ESRI Research Note

Demographics and the Growth Outlook for Europe

Kieran McQuinn and Karl Whelan

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Demographics and the Growth Outlook for Europe

* Kieran McQuinn and Karl Whelan[1]

1. Introduction

With low inflation in the Euro Area taken as a given, a return to steady real GDP growth is likely to be the most effective mechanism for restoring Europe's highly indebted governments, businesses and households to sustainable situations. This paper examines prospects for growth in the Eurozone. It follows up on an earlier paper of ours (McQuinn and Whelan, 2008) that focused on trends up to mid-2006. While the period of growth in Europe prior to the global crisis of 2008 is sometimes referred to as "the boom", our previous paper had noted that long-run trends in both productivity and per capita hours worked were deteriorating to the point where potential output growth in the Euro Area was at a historical low point and apparently on a negative trend. After a long period of catching up with US levels of labour productivity, Euro Area productivity growth had, from the mid-1990s onwards, fallen significantly behind.

In this paper, we update our calculations from our 2008 paper and provide projections of Eurozone growth out to 2060, based on recovery scenarios and long-term demographic trends. Because of data restrictions, we restrict our analysis to the twelve countries that participated in the Euro Area prior to the most recent accessions.[2]

Overall, our findings are sobering for those expecting economic growth to deal with the Euro Area's debt problems over the next decade. Among the results we report are the following:

[1] Whelan is professor of economics at UCD. The authors would like to thank all those who participated at the second CSPR-Modena conference on growth in mature economies for comments on an earlier draft. Any remaining errors are the responsibility of the authors.

[2] These are Ireland, Belgium, the Netherlands, Luxembourg, France, Spain, Portugal, Germany, Finland, Austria, Greece and Italy.

* kieran.mcquinn@esri.ie; Karl.Whelan@ucd.ie

1. Total Factor Productivity (TFP) growth in the Euro Area has almost ground to a halt: it averaged 0.2 per cent per year over the period 2000-2013.
2. The ongoing slump in investment is having negative supply-side effects: low capital stock growth is subtracting about 0.6 per cent per year from potential output growth.
3. The working age (15 to 64) population of the Euro Area has been declining since 2010.
4. We project real GDP growth of just over half of one per cent over the next decade even if unemployment and investment return to their pre-crisis rates by 2020.

2. Growth Accounting Framework

The analytical framework which we use to assess the performance of European countries is similar to that outlined in Byrne and McQuinn (2014) and is based on the standard assumption that output is produced according to a Cobb-Douglas production function

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

where Y_t is real output, K_t is capital input, L_t is labour input (defined in this paper as total hours worked), and A_t is Total Factor Productivity. Output growth can then be expressed as

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \alpha\frac{\dot{K}_t}{K_t} + (1 - \alpha)\frac{\dot{L}_t}{L_t}$$

Using data on output growth, capital growth and labour growth, TFP growth can be calculated. As there is no official capital stock series for the European economy, we construct this series ourselves. To do this we assume that the initial stock of capital in 1970 equals the steady-state value implied by the Solow growth model in this year based on the trends at that point for GDP growth, the investment share of GDP and the growth rate of labour input. The rest of the capital stock series is then derived using the following definition

$$K_t = (1 - \delta)K_{t-1} + I_{t-1}$$

with a depreciation rate of six per cent per annum. For more on the assumptions underpinning the growth calculations see McQuinn and Whelan (2007) and McQuinn and Whelan (2008).[3]

3. Historical Assessment and Likely Future Trends in TFP and Labour Supply

Table 1 presents results for the Euro Area and the US of the growth accounting exercise which allocates output growth according to its three components. Amongst the trends to emerge from the table is the declining rate of TFP growth. Euro Area TFP growth was running at 2.7 per cent in the first half of the 1970s, fell to 1.6 per cent over 1977-1986, to 1.5 per cent over 1987-1996 and to 0.7 per cent over 1997-2006. The period from 2007-2013 has seen TFP decline at an average rate of 0.2 per cent per year, mainly due to a 3 per cent decline in 2009. In terms of assessing likely future trends in Euro Area TFP, we believe that the average growth rate over the period 2000-2013 of 0.2 per cent may well represent a reasonable value for the medium-term growth rate. This period incorporated a number of years of expansion and falling unemployment as well as two periods of rising unemployment so the total cyclical effect on this average is probably quite low.

