6	7.3	-6.6	-4.9	11.5
LV	19.5%	58.0%	22.5%	1.0	-6.9	5.9	-7.5	-4.1	11.7
MT	71.5%	16.9%	11.6%	-11.7	4.9	6.8	-14.4	1.7	12.7
NL	31.4%	40.4%	28.3%	-6.6	1.4	5.2	-9.1	-1.3	10.4
PL	17.9%	62.4%	19.7%	-4.4	-6.3	10.7	-6.9	-8.9	15.8
PT	67.3%	18.9%	13.8%	-14.6	8.0	6.6	-11.3	-1.1	12.4
RO	30.3%	57.9%	11.8%	-3.1	-1.9	5.0	-11.0	0.5	10.5
SE	25.7%	46.2%	28.2%	-5.2	-2.0	7.2	-8.7	-3.3	12.0
SI	20.8%	58.9%	20.2%	-5.7	-1.0	6.7	-5.0	-6.8	11.8
SK	16.0%	68.9%	15.0%	-3.3	-1.9	5.2	-5.8	-4.9	10.7
UK	26.9%	43.0%	30.0%	-5.2	0.4	4.8	-6.7	-2.9	9.6
Unweighted Avg.				-5.5	-0.4	5.9	-8.3	-3.1	11.4
Population weighted Avg.				-5.9	0.5	5.4	-8.2	-2.8	11.0

Note: Own calculations based on population projections in Huisman et al. (2013) applied to EU-SILC data for 2030.

Table 6: Employment Rates

	Percent	% point change		% point change with wage adj.	
Country	Base	tough	friendly	tough	friendly
AT	64.12	-2.62	-1.93	-1.62	0.11
BE	62.70	0.82	1.60	1.43	3.21
BG	72.03	-0.90	1.31	-3.57	-0.69
CY	68.18	1.03	2.22	3.34	4.66
CZ	61.76	0.74	1.89	4.12	6.15
DE	62.77	-2.50	-1.18	-0.70	1.37
DK	76.97	0.68	1.12	1.08	1.92
EE	75.11	-1.49	0.59	-2.25	0.10
EL	59.14	-1.15	-0.52	-0.05	1.28
ES	65.20	-1.39	-0.10	-1.87	0.23
FI	73.25	1.15	1.93	0.96	2.41
FR	66.55	0.34	0.79	-0.02	0.95
HU	62.80	1.24	1.74	-1.56	-0.18
IE	67.01	-0.98	0.48	-1.28	0.14
IT	63.12	0.15	0.02	-1.55	-1.12
LT	69.99	0.74	2.68	-0.45	2.30
LU	64.25	-1.20	-1.22	1.31	2.22
LV	73.08	0.21	1.81	-1.32	1.08
MT	56.83	3.80	4.66	3.79	5.78
NL	68.37	0.29	0.95	0.06	1.43
PL	57.90	2.58	3.76	3.59	5.13
PT	66.47	0.78	0.10	0.69	-0.14
RO	55.57	-1.72	2.06	-0.02	3.66
SE	78.94	1.22	2.01	-1.36	0.13
SI	63.51	-1.72	-1.09	-1.66	-0.55
SK	67.62	0.79	1.75	0.17	3.46
UK	66.82	-0.26	0.58	0.43	1.73
Unweighted average		0.02	1.04	0.06	1.73

Note: Own calculations based on population projections in Huisman et al. (2013) applied to EU-SILC data and labor demand and labor supply elasticities.

