Abstract

This final report summarizes the key methodological contributions and research findings of NEUJOBS Work Package 10 on modelling the evolution of labor supply and labor demand until 2030. It further relates the main conclusion to be drawn from WP 10 to the findings from other Work Packages of the NEUJOBS Projects.

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Modelling the Evolution of Labor Supply and Labor Demand in Europe 2030
Work Package 10 - Final Report*

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Abstract

This final report summarizes the key methodological contributions and research findings of NEUJOBS Work Package 10 (WP 10) on modelling the evolution of labor supply and labor demand. It further relates the main conclusions drawn from the WP 10 to the findings from other Work Packages of the NEUJOBS project.

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1 Introduction

European labor markets are currently under profound pressure and are still struggling to cope with the aftermath of both the Great Recession and the subsequent Eurozone sovereign debt crisis. Unemployment levels are at unprecedentedly high levels in many European countries, with high youth unemployment rates being a first-order problem in most European labor markets. While policy measures slowly seem to gain ground, and some countries show the first signs of recovery, the next challenges for European labor markets are already in sight.

It is uncontested that European labor markets will undergo severe structural changes in the upcoming decades, which are induced by three major transitions. These transitions are (i) demographic change, (ii) climate change and resource scarcity, and (iii) ever increasing global competition in combination with routine-biased technological change. It is almost certain that these developments will strongly shape labor market outcomes across Europe both in the medium and long-run. Despite the salience of these transitions, knowledge about their likely extent and consequences for employment, wages (and their distribution) and fiscal balances is incomplete and to a large part even missing. However, a broad understanding of the magnitude and structure of the challenges ahead is a prerequisite for tailoring effective and timely policy responses that can mitigate potentially adverse effects.

Against this backdrop, the NEUJOBS project is dedicated to analyzing the possible future developments across European labor markets to (i) determine potential challenges for policy-makers arising from structural changes in the labor force and (ii) identify potential policy measures to accommodate these changes. Within this ambitious task of the project, Work Package 10 (WP 10) provides an explicit analysis of potential future labor market effects arising from demographic change up to the year 2030. Among the mentioned mega-trends affecting European societies, demographic change is expected to become one of the key drivers which will strongly impact the individual labor markets of each of the EU member countries and the Union as a whole. Population ageing will lead to a decline of the working-age population in most European countries. In addition, advances in educational attainment, often referred to as up-skilling, changing migration flows and agglomeration effects will crucially change the size and composition of the European population over the coming decades.

To obtain a precise picture of the consequences of demographic change for Eu-
European labor markets and to identify potentially adverse outcomes, we have modeled the evolution of both labor supply and labor demand until 2030, thereby identifying possible mismatches in employment arising from population ageing or changes in educational attainment. In a second step, we have highlighted fiscal and distributional imbalances arising from this demographic change. The assessment and precise description of these likely challenges allowed us to identify suitable policy measures that may mitigate adverse effects.

In order to address both fiscal and distributional policy measures, we have based our empirical method on rich, micro-level data for the EU-27 countries and employed state-of-the-art microsimulation methods. While microsimulation models have certain weaknesses in general, which we discuss in Section 2.1, we make two adjustments to the standard Microsimulation workhorse model that make our methodological approach preferable over General Equilibrium models to answer the specific questions raised. In particular, we provide an analysis of labor market effects, accounting for skill and gender heterogeneity. As distributional questions are also investigated, a micro-based approach is indispensable.

In this summary report of WP 10, we present, summarize and consolidate the key findings of each of the deliverables. Moreover, we relate our findings to the insights obtained in other Work Packages of the NEUJOBS consortium. Precisely, we start by describing the key aspects of the underlying methodological framework, discussing strengths and weaknesses of our modeling choices compared to potential alternative in the literature (Section 2). Next, we present the main findings of Work Package 10 and its deliverables in a comprehensive way, showing projected future employment levels and highlighting potential policy measures to accommodate adverse developments (Section 3). We then assess our findings in the context of the entire NEUJOBS project, discussing potential interaction effects (Section 4). Section 5 concludes.

