

Special Report

Overcoming the Euro area's demographic challenge

- This business cycle, which began in the Euro area in 2013, has had a number of features: lackluster growth potential, reduced productivity growth and limited traction of very easy monetary policy.
- Demographic developments play a role in all of these developments: a slowing and ageing population dampens growth potential and productivity and reduces the traction of monetary policy, partly by depressing the equilibrium real interest rate r^* .
- Reduced fertility rates and increased longevity have led to a slowdown in the growth rate of the Euro area's population and an increase in the proportion of older individuals.
- Over the past 25 years, the Euro area population has grown by an average of 0.3% per year. By the end of the next decade, the population will be stagnant.
- Twenty five years ago, only 18.8% of the total population was aged over 65. In 2030, those aged 65+ will represent 33.5% of the population.
- Slowing population growth and its ageing is having a significant macroeconomic impact. Growth potential is lower due to reduced labor supply growth, lower productivity growth and reduced innovation. By 2030, Euro area potential growth could be 0.5% or less.
- Demographic developments are reducing the efficacy of monetary policy, partly because the old are less inclined to engage in intertemporal substitution and partly through the influence of demography on r^* . There are three key channels affecting r^* : first, lower growth potential; second, dissaving by larger retired cohorts; and third, increased saving by prime-aged cohorts due to greater longevity. On balance, we think that r^* is likely to remain low.
- Reduced efficacy of monetary policy and a sustained low r^* will make it harder for the ECB to manage the business cycle and meet its inflation objective.
- The ageing of the population will also weigh on sovereign deficit and debt dynamics. For the region as a whole, this is manageable. An ongoing decline in the regional debt-to-GDP ratio over the next decade will likely require some fiscal tightening to offset increasing age related spending.
- These demographic pressures will continue in the coming decade which will create great challenges for policy makers. Three developments can help overcome the demographic challenge: increased participation of older individuals; increased productivity and innovation; and increased inward migration.

Contents

Recent demographic trends	3
Future demographic trends	4
Demography and growth potential	5
Demography and monetary policy	7
Demography and the neutral real interest rate (r^*)	8
Demography and fiscal dynamics	10
Policy implications to overcome demographic challenge	11

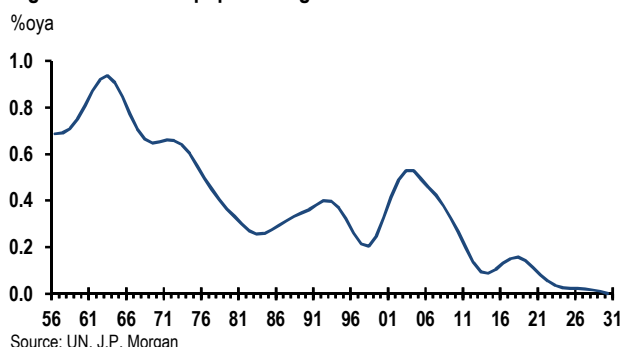
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We can't be as certain about demography as we can be about taxes and death, but we can be pretty certain. Falling fertility rates across the Euro area have slowed the growth of the population, and increased life expectancy has lifted the proportion of older people in the population. Given that both fertility rates and longevity are very slow moving, much of what happens to the Euro area natural population—the balance between births and deaths—over the coming decade is pre-determined. This applies to both the overall growth of the natural population and the age distribution. The only uncertainty in terms of growth of the total population over the coming decade is the pace of migration flows.

The Euro area demographic outlook is clearly challenging. Over the coming decade overall population growth is likely to slow further, assuming steady migration flows, and the population will get older. Over the past decade, the Euro area population has been growing at around 0.16% per year (Figure 1). From 2020 to 2030, according to UN projections, it is expected to grow by only 0.04% per year. By 2030, the Euro area population will be stagnant.

Figure 1: Euro area population growth



The Euro area population is also ageing. In 2010, only 21.7% of the population aged over 15 was aged over 65. By 2020, this is expected to be 25.1% and by 2030, 29.9% (Table 1).

Table 1: Euro area age distribution

% of population aged over 15

	2010	2015	2020	2030
15-24	13.2	12.5	12.2	11.9
25-34	15.4	14.4	13.7	12.7
35-44	17.7	16.3	15.3	13.9
45-54	17.5	18.0	17.3	15.1
55-64	14.4	15.2	16.5	16.6
65+	21.7	23.5	25.1	29.9

Source: U.N. J.P. Morgan

Demographic developments are important for a number of reasons.

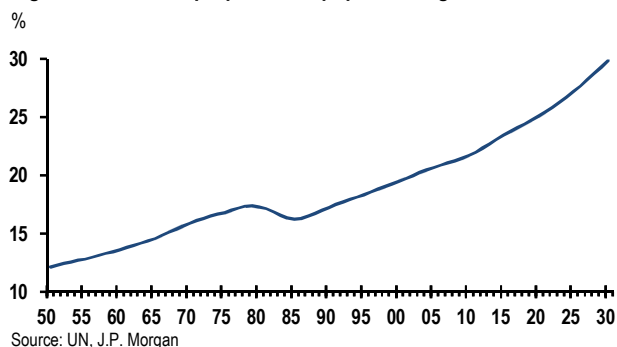
First, developments in the population aged over 15 are key inputs into an economy's growth potential. What matters here is both growth in the 15+ population and changes in its age distribution. People affect growth potential by participating in the labor force, and participation rates vary significantly across age groups. If age-specific participation rates remain constant, then overall labor participation will decline as the population ages. This reduced labor supply will act as a drag on the economy's growth potential. Ageing might also dampen growth potential through its impact on productivity and innovation. There is evidence that older individuals are less productive and less innovative. Demography is clearly one of the forces that have weighed on growth potential in recent years.

Second, demographic developments affect the efficacy of monetary policy. The older the population, the less effective monetary policy is likely to be because the intertemporal inclinations of the old are different to those of the young. This, along with deleveraging headwinds, likely explains why exceptionally easy monetary policy has not been more effective since the global financial crisis.

