EUROPEAN CENTRAL BANK

EUROSYSTEM

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Economic and monetary developments

Overview

At its monetary policy meeting on 7 September 2017, the Governing Council assessed that while the ongoing economic expansion provides confidence that inflation will gradually head to levels in line with its inflation aim, it has yet to translate sufficiently into stronger inflation dynamics. The economic expansion, which accelerated more than expected in the first half of 2017, continues to be solid and broad-based across countries and sectors. At the same time, the recent volatility in the exchange rate represents a source of uncertainty which requires monitoring with regard to its possible implications for the medium-term outlook for price stability. Measures of underlying inflation have ticked up slightly in recent months but, overall, remain at subdued levels. Therefore, a very substantial degree of monetary accommodation is still needed for underlying inflation pressures to gradually build up and support headline inflation developments in the medium term. The Governing Council thus maintained its monetary stance and will decide in the autumn on the calibration of the policy instruments beyond the end of the year.

Economic and monetary assessment at the time of the Governing Council meeting of 7 September 2017

The euro area economic expansion is continuing and becoming increasingly resilient, with the ECB's monetary policy measures supporting domestic demand. Euro area real GDP increased by 0.6%, quarter on quarter, in the second quarter of 2017, after 0.5% in the first quarter. Real GDP growth is supported primarily by domestic demand. Private consumption is underpinned by employment gains, which are also benefiting from past labour market reforms, and by increasing household wealth. The recovery in investment continues to benefit from very favourable financing conditions and improvements in corporate profitability. Surveys and short-term indicators confirm the outlook for robust growth momentum in the near term.

The broad-based global recovery will support euro area exports. Global economic activity is projected to accelerate moderately, underpinned by continued monetary and fiscal policy support in advanced economies and a recovery in commodity-exporting emerging market economies. After showing a marked improvement at the turn of the year, global trade has softened recently, but leading indicators continue to signal positive prospects. Overall, the broad-based global recovery will mitigate the potential impact on exports of a stronger exchange rate, which has appreciated by 3.4% in trade-weighted terms since the Governing Council's monetary policy meeting in June.

The September 2017 ECB staff macroeconomic projections for euro area real GDP growth are 2.2% in 2017, 1.8% in 2018 and 1.7% in 2019. Compared with the

June 2017 Eurosystem staff projections, the expected growth rates have been revised up for 2017 and are broadly unchanged thereafter. Risks surrounding the euro area growth outlook remain broadly balanced. On the one hand, the current positive cyclical momentum increases the chances of a stronger than expected economic upswing. On the other hand, downside risks continue to exist, primarily relating to global factors and developments in foreign exchange markets.

According to Eurostat's flash estimate, euro area annual HICP inflation in August 2017 was 1.5%, up from 1.3% in July. This reflected higher energy and, to a lesser extent, higher processed food inflation. On the basis of current oil futures prices, annual rates of headline inflation are likely to temporarily decline towards the turn of the year, mainly reflecting base effects in energy prices, before rising again.

While measures of underlying inflation have ticked up moderately in recent months, they have yet to show convincing signs of a sustained upward trend. According to Eurostat's flash estimate, HICP inflation excluding energy and food was 1.2% in August, unchanged from July, but 0.4 percentage point higher than the average for the final quarter of 2016. Domestic cost pressures, notably from labour markets, are still subdued. Underlying inflation in the euro area is expected to rise gradually over the medium term, supported by the ECB's monetary policy measures, the continuing economic expansion, and the corresponding gradual absorption of economic slack and rising wages.

The September 2017 ECB staff macroeconomic projections for the euro area foresee annual HICP inflation at 1.5% in 2017, 1.2% in 2018 and 1.5% in 2019. Compared with the June 2017 Eurosystem staff macroeconomic projections, the outlook for headline HICP inflation has been revised down slightly, mainly reflecting the recent appreciation of the euro exchange rate.

The euro area budget deficit is foreseen to decline further over the projection horizon (2017-19) owing to improving cyclical conditions and decreasing interest payments. Based on the September 2017 ECB staff macroeconomic projections, the general government deficit ratio for the euro area is expected to fall from 1.5% of GDP in 2016 to 0.9% of GDP in 2019.Structural deficits, however, are not declining, despite the favourable growth dynamics.

Money growth remained robust despite some monthly volatility. The recovery in the growth of loans to the private sector has been proceeding. At the same time, the annual flow of total external financing to non-financial corporations is estimated to have eased somewhat in the second quarter of 2017.

The pass-through of the monetary policy measures put in place in recent years continues to significantly support borrowing conditions. Euro area sovereign bond yields have remained broadly unchanged since the Governing Council's monetary policy meeting in June. Corporate bond spreads vis-à-vis the risk-free rate have declined marginally and remain below the levels observed in early March 2016 when the corporate sector purchase programme was announced.

Monetary policy decisions

Taking into account the outcome of the economic analysis and the signals coming from the monetary analysis, the Governing Council concluded that a continued very substantial degree of monetary accommodation is needed to secure a sustained return of inflation rates towards levels that are below, but close to, 2%. The Governing Council decided to keep the key ECB interest rates unchanged and expects them to remain at their present levels for an extended period of time, and well past the horizon of the net asset purchases. Regarding non-standard monetary policy measures, the Governing Council confirmed that the net asset purchases, at the current monthly pace of €60 billion, are intended to run until the end of December 2017, or beyond, if necessary, and in any case until the Governing Council sees a sustained adjustment in the path of inflation consistent with its inflation aim. The net purchases are made alongside reinvestments of the principal payments from maturing securities purchased under the asset purchase programme (APP). In addition, the Governing Council reconfirmed its commitment to increase the APP in terms of size and/or duration if the outlook becomes less favourable, or if financial conditions become inconsistent with further progress towards a sustained adjustment in the path of inflation. This autumn the Governing Council will decide on the calibration of the policy instruments beyond the end of the year, taking into account the expected path of inflation and the financial conditions needed for a sustained return of inflation rates towards levels that are below, but close to, 2%.

1 External environment

The global economy is continuing to expand at a solid rate. After a temporary dip in momentum in some countries at the start of the year, data point to a rebound in global GDP growth. Looking ahead, global economic activity is projected to accelerate moderately, underpinned by continued monetary and fiscal policy support in advanced economies and a recovery in commodity-exporting emerging market economies. After showing a marked improvement at the turn of the year, global trade has softened recently, but leading indicators continue to signal positive prospects. Global inflation is expected to rise as spare capacity at the global level diminishes.

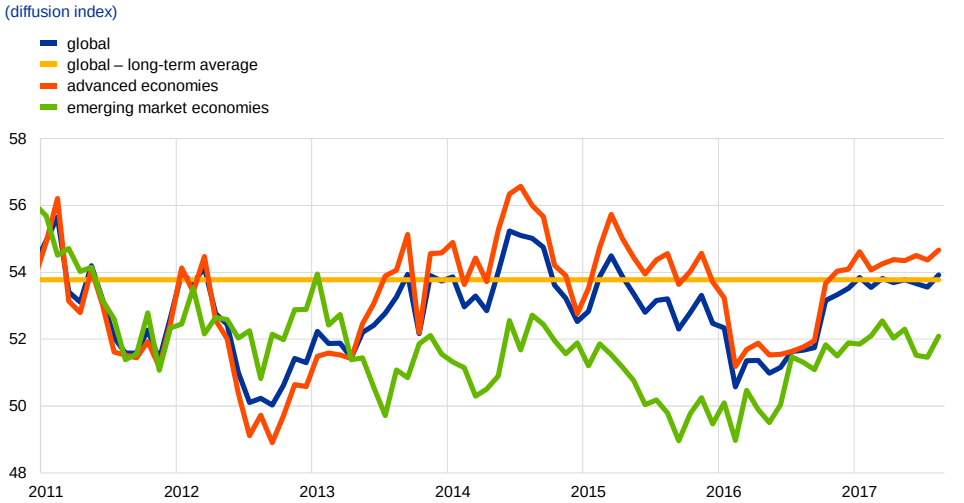
Global economic activity and trade

The global economy has continued to expand steadily. Following a temporary dip in growth in some economies in the first quarter, the latest data and survey-based indicators show a rebound in global growth. With regard to advanced economies, GDP growth rebounded in the United States in the second quarter, as consumer spending and inventories recovered from previous weak outcomes, supported by the tightening labour market and strong household confidence. In Japan, activity grew strongly in the second quarter supported by a favourable external environment and fiscal stimulus. By contrast, activity in the United Kingdom remained relatively muted, as household incomes were affected by rising inflation and falling real wages. With regard to emerging market economies, in Brazil and Russia, activity has been supported by the rebound in growth following deep recessions, while economic growth remained resilient in India and China.