2 Methodological Framework

The main contribution of WP10 is to go beyond an analysis of demographic change in terms of headcount and gauge its consequences on labor markets and fiscal budgets. For this purpose, our analysis rests on a microsimulation model based on individual-level data for the EU-27. We start this section by presenting the commonly used method of microsimulation, pointing to general strengths and weaknesses in com-
parison to other methodological frameworks and stressing the superiority of the microsimulation approach to answer the questions raised in the NEUJOBS project (Section 2.1). In Section 2.2, we briefly present the micro datasets as well as the tax-benefit calculator EUROMOD that we used for the empirical analyses. We then provide insights on the modeling of labor market outcomes. In Section 2.3, we present the modeling of the supply side. In Section 2.4, we complete the partial labor market analysis by summarizing the demand side modeling and its interaction with labor supply, which eventually yields the projected employment outcomes.

2.1 Modeling Approach and Critical Assessment

Microsimulation Models (MSM) have become a standard tool for the ex-ante evaluation of labor market responses to policy reforms at the micro (household) level (Bourguignon and Spadaro, 2006). The basic idea of MSM is to apply different sets of policy parameters to the same individual dataset and compare the outcomes across various dimensions such as inequality and employment. In the context of the NEUJOBS project, MSM offer a suitable framework to deal with (i) demographic change, (ii) its labor market consequences, (iii) the respective fiscal outcomes as well as (iv) actual policy reforms such as the raising of the statutory retirement age across European countries, as simulated in Paulus et al. (2014, D10.10).

The virtue of MSM is their ability to account for the full heterogeneity within a given population. This is in contrast to approaches relying on representative agents, including computable general equilibrium (CGE) models. Moreover, the MSM results can be aggregated to the macro level, which is also not possible for representative agent models. In the context of divergent demographic trends across EU countries, a micro-based approach is particularly useful, as we can account for the fact that the age composition, educational attainment and household composition are affected differently by demographic change in different countries.\footnote{As we do not impose behavioral assumptions on the micro level, our type of model would be classified as arithmetic according to Bourguignon and Spadaro (2006).}

Within the NEUJOBS projects, we have made two main advances in MSM that have proven to be valuable for other research and policy analyses in the future. First, past MSM studies have put a focus on modeling labor supply behavior while being relatively agnostic as far as labor demand feed-back effects were concerned. By introducing a novel labor supply and labor demand link (see Section 2.4 and (Peichl and Siegloch, 2012, D10.3) for details), we overcome this shortfall and add
a (partial) equilibrium notion to MSM, which was lacking before. Second, we implement a reweighting technique that accounts for demographic change, which allows us to not only study labor market adjustments to policy reforms in current years but also in the future (see Section 2.2).

The latter extension enables us to incorporate population ageing into MSM to assess its effects on a comprehensive measure of public revenues (including the personal income tax base) on the micro-level. Despite the obvious importance of demographic change for total budgets, there have been relatively few studies to take such a comprehensive perspective. Most related papers focus on the expenditure side of public budgets, in particular on the pension system (European Commission, 2012, OECD, 2013). Notable exceptions are Börsch-Supan et al. (2014) and Jensen et al. (2002), who both rely on a General Equilibrium approach.

Such General Equilibrium models have an advantage over MSM in that they can potentially model how the whole economic system adopts to structural changes such as population ageing or policy reforms. Besides adjustments on the labor market, which are well covered in our Microsimulation model, General Equilibrium models also capture how aggregate demand is affected by economic shocks, modeling complicated feed-back effects between the different markets.

A potential extension to Microsimulation models to take into account aggregate demand effects is to link the output from the micro-output to a macro model (Peichl, 2008, Vaqar and O’Donoghue, 2007). However, setting up such a model comes with many non-trivial problems (Peichl, 2008, pp. 15f). Possible error sources include inconsistencies between data sources and different variable definitions. Moreover, given that the task of this Work Package was to explicitly focus on labor market effects of demographic change, behavioral MSM appear to be the best suited modeling option. First, MSM in combination with a suitable labor demand extension using micro-level estimates for both sides of the market give a precise picture of the eventual labor market (hence partial) equilibrium. Second, and more generally, MSM clearly outperform General Equilibrium models when it comes to distributional analyses since the latter rely on a representative agent framework instead of a micro-based household approach. Therefore, our chosen framework proposes a middle ground between micro and macro approaches by making MSM outcomes more plausible when accounting for labor market effects. At the same time, the method is parsimonious, straightforward to implement and does not rest on too many assumptions, avoiding a black box.

