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Introduction

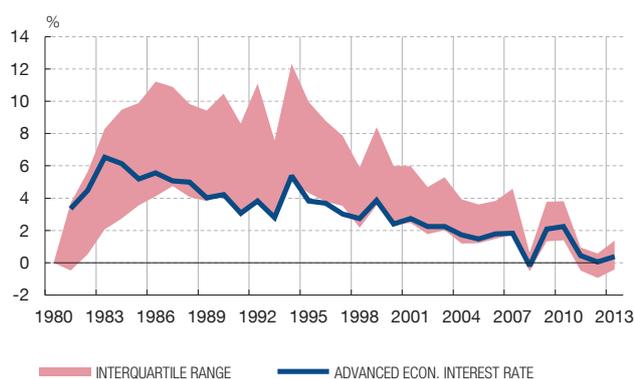
The real interest rate (i.e. the nominal return on assets after discounting for expected inflation) is a key macroeconomic variable since it determines economic agents' intertemporal investment and consumption decisions. The equilibrium real interest rate is that which equates the supply (saving) and demand (investment) for loanable funds or, in other words, makes the marginal productivity of capital equal to the compensation that savers require to delay their consumption. This concept is closely linked to the "natural" real interest rate habitually used in the business cycle literature, which is defined as that consistent with the use of all the productive resources in an economy without any type of financial or real frictions (Wicksell, 1898). This natural interest rate measures the return associated with the economy's potential growth and depends on fundamental parameters such as productivity and population growth, and the elasticity of intertemporal substitution, which measures consumers' readiness to delay their consumption.

The growing trade and financial integration of recent decades has seen real interest rates in every economy increasingly influenced by international developments. The progressive opening up of economies, with growing trade and financial flows, has enabled economies with investment requirements not covered by their domestic saving to resort to other countries' excess saving, such that financing flows towards countries where it is more profitable, generating global gains. Accordingly, a global real interest rate may be defined as that which equates the supply and demand for loanable funds at the global level. From this perspective, real interest rates are increasingly determined by factors common to all countries that depend on saving and investment at the global level.

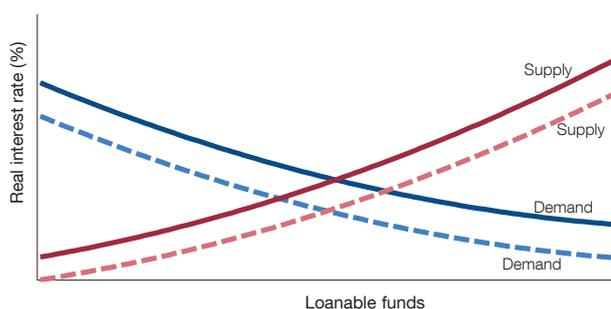
There is wide evidence that real interest rates have progressively declined since the 1980s in most advanced and emerging economies to stand currently at very low levels. The persistence and intensification of this trend during the global financial crisis led to consideration of a series of highly relevant issues in different areas (Teulings and Baldwin, 2014). First, it can be asked to what extent the task of monetary policy of steering the interest rate towards its natural level is made more difficult by the fact that this natural interest rate may be very low (or even negative, if adverse macroeconomic shocks occur), given the current context of persistent low inflation rates, which means that nominal interest rates need to be significantly negative (Summers, 2014). Further, the existence of excessively low interest rates for prolonged periods raises the question of the implications for financial stability. Lastly, there is the question of whether this situation is actually the reflection of a substantial reduction in potential growth at the global level.

Against this background, this article analyses the determinants of this trend from a global perspective, discussing the extent to which it is likely to continue in the medium and long term. In this connection, the following section reviews the main stylised facts relating to real interest rate developments. The third section discusses the determinants that the literature has related to the trends observed, differentiating between various time periods and highlighting the influence of the emerging economies, since the beginning of this century, and of other factors that have operated in the wake of the global financial crisis. The fourth section discusses some medium and long-term trends that may affect the future course of interest rates.

