

THE IMPACT OF GLOBAL AGING

How demographic change will affect savings, growth and interest rates

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IN BRIEF

- The world economy stands on the brink of a sizable, long-term decline in household savings, driven by a global aging process that is set to become faster and more synchronous in the coming decades. In this paper, we consider whether this shift will reverse the global savings “glut” of the early 2000s and apply upward pressure to interest rates.
- Our analysis of the U.S., Germany, Japan and China suggests that an aging-driven decline in savings of 2.6% of GDP will unfold over the next 30 years, translating into real interest rates that are 25 to 50 basis points (bps) higher than they would have otherwise been. In contrast, our Long-Term Capital Market Assumptions (LTCMAs) embed a population-aging effect (through slower labor force growth) that lowers trend growth and rates by ~50bps over the next 10 to 15 years.
- Which force prevails—whether demographics drive rates higher or lower—will depend on how other parts of the economy respond. For instance, whether investment demand wilts under lower trend growth or is buttressed by a transition to a more capital-intensive economy will be a key determinant.

GLOBAL AGING AND THE IMPACT OF DEMOGRAPHIC CHANGE

Deeply enmeshed in our capital market assumptions is the idea that demographic change influences long-term asset returns. Our interest rate projections are informed by an assumption about trend growth, itself a function of labor productivity and the demographic factors shaping the size of the workforce. A reasonable rule of thumb suggests that for each percentage point (ppt) change in trend growth, the real interest rate of the economy changes by about the same amount.¹

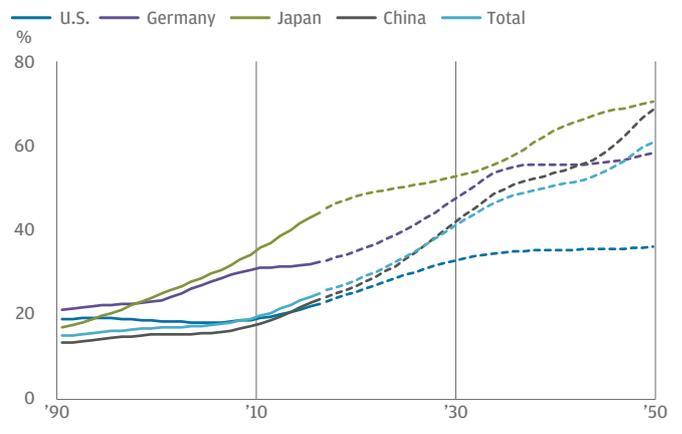
However, there are important exceptions. One exception arises when the supply of global savings changes so dramatically and quickly that it causes an imbalance in the world's desired (i.e., ex ante) level of savings vs. its desired level of investment—a so-called savings glut. Former Federal Reserve governor and chairman Ben Bernanke popularized this idea in the mid-2000s to explain why real interest rates were so low and why the U.S. was running such a large current account deficit (Bernanke 2005, 2007). He argued that the rapid buildup of savings in emerging market (EM) economies after a spate of financial crises in the 1990s, a sharp rise in the price of oil in the early 2000s and an upswing in household and corporate savings in China caused a shift outward in the global savings supply curve. (That is, it led to a greater supply of global savings at any level of the interest rate.) These increases in the supply of savings, in turn, could only be absorbed by global investment demand once interest rates moved lower and developed market (DM) economies became net borrowers. Importantly, real interest rates fell by more in the mid-2000s than did estimates of trend growth.

Today we stand on the brink of another massive swing in global savings, driven this time by the aging of the global population. Older cohorts transitioning out of the workforce and into retirement will save less as they draw down assets to finance consumption. The process is well underway in DM economies and will hasten in the coming years as U.S. retirement rates continue to rise and, eventually, as China's huge population ages and lowers its saving rate. In this paper, we explore the idea that this decline in savings will reverse the behavior that accompanied the savings glut of the early 2000s and will apply upward pressure to global real interest rates.

The first reason demographics matter in this context is that the global aging process will become faster and more synchronous in the coming decades. The dependency ratio—defined here as the ratio of the older to the younger population—has been rising for some time in Japan and Germany and is beginning to creep up in the U.S. and China.² According to United Nations population forecasts, the overall dependency ratio will rise by 10ppt per decade over the next 30 years (**Exhibit 1**).