The main parameters we employ, apart from assumptions underlying the de-
mographic projections, are elasticities on labor supply and demand. Throughout the analysis, we keep these elasticities constant. While this is unlikely to be the case in reality and hence could be criticized, it is important to understand the implications of this assumption. Time-persistent elasticities imply that responses of supply and demand to relative scarcities on the labor market are not changing over time. While the mechanics of the labor market might change over time, it is a priori not clear in which direction they might change and whether there is heterogeneity in the evolution. For that reason, the assumption that labor market mechanisms in 15 years will be approximately as they are today – besides relative scarcities changing considerably – seems reasonable to us.

The findings of this Work Package need to be interpreted in light of our methodology. We focus on future fiscal imbalances and inequality arising from two channels, namely, demographic change and the interaction between labor supply and demand. We do not claim to provide a full picture of future consequences from population ageing. Instead, we deliver a detailed analysis on one very important mechanism. The parameters of the model are obtained from observed individual behavior and kept constant. Hence, our analysis follows a ceteris paribus logic. There is a multitude of developments that are expected to influence the characteristics of future labor markets, such as increasing global competition, increased use of automation technologies, changing migration patterns within and from outside the EU and diminishing returns to education. These would be manifested by different demographic projections and/or different elasticities in our model. In the absence of an explicit theory on the driving forces, for example, changing returns to education, the choice of parameters would be highly arbitrary.

2.2 Micro data, tax-benefit calculator and reweighting

In order to assess tax revenue effects as a consequence of changes in the labor market, we take advantage of EUROMOD, a European tax-benefit calculator (Sutherland and Figari, 2013). EUROMOD is linked to data from the European Union Statistics on Income and Living Conditions (EU-SILC), an integrated and harmonized household survey conducted by Eurostat for the EU-27 (Eurostat, 2013). While suffering from some drawbacks common to all survey data, for example under-reporting of capital income and under-coverage of certain population subgroups, there are clear advantages of using the EU-SILC instead of nationally conducted surveys. By applying the same definitions in every country, high comparability is guaranteed in
EU-SILC. EUROMOD uses the EU-SILC data and feeds them into country-specific tax-benefit calculators. These replicate the national tax and benefit regulations and calculate individual payments for all relevant taxes, contributions and benefits. The tax-benefit calculator is designed and maintained by national experts, guaranteeing timeliness and accuracy.

We incorporate the demographic projections underlying the whole Work Package (Huisman et al., 2013, D10.1) by applying a reweighting technique. The demographic projections are implemented into our household-level data by adjusting household weights such that they match the projected amounts for a given year and country. This is done separately for the "tough" and the "friendly" scenario. The projections account for age, gender, educational attainment as well as position within the household and are given for all EU-27 countries up until 2030. Projections are provided for two different scenarios, which rely on varying assumptions about future fertility levels, life expectancy, GDP growth and net migration. Among others, population projections in the tough scenario assume lower levels of fertility, higher life expectancy and lower net migration, leading to an ageing society and thus an increasing dependency rate. In contrast, population ageing is less severe and net migration is higher in the friendly scenario, resulting in less negative developments for the working age population.

2.3 Changes in Labor Supply

Future changes in aggregate labor supply are driven by two main components: a structural component triggering population changes in both numbers and composition and a behavioral component that takes into account if and how transitions in the stock of the working age population will transfer to the labor market. A one percent increase of the working age population, for instance, may not necessarily result in a one percent rise in hours worked, due to differential labor supply behavior across worker types: for example, married females work less hours than single males, on average. Both components are modeled within WP 10.

