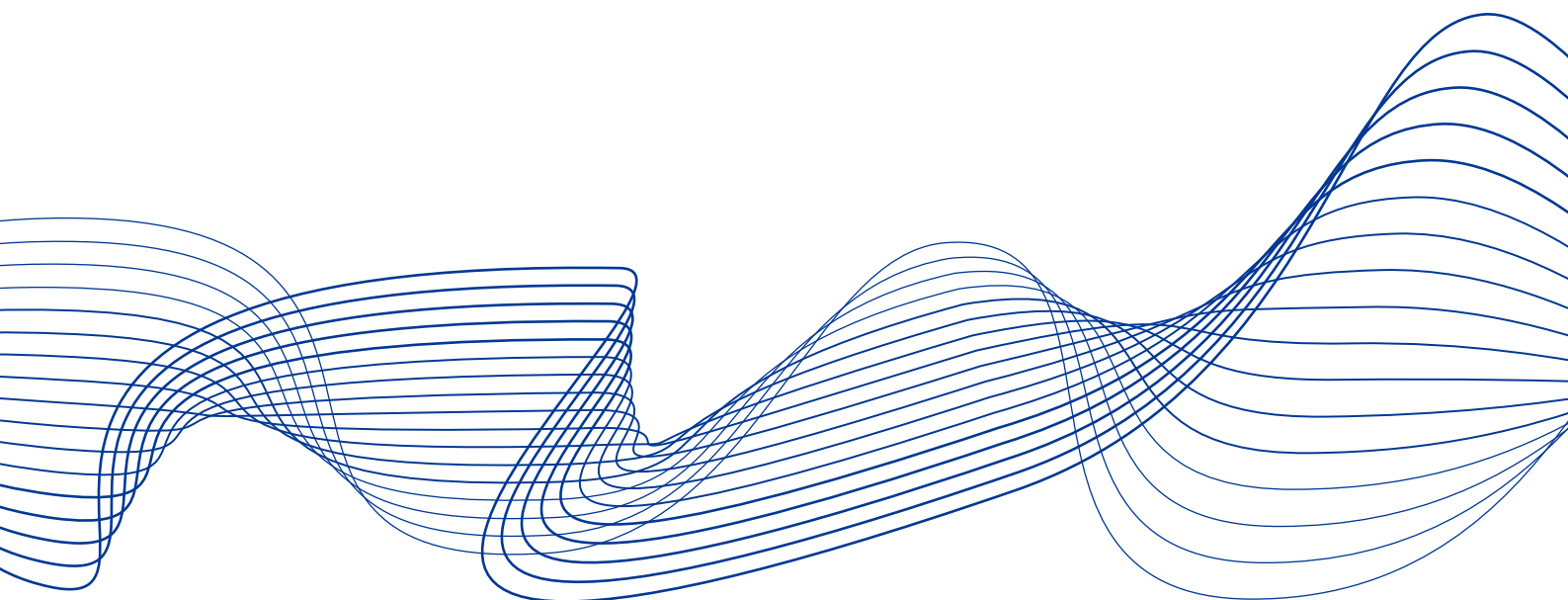# Technical Documentation Section A

November 2016

The low interest rate environment and structural changes in the real economy

Joint ATC-ASC-FSC Task Force

ESRB
European Systemic Risk Board
European System of Financial Supervision

Contents

Executive Summary

The current environment is characterised by exceptionally low nominal interest rates in the European Union (EU), which have reached their lowest level in five decades. The decline started in the mid-1980s, when disinflation began, and then accelerated with the outbreak of the global financial and sovereign debt crises. The decline in market rates has brought about a fall in the financing costs of banks, non-financial corporations, households and governments. Other advanced economies have also experienced declining interest rates.

The issue of a low interest rate environment has been gradually attracting the attention of academics and policymakers around the world. There are two main views as to what has driven real interest rates in recent decades. According to the "secular stagnation" explanation, interest rates have declined permanently for structural reasons related to total factor productivity, demographic trends, income and wealth inequality and a preference for scarce safe assets. All these factors have led to the supply of funds (i.e. savings) exceeding demand (i.e. investment).

Demographic factors normally form part of an analysis of the level of real interest rates. Lower fertility and rising longevity require more savings for old age, which are marginally offset by a potentially higher retirement age, and can lead to lower aggregate consumption. Population dynamics can also have a dampening effect on investment, as lower population growth requires lower investment to maintain a given capital-to-labour ratio. **Slower technological progress and productivity growth implies lower real interest rates.**

According to the "financial cycle" view, real interest rates declined in response to the global financial crisis-induced recession. **The financial cycle in the EU is still negative,** as deleveraging is still ongoing and is contributing to both lower growth and lower interest rates.

A panel VAR model is used to derive long-term projections for a set of macroeconomic variables in the 28 EU countries, including short and long-term interest rates, conditional on two scenarios. In the **"low for long" scenario** it is assumed that TFP growth will be zero in the period 2016-25 for all EU countries and demographic factors (i.e. population growth and the dependency ratio) are expected to follow the projections of the European Commission (EC). This scenario allows us to assess the effects of structural changes that, according to the "secular stagnation" view, are keeping interest rates at low levels by giving rise to an excess of savings over investment. This "low for long" scenario is the most relevant for assessing risks to financial stability. Under the **"back to normal" scenario** it is assumed that TFP growth and long-term interest rates will return to the 2000-06 average in all EU countries, population growth will follow EC projections and dependency ratios will increase by half the amount foreseen by the EC. The path of short-term interest rates will be such that, on average, pre-crisis levels of real GDP growth and real investment growth should be achieved across EU countries. These assumptions reflect a rationale that sees demographic factors behaving somewhat more favourably than under a "low for long" scenario in respect of dependency ratios, with strengthening TFP growth and interest rates returning to higher levels.

In the "low for long" scenario, the simulations show output, consumption and investment growth as weaker than in the "back to normal" scenario, with concomitant lower interest rates. The model estimates and the projections suggest that demographic factors play an important role, given that poor demographic prospects are associated with lower output growth.

The EC's potential output growth projections, the International Monetary Fund's real GDP growth projections and survey-based expectations are, on average, across the largest EU countries, closer to a **"low for long"** scenario than a "back to normal" scenario.

There are two caveats that apply to the projections of the two scenarios. First, the linear model cannot deal with non-linearities, and this could be important if agents and institutions modify their

behaviour in a LIRE. Secondly, the model's estimates use a sample that does not include a period of prolonged low interest rates.

A qualitative assessment and the quantitative results suggest that the risks for the real economy, with their implications for financial stability, arising from a low interest rate environment, appear to be limited. An important caveat is that developments in the real economy are heterogeneous across EU countries, which means that risks are heterogeneous too. This also reflects, for the various countries, differences in economic and financial structures, as well as variations in the macroeconomic consequences of the global financial and sovereign debt crises.

Under a "low for long" scenario the likelihood of a build-up of imbalances in real estate markets is higher than it is in the "back to normal" scenario. However, the severity of this risk depends on the drivers of low interest rates. **The probability of a build-up of imbalances is lower if low interest rates are associated with low disposable incomes, output and investment.** Cross-country spillovers are then limited due to the nature of residential markets and limited cross-border bank funding, and are more pronounced in the commercial sector where financing has a more international dimension. Corrections in real estate markets can have a significant and long-lasting impact on the real economy. **The consequences of a crash in commercial real estate could be more severe than in the case of a correction in the residential sector.**

Section 1
The current environment of low interest rates

A low interest rate environment (LIRE) currently characterises most EU countries. Nominal and real rates, which are extraordinarily low for all maturities, have fallen gradually over the last 25 years. The pace of this decline increased with the outbreak of the global financial crisis. This LIRE, which also characterises other advanced economies, has led to record low funding costs for the real economy.

1.1   Nominal and real long-term interest rates

The current environment is characterised by exceptionally low nominal and real rates in most EU countries (Chart 1.1). The decline of nominal rates began in the mid-1980s, along with disinflation, and then accelerated with the outbreak of the global financial and sovereign debt crises. Part of this fall is explained not only by lower inflation and inflation risk premia, to which monetary policy credibility has contributed, but also by the decline of real rates (Chart 1.2).

Chart 1.1

10-year sovereign bond yields in selected EU countries

(% p.a.)
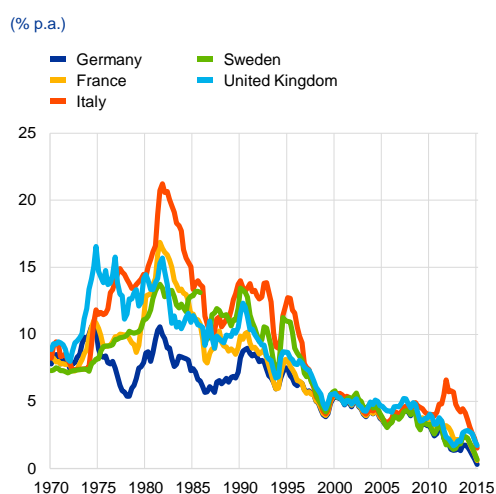
Source: International Monetary Fund (IMF).
Note: Last observation: 2015Q1.

Chart 1.2

Real 10-year sovereign bond yields in selected EU countries

(% p.a.)
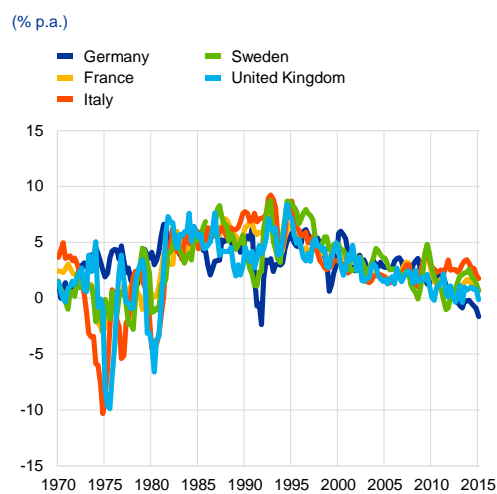
Source: IMF. Note: Real rates are calculated by subtracting the four-quarter growth rate of the GDP deflator (for Germany and the United Kingdom) or the consumer price index (for France, Italy and Sweden). Last observation; 2015Q1.

The decline in nominal and real interest rates is both an EU and a worldwide phenomenon (Chart 1.3). An empirical analysis by the IMF (2014) shows that common forces explain most of the worldwide fall in real rates. According to a principal component analysis, the weight of the first component on the variation in real rates at global level increased from 55% between 1980 and 1995 to 75% between 1995 and 2012. A likely explanation for this pattern is increased financial market integration: long-term yields have fallen in all euro area countries in the past three decades. The dispersion in the 10-year government bond yields of euro area sovereigns also declined until the outbreak of the sovereign debt crisis (Chart. 1.4).

The current environment of very low interest rates is also characterised by relatively flat yield curves. A flat yield curve is present in certain advanced economies (Chart 1.5). Most of the

time, changes in the slope are due to developments in short-term rates. For instance, the slope shot up in the outbreak of the global financial crisis, following the sharp fall in short-term rates. Thereafter, the slope gradually declined, as interest rates at longer maturities 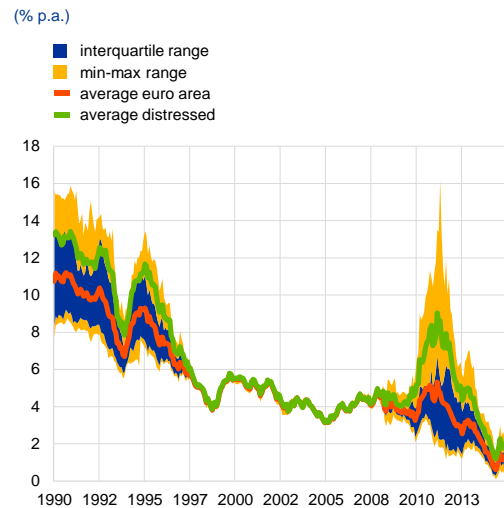also came down. These developments were common to the euro area, the US and the UK, reflecting the global dimension of the 2008-09 financial crisis.

Chart 1.3

10-year sovereign bond yield in selected countries

(% p.a.)
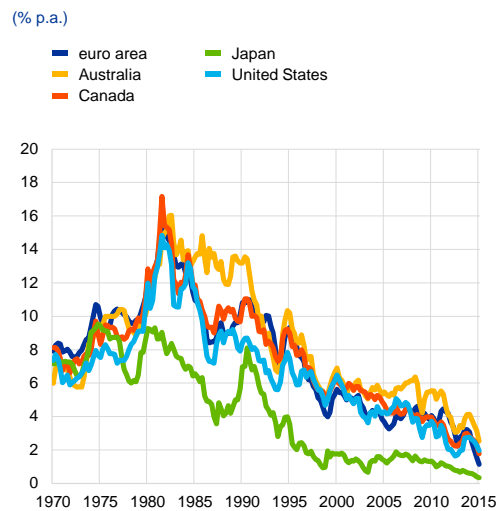
Source: IMF.

Chart 1.4

10-year sovereign bond yield in the euro area

(% p.a.)

Source: European Central Bank (ECB) computations based on Datastream. Green line: simple average of Italian, Portuguese, Irish and Spanish yields.