Table 7: Hours worked

	Mill. Hours	% Change		% Change with wage adj.	
Country	Base	tough	friendly	tough	friendly
AT	148.0	-11.1%	-3.1%	-9.4%	0.1%
BE	177.9	4.7%	11.8%	3.5%	11.3%
BG	179.0	-27.4%	-8.6%	-30.7%	-12.1%
CY	17.0	2.5%	16.7%	2.5%	16.6%
CZ	221.4	-8.6%	1.0%	-8.9%	1.8%
DE	1442.5	-20.3%	-10.1%	-19.8%	-9.4%
DK	109.4	-0.3%	3.9%	0.1%	5.2%
EE	29.8	-20.9%	2.3%	-23.1%	-0.6%
EL	218.1	-9.0%	-2.9%	-10.0%	-3.2%
ES	910.5	-6.2%	9.5%	-8.0%	7.7%
FI	110.2	-4.4%	-0.3%	-5.9%	-1.0%
FR	1080.2	-0.2%	4.5%	-2.6%	2.6%
HU	188.5	-8.2%	-5.0%	-14.0%	-9.9%
IE	82.1	2.0%	19.0%	-0.4%	15.2%
IT	1169.6	1.1%	10.3%	-5.0%	4.6%
LT	69.6	-17.6%	-7.5%	-19.6%	-9.1%
LU	9.5	17.3%	24.7%	17.4%	26.1%
LV	51.6	-22.6%	-6.5%	-25.6%	-9.9%
MT	6.7	-12.5%	2.1%	-13.7%	1.6%
NL	270.6	-4.6%	0.9%	-4.1%	2.2%
PL	745.3	-11.1%	-3.2%	-12.3%	-3.9%
PT	206.5	-4.4%	0.5%	-7.1%	-1.7%
RO	376.3	-22.3%	-0.5%	-22.2%	-1.3%
SE	177.9	7.0%	13.7%	4.3%	11.8%
SI	40.3	-8.8%	0.0%	-10.4%	-1.2%
SK	119.5	-7.3%	-0.8%	-8.1%	-0.8%
UK	1033.9	3.1%	8.6%	3.1%	9.1%
Unweighted average		-7.0%	3.0%	-8.5%	1.9%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and labor demand and labor supply elasticities.

Table 8: Change in original income between 2010 and 2030 (alpha)

	Total α		α_d		α_w	
Country	Tough	Friendly	Tough	Friendly	Tough	Friendly
AT	4%	8%	-9%	-8%	14%	17%
BE	3%	7%	-3%	-2%	6%	10%
BG	-10%	-4%	-11%	-4%	0%	0%
CY	3%	14%	-5%	-3%	9%	18%
CZ	-5%	-1%	-8%	-6%	4%	5%
DE	8%	4%	-11%	-8%	22%	13%
DK	4%	14%	-2%	-3%	6%	17%
EE	0%	3%	-7%	0%	7%	2%
EL	3%	3%	1%	2%	2%	1%
ES	5%	11%	-2%	1%	8%	10%
FI	4%	12%	-4%	-4%	8%	16%
FR	5%	12%	-4%	-4%	8%	16%
HU	-10%	-8%	-5%	-3%	-5%	-5%
IE	16%	10%	4%	5%	12%	5%
IT	10%	11%	4%	4%	6%	6%
LT	0%	3%	-3%	1%	3%	2%
LU	4%	9%	-4%	-3%	8%	12%
LV	-8%	-4%	-7%	-1%	-2%	-3%
MT	-11%	-4%	-7%	-3%	-4%	-1%
NL	8%	11%	-3%	-3%	11%	14%
PL	-4%	1%	-3%	0%	-1%	2%
PT	9%	11%	6%	5%	3%	5%
RO	-7%	-8%	-7%	3%	1%	-11%
SE	5%	10%	-1%	-2%	6%	13%
SI	1%	0%	-8%	-7%	11%	7%
SK	-13%	-9%	-13%	-12%	0%	3%
UK	12%	14%	0%	1%	12%	14%
Average	1%	5%	-4%	-2%	6%	7%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and EUROMOD version F6.0. α represents the total change in monthly average household original income between 2010 and 2030. This is decomposed into the part due to demographic change, α_d, and the part due to wage changes, α_w.