As for the second component, state-of-the-art structural labor supply models are needed to estimate how changes in the population translate into changes in labor supply. While deliverables D10.4 and D10.5 set up a labor supply model for Germany, D10.6 provides a harmonized framework for the estimation of labor supply responses to wage changes, applying the same structural model to a comparable

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2See Dolls et al. (2012, D10.5) for Germany and Dolls et al. (2014, D10.9) for the EU.
database covering 17 European countries and the US. Elasticities of labor supply are estimated separately by gender and marital status. The results provide evidence that labor supply elasticities are rather uniform across countries and relatively small, suggesting that workers’ labor supply varies little when wages change. Nonetheless, differences exist between countries, reflecting varying individual and social preferences, primarily in work preferences and child care policies. In contrast, different tax-benefit systems add little to the observed heterogeneity across countries.

We distinguish structural from behavioral aspects of labor supply. As explained above, the structural component accounts for changes in size and composition of the working age population, such as the distribution of the workforce along age groups, gender, skill levels, regions and household types. In turn, the behavioral component covers differences in labor supply behavior among these socio-demographic groups. For example, the labor supply of single, prime-aged males differs from the average labor supply of married women with children. Our methodology allows us to correctly assess labor market effects of demographic change by distinguishing structural and behavioral dimensions of labor supply.

2.4 Labor Market Effects and Adjustments in Wages

In order to assess potential effects of demographic change for both sides of the labor market, the analysis of labor supply is supplemented by a link to the demand side, allowing the investigation and quantification of partial equilibrium effects. In detail, a linking mechanism between labor supply and labor demand is modeled by using country-specific estimates of the labor demand elasticity as a parameter for firms’ labor demand behavior and iterating changes in labor supply and demand until convergence. D10.3 presents the underlying theoretical foundations of firm behavior and provides, based on rich plant-level data, empirical estimates of the elasticity of labor demand for Germany. Consistent with theory, the estimates of the elasticity of labor demand are negative, showing that firms’ demand for labor decreases when wages increase. The results further highlight that firms’ demand for labor is more elastic for unskilled than for high-skilled labor, suggesting that unskilled workers’ tasks may be substituted more easily. Due to a lack of comparable firm-level data, benchmark elasticities of labor demand for the EU-27 are obtained by means of a meta-regression analysis of the relevant empirical literature (see D10.7). Based

While the literature on individual labor supply behavior is vast, empirical findings are hard to compare due to methodological differences. Therefore, the paper is a major contribution to the literature.
on 784 estimates of the labor demand elasticity from 82 different micro-level studies, the deliverable identifies key variables affecting the magnitude of the elasticity and provides predicted benchmark elasticities for Continental, Nordic, Southern and Eastern European countries as well as for the UK and Ireland. Estimates differ considerably across these groups of countries, possibly due to differences in employment protection legislation and other country-specific labor market institutions.

Given constant micro-level elasticities for both sides of the labor market, it is hence possible to capture partial equilibrium effects by means of demand side reactions and wage adjustments as a response to demographic change. To incorporate divergent developments across the population, the procedure is applied to twelve sub-labor markets separately, distinguishing workers by gender, marital status and qualification. **D10.4** provides detailed information on the iteration mechanism and highlights the relevance of linking both sides of the labor market when assessing labor market reforms using Germany as a case study. **D10.8** extends this rationale to the EU-27 countries.

## 3 Key Findings

The following section presents the main results obtained by means of the methodological framework described in Section 2. We focus on results in terms of (i) labor supply, (ii) partial equilibrium effects, (iii) distributional implication, and (iv) the effects of potential policies to accommodate the projected labor market outcomes. For reasons of clarity, we focus on the six largest EU countries and the tough scenario as the more extreme and pessimistic future. Country-specific results can be found in the respective deliverables.