Survey indicators suggest sustained global growth in the near term. The global composite output PMI (excluding the euro area) rose in August to just above the long-term average. The survey indicates the fastest pace of expansion since early 2015 (see Chart 1). Sentiment survey indicators have also risen over the past few months.

Chart 1

Global composite output PMI



Sources: Haver Analytics, Markit and ECB staff calculations.
Notes: The latest observations are for August 2017. "Long-term average" refers to the period from January 1999 to August 2017.

Global financial conditions remain supportive overall. Equity markets in advanced economies were broadly unchanged over recent weeks amid subdued volatility and low risk aversion. Long-term interest rates in the United States and United Kingdom have moderated in the past couple of months. In Japan, yields were stable, reflecting the Bank of Japan's yield curve control programme. Financial conditions in emerging market economies are also benefitting from expectations of a brighter global growth outlook amid resilient capital flows. In China, financial conditions have eased somewhat after a period in which authorities tightened financial conditions substantially in an effort to curb leverage in the financial system.

Monetary policies remain accommodative in advanced economies, and central banks in some emerging market economies have lowered their interest rates. In line with market expectations, the Federal Reserve System increased interest rates at its June meeting. It also announced the intention to start normalising its balance sheet later this year. However, markets continue to price in a very gradual monetary tightening in the United States, while central banks in other advanced economies are expected to maintain their accommodative stance. Among emerging market economies, some commodity-exporting countries lowered their policy rates, as inflation pressures subsided and exchange rates firmed.

Looking ahead, global economic activity is projected to accelerate gradually. The outlook amongst advanced economies is for a modest expansion, underpinned by continued monetary and fiscal policy support, as the cyclical recovery continues and output gaps close gradually. Amongst emerging market economies, the outlook is supported by resilient growth in China and India, and the recovery of commodity-exporting countries from significant adverse shocks to their terms of trade. Nonetheless, the pace of global expansion will remain below pre-crisis rates, which is consistent with estimates suggesting that the growth potential has declined across most advanced and emerging market economies in recent years. One of the factors

behind this slowdown has been the weakness in capital contributions. Box 1 elaborates on the factors underlying subdued investment in advanced economies.

In the United States, activity is expected to strengthen. The recent depreciation of the US dollar and the pick-up in global growth are expected to boost the contribution of net exports to growth. Gains in housing and equity prices, coupled with buoyant consumer confidence and tight labour market conditions should all strengthen consumption spending further. With companies reporting improved earnings and solid business confidence, investment is projected to increase at a steady pace. However, market expectations of a smaller fiscal stimulus will provide less impetus to economic activity than previously foreseen. Moreover, in the near term there is some uncertainty about the impact of hurricane Harvey on economic activity in affected regions.

In the United Kingdom, real GDP growth is expected to remain relatively muted in the near term. Although the depreciation of the pound sterling is likely to support exports, the increase in inflation will lower real household incomes and private consumption. Heightened uncertainty about the United Kingdom's future trade arrangements is also weighing on investment.

In Japan, accommodative policies continue to support expansion. In the near term accommodative monetary policy and the fiscal stimulus programme should support domestic demand, while exports gradually recover as external demand improves. Further ahead, however, activity is projected to decelerate towards its potential as fiscal support wanes and economic slack diminishes. Moreover, despite robust job creation, wage increases have remained modest, dampening private consumption prospects.

In China, activity continues to expand at a robust pace, supported by resilient consumption and the buoyant housing market. While fiscal policy should continue to be supportive, the focus of authorities on also containing financial stability risks is expected to underpin a gradual rebalancing as investment slows.

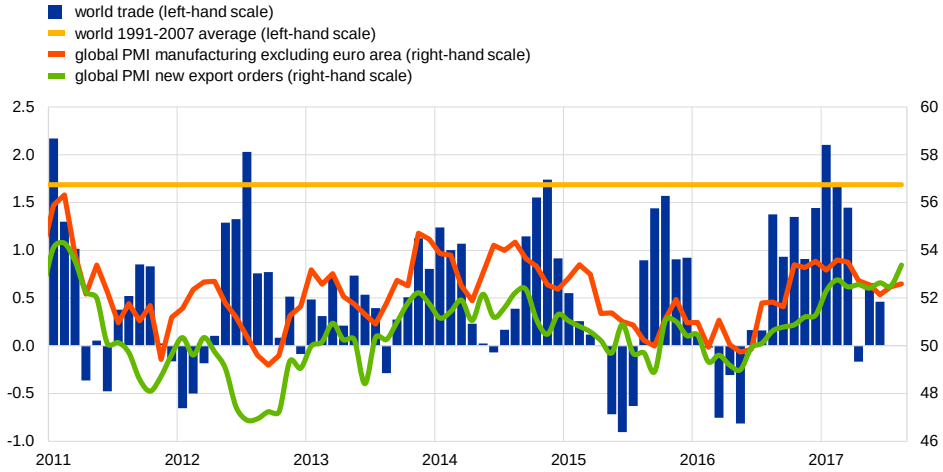
Central and eastern European countries benefit from strong consumption and investment, the latter supported by EU structural funds. Although inflation is foreseen to increase gradually, reflecting the fading effects of energy price falls, real disposable income is forecast to support GDP growth on the back of a further strengthening of the labour market and growth in wages.

The large commodity-exporting countries are continuing their recovery following deep recessions. In Russia, the rebound in activity since the start of the year is likely to continue, supported by oil prices, a benign external environment and an accommodative monetary policy. Consumption should improve at modest rates in response to rising real wages and growing consumer confidence, albeit from very low levels. Fiscal challenges will continue to weigh on growth. Economic activity in Brazil is expected to benefit from stabilising business confidence, improving terms of trade and loosening financial conditions. At the same time, recurring political uncertainties and fiscal consolidation needs continue to weigh on the medium-term outlook.

Growth in global trade slowed during the second quarter, but leading indicators continue to signal positive prospects. The volume of global goods imports increased by 0.5% quarter on quarter in the second quarter of 2017, which was below the pace of the previous quarter (see Chart 2). The slowdown in trade in merchandise was driven mainly by emerging market economies. Leading indicators, however, signal a positive outlook for global trade in the near term, with the global PMI for new export orders rising in August. Looking further ahead, world trade is projected to expand broadly in line with global activity.

Chart 2
World trade in goods

(left-hand scale: three-month-on-three-month percentage changes; right-hand scale: diffusion index)



Sources: Markit, CPB and ECB calculations.
Note: The latest observations are for August 2017 (PMIs) and June 2017 (trade).

Overall, global growth is projected to increase gradually over the period 2017-19. According to the September 2017 ECB staff macroeconomic projections, world real GDP growth (excluding the euro area) is projected to accelerate from 3.2% in 2016 to 3.7% in 2017 and 3.8% in 2018-19. Growth in euro area foreign demand is forecast to increase from 1.6% in 2016 to 4.7% in 2017, followed by growth of 3.4% in 2018 and 3.5% in 2019. Compared with the June 2017 projections, global GDP growth is largely unrevised, with downward revisions to prospects in the United States reflecting expectations of a smaller fiscal stimulus, which is offset by a brighter outlook in some emerging market economies. Growth in euro area foreign demand has been revised upwards for 2017, reflecting stronger import data in the first quarter.