Table 9: Decomposition of the change in the Gini coefficient

						Total effect		Demographic effect		Scarcity effect	
Gini	**1**	**2**	**3**	**4**	**5**	**Tough**	**Friendly**	**Tough**	**Friendly**	**Tough**	**Friendly**
AT	0.26	0.27	0.27	0.27	0.26	3.6%	-1.4%	2.7%	3.0%	0.9%	-4.4%
BE	0.26	0.26	0.26	0.26	0.26	-0.9%	-0.7%	-0.5%	-1.2%	-0.3%	0.5%
BG	0.35	0.35	0.34	0.35	0.35	2.0%	0.9%	0.5%	-1.2%	1.6%	2.1%
CY	0.37	0.36	0.36	0.35	0.36	-3.5%	-1.0%	-1.0%	-1.8%	-2.5%	0.8%
CZ	0.25	0.26	0.26	0.26	0.27	3.4%	8.2%	3.8%	3.7%	-0.4%	4.5%
DE	0.29	0.30	0.29	0.29	0.29	2.7%	0.7%	3.3%	2.6%	-0.7%	-1.9%
DK	0.23	0.24	0.24	0.25	0.27	6.3%	15.5%	2.1%	3.0%	4.2%	12.5%
EE	0.32	0.32	0.32	0.32	0.32	1.8%	-0.3%	1.6%	0.7%	0.1%	-1.0%
EL	0.35	0.35	0.35	0.35	0.35	1.1%	0.3%	0.1%	0.8%	0.9%	-0.5%
ES	0.33	0.34	0.34	0.32	0.32	-2.8%	-3.8%	1.6%	0.8%	-4.3%	-4.6%
FI	0.28	0.29	0.29	0.30	0.31	8.0%	12.4%	4.6%	4.9%	3.4%	7.5%
FR	0.25	0.26	0.26	0.25	0.26	0.5%	2.1%	3.4%	3.3%	-3.0%	-1.2%
HU	0.27	0.26	0.26	0.26	0.25	-2.9%	-5.5%	-1.1%	-1.2%	-1.8%	-4.3%
IE	0.29	0.29	0.29	0.28	0.27	-4.2%	-5.1%	-0.2%	-1.3%	-4.0%	-3.8%
IT	0.34	0.35	0.35	0.35	0.34	2.1%	1.6%	4.1%	4.2%	-2.0%	-2.6%
LT	0.35	0.35	0.35	0.35	0.35	0.2%	-1.3%	1.2%	-0.4%	-1.0%	-0.9%
LU	0.26	0.27	0.26	0.25	0.24	-2.7%	-4.3%	4.2%	3.5%	-6.9%	-7.9%
LV	0.37	0.38	0.37	0.37	0.36	1.4%	-0.9%	3.0%	1.4%	-1.7%	-2.3%
MT	0.29	0.29	0.29	0.29	0.29	0.2%	0.4%	1.5%	0.5%	-1.4%	-0.1%
NL	0.26	0.27	0.26	0.26	0.26	-0.6%	0.9%	1.2%	0.9%	-1.8%	0.0%
PL	0.33	0.34	0.34	0.33	0.33	-2.5%	-1.1%	0.6%	0.2%	-3.1%	-1.4%
PT	0.38	0.41	0.41	0.38	0.38	0.9%	1.3%	8.2%	8.2%	-7.3%	-6.9%
RO	0.34	0.33	0.32	0.32	0.30	-7.4%	-12.8%	-2.3%	-5.6%	-5.1%	-7.2%
SE	0.25	0.25	0.25	0.26	0.28	2.1%	10.4%	0.2%	0.2%	1.9%	10.2%
SI	0.29	0.29	0.29	0.29	0.28	1.9%	-3.1%	2.2%	2.4%	-0.3%	-5.5%
SK	0.23	0.24	0.25	0.25	0.27	8.0%	15.0%	5.0%	6.0%	3.0%	9.1%
UK	0.33	0.34	0.33	0.32	0.32	-3.0%	-3.4%	0.5%	0.1%	-3.5%	-3.5%
Average	0.30	0.31	0.30	0.30	0.30	0.6%	0.9%	1.9%	1.4%	-1.3%	-0.5%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and EUROMOD version F6.0. Column 1 shows the baseline scenario (2010). Column 2 shows the 2030 tough scenario without wage adjustment. Column 3 shows the 2030 friendly scenario without wage adjustment. Column 4 shows the 2030 tough scenario with wage adjustment. Column 5 shows the 2030 friendly scenario with wage adjustment.