The global aging process will become faster and more synchronous in the coming decades

EXHIBIT 1: DEPENDENCY RATIOS, 1990-2050



Source: United Nations, J.P. Morgan Asset Management Multi-Asset Solutions.

The second reason demographics matter is because the relationship between labor force growth and interest rates will arguably be more uncertain going forward. Demographic forces will likely push interest rates in opposite directions. Slower labor force growth, dragging on trend growth, will put downward pressure on rates; at the same time, lower saving rates in retirement will apply upward pressure on rates. More specifically: On the one hand, demographics will continue to exert downward pressure on trend growth of ~50bps over the next 10 to 15 years, reducing interest rates by about the same amount. On the other, we estimate that the corresponding reduction in savings—all else equal—will raise interest rates by 25bps to 50bps over the next 30 years. We are fairly confident that the demographic forces driving trend growth and rates lower will prove to be the more powerful influence in the long run. But we recognize that demographics can buffet interest rates along the way, subjecting our yield estimates to additional uncertainty.

¹ This rule is also rooted in economic theory. In neoclassical growth models, the saving rate that maximizes the level of consumption, known as the “golden rule” saving rate, implies that the risk-free rate in the economy equals its trend growth rate. See Solow, Robert M. (1956): “A contribution to the theory of economic growth.” *The Quarterly Journal of Economics* 70:1, 65-94.

² The analysis herein will focus on these four economies, which together compose 26% of the global population, 50% of global GDP and 55% of global gross savings.

LIFE CYCLE SPENDING PATTERNS AND THE FUTURE OF GLOBAL SAVINGS

In defining a reversal of the savings glut, we first relate the large expected swing in the age composition of the population to aggregate savings. We focus on the household saving rate as the most direct channel and use a simple technique to parse the overall saving rate of each country into a saving rate for the younger cohort (under 65) and the older cohort (over 65).³ The technique is based on the idea of consumption smoothing over the life cycle, since people entering retirement face a large decline in their income but use their accumulated savings to finance consumption.⁴ Therefore, under our assumptions about average changes in income and

consumption between working age and retirement, we are able to estimate the average saving rate in each cohort.⁵ For example, the official gross household saving rate in the U.S. was 7% of disposable income in 2016, from which we estimate a 13% average saving rate for younger cohorts and a -48% average rate for older people.

Armed with age-specific saving rates and a forecast for dependency ratios, we estimate the effect of aging on average saving rates in the coming decades. Our estimates are shown in **Exhibit 2**, with each economy's saving rate falling roughly in line with the contour of the rise in its dependency ratio. In the U.S., where saving rates have been oscillating around 9% in recent decades, the retirement of the baby boom cohort (Americans born 1946-64) will subtract about 2ppt between now and 2030 before stabilizing. In Japan and Germany, where saving rates are generally higher and dependency ratios have already been on the rise, the swing will be of similar magnitude between now and 2030. But while