The uncertainty surrounding the baseline projections for global activity remains elevated, with the balance of risks tilted to the downside. On the upside, there is a possibility that improved sentiment – as evidenced in surveys and financial markets – will translate into a faster revival of activity and trade in the short term. Key downside risks include an increase in trade protectionism; a disorderly tightening of global financial conditions, which could affect vulnerable emerging market economies in particular; possible disruptions associated with China's reform and liberalisation process; and the potential for volatility derived from political and

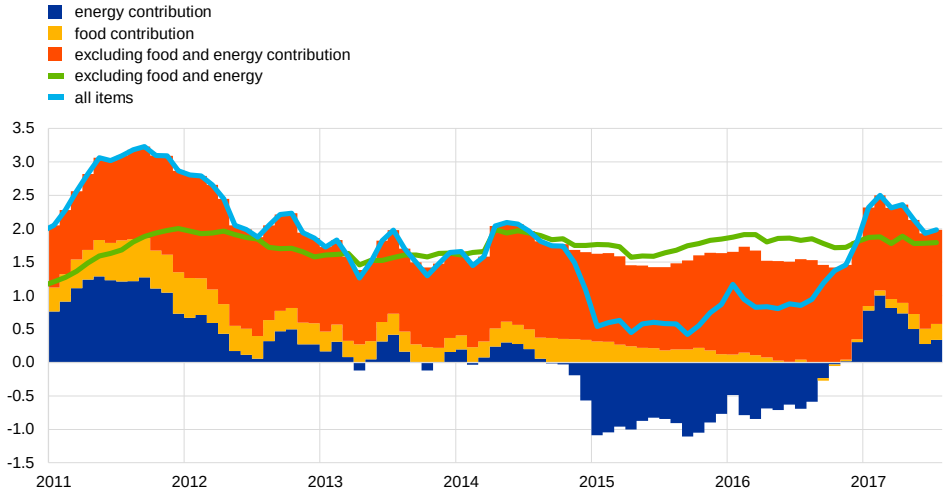
geopolitical uncertainties, including those related to the negotiations on the future relations between the United Kingdom and the European Union. Finally, there is considerable uncertainty about the outlook for fiscal policy in the United States.

Global price developments

Global consumer price inflation remains relatively subdued. After falling during the early part of this year as the contribution of energy prices faded, annual consumer price inflation in the OECD area rose slightly in July to 2.0% (see Chart 3). Excluding food and energy, OECD annual inflation was stable at 1.8% in July.

Chart 3
OECD consumer price inflation

(year-on-year percentage changes; percentage point contributions)



Source: OECD.
Note: The latest observation is for July 2017.

Oil prices have risen in recent weeks. After falling during the early weeks of the summer, Brent crude oil prices have since recovered to around USD 52 per barrel. This increase reflected expectations of a moderately faster rebalancing of the oil market. US crude oil inventories fell by more than the market had expected, while oil demand was somewhat stronger in the second quarter of 2017. At the same time, supply constraints bolstered prices amid a slowdown in the growth rate of the US oil rig count and expectations that Saudi Arabia may curb exports of crude oil. So far, Brent crude oil prices or futures quotations have not been affected by tropical storm Harvey, which hit the US Gulf of Mexico.

Looking ahead, after a slight moderation in the near term, global inflation is expected to rise slowly. The oil futures curve indicates a modest increase in oil prices over the projection horizon, with energy prices providing a small positive contribution to inflation. At the same time, slowly diminishing spare capacity at the global level should support underlying inflation.

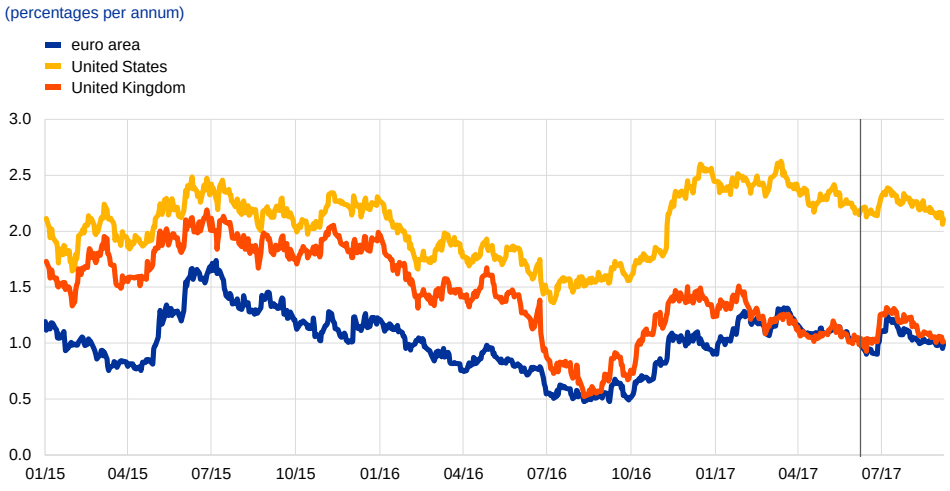
2 Financial developments

Euro area sovereign bond yields have remained broadly unchanged since the Governing Council's monetary policy meeting on 8 June. Corporate bond spreads vis-à-vis the risk-free rate have declined marginally and remain below the levels observed in early March 2016 when the corporate sector purchase programme (CSPP) was announced. The equity prices of euro area non-financial corporations (NFCs) have fallen, mainly owing to an increase in perceived geopolitical risks, but they continue to be supported by robust earnings expectations. In foreign exchange markets, the euro has appreciated markedly.

Long-term euro area government bond yields have remained broadly unchanged overall since early June. During the period under review (from 8 June to 6 September 2017) the euro area ten-year overnight index swap (OIS) rate increased by 3 basis points, to 0.58%, while the GDP-weighted euro area ten-year sovereign bond yield increased by 1 basis point to 0.99% (see Chart 4). In the United States, long-term government bond yields declined by 8 basis points, to 2.11%. Developments in euro area long-term interest rates since early June have been muted overall, masking one particular episode of volatility when market participants somewhat abruptly revised their expectations regarding the future path of monetary policy and yields consequently increased. However, this increase unwound towards the end of the review period, partly on account of geopolitical tensions and less positive macroeconomic news both in the euro area and abroad.

Chart 4

Ten-year sovereign bond yields in the euro area, the United States and the United Kingdom



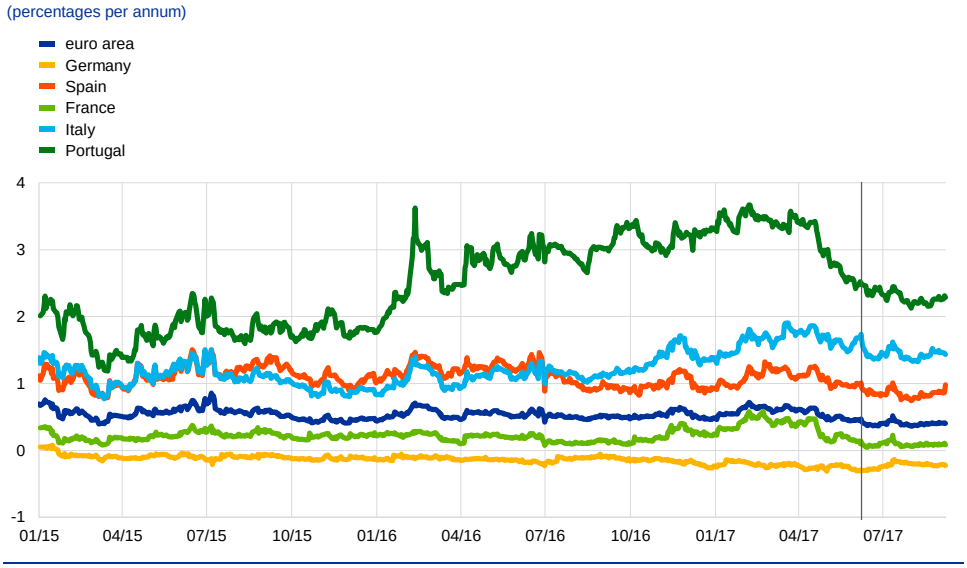
Sources: Bloomberg and ECB.
Notes: For the euro area, the GDP-weighted average of ten-year sovereign bond yields is reported. The vertical grey line denotes the start of the review period on 8 June 2017. The latest observation is for 6 September 2017.