Table 10: Decomposition of the change in the P90/P50 ratio

						Total effect		Demographic effect		Scarcity effect	
P90/50	**1**	**2**	**3**	**4**	**5**	**Tough**	**Friendly**	**Tough**	**Friendly**	**Tough**	**Friendly**
AT	1.74	1.75	1.77	1.79	1.70	2.7%	-2.1%	0.8%	1.6%	1.9%	-3.7%
BE	1.69	1.67	1.67	1.65	1.68	-2.3%	-0.1%	-1.2%	-1.2%	-1.1%	1.1%
BG	2.20	2.22	2.24	2.28	2.33	3.9%	5.8%	0.9%	1.7%	3.0%	4.1%
CY	1.98	2.12	2.12	2.05	2.24	3.7%	12.9%	7.2%	6.9%	-3.4%	6.0%
CZ	1.76	1.87	1.87	1.87	1.95	6.1%	10.3%	5.8%	6.1%	0.3%	4.2%
DE	1.85	1.89	1.89	1.91	1.86	3.0%	0.5%	2.2%	2.4%	0.8%	-1.9%
DK	1.61	1.62	1.64	1.71	1.86	6.1%	15.2%	0.8%	1.6%	5.4%	13.6%
EE	2.05	2.09	2.11	2.07	2.05	1.1%	-0.1%	1.7%	2.7%	-0.6%	-2.8%
EL	2.13	2.15	2.17	2.16	2.18	1.2%	2.3%	0.9%	1.7%	0.4%	0.6%
ES	2.02	2.10	2.09	1.99	1.97	-1.1%	-2.4%	4.3%	3.6%	-5.4%	-5.9%
FI	1.78	1.81	1.83	1.87	1.97	5.3%	10.7%	2.0%	3.0%	3.3%	7.7%
FR	1.83	1.86	1.87	1.81	1.85	-1.2%	1.2%	1.4%	2.0%	-2.5%	-0.7%
HU	1.80	1.77	1.78	1.72	1.69	-4.4%	-6.4%	-1.9%	-1.1%	-2.5%	-5.3%
IE	1.86	1.80	1.79	1.78	1.78	-4.5%	-4.3%	-3.2%	-3.7%	-1.2%	-0.6%
IT	1.98	2.03	2.04	1.99	2.00	0.8%	0.8%	2.7%	3.1%	-1.9%	-2.3%
LT	2.32	2.31	2.27	2.29	2.28	-1.2%	-1.4%	-0.2%	-2.0%	-0.9%	0.5%
LU	1.76	1.82	1.81	1.71	1.72	-2.6%	-2.1%	3.4%	3.2%	-6.0%	-5.2%
LV	2.34	2.44	2.41	2.45	2.43	4.8%	3.8%	4.1%	2.8%	0.7%	0.9%
MT	2.00	2.09	2.09	2.01	2.04	0.5%	1.7%	4.1%	4.5%	-3.6%	-2.9%
NL	1.79	1.81	1.81	1.78	1.80	-0.3%	0.7%	1.3%	1.1%	-1.6%	-0.4%
PL	2.06	2.05	2.07	1.99	2.06	-3.5%	-0.1%	-0.2%	0.5%	-3.3%	-0.6%
PT	2.44	2.77	2.77	2.25	2.32	-7.7%	-5.0%	13.7%	13.6%	-21.5%	-18.6%
RO	2.03	1.94	1.91	1.86	1.78	-8.1%	-12.1%	-4.2%	-5.7%	-3.9%	-6.4%
SE	1.70	1.72	1.73	1.73	1.89	1.8%	11.3%	1.2%	1.9%	0.5%	9.4%
SI	1.83	1.87	1.87	1.87	1.76	2.5%	-4.0%	2.3%	2.2%	0.2%	-6.2%
SK	1.68	1.78	1.79	1.81	1.92	7.6%	14.3%	5.9%	6.5%	1.7%	7.8%
UK	2.14	2.15	2.15	2.07	2.07	-3.3%	-3.1%	0.3%	0.7%	-3.6%	-3.7%
Average	1.94	1.98	1.98	1.94	1.97	0.4%	1.8%	2.1%	2.2%	-1.7%	-0.4%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and EUROMOD version F6.0. Column 1 shows the baseline scenario (2010). Column 2 shows the 2030 tough scenario without wage adjustment. Column 3 shows the 2030 friendly scenario without wage adjustment. Column 4 shows the 2030 tough scenario with wage adjustment. Column 5 shows the 2030 friendly scenario with wage adjustment.