Third, demographic developments likely affect the equilibrium neutral real interest rate (r^*), through three channels. First, reduced growth potential will weigh on r^* as income expectations moderate. Second, the ageing of the population will exert downward pressure on the aggregate saving rate due to the very low or negative saving rates of those who have retired, which will exert upward pressure on r^* . And third, increased longevity will put downward pressure on r^* as prime-age individuals need to save more due to longer periods in retirement. Demography has clearly been one of the forces putting downward pressure on r^* in the past decade.

Fourth, demographic developments also affect sovereign fiscal dynamics due to increased health care needs of a more elderly population and increased pressure on unfunded pension systems. Figure 2 shows the proportion of the population aged 15+ who are over 65. This ratio currently stands at 24% and is expected to reach 30% in 2030. Meanwhile, the very elderly, those aged 80+, who have greater medical needs, will grow as a proportion of the population, from 7% currently to 9% in 2030. Demographic developments have already exerted upward pressure on spending on public pensions, age related healthcare and long-term care for the elderly. This will continue in the coming decade.

Figure 2: Euro area proportion of population aged 65+



In this report, we focus on the next decade through 2030. We draw a number of conclusions.

- First, unless age specific participation rates rise more strongly than recent trends, reduced labor supply will weigh on Euro area growth potential. Even if age specific participation rates do rise by enough to offset the slow-down in population growth and population ageing, there may be other forces weighing on growth potential, such as reduced productivity and innovation.
- Second, the efficacy of monetary policy is likely to continue declining as the population ages further. This will present great challenges to the ECB, especially in combination with persistently low r^* .
- Third, the demographic pressure on r^* is unlikely to ease, even as larger older-age cohorts run down their savings. The impact of that on r^* will likely be offset by reduced growth potential and increased saving by prime age individuals as they respond to increased longevity.
- And fourth, ageing will put pressure on public finances and debt dynamics. However, over the coming decade these pressures are modest, but for the debt-to-GDP ratio to decline there will need to be either tax increases or declines in spending to offset age related pressures.

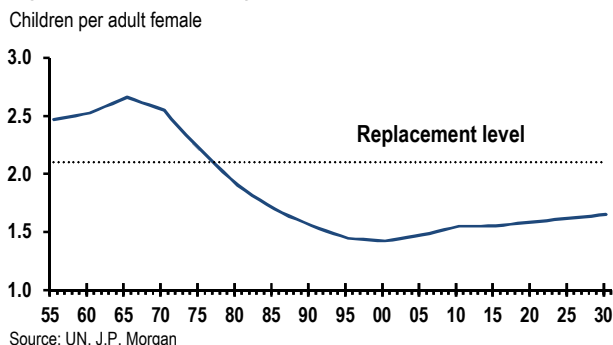
We have focused on the Euro area in the next decade. Adverse demographic developments in the region will continue beyond that. In the decades beyond 2030, the Euro area population is expected to shrink and continue to age. In this environment it will be even more challenging to sustain growth potential, manage the business cycle and maintain favorable sovereign debt dynamics.

Recent demographic trends

Most of the current and prospective demographic trends were determined several decades ago. Back in 1960, the Euro area had a fertility rate—the number of children per adult fe-

male—well above the replacement rate of around 2.1 (Figure 3). The replacement rate is the number of children needed to keep the population stable in the long run in the absence of increased longevity and immigration. It is slightly above two due to a greater proportion of males born and the possibility that females die before the end of their fertile lives.

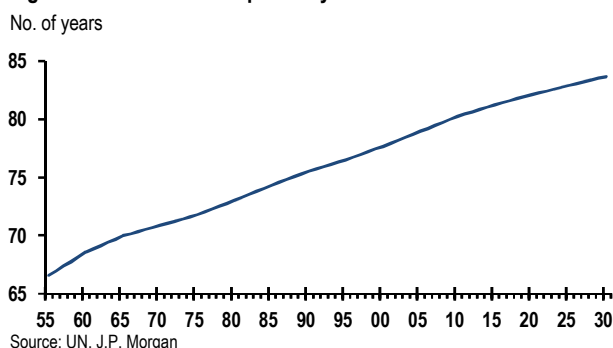
Figure 3: Euro area fertility rates



The Euro area fertility rate was well above the replacement rate in 1960. By 1978, for the Euro area as a whole the fertility rate fell below the replacement rate. By 1999, the fertility rate for the Euro area was 1.4, and all of the 19 Euro area countries had fertility rates below the replacement rate. Since 2000, the regional fertility rate has crept up and now stands around 1.6.

Life expectancy at birth has been increasing for a long time, reflecting reduced infant mortality and better nutrition, hygiene and healthcare. In 1960 it stood at 68.6 years and now stands at 81.8 years (Figure 4).

Figure 4: Euro area life expectancy at birth



The combination of low fertility rates and increased longevity slowed the growth in the overall population and shifted the age distribution towards the elderly. During the 1960s, the Euro area population grew by an average of 0.8% a year. By the 1980s, this had slowed to 0.3% a year. In the past decade, it has averaged 0.2% a year. Meanwhile, back in 1960,

19.8% of the population aged 15+ was aged between 15 and 24. By 2018, this had fallen to 12.3% (Table 2). Meanwhile, back in 1960, 13.6% of the population aged 15+ was over the age of 65. By 2018, this had risen to 24.4%. These developments have lifted the median age of the Euro area population from 32.0 in 1960 to 44.4 in 2018.