Chart 1.5

Slope of the yield curve in selected countries

(% p.a.)
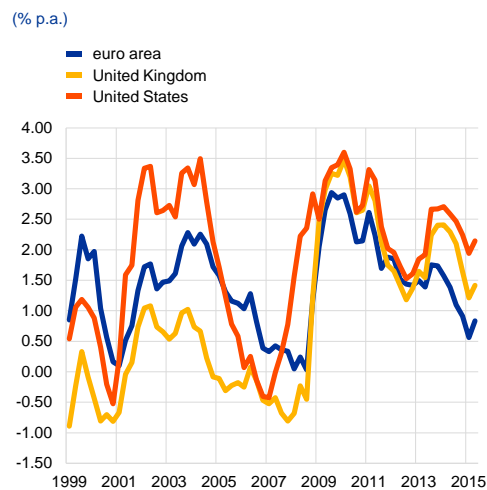
Source: Datastream. Note: the slope is calculated as the difference between the 10-year government bond yield and the 3-month Treasury bill yield.

Chart 1.6

Banks' funding costs in selected euro area countries

(% p.a.)
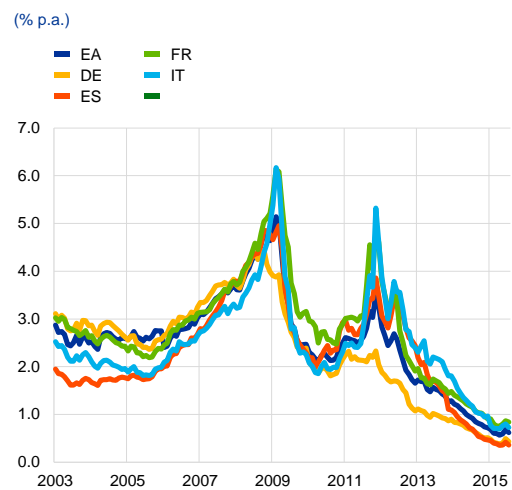
Source: Reuters, ECB. Note: composite cost of deposit and non-secured market debt funding.

The decline in short and long-term market rates has brought about a fall in financing costs for banks, non-financial corporations, households and governments. These now stand at their

historical lows in nominal terms, and funding costs for banks in the euro area have also reached lows (Chart 1.6). Since euro area banks can fund lending cheaply, the cost of funding for the private sector has fallen.

Chart 1.7

Nominal cost of external financing for NFCs in the euro area

(% p.a.)

- overall cost of financing
- cost of market-based debt
- short-term cost of lending indicator
- long-term cost of lending indicator

Source: ECB, Merrill Lynch, Thomson Reuters and ECB calculations. Note: The overall cost of financing for non-financial corporations is calculated as a weighted average of the cost of bank lending, the cost of market-based debt and the cost of equity, based on outstanding amounts taken from the euro area accounts (ESA 2010).

Chart 1.8

Composite indicator of cost of bank borrowing for households for house purchase
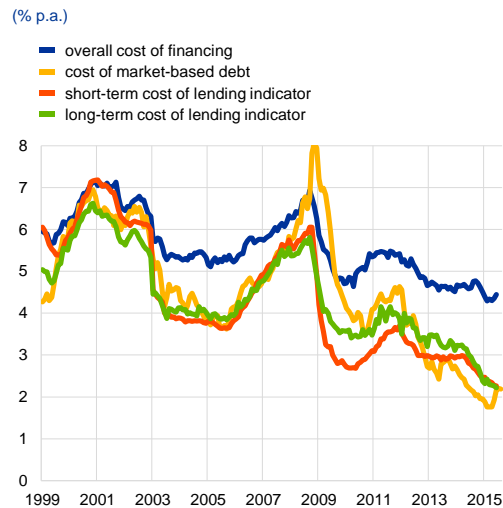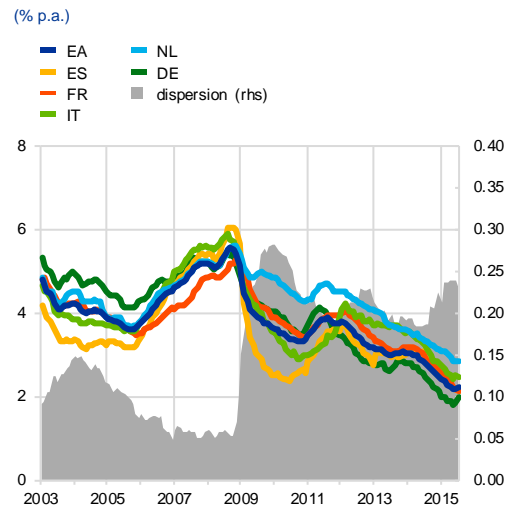
(% p.a.)

- EA
- ES
- FR
- IT
- NL
- DE
- dispersion (rhs)

Source: ECB. Note: The indicator for the total cost of lending is calculated by aggregating short and long-term rates using a 24-month moving average of new business volumes. The cross-country coefficient of variation is calculated over a fixed sample of 12 countries.

The composite indicator for non-financial corporations (NFCs) in the euro area includes three sources of finance: equity, debt and bank loans (Chart 1.7). These funding costs have been declining since the early 2000s, with two episodes of cyclical upswing, one from 1999 to 2003 and the other from late 2005 to mid-2008. These developments reflected declining corporate bond yields, as well as short and long-term bank interest rates. NFCs' funding costs have fallen markedly since the outbreak of the global financial crisis, while households have also benefitted from falling interest rates. Bank rates on housing loans currently stand at record lows (Chart 1.8).

Section 2
Factors behind the persistent decline in interest rates in the EU

The issue of a low interest rate environment has been gradually attracting the attention of academics and policymakers around the world (IMF, 2014 and CEPR-ICMBS, 2015). **There are two main views as to what has driven real interest rates in recent decades**. **According to the "secular stagnation" explanation** (Summers, 2014), **interest rates have declined permanently** for structural reasons related to total factor productivity, demographic developments and rising inequality. All these factors have led to the supply of funds exceeding demand. **According to the "debt super cycle" or "financial cycle" views** (Borio, 2012 and Lo and Rogoff, 2015), **real interest rates declined in response to the recession induced by the global financial crisis**, as monetary policy turned highly accommodative.

2.1 The role of structural factors

This section focuses on the role of structural factors in the persistent decline in real interest rates in the last three decades. These factors have operated in both, the supply and demand sides of the economy, each potentially reinforcing the other.[1]

2.1.1 Demographic factors

Demographic factors normally form part of an analysis of the level of real interest rates and the equilibrium or "natural" rate of interest. Population trends affect the real economy on both the demand and the supply sides. **Lower fertility and longer longevity**, which imply a higher old-age dependency ratio, **require more savings** for old age, unless these are offset by an increase in the retirement age **and may cause a decline in aggregate consumption** as a share of income. Population trends also affect investment demand, as lower population growth implies that lower investment is required to maintain a given capital-to-labour ratio, reducing real interest rates.

A larger proportion of elderly people implies a lower proportion of people at a working age. For a given capital stock, this lowers the real rate due to higher capital intensity. As time goes by, however, the elderly consume their own wealth and reduce their savings, which can exert upward pressure on interest rates. **A decline in population can also lead to lower incentives for firms to invest,** given that a smaller workforce requires lower investment, causing growth and interest rates to fall.

Several contributions have recently appeared in the literature on the role of demographic factors. Aksoy et al. (2015) investigated the impact of demographic structures and show that the **ageing of the population leads to subdued output growth, higher savings and lower interest rates** (Favero et al., 2015). As the proportion of younger workers in the population decreases, the innovation process loses momentum, leading to lower output growth. Further, as growth prospects

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[1] See the speech "International headwinds and the effectiveness of Monetary Policy" by Vítor Constâncio, at the 25th Annual Hyman P. Minsky Conference on the State of the US and World Economies at the Levy Economics Institute of Bard College, Blithewood, Annandale-on-Hudson, New York, 13 April 2016.

worsen, the propensity to save increases, especially among the middle-aged cohort, exerting further downward pressure on real rates. Favero and Galasso (2015) show that **interest rates are depressed by increased savings by the middle-aged population, due to longer life expectancy.** This effect is compensated by longevity, as the longer-living generations of retirees raise aggregate consumption and interest rates. Future demographic trends should stabilise as the baby-boomer generation retires, leading to a small increase in real rates. Carvalho et al. (2015) developed a life-cycle model to capture the salient demographic features in developed economies. Demographic trends between 1990 and 2014 reduced, ceteris paribus, the equilibrium interest rate by 1.5 percentage points. Ikeda and Saito (2014) developed a model for the Japanese economy and showed that an exogenous decline in the ratio of workers to the total population lowers the real interest rate. Backus, Cooley and Henriksen (2014) studied the persistence of international capital flows (i.e. "global imbalances") and argue that demographic factors could be behind these developments. The authors show that among demographic factors, changes in life expectancy can explain much of the pattern of capital flows across countries. Moreover, these changes and the related incentive to save more are consistent, ceteris paribus, with the pattern of declining interest rates over the past two decades.

2.1.2   Capital flows and the demand for safe assets

Bernanke (2005) links the low interest rates in the US to the increase in its current account deficit since the late 1990s and to the sharp increase in excess savings in emerging market economies (the so-called "saving glut"). The transformation of developing countries from net borrowers to net lenders has been a consequence of rapid economic growth, rising oil prices, changes in strategies for managing capital flows, and a rising proportion of older demographic cohorts which has, in turn, led to higher savings. This process has been amplified by the integration of international capital markets.

The demographic transition in developing economies, which has led to more pronounced capital flows towards developed countries, is contributing to lower interest rates in advanced countries (Cervellati et al., 2015). The flows will cease when the transition is complete, leading to the stabilisation of interest rates and global output growth driven mainly by technological developments. Ferrero (2010) shows that the international demographic transition is a key factor that explains the large US external imbalances and is also consistent with the persistent decline in global real interest rates.

An extensive gap between the demand for and the supply of safe assets can contribute to keeping interest rates low (Caballero and Fahri, 2013 and 2015). Changes in regulations may also have boosted demand for safe assets.

2.1.3   The relative price of investment

Another reason for the low level of real interest rates is that investment goods (machines, equipment and buildings) prices have fallen. Thwaites (2015) argues that **a fall in investment goods' prices means that the same amount of savings can finance more investment.** However, as labour and capital are not perfect substitutes in the production of goods, the marginal productivity of an additional unit of investment decreases. **A fall in the supply of investment opportunities leads to a fall in the required rate of return – i.e. the real rate.**

There are two problems with this explanation (CEPR-ICMBS, 2015). First, while long-term real

rates started to decline in the early 1990s, the relative price of investment goods has been falling throughout the post-war period. Second, a lower user cost of capital encourages real investment and raises output growth. However, output growth has been declining over time rather than increasing.

2.1.4 Growth, productivity and inequality

Interest rates can also be linked to productivity growth. In growth models, the real interest rate is linked to the growth rate of total factor productivity (TFP), which depends on the rate of technological innovation and on population dynamics (Section 2.1.1). **Lower productivity growth reduces the real interest rate,** which in growth models is the marginal product of capital, **and causes a decline in consumption and investment growth.** The empirical evidence concerning this link is unclear (Hamilton et al., 2014). Gordon (2012) argues that the rate of growth of potential output may slow down in the US and other advanced economies, partly due to the worsening of demographic factors, but also because of a permanently slower pace of innovation. An opposing view is put forward by Brynjolfsson and McAfee (2014) and builds upon the idea that information technology and digital communication still have great development potential and may increase productivity.

Declining real rates are also associated with rising inequality (Eggertsson and Mehrotra, 2014). As larger income shares are attributed to households with a lower propensity to consume, consumption decreases and savings increase, causing a fall in interest rates. Hall (2016) argues that the increase in the wealth of risk-averse investors relative to the wealth of risk-tolerant investors is a cause of the downward trend in worldwide real interest rates.

2.2 Crisis-related factors: the financial cycle

Another major source of explanations for the protracted period of low interest rates is the global financial crisis. A "debt supercycle" occurred whereby firms, households and, in some cases, governments accumulated excessive debt on the basis of overly optimistic expectations of future income and revenues and excessively permissive regulation. As this went into reverse, aggregate savings increased and a persistent deleveraging process began. The self-reinforcing interactions between perceptions of value and risk, attitudes towards risk, and financing constraints can give rise to booms followed by busts (Borio, 2012 and Lo and Rogoff, 2015). These interactions may also amplify economic fluctuations and can potentially lead to serious financial distress and to recessions. **As the financial cycle turns negative, interest rates need to remain low for an extended period of time as deleveraging is a long and persistent process.** Borio (2012) shows that peaks in the financial cycle tend to coincide with episodes of systemic financial distress and that financial cycles tend to be longer than business cycles.