Sovereign bond spreads vis-à-vis risk-free OIS rates declined in a number of countries against the background of an improved euro area macroeconomic outlook. The declines ranged from 1 basis point in France to 19 basis points in Italy and 20 basis points in Portugal (see Chart 5). They were initially precipitated

following the results of the French presidential election in April. Thereafter they reflected primarily an improvement in the euro area macroeconomic environment.

Chart 5

Euro area sovereign bond spreads vis-à-vis the OIS rate

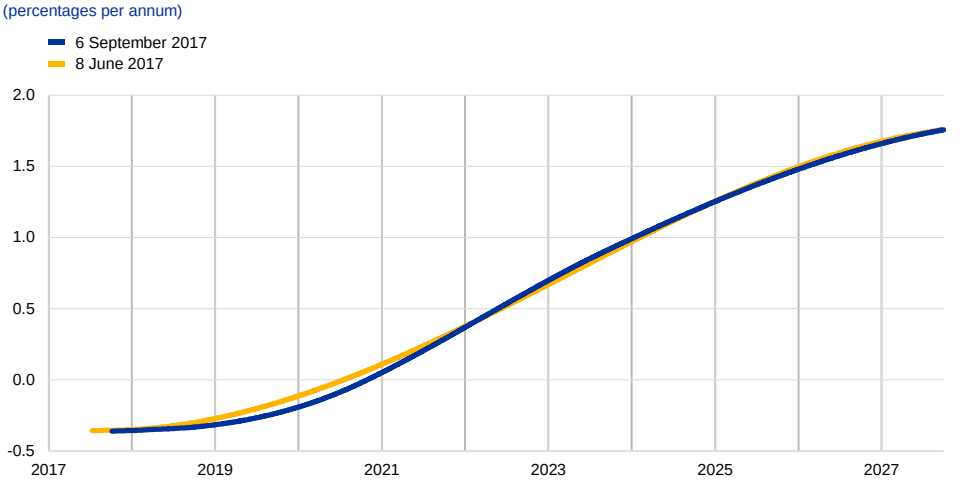


Sources: Thomson Reuters and ECB calculations.
Notes: The spread is calculated by subtracting the OIS rate from the sovereign yield. For the euro area, the GDP-weighted average of ten-year sovereign bond yields is reported. The vertical grey line denotes the start of the review period on 8 June 2017. The latest observation is for 6 September 2017.

The euro overnight index average (EONIA) forward curve has shifted slightly downwards for short maturities, but remains largely unchanged for longer maturities (see Chart 6). The gradual upward slope of the curve implies that market participants continue to expect a prolonged period of negative EONIA rates until around mid-2020.

Chart 6

EONIA forward rates



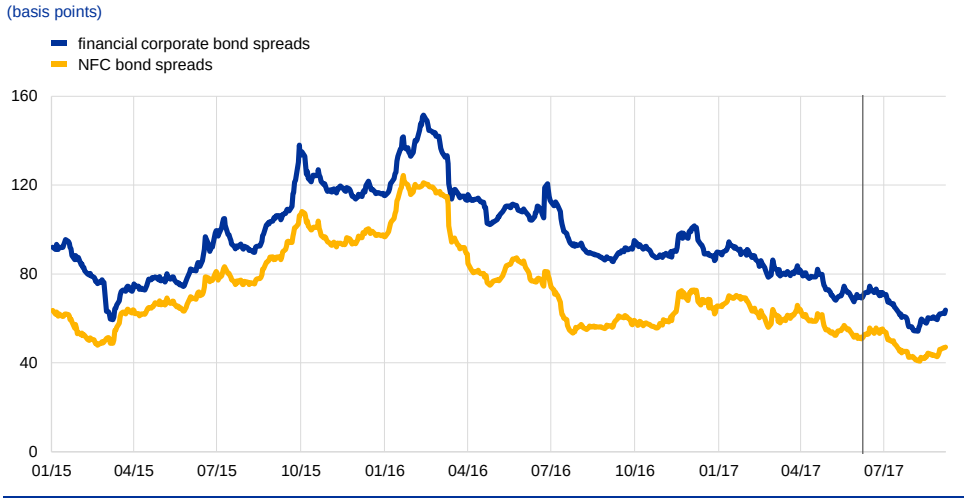
Sources: Thomson Reuters and ECB calculations.

The EONIA hovered around −36 basis points during the review period. Excess liquidity increased by about €100 billion, to around €1,770 billion. This increase is attributable to ongoing purchases under the expanded asset purchase programme. Liquidity conditions are discussed in more detail in Box 2.

Spreads on bonds issued by NFCs declined marginally during the period under review (see Chart 7). On 6 September investment-grade NFC bond spreads (over the corresponding AAA-rated euro area average yield curve) were on average 5 basis points lower than in early June and around 70 basis points below their levels in March 2016, prior to the announcement and subsequent launch of the CSPP. Spreads on non-investment-grade NFC and financial sector debt also declined during the period under review, falling by 39 basis points and 6 basis points respectively. The low level and further compression of corporate bond spreads is consistent with a firming economic recovery.

Chart 7

Euro area corporate bond spreads



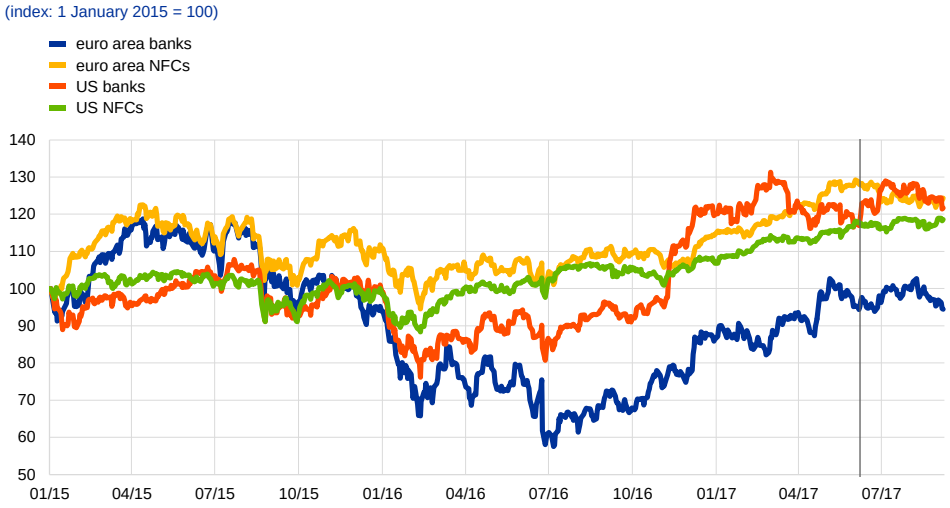
Sources: iBoxx indices and ECB calculations.
Notes: The vertical grey line denotes the start of the review period on 8 June 2017. The latest observation is for 6 September 2017.

Euro area equity prices have decreased since early June (see Chart 8). Equity prices of euro area NFCs ended the review period around 3% lower, while share prices fell by 2.5% for financial corporations. The falls primarily reflect an increase in perceived geopolitical risk. Nevertheless, bank equity prices still stand around 65% higher overall than the low levels recorded in the aftermath of the United Kingdom's referendum on EU membership in June 2016 (NFC equity prices are only 25% higher). By contrast with the falls in euro area NFC equity prices, the equity prices of US NFCs ended the review period 1.5% higher. One possible reason for the underperformance of euro area NFC equities is that the appreciation of the euro exchange rate has dampened market expectations regarding short-term earnings of firms that are heavily dependent on exports. Longer-term earnings expectations have, however, remained strong and have continued to support NFC equity prices. Market expectations regarding equity price volatility in the euro area increased in response to a flare-up of geopolitical tensions in mid-August, but thereafter reverted

to the low levels which have prevailed throughout 2017. In the United States, expectations regarding equity price volatility have also declined overall.

