

Labor Force Projections for Europe by Age, Sex, and Highest Level of Educational Attainment, 2008 to 2053

Elke Loichinger

Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/OeAW, WU),
Vienna University of Economics and Business
elke.loichinger@wu.ac.at

- Submission for PAA 2013, New Orleans -

Motivation

A lot of research has been done on the potential economic consequences of population aging. One topic that has gotten a lot of attention is the expected shrinkage (in absolute and relative terms) of the working-age population (i.e. the population between 15 and 65 years). At the same time, the share of people above the age of 65 is going to increase significantly in all European countries. If patterns of economic activity stay at current levels, the labor force is going to shrink, meaning that a decreasing number of workers will have to produce a sufficient amount of output to support themselves and an increasing number of non-workers.

However, the absolute and relative size of the labor force is only one aspect when it comes to estimating future total output and economic growth. The fact that a smaller but more productive labor force might be able to alleviate some or all of the expected financial consequences of population aging is another aspect that is mentioned and quantified more and more often (Fougere, Harvey, Mercenier et al. 2009, Ludwig, Schelkle and Vogel 2008, Leibfritz and Roeger 2008, Lee and Mason 2010). Ludwig, Schelkle and Vogel (2008) and Fougere, Harvey, Mercenier et al. (2009) demonstrate that the predicted endogenous increase of future young generations in the investment in human capital – due to expected higher returns to education – will lead to an overall better skilled and more productive labor force.

The majority of existing long-term labor force projections is based on explicit assumptions about the future development of age- and sex-specific participation rates, which are then applied to age- and sex-specific population projections. This allows estimating the absolute future size (quantity dimension) of the labor force as well as its composition by age and sex, but does not allow any inference about the skill composition of future workforce (quality dimension).

The goal of this paper is to show how the inclusion of education (as a proxy for the qualification of the labor force) changes the outcome of labor force projections compared to projections that do not account for educational differences. The outcome will be compared in terms of (a) total

size of as well as (b) the composition of the labor force. The analysis covers 26 EU countries (all EU27 countries except Malta), and projects labor supply until 2053.

Method and data

The labor force projections (from 2008 to 2053, in five-year intervals) are performed in three main steps:

1. Projection of labor force participation for each country by age, sex, and highest level of educational attainment.
2. Projection of the population of each country by age, sex, and highest level of educational attainment.
3. Combination of the results of the participation and the population projections, in order to get the future labor force in each country by age, sex and education.

Estimates of past and present labor force participation rates by age, sex, and highest level of educational attainment are based on the European Labor Force Survey (EU LFS), collected by the national statistical institutes and provided by Eurostat (European Commission 2010). These cross-sectional data are suited particularly well for comparisons across time and space since the used concepts, definitions and classifications are harmonized by Eurostat to allow explicitly for comparative analyses.