1 LONG-TERM INTEREST RATE IN ADVANCED ECONOMIES



2 REAL INTEREST RATE AND CHANGES IN THE SUPPLY AND DEMAND FOR LOANABLE FUNDS



SOURCES: Blanchard et al. (2014) and Banco de España.

The global interest rate

Despite the significance of the real interest rate for economic agents' decision-making, it is not a directly observable variable; therefore, it is usually proxied at a specific term by the nominal return on public debt (considered as the safe asset in each economy) at that term less the inflation expectations over that same horizon.¹

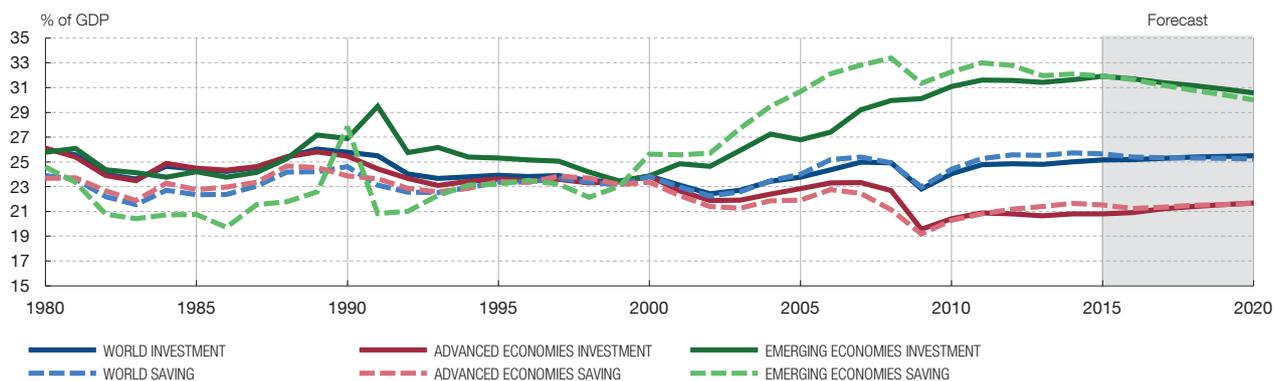
Following Blanchard et al. (2014), the left-hand panel of Chart 1 tracks the average real interest rate (weighted by GDP) on the 10-year public debt of the main advanced economies since 1981. Two notable trends can be appreciated in the chart:

- The gradual decline in the real interest rate from levels around 5% in the mid-1980s to around 2% at the onset of the financial crisis, and ultimately approximately zero in 2012.
- The reduction in the dispersion between interest rates in an environment of greater financial integration, which heightens the importance of the common global factors in the determination of each country's real interest rates.

Indeed, assuming a high degree of financial integration between the main global economies, global real interest rates will be determined by the supply of (saving) and the demand for (investment) loanable funds at the global level.² Under normal conditions, the supply of loanable funds increases with the interest rate, so that interest rate rises entail increases in saving and reductions in consumption (i.e. in consumption decisions, negative substitution and wealth effects predominate over the positive income effect), while the demand for

¹ An alternative is to use the yields on inflation-indexed public debt instruments directly, but these are available only for a small number of economies and a very short period. Moreover, the markets for these assets are usually less liquid than those for traditional public debt, so that premiums may arise which complicate the interpretation of yields.

² Although financial integration had been increasing until the global financial crisis, during the period analysed there were significant restrictions on the mobility of capital flows, especially in emerging economies, of which China is the best example. The consensus in the literature on international finance is that the advanced economies have closely interconnected capital markets, while the integration of the emerging economies into the international financial system is more recent and limited. As a result, the implicit assumption of financial integration underlying the conceptual framework in which the interest rate is determined by the balance of the global supply and demand for funds needs to be considered with caution. Moreover, one possible side effect of the global financial crisis is an increase in financial fragmentation, which may reduce the importance of global factors in the determination of saving and investment at the global level.