Chart 8

Euro area and US equity price indices



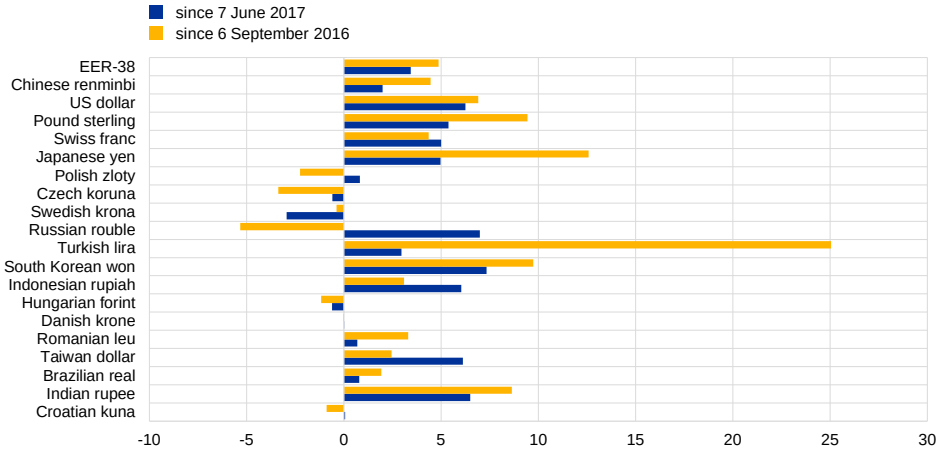
Sources: Thomson Reuters and ECB calculations.
Notes: The vertical grey line denotes the start of the review period on 8 June 2017. The latest observation is for 6 September 2017.

In foreign exchange markets, the euro has appreciated by 3.7% in trade-weighted terms since early June (see Chart 9). The euro has appreciated vis-à-vis most other major currencies, against the background of an improved euro area macroeconomic outlook. In bilateral terms, since 8 June the euro has strengthened by 6.3% against the US dollar, by 5.0% against the Japanese yen, by 5.4% against the pound sterling and by 5.0% against the Swiss franc. The euro has also appreciated vis-à-vis the currencies of most emerging economies, including the Chinese renminbi (by 2.0%), as well as the currencies of other economies in Asia, whereas it has slightly depreciated vis-à-vis the currencies of some non-euro area EU Member States. The appreciation of the euro vis-à-vis the US dollar has been driven by three forces, of roughly equal strength: the improvement in euro area growth prospects, a tightening in the monetary policy stance relative to the United States, and an exogenous component possibly reflecting improved market sentiment regarding the exchange rate of the euro vis-à-vis the US dollar.

Chart 9

Changes in the exchange rate of the euro vis-à-vis selected currencies

(percentages)



Source: ECB.
Notes: EER-38 is the nominal effective exchange rate of the euro against the currencies of 38 of the euro area's most important trading partners. All changes are computed using the exchange rates prevailing on 6 September 2017.

3 Economic activity

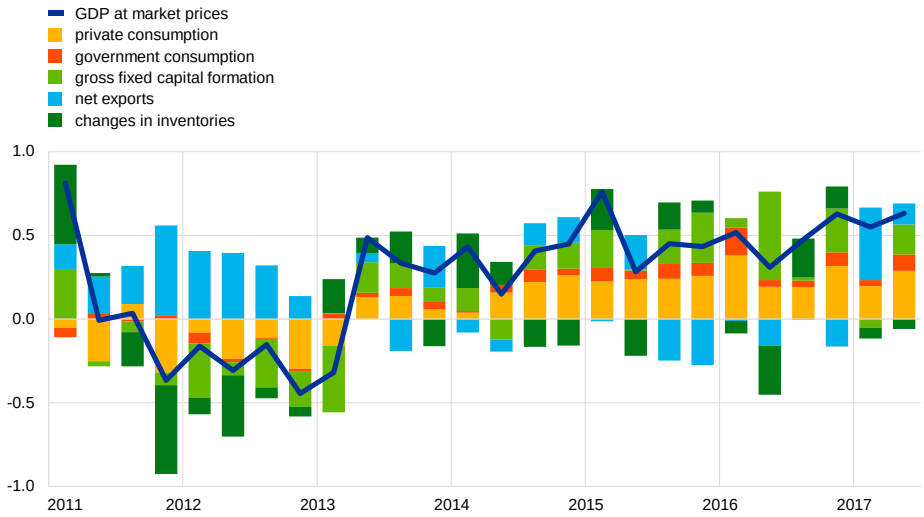
The euro area economic expansion is continuing and is becoming increasingly resilient. Real GDP growth is being supported primarily by domestic demand. Surveys and short-term indicators confirm the outlook for robust growth momentum in the near term. Compared with the June 2017 Eurosystem staff macroeconomic projections, the September 2017 ECB staff macroeconomic projections have been revised upwards for 2017 and remain broadly unchanged thereafter. Euro area real GDP is foreseen to grow by 2.2% in 2017, 1.8% in 2018 and 1.7% in 2019.

The economic expansion in the euro area has gained momentum and is primarily being supported by domestic demand. Real GDP increased by 0.6%, quarter on quarter, in the second quarter of 2017, following growth of 0.5% in the previous quarter (see Chart 10). Domestic demand remained the engine for growth, alongside a smaller contribution from net exports, whereas changes in inventories provided a small negative contribution. On the production side, economic activity was broad based, with positive value added growth in industry (excluding construction), as well as in the construction and services sectors.

Chart 10

Euro area real GDP and its components

(quarter-on-quarter percentage changes and quarter-on-quarter percentage point contributions)



Source: Eurostat.
Notes: The latest observations are for the second quarter of 2017.

Euro area labour markets continue to exhibit favourable dynamics. Growth in euro area employment continued in the first quarter of 2017, at 0.4%, quarter on quarter, and thus for the first time surpassed the pre-crisis peak recorded in 2008 (see Chart 11). Total hours worked also continued to recover, although average hours worked per person employed have remained broadly stable, despite both full-time workers and part-time workers working more hours on average, as these increases were offset by the changing composition of employment towards a higher

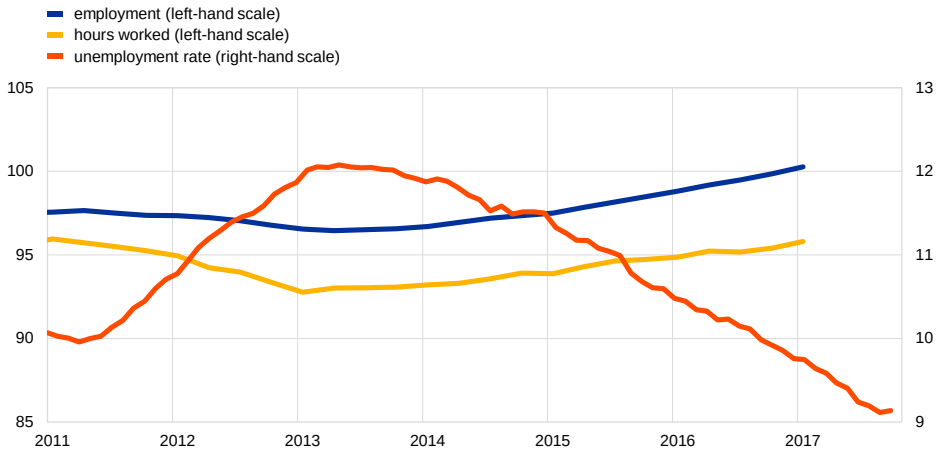
proportion of part-time workers.[1] Euro area unemployment has shown a marked decline after peaking at 12.1% in the second quarter of 2013. In July 2017 the unemployment rate stood at 9.1%, the lowest level since February 2009. Survey data available up to August 2017 point to further improvements in labour market conditions, with increasing reports of labour shortages across the large euro area economies.