Table 2: Euro area age distribution

% of population aged 15+

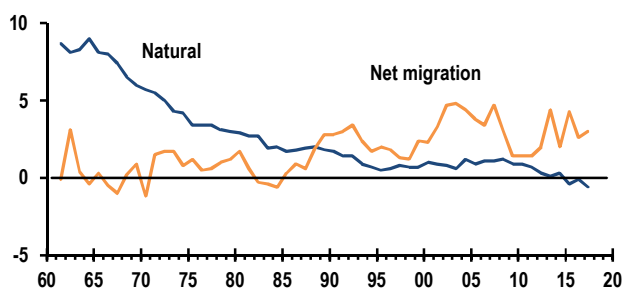
	1960	1980	2000	2018
15-24	19.8	20.6	15.1	12.3
25-34	19.3	18.3	17.9	14.0
35-44	15.9	16.4	18.4	15.6
45-54	17.2	15.6	15.8	17.7
55-64	14.3	12.0	13.3	16.0
65-80	11.6	14.3	15.2	17.0
80+	2.0	3.0	4.3	7.4

Source: UN, J.P. Morgan

If fertility is below the replacement rate, each new age cohort will be smaller than its predecessor. If life expectancy is unchanged, and there is no migration, then the total population will eventually start to shrink. That may not happen immediately if the size of the female child-bearing age cohort is larger than the older age cohort. Increased longevity and the initial larger size of the child-bearing age cohort explain why the natural population kept growing until 2014, albeit at a declining pace (Figure 5). From 1978, when the fertility rate for the Euro area fell below the replacement rate, to 2014, life expectancy at birth in the region increased from 72.5 years to 81.0 years. Meanwhile, if we assume that the child-bearing female age cohort is 25-44 years, then in 1978 this group was 17.1% of the total population. But by 2014, when the natural population stopped growing, the child-bearing female cohort was only 15.7% of the total population. Increased longevity and a larger initial female child-bearing age cohorts were no longer offsetting low fertility. Since 2015, the natural population has been shrinking (Figure 5).

Figure 5: Euro area population flows

Change per 1000 people



Source: Eurostat, J.P. Morgan

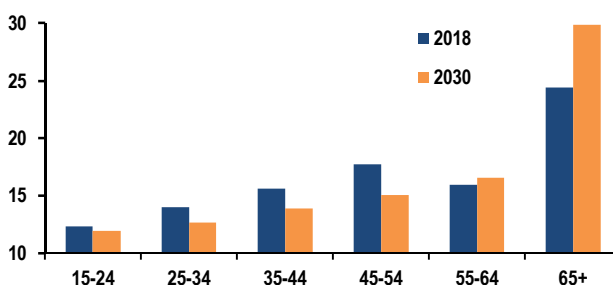
Net inward migration is the other important influence on population dynamics. As Figure 5 shows, net migration has been contributing more to Euro area population growth than the natural increase in population since 1989. Since 2015, it has contributed all of the increase in Euro area population. Over the past three years, inward migration to the Euro area has averaged 1.1 million individuals a year.

Future demographic trends

According to U.N projections, Euro area population growth will continue to slow, as fertility rates are expected to remain well below the replacement level and inward migration is assumed to be steady at a moderate pace. In the UN baseline projections for the next decade, the fertility rate is expected to be broadly stable at 1.6, while life expectancy is expected to increase further from 81.8 to 83.7. Reduced fertility rates and increased longevity will mean that the population continues to age. In 2018, 24.4% of the population aged over 15 was aged 65 or above. By 2030, this will have increased to 29.9% (Figure 6).

Figure 6: Euro area projected age distribution

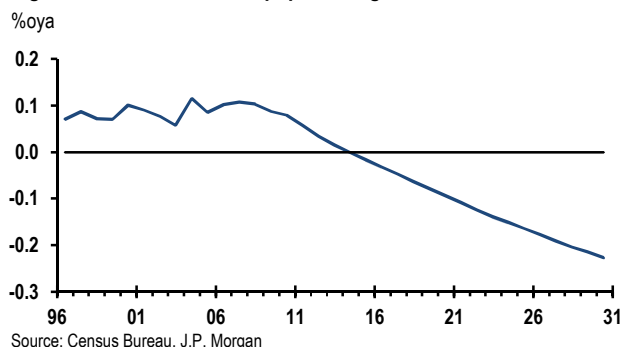
% of population aged over 15



Source: UN, J.P. Morgan

Meanwhile in the projections, inward migration into the Euro area is assumed to be around 550,000 a year. After running at 0.15% on average during the last decade, population growth is expected to be 0.04% over the next decade. This compares with an average growth rate of 0.38% during the two decades from 1990 to 2009. The natural population is expected to shrink over the next decade, at an annual average pace of 0.2% (Figure 7).

Figure 7: Euro area natural population growth



Of course the overall population can be boosted either by an increase in fertility or an increase in immigration. Each 0.1 increase in the fertility rate increases the total population by around 200,000 per year. Of course it would take 15 years for any increase to reach the working-age population of 15+. Each additional 300,000 immigrants adds around 0.1%-pts to the growth rate of the total population and would immediately add to the working age population if they were aged over 15.

Demography and growth potential

Demographic developments are of huge importance to the Euro area's growth potential due to the slowdown in the growth of the working age population (those aged over 15) and the shift towards older age cohorts who participate less in the labor force.

Over the past three years, the labor force in the Euro area has increased by 1.9%, or around 0.6% a year. This rise has comprised a three-year increase in the population of working age (15+) of 1.0% and a move up in the overall participation rate—the proportion of the population of working age that is in the labor force (either employed or unemployed)—from 56.8 to 57.3. The move up in the participation rate has clearly played an important role in sustaining the growth in labor supply in recent years in the face of an ageing of the population.

Two forces are influencing the overall Euro area participation rate. On the one hand, the ageing population is exerting downward pressure on the overall participation rate, as individuals increasingly move into age cohorts with lower-than-average participation rates. But, on the other hand, there is upward pressure on the overall participation rate as the participation rates of the older age cohorts rise, as individuals live longer and retirement ages increase.

