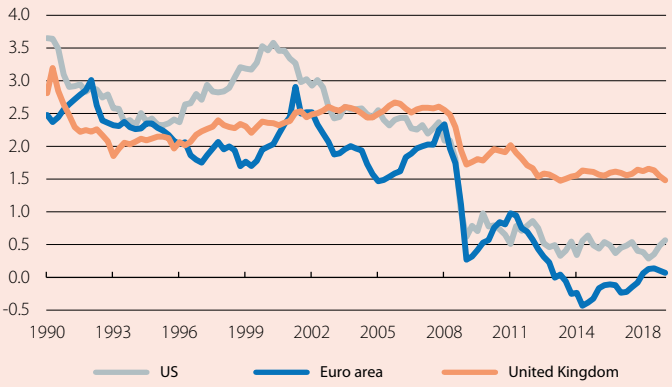
The demographic cycle of savings and interest rates

Since the global financial crisis of 2007-2008, interest rates have stood at historical lows in many advanced economies, in some cases close to 0% or even in negative territory. These all-time lows have occurred in a context characterised by highly accommodative monetary policies, but it is not clear that these policies are the exclusive cause behind the low interest rates. As can be seen in the first chart, if we extend the time horizon, we see that the decline in interest rates is a phenomenon that has been occurring for more than two decades, suggesting that there are other latent forces behind the decline. One of them is demographics and, more specifically, population ageing. This is a process that is having a widespread effect on practically all the economies of the world (albeit with differing extents and speeds) and it is likely to continue to apply downward pressure on interest rates over the coming years.[1]

Population ageing offers a natural explanation since, as we shall see, it is a phenomenon with significant consequences for household savings. According to the life cycle theory developed by the Nobel Laureates in Economics Franco Modigliani and Milton Friedman, among others, savings vary over our lifetimes in an inverted U-shaped pattern: the theory suggests that those who save the least are the young and the elderly, while the middle-aged save the most. The reason behind this pattern is the desire to maintain a relatively stable quality of life over time. To achieve this, people must save more at ages when they have a higher income, and then use these resources to improve their quality of life at ages when income streams are lower (typically, youth and old age).

Short-term interest rates in the main advanced economies

(%)



Note: *Natural interest rates estimated by K. Holston* et al. *(2016), «Measuring the Natural Rate of Interest: International Trends and Determinants», FRBSF Working Paper.*
Source: *CaixaBank Research, based on data from the Federal Reserve Bank of San Francisco.*

The predictions of the life cycle theory can be clearly observed when we analyse the data for US households. As we can see in the second and third charts, household income increases between the ages of 25 and 64, and it decreases thereafter. This follows a very similar pattern to the savings rate, which is lower among young people and the retired (in fact, the rate among these age groups is negative, based on the data we have for the years 2013-2017),[2] and higher among the population aged between 25 and 64. Dynan et al. (2009)[3] corroborate this inverted U-shape in the profile of the savings rate with a more detailed empirical analysis covering the period 1983-2007 in the US, as does a study by the World Bank, which suggests that there is a similar pattern in other advanced countries such as Germany, Canada and the United Kingdom.[4] However, in other economies, such as Italy and Japan, the data reflect a sustained increase in savings rates throughout the population's lifetimes, even for those over the age of 65, and this also seems to be the case for Spain.[5] This pattern would contradict the life cycle theory, but the Bank of England[6] notes that the observation of an increase in savings rates in those aged over 65 could be due to the statistical difficulties of correctly measuring the income of retirees.

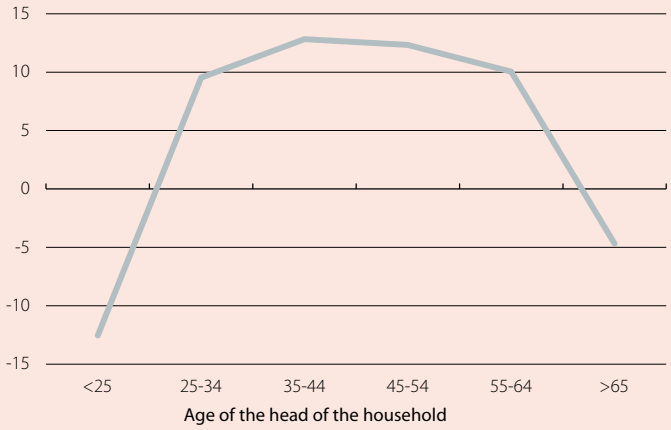
Besides the behaviour of each family, analysing the impact of population ageing on an economy's aggregate savings requires us to distinguish between the different demographic forces that lie behind this ageing process: the increase in life expectancy, the decline in fertility rates and the movement of the baby boom generation up the demographic pyramid.