### 3.1 Labor supply in 2030

As laid out before, labor supply is determined by a structural component, which is shaped by population changes, and a behavioral component. Figure 1 presents total population developments in the tough scenario for selected countries. Whereas the overall population is going to decrease in Germany (−11.6%), Poland (−8.8%) and Spain (−2.6%), it will rise in France (+5.4%) and the UK (+8.8%). Regarding population ageing, the share of elderly people (above 65) is projected to increase in almost every country.
Using Germany as a case study, D10.5 demonstrates how changes in population translate into changes in labor supply. Both the size of the workforce as well as the number of total hours supplied are predicted to substantially decrease until 2030. However, the decline in working hours even exceeds the headcount reduction due to a larger share of elderly workers (50 to 65) in the labor force. This age group supplies less hours compared to young or middle-aged workers. When applying the framework to the EU-27, the results obtained in D10.9 show that the overall labor force is projected to shrink in most EU countries while at the same time becoming older and better educated. Yet, cross-country differences in demographic change are apparent.
To be precise, and according to the tough scenario projections, the labor force in EU-27 countries is projected to shrink by 8.7% on average up to 2030. Particularly sharp declines in the total labor force are projected for Germany (−18.7%) and Poland (−16%), whereas changes in the total labor force amount to −2.7% and −8.0% for France and Spain, respectively (cf. Figure 2). In the friendly scenario, changes in the working age population are generally less dramatic and in some cases positive: for France and Spain, the total labor force is predicted to increase by 0.5% and 5.8%, respectively; whereas the working age population decreases by −11.1% and −10.2% in Germany and Poland in turn.\(^4\) When accounting for behavioral aspects of labor supply, divergent trends across countries become even more visible. In most countries, behavioral effects counteract the structural effects on labor supply. For example, in the tough scenario, behavioral responses partly make up for the decline in heads in most countries. Yet, in some countries, such as Spain and Germany, behavioral responses amplify the structural decline in the working age population. Figure 3 illustrates the relative magnitude of structural and behavioral labor supply effects for the EU-27 in the tough scenario: countries in which the behavioral effect amplifies the structural effect are displayed below the 45-degree line. Here, demographic change is aggravated by individual labor supply behavior. Table 1 summarizes the range of demographic developments implied by our projections.

\(^4\)See also Figure 2.
### Table 1: Projected change in main indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Tough</th>
<th>Friendly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>average</td>
<td>min</td>
</tr>
<tr>
<td>Total population</td>
<td>-2.6%</td>
<td>-23% (BG)</td>
</tr>
<tr>
<td>Share of aged 65+</td>
<td>+5.8pp</td>
<td>+2.5pp (SE)</td>
</tr>
<tr>
<td>Total labor force</td>
<td>-9.2%</td>
<td>-29% (BG)</td>
</tr>
<tr>
<td>Share of low skilled</td>
<td>-5.5pp</td>
<td>-15pp (PT)</td>
</tr>
<tr>
<td>... medium skilled</td>
<td>-0.4pp</td>
<td>-11pp (LT)</td>
</tr>
<tr>
<td>... high skilled</td>
<td>+5.9pp</td>
<td>+0.9pp (DE)</td>
</tr>
<tr>
<td>Employment rate</td>
<td>+0.0pp</td>
<td>-2.6pp (AT)</td>
</tr>
<tr>
<td>Hours worked (WA)</td>
<td>+1.7pp</td>
<td>-1.7pp (AT)</td>
</tr>
<tr>
<td>Hours worked (WA)</td>
<td>-8.8%</td>
<td>-30% (BG)</td>
</tr>
<tr>
<td>Hours worked (WA)</td>
<td>-8.7%</td>
<td>-30% (BG)</td>
</tr>
</tbody>
</table>

Notes: EU-27 average change (unweighted); WA = with wage adjustments.

### 3.2 Labor Demand Effects and Wage Adjustments

Having identified labor supply effects in response to demographic change, demand effects are introduced to obtain partial equilibrium results for the labor market in 2030 and to analyze the impact of demographic change on wages. As explained above, labor demand elasticities are fed into our model, and a labor market equilibrium is obtained by deriving the intersection of the supply and the demand curve. **D10.8** shows that shifts in wages can generally be attributed to demographic change and subsequent reactions in the labor market. Adjustments in wages due to demographic change reflect the upskilling and ageing of the population and are, on average, positive (displayed by the dark gray bars in Figure 4). Most notably, due to considerable predicted increases in educational attainment, large wage increases are found for Greece, Poland and Portugal, among others. In turn, wage changes due to labor market adjustments reflect changing scarcities in labor supply. Here, results differ by country and the underlying scenario. As an example, wages are projected to decrease in Luxembourg and Sweden due to an increasing labor force in these countries. In turn, wage increases due to market adjustments are expected to be particularly strong in Bulgaria, Germany, Estonia and Latvia, which are the countries with the strongest decrease in headcount. Figure 4 plots average changes in the wage rates, due to demographic change and labor market adjustments for the tough scenario. In terms of an overall picture, wage rates are found to respond to excess or abundant labor supply, decreasing in the former and increasing in the latter case, while being accompanied by developments in skill-upgrading or ageing.
Figure 4: Decomposition of wage changes