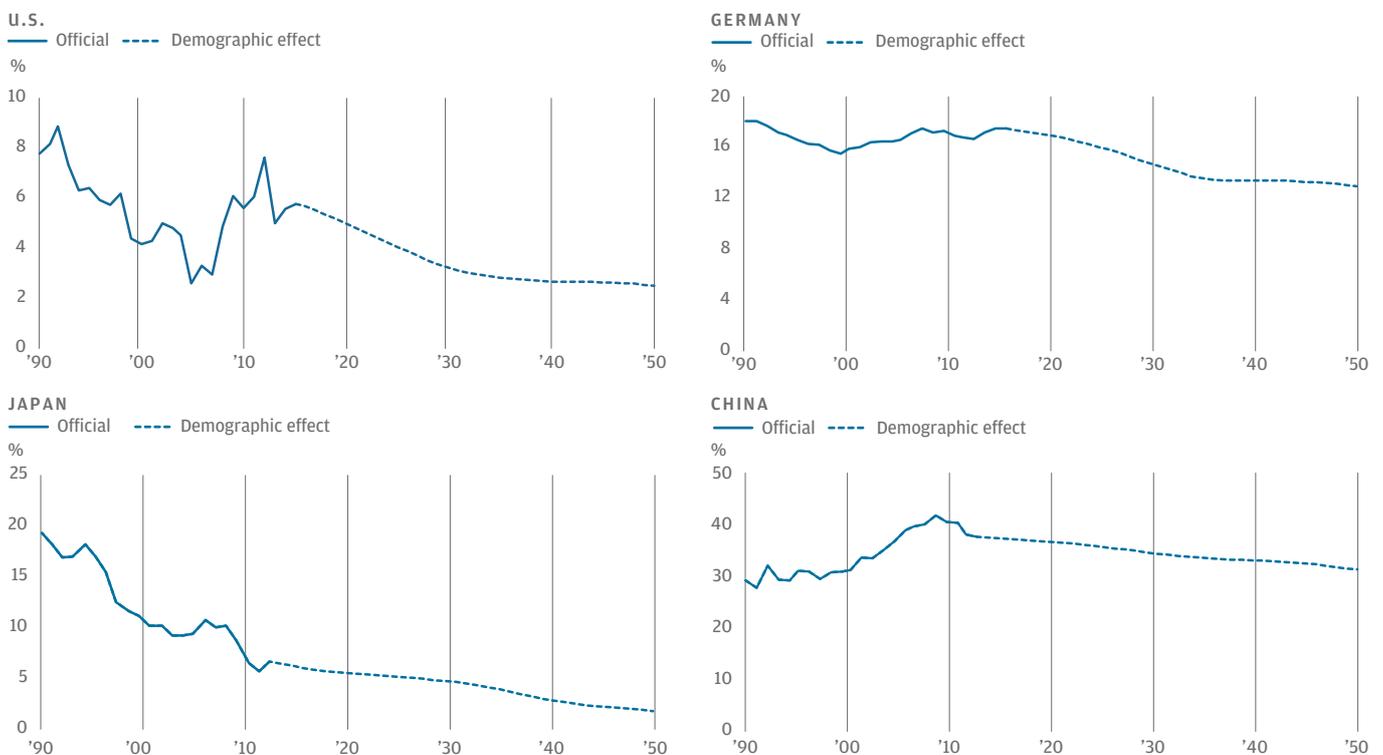
³ We use slightly different definitions of older cohorts across countries, reflecting differences in retirement ages. The cutoff is assumed to be 65 years old in the U.S., Germany and Japan. In Japan, retirement age varies by pension scheme, but under current legislation the varying ages will center around 65 in the coming years. The Chinese cutoff is set at 60, the current retirement age for men (the female age is 55).

⁴ Another important driver of household savings operates via real estate. In previous research using the U.S. Survey of Consumer Finances (<https://am.jpmorgan.com/gi/getdoc/1383246462222>), we found that residential property alone contributed 59% of the average baby boomer's total asset growth since 1989. Unfortunately, a similar forensic decomposition of household balance sheets by age group is not possible for the other countries, given data limitations, and that is why we focus on the flow of income diverted to savings as opposed to the stock of savings.

⁵ Our calculations assume a decline in income of 50% and a decline of consumption of 15% in old age.

Life cycle saving patterns will exert downward pressure on household saving rates

EXHIBIT 2: HOUSEHOLD SAVING RATES, U.S., GERMANY, JAPAN, CHINA, 1990-2050 (%)



Source: National statistical offices, United Nations, J.P. Morgan Asset Management Multi-Asset Solutions.

Note: Throughout this analysis, we use gross household saving rates rather than net rates, given data availability constraints for China. Gross household saving rates are generally higher levels than net rates since they include depreciation and other forms of household capital consumption, but have little effect on the changes in saving rates that we forecast.

U.S. saving rates are projected to stabilize in 2030, in Japan and Germany they are expected to continue falling, bringing the total decline in the saving rate to 4%-5% through 2050.