2.3 Some evidence from the data

Savings in the EU since 2000 have increased while the proportion of investment started falling when the global financial crisis began (Chart 2.1). **Rising savings, therefore, started depressing interest rates long before the global financial crisis, while the contribution of investment to the fall in interest rates was linked more to the crisis.**

EU potential growth rates in the early 2000s were estimated at above 2% per annum; before the global financial crisis they had already declined to 2%, and since it began, potential growth has averaged around 0.8%. This slowdown is apparent in most countries. Regarding the three components of potential growth (labour, capital and TFP), both the contribution of labour and that of capital remained broadly stable over this period while the contribution of TFP declined significantly in 2008, with an annual growth rate averaging -0.2% (Chart 2.2). There was significant TFP variation by country during this period, and especially since the onset of the global financial crisis (Chart 2.3).

The recessions that followed the global financial and sovereign debt crises further lowered EU potential growth, although by different degrees in different countries. The decline of potential growth during the two crises has taken place through two channels: lower growth in capital stock due to falling investment and an increase in the non-accelerating wage rate of unemployment (NAWRU).

Chart 2.1
EU investment and savings

(% of nominal GDP)
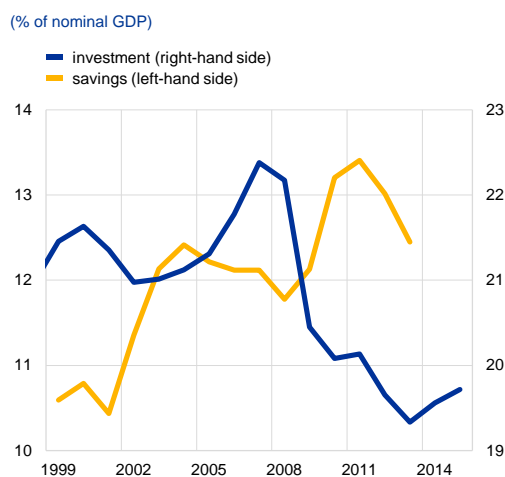
Source: European Commission.

Chart 2.2
Contributions to EU28 potential growth

(annual % change)
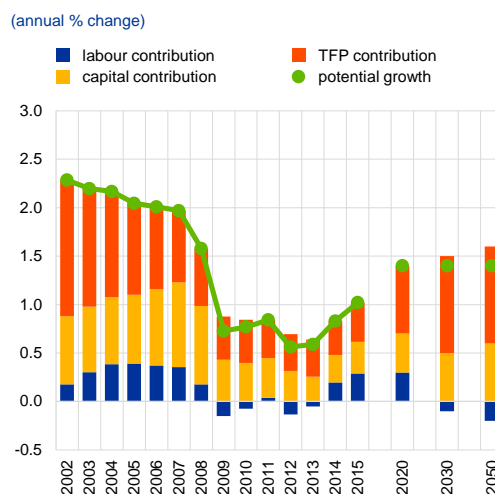
Source: European Commission.

Chart 2.3
TFP growth and min/max intervals

(annual % change)

Source: European Commission.

Chart 2.4
Domestic credit-to-GDP gap

(EU28; % nominal GDP)

Source: European Commission. Note: EU-28 GDP-weighted average

The domestic private credit-to-GDP gap, a well-known proxy for the financial cycle, shows that the gap is still negative in the EU (Chart 2.4). This suggests that deleveraging is still underway and is contributing to lower growth and lower i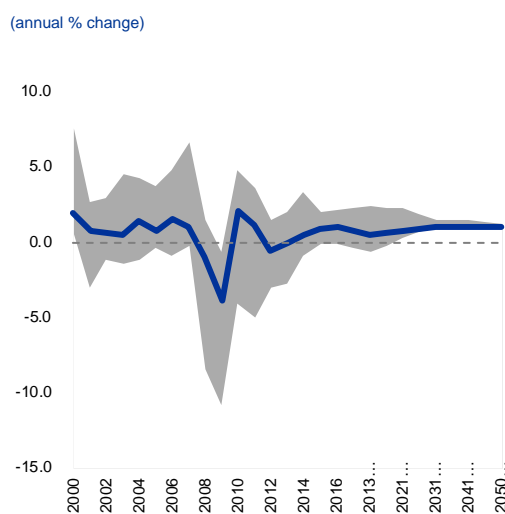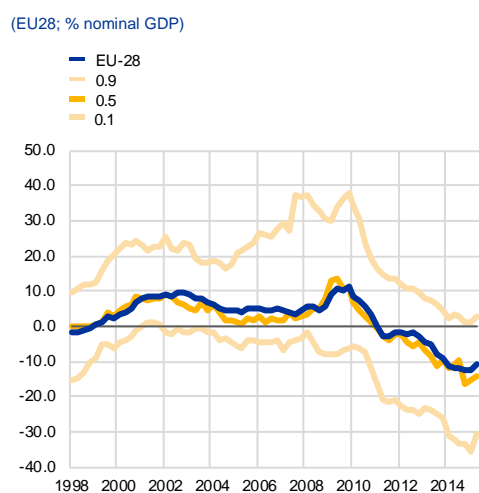nterest rates. Cuerpo et al. (2013) quantified the effects of deleveraging using the QUEST model and found that a rapid and sizeable household debt reduction leads to a marked contraction in real GDP.

## 2.4   Looking forward: the role of structural and cyclical factors

In the long run demographic factors are expected to weigh negatively on potential output growth and real interest rates in the EU. Both, life expectancy and fertility rates are expected to increase, although the latter will probably remain below the replacement rate, implying continued population ageing. Investment may increase, depending on to what extent aggregate demand improves and the uncertainty regarding the medium-term outlook fades.

NAWRUs are also expected to return to their long-term levels, positively affecting potential growth in the medium term. As a result, EU growth is expected to accelerate to 1.3% according to the European Commission (2014a; henceforth EC), a figure which would still be below pre-crisis levels. However, significant heterogeneity is likely to persist among EU countries. The working age population is expected to decline in the EU over the next decade (Chart 2.4). **Old-age dependency ratios** (i.e. the ratio of those older than 65 years to the working age population) **will increase steeply, from below 30% in 2013 to above 50% in 2050 (Chart 2.5).**

TFP trends are also likely to remain weak, contributing to keeping, ceteris paribus, interest rates at low levels (Chart 2.3). The EC (2014b) has assessed the risk of secular stagnation in the euro area. The analysis shows that the euro area is facing a mostly secular decline due to low productivity growth and ageing, a process that started before the 2008-09 recession. The negative effect of these forces has, however, been aggravated by the deleveraging that began with the global financial crisis. These factors will require low real interest rates in order to generate sufficient aggregate demand. Jimeno (2015) shows, using an overlapping generation model, that high debt and low population and productivity growth may condition the macroeconomic performance of some European countries over the medium and long term.

Chart 2.5
Working age population projections

(annual % change)
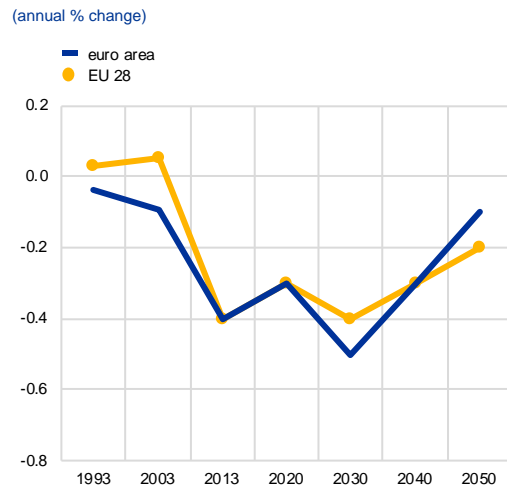
Source: European Commission.

Chart 2.6
Old-age dependency ratios

(percentage)
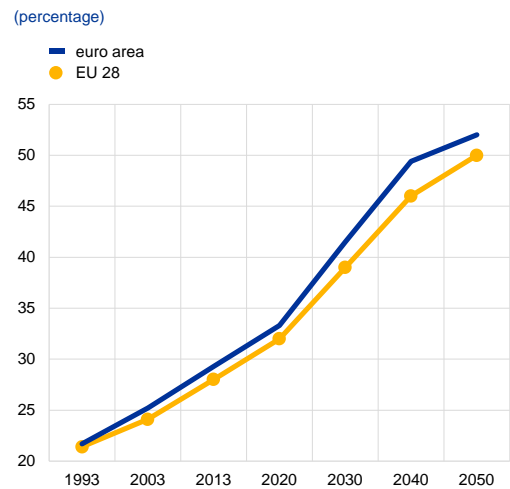
Source: European Commission.

With regard to the role of crisis-related factors, in the light of past episodes, a slow recovery may be expected in the aftermath of the global financial and sovereign debt crises. Reinhart and Rogoff (2009), Borio (2012), Jordà et al. (2013) and Laeven and Valencia (2013) stress that recessions following a financial crisis are, on average, costlier than normal recessions, and that credit-driven upturns are followed by deeper and longer downturns. **The downward pressure on (real) interest rates may diminish over the next few years as the financial cycle improves. However, demographic factors and TFP trends are likely to keep real rates low.**

All in all, interest rates may increase, but most probably at a slow pace. In Section 4, a panel VAR model will be presented and used to derive the path of interest rates and key macroeconomic variables until 2025. These paths will be based on specific assumptions for demographic factors and TFP trends.

Section 3
The impact of a low interest rate environment on the real economy

This section describes the channels through which a LIRE can affect the decisions of households, non-financial firms and governments, and assesses the potential changes in their behaviour of these agents in the current LIRE. **The descriptive analysis does not aim to provide evidence of vulnerabilities building up in the real economy, as a result of the LIRE, that could threaten financial stability in the EU.**

3.1   The behaviour of households, firms and governments in a LIRE

Low real interest rates make it more attractive for households and non-financial corporations to borrow to finance consumption and investment (intertemporal substitution effect). Low rates may reduce savers' supplies of funds and increase the prices of financial and real assets. As a consequence, savers tend to move into riskier assets in a search for higher yields (portfolio substitution effect). The impact on savers' wealth is more uncertain: on the one hand, lower yields tend to reduce financial income from riskless assets and make it more expensive to accumulate the savings necessary to provide for retirement; on the other hand, higher asset prices have an expansionary effect on aggregate demand by directly increasing the wealth of the holders of those assets (wealth effect). To the extent that the LIRE is not a global phenomenon, the reduction in the real interest rate may have an impact on the real exchange rate and thus on competitiveness (competitiveness effect), which would then lead to higher economic growth.

The impact on the real economy depends on the persistence of the LIRE. The longer the LIRE is expected to remain in place, the smaller the positive effects on aggregate demand via intertemporal substitution and the larger the negative impact on savers.

The macroeconomic effects of a persistent LIRE may be different from those that may arise when interest rates remain low for a short period due to the presence of "distortions", "imperfections" and "constraints" that may become "active", "economically more relevant" or "binding" in a LIRE, favouring the building up of bubbles, excessive risk-taking, inefficient resource allocation and debt overhang. The "distortions", "imperfections" and "constraints" are the following.

- *Money illusion*: Agents focus on nominal variables, even though economic decisions should be based on real variables. Investors are unable to look through inflation and focus on the real return on investment. Agents may feel frustrated by the low level of nominal rates and decide to irrationally overcome these through imprudent investments (search for yield).

- *Myopic behaviour*: Agents are often short-sighted and focus on the short term, neglecting the future. Low rates may induce households to take on floating-rate mortgages without considering that interest rates could increase in the future, and to borrow excessively.

- *Financial illiteracy*: Agents focus on return without distinguishing between risk-free and risk-premium components. This may explain why some agents do not understand that if they want a fixed return from a portfolio that was bought in a period of high interest rates, the composition of this portfolio must be changed by increasing the proportion of risky assets.

- *Agency problem and moral hazard*: A LIRE may undermine agents' incentives to use resources efficiently, by weakening market controls and reducing the probability of default. Managers (politicians by analogy) benefit from the rents associated with their positions (the

agency problem), and have ex ante incentives to manage the firm (the government) successfully to maintain their position and to prevent a default (change of government). A LIRE could also increase moral hazard and shirking by managers, and may lead to a less efficient use of resources.

- *Zero lower bound of nominal interest rates*: In a LIRE, the probability of hitting the zero lower bound on nominal interest rates is higher.

3.2 A look at the data

3.2.1 The household sector

Saving rates, after an initial increase following the global financial crisis, have been decreasing to levels observed just before the crisis (Chart 3.1 (a)). From a longer term perspective, saving rates in 2013 in most EU countries were well below the levels observed in 2001. In most countries, households' debt-to-income ratios increased after the onset of the global financial crisis and then either slowly decreased or remained unchanged (Chart 3.1 (b)) depending on the country. In the EU as a whole, the ratio was, on average, 102% in 2013.