We now turn to labour market developments in the Euro Area. Labour productivity and hours worked together determine the path of GDP in any economy. Table 2 provides a decomposition of the percentage change in total hours worked as a function of four different components: changes in population, the participation rate (labour force divided by the total population), the employment rate (employment as a fraction of the labour force) and the change in average work week per employee. Figure 1 provides graphical evidence of related variables. It shows that in the period since 1970, European population growth has fluctuated around a relatively low average value of about half of one per cent and has gradually fallen over the past decade. Rising female labour force participation has driven a significant increase in the fraction of the population that is available for work but this series has levelled off in recent

[3] All of the data, with the exception of the average work week is taken from the European Commission AMECO database. Data on the work week is taken from the Groningen Growth and Development Centre (GGDC): www.rug.nl/research/ggdc/.

years. Offsetting the longer-term rise in participation, the average work week has declined steadily and unemployment rates have risen to a much higher average value than those recorded in the early 1970s.

Rather than focus in detail on the factors that have driven past fluctuations in labour input, we want to focus on the outlook for the future. A number of patterns are now in place that point against significant increases in total hours worked in the Euro Area economy in the next few decades.

1. The population of the Euro Area 12 group of countries is expected to grow very slowly over the next few decades. Eurostat projections show 0.18 per cent per year growth in population between 2013 and 2023 followed by a gradual reduction in population growth until population levels begin declining in 2046 (see Figure 2).
2. More seriously, Eurostat estimate that the Euro Area's population in the normal working-age bracket of 15 to 64 years old peaked in 2010 and is set to decline steadily over the next few decades. Eurostat project that the population in the 15 to 64 years old bracket will fall at an average annual rate of 0.21 per cent in the decade finishing in 2023 and then fall at a rate of 0.48 per cent per year in the subsequent decade.
3. Among those who are in the working-age bracket of 15 to 64 years old, the increase in participation rates has gradually tailed off in recent years. This represents female labour force participation reaching a plateau in many countries but also the effects of population ageing. Participation rates fall off as people get closer to the "official" retirement age so the ageing of Europe's population is likely to limit further gains in the participation rate.

4. Longer-Run Outlook

How are these trends likely to shape economic growth in the coming decades? Here, we report results from a simulation of a simple supply-side model that projects growth using recent trends for TFP, uses the demographic projections just described and also assumes an unwinding of the cyclical problems with low investment and high unemployment. Everything up to 2013 is taken from

historical data, so 2014 is the first year of the simulation. The model's ingredients are described as follows:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$
$$K_t = (1 - \delta)K_{t-1} + I_{t-1}$$
$$L_t = (1 - u_t)(p_t \times Pop_t) \times H_t$$
$$I_t = s_t Y_t$$
$$\Delta \log A_t = g$$

The evolution of each country's capital stock depends on last period's rate of investment which we project as a time-varying ratio of total real GDP. Labour input is modelled as a product of the country's employment rate (1 - u_t), the participation rate for those in the work-age population, (p_t), the working age population, (Pop_t) and the average length of the work week (H_t). The assumptions underlying the simulation are as follows:

1. TFP growth is assumed to continue to grow at the Euro Area 2000-2013 average of 0.2 per cent.
2. The ratio of investment to GDP is projected to recover to its 1998-2007 average by 2020 and remain constant thereafter.
3. The unemployment rate is projected to fall gradually to their 1998-2007 averages by 2020 and be constant thereafter.
4. European participation rates of work-age population remains at 2013 levels.
5. Despite the downward trend observed in the average work week, we hold the work week constant from 2014 onwards.
6. The work-age population follows Eurostat projections.