SOURCE: IMF, WEO, October 2015.

funds will decline with the interest rate, so that interest rate rises entail falls in investment (see right-hand panel of Chart 1).

In this conceptual framework, the fall in real interest rates may occur either due to a rightward shift in the saving curve (agents desire to save more at current rates) or to a leftward shift in the global investment curve (agents prefer to invest less at current rates), or to a combination of both these developments. Chart 1 shows how positive shocks to global saving are associated with a decline in real interest rates accompanied by increases in global saving and investment. Negative shocks to investment also prompt falls in real interest rates, while global saving and investment are reduced. The combination of a simultaneous increase in the propensity to save and decline in the propensity to invest would lead to a fall in real interest rates and an indeterminate effect on saving and investment.

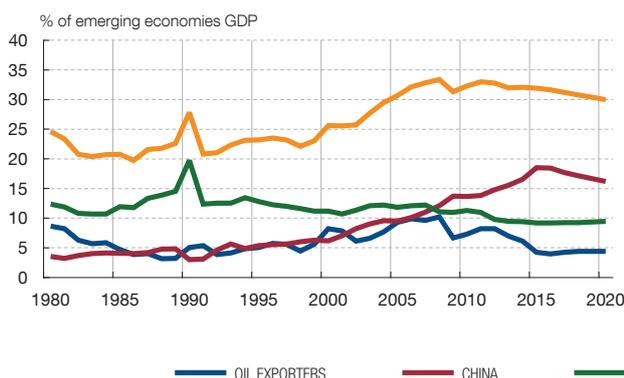
Chart 2 shows saving and investment rates³ for the global economy, the advanced economies and the emerging economies.⁴ The following stylised facts are apparent in this chart:

- The relative stability of global saving and investment rates since the 1980s, despite the fall in interest rates over this period, although a mild upward trend is apparent from the end of the 1990s, which was only interrupted during the global financial crisis.
- In the advanced economies there was a fall in saving and investment rates from the start of the century, which intensified after the global financial crisis. Since then there has been a slight recovery, to rates of around 21% at present.
- By contrast, saving and investment rates in the emerging economies increased substantially from the end of the 1990s, following certain significant regional crises and coinciding with the intensification of globalisation and greater financial integration. After the crisis, these ratios stabilised, but they remain above 30%.
- In the early years of this century, the increase in saving in the emerging economies was much larger than the increase in investment, these economies

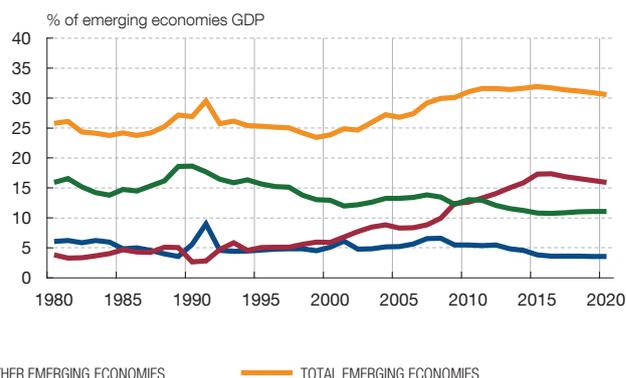
³ The differences between global saving and investment rates arise from statistical discrepancies.

⁴ Saving and investment rates are calculated as nominal saving and investment, respectively, divided by nominal GDP. However, significant changes in relative prices must have occurred, since the price of investment goods shows a downward trend relative to the economy as a whole, which would lead to a higher investment rate at constant prices than in nominal terms.

1 SAVING RATE



2 INVESTMENT RATE



SOURCE: IMF, WEO, October 2015.

providing net financing to the rest of the world, contradicting the simplest models of location of investment, which predict that it goes where capital is scarcer. The saving rate of the emerging economies increased notably after 2000. Consequently, the global saving rate increased between 2000 and 2007 by 1.6 percentage points (pp), of which 1.5 pp may be attributed to the increase in saving in the emerging economies, 0.8 pp to the increase in their weight in world GDP, and a negative contribution of -0.7 pp to the advanced economies. The increase in saving has been concentrated in a small number of economies, essentially China and commodities exporters (see Chart 3).