Table 11: Decomposition of the change in the P10/P50 ratio

						Total effect		Demographic effect		Scarcity effect	
P10/50	**1**	**2**	**3**	**4**	**5**	**Tough**	**Friendly**	**Tough**	**Friendly**	**Tough**	**Friendly**
AT	0.54	0.53	0.54	0.54	0.54	0.2%	0.0%	-0.6%	0.2%	0.9%	-0.3%
BE	0.57	0.55	0.56	0.55	0.56	-3.4%	-1.4%	-3.6%	-2.3%	0.2%	0.9%
BG	0.48	0.49	0.50	0.48	0.49	1.0%	3.8%	3.8%	5.5%	-2.8%	-1.6%
CY	0.45	0.47	0.46	0.45	0.46	0.6%	2.5%	4.1%	3.1%	-3.5%	-0.6%
CZ	0.63	0.65	0.66	0.64	0.65	1.6%	3.0%	3.2%	3.8%	-1.6%	-0.8%
DE	0.50	0.49	0.50	0.49	0.50	-2.0%	-0.2%	-2.5%	-0.8%	0.5%	0.5%
DK	0.58	0.57	0.57	0.58	0.59	-1.1%	0.4%	-2.3%	-2.3%	1.2%	2.7%
EE	0.50	0.51	0.51	0.49	0.50	-0.6%	0.8%	2.1%	2.3%	-2.7%	-1.6%
EL	0.42	0.42	0.42	0.42	0.42	-1.0%	-0.3%	-1.3%	-0.8%	0.2%	0.5%
ES	0.39	0.41	0.41	0.42	0.42	8.6%	7.5%	6.1%	6.1%	2.5%	1.4%
FI	0.56	0.57	0.57	0.56	0.58	-0.8%	2.9%	0.8%	1.2%	-1.5%	1.7%
FR	0.63	0.62	0.62	0.62	0.62	-1.7%	-1.1%	-2.5%	-2.4%	0.8%	1.3%
HU	0.56	0.55	0.55	0.54	0.54	-2.7%	-3.1%	-1.3%	-0.4%	-1.4%	-2.7%
IE	0.54	0.52	0.51	0.55	0.54	1.9%	0.0%	-4.0%	-4.3%	5.8%	4.3%
IT	0.48	0.46	0.46	0.46	0.46	-4.9%	-4.9%	-3.9%	-3.7%	-1.0%	-1.2%
LT	0.51	0.50	0.52	0.51	0.50	-0.6%	-1.0%	-2.0%	2.3%	1.4%	-3.4%
LU	0.58	0.56	0.57	0.58	0.59	1.2%	2.6%	-2.1%	-1.2%	3.3%	3.9%
LV	0.45	0.47	0.48	0.44	0.47	-1.6%	4.6%	3.6%	5.7%	-5.2%	-1.1%
MT	0.51	0.54	0.55	0.53	0.54	3.3%	4.9%	4.8%	6.3%	-1.4%	-1.5%
NL	0.60	0.58	0.58	0.57	0.57	-3.6%	-4.8%	-2.6%	-2.9%	-1.0%	-1.8%
PL	0.49	0.51	0.51	0.50	0.51	2.6%	3.5%	3.3%	4.2%	-0.7%	-0.7%
PT	0.45	0.44	0.45	0.41	0.43	-9.0%	-5.4%	-1.3%	-1.1%	-7.7%	-4.3%
RO	0.39	0.37	0.39	0.37	0.39	-6.8%	-0.7%	-5.4%	0.0%	-1.3%	-0.7%
SE	0.55	0.56	0.56	0.56	0.58	0.9%	4.6%	1.4%	1.8%	-0.5%	2.8%
SI	0.47	0.47	0.47	0.48	0.47	1.4%	-1.4%	-1.3%	-1.5%	2.7%	0.1%
SK	0.61	0.64	0.64	0.63	0.64	3.7%	4.7%	4.8%	5.1%	-1.1%	-0.3%
UK	0.48	0.48	0.47	0.47	0.48	-1.9%	-1.2%	-1.6%	-1.6%	-0.3%	0.4%
Average	0.52	0.52	0.52	0.51	0.52	-0.5%	0.8%	0.0%	0.8%	-0.5%	-0.1%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and EUROMOD version F6.0. Column 1 shows the baseline scenario (2010). Column 2 shows the 2030 tough scenario without wage adjustment. Column 3 shows the 2030 friendly scenario without wage adjustment. Column 4 shows the 2030 tough scenario with wage adjustment. Column 5 shows the 2030 friendly scenario with wage adjustment.