In China, where the puzzlingly high level of household savings has been the subject of a voluminous literature (see, for instance, Modigliani and Cao 2004 or Ma and Yi 2010), demographic effects are expected to bring down saving rates steadily, from 38% at present to 31% in 2050. China's case, in particular, allows us to examine whether it is reasonable to assume a constant saving rate going forward, given that the

age-specific rates themselves might be driven by changing demographic factors. Indeed, according to our calculations, if China's working age saving rate were to revert to where it was at the beginning of the 2000s, its overall saving rate would be closer to 25% by 2050. It could also be the case that these types of forecast errors are offsetting across countries: Germany, for example, has had a rising dependency ratio since 2000 without any notable decline in its saving rate. We discuss Japan's experience in the accompanying sidebar, "The Case of Japan."

THE CASE OF JAPAN

Our analysis makes a series of assumptions about the nature of savings in the wake of a demographic shift. For example, we've embedded an assumption that households smooth out consumption over their life cycles and therefore have lower saving rates in retirement. We have also focused on the household sector, paying little attention to the effects of demographic transition on corporate or government savings. Japan's experience over the past quarter century provides a case study in addressing whether these assumptions are reasonable.

To put the Japan case in context, the economy's dependency ratio has nearly tripled since the early 1990s. Consistent with our thesis that a higher share of older age cohorts translates into lower savings, household saving rates have fallen dramatically over that period, from 19% in 1995 to 7% in 2015 (Exhibit 3). Using our estimates of age-specific saving rates from the mid-1990s, demographic changes would have accounted for 4.9ppt (40%) of the total 12.7ppt decline in the saving rate. Of course, demographic change was but one factor that caused saving rates to decline.

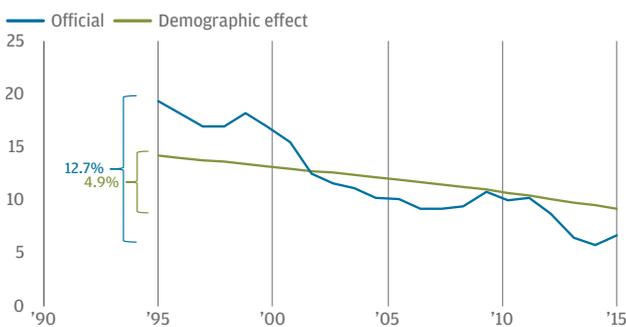
Others include the gradual recovery of household balance sheets following the financial crisis in 1990. And, even prior

to that, modest tax incentives for saving had been scaled back over the course of the 1980s. Delayed retirement is an example of a factor that would have slowed the decline in saving rates, though older worker labor force participation has actually fallen slightly since the mid-1990s.

We also note that, even as household saving rates continued to decline in the mid-1990s, the contribution of corporates to the country's gross national savings (i.e., the total including household, corporate and government savings) was steady at ~4%-5% of GDP (Exhibit 4). The fact that corporate savings swung from negative to positive raises the possibility that lower trend growth—largely driven by demographics—reduced incentives for Japanese companies to borrow. However, that swing may have simply reflected the deflation of the 1980s bubble. The lack of any discernible correlation between weakening demographics and steady corporate savings after the initial change in the 1990s is consistent with the idea that the country's financial crisis was a more powerful influence on corporate savings. Overall, these patterns leave us fairly comfortable with our focus on demographically driven shifts in household savings.

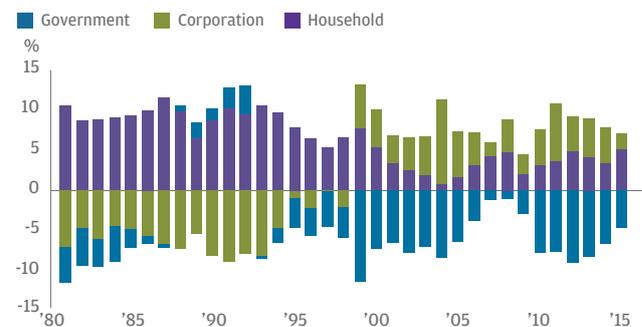
Japanese household saving rates have fallen dramatically since the mid-1990s, with demographics accounting for about 40% of the decline

EXHIBIT 3: HOUSEHOLD SAVING IN JAPAN



In Japan, corporate contributions to gross national savings have held relatively steady as household saving rates have declined

EXHIBIT 4: CONTRIBUTIONS TO TOTAL SAVING RATES IN JAPAN



Source: Bank of Japan, Cabinet Office of Japan, Haver Analytics, J.P. Morgan Asset Management Multi-Asset Solutions; data through July 2017.