Determinants of the global real interest rate

Since the real interest rate is the price that equates the desired supply and demand for loanable funds, its path is determined by those factors that influence agents' propensity to save and to invest. There is an abundance of theoretical and empirical literature that has studied the determinants of saving and investment decisions.⁵ Among the factors which explain the path of saving, may be distinguished those linked to structural factors and those associated with economic policies. In the first group, economic theory has highlighted the level and growth of income, demographics and uncertainty, which leads to saving for precautionary motives. Economic policies (for example, fiscal policy, the characteristics of the welfare state, inequality or the level of financial development, closely linked to regulation) may also influence the path of saving. Among the determinants of investment, the literature has highlighted the relative prices of capital goods, the uncertainty regarding future income, the demographic structure, the productive structure, urbanisation and financial development. In this case, economic policies can also play a notable role: directly, through public investment and the development of infrastructure, and, indirectly, by creating an environment conducive to the profitability of private investment.

Other factors also influence the path of the real interest rate, in addition to the determinants of saving and investment. Thus, the relative risk of the different types of financial assets affects the profitability of safe assets. For its part, monetary policy through inflation expectations and the yield curve, affects long-term real interest rates, although the potential deviations from the natural interest rate will be temporary.

⁵ See, for example, IMF (2014a), Grigoli et al. (2014), Bean et al. (2015), or the numerous references cited in these papers.

The conjunction of determinants that has led to the fall in the global real interest rate has prompted some debate, against a background of relatively stable global saving and investment rates, which is one of the stylised facts presented in the previous section. These trends would be compatible with an increase in the propensity to save, which would involve a rightward shift in the supply of loanable funds, taking place at the same time as a reduction in the propensity to invest, which would move the demand curve for funds leftward (see Chart 1). However, other explanations are possible. For example, if the supply of funds (i.e. saving) is very insensitive to changes in interest rates (so that substitution and wealth effects are fully offset by the income effect), a reduction in the propensity to invest would give rise to a fall in the interest rate, with no effect on the amounts exchanged. Likewise, if investment were insensitive to interest rates (as may have been the case, to some extent, following the global financial crisis), and increase in the propensity to save would lead to a fall in the real rate, with no change in equilibrium saving and investment.

The possible determinants of the path of real interest rates are reviewed below, noting the changes observed in the composition of saving and investment by geographical area and over time.

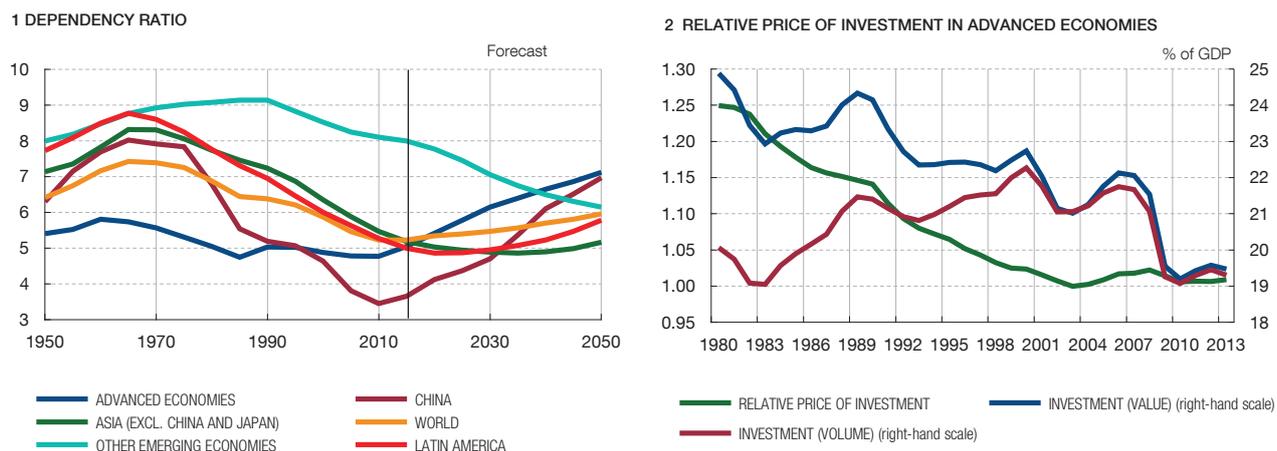
In the last two decades of the 20th century, the advanced economies played a central role in global saving and investment developments. Limited financial integration at the global level and the low weight of the emerging economies meant that their impact on global saving and investment decisions was small. As a result, the overall trend in real interest rates was determined by the increase in the readiness to save and the decline in the propensity to invest in the advanced economies.