Table 12: Decomposition of the change in FGT0

						Total effect		Demographic effect		Scarcity effect	
FGT0	**1**	**2**	**3**	**4**	**5**	**Tough**	**Friendly**	**Tough**	**Friendly**	**Tough**	**Friendly**
AT	0.14	0.15	0.15	0.15	0.14	4.9%	-0.1%	3.2%	2.1%	1.8%	-2.2%
BE	0.13	0.15	0.15	0.15	0.14	14.8%	6.8%	15.8%	15.0%	-1.0%	-8.3%
BG	0.19	0.19	0.18	0.20	0.19	2.2%	-1.3%	-4.2%	-6.4%	6.5%	5.1%
CY	0.21	0.23	0.23	0.22	0.22	4.2%	3.5%	6.6%	8.5%	-2.4%	-5.0%
CZ	0.08	0.07	0.07	0.07	0.07	-11.1%	-17.2%	-14.8%	-18.8%	3.8%	1.6%
DE	0.17	0.18	0.18	0.18	0.18	4.2%	4.1%	6.2%	4.0%	-2.0%	0.1%
DK	0.11	0.12	0.12	0.12	0.12	3.8%	4.2%	8.7%	8.8%	-5.0%	-4.6%
EE	0.17	0.16	0.15	0.18	0.17	5.4%	1.9%	-5.9%	-7.4%	11.3%	9.3%
EL	0.24	0.23	0.23	0.23	0.23	-2.3%	-1.7%	-2.0%	-1.6%	-0.3%	0.0%
ES	0.21	0.23	0.23	0.23	0.22	5.8%	5.3%	8.4%	7.1%	-2.6%	-1.7%
FI	0.14	0.14	0.13	0.14	0.12	5.1%	-11.7%	-0.5%	-1.3%	5.6%	-10.4%
FR	0.09	0.09	0.09	0.09	0.08	0.3%	-6.3%	-0.5%	-2.6%	0.8%	-3.7%
HU	0.13	0.13	0.13	0.14	0.13	3.2%	0.5%	-0.7%	-4.6%	3.9%	5.1%
IE	0.16	0.20	0.22	0.21	0.20	27.2%	21.7%	26.8%	36.5%	0.4%	-14.7%
IT	0.20	0.20	0.20	0.20	0.19	0.4%	-0.3%	1.6%	2.0%	-1.2%	-2.2%
LT	0.17	0.16	0.15	0.18	0.17	2.9%	2.2%	-4.9%	-9.6%	7.8%	11.8%
LU	0.12	0.12	0.12	0.12	0.12	-6.4%	-5.4%	-0.9%	-2.3%	-5.4%	-3.1%
LV	0.20	0.21	0.21	0.24	0.22	15.3%	7.0%	4.7%	3.3%	10.6%	3.7%
MT	0.15	0.14	0.13	0.15	0.14	-4.1%	-10.7%	-6.3%	-16.8%	2.2%	6.1%
NL	0.11	0.12	0.12	0.12	0.13	13.4%	17.7%	11.3%	12.0%	2.1%	5.7%
PL	0.18	0.17	0.16	0.16	0.16	-6.6%	-6.7%	-5.0%	-7.1%	-1.7%	0.4%
PT	0.22	0.24	0.24	0.27	0.25	21.9%	14.2%	8.0%	8.0%	13.9%	6.3%
RO	0.24	0.24	0.22	0.23	0.22	-1.0%	-7.6%	2.0%	-4.4%	-3.0%	-3.2%
SE	0.13	0.12	0.12	0.13	0.11	-0.2%	-14.1%	-6.7%	-8.5%	6.4%	-5.6%
SI	0.20	0.19	0.19	0.19	0.19	-4.3%	-4.4%	-3.5%	-3.8%	-0.8%	-0.6%
SK	0.09	0.07	0.07	0.08	0.08	-14.9%	-19.0%	-21.0%	-22.3%	6.1%	3.4%
UK	0.19	0.20	0.20	0.19	0.19	-0.6%	-1.8%	2.9%	2.0%	-3.5%	-3.8%
Average	0.16	0.16	0.16	0.17	0.16	3.1%	-0.7%	1.1%	-0.3%	2.0%	-0.4%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and EUROMOD version F6.0. Column 1 shows the baseline scenario (2010). Column 2 shows the 2030 tough scenario without wage adjustment. Column 3 shows the 2030 friendly scenario without wage adjustment. Column 4 shows the 2030 tough scenario with wage adjustment. Column 5 shows the 2030 friendly scenario with wage adjustment.