Results from Supply-Demand Link. Countries are ordered by total wage change in ascending order.

Subsequently, projected labor supply shocks and labor demand elasticities are used as input parameters in order to allow a feedback process between labor supply, demand and wages. Allowing wages to adjust to changes in labor supply dampens the effects of demographic change on the total hours supplied. However, effects are rather small. For the EU-27, total hours worked decrease by 8.9 million when wage adjustments are not considered, and they fall by around 8.5 million when wages are allowed to respond to scarcities. Overall, the results suggest that demographic change leads to a sharp decline in total hours supplied in the EU-27, which is accompanied by considerable increases in wage rates as a response to arising scarcities.

3.3 Distributional Effects

How do these changes of the partial labor market equilibria in the EU-27 affect the income distribution? D10.11 assesses the distributional consequences of demographic change under current tax-benefit systems by applying decomposition techniques to isolate distributional effects due to demographic change from those being caused by wage adjustments at the labor market. Relying on employment and wage projections for 2030, results suggest that inequality and poverty levels are likely to decline in the EU-27 over the next few decades. Adjusting tax-benefit policy parameters according to changes in wages, the EU-average Gini index is projected to decrease in both the tough (–0.3%) and friendly (–1.3%) scenario, the effect being driven
Projected effects are obtained using uprated policy parameters, employing the mean change in disposable income between 2010 and 2030 as uprate factor. Countries are ordered by total change in the Gini coefficient in ascending order.

by predicted increases in wages. However, developments differ quite substantially across the EU-27. The analysis points to convergence of inequality levels across the EU, as some countries with rather high current levels of inequality (Southern and Eastern European countries, in particular) are projected to experience large declines in inequality, particularly due to changes in wages. For example, based on the population projections of the “tough” scenario, the Gini index is projected to decrease for Spain (–7.5%), Cyprus (–8.4%) and Romania (–11.0%). However, the projections also imply large increases in the Gini index in the Continental European and Nordic countries, especially for Germany (+17.6%) and Denmark (+8.1%). Here, increases in predicted inequality are due to income increases for the top half of the income distribution, indicating the need for policy intervention.

3.4 Evaluation of Policy Measures

Increasing dependency ratios (defined as the old-age population divided by the working age population) are most likely to impact the fiscal budgets of all EU-27 countries, but in particular those with generous health insurance and pension systems. Simulating an obvious policy response to population ageing in D10.10, we assess the fiscal effects of increases in the statutory retirement age for the EU-27 countries by 2030.
In order to properly gauge these fiscal effects, reforms are assessed against a benchmark scenario in which current retirement policies are assumed to remain constant until 2030. In line with the previous analysis, we first project the labor force for 2030, providing evidence that, for most countries, the share of the old-age population (65 or above) increases, whereas the working age population (15-64) markedly decreases. Old-age dependency ratios are thus projected to increase considerably, ranging between 0.28 in Ireland and 0.45 in Germany in 2030. In a second step, labor market effects in response to structural changes in the population are estimated, accounting for wage adjustments. Based on these predictions, the fiscal budget for 2030 is estimated for each country while keeping retirement age at the 2010 levels. Overall, fiscal balances – defined by the sum of all personal taxes and social insurance contributions (SIC) less the sum of cash benefits – are predicted to decrease in almost every country by 2030. In detail, the calculations show that Eastern European countries, such as Latvia, Romania or Slovakia, as well as Germany will experience a substantial worsening in fiscal budgets absent reforms. Here, negative effects on total fiscal budgets are particularly driven by considerable increases in cash benefits, offsetting positive effects due to higher tax revenues. In turn, positive effects on the fiscal budgets are found for the UK and Ireland, due to substantial predicted immigration flows. Moreover, the pension systems in both countries heavily rely on private contributions and company pensions plans.