Chart 3.1

Households' saving rates and gross debt-to-income ratio in the EU

(a) Households' saving rates

(b) Gross debt-to-income ratio
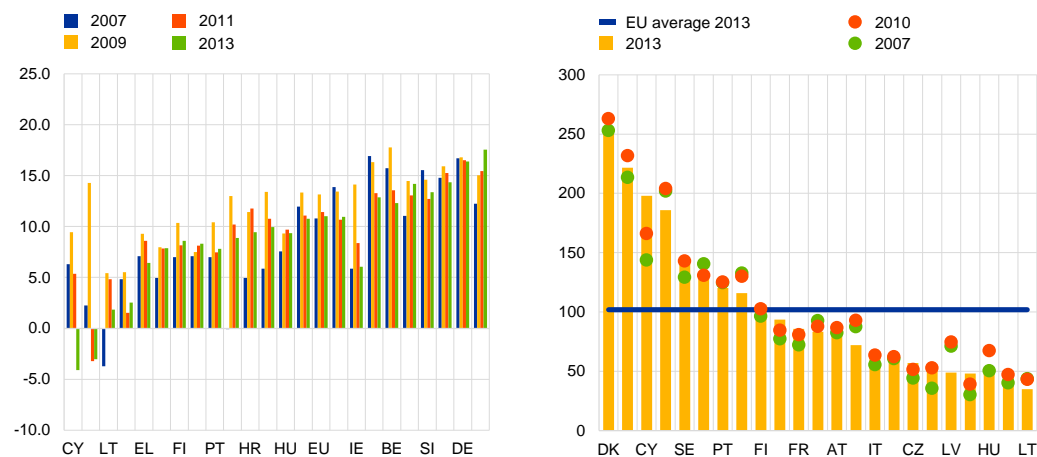
Source: Eurostat and own calculations. Note: Last observations available for all countries: 2013. In panel b) the EU average does not include Bulgaria, Greece, Luxembourg, Malta and Romania, as data for these countries are not available.

Chart 3.2

Assets composition of households in the EU

(% of total assets)

- currency and deposits
- debt securities
- equity
- investment funds shares/units
- insurance, pensions and standardised guarantees
- other assets

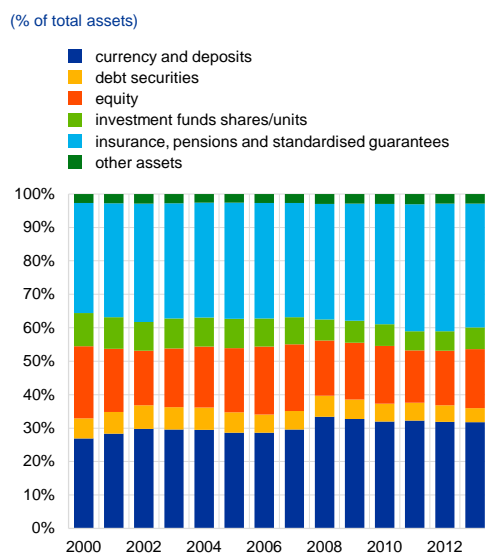Source: Eurostat. Note: based on ESA 2010. Households; non-profit institutions serving households.

Until 2013, there was no clear evidence of a rebalancing by households towards riskier assets. Deposits and life insurance and pension schemes represented the largest proportion of households' assets. Between 2009 and 2013, the composition of total assets held by households was relatively stable inside the EU (Chart 3.2). There is high cross-country heterogeneity in the composition of portfolios. Compared with the average for the period before the global financial crisis (2001-2007), most countries have significantly reduced their holdings of debt securities, while they have made a smaller reduction in their holdings of equities and investment funds.

With regard to households' liabilities, which are mostly in the form of bank loans, **a LIRE could change the proportion of new house purchase loans with floating or fixed rates.** If the proportion of housing loans contracted with a maturity of less than one year or at a floating rate is high, households might face higher debt servicing costs and more difficulties in meeting their repayments if nominal rates increase rapidly.

The data do not show a shift towards more loans at floating rates (Chart 3.3). Contrary to what might have been expected, the proportion of fixed-rate loans has remained constant or has increased slightly across euro area countries since the beginning of the global financial crisis (Chart 3.3 (a)). These trends reflect both demand and supply factors. The fact that the proportion of housing loans differs widely across euro area countries suggests that supply-side structural factors may explain country differences (Chart 3.3 (b)). All in all, recent developments do not point to a high risk in the event of an increase in interest rates.
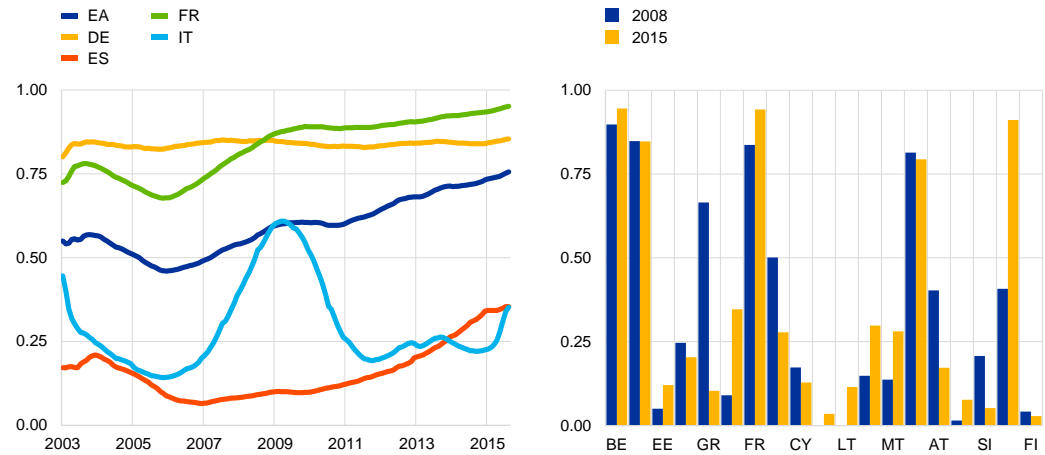
Chart 3.3

New loans for house purchases: percentage of long-term loans

(a) The euro area and the larger economies

(b) Comparison across euro area countries

Source: ECB and own calculations. Note: Based on new loans for house purchases by households. Loans at long-term rates are loans with a maturity of more than one year at a fixed rate and loans at a floating rate with a fixation period of more than one year. Long-term loans at a floating rate with an initial interest rate fixation period of less than one year are excluded.

3.2.2   The non-financial corporation sector

The proportion of floating and fixed-rate loans to non-financial corporations has remained stable over the last decade in most euro area countries (Chart 3.5), suggesting that interest rates may not have been the key variable that convinced firms to borrow at floating rates.

The stock of debt (debt securities and loans) **of NFCs is currently large compared to nominal GDP in the EU, although this varies across countries (Chart 3.6).** This debt was largely accumulated before the outbreak of the global financial crisis. With the exception of a few countries, debt has remained stable due to the contraction in investment which started in 2008 in most EU countries. Since then, **the accumulation of capital by firms has remained weak (Chart 2.1).** Persistently low investment may reduce potential output growth in the medium and long term and contribute to the exertion of downward pressure on interest rates (Section 2).

Chart 3.5
Non-financial corporations: floating-rate loans as a percentage of total loans

(percentage)

Legend:
- FI
- AT
- BE
- DE
- ES
- FR
- NL
- IE
- IT
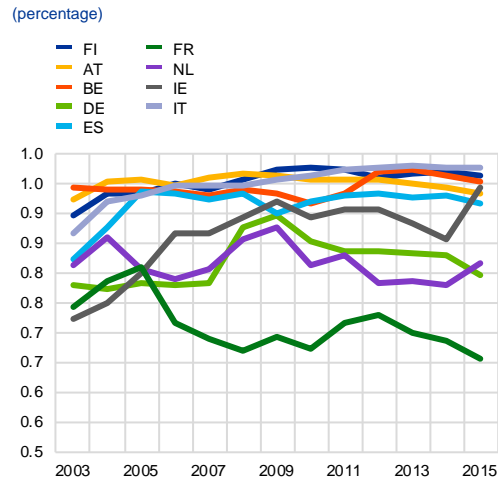
Source: ECB. Note: new business amounts for loans (excl. bank overdrafts) to non-financial corporations with an initial fixation period of up to one year, as a proportion of total new loans.
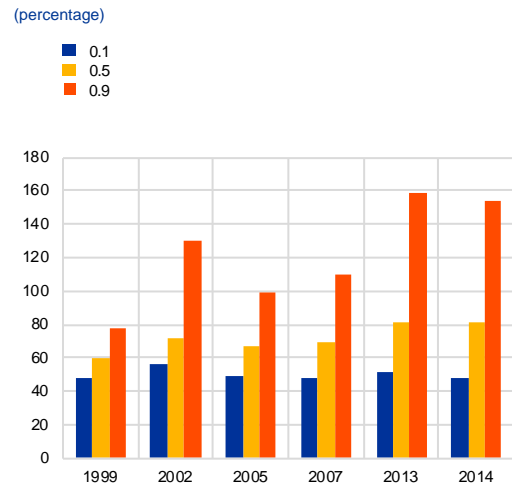
Chart 3.6
Non-financial corporations' debt to GDP ratio

(percentage)

Legend:
- 0.1
- 0.5
- 0.9

Source: ESRB risk dashboard. Note: the chart plots the median across countries together with the 0.1 and 0.9 percentiles of the distribution. Debt is composed of debt securities, loans and pension scheme liabilities

The amount of debt securities issued by NFCs in August 2015 is almost as high as the debt issued in 2013 or in 2014 in most EU countries. Compared to 2005, the average amount of debt issued over the last three years is significantly higher in the largest EU countries (Chart 3.7 (a)); in the countries with higher issuance volumes, the percentage of high-yield debt has increased since 2011 (Chart 3.7 (b)). Even though the search for yield in a LIRE may have pushed up the demand for high-yield securities, it is difficult to separate the effect of low rates from that of improved economic prospects and the shift towards more market-based financing.

With regard to the risk of excessive borrowing by NFCs, it should be stressed that firms' investment decisions depend not only on financial conditions but also on their forecasts of the demand for their output. If aggregate demand and output growth remain low, the risk that firms will overinvest is limited (the results in Section 4 provide support for this view). Such incentives are also held back by firms' existing large stock debt.

Chart 3.7

Debt issuance by non-financial corporations

(a) Total debt issuance by type

(b) High-yield corporate debt issuance as a percentage of total debt issuance

(billion €)

- corporate Bond-High Yield
- corporate Bond-Investment-Grade
- total debt issuance in 2005
- total debt issuance, three-year average

(percentage)

- 2011
- 2012
- 2013
- 2014
- 2015
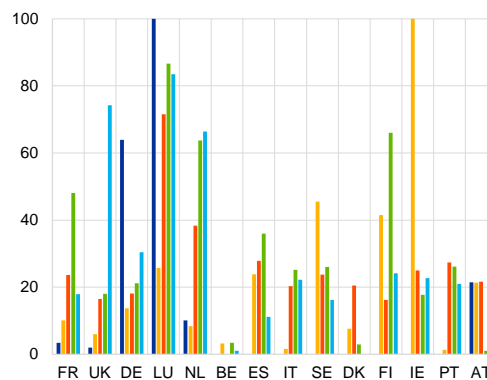
Source: Dealogic and own calculations.

3.2.3   The government sector

With regard to the behaviour of governments, we do not make any specific assumptions regarding fiscal policy since the risks of loose fiscal policy are limited by current EU legislation. The LIRE may provide incentives to change the composition of public debt towards more variable-rate issuance, given that governments are myopic and focus only on the short-term gains that the lower cost of funding may provide. The flattening of the yield curve also provides incentives to governments to increase the average maturity of their debt.

Chart 3.8

Public debt by type and maturity

(a) Public debt with initial maturity of below one year (b) Average maturity of sovereign debt issuance

(% of total)

EU28 ▬ 0.5 ▬
0.25 ▬ 0.75 ▬

2011 ▬ 2014 ▬
2012 ▬ 2015 ▬
2013 ▬
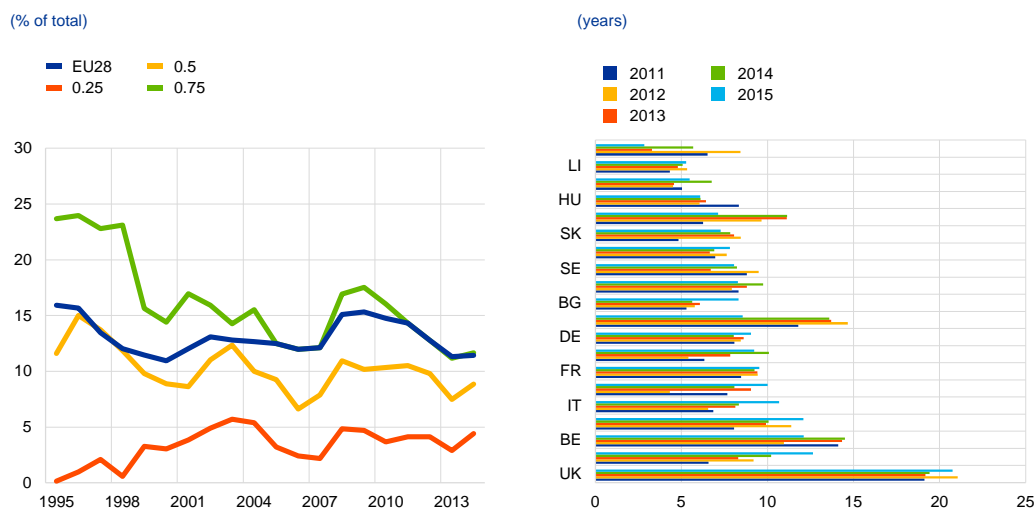
Source: ECB and Dealogic. Note: panel (a) reports the 25th and the 75th percentiles of the country distribution, the median and the EU aggregate.