Table 13: Decomposition of the change in FGT1

						Total effect		Demographic effect		Scarcity effect	
FGT1	**1**	**2**	**3**	**4**	**5**	**Tough**	**Friendly**	**Tough**	**Friendly**	**Tough**	**Friendly**
AT	0.03	0.03	0.03	0.03	0.03	4.7%	3.7%	12.1%	9.5%	-7.3%	-5.9%
BE	0.05	0.05	0.05	0.05	0.05	7.1%	2.7%	3.7%	1.3%	3.5%	1.4%
BG	0.05	0.05	0.05	0.06	0.05	7.7%	-2.6%	-1.9%	-9.6%	9.6%	7.0%
CY	0.07	0.07	0.07	0.07	0.07	-4.0%	-8.9%	-4.5%	-4.1%	0.5%	-4.8%
CZ	0.02	0.02	0.01	0.02	0.01	-9.8%	-18.8%	-13.5%	-19.0%	3.7%	0.2%
DE	0.04	0.04	0.04	0.04	0.04	5.5%	7.5%	19.5%	14.3%	-14.0%	-6.8%
DK	0.02	0.03	0.03	0.03	0.03	4.3%	3.0%	3.0%	4.3%	1.3%	-1.3%
EE	0.05	0.05	0.05	0.05	0.05	1.1%	-4.3%	-6.0%	-9.4%	7.0%	5.1%
EL	0.14	0.13	0.13	0.13	0.13	-6.3%	-8.4%	-6.3%	-7.7%	0.0%	-0.7%
ES	0.10	0.10	0.09	0.09	0.09	-7.0%	-8.2%	-4.1%	-6.1%	-2.9%	-2.0%
FI	0.03	0.03	0.03	0.03	0.03	6.9%	-6.3%	-2.1%	-4.6%	9.0%	-1.7%
FR	0.02	0.02	0.02	0.02	0.02	2.8%	-9.8%	9.5%	7.2%	-6.7%	-16.9%
HU	0.03	0.03	0.03	0.04	0.03	18.2%	15.7%	9.9%	4.5%	8.3%	11.2%
IE	0.04	0.04	0.04	0.04	0.04	-8.1%	-4.9%	10.8%	11.9%	-18.9%	-16.8%
IT	0.06	0.06	0.06	0.06	0.06	4.7%	4.7%	1.6%	2.2%	3.1%	2.6%
LT	0.06	0.06	0.05	0.06	0.05	0.9%	-7.1%	-1.2%	-11.0%	2.1%	3.9%
LU	0.02	0.02	0.02	0.02	0.01	-2.4%	-16.5%	16.2%	13.8%	-18.6%	-30.3%
LV	0.06	0.06	0.05	0.06	0.06	11.6%	0.5%	1.0%	-4.5%	10.6%	5.0%
MT	0.04	0.04	0.03	0.04	0.03	12.7%	-8.8%	-0.8%	-12.7%	13.5%	3.8%
NL	0.05	0.05	0.05	0.04	0.04	-7.6%	-9.5%	-1.9%	-2.4%	-5.8%	-7.2%
PL	0.05	0.05	0.05	0.05	0.05	-8.7%	-12.4%	-8.3%	-11.9%	-0.4%	-0.4%
PT	0.05	0.06	0.06	0.07	0.06	33.1%	19.2%	8.2%	6.0%	24.9%	13.2%
RO	0.08	0.09	0.08	0.09	0.08	7.0%	-4.8%	5.9%	-6.1%	1.1%	1.3%
SE	0.04	0.03	0.03	0.03	0.03	-3.5%	-15.9%	-6.1%	-8.5%	2.6%	-7.4%
SI	0.05	0.05	0.05	0.05	0.05	-1.0%	3.1%	0.5%	0.2%	-1.5%	3.0%
SK	0.02	0.01	0.01	0.02	0.01	7.0%	-3.6%	-0.8%	-4.8%	7.8%	1.2%
UK	0.06	0.06	0.06	0.06	0.06	-2.6%	-5.5%	1.6%	-0.3%	-4.1%	-5.2%
Average	0.05	0.05	0.05	0.05	0.05	2.8%	-3.6%	1.7%	-1.8%	1.1%	-1.8%

Note: Own calculations based on EM input datasets reweighted for 2010 and 2030 and EUROMOD version F6.0. Column 1 shows the baseline scenario (2010). Column 2 shows the 2030 tough scenario without wage adjustment. Column 3 shows the 2030 friendly scenario without wage adjustment. Column 4 shows the 2030 tough scenario with wage adjustment. Column 5 shows the 2030 friendly scenario with wage adjustment.