Since the third quarter of 2015, the latter of these forces has dominated the evolution of labor supply. If age-specific participation rates had remained steady at their 3Q15 levels, but the population had aged as it has done, the labor force would have shrunk by 0.3% over the past three years. Given that the labor force has actually increased by 1.9% since 3Q15, this implies that the rise in age-specific participation rates of older age cohorts has added 2.2% to labor supply over this period. This is a significant addition.

Table 3 shows how age cohorts and age-specific participation rates have evolved since 3Q15. The 15-54 age cohort, which has a very high participation rate, is shrinking. This drags down labor supply. Over the past three years, the combination of this decline, along with a small rise in the participation rate, has exerted a drag on labor supply worth 0.7%-pt. Meanwhile, older age cohorts above 55 years have increased in size. Given that these have below-average participation rates, this has exerted downward pressure on labor supply. But, the significant increases in age-specific participation rates have more than offset this effect. Altogether, these older age cohorts of 55+ have added 2.6%-pts to labor supply.

Table 3: Euro area labor supply and participation

% for participation and population, %-pts for contribution

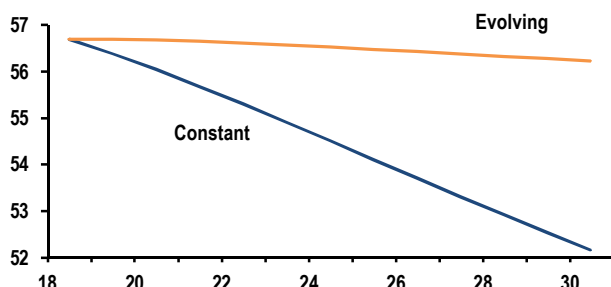
	15-54	55-59	60-64	65+	Total
Population share					
3Q15	61.7	8.0	7.2	23.0	100.0
3Q18	60.3	8.5	7.5	23.8	100.0
Change	-1.4	0.5	0.3	0.8	0.0
Participation rate					
3Q15	76.0	73.0	41.7	4.6	56.8
3Q18	76.4	76.2	47.3	5.4	57.3
Change	0.4	3.2	5.6	0.8	0.5
Contribution to labor supply 3Q15-3Q18	-0.7	1.2	1.0	0.4	1.9

Source: Eurostat, J.P. Morgan

We can use the UN's age-specific population projections to see how the ongoing slowing of population growth and population ageing over the next decade will influence labor supply. Between 2018 and 2030, the population aged 15+ is expected to increase by 1.5% (0.1% per year). But the ongoing ageing in the population will make it more challenging to sustain growth in labor supply.

Figure 8: Euro area 15+ participation rate

% of 15+ population



Source: UN, Eurostat, J.P. Morgan

If the population ages in line with the UN projections, and age-specific participation rates remain unchanged, then the overall participation rate will fall from 57.3% currently to 52.1% in 2030 (Figure 8). Table 5 illustrates how the decline in the 15-54 age cohort, which has a well above average participation rate, lowers the overall participation rate by 1.5%-pts. Meanwhile, the increase in the 65+ age cohort, which has a much lower than average participation rate, reduces the overall participation rate by 2.9%-pts. Altogether, this means that the 15+ labor force would contract by 0.6% on average each year for the next decade (Figure 9). This compares with 0.3% annual growth in the labor force over the past decade.

Table 4: Euro area labor supply and constant participation

% for participation and population, %-pts for contribution

	15-54	55-59	60-64	65+	Total
Population share					
2018	59.6	8.5	7.5	24.4	100.0
2030	53.6	8.1	8.5	29.9	100.0
Change	-6.1	-0.4	1.0	5.5	0.0
Participation rate					
2018	76.2	76.2	46.7	5.3	56.7
2030	75.5	76.2	46.7	5.3	52.2
Change	-0.7	0.0	0.0	0.0	-4.5
Contributions to labor supply 2019-2030	-7.7	-0.4	0.9	0.6	-6.6

Source: UN, Eurostat, J.P. Morgan

Table 5: Euro area projected contributions to 15+ participation rate from 2018-2030

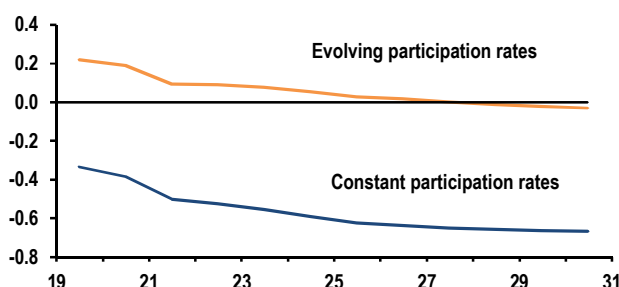
%-pts, constant participation rates

	Population effect	Participation effect	Total effect
15-54	-1.5	0.0	-1.5
55-59	-0.1	0.0	-0.1
60-64	-0.1	0.0	-0.1
65+	-2.9	0.0	-2.9
Total	-4.5	0.0	-4.5

Source: Eurostat, J.P. Morgan

Figure 9: Euro area labor supply

%oya



Source: UN, Eurostat, J.P. Morgan

Assuming that migration doesn't increase by more than projected, the only way for the Euro area labor supply to increase between now and 2030 is if age specific participation rates increase. Table 6 shows how different age cohorts will impact labor supply if we take the UN population projections and assume that the trend in age-specific participation rates is the same over the next decade as it has been in the past year. With these assumptions, the participation rate for the 15-54 age cohort would decline by 0.5%-pts, and the 6.1% decline in the size of the age cohort would depress labor supply by 7.6%-pts. This occurs because there is a decline in the population in an age cohort that has a high participation rate.