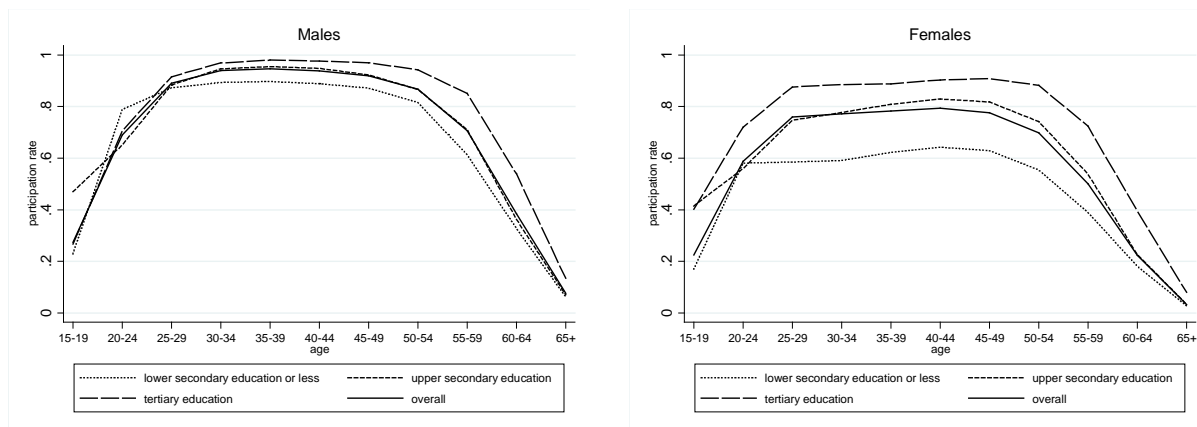


Figure 1: Labor force participation rates for all EU27 countries (except Malta) combined, by highest level of educational attainment, age and sex, average of years 2004-2008 (EU LFS, own calculations).

Labor force participation and education are positively correlated. Focusing on the countries of the present analysis, labor force participation by age and highest level of educational attainment follows the same profile as the profile only by age (see Figure 1): lower participation for younger and older age-groups, and an almost flat section for the middle ages. Since the majority of the

European labor force has a non-tertiary degree, the overall profile is determined by the rates of those without tertiary education. For the middle ages, the difference between educational groups is greater for women than for men. At the same time, differences between the rates of men and women are negatively correlated with the highest level of educational attainment.

The six scenarios of future labor force participation are:

- (1) **Constant scenario.** Labor force participation rates are kept at the level that was observed in 2008.
- (2) **Cohort scenario.** In this scenario, cohort developments in participation between 2003 and 2008 are analyzed and enter the projection.
- (3) **Benchmark scenario.** Participation is modeled towards a given distribution.
- (4) **Equalization scenario.** Female participation in 2053 reaches the levels that are observed for males in 2008.
- (5) **Retirement scenario.** In this scenario, labor force participation of older workers (aged 55+) is assumed to increase by a certain percentage each 5-year period between 2008 and 2053.
- (6) **Combination scenario.** This scenario combines the assumptions in scenario 4 and 5.

The population data are the result of population projections by age, sex and highest level of educational attainment that have been done using the specifications for fertility, mortality, migration and the education transitions as laid out in KC, Barakat, Goujon et al. (2010), the only difference being that the assumptions about the future development of fertility, mortality and migration have been updated with the latest Version of the World Population Prospects (United Nations 2011). The education transitions are those of the GET (Global Education Trend) scenario whose transitions are based on the development of historical global patterns of educational expansion.

Figure 2 shows the population composition in 2010 and 2050 by age, sex and highest level of educational attainment for all 26 countries combined. The share of the population 15 years and older who finished at primary education is projected to decrease from 13.2 % in 2010 to 4.5 % in 2050. At the same time, the share of the population with a secondary degree will decrease from 66.7 % to 59.7 %. This reduction in the share of the population that holds a non-tertiary degree is naturally accompanied by an equivalent increase in the share with a tertiary degree: In 2010, 20.1 % of persons ages 15+ had a tertiary degree. Until 2050, this is expected to change significantly: the average share of higher-educated persons ages 15+ will increase by 78.0 %, meaning that 35.8 % will have a tertiary degree.

Besides projecting the labor force education-specific, the labor force is also estimated across both education categories and the results with and without differentiation by education are compared in terms of absolute labor force size.