The swift decline in euro area unemployment is particularly encouraging against a background of increasing labour supply. The increase in labour supply, which has continued throughout the crisis and into the recovery, can primarily be explained by growing labour force participation rates for older workers and women (see Box 3 entitled "Recent developments in euro area labour supply" in this issue of the Economic Bulletin). Nevertheless, broader measures of unemployment suggest that slack is still elevated in many euro area labour markets. A survey of large euro area firms (see Box 5 entitled "Structural reform needs in the euro area: insights from a survey of large companies" in this issue of the Economic Bulletin) suggests that further structural reforms to euro area labour markets would improve their functioning and strengthen the broader growth outlook.

Chart 11

Developments in the euro area labour market

(left-hand scale: index: Q1 2008 = 100; right-hand scale: percentage points)



Sources: Eurostat and ECB calculations.
Notes: The latest observations are for the first quarter of 2017 for employment and hours worked and July 2017 for the unemployment rate.

Improving labour markets continue to support income growth and consumer spending. Private consumption growth remained steady at 0.5%, quarter on quarter, in the second quarter of 2017, up from 0.4% in the previous quarter. Robust labour income growth, which is the main driver of household disposable income, in combination with a slight decline in the saving ratio, has continued to benefit household spending. The ECB's monetary policy measures, which have improved financing conditions, have also remained supportive of household spending.

1 See the box entitled "Factors behind developments in average hours worked per person employed since 2008", *Economic Bulletin,* Issue 6, ECB, 2016.

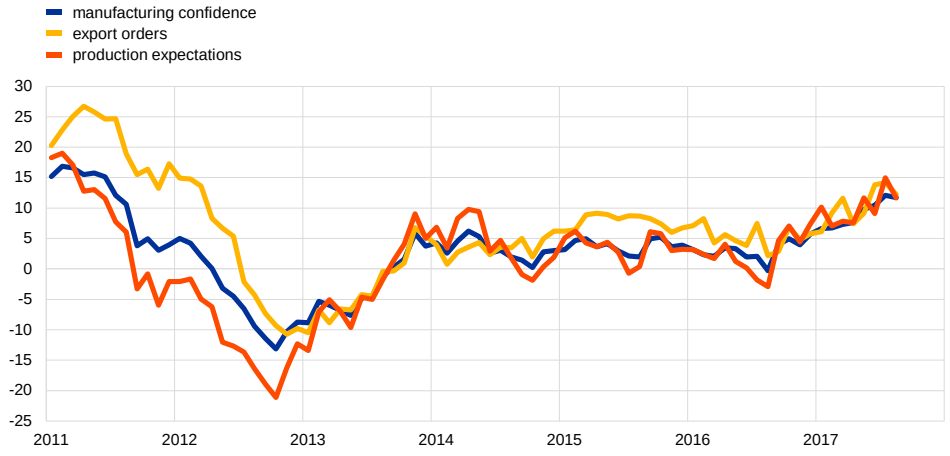
Consumer confidence, which rose further in August 2017, remains very elevated and well above its long-term average level, signalling strong underlying consumer spending dynamics in the near term.

Euro area housing market developments continue to support the growth momentum. Housing investment increased by 1.3% in the second quarter of 2017, reflecting a continuation of the recovery in the euro area and in many euro area countries. This recovery, albeit from very low levels in some countries, has been supported by the strong growth in household disposable income, improved labour market conditions, favourable financing conditions and an increased preference for housing investment in the context of low yields on interest-bearing assets. In addition, business confidence has risen very strongly in the construction sector. Moreover, the rising number of building permits issued, increasing demand for loans for house purchase and improved bank lending conditions should continue to support the broad-based upward trend in euro area housing investment.

Business investment rebounded in the second quarter of 2017. The increase (1.0%, quarter on quarter) was driven by investment in intellectual property products; and machinery, equipment and weapons systems, other than transport equipment. Moreover, data such as industrial production in the capital goods sector – which grew by 0.7%, quarter on quarter, in the second quarter of 2017 – suggest a pick-up in euro area business investment.

Chart 12

Developments in the euro area capital goods sector



Source: European Commission.
Note: The latest observations are for August 2017.

Business investment is expected to continue its recovery. A number of factors are favourable for the investment outlook. Business confidence, production expectations and export orders in the capital goods sector remain elevated despite declining somewhat in August (see Chart 12). Capacity utilisation has continued to increase above its average pre-crisis level, financing conditions remain very supportive, firms' retained earnings for potential investment spending remain high, and there is a need to modernise the capital stock after several years of subdued

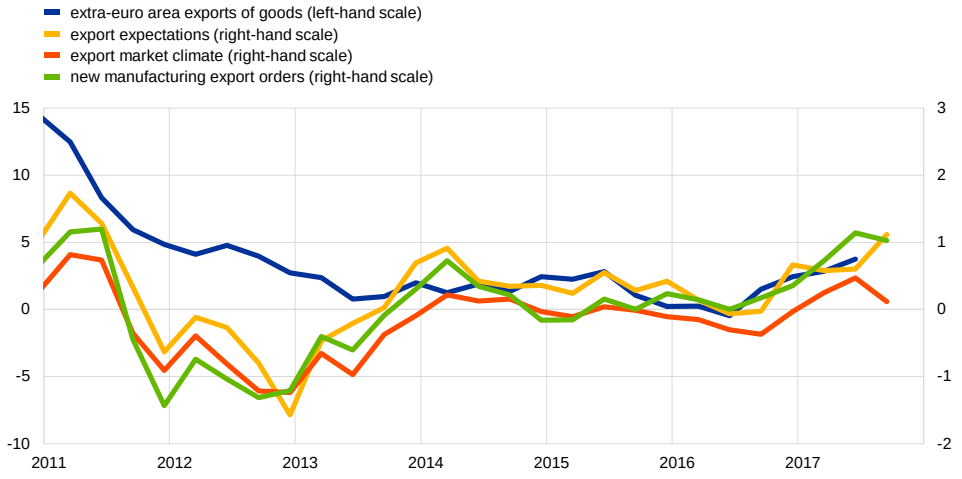
investment. Some factors, however, are expected to continue to weigh on the outlook for business investment. These include expectations of weaker long-term growth potential than in the past, rigidities in product markets and the slow pace of change in the regulatory environment. Low bank profitability and the still high level of non-performing loans on banks' balance sheets in a number of countries are also expected to continue to weigh on the intermediation capacity of banks and, in turn, on firms' investment funding in the near term.

Euro area trade has continued to rebound. Euro area exports of goods and services rose by 1.1%, quarter on quarter, in the second quarter of 2017 and the momentum in extra-euro area trade in goods has been improving steadily since the summer of 2016. According to monthly trade data, extra-euro area goods exports in the first half of 2017 were driven mainly by exports to China, the rest of Asia and non-euro area EU Member States. This bodes well for the overall growth outlook, as euro area foreign demand has become increasingly broad-based. Short-term indicators such as surveys and new export orders with a bearing on the second half of 2017 point to sustained export momentum, despite the recent strengthening of the effective exchange rate of the euro (see Chart 13). Looking further ahead, the broad-based global recovery will support euro area exports. However, risks to trade remain elevated and primarily relate to geopolitical tensions that have the potential to hamper global growth.