Table 6: Euro area labor supply and participation projections

% for participation and population, %-pts for contribution

	15-54	55-59	60-64	65+	Total
Population share					
2018	59.6	8.5	7.5	24.4	100.0
2030	53.6	8.1	8.5	29.9	100.0
Change	-6.1	-0.4	1.0	5.5	0.0
Participation rate					
2018	76.2	76.2	46.7	5.3	56.7
2030	75.7	88.8	69.1	8.9	56.2
Change	-0.5	12.6	22.5	3.6	-0.5
Contributions to labor supply 2018-2030	-7.6	1.5	4.3	2.5	0.7

Source: UN, Eurostat, J.P. Morgan

Table 7: Euro area projected contributions to 15+ participation rate from 2018-2030

%-pts, evolving participation rates

	Population effect	Participation effect	Total effect
15-54	-1.4	0.1	-1.3
55-59	-0.1	1.1	1.0
60-64	-0.1	1.8	1.8
65+	-2.9	1.0	-1.9
Total	-4.5	4.0	-0.5

Source: Eurostat, J.P. Morgan

Meanwhile, older age cohorts (55+) all make sizable positive contributions to labor supply over the next decade. But even so, labor supply is projected to increase by only 0.7% between now and 2030, which equates to a minimal increase each year. This compares with annual growth in the labor force of 0.3% over the past decade.

Developments in labor supply have a huge impact on growth potential. If age-specific participation rates were to remain constant over the next decade, labor supply growth would be 0.9%-pt lower per year than in the past decade, which would take around 0.6%-pt off regional growth potential. Given that growth potential has been running close to 1% in recent years, this would take regional growth potential close to zero, all else equal.

But if age-specific participation rates rise in line with recent trends, labor supply growth in the next decade relative would be only 0.2%-pt lower than in the past decade, which would take around 0.1%-pts off regional growth potential, all else equal (Table 8).

Table 8: Euro area population, labor supply and growth potential

	Last decade	Next decade	
		Constant participation rates	Evolving participation rates
Total population	0.2	0.0	0.0
Population 15+	0.2	0.1	0.1
Labor supply	0.3	-0.6	0.1
Growth potential	0.9	0.3	0.8

Source: Eurostat, AMECO, UN, J.P. Morgan

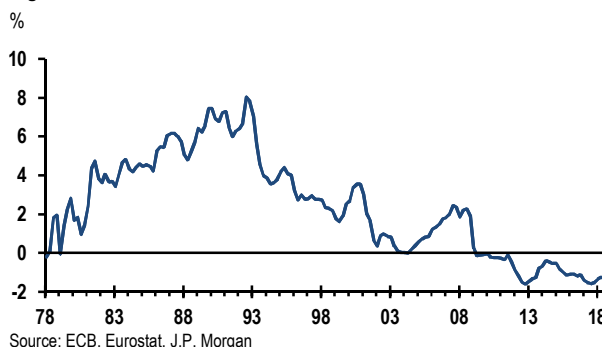
Demography and monetary policy

Demographic developments affect monetary policy through the impact on r^* . In addition, it seems likely that the efficacy of monetary policy will be impacted by the aging of the population.

In simple macro models, actual growth relative to potential is determined by the stance of monetary policy. There seems little doubt that monetary policy has been extremely accommodative since the global financial crisis: real policy rates have been very negative and the ECB's balance sheet has grown enormously with asset purchases and low cost loans to banks (Figure 10). However, economic performance relative to potential, as indicated by the year on year change in the unemployment rate, has been no stronger than at previous times in the Euro area's history (Figure 11). While some of the reduced impact of monetary policy may reflect deleveraging headwinds after the global financial crisis and the regional sovereign crisis, it may also reflect the demographic shifts

in the population towards older people who are likely less responsive to monetary easing.

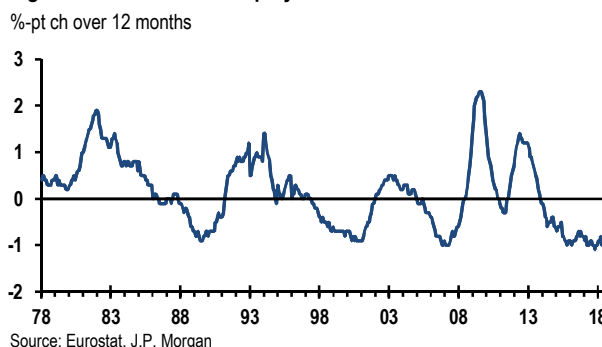
Figure 10: Euro area real short-term interest rate



Source: ECB, Eurostat, J.P. Morgan

Monetary policy affects the real economy through a number of channels: income effects, substitution effects and wealth effects. These are all likely to be influenced by age. Income effects are likely to grow stronger with age, reflecting increased asset holdings of the elderly. Substitution effects are likely to grow weaker with age, reflecting the more limited future labor income of the elderly. And wealth effects are likely to increase with age, again reflecting higher asset holdings of the elderly.

Figure 11: Euro area unemployment



Source: Eurostat, J.P. Morgan

Consider the impact of an interest rate cut in a society where the population is aging. A greater proportion of older individuals will experience reduced incomes, which will lead to lower spending than otherwise. A smaller proportion of younger individuals will engage in intertemporal substitution, which will lead to lower spending than otherwise. And a greater proportion of older individuals will experience gains in wealth, which will lead to more spending than otherwise. Ex ante, it is not clear which of these effects will dominate. In our view, the substitution effect is the most powerful channel of monetary policy; if so, ageing of the population will reduce the efficacy of monetary easing.

This view is supported by academic studies using micro data from the Consumer Expenditure Survey (CES). Looking across US states, Wong¹ estimates that the consumption elasticity of young people (those aged less than 35 years) to a monetary policy shock is about double that of the average person in the economy. The impact comes from the fact that younger individuals are more likely to refinance existing loans and take on new loans than older individuals.

The structure of the housing market is different in the Euro area, but analysis for the UK also suggests a demographic link. Monetary policy is found to significantly affect expenditure for those with a mortgage, but has an insignificant affect on outright owners.² Given that outright owners are more likely to be older, this suggests that as the population ages the impact of monetary policy will decline.