Figure 6: Effect of Retirement Age reform on fiscal balances; no labor market adjustments

Note: To make fiscal balances comparable across countries, figures are normalized by the sum of disposable income. D = Demographic change only; DR = Demographic change and Retirement Age Reform.
Given the projected effects of the benchmark scenario, two potential reforms of the legal retirement age are simulated for each country, and changes in employment and fiscal budget are assessed. Reform 1 raises the (gender-specific) retirement age by 5 years in every country. In contrast, Reform 2 proposes a single retirement age of 70 across all countries and for both females and males. Both reforms raise current retirement age levels considerably, ranging between 60 (France) and 68 years (Finland) at the time of the analysis.

Based on the projected employment rates, counterfactual aggregate hours worked and fiscal effects are obtained. Comparing outcomes for both scenarios with the benchmark, fiscal budgets are found to increase in most countries in both demographic scenarios. Figure 6 plots the relative change in fiscal balances due to retirement age reform No. 1, highlighting the heterogeneity in the magnitude of budget effects across countries. When taking wage adjustments into consideration, differences in the budget change between countries become smaller.

4 Interactions with other Work Packages

We next relate our findings to the pieces of evidence obtained in other Work Packages of the NEUJOBS consortium, placing particular emphasis on policy relevant conclusions that can be drawn when combining results.

The first point worth noting is that, based on the demographic projections superimposed for the entire NEUJOBS project, both our micro-based as well as the macro approach applied in Work Package 9 predict comparable aggregate developments for the total European labor force until 2030, accompanied by an up-skilling of the average worker (Boitier et al., 2011, D10.9)). Qualitatively similar results are also found with respect to expected fiscal balances (Boitier et al., 2011, p. 22). Gains in aggregate educational attainment may foster sustainable growth in the longer run, given that knowledge-intensive jobs will become more important. In fact, the expected socio-ecological transition, requiring advances in energy production and efficiency and, hence, technological innovations (Colijn and van Ark, 2014, D3.9), is likely to be a driver of growth in knowledge-intensive jobs. Yet, as stressed by Beblavy, Teteryatnikova and Thum (2013, D4.4.2b), policy reforms that foster educational attainment must not lead to an inflation of tertiary educational degrees accompanied by reductions in training standards. Instead, proactive policy reforms should carefully identify future occupational demands in order to mitigate shortages,
such as in the STEM professions (Beblavy, Lehouelleur and Maselli, 2013, D4.4.2a).

However, a general tendency of up-skilling combined with the commonly observed pattern of job polarization, defined by disproportionate job growth at the upper and lower end of the skill distribution (see, for example, Massari et al. (2013, D3.6), may have negative labor market implications. As highlighted by Beblavy and Veselkova (2014, D4.6), this co-movement may result in a continued filling of low-skilled jobs by medium-skilled workers, a situation that may be costly for firms, individuals and thus the entire economy (McGuinness, 2006). Analyzing the potential of "green" jobs in the EU, Colijn (2014, D4.2) stresses that adaption to socio-ecological change may provide a counterweight to the decline of medium-skilled jobs in the economy, given that "green" jobs are rather technical and hence support medium-skilled occupations in particular. In light of likely socio-ecological transitions, investment in skills and promotion of educational attainment at all ages (Maselli and Beblavy, 2013, D4.4.3) seems favorable from a policy perspective.

Accompanied by the decline in the overall EU workforce, our results further highlight that the share of elderly workers in the workforce will significantly increase up to 2030. Given that elderly workers nowadays supply less hours than middle- or young-aged workers, the negative effects on total hours supplied may reinforce the negative labor market effects due to declines in the total EU workforce. Hence, suitable policy reforms need to be designed in order to cope with population ageing by increasing the participation rates of elderly workers both at the extensive and intensive margin. Ruzik-Sierdzinska (2014, D17.5) highlights several potential factors that may lead to higher participation rates of elderly workers, emphasizing that benefit systems, taxes, labor market regulation, education, training policies and active labor market programs all seem to affect the economic activity of the elderly.