The proportion of short-term debt has remained broadly stable over time, with no significant variation by country. **Governments have increased their amounts of variable-rate long-term debt which, however, remains limited (Chart 3.8 (a)).** Long-term debt at variable rates has increased from 4% to 7% of GDP in the EU and from 5% to 9% in the euro area. The replacement of maturing debt by new debt at lower rates may have a positive effect on governments' financial positions, as interest rate charges will be lower. The maturity of debt issuance has increased in recent years to a varying degree across countries (Chart 3.8 (b)).

Section 4
Assessing the real effects of the LIRE in the EU

Section 3 analysed the behaviour of the different sectors of the real economy in the current LIRE. This section takes a forward-looking perspective and presents a series of scenario-conditional projections for interest rates and other macroeconomic variables.

There are two possible modelling approaches to computing the conditional projections: dynamic stochastic general equilibrium (DSGE) and vector autoregressive (VAR) models. Both approaches have been covered extensively in the applied macroeconomic literature but have limitations that should be acknowledged. DSGE models cannot easily deal with structural changes in the functioning of the financial system and the real economy, or in the interaction of the two, as they are designed to study economic fluctuations around stable steady states. VAR models with time-varying parameters may be better suited to deal with such changes. However, the estimates of such models with a large number of macroeconomic variables can be computationally complex.

DSGE models have the advantage of identifying the channels through which shocks propagate to the real economy. However, they rely on major and unrealistic assumptions which were severely criticised after the outbreak of the global financial crisis in 2008, in particular in respect of the modelling of the financial sector. VAR models have the advantage of being more flexible although they do not identify the channels of shock transmissions. Both DSGE and VAR models describe the "linear" behaviour of a system of variables. They cannot, therefore, easily deal with non-linear phenomena such as the lower bound on policy rates, irrational behaviour and bubbles. Both models rely on shocks as driving forces.

An empirical time series model can capture the low frequency relations among demographic factors, TFP, growth and interest rates – which are the object of our analysis and are essential for computing long-term projections – much better than DSGE models. As a matter of fact, it is difficult to see why such relations have never been observed in the data, especially given the strong theoretical background of these relations.[2]

After carrying out an in-depth review of the pros and cons of the two approaches the workstream has opted for the VAR model to compute the projections of the key macroeconomic variables of interest. In order to deal with the large number of countries and variables, the panel VAR methodology has been identified as the best approach. However, the projections have also been computed using the EC's DSGE model and compared with those produced by international institutions. This comparison enables our projections to be cross-checked.

The panel VAR model is used to derive the long-term projections for a set of macroeconomic variables in the EU countries, including short and long-term interest rates, conditional on two scenarios.[3] The (unbalanced) panel VAR(X) model with fixed effects for the 28 EU countries includes 13 endogenous and two exogenous variables.[4] In order to ensure

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[2]   It is true, however, that the lower bound to interest rates had never been a concern for policymakers before the global financial crisis.

[3]   See "A panel VARX for the EU28 to study the implications of the low interest rate environment" by Marco Gross (DG Macroprudential Policy and Financial Stability, DIV Macro-Financial Linkages, ECB). For a survey of the methodology see Canova and Ciccarelli (2013).

[4]   The model involves exclusion restrictions which are intended to keep its dimensionality tractable.

feasibility of the estimation, the coefficients of the equations are assumed to be identical across countries. In this sense, the model captures average effects; heterogeneity across countries and variables are taken into account by the fixed effects which capture the difference from the average effect.

The endogenous variables are: TFP, real GDP and its deflator, real investment and its deflator, real consumption and its deflator, nominal long-term (10-year maturity) and short-term interest rates (1-year maturity), the unemployment rate, nominal residential property prices, nominal equity prices and savings ratios. The exogenous variables are population growth and the dependency ratio, which is defined as the ratio of the population aged less than 15 and more than 64 to the population aged 15-64. Annual data over the period 1990-2015 are taken from the EC AMECO database. Residential property and equity prices are sourced from ECB databases.

The model is estimated using a generalized least squares (GLS) methodology which takes proper account of possible cross-country residual correlation. All model variables (except interest rates) are normalised by their historical standard deviations in order to better account for cross-country differences in a model in which the coefficients are assumed to be identical across countries. The estimated coefficients of long-term rates imply a positive impact on real activity variables and asset prices. The signs of the coefficients of short-term interest rates are the opposite, which means that if short-term rates are raised, ceteris paribus, real activity will be dampened. Dependency ratios play a significant role: the effects on TFP, real GDP, consumption and investment growth are all negative and statistically significant.

4.1   The scenarios

In the first, "low for long", scenario it is assumed that TFP growth will be zero in the period 2016-2025 for all EU countries. Demographic factors are assumed to follow the projections developed by the EC (specifically the 2015 Ageing Report). This scenario allows us to assess the effects of structural changes that, according to the secular stagnation view, keep interest rates low by causing savings to exceed investment.[5] This "low for long" scenario is the most relevant for assessing the risks to financial stability in the EU.

In the second, "back to normal", scenario it is assumed that TFP growth and long-term interest rates will return gradually to their 2000-2006 average in all EU countries, population growth will follow EC projections and dependency ratios will increase by half the amount forecast by the EC.[6] The path of short-term interest rates will be such that pre-crisis levels of real GDP growth and real investment growth will be achieved, on average, across the EU countries. The rationale for these assumptions sees the adverse effects of the structural factors related to demography and productivity fading away and interest rates gradually returning to higher levels.[7] An alternative rationale sees the downward pressures on interest rates related to the state of the financial cycle and deleveraging gradually fading away.

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[5]   While these factors can easily be measured, the role of inequality and increased preference for safe assets is more difficult to model.

[6]   The projections by the EC incorporate pension legislation in place at the end of 2014. Pension reforms and increased migration may contribute to offsetting the increase in dependency ratios in the next ten years.

[7]   Demographic factors may be less adverse because retirement age has been raised and migration flows are larger than those foreseen by the EC.

With regard to consumer price dynamics, we make no assumptions such as convergence to central banks' targets, as this would imply other assumptions regarding monetary policy. Moreover, any assumption would be in contrast to the endogenous relative price adjustment within the EU.

Table 1 presents the weighted average results for the EU over the period 2016-2025. Chart 4.1 plots the time paths together with the 10th and 90th percentiles of the country distribution.[8]

Table 1
Projected paths of selected variables in the EU-28

Scenario		Long-term interest rates	Short-term interest rates	Term spread in PP	TFP	Real GDP	GDP per capita	Real invest-ment	Real priv. consump-tion	GDP deflator	Invest-ment deflator	Priv. cons. Deflator	Unemploy-ment rates	House prices	Stock prices	Savings ratio	Popu-lation	Depen-dency ratio
2000-06		4.6%	3.9%	0.8	1.0%	2.4%	2.0%	2.6%	2.3%	2.4%	2.2%	2.3%	8.1%	8.8%	4.3%	6.5%	0.4%	49.7%
2007-15		3.3%	1.7%	1.6	0.0%	0.7%	0.3%	-0.3%	0.6%	1.5%	1.2%	1.6%	8.7%	1.1%	1.2%	5.6%	0.4%	51.6%
2015		1.3%	0.2%	1.2	0.7%	1.9%	1.4%	2.9%	2.0%	1.1%	0.4%	0.3%	9.0%	2.8%	-3.0%	4.6%	0.5%	53.9%
2016-25 *	LfL	1.2%	0.0%	1.2	0.0%	1.4%	1.2%	1.5%	1.4%	0.6%	0.7%	0.7%	9.1%	1.9%	0.2%	2.9%	0.2%	60.6%
	BtN	5.1%	3.2%	1.9	1.2%	2.0%	1.8%	3.0%	1.9%	1.3%	1.4%	1.3%	7.4%	4.0%	4.5%	-0.1%	0.2%	57.3%
2016-20 **	LfL	1.4%	0.0%	1.4	0.0%	1.3%	1.2%	1.6%	1.4%	0.8%	0.7%	0.8%	8.8%	1.9%	0.3%	3.7%	0.2%	57.3%
	BtN	3.2%	1.7%	1.5	1.0%	2.0%	1.8%	2.9%	1.9%	1.1%	1.1%	1.0%	8.2%	3.6%	4.0%	2.5%	0.2%	55.6%
2021-25	LfL				0.0%	1.4%	1.2%	1.5%	1.4%	0.5%	0.7%	0.7%		1.9%	0.1%		0.2%	
					1.4%	2.1%	1.8%	3.1%	1.9%	1.5%	1.6%	1.5%		4.4%	5.0%		0.2%	
BtN (2016-25)-LfL (2016-25)		386	315	0.7	1.2	0.7	0.7	1.4	0.5	0.7	0.6	0.6	-1.7	2.1	4.3	-3.0	0.0	-3.4

Note: * For interest rates, the term spread, the unemployment rate, the saving ratio, and the dependency ratio, the numbers in the table refer to 2025. ** For interest rates, the term spread, the unemployment rate, the saving ratio, and the dependency ratio, the numbers in the table refer to 2020. "Low for long" (LfL) All endogenous, but TFP growth exogenous at zero for all countries along the horizon. Population growth and dependency ratio (aligned with EC). "Back to normal" (BtN) As BtN but dependency ratio paths half-way in between flat and path from the EC and short-term rate paths lifted up to match average of GDP and ITR growth at EU level on average along the horizon.

In the "low for long" scenario, short and long-term interest rates remain low and reach, on average, 0.0% and 1.2% respectively in the EU-28. Real GDP growth is 1.4% on average for the projection horizon, reflecting low consumption and investment growth (1.2% and 1.5% respectively). In per capita terms, real GDP will grow on average by 1.2%.[9] The assumed trend for dependency ratios will play a key role in determining the future path of some of the macroeconomic variables. In a counterfactual scenario, in which demographic factors are assumed to follow a less adverse path (dependency ratios remaining constant at 2015 levels), macroeconomic outcomes would be less negative. TFP trends are more relevant for investment growth, unemployment and house price growth, while dependency ratios are more relevant for driving GDP and private consumption growth. The expected general worsening of demographic trends will require relatively low short-term rates for a prolonged period to compensate.[10,11]

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[8] All projections are typically surrounded by a large degree of uncertainty, which increases with the length of the horizon.

[9] After the bursting of the housing, land and stock bubbles in Japan in 1990, real GDP growth was substantially lower than before: between 1980 and 1990 real GDP grew on average by 4.5%, compared with 0.9% between 1995 and 2015. During the same periods US real GDP grew by 3% and 2.5%, respectively. Per-capita growth of real GDP in Japan between 2000 and 2006 was 1.3%, compared with an EU-28 average over the same period of 2.0% and 1.2% over the projection horizon.

[10] In order to assess which structural factors were more relevant for macroeconomic outcomes, the model was used to conduct a series of counterfactuals. TFP and dependency ratios were separately shocked at country level, with shocks assumed to be permanent. The shocks were calibrated to one standard deviation of the historical series of TFP growth and changes in dependency ratios.

