1.3. What is the role of demography and education on future Portuguese output growth?

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1. Motivation

Similarly to other developed countries, Portugal is undergoing profound changes in its age structure as a result of low fertility rates and an ongoing rise in average life expectancy. Over the last years, this process has intensified, and population has started to decline. The impact of the demographic transition is therefore already visible and not only a long-term concern.

Demographic changes are phenomena that can cause profound changes in social, economic and political structures. In particular, there are questions on the impact on public finances, namely in terms of expenditure on health and especially pensions, on the effect of changes to the voters' age structure on the approval of certain policies and, more generally, on the impact on economic growth. In this Section we discuss the main trends implied in demographic projections and their implications for Portuguese economic growth in the next decades.

2. Demographic projections for 2016-2070

Eurostat's latest demographic projections for 2016-2070 point to a marked change in the Portuguese population's age structure over the next decades (Figure 5). This evolution reflects fertility rates below replacement levels and an ongoing increase in average life expectancy (Figure 6). Net migration flows are projected to be positive, but of low magnitude.

Based on the dynamics of these variables, projections show a gradual reduction in total population to around 8.0 million in 2070 (23 per cent less than in 2016), essentially reflecting the trend in the working-age population (15-64), for which a 37 per cent decline is projected (Figure 7a).

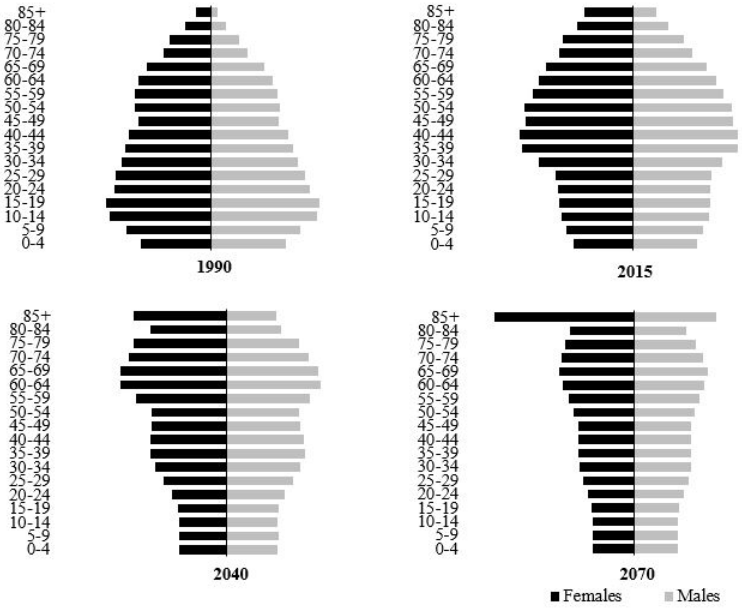
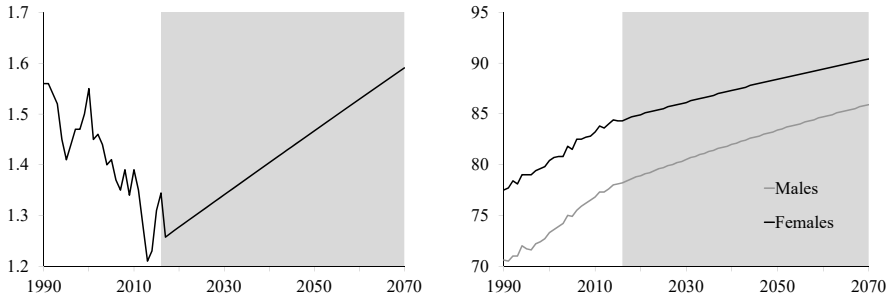


Figure 5: Age distribution of the Portuguese population
Sources: Eurostat and authors' calculations.

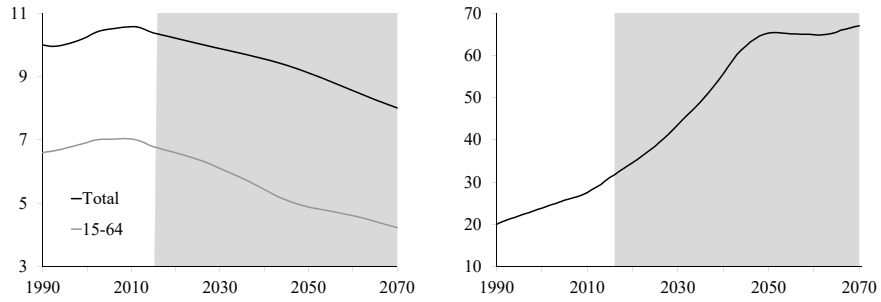


(a) Total fertility rate

(b) Life expectancy at birth

Figure 6: Fertility rate and life expectancy
Notes: Shaded area – projections. Total fertility rate – number of births per women; life expectancy – years.
Sources: Eurostat and authors' calculations.