In the 1980s, in most of the advanced economies longevity continued to rise and in some of them fertility began to fall. Against this background, the relative weight of the middle-aged segment of the population increased and, consequently, dependency ratios⁶ fell (see left-hand panel of Chart 4). According to life cycle theory, this segment has the highest wage income and the highest propensity to save for retirement, so that an increase in its relative weight boosts the aggregate propensity to save. In addition, technological progress and the start of globalisation would have led to an increase in wage dispersion, which may have increased the aggregate propensity to save, by increasing the income of richer people, who have higher saving rates (Bean et al., 2015). Low-skilled workers have suffered an erosion of their relative income in the advanced economies, deriving from the changes entailed by automation of many regular tasks and higher consumption of goods produced with the abundant labour available in the emerging economies. In conjunction with this, the increasing uncertainty regarding the sustainability of the welfare state led to an increase in individual protection. Conversely, financial deregulation would have helped eliminate liquidity constraints, limiting the increase in the readiness to save.

Among the factors that contributed to the decline in the propensity to invest in the period 1980-2000, the transformation of the productive structure of the advanced economies (with the weight of financial and business services growing, to the detriment of manufacturing) and the decline in the relative price of investment goods (see right-hand panel of Chart 4) may be highlighted.⁷ Indeed, insofar as the investment content of services is more limited than that of industry, the shift in activity toward services contributed to

⁶ The ratio between the population aged under 15 and over 64 and the population aged between 15 and 64.

⁷ See Berganza et al. (2015) for an analysis of the factors explaining the weakness of investment in the advanced economies.



SOURCES: UN and IMF (2014a).

reducing the rate of investment in the advanced economies, although the available evidence suggests that this composition effect is of limited quantitative importance (OECD, 2015). The relative price of investment goods displayed a downward trend as a result of the technological progress incorporated into this type of goods, which has led to a gradual increase in their efficiency. Thus, although this development favoured the growth of investment in real terms, the nominal demand for funds to invest fell relative to GDP.⁸ An additional factor was the downward trend in public investment in the advanced economies (IMF, 2014b).

THE GROWING IMPORTANCE OF THE EMERGING ECONOMIES (2000-2007)

As mentioned in the second section, between 2000 and 2007 the emerging economies, against a background of globalisation and increasing financial integration, contributed decisively to the increase in global saving and investment, playing a more important role in the evolution of global real interest rates. Chart 5 shows that China, along with the oil exporters, was the best example of these developments and, also, that the changes in saving were larger than those in investment, generating net lending by the emerging economies. Indeed, Bernanke (2005) pointed to a “saving glut” in the emerging economies as the main determinant of the reduction in the real interest rate.