Chart 13

Extra-euro area goods exports

(left-hand scale: annual percentage changes in three-month moving averages; right-hand scale: index)



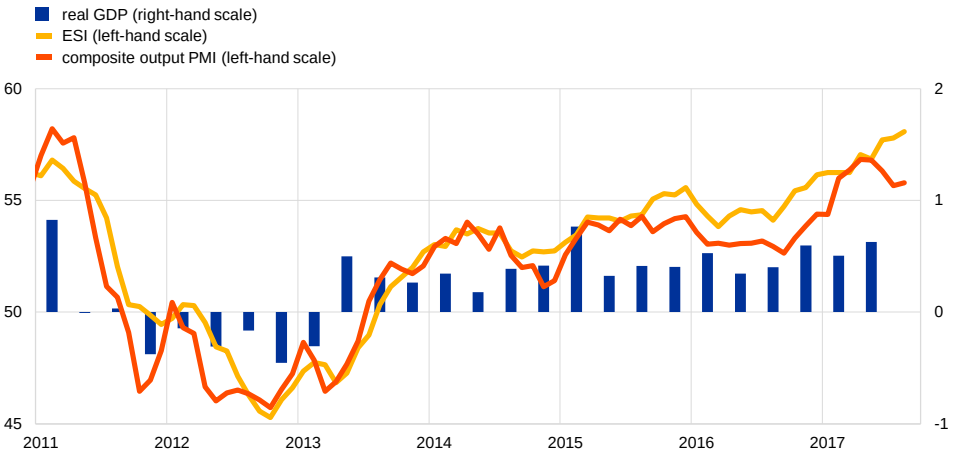
Sources: Eurostat, Markit and European Commission.
Note: The latest observations are for August 2017 for the surveys and the second quarter of 2017 for exports.

Overall, incoming data point to robust growth momentum in the third quarter of 2017. The European Commission's Economic Sentiment Indicator (ESI) and the composite output Purchasing Managers' Index (PMI) remained at elevated levels in August and continue to stand well above their average levels (see Chart 14). Thus, overall, they signal robust growth in the third quarter of 2017.

Chart 14

Euro area real GDP, the composite output PMI and the ESI

(quarter-on-quarter percentage changes, normalised percentage balances and diffusion indices)



Sources: Markit, European Commission and Eurostat.
Note: The latest observations are for the second quarter of 2017 for real GDP and August 2017 for the ESI and the PMI.

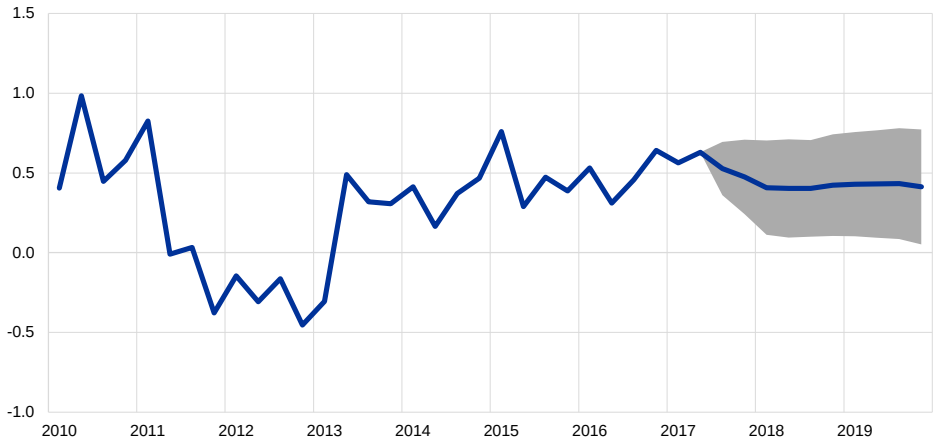
The ongoing euro area economic expansion is expected to continue, supported by the ECB's monetary policy measures, which are being passed through to the real economy. Very favourable financing conditions, low interest rates and improving labour markets continue to promote private consumption and the recovery in investment, in the context of rising profits and lower deleveraging needs. External tailwinds will also support growth, with a strengthening of global economic activity and a corresponding improvement in euro area foreign demand.

The September 2017 ECB staff macroeconomic projections for the euro area foresee annual real GDP increasing by 2.2% in 2017, 1.8% in 2018 and 1.7% in 2019 (see Chart 15). Compared with the June 2017 Eurosystem staff macroeconomic projections, the outlook for real GDP growth has been revised upwards for 2017 and remains broadly unchanged thereafter. The upward revision for 2017 relates mainly to recent strong GDP growth momentum.

Chart 15

Euro area real GDP (including projections)

(quarter-on-quarter percentage changes)



Sources: Eurostat and the article entitled "September 2017 ECB staff macroeconomic projections for the euro area", published on the ECB's website on 7 September 2017.
Notes: The ranges shown around the central projections are based on the differences between actual outcomes and previous projections carried out over a number of years. The width of the ranges is twice the average absolute value of these differences. The method used for calculating the ranges, involving a correction for exceptional events, is documented in *New procedure for constructing Eurosystem and ECB staff projection ranges*, ECB, December 2009, available on the ECB's website.

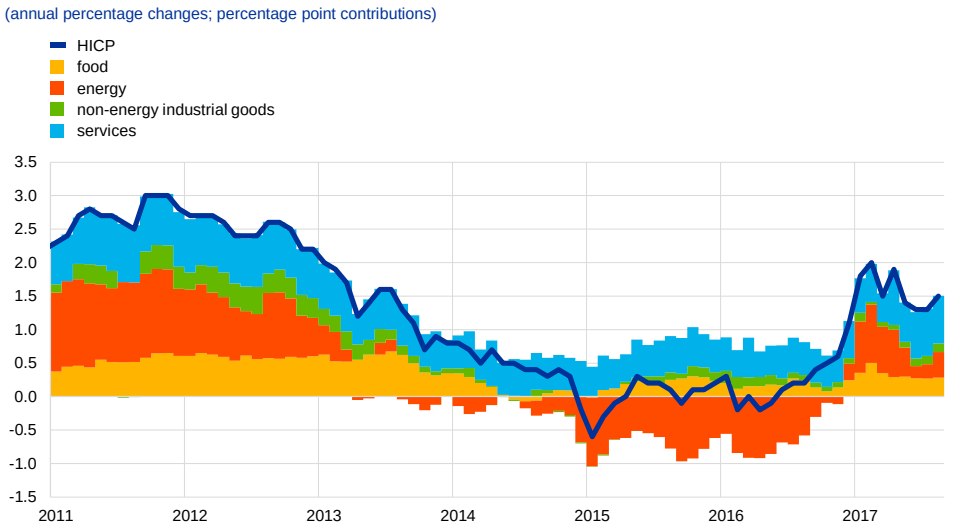
4 Prices and costs

According to Eurostat's flash estimate, euro area annual HICP inflation in August 2017 was 1.5%, up from 1.3% in July. Looking ahead, on the basis of current oil futures prices, annual rates of headline inflation are likely to temporarily decline towards the turn of the year, mainly reflecting base effects in energy prices. At the same time, measures of underlying inflation have ticked up moderately in recent months, but have yet to show convincing signs of a sustained upward trend. The September 2017 ECB staff macroeconomic projections for the euro area foresee annual HICP inflation at 1.5% in 2017, 1.2% in 2018 and 1.5% in 2019.

Headline inflation increased in August. According to Eurostat's flash estimate, headline HICP inflation rose to 1.5% in August, after standing at 1.3% in June and July (see Chart 16). This reflected higher energy and, to a lesser extent, higher processed food inflation. The increase in energy inflation was anticipated, as it reflects the impact of an upward base effect and the upward pressure stemming from the latest increases in oil prices.

Chart 16

Contributions of components to euro area headline HICP inflation



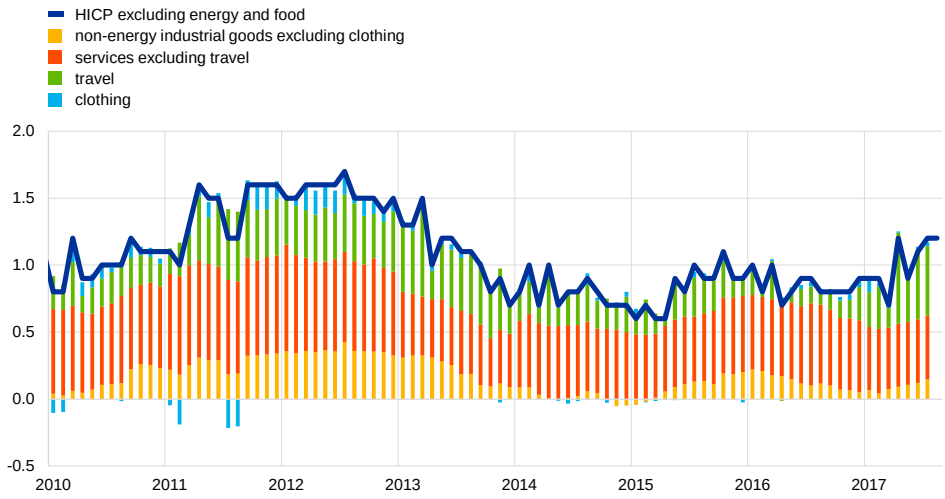
Sources: Eurostat and ECB calculations.
Note: The latest observations are for August 2017 (flash estimates).