In tandem with a decrease in population, ageing is projected to intensify, translating into a gradual increase of the old-age dependency ratio from 32 per cent in 2016 to 67 per cent in 2070 (Figure 7b). The evolution of this ratio reflects a sharp increase in the share of population aged 65 and over combined with an also quite marked decline in the share of the working-age population.



(a) Population (b) Old-age dependency ratio

Figure 7: Population and old-age dependency ratio

Notes: Shaded area – projections. Population – millions of people. Old-age dependency ratio – population aged 65 and over as a % of the population aged 15-64.
Sources: Eurostat and authors' calculations.

3. Impact on economic growth: methodology

The impact of the demographic transition on economic growth may be addressed from different perspectives. We adopted a growth accounting perspective to the detriment of a more complex analysis relying on a macroeconomic model. This exercise is therefore a first approach to the impact of the demographic transition on growth rather than an exhaustive analysis that considers the interaction among different growth factors.

As a starting point, a Cobb-Douglas production function with the following specification has been considered:

$$Y = A(hL)^{\alpha}K^{(1-\alpha)}, \tag{3}$$

where Y represents real GDP, A corresponds to total factor productivity (TFP), h to the level of human capital as measured by the average number of years of schooling of the labour force, L to the quantity of labour, K to the capital stock and α to the GDP elasticity with respect to labour. By using a Cobb-Douglas production function one assumes a unitary elasticity of substitution across factors.

Taking the logarithm and considering the first difference, growth of GDP *per capita* can be written as follows:

$$\frac{\widehat{Y}}{P} = \widehat{A} + \alpha\widehat{h} + \alpha\frac{\widehat{L}}{P} + (1-\alpha)\frac{\widehat{K}}{P}, \tag{4}$$

where P corresponds to total population. So as to isolate the impact of demographic developments in a strict sense, employment *per capita* can be broken down into:

$$\frac{L}{P} = \frac{L}{P_A} \times \frac{P_A}{P_{15-64}} \times \frac{P_{15-64}}{P}, \tag{5}$$

where P_A corresponds to the labour force and P_{15-64} to population aged 15-64. The capital stock *per capita* can be broken down into:

$$\frac{K}{P} = \frac{K}{L} \times \frac{L}{P} \tag{6}$$

Hence, growth of GDP *per capita* can be broken down into the following contributions:

$$\begin{aligned} \frac{\widehat{Y}}{P} = \underbrace{\widehat{A}}_{\text{TFP}} + \underbrace{\alpha\widehat{h}}_{\text{Human capital}} + \underbrace{\widehat{\frac{L}{P_A}}}_{\text{Employment rate}} + \underbrace{\widehat{\frac{P_A}{P_{15-64}}}}_{\text{Activity rate}} \\ + \underbrace{\widehat{\frac{P_{15-64}}{P}}}_{\text{Pure demographic effect}} + \underbrace{(1-\alpha)\widehat{\frac{K}{L}}}_{\text{Capital stock per worker}} \end{aligned} \tag{7}$$

In this Section, we focus on the contribution from human capital, the employment rate, the activity rate and the pure demographic effect, not analysing the contribution from the other two components (TFP and capital stock per worker).

The α elasticity is approximated by the historical labour income share as a percentage of value added, which equals 0.64 (see Almeida and Félix (2006)).

As far as human capital is concerned, it is assumed that the average number of years of schooling of the labour force will continue to increase, converging to around 12 years in 2070.[7] This results from the fact that the level of human capital in Portugal is quite low in comparison with other developed countries. In particular, in 2018 around 56% of the labour force had completed secondary education, against around 78% in the euro area (Eurostat – Labour Force Survey). The quality of human capital, although relevant, is not taken into account in the analysis because it is difficult to quantify, particularly in the context of a projection scenario.