Figures 3 and 4 provide graphic illustrations of how our assumptions translate into Euro Area aggregate labour market outcomes. The reduction in the unemployment rate leads to a temporary increase in total employment up to 2020 before demographic patterns reassert themselves and produce a gradual

decline in employment from there onwards. Our assumption about a constant work week for employees means the projection for hours worked roughly parallels that for employment with an average annual growth rate of 0.38 per cent per annum up to 2020 followed by declines in subsequent decades. Figure 5 illustrates the assumptions for TFP growth and the investment share of GDP with the Euro Area assumed to move towards its average investment rate of the period 1998-2007.

Putting these figures together, we project that output per hour will grow at an average rate of 0.49 per cent over the period 2014-2023 while GDP will grow at an average rate of only 0.60 per cent per year because of declining hours worked (see Figure 6). After this decade, output per hour is projected to grow in the subsequent decades at average rates of 0.71 per cent in 2024-2033 (declining employment leads to a temporary boost via a capital deepening effect), 0.52 per cent in 2034-2043, and 0.4 per cent in 2044-2053 as this rate gradually eases towards its steady-state value of 0.3 per cent. With falling hours worked, Euro Area GDP grows at 0.21 per cent per year in 2023-2033. The decline in hours growth tails off in subsequent decades, thus allowing total GDP growth to settle down at about 0.28 per cent per year despite declining productivity growth.

5. Concluding Comments

Despite the need for the Euro Area to return to faster rates of economic growth to deal with severe balance sheet problems affecting many of its members, the current set of supply-side trends are not at all encouraging for the growth prospects over the medium- and long-term. TFP growth is very poor, investment is low and demographic problems are going to restrain the growth of labour input in the coming years. Combined with a series of demand-side problems, such as tight fiscal policy and restrictions on bank credit, the prospects for the Euro Area economy over the next decade do not look so good.

Indeed, even allowing for a return of investment and unemployment to pre-crisis levels, we project growth in the Euro Area that is well below one per cent over the next decade. In this sense, despite the intense focus on debt levels, the Euro

Area is facing a growth crisis as much as it is facing a debt crisis, with the latter perhaps more a symptom of the former.

The Euro Area's current ratio of public debt to GDP is high by modern historical standards at 95 per cent but many of its Member States are able to borrow at very low rates and the pricing of ESM-issued securities shows that there are few concerns about the solvency of the Euro Area as a whole. There is thus a strong economic case for a large investment programme aimed at reducing unemployment and raising the supply capacity of the economy, funded by the Euro Area as a whole. Given that public capital funding is usually the first item slashed when governments cut back on spending in a crisis, it is likely that many of the projects funded by such an initiative involve spending that will need to be undertaken at some time in the future anyway so a programme of this sort may have limited long-run effects on debt levels. Unfortunately, Europe's political constraints are likely to rule out such a programme for the foreseeable future.

Over the longer-term, Europe needs a plan for dealing with a pattern of population ageing that is set to have enormous effects. Policy initiatives to delay retirement ages and to encourage labour force participation are undoubtedly part of the solution to the problems posed by ageing. However, these initiatives are likely to be very unpopular politically and may have negative implications for productivity. A policy of large planned increases in the amount of immigration into the EU, while also politically challenging, may turn out to be the only way to keep the European economy expanding in the future.