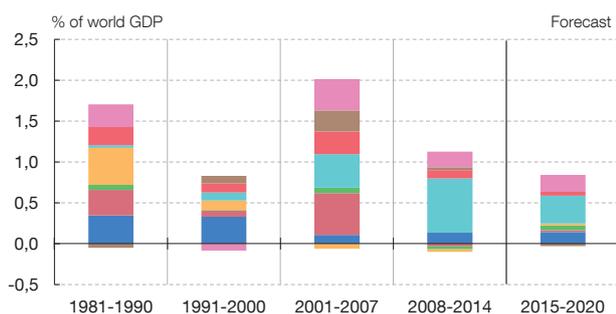
The available empirical evidence suggests that sustained economic growth in the emerging economies was the main determinant of the increase in the saving rate in this period (IMF, 2014a). The determinants of saving in China, which accounts for approximately half of the saving of the emerging economies, have a decisive influence on the behaviour of global saving. Bean et al. (2015) consider that the one child policy combined with limited social protection substantially boosted saving. Also, limited financial development and the protection of public corporations favoured the accumulation of retained earnings. The economic development strategy may also have played a role in the determination of saving. In this respect, China’s exchange-rate policy throughout this period aimed to keep the renminbi exchange rate relatively stable and undervalued against the dollar. Upward pressures on the renminbi were countered, in order to stimulate exports and, consequently, economic growth. This resulted in the generation of very large current account surpluses.

⁸ Problems related to the measurement of investment, stemming, for example, from the increasing importance of intangible assets and their possible undervaluation in the national accounts, would limit the decline in the observed investment rate.

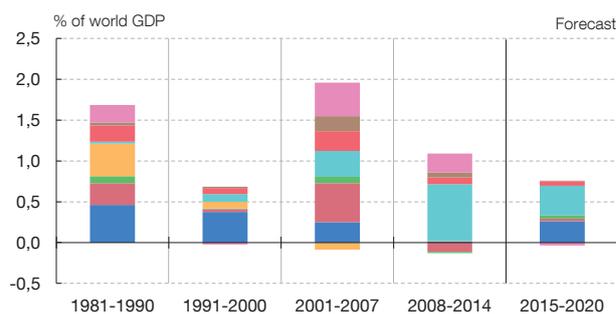
INCREASE IN SAVING AND INVESTMENT. GEOGRAPHIC DISTRIBUTION

CHART 5

1 CHANGES IN GLOBAL SAVING



2 CHANGES IN GLOBAL INVESTMENT



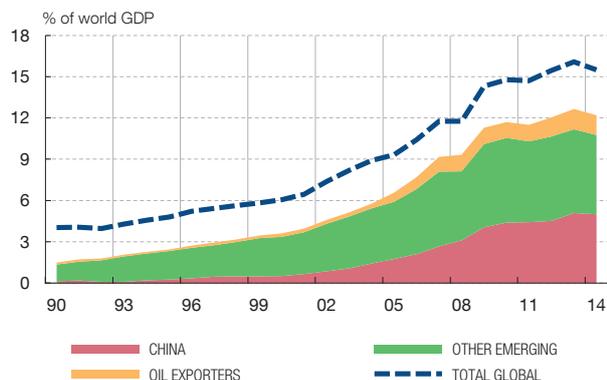
UNITED STATES EURO AREA UNITED KINGDOM JAPAN CHINA
OTHER ADVANCED ECONOMIES OIL EXPORTERS REST OF THE WORLD

SOURCE: IMF, WEO, October 2015.

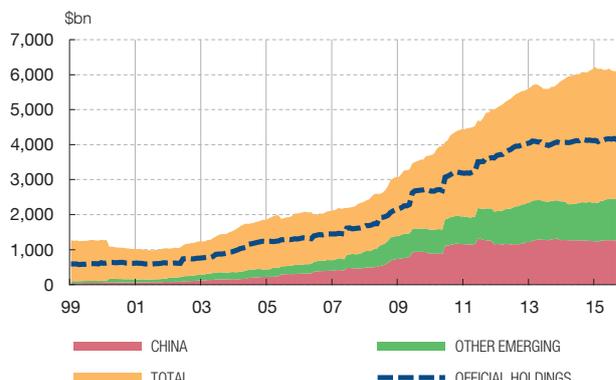
SAFE ASSETS AND PORTFOLIO SHIFTS

CHART 6

1 INTERNATIONAL RESERVES



2 FOREIGN HOLDINGS OF US TREASURIES



SOURCES: IMF and US Department of the Treasury.