[11] Ferrero et al. (2015) show, using an overlapping generation model, that in order to compensate for the downward pressure of demographic trends on the real interest rate, steady state productivity growth should double (from 1% to 2%).
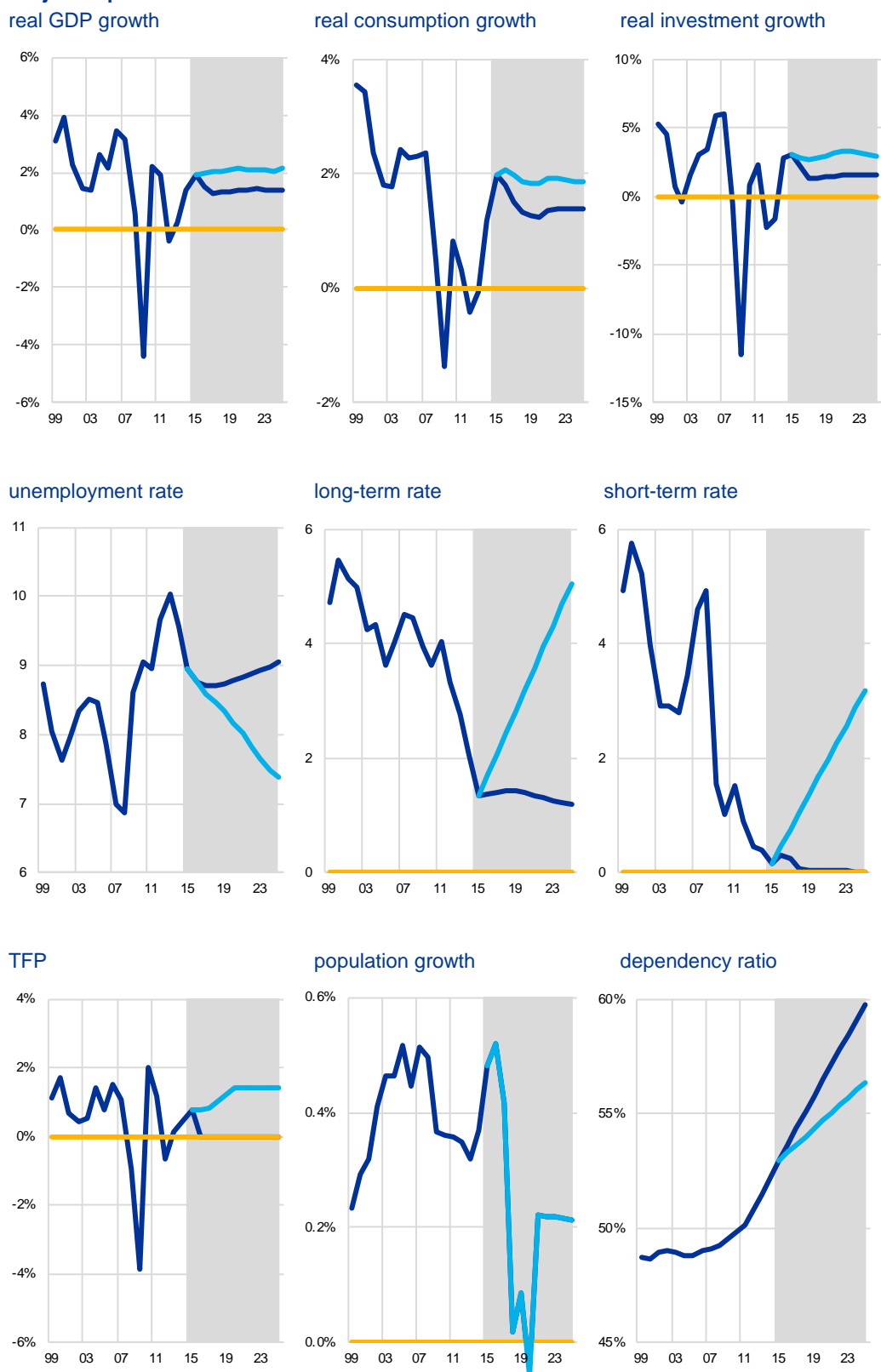
Under the "back to normal" scenario, the outcome for real activity variables appears more favourable than under the "low for long" scenario. Real GDP and investment growth average 2.0% and 3.0% respectively per annum along the simulation horizon. Nominal house prices increase by 4.0% under the "back to normal" scenario and by 1.9% under the "low for long" scenario. Long-term rates move back to 2000-2006 averages by the end of the horizon (2025), reaching 5.1%, whereas short-term rates will endogenously reach 3.2%. The average difference between the growth rate of real GDP under the two scenarios is 0.7 p.p., similar to that of real consumption growth, but lower than the difference for real investment growth (1.4 p.p.). The differences in terms of short- and long-term rates are larger, also reflecting the assumptions.

Figure 4.1

Projected paths of selected variables in the EU-28

real GDP growth

real consumption growth

real investment growth

unemployment rate

long-term rate

short-term rate

TFP

population growth

dependency ratio

Note: annual data. Solid lines denote EU-weighted average. Light grey shaded area denotes the 10th-90th percentiles of the country distribution. From 2015 onwards the charts report the projected path for the variables.

The results from the panel VAR are qualitatively consistent with the simulations carried out by the EC using a version of the QUEST model.[12] In the projection based on this model, it is assumed that TFP growth has persistently declined since 2009 and that dependency ratios will worsen over the coming decade, as described in the EC 2015 Ageing Report. **It is forecasted that the combination of these adverse developments will lead to a substantial decline in real consumption, investment and GDP growth between 2015 and 2025:** the average GDP growth in this period will be 0.7%, below the estimate obtained from the panel VAR (1.5%). **Lower TFP growth and a higher dependency ratio will lead to a large and persistent decline in the nominal short-term interest rate.** Considering only the decline in TFP growth, the short-term rate will return to baseline by 2025, whereas considering only the increase in the dependency ratio, it will remain persistently low, as does the real interest rate, due to higher savings and lower consumption. The negative impact of a higher dependency ratio on consumption is larger than that of lower TFP growth.

4.2   Country heterogeneity

This section uses the outcome of the projection exercise to understand the country differences and relate them to the assumptions for TFP growth and demographic developments.

The average projection for the EU-28 masks heterogeneous patterns.

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[12]   The model is a two-region open-economy setup of the euro area and the rest of the world. In each region there are two types of households: liquidity-constrained and intertemporally optimising Ricardian households. The only rate is a short-term one. The increase in the dependency ratio is modelled as an increase in the population share of non-participants in the labour market. WS1 thank Werner Roeger, Marco Ratto, Jan in't Veld, Lukas Vogel, Beatrice Pataracchia and Romanos Priftis for their help and support.
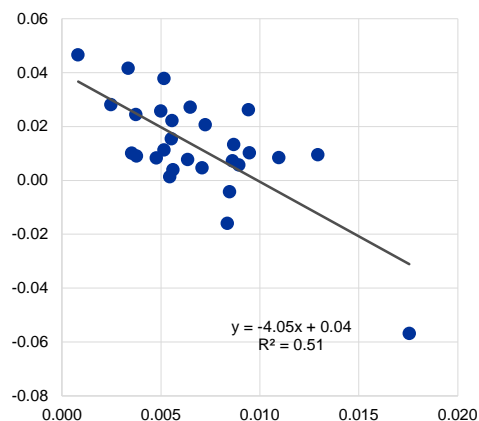
Chart 4.2

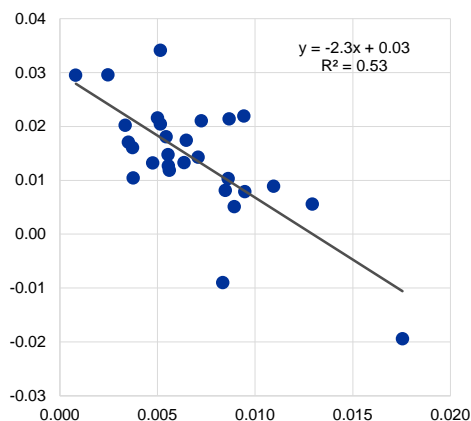**The role of demographics in the "low for long" scenario**

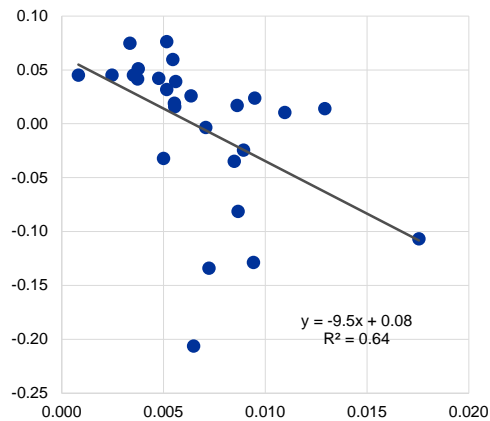(a) Long-term interest rate and change in dependency ratio

$y = -99.1x + 1.99$
$R^2 = 0.08$
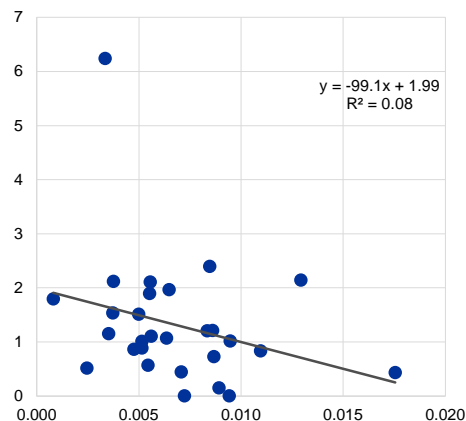
(b) Per-capita real GDP growth and change in dependency ratio

$y = -4.05x + 0.04$
$R^2 = 0.51$

(c) Real consumption growth and change in dependency ratio

$y = -2.3x + 0.03$
$R^2 = 0.53$

(d) Nominal house prices growth and change in dependency ratio

$y = -9.5x + 0.08$
$R^2 = 0.64$

Note: the charts report the country projections for the selected variables in 2025, the last year of the projection horizon.

The charts allow us on the one hand, to assess the degree of heterogeneity in the relationship between changes in the dependency ratios and total factor productivity growth, and on the other hand, a set of macroeconomic variables. Although we focus on the last year in the projection horizon (2025), the results are similar if any other year is used.

In the "low for long" scenario, increases in the dependency ratio are associated with lower per capita GDP growth, lower consumption growth and lower long-term interest rates. This means that countries for which the dependency ratio is expected to worsen would experience lower per capita output growth and lower interest rates. Similarly, in such countries nominal property prices would increase less. Importantly, the relationship between per capita growth and the changes in dependency ratios is significant while the relationship with population growth is not. This result suggests that the age composition of the population matters for long-run growth.

Under the "back to normal" scenario, the larger the growth in TFP, the larger the per capita real GDP growth, which is consistent with the theory literature (Section 2). In contrast, changes in dependency ratios do not correlate positively with per-capita output growth. **Countries with fast growth in TFP will tend to experience, ceteris paribus, stronger growth in real investment.**
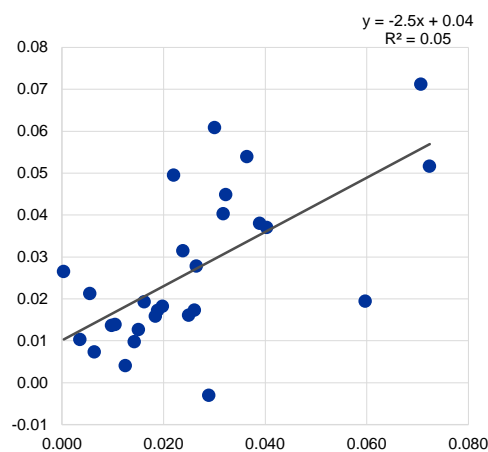
Chart 4.3
The role of total factor productivity under the "back to normal" scenario
a) Long-term interest rate and TFP growth
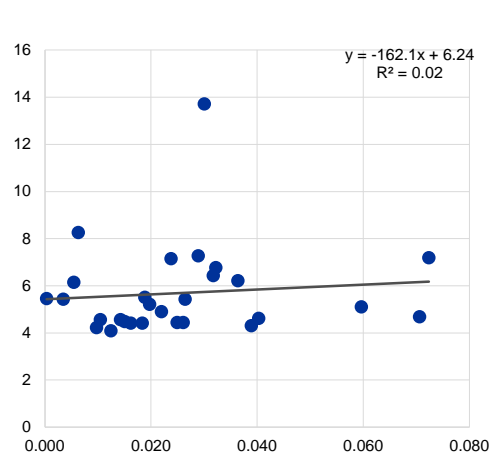
(b) Per capita real GDP growth and TFP growth

y = -162.1x + 6.24
R² = 0.02

y = -2.5x + 0.04
R² = 0.05

(c) Real investment growth and TFP growth growth
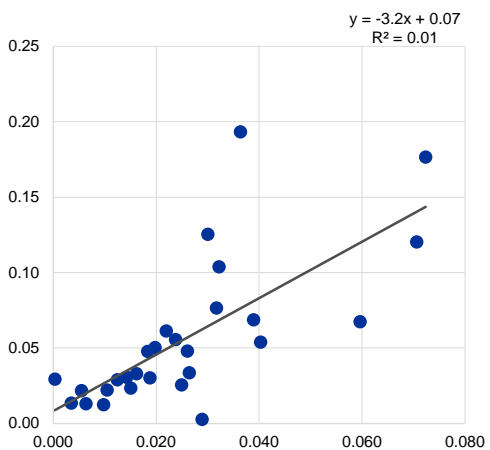
(d) Nominal house price change and TFP
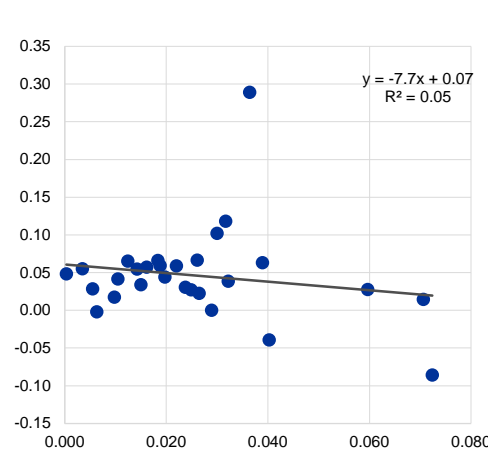
y = -3.2x + 0.07
R² = 0.01

y = -7.7x + 0.07
R² = 0.05

Note: the charts report the country projections for the selected variables in 2025, the last year of the projection horizon.

4.3   Projections by other international institutions

This section compares the projections for the two scenarios with those produced by the EC for the 2015 Ageing report and by the IMF, and with survey-based expectations (Consensus Economics),

focusing on real GDP growth and long-term rates. Given the length of the projection horizon, these figures should be treated with caution.