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TABLE 1 Decomposition of Euro Area and US Output Growth Rates (%)

	Euro Area				United States			
Period	Δy	Δa	Δk	Δl	Δy	Δa	Δk	Δl
1970-1976	3.6	2.7	1.5	-0.5	3.1	0.9	1.2	1.0
1977-1986	2.1	1.6	0.8	-0.4	3.1	0.7	1.2	1.2
1987-1996	2.3	1.5	0.8	0.0	2.9	0.9	1.1	0.9
1997-2006	2.2	0.7	0.8	0.7	3.1	0.9	1.6	0.7
2007-2013	-0.3	-0.2	0.5	-0.6	1.0	0.5	0.7	-0.2
2000-2013	0.9	0.2	0.7	0.0	1.7	0.5	1.1	0.2
2010-2013	0.1	0.3	0.3	-0.5	2.1	0.7	0.5	0.9

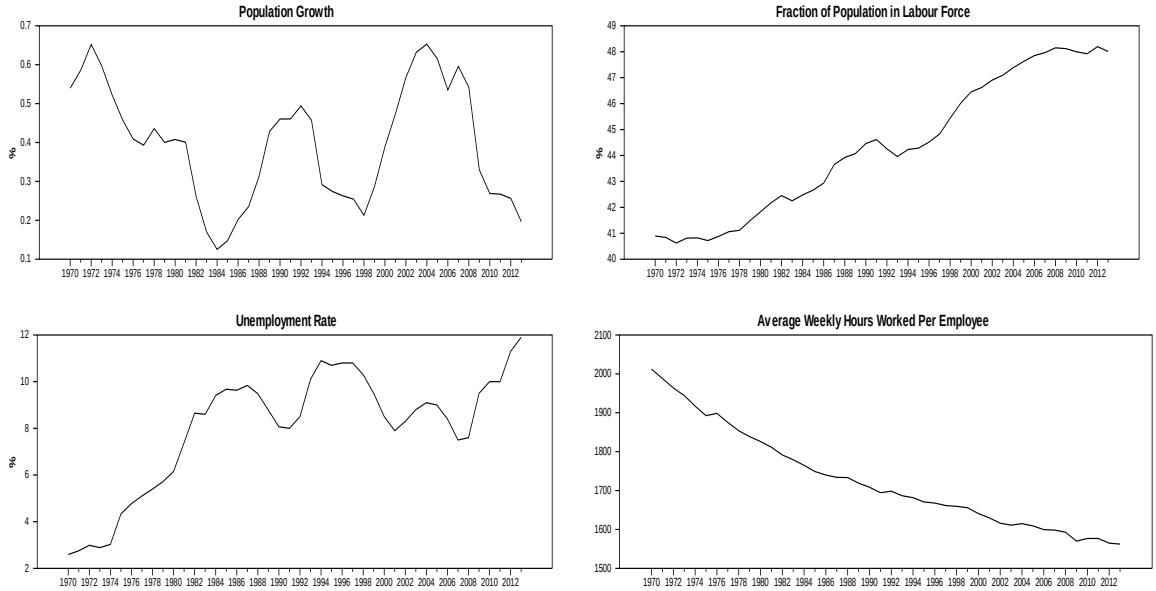
Source: McQuinn, K. and K. Whelan. *Demographics and the Growth Outlook for Europe*. ESRI Working Paper, forthcoming.
Notes: The table shows the contribution of growth in labour inputs, capital inputs and TFP to total output growth, where Δa denotes change in TFP; Δk denotes change in capital inputs; Δl denotes change in labour inputs and Δy denotes change in total output growth.

TABLE 2 Decomposition of Growth in Hours Worked (%)

	Euro Area				
Period	Total	Pop.	P. Rate	Emp. Rate	Work Week
1970-1976	-0.8	0.5	0.0	-0.4	-1.0
1977-1986	-0.6	0.3	0.5	-0.5	-0.8
1987-1996	0.1	0.4	0.2	-0.1	-0.4
1997-2006	1.1	0.5	0.7	0.3	-0.4
2007-2013	-0.9	0.3	0.0	-0.8	-0.4
2000-2013	0.0	0.5	0.3	-0.3	-0.4
2010-2013	-0.8	0.2	0.0	-0.7	-0.3
	United States				
Period	Total	Pop.	P. Rate	Emp. Rate	Work Week
1970-1976	1.5	1.0	1.5	-0.5	-0.5
1977-1986	1.8	1.0	0.9	0.0	-0.1
1987-1996	1.3	1.2	0.1	0.1	0.0
1997-2006	1.0	1.0	0.2	0.0	-0.2
2007-2013	-0.3	0.8	-0.5	-0.5	0.0
2000-2013	0.2	0.9	-0.2	-0.3	-0.1
2010-2013	1.4	0.7	-0.4	0.8	0.2