The pursuit of this strategy required restrictions on capital movements, which limited financial development and fostered a huge accumulation of international reserves.

At the same time, the increase in the prices of oil and other commodities from 2003, against a background of strong growth in the world economy, led to an increase in the saving of commodity exporters. An additional argument to explain the accumulation of reserves by the emerging economies is that, following the financial crises of the 1990s, there was a tendency for self-insurance against possible future crises, given the limited development of global and regional institutional protection networks.

The increase in the foreign reserves of China and other emerging economies (like the investments of the sovereign wealth funds of certain oil exporters (see left-hand panel of Chart 6) mostly took the form of dollar-denominated fixed-income instruments, helping to finance the large US current account deficit. The limited development of the financial markets of the emerging economies, along with the limited supply of safe assets, helps to explain this phenomenon (Caballero, 2006). Thus, foreign holdings of US Treasury bonds increased considerably after 2000, largely due to the increase in the official holdings of

these emerging economies (see right-hand panel of Chart 6). This phenomenon helps to explain the reduction in the real interest rate (Warnock and Warnock, 2009; Bernanke et al., 2004; Beltran et al., 2013), and the increase in the equity premium, which may be associated with portfolio reallocation towards fixed-income instruments.

As a result of the global financial crisis, various factors that are, to a greater or lesser extent, temporary, have continued to exert downward pressure on real interest rates. First, non-standard monetary policies have been geared towards reducing long-term interest rates, given the limited scope for changes in short-term rates. Specifically, sovereign bond purchases by the main central banks have had a composition effect on investors' portfolios, by reducing the return on safe assets and increasing the risk premia.

Second, financial crises tend to reduce the propensity to invest, mainly as a result of the limited supply of financing and the more uncertain outlook (Berganza et al., 2015). Empirical evidence suggests that, three years after the start of a crisis, the ratio of investment to GDP will have fallen by 3-3.5 pp (IMF, 2014a). This is roughly the contraction recorded in the rate of investment in the developed countries following the global financial crisis. Moreover, in the euro area and in Japan, possibly due to their greater dependence on bank financing, business investment is recovering more slowly than in the United States and in the United Kingdom, and still stands below its pre-crisis level. Finally, those countries that have had to consolidate their public accounts following the crisis have, to a greater or lesser extent, used public investment as an item of adjustment.

The crisis also boosted the private sector's propensity to save for precautionary motives. First, because of the deterioration in income expectations and greater uncertainty; in addition, fiscal adjustment policies resulted in some cases limitation of the welfare state and, in particular, of public pensions, all of which led to an increase in private saving. At the same time, against a background of high corporate and household indebtedness in certain developed economies, the fall in the price of assets following the crisis obliged private agents to increase their saving rate in order to reduce the mismatches in their balance sheets and increase their ability to finance themselves, given the scarcity of credit. In parallel, the financial sector has tended to deleverage and increase the resources assigned to the creation of buffers to prevent the occurrence of crises and to reduce their cost if they do occur. These changes have, on aggregate, led to significant progress in the process of debt reduction in these economies since 2009 and to moderation in lending to finance investment. Also, fiscal consolidation has contributed to the increase in public saving in numerous economies.

Finally, changes in the distribution of income and wealth may also have boosted the propensity to save. The greater income inequality that had already been observed in the advanced economies since the 1980s, has been heightened in some countries following the crisis by higher and persistent unemployment rates and greater wage dispersion.

The medium and long-term outlook

As the recovery in the world economy takes hold, the effects of the financial crisis on the propensity to save and invest (partly linked to deleveraging) should ease, prompting some recovery in the real interest rate. Monetary policy will push nominal interest rates upwards as output gaps close and inflation rises. However, the application of the Basel III accords on capital and liquidity ratios will increase financial institutions' demand for safe assets in the coming years, exerting downward pressure on the real interest rate.