THE EFFECT ON REAL INTEREST RATES

Having established a connection between demographic transition and savings, we now link our projections of slowing household savings to real interest rates. A stylized way to render that link is through the supply and demand for global savings. The idea is that the aging of the global population—as measured here in the U.S., Germany, Japan and China—represents an inward shift in the savings supply curve (Exhibit 5). If demographic forces influence interest rates primarily through supply—and not by shifting the demand curve for investment—the contraction in household savings we’ve identified will put upward pressure on the price of savings, which is the real interest rate.

Given that demographic change is an increasingly *global* influence on savings, we model the corresponding shifts in *global* supply and demand. We believe that this mechanism will become increasingly influential over time. For instance, we expect the effect to be larger in the coming decades than it was in Japan, which was at the forefront of developed market demographic shifts in the 1990s. In that case, the savings effects were more local in nature and domestic interest rates continued their downward trend.

We calibrate the effect on real interest rates using our estimates of the aging-driven decline in savings in the coming decades, as well as estimates of the slope of the supply and demand curves (i.e., the price elasticity of savings and

investment, respectively).⁶ Aggregating across our savings projections for the U.S., Germany, Japan and China, we estimate that aging will subtract 1.2ppt of GDP over the next 10 years and 2.6ppt cumulatively over the next 30 years; these are the leftward shifts in the supply curve shown in Exhibit 5.⁷ Translating these shifts into increases in the real interest rate, aging will push up rates by 15bps over the next 10 years and 35bps over the next 30 years. Allowing for some uncertainty about what the true elasticities are, the effect is in the range of 25bps-50bps over the next 30 years.

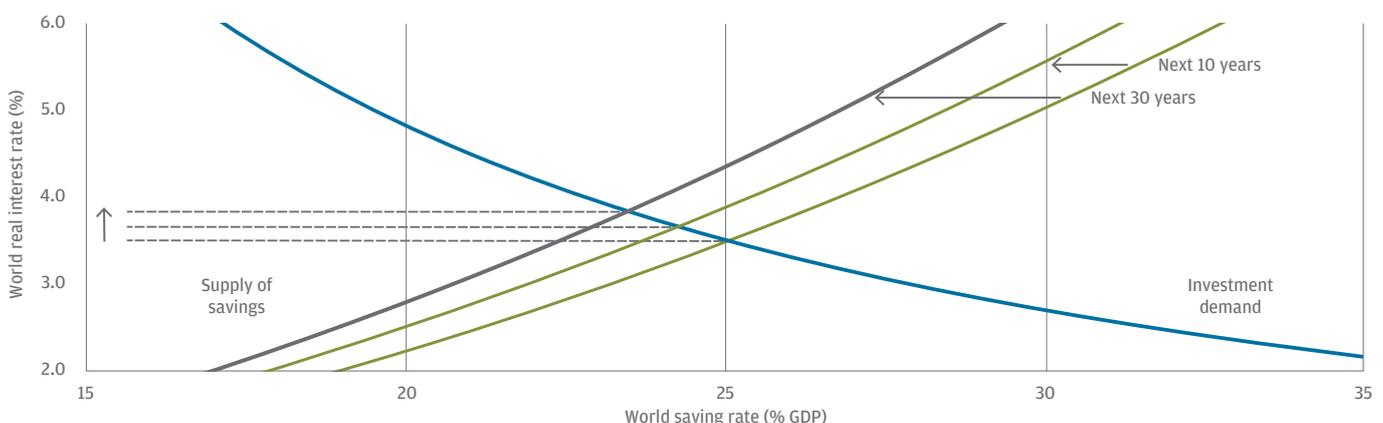
⁶ Our baseline elasticity assumptions are based on work by Rachel and Smith (2015). In their work, $\beta_s=0.5$ in a savings supply equation of the form: $\ln(r)=\alpha_s+(1/\beta_s)\ln(\frac{y}{r})$ and $\beta_i=-0.7$ in an investment demand equation of the form: $\ln(r)=\alpha_i+\ln(1/\beta_i)\ln(\frac{y}{r})$. We present results for a range of elasticities: $\beta_s=[0.1,0.9]$ and $\beta_i=[-0.3,-1.1]$.