1. Other forces responsible would include greater risk aversion and a preference for safe-haven assets, lower productivity growth, greater inequality and structural changes in the economy towards less labour-intensive sectors. For more details on these forces and their implications on the design of monetary policy, see the Focus, «What is the new equilibrium interest rate?» in the MR09/2017 and «Monetary policy frameworks for the future» in the MR10/2017.
2. i.e. with a negative savings rate, these groups have a consumption level that exceeds their income.
3. K. Dynan *et al.* (2009), «The Effects of Population Aging on the Relationship among Aggregate Consumption, Saving, and Income», American Economic Review, vol. 99, n° 2.
4. World Bank (2007), «From Red to Gray».
5. BBVA Research (2010), «Microeconomic determinants of saving: a static analysis », box 1 in «Spain: Consumption Outlook».
6. Bank of England (2002), «Ageing and the UK economy».

Firstly, in the absence of changes in the retirement age, the increase in life expectancy would require families to spread the economic resources they accumulate during their working lives over a longer retirement. Faced with this dilemma, we can find two types of behaviour. Some households will anticipate this problem of resource distribution and will respond with higher savings rates in order to offset the longer life expectancy, allowing them to maintain a relatively stable consumption profile. Other households, however, may be less forward-looking and will not adjust their savings rate, such that they end up having fewer resources when they retire. Both behaviours have different consequences: in the first case, there is an increase in the aggregate savings rate which pushes down interest rates, while the second group reduce savings per capita and push interest rates up.

US: household savings rate by age group

Fraction of household disposable income (%)

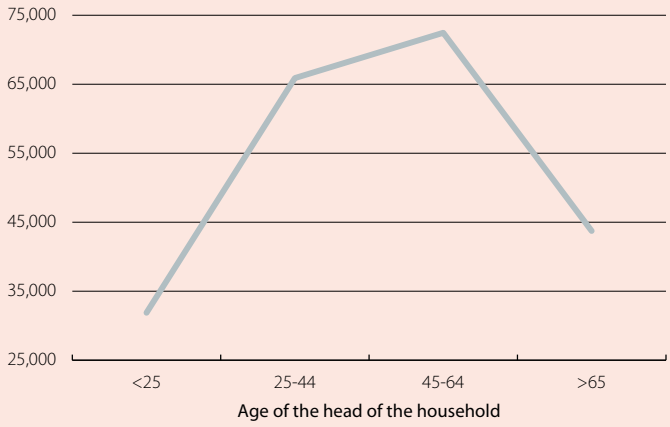


Note: *Average for the period 2013-2017.*
Source: *CaixaBank Research, based on data from the Bureau of Labor Statistics.*

Secondly, the reduction in birth rates change savings and investment needs in different ways. On the one hand, it leads to lower population growth, which translates into lower GDP growth[7] and, therefore, lower growth in the demand for investment, which tends to lower interest rates.[8] On the other hand, lower fertility also causes an increase in the proportion of the population that is made up of the elderly, who tend to have lower savings rates but larger volumes of capital (as a result of the savings accumulated throughout their working life). As such, we find two opposing forces. On the one hand, we find a lower flow of savings, which puts upward pressure on interest rates. On the other hand, there is an increase in the population with a greater volume of accumulated savings (resulting in a relative abundance of capital, which restrains the upward pressure on rates caused by the lower flow of savings).

US: household income by age group

(Dollars)



Note: *2017 average.*
Source: *CaixaBank Research, based on data from the American Community Survey.*

Finally, in most advanced economies, the baby boom generation, born primarily between the mid-1940s and early 1960s (between 1950 and 1970 in the case of Spain), is causing changes in the composition of the population pyramid. Initially, it widened the base of students and young workers, but today this generation is approaching retirement. This is leading to a relatively high percentage of the population who have significant accumulated savings but will soon begin to reduce their savings rates.

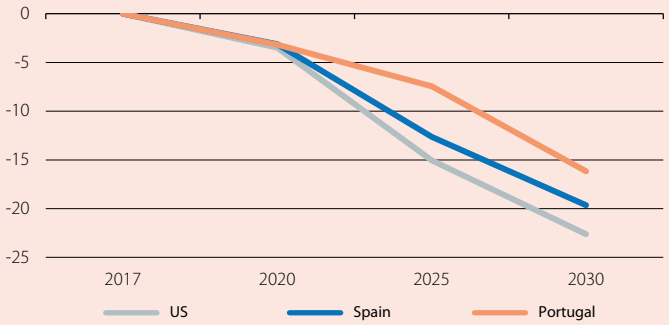
What is the net effect of this trend on savings? Taking into consideration the different mechanisms involved, Dynan et al. (2009) estimate that, in the US, these demographic dynamics would have led to a 1.9 pp increase in the aggregate savings rate between 1980 and 2000, although they project that it could reduce by 0.9 pps between 2000 and 2020. If we use the savings rates for each age group in 2017 as a benchmark, we can perform a similar exercise with projections up to 2030 for the US, Spain and Portugal.[9] The results of this exercise, presented in the fourth chart, suggest that changes in the composition of the population pyramid (in the absence of other dynamics) would tend to reduce the aggregate saving rates over the period 2018-2030 by about 20% in the US, Spain and Portugal (i.e. reductions of 1.5, 1.1 and 0.8 pps, respectively). The reason for this is that the fraction of people aged over 65 will increase in all three economies, while the proportion represented by groups with higher savings rates will decrease.