In the medium term, the propensity to save may decline as a result of China's policies to rebalance its economy and if oil prices remain low for a prolonged period. The Chinese

authorities are currently pursuing a strategy to achieve more balanced growth, involving improvements in social protection, financial development and the liberalisation of cross-border flows, all of which should reduce saving arising from the precautionary motive and liquidity constraints. Moreover, if the reforms lead to broad liberalisation of the capital account, China's high volume of savings will have a greater impact on the global real interest rate. The global propensity to save will also tend to decline if commodity prices remain at their current low levels, since the propensity to consume of oil importers tends to be greater than that of oil exporters. As regards investment in the emerging economies, the slowdown in potential growth with respect to the period before the global financial crisis will entail less investment in infrastructure associated with industrialisation and urbanisation.

In the longer term, there is widespread agreement that two real factors will be important in the path of global saving and investment: demography and technological change.

Increasing life expectancy and declining fertility are trends common to advanced and emerging economies, albeit with somewhat different timing, which will tend to reduce the readiness to save. While population ageing began in the developed countries in the 1980s, in many emerging economies it is beginning at the moment, especially in Asia. In the initial stages of the ageing process, the aggregate propensity to save increases, as the middle-aged section of the population, which saves to finance lengthening retirement periods, increases in weight. In later stages, as the relative weight of the eldest groups increases, the propensity to save will tend to fall, while public saving will tend to be reduced due to the pressure on the health budget and public pension systems. These trends are clearly reflected in the path of the dependency ratio, as the UN projections to 2050 of population composition by geographical area (see left-hand panel of Chart 4) indicate.

The reduction in the working-age population inherent in this process will also affect the propensity to invest. In principle, the decline in the labour force may generate an increase in wages and a substitution of capital for labour, intensifying productive processes with greater investment. However, the empirical evidence suggests that the relationship between these two factors of production at the aggregate level is positive, so that upward pressure on the rate of investment should not be expected in future.

These population ageing and labour force trends may be partially moderated by decisions such as those taken in certain European countries to raise the age of retirement in order to boost the sustainability of their pension systems. Possibly of greater importance will be the economic policy measures of countries such as China, given their greater weight at the global level. Notable in this respect is China's recent announcement of the end of the one child policy, to boost the birth rate.

A second decisive factor in determining the path of the long-term real interest rate, on account of its notable effect on the propensity to invest, is total factor productivity, which measures the level of technological progress of an economy. There is currently a debate regarding the level of innovation to be expected over the coming decades. On one hand, Gordon (2015) has argued that, at best, the United States will continue to post the low rates of technological change that have been recorded since 1980 (around 0.6% per annum), well below those of the period 1920-1970, when many of the advances of the second Industrial Revolution were incorporated. Other authors, however, maintain that the interaction between science and technology will involve a fresh boost to progress, through industries such as information and communications, biotechnology and robotics, activities

	2010-2014	2014-2024	2024-2060
OECD	1.0	0.9	0.6
United States	1.0	0.9	0.7
Euro area	1.0	0.9	0.6
Emerging economies (a)	0.9	0.8	0.5

SOURCES: OECD Economic Outlook - Long-term baseline projections.

a Brazil, China, India, Indonesia, Russia and South Africa.

that are, in any case, still not adequately reflected in the measurement of GDP (Mokyr, 2014). From an international perspective, European countries have on average failed to surpass the technological progress seen in the United States in recent decades and a large part of the progress in emerging countries stems from incorporating the innovations of the technologically most advanced countries. Table 1 sets out the OECD's long-term forecasts of productivity growth, which are more in line with the first hypothesis.

Accordingly, the normalisation of monetary policies, the change in the growth model of certain emerging countries and the socio-demographic and productivity trends would point to a gradual recovery in real interest rates, over a medium-term horizon, albeit with a high degree of uncertainty, both as regards the magnitude of the rise and its timing. Over the longer term, this trend may tail off against a background of limited technological progress, which fails to boost investment, or a sharper-than-expected decline in investment in the emerging economies.

14.12.2015.

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