7 The average number of years of schooling of the labour force in the period 2016-18 was computed using the Labour Force Survey of Statistics Portugal and it is approximately equal to 10. For a longer series, computed from the data of Barro and Lee (2013), see Banco de Portugal (2015).

For the employment rate, activity rate and pure demographic effect, the projections from Eurostat and European Commission (European Commission (2018)) were used.

There is high uncertainty surrounding the projections of net migration flows and projections for these flows take into account the number of persons, without considering their level of education. In addition to this limitation, there are endogeneity issues inherent to the exercise. As such, results should be interpreted with caution.

4. Impact on economic growth: results

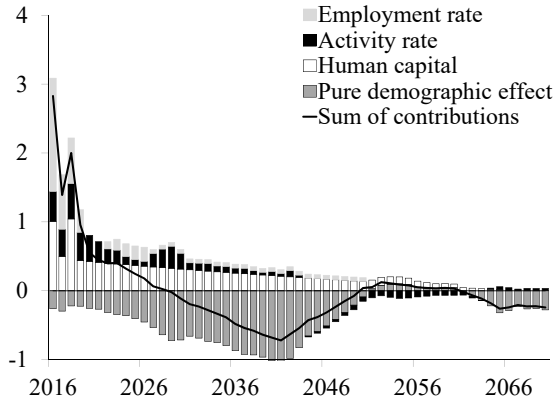
Figure 8 shows the contribution of each component under analysis to GDP *per capita* growth, both for each year and in cumulative terms.

An immediate conclusion is that pure demographic developments – as measured by the ratio of population aged 15-64 to total population – have a very sharp negative contribution to GDP *per capita* growth up to 2050, more pronounced until the early 2040s. In cumulative terms, this contribution amounts to -19.7 p.p. in 2050 and -21.1 p.p. in 2070. The contribution from human capital is expected to partially offset the negative contribution from the pure demographic effect. Cumulatively, its contribution amounts to 10.4 p.p. in 2050 and 11.5 p.p. in 2070. The contribution from the employment rate is particularly strong up to 2019, reflecting the continued decline in the unemployment rate. Subsequently, this contribution becomes somewhat low, as that of the activity rate.

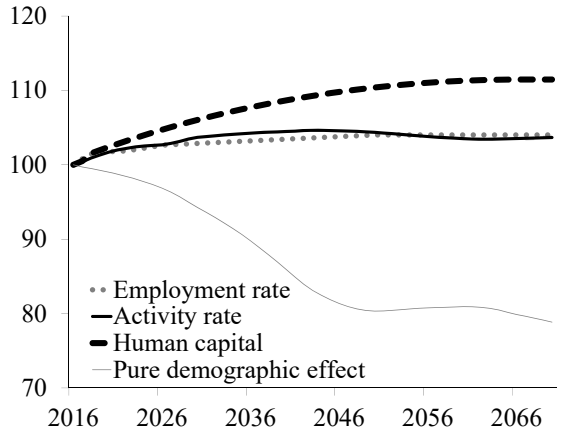
Therefore, the key conclusion drawn from the analysis is that in Portugal the adverse impact of demographic developments on growth will coexist with a favourable impact from a more skilled labour force.

5. Policies and issues for discussion

The economic impact of the population decline and ageing projected for Portugal should be mitigated by a series of suitable public policies. The necessary improvement of the institutional, legal and tax framework governing the activity of economic agents and the increase in quality of public expenditure require measures that in various cases may be more difficult to approve by an older electorate. This stresses the urgency of compromise and approval of the policy guidelines needed for a successful response to demographic challenges.



(a) Annual contributions – percentage points



(b) Cumulative annual contributions – 2016=100

Figure 8: Contributions to GDP *per capita* growth

Sources: Statistics Portugal, projections from Eurostat and European Commission and authors' calculations.

This Section highlights the importance of education policies for mitigating demographic developments, and therefore these policies must be analysed (even more) carefully. In addition, policies that support a higher birth rate, policies to attract (and if necessary integrate) foreign workers, and the revision of employment policies, in particular in the higher age cohorts of the labour force, will also play a relevant role.

These policies should be credible and ongoing, for their success largely depends on agents' expectations. Furthermore, they should be designed in an integrated manner and combined with structural reforms that raise productivity, notably as regards factor mobility, innovation and competition in product markets. Ultimately, the effects of demographic trends should be accommodated via sustained total factor productivity growth.

References

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