The comparison is meant to assess which of the two scenarios may be seen as most likely, given that similar projections are produced by international institutions whose o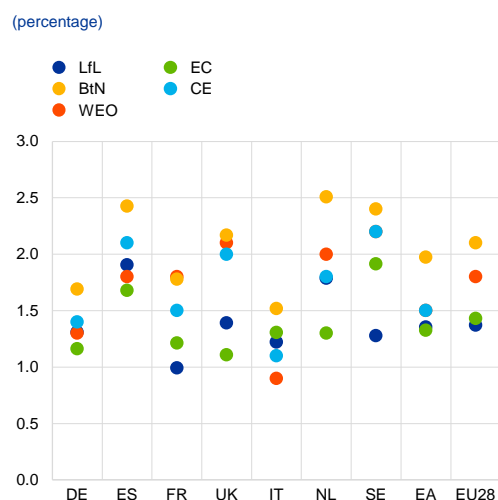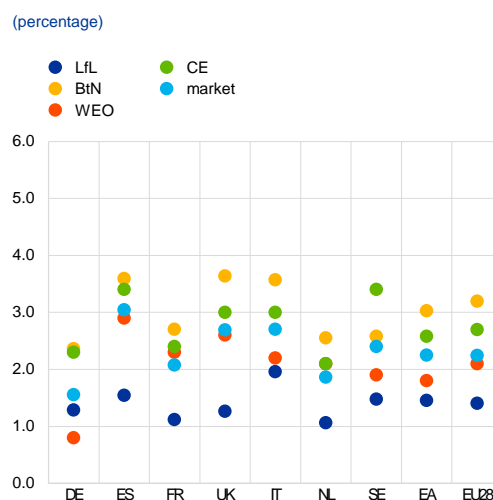utlooks may be taken as a baseline scenario.[13] The following chart compares such projections for the year 2020 for a selection of large EU countries for which survey-based expectations are also available.

Chart 4.4
Comparison of projections for 2020
a) Real GDP growth   (b) Long-term interest rate

Note: Low for long (LfL) and back to normal (BtN) refer to the projections described in Section 4.1. IMF projections are taken from the World Economic Outlook (April 2016; WEO), while EC refers to the estimates of potential output included in the 2015 European Commission Ageing Report. Consensus Economics (April 2016; CE) data are available only for the largest countries. Market expectations for interest rates are the average for December 2015. The figures for the euro area and the EU-28 are calculated as the weighted averages of the individual countries reported in the charts.

With regard to real GDP growth, survey-based expectations (Consensus Economics) **and the projections of the IMF and the EC are very close to each other for the euro area and some of its largest countries (Chart 4.4 (a)), and are closer to the "low for long" scenario than to the "back to normal" scenario.** For non-euro area countries, the projections by the IMF, the EC and Consensus Economics are, on average, closer to the "back to normal" scenario.

As for long-term interest rates, the results of the comparison are less clear cut. For the euro area and the EU, the projections by the IMF are closer to the "low for long" scenario (Chart 4.4 (b)).

Market-based expectations for interest rates were input into the panel VAR model in order to produce conditional forecasts for the macroeconomic variables and compare these with the two scenarios.[14] The projections for macroeconomic variables are, along the 2015-2025 horizon, lower

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[13] In contrast to the two scenarios generated by means of the panel VAR model, whose nature is not a priori defined to be of a "baseline" type.

[14] Market-based expectations are available for 11 countries, which represented 70% of the EU in terms of nominal GDP in 2014. For the remaining 17 EU countries the expectation estimates implied by market data were not deemed sufficiently robust. For these countries it was therefore assumed that their short and long-term interest rate paths would move in parallel to Germany's interest rates.

on average than under the "low for long" scenario, suggesting that market expectation-implied rates are, according to the model, consistent with fairly stagnant growth.

Table 2 shows the trend over time of the projections for real GDP and potential output growth by the IMF and the EC. More precisely, the WEO projections refer to the latest year in the projection horizon, whereas the EC projections refer to the same years (2020 and 2025).

Table 2

Projections of real GDP and potential output growth by the IMF and the EC for selected years

	WEO – Oct. 2010	WEO – Oct. 2013	WEO – Apr. 2016	Ageing report 2009		Ageing report 2012		Ageing report 2015	
horizon	2015	2018	2021	2020	2025	2020	2025	2020	2025
Euro-area	1.7	1.6	1.5	2.1	1.6	1.6	1.6	1.3	1.3
EU-28	2.2	1.9	1.8	2.1	1.8	1.7	1.7	1.4	1.3
minimum	1.2	1.2	0.9	1.5	0.9	1.0	0.7	0.1	0.6
first quartile	1.9	1.7	1.6	1.9	1.7	1.4	1.4	1.4	1.3
median	2.7	2.3	2.1	2.4	1.9	1.8	1.8	1.8	1.5
third quartile	3.5	3.1	2.9	2.7	2.3	1.9	2.0	2.1	1.9
maximum	5.0	4.0	4.0	3.9	3.2	3.3	3.4	3.0	3.0
std. dev.	1.0	0.8	0.8	0.6	0.5	0.5	0.6	0.6	0.6

Note: the table reports the projections by the IMF reported in the World Economic Outlook for the last year in the projection horizon: 2015 for the October 2010 WEO, 2018 for the October 2013 WEO and 2021 for the April 2016 WEO. As for the EC, the table shows the projections of potential output growth for the years 2020 and 2025 reported in the 2009, 2012 and 2015 Ageing Reports. Source: IMF World Economic Outlook and European Commission Ageing Report.

Both the IMF and the EC revised their projections downward for medium-term output growth following the outbreak of the global financial crisis. In all cases the distribution of the projections has shifted towards lower output growth outcomes. The five-year forward median projection by the IMF declined from 2.7% in October 2010 to 2.1% in April 2016. The EC's median projections for 2020 and 2025 declined to 1.8% and 1.5% respectively in the 2015 Ageing Report from 2.4% and 1.9% in the 2009 Ageing Report.

The median five-year forward projections for real GDP growth in the April 2016 WEO fell to 1.5% and 1.8% for the euro area and the EU respectively, from 1.7% and 2.2% respectively in the October 2010 WEO.

EC projections for potential euro area output in 2020 were revised downward from 2.1% in the 2009 Ageing Report to 1.6% in the 2012 Ageing Report, and to 1.3% in the 2015 Ageing Report. EU potential output growth was revised downward from 2.1% in 2009 to 1.7% and 1.4% in the 2012 and 2015 Ageing Reports respectively. The latest report forecasts TFP growth reaching 1%, up on the current historically low levels.

Table 3 below shows the five-year forward projections by the IMF for ten-year interest rates, in three rounds of the WEO: October 2010, October 2013 and April 2016.

Table 3

Projections for 10-year long-term interest rates – IMF

	WEO – Oct. 2010	**WEO – Oct. 2013**	**WEO – Apr. 2016**
horizon	**2015**	**2018**	**2021**
Euro-area	4.0	3.8	1.9
EU-28	4.4	3.9	2.2
minimum	2.0	2.7	0.6
first quartile	4.4	3.1	2.1
median	4.7	4.0	2.3
third quartile	5.5	5.2	3.2
maximum	7.5	8.8	9.0
std. dev.	1.1	1.4	1.7

Note: the table reports the 5-year forward projections by the IMF reported in the World Economic Outlook for the last year in the projection horizon: 2015 for the October 2010 WEO, 2018 for the October 2013 WEO and 2021 for the April 2016 WEO.

For the euro area as a whole, the projections have been significantly downward in the last five years, from 4.0% in October 2010 to 1.9% in April 2016. The distribution across EU countries has gradually shifted towards lower figures: the first and third quartiles declined to 2.1% and 3.2% respectively in the April 2016 WEO, from 4.4% and 5.5% respectively in October 2010.

Section 5
Risk assessment for the real estate sector

This section briefly describes the main drivers of real estate markets, before focusing on the factors that can aggravate the build-up of vulnerabilities and amplify the impact of corrections in both the residential and the commercial real estate markets. A risk assessment is carried out for both the "low for long" and "back to normal" scenarios.

Factors that determine trends in real estate markets may be grouped as those affecting supply and demand, and institutional factors.[15] **The main supply and demand factors include interest rates, income, output and demographic trends** (ESRB Expert Group on real estate, 2015).

Interest rates are an important factor driving the real estate sector, since they determine a large part of the demand. Low interest rates decrease the cost of lending, stimulate real estate demand and, in turn, contribute to raising prices in the market. Low interest rates also reduce default risk by easing debt servicing, and therefore increase the supply of loans. Through the credit channel, higher prices may further stimulate lending and may potentially lead to self-reinforcing house price and credit cycles.

Output and income growth are two other important drivers of the real estate sector. In an environment of persistently low income and low output growth, demand in the real estate sector should remain low, thereby countering the effects of low interest rates.

Demand is also strongly influenced by demographic factors and migration flows. The ageing of the population negatively impacts residential real estate markets, since elderly people move home less frequently. Demand for real estate is positively impacted by migration and a change in household structure (e.g. more single-parent households).[16] For commercial real estate (CRE), an ageing population, the internet and flexible use of office space will specifically reduce the need for physical floor space in office and retail markets. CRE is an asset class for investors and, as such, investment in CRE tends to be volatile and prone to search-for-yield behaviour. This may be particularly problematic for open-ended investment funds as the underlying CRE is less liquid than the fund itself and this could lead to a fire sale.

The main institutional factors determining trends in real estate markets include taxes and subsidies, lending contract features (e.g. floating-rate vs. fixed-rate contracts), **and foreclosure and insolvency legislation.**

5.1 Risks in the residential real estate (RRE) sector

A build-up of risks in the RRE market is more likely in an environment of high and rising house prices, large and increasing mortgage debt, either in itself, relative to income, or relative to home values, **and strong investment in residential construction.** Both the "low for long" and "back to normal" scenarios may lead to the accumulation of risks in the RRE market.

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[15] The recently established Residential Real Estate Task Force will focus on enhancing the methodology for cross-country comparisons of RRE vulnerabilities, developing a framework for assessing policy stances (taking country specificities into account), while deepening the analysis of country specificities and their impact on RRE vulnerabilities.

[16] Monnet and Wolf (2016) show that demographic changes are a better predictor of the residential investment rate than any macroeconomic or financial variable.

Under the "low for long" scenario, the likelihood of a build-up of imbalances is higher than under the "back to normal" scenario. As a consequence, the potential size of a subsequent correction increases over time. However, the severity of this risk depends on the drivers behind low interest rates. **To the extent that low interest rates are associated with low income and low output growth, the likelihood of a build-up of imbalances will be lower.** This view is supported by the projections under the "low for long" scenario: the average growth of nominal residential prices (Table 1 and Chart 4.2) is almost zero, and slightly negative in real terms.

Under the "back to normal" scenario, interest rates gradually adjust back to a higher level at which it is presumed there will be no further build-up of imbalances in the RRE market, despite the fact that nominal real estate prices have increased. In this case the largest risk may be associated with the normalisation phase. When interest rates rise under the "back to normal" scenario, mortgage debt-servicing costs also rise for households. **Households that have borrowed heavily** (in relation to their income) **at floating rates are hit hard by the increase in short-term rates under the scenario.** This impact may be alleviated as income rises, but the short-term effect of an interest rate increase could still be significant and could adversely affect financial stability, since the increase in debt servicing costs is likely to be faster than the increase in nominal incomes during the upswing. Also, if households' decisions have been based on misconceptions concerning future interest rates, especially the belief that rates would continue to remain at record low levels, the over-borrowing could be substantial, amplifying the potential downturn.

Vulnerabilities in the RRE market pose the highest risk for households and banks. If households find it increasingly difficult to service their mortgage debt they may default on their obligations. Banks' asset quality may worsen and their resilience could be put at risk. To a lesser extent, the construction sector may also be negatively affected. Households might also reduce their consumption in order to service their debt. These effects are likely to have a negative impact on the real economy, affecting investment and employment.

Risks in the RRE market create significant knock-on effects on banks' profitability, causing households' and construction firms' default rates to increase and lending conditions to tighten. There is also a potential negative spillover to other financial intermediaries due to a loss of confidence in the financial sector, should problems in the banking sector escalate. **Cross-country spillovers should be limited due to the local nature of housing markets,** although if the same or similar shocks are driving an increase in imbalances or a common shock triggers a downturn, risks may materialise simultaneously in several different countries.

5.1.1   Cross-country assessment: vulnerabilities and risks

Cyclical factors, such as sustained output and income growth, are needed for imbalances in RRE to build up. Structural factors such as high rates of home ownership, high bank leverage, high LTI and LTV ratios, and high tax breaks and subsidies **may also aggravate** the vulnerabilities in the build-up phase and the impact should these risks materialise. **A higher proportion of floating-rate mortgages could mitigate the accumulation of these vulnerabilities for the banking sector,** although it may lead to greater house price volatility.[17]

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[17]   This report also presents a cluster analysis based on the structural characteristics of EU countries for the period before the crisis. For further details please refer to Section 1.4. of the report.

Since EU countries have differing cyclical conditions and structural characteristics, it is difficult to assess how these structural and institutional factors could affect RRE vulnerabilities at country level, not least because this may depend on interactions with other policies.

If interest rates remain low for long, risks are judged to be contained at aggregate EU level, due not only to the large existing debt and the weak prospects for income, limiting demand for new credit, but also to limited cross-country spillovers given the nature of housing markets and limited cross-border bank funding. Cross-country spillover effects will depend on the size of the country, the relative stake of foreign banks in its banking system and its trade with other EU member countries.