Demography and the neutral real interest rate (r^*)

The standard model of monetary policy has the central bank adjusting the interest rate instrument relative to a neutral real interest rate (r^*) in order to manage demand relative to supply. The standard model assumes that r^* is the interest rate that will align demand and supply growth and keep the economy at full employment and price stability once that position has been reached, assuming that all other influences on demand and supply are in equilibrium.

It is now widely accepted that r^* has declined significantly over recent decades, for a number of reasons. Adverse demographic trends (increases in life expectancy at a faster pace than increases in retirement ages), increased inequality and reduced growth potential are all thought to have increased desired savings. Meanwhile, the decline in the relative price of capital goods, the decline in public investment and reduced growth potential are all thought to have reduced desired investment. The Bank of England considers such developments and uses them, alongside others, to account for 400bp of the 450bp decline in the global long-term real interest rate over the past thirty years.³

¹ Transmission of monetary policy to consumption and population ageing, Wong, 2018

² Monetary policy when households have debt: new evidence on the transmission mechanism, Cloyne, Ferreira and Surico, 2016

³ Secular drivers of the global real interest rate, Rachel and Smith, Bank of England working paper, 2015

Perhaps the most widely quoted estimates of the trend in r^* is Holston et al.⁴ As well as highlighting longer-term trends in r^* , their analysis suggests a particularly sharp drop during the financial crisis. In the Euro area, r^* is estimated to have fallen from around 1.9% in the last business cycle to around 0.1% in the current cycle (Figure 12).

Figure 12: Euro area r^* estimate



Evaluating where r^* might go in the coming decade is of crucial importance. A lower r^* with an unchanged inflation objective means that the effective lower bound will be reached more often, and as a consequence unconventional monetary policy instruments will be used more frequently. If unconventional policy is not as effective as conventional monetary policy, the ECB will struggle to manage the business cycle and sustain price stability.

The relevance of demographics to the determination of r^* is twofold: first, lower labor supply growth, due to both slower growth in the population and its aging, will dampen growth potential, exerting downward pressure on r^* ; and second, the shifting age distribution will affect the overall desire to save because different age cohorts have different propensities to save.

Developments in labor supply are a key determinant of growth potential so demographic developments affect r^* through this channel. If age specific participation rates remain constant, then over the next decade, the labor force will shrink by 0.6% per year. This compares with growth in the labor force over the past decade of around 0.3% per year. Unless productivity growth increased, a slowdown in labor supply growth of this magnitude would take growth potential down from the average of the last decade of around 0.9% to around 0.3%.

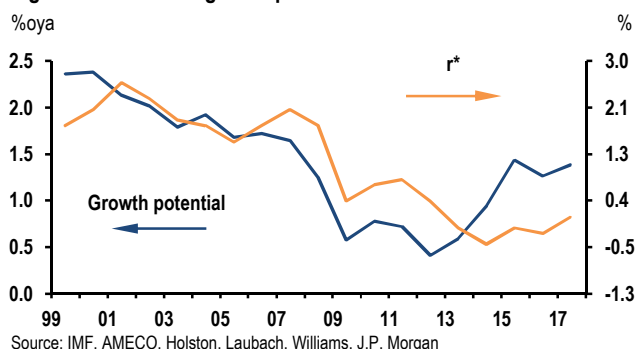
⁴ Estimating the Natural Rate of Interest: International Trends and Determinants, Holston, Laubach and Williams, Federal Reserve Bank of San Francisco working paper, 2016.

But, age specific participation rates are unlikely to remain constant. In particular, participation rates for older individuals will likely increase. Our baseline assuming that age specific participation rates evolve in line with recent trends, projects 0.1% labor force growth per year over the next decade. This would put potential growth at around 0.8%, all else equal, down from 0.9% over the past 10 years.

But labor supply may not be the only influence of demographics on growth potential. Lower population and labor force growth reduces investment demand, as less investment is needed given the rise in the capital-to-labor ratio. In addition, empirical evidence suggests that there is a relationship between age and productivity: productivity appears to increase towards middle age and to decline once individuals are over 50. This is also evident in patterns of innovation: the young tend to be more innovative. Finally, older individuals tend to be more resistant to structural reform.

A range of evidence suggests that demographic developments will exert a broad based drag on Euro area growth potential over the coming decade. Gauging what weaker growth potential would do to r^* is difficult. But based on the review of how technological change affects r^* mentioned in the Bank of England study, each percentage point decline in growth potential could reduce r^* by one percentage point or more. This is also the impression given by looking at the relationship between growth potential (the average of the European Commission and IMF estimates) and the Holston, Laubach and Williams estimate of r^* (Figure 13). A simple regression suggests a close to one-to-one relationship between growth potential and r^* . Even if age specific participation rates increase, it is not hard to imagine growth potential sliding towards 0.5% per year. This would act as a significant further dampener on r^* relative to where it stands now.

Figure 13: Euro area growth potential and r^*



Demography will also influence r^* through its effect on saving behavior. Macroeconomic studies suggest that there is a link between demography and household saving: an increase

in the old-dependency ratio—individuals aged 65+ as a proportion of individuals aged 15-64—has a negative effect on overall saving. This is consistent with the life cycle hypothesis where households save during their working lives in order to dissave during their retirement. The greater the old-dependency ratio the greater the dissaving of the old relative to the saving of the working population. But this is not the only influence of demography on saving. Increases in longevity relative to increases in the retirement age are likely to exert upward pressure on the saving rates of working individuals.

Microeconomic studies, meanwhile, have generally found it difficult to identify a significant effect of demography on household saving. To some extent this reflects the rather unusual pattern of saving rates across age-cohorts in the household survey data. According to most micro data sets, saving rates are not negative for older age-cohorts. This can be seen in age related saving data published by Eurostat (Table 9). According to Eurostat, the saving rate of individuals aged over 65 in France is higher than the saving rate of the rest of the population. This makes little sense unless pension replacement rates are very high. If they are, then downward pressure on r^* will persist even as individuals age.