7. See the article «Population ageing and its macroeconomic impact» in this same Dossier.
8. Since the accumulated capital depreciates slowly, the supply of investment, which also decreases, does so more gradually, so there is downward pressure on rates.
9. For Spain and Portugal, we assume that the relationship between the savings rate and age follows an inverted U pattern, proportional to that of the US.

Besides the changes in the savings rates, quantifying the net impact on interest rates requires us to analyse the consequences for the aggregate volume of savings and investment. The main studies on this matter suggest that the ageing of the population can explain a substantial portion of the decline in interest rates seen in recent decades. For example, Gagnon et al. (2016)[10] estimate that the demographic dynamics of the US alone can explain a 125bp reduction in short-term US interest rates between 1980 and the present day (which, as reflected in the first chart, represents most of the total reduction observed), mainly due to a reduction in the fertility rate and the accumulation of capital by the baby boom generation. Similarly, the analysis by Carvalho et al. (2017)[11] suggests that the increase in life expectancy and the decrease in population growth could explain a reduction of around 200 bps in short-term US interest rates since 1990 (although their model suggests that life expectancy is the dominant factor). Finally, according to Lisack et al. (2017),[12] the ageing of the population will have contributed to reducing short-term global interest rates by 150 bps since 1980. In addition, these three studies forecast that the demographic dynamics will continue to exert downward pressure on interest rates in the coming decades. This is primarily due to the increase in life expectancy, which they assume will result in an increase in household savings, and due to the fact that the ageing of the population will lead to a greater relative weight of groups with more accumulated capital.

Savings rate: impact of demographics

*Cumulative deviation compared to 2017 (%) **



Note: ** Savings rates by age group are hold constant at their 2017 levels, and the change in the national savings rate produced by the demographics is projected based on these fixed rates and the forecasted change in the distribution of the population by age group. For Spain and Portugal, it is assumed that each age group has the same savings profiles as those shown by the data for the US (adjusted for the different levels of national savings rates).*

Source: *CaixaBank Research, based on data from the Bureau of Labor Statistics, the United Nations, the National Statistics Institute of Spain and the National Statistics Institute of Portugal.*

One of the limitations of all the above estimates is that they analyse the impact of the ageing of the population based on a closed economy perspective: that is, without taking into account the fact that the population pyramid is also changing in the rest of the world, which can generate capital flows between different regions. In this regard, the analysis by Krueger and Ludwig (2007)[13] suggests that considering these international capital flows does not substantially affect the estimates, at least for the US (in line with the studies mentioned previously, their results also point towards the demographics continuing to apply downward pressures on interest rates). However, Goodhart and Pradhan (2017)[14] from the Bank of International Settlements argue that the demographic transition of China will have major implications at the global level, reducing its high level of savings and pushing interest rates up. In addition, unlike the previous studies, these authors predict that the demographics will push up interest rates over the coming years for two reasons (in addition to the «China» factor): on the one hand, they consider that the increase in life expectancy will not significantly increase savings, while on the other hand, they argue that the upward pressure resulting from a reduced flow of savings (due to the increase in pensioners, with lower savings rates) will more than offset the downward pressures exerted by the high levels of capital accumulated by these pensioners throughout their working lives.

In conclusion, the evidence available suggests that, besides the cyclical changes in monetary policy (which over the next few years should push interest rates upwards), demography will remain a key variable for understanding how interest rates will change in the medium to long term.

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10. E. Gagnon *et al.* (2016), «Understanding the New Normal: the Role of Demographics», Finance and Economics Discussion Series, Board of Governors of the Federal Reserve System.
11. C. Carvalho *et al.* (2017), «Demographic Transition and Low U.S. Interest Rates», Federal Reserve Bank of San Francisco Economic Letter.
12. N. Lisack *et al.* (2017), «Demographic trends and real interest rate», Bank of England Staff Working Papers.
13. D. Krueger and A. Ludwig (2007), «On the Consequences of Demographic Change for Rates of Returns to Capital, and the Distribution of Wealth and Welfare», Journal of Monetary Economics.
14. C. Goodhart and M. Pradhan (2017), «Demographics will reverse three multi-decade global trends», BIS Working Paper.