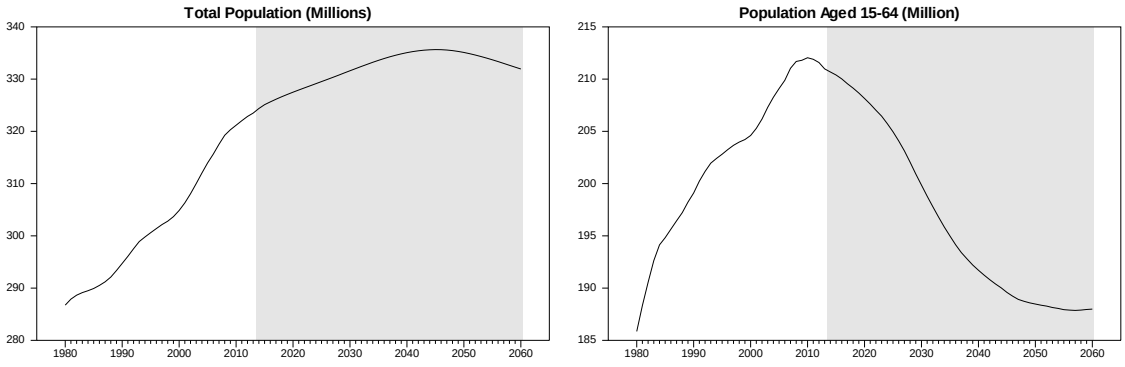
Source: McQuinn, K. and K. Whelan. *Demographics and the Growth Outlook for Europe*. ESRI Working Paper, forthcoming.
Notes: Pop. refers to changes in population, P. denotes participation; EMP. denotes employment; and Work Week refers to change in average work week hours.

FIGURE 1 Determinants of Euro Area Hours Growth: 1970-2013



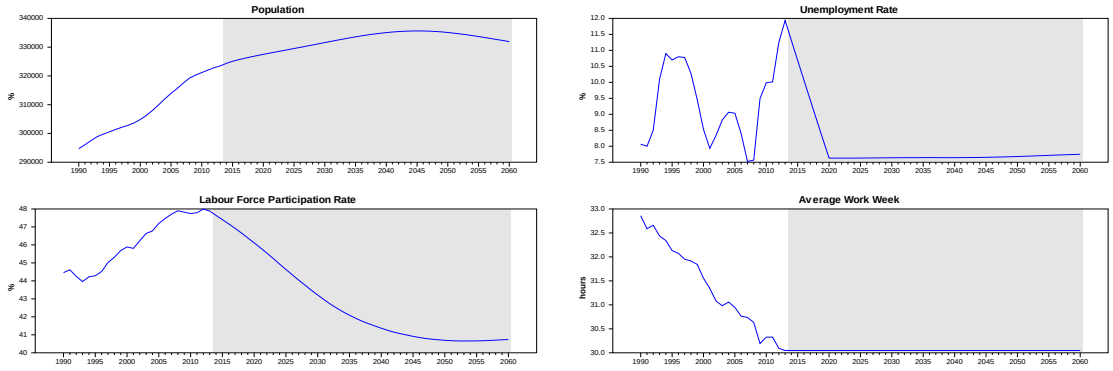
Source: AMECO.