Table 9: Euro area saving rates by age group

	<30	30-44	45-59	60+
Germany	2.9	18.9	17.0	8.0
France	4.2	24.2	29.8	36.2
Italy	-31.5	15.7	25.3	33.5
Spain	-4.5	13.4	15.4	25.1

Source: Eurostat, J.P. Morgan

But, not everyone is convinced by the surprisingly high saving rates among elderly individuals. One explanation is the treatment of private pension plans. Pension contributions should be treated as part of an individual's income, which would lift the saving rates of working individuals, while pension benefits should not be treated as part of an individual's income, which would depress the saving rates of retired individuals. Bosworth et al modify US saving rates by age group for the treatment of pensions, and this gives a profile of saving rates much closer to the life cycle hypothesis (Table 10).

Table 10: US saving rate by age group

	25-44	45-64	Over 64	Total
Original income definition				
1982-85	9.1	13.0	11.5	10.8
Modified income definition				
1982-85	17.2	15.2	-3.9	14.0

Source: Bosworth et al "The decline in saving: evidence from household surveys," J.P. Morgan

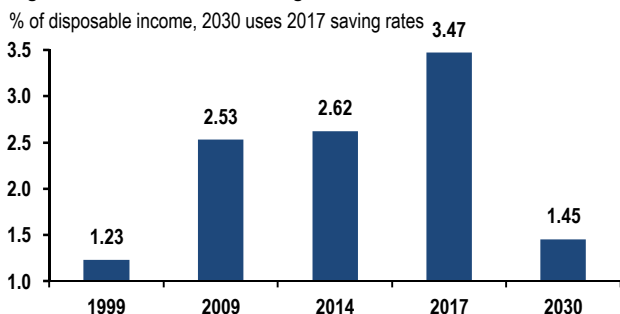
Statistics Canada provide age related spending over time with the pension adjustment (Table 11). These data show an increase in saving by individuals aged 35-64 over the past couple of decades, reflecting the ongoing increases in longevity. If we create an aggregate saving rate for various years by weighting together the age related saving rates with the population shares, we see upward pressure on overall saving through 2017. This reflects the increased saving rates for 45-64 year olds who are preparing for a longer retirement. The share of this age group in the total population increased from 49% in 1995 to 56% in 2017. The impact of this is to increase the overall saving rate over time, exerting downward pressure on r^* . The share of this age cohort will decline to 51% in 2030, even as the 65+ age cohort increases from 24% to 30%. If age specific saving rates remain steady through 2030, the overall saving rate will fall from 3.47 in 2017 to 1.45 in 2030 (Figure 14). Presumably this would exert upward pressure on r^* . However, if age specific saving rates continue to evolve through 2030 as they have done over the past decade, then the overall saving rate would rise to 5.33 in 2030 (Figure 15). Presumably this increase would exert more downward pressure on r^* . This seems likely given pressure on public sector pensions, which are likely to get less generous over time, and low rates of return on private pensions.

Table 11: Saving rates by age group

% of disposable income					
	15-35	35-44	45-54	55-64	65+
1999	2.56	11.65	8.39	-7.59	-2.50
2009	8.55	13.54	11.73	-4.74	-12.54
2014	3.84	15.91	13.41	3.43	-20.71
2017	3.42	14.63	12.88	7.05	-19.74

Source: Statistics Canada, J.P. Morgan

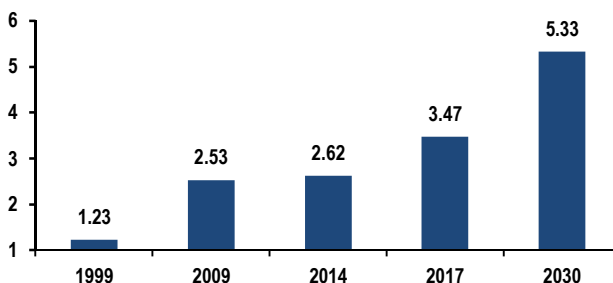
Figure 14: Euro area 15+ saving rate



Source: Statistics Canada, UN, J.P. Morgan

Figure 15: Euro area 15+ saving rate

% of disposable income, 2030 uses evolving saving rates



Source: Statistics Canada, UN, J.P. Morgan

Table 12: Euro area life expectancy and retirement

	Life expectancy		Retirement age	
	Male	Female	Male	Female
1970	67.8	73.9	68.2	66.2
1980	69.6	76.4	64.8	63.3
1990	72.0	79.0	62.9	60.9
2000	74.2	81.0	61.4	59.9
2010	77.2	83.2	62.5	61.2
2016	78.7	84	63.6	62.3

Source: OECD, UN, J.P. Morgan

Greater increases in longevity relative to increases in the retirement age increases working individuals' need to save and keeps downward pressure on r^* . This is illustrated in table 12. Since 1970, male life expectancy in the Euro area has gone up by almost eleven years. But over this period, the effective retirement age for males has declined by almost five years. The pattern is similar for females. Essentially, back in 1970 many people didn't reach the effective retirement age. Now, males can expect an average of 15 years in retirement, while females can expect an average of almost 22 years in retirement.

This analysis suggests that demographics will influence r^* through three channels. First, the impact on growth potential, which depends on labor supply, productivity and innovation. Second, the increased share of older individuals who dissave. And third, the increased saving of age cohorts ahead of retirement as they prepare for further increases in longevity. In our view, the net effect of these influences will be to keep r^* depressed.

Demography and fiscal dynamics

Demographic developments will exert pressure on the public finances through two channels: the decline in growth potential and the increase in age-related public spending.

The Euro area currently has a reasonable fiscal position. It has a 1% of GDP primary surplus and an average interest rate of 2.1%. Assuming that nominal growth can settle at around 2.5%, the debt dynamics are constructive. If this conjuncture were sustained, the level of Euro area debt would decline from 84.9% of GDP currently to 69.2% in 2030, an annual decline of 1.3%-pts.