Residential house prices are broadly in line with fundamentals in most EU countries, despite the fact that prices have been increasing over the last few years (Chart 5.2 (a)). However, individual countries show signs of having overvalued residential real estate. Further, household debt in relation to gross disposable income varies significantly across EU countries and appears elevated in some countries (Chart 5.2 (b)).

Chart 5.2

Indicator of vulnerabilities in residential real estate

a) Estimated over/undervaluation of residential real estate

(b) Household debt to gross disposable income ratio
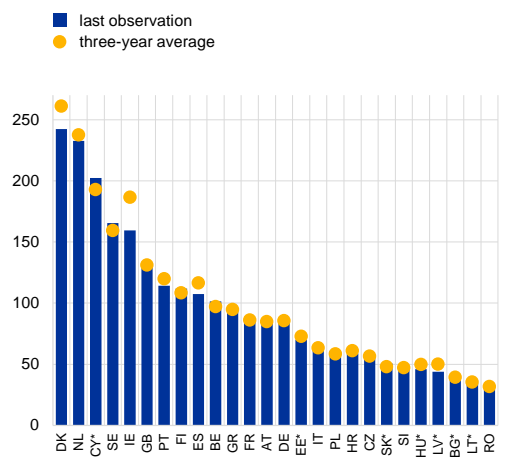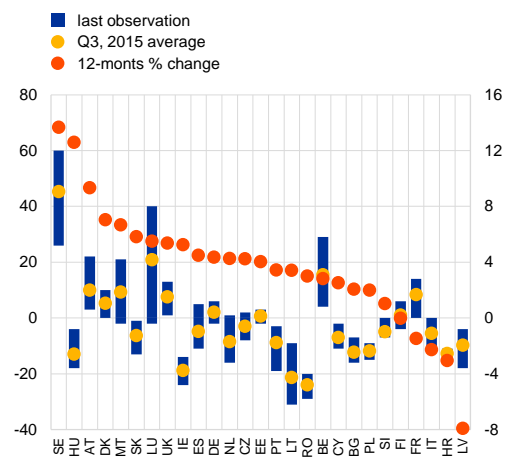
Source: ESRB risk dashboard and ECB.
Note: Sample period 1997:Q1-2015:Q3. Chart a): the bars represent the min-max interval across different valuation methods. Year-on-year percentage change in residential property prices. Chart b): interquartile range of valuation estimates across countries (2015Q3; except for Belgium (2014Q4), Denmark, Finland and Slovakia (2015Q2)).

In September 2016 the ESRB decided to issue warnings following a forward-looking Union-wide assessment of vulnerabilities relating to residential real estate. The ESRB assessed vulnerabilities related to residential real estate in all Member States and concluded that vulnerabilities prevail in eight Member States: Austria, Belgium, Denmark, Finland, Luxembourg, the Netherlands, Sweden and the United Kingdom. These warnings were given on the basis of analyses conducted within the ESRB: the ESRB report on vulnerabilities in the in the EU residential real estate sector (2016), the ESRB Expert Group on Residential Real Estate (2015) and the ESRB Secretariat's Issues Note on Risks in the EU Financial System (December 2015).

The key vulnerabilities highlighted by the ESRB assessment are of a medium-term nature and relate to the rising indebtedness and ability of households to repay their mortgage debt or to the valuation or price dynamics of residential real estate. Regarding households, in many of the countries receiving warnings, vulnerabilities are related to the level of indebtedness or the growth of mortgage credit. Regarding valuation, some countries have vulnerabilities related to the rate of price growth or overvaluation of residential real estate. The ESRB performed an analysis of risks to the banking system from residential real estate. At this time, the ESRB has not identified direct near-term risks arising from residential real estate exposures in the banking systems of the warned countries, although second-round effects are not excluded in the medium term. Moreover, these countries have taken steps to ensure the resilience of their banking sectors, for example through the increase in bank capital requirements in recent years. In most of the warned countries, however, medium-term vulnerabilities are generated by a combination of household indebtedness and price dynamics.

Under the "low for long" scenario, countries that are not currently considered vulnerable, despite having relatively high levels of home ownership financed by mortgages, with high bank leverage, high LTI and LTV ratios, and high tax breaks and subsidies for residential real estate purchases, may yet become vulnerable.

Under the "back to normal" scenario, the risk is associated with the normalisation phase since mortgage debt servicing costs for households will increase with a rise in interest rates. The most vulnerable countries are those where households have borrowed heavily (in relation to their income) at floating interest rates. The impact of this could be alleviated by higher income, although in the short-term interest rate rises could have a markedly negative impact on financial stability in those countries. Countries where the construction sector has also leveraged to fund new investment by means of credit may also be vulnerable to price corrections.

5.2   Risks in the commercial real estate (CRE) sector

There are major challenges to consider when assessing commercial real estate risks. **For example, there is no clear-cut or commonly shared statistical definition of CRE in the EU.**[18] Commercial property includes buildings and the land they stand upon and is expressly intended to generate an income and/or capital gain.

Data on CRE are generally scarce, incomplete or inconsistent, especially compared with RRE data, **and this makes any risk assessment quite difficult.** Data gaps and inconsistencies relate to prices and quantities, financial institutions' and investors' exposures, the riskiness of financial institutions' and investors' funding, and the financial position of property borrowers.

Commercial real estate markets tend to be significantly more cyclical than residential real estate. This is due to CRE's closer links with general economic conditions, more inelastic supply conditions than for RRE, the international dimension of CRE and the opaqueness of CRE markets.

The European CRE market is quite concentrated, with the United Kingdom, France and Germany accounting for more than two-thirds of transactions in recent years (Chart 5.3 (a)).

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[18]   Commercial property can be defined as a combination of both land and the buildings upon it, which generates profit or income from capital gains or rents. See the report by the Expert Group on Commercial Real Estate.
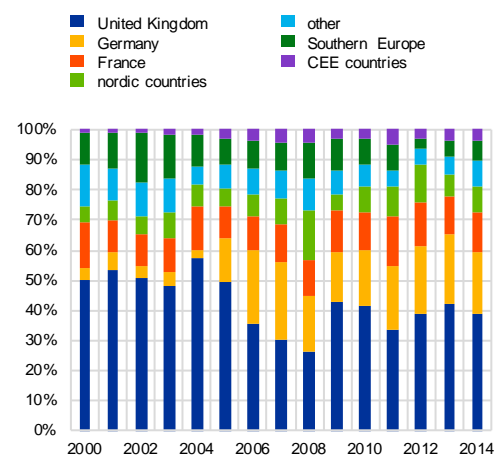
The overall direct exposure of the financial system to CRE varies significantly between countries (Chart 5.3 (b)). While banks generally account for the majority of exposures to CRE, in some countries other financial institutions, such as insurance companies, pension funds and investment funds, also play a prominent role.

Banks account for the largest share of exposures to CRE, although non-banks account for a significant part of the funding in some countries. Since the outbreak of the global financial crisis, the share of equity funding has risen. Within debt funding there is a shift from bank lending towards non-bank funding (insurance companies, pension funds and asset managers) via bonds issued by property companies. In the Netherlands pension funds play a significant role, while in Luxembourg and Portugal exposures to CRE are mainly concentrated in investment funds. As far as banks' exposures are concerned, Germany, Italy, Spain, France and the United Kingdom have the highest absolute exposure.
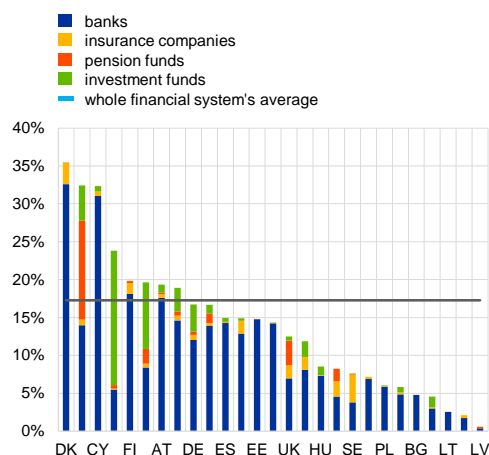
Chart 5.3
Commercial real estate: some facts
a) Geographical distribution of CRE transaction volumes

(b) Total direct exposure of the financial system to CRE

(% of GDP; 2013)

Sources: Report on commercial real estate and financial stability in the EU. ESRB, December 2015.
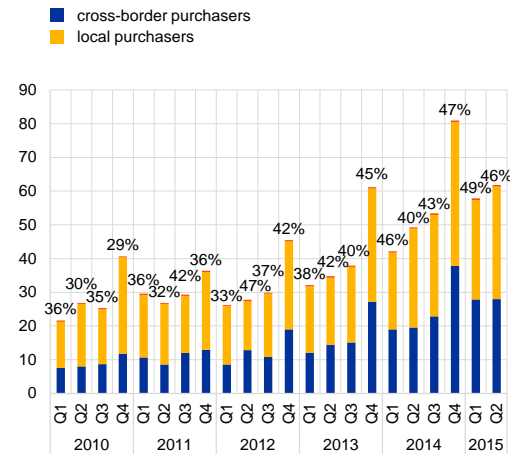
Chart 5.4

Commercial real estate: cross-border investment
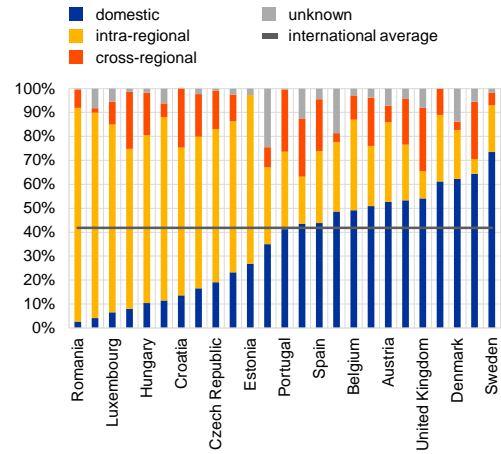
(a) Cross-border investment, Europe

(b) Source of investment in the EU
2006 – 2015 (first half) to gross disposable

(EUR billion)

(percentage)

Sources: Report on commercial real estate and financial stability in the EU. ESRB, December 2015.

CRE market fluctuations are correlated with international capital markets. CRE markets in the EU tend to be open to foreign market participants, with significant cross-border investment (Chart 5.4 (a)). This entails additional risk factors which is why CRE is prone to "irrational exuberance". Investors and lenders may extrapolate from past gains in property prices when making investment and lending decisions, lending support to unsustainable price rises.

The CRE market in the EU is an attractive market for cross-border investment by foreign market participants, especially those from the US and the Middle East. In most of the EU countries, cross-border investment is still mainly intra-regional (i.e. from within the EU). Cross-regional investment (i.e. from outside the EU) is over 20% only in Poland, Spain, France, Germany, the United Kingdom and Ireland. International investors play a major role in Luxembourg and central and eastern European countries (Chart 5.4 (b)).

The latest information for the euro area as a whole suggests that valuations indicate that prime commercial property prices are above their long-term average (Financial Stability Review, ECB, November 2015). However, these aggregate figures include highly heterogeneous trends across countries. **Investment in commercial property markets remains robust,** driven by cross-border investment. Non-European investors, in particular international funds and US investors, are further increasing their European commercial property holdings. **The most vulnerable countries are currently those where investment in CRE is growing fast.**

CRE markets affect financial stability through various channels. Financial stability is directly affected by lenders providing CRE loans, which tend to be on a non-recourse basis and typically show higher default rates than RRE lending. The collateral channel may lead to higher LTV ratios and ultimately greater losses in the case of default. CRE markets pose an indirect stability risk due to their strong connection with the construction sector, which accounts for a significant part of GDP in most EU countries. A final channel, through which CRE affects financial stability, is the scale of investments made by institutional investors. Previous CRE-related crises showed that a common set of factors played a major role. These were: fast lending growth, the easing of lending standards

and rapid CRE price increases ahead of the crisis. In the downturn this resulted in a high number of non-performing loans and large credit losses.

Open-ended investment funds issue shares to investors who redeem their shares at short notice. During a correction in the CRE market, open-ended funds may be forced to "fire sell" assets, potentially leading to further falls in prices and amplifying the correction. Closed-ended investment funds differ from open-ended investment funds in that they issue a fixed number of shares. Since their liabilities are long term, these funds follow more stable investment strategies. From a financial stability perspective, however, closed-ended investment funds may pose risks to financial stability due to their significant leverage.

Both the "low for long" and the "back to normal" scenarios entail risks for the CRE market. The former scenario could lead to a build-up of debt and to price increases. **Low interest rates may stimulate borrowing to finance acquisitions or new commercial property development,** and riskier loans and riskier assets may be financed more easily. The amount of relatively cheap financing could support property valuations and, since debt is building up, the potential correction could be more severe. The effect on the real economy will be significant for countries where construction is a major part of real GDP. The risks under the "low for long" scenario could be mitigated by the drivers of the LIRE. In regard to the "low for long" scenario, structural factors like demographics and technological innovation have a significant influence on interest rates. These structural factors may lower the demand for CRE and mitigate the risk of a potential bubble.

Under the "back to normal" scenario there is a significantly lower risk of vulnerabilities building up; the cost of servicing debt increases, possibly leading to an increase in default rates. The risk is greater during the normalisation phase when income growth is still lagging behind higher interest rates.

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