In general, the decline in the overall workforce and hence the rise of dependency ratios is likely to impact fiscal budgets, in particular those countries with generous health insurance and pension systems. Increases in the legal retirement age and a harmonization of statutory retirement ages for men and women are thus crucial policy instruments to cope with the consequences of demographic change. Along with our findings on positive fiscal budget effects of retirement age reforms (Paulus et al., 2014, D10.10), Baran et al. (2014, D16.5) show that increases in the retirement age for women have crucial impacts on their retirement decisions and postpone women’s withdrawal from the labor market. As those reforms are regularly perceived with skepticism in the general public, some flexibility in the retirement regulations might be beneficial, for example, by allowing early retirement
if a given minimum contributory period has been exceeded (Styczyńska and Zaman, 2013, D8.6).

Of course there are many other policies that could be implemented to address the labor market challenges imposed by demographic change. Any fertility enhancing measure would lead to a decrease in the dependency ratio in the long-term. Even such fertility centered policies are manifold. They range from simple financial incentives for parents to programs facilitating the combination of work and family such as the extension and improvement of child care facilities (Baran et al., 2014, D16.5). Another important field is migration policy. While the populations of many European countries are ageing and shrinking, other countries have a large and mobile labor force, which could help to overcome shortages – especially in high-skilled professions. De Somer (2012, D18.1) provides a detailed overview of EU migration policies and the global race for talents.

5 Concluding Remarks

Work Package 10 analyzes the impact of demographic change, one of the key transitions affecting European societies in the upcoming decades, on EU labor markets. Based on a detailed micro dataset for the EU 27, we model the evolution of both labor supply and labor demand until 2030 by combining structural empirical models and state-of-the-art reweighting techniques. Relying on the comprehensive European tax-benefit calculator EUROMOD, we use micro-simulation techniques to project the potential fiscal strain, distributional imbalances and the scope of specific policies, such as increasing the statutory retirement age to mitigate the adverse effects of demographic change, on European labor markets.

The results of this analysis are manifold. First, whereas the underlying demographic projections suggest that the population will not decline uniformly in every European country, population ageing will be a problem hitting almost every EU-27 country. On average, the labor force will shrink by 8.7% up to 2030 in the tough scenario, which we consider the more realistic benchmark. At the same time, workers become older on the one hand and better educated on the other.

From a methodological point to view, our analysis stresses the importance of accounting for individual and firm behavior. First, labor supply can both mitigate and amplify negative trends of demographic change on the labor market. Second, labor demand will certainly respond to arising scarcities on the supply side, leading
to positive but quite heterogeneous wage adjustments across European countries.

As regards the issue of redistribution, increasing wages and decreasing total hours of work are shown to lead to a convergence of inequality levels across Europe. This might be seen as a favorable side effect, which however comes at the cost of increased fiscal strain on almost all countries’ national budgets. Given that longevity is projected to increase while fertility is declining in many European countries, fiscal imbalances will be driven by sharp rises in dependency ratios.

Based on a simple simulation exercise, we propose a way to address these foreseeable challenges to the pension system by increasing the statutory retirement age. This policy proves to be an effective measure to counteract the fiscal strains and adjust pension systems to changed working life realities.5

Overall, the findings of this Work Package suggest that a relatively smaller labor force might drive wages upwards. This has consequences for the role of national governments to cope with population ageing. It is widely believed that an ageing society will lead to increasing strain on public budgets as a consequence of higher expenditures for public pensions and health systems. In our analysis, we emphasize a channel that is often neglected, namely, labor market effects arising from scarcities in supply of the production factor labor. As this is likely to trigger wage effects and hence influence public revenues, there might be considerable capacities for various policy measures to counteract adverse effects of population ageing.

\[5\] See also the CGE study by Börsch-Supan et al. (2014), who conclude that living standards in Europe can be maintained in spite of population ageing if modest reform steps are taken. This is particularly interesting, as their methodological approach is complementary to ours.
References