If demography leads to lower growth potential then, all else equal, this will adversely affect deficit and debt dynamics. A decline in growth potential of 0.5%-pt, would reduce the primary surplus by around 0.25%-pts of GDP. It would also limit the reduction in debt over the coming decade. With a smaller primary surplus and slower nominal growth which falls below the average interest rate, the level of Euro area debt would decline from 84.9% currently to 76.9% in 2030. However, there will be some mitigation if a persistently lower r^* continues to weigh on sovereign borrowing costs.

Age related public spending is set to go up over the next decade, as governments spend more on public pensions, healthcare and long-term care. Table 13 shows how these are expected to evolve through 2030, an increase of 1.9%-pts of GDP. Unless there is an offset through higher taxes or reduced spending elsewhere, this increase in expenditure would add an equivalent amount to the fiscal deficit. This would adversely affect debt dynamics. Instead of declining at an annual rate of 1.3%-pts of GDP, the Euro area debt stock would rise by 1.2%-pts of GDP annually. In order to stabilize the debt stock, fiscal policy would have to tighten by around 1.25%-pts of GDP.

Table 13: Euro area age related spending projections
% of GDP

	2016	2030	Change
Public pensions	12.3	13.0	1.3
Health care	6.8	7.1	0.3
Long term care	1.6	1.9	0.3

Source: European Commission Ageing Report

Policy implications to overcome demographic challenge

There are three ways that the adverse impact of demographics can be mitigated: increased labor force participation, increased productivity growth and innovation, and increased inward migration. Participation rates, especially those of older age groups, have been increasing for a while, and this trend is expected to continue. Increases in the retirement age will encourage this process. It is important to stress the sensitivity of labor force projections to assumptions made about the participation rate of older individuals. Be-

cause the older age cohorts become so large in the projections, modest differences in the evolution of participation rates can have a sizeable impact on labor supply.

Over the past three years, the participation rate of individuals aged 65+ increased by 0.3%-pts a year. This has helped to sustain labor force growth. Table 14 illustrates the impact of changes in the participation rate of individuals aged 65+ on labor supply. If the participation rate is stable, that would take labor supply down by 0.1% a year. If, by contrast, the participation rate of individuals aged 65+ increased by 0.3%-pts per year, this would ensure that labor supply growth was 0.1% a year.

Table 14: Evolution of participation rates 65+

Annual change in participation rates (%-pt)	Level of participation rate 2030 (%)	Annual growth of labor supply* (%)
0.0	5.3	-0.10
0.3	8.9	0.06
0.4	10.1	0.11
0.7	13.7	0.27

Source: Eurostat, UN, J.P. Morgan *This table shows the impact of changes in the participation rate of 65+ individuals assuming all other age related participation rates evolve as in the baseline

Table 15 illustrates the cross-country differences in the participation rates of older individuals across the Euro area. In our projections, we assume that the participation rate of those aged 55-59 increases to 88.8; that the participation rate of those aged 60-64 increases to 69.2; and that the participation rate of those aged 65+ increases to 8.9. Looking across the Euro area, these assumptions look ambitious for the 55-64 age cohort in the sense that they are above the highest levels currently seen in the Euro area. However, there are six countries which currently have a participation rate for the 65+ age group which is higher than our assumption. Moreover, there is a clear link between educational attainment and labor force participation. As younger age cohorts—which tend to have higher educational attainment—get older this should increase the participation rate of older individuals.

Table 15: Participation rates as of 3Q18

	55-59	60-64	65+
Euro area	76.2	47.3	5.4
Germany	83.1	62.4	7.7
France	76.3	34.2	2.9
Italy	68.6	43.1	4.8
Spain	73.1	45.2	2.4
Netherlands	78.9	62.3	8.6
Belgium	71.8	31.2	2.8
Austria	76.5	31.8	4.9
Ireland	72.5	52.7	11.4
Finland	83.7	56.1	6.7
Portugal	76.4	49.6	11.8
Greece	62.5	36.0	3.8
Cyprus	74.8	55.4	9.5
Slovakia	81.4	33.7	3.9
Slovenia	73.4	25.4	4.9
Lithuania	81.6	60.6	9.0
Latvia	84.2	57.5	9.7
Estonia	84.4	61.5	14.2
Luxembourg	59.5	21.6	3.0
Malta	68.2	33.2	4.6

Source: Eurostat, J.P. Morgan

Increased productivity growth and innovation will help mitigate the adverse impact of demographics. Feyrer concluded that the relationship between age and productivity is an inverted U-shape.⁵ The peak of the U is the proportion of workers aged 40-49. Given that a huge amount of aggregate productivity growth and innovation comes from the churning associated with new firms being born and old firms dying, policy makers should focus on enabling individuals in the middle-age cohorts to start their own businesses. Apart from regulatory change, this may require financial change to allow individuals who do not have much collateral to access capital markets.

Increased inward migration is the other channel that can help mitigate the region's adverse demographics. In the UN projections, it is assumed that net immigration average around 543,000 a year, close to the UN's estimate of the average of the past decade. Eurostat provides estimates of the impact of different migration flows and what that does to the growth of the population (Table 16). Essentially, to add 0.1%-pt to population growth, inward migration would have to increase by around 300,000 a year (Table 17). Thus, in order to sustain the growth in the total population at the pace of the last decade, net inward migration would need to be around 600,000 higher than in the UN baseline projection. This would effectively double the baseline assumption.

Table 16: Euro area average annual inward migration

Number of migrants	
1960s	92,000
1970s	382,000
1980s	319,000
1990s	733,000
2000s	1,140,000
2010s	525,000
2020s	543,000

Source: UN, J.P. Morgan

Table 17: Migration assumptions 2018-2030

	Migration avg flow	Total population %oya
High migration	1,117,195	0.27
Baseline migration	837,894	0.18
Low migration	558,619	0.08

Source: Eurostat, J.P. Morgan

⁵ Feyrer, Demographics and productivity, 2007

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