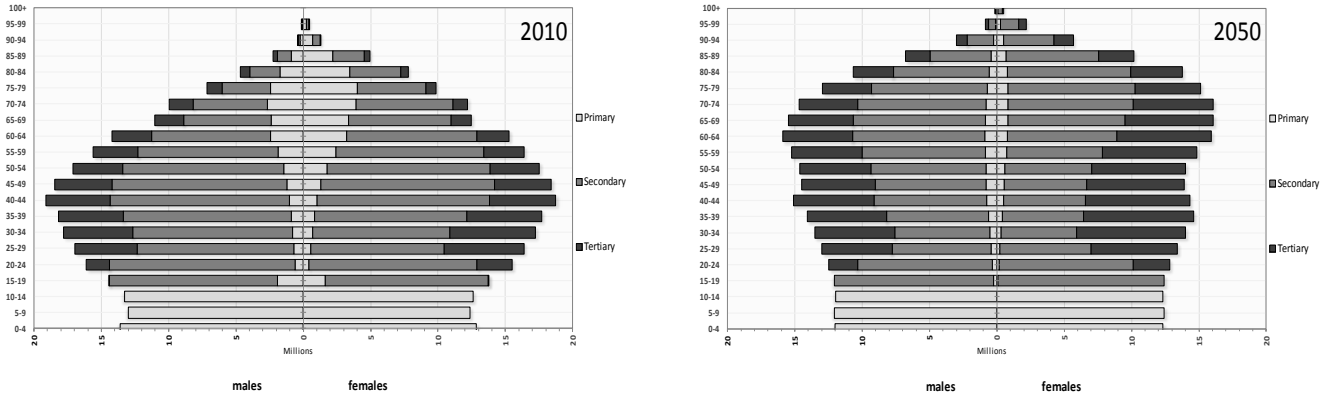


Figure 2: Population pyramid for ages 15+, all EU27 countries combined (except Malta), 2010 and 2050. Education categories: lower secondary (ISCED levels 0 and 1), secondary (ISCED levels 2,3 and 4), and tertiary (ISCED levels 5 and 6) (EU LFS, own calculations).

Results

For each scenario, i.e. irrespective of the assumptions about future development of the labor force, adding the education dimension leads to a larger projected labor force than without it. The effect, though, is moderate if not small. The magnitude of the effect varies across countries and scenarios and increases over time, but does in 2053 in no case exceed 8 % (the average across countries and scenarios in 2053 is 3 %). The general development of the size of the labor force is driven by the specification of the scenario, not whether the scenario is estimated with or without education differentiation of participation.

As far as the educational composition of the labor force is concerned, there will be a shift toward higher degrees between 2008 and 2053. The fact that the share of the population that holds a tertiary degree will increase in each of the 26 countries during the next decades, in combination with higher participation rates of the higher educated, leads to an overall better educated labor force: in all 26 countries combined, the share of 20- to 64- year old workers that possess a tertiary degree is going to increase from 27 % in 2008 to 46 % in 2053 (under the assumptions of the combination scenario; differences between scenarios are small though). Given that countries differ greatly in the educational composition of their populations as well as the education-specific labor force participation, it is not surprising that there are large differences between countries. This result of a better educated labor force is robust in the sense that it holds for each participation scenario and also for the analyzed subgroups (gender and age-groups).

In the discourse about how to alleviate some of the expected economic consequences of population aging, one of the factors that can act as a possible leverage is productivity in general, and labor productivity in particular. With the present projections of human-capital-specific labor supply, it is possible to calculate future output including differentials in productivity due to differing levels of human capital and compare these results with calculations that are done without the human capital dimension (e.g. Prskawetz, Fent and Guest 2008).

References

- European Commission (2010). European Union Labour Force Survey (yearly microdata files), Eurostat.
- Fougere, M., S. Harvey, J. Mercenier, et al. (2009). "Population ageing, time allocation and human capital: A general equilibrium analysis for Canada." *Economic Modelling* 26 (1): 30-39.
- KC, S., B. Barakat, A. Goujon, et al. (2010). "Projection of populations by level of educational attainment, age, and sex for 120 countries for 2005-2050." *Demographic Research* 22 (15): 383-472.
- Lee, R. and A. Mason (2010). "Some macroeconomic aspects of global population aging." *Demography* 47-Supplement: 151-172.
- Leibfritz, W. and W. Roeger (2008). "The Effects of Aging on Labor Markets and Economic Growth". in: I. Hamm, H. Seitz and M. Werding. *Demographic Change in Germany. The Economic and Fiscal Consequences*. Berlin Heidelberg, Springer.
- Ludwig, A., T. Schelkle and E. Vogel (2008). "Demographic Change, Education and Welfare."
- Prskawetz, A., T. Fent and R. Guest (2008). "Workforce Aging and Labor Productivity: The Role of Supply and Demand for Labor in the G7 Countries." *Population and Development Review* 34 (Special Issue: Population Aging, Human Capital Accumulation, and Productivity Growth): 298-323.
- United Nations (2011). "World Population Prospects: The 2010 Revision."