FIGURE 2 Euro Area Demographic Changes



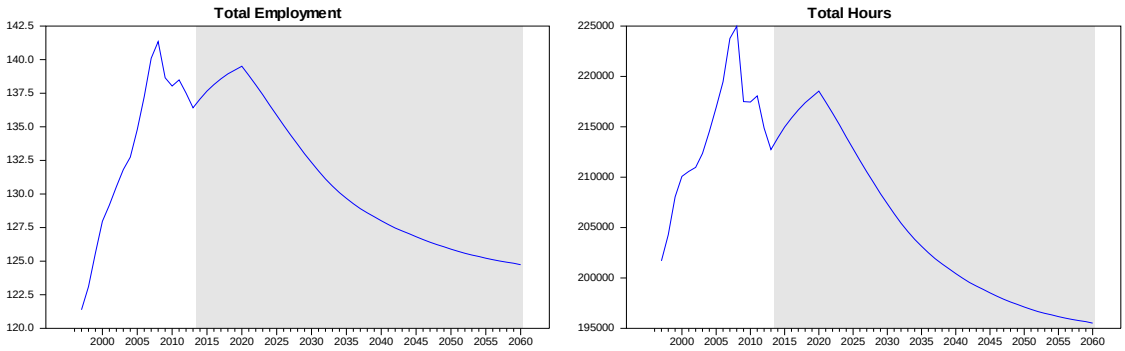
Source: AMECO + own estimates.

Figure 3 Labour Market Assumptions



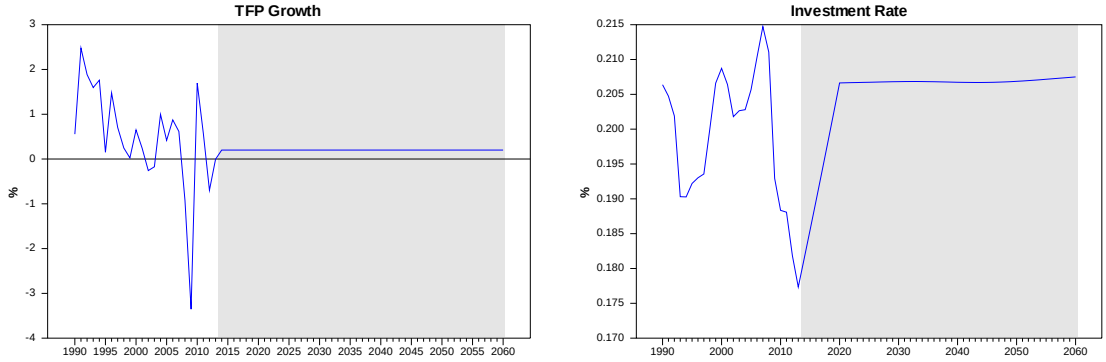
Source: AMECO + own estimates.

Figure 4 Labour Supply (Millions)



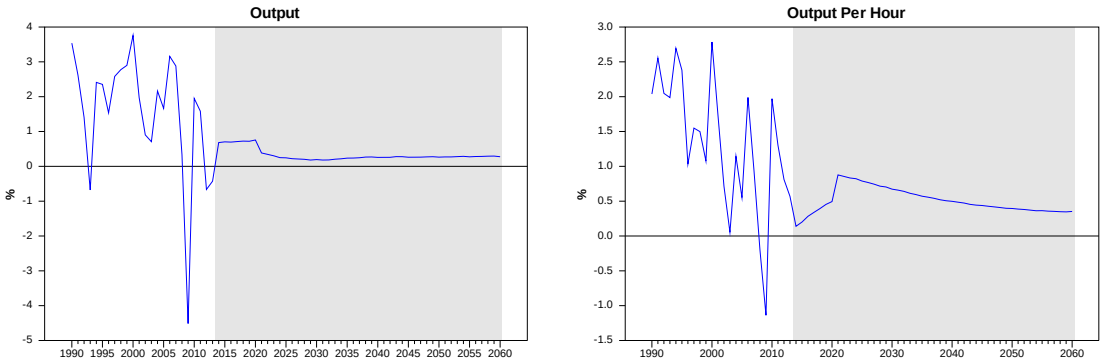
Source: AMECO + own estimates.

Figure 5 Investment and TFP Assumptions



Source: AMECO + own estimates.

Figure 6 Output Growth Rates



Source: AMECO + own estimates.