Our starting point for the current global real interest rate is something we would consider to be a “normal” rate in the absence of quantitative easing and other factors pushing around the net supply of safe assets. To estimate what that normal real rate would be, we use an assumption similar to the LTCMA framework for fixed income, linking it to trend real growth. Since we think that trend global growth is currently ~3%-3.5%, that is the starting point for the global real interest rate in Exhibit 5. The starting point for the national savings as a share of GDP (25%) is a weighted average across countries and comes from the IMF World Economic Outlook.

⁷ These projections are arguably conservative compared with what would be obtained using prior estimates of the link between dependency ratios and overall savings. Rachel and Smith (2015) present cross-country evidence that a 1ppt increase in the dependency ratio tends to lower savings by about 50bps of GDP, implying a decline in savings of 4%-5% of (overall) GDP over our forecast horizon.

If demographic forces influence interest rates primarily through supply, a contraction in household savings will put upward pressure on real interest rates

EXHIBIT 5: SUPPLY AND DEMAND FOR GLOBAL SAVINGS (%)



Source: Rachel, Lukasz and Thomas D. Smith (2015): “Secular drivers of the global real interest rate.” Bank of England Staff Working Paper No. 571. J.P. Morgan Asset Management Multi-Asset Solutions; data as of July 2017.

CONCLUDING THOUGHTS

As we have discussed, a tension between two opposing forces will play out in the way that aging populations will influence interest rates. As more workers retire and workforce growth slows, the demographic change will act as a source of downward pressure on both economic growth and equilibrium interest rates. However, the change will also coincide with a large downshift in savings as those workers save less in retirement, and in this way it will apply upward pressure to rates.

Which force will prevail over our 10- to 15-year forecast horizon? It will depend in part on how other areas of the economy respond. Viewed through the lens of our supply and demand framework, to get to the lower equilibrium interest rates that theory implies even as the supply curve of savings is shifting inward, the rest of the economy would need to increase savings somehow, or investment demand would need to shift inward as well.

As households lower their saving rates, aging populations may well boost savings in the rest of the economy. Governments may be required to shore up savings to meet future entitlement obligations, and businesses may take on less debt as they anticipate a slower-growth future. It is also possible that China's growing weight in the world economy will pull global saving rates closer to China's own astronomical levels. In other words, the fact that China is growing relatively quickly means that its contribution to global savings flows will actually grow, not shrink. Finally, from the U.S. perspective, to the extent that foreign savings fall by more than that in the U.S., the U.S. current account deficit would likely shrink.

While lower trend growth will depress investment, all else equal, we also see several factors boosting investment in the coming years. Take business investment spending or capital expenditure (capex), for example. Notwithstanding the fact that capex trends generally follow those of overall growth, we expect recent cyclical distortions in capex to normalize and for investment in technology (and intellectual property more generally) to support overall investment. Perhaps the biggest question mark with regard to aging and investment is whether the demographic process we have described here spurs additional developments in labor-saving technologies and automation, which would cause the economy to become more capital intensive and support investment spending along the way.

All in all, these crosscurrents make it difficult to predict whether we will see a strong reversal of the global savings glut and a corresponding upswing in interest rates. As a case in point, in the 1990s and 2000s Japanese government bond yields did not show any discernible upward impulse as household savings declined, perhaps swamped by the effects of weak trend growth or the international drivers of interest rates. What is clear, though, is that the accelerating and increasingly globally synchronized nature of demographic change will put this hypothesis to the test in the coming decades. And while the arrival of higher interest rates is by no means an inevitable outcome of the demographic shifts to come, we view it as an important upside risk.

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