Measures of underlying inflation have moved to somewhat higher levels since the end of last year. According to Eurostat's flash estimate, HICP inflation excluding energy and food was 1.2% in August, unchanged from July, but 0.4 percentage points higher than the average for the final quarter of last year (see Chart 17). However, over the same period, HICP inflation excluding energy as well as food and the very volatile components travel-related items and clothing and footwear shows only a comparatively modest uptick.

Chart 17

Decomposition of HICP excluding energy and food

(annual percentage changes)



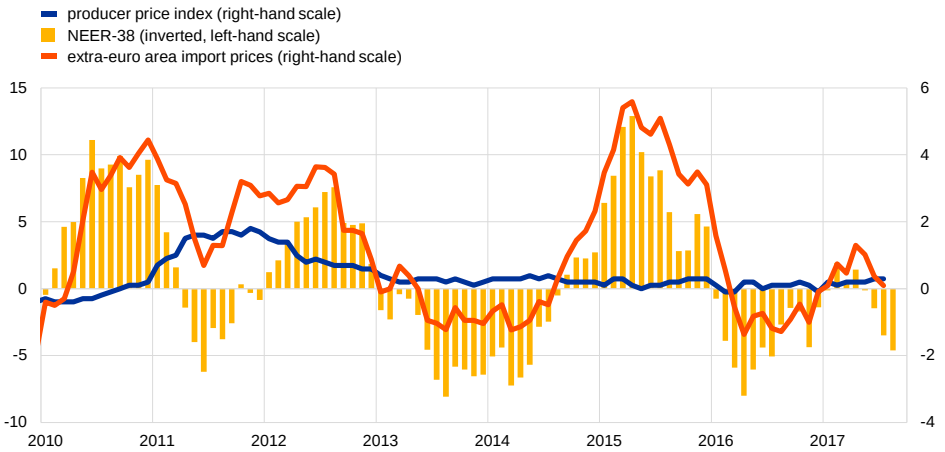
Sources: Eurostat and ECB calculations.
Note: The latest observations are for August 2017 (flash estimate) for HICP excluding food and energy, and July 2017 for all other variables.

The recent appreciation of the euro implies some moderation in price pressures at the early stages of the production and pricing chain. The appreciation of the nominal effective exchange rate (NEER) of the euro in recent months has started to exert downward pressure on import prices. The annual change in import prices of non-food consumer goods decreased from 1.3% in April to 0.1% in July (see Chart 18). This downward pressure will mitigate the upward pressure resulting from the strong pick-up in global non-energy producer price inflation that began in mid-2016. Despite strong pipeline pressures from the external side, which may now ease somewhat, domestic producer prices for non-food consumer goods have remained broadly stable, with only a marginal upward movement from 0.2% in May to 0.3% in June and July. The pass-through of the recent euro appreciation on domestic pipeline pressures is surrounded by a large degree of uncertainty and also depends on a potential adjustment of profit margins.

Chart 18

Exchange rate developments and import and producer prices for non-food consumer goods

(annual percentage changes)



Sources: Eurostat and ECB calculations.
Note: The latest observations are for August 2017 for the nominal effective exchange rate of the euro against 38 of its main trading partners (NEER-38), and July for producer prices and import prices.

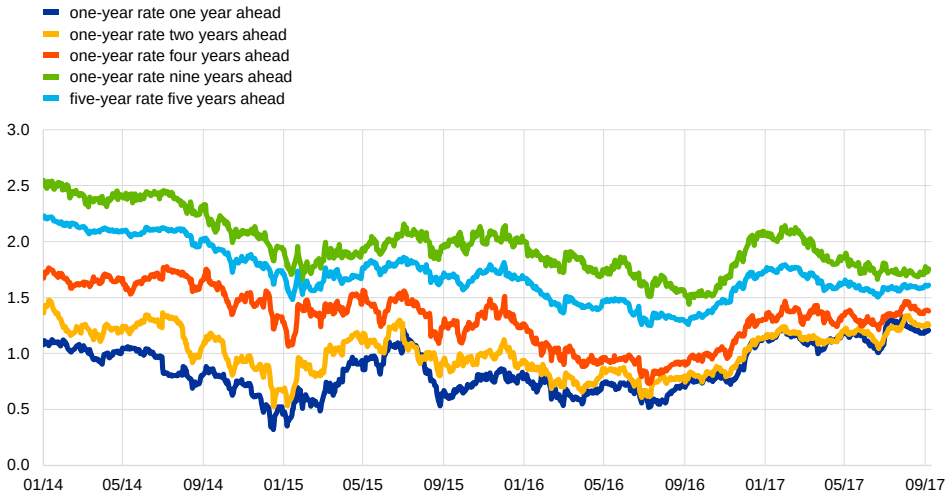
Wage growth remains subdued. The annual change in negotiated wages per employee was 1.4% in the second quarter of 2017, down slightly from 1.6%, but was unchanged when volatile one-off payments are excluded. Compensation per employee has also remained low up to the first quarter of 2017 but has diverged from compensation per hour owing to the decline in the average number of hours worked by employees. In general, factors that may have been holding back wage growth include the still significant slack in the labour market, low inflation, weak productivity growth and the continuing impact of labour market reforms implemented in some countries during the crisis.

Both market-based and survey-based measures of long-term inflation expectations have remained stable. The five-year forward inflation rate five years ahead stood at 1.61% on 6 September 2017, slightly above the level observed at the beginning of June (see Chart 19). The survey-based measures of longer-term inflation expectations for the euro area, as reported in the ECB Survey of Professional Forecasters for the third quarter of 2017, remained unchanged at 1.8%.

Chart 19

Market-based measures of inflation expectations

(annual percentage changes)



Sources: Thomson Reuters and ECB calculations.
Note: The latest observations are for 6 September 2017.

Looking ahead, the increase in HICP inflation in the euro area is expected to be slightly lower than previously expected. On the basis of the information available in mid-August, the September 2017 ECB staff macroeconomic projections for the euro area foresee HICP inflation to be 1.5% in 2017, 1.2% in 2018 and 1.5% in 2019 (see Chart 20).[2] By comparison with the June 2017 Eurosystem staff macroeconomic projections, the outlook for headline HICP inflation has been revised down slightly, mainly reflecting the recent appreciation of the euro exchange rate. Base effects imply a significant drop in the contribution from HICP energy inflation to headline inflation between the last quarter of 2017 and the first quarter of 2018 (see also the box entitled "The role of base effects in the projected path of HICP inflation" in this issue of the Economic Bulletin). The assumed increase, albeit modest, in oil prices over the remainder of the projection horizon, as reflected in the oil price futures curve, implies some rebound in HICP energy inflation in 2019.

HICP inflation excluding energy and food is expected to rise gradually over the medium term. HICP inflation excluding energy and food is envisaged to be 1.1% in 2017, 1.3% in 2018 and 1.5% in 2019. While the euro exchange rate appreciation will exert downward pressures on underlying inflation over the projection horizon, this is partially offset by an improved outlook for euro area domestic demand. On the domestic cost side, one important factor behind the gradual pick-up in underlying inflation is the envisaged reduction in labour market slack and the increasing labour supply shortages in some parts of the euro area, which are expected to drive an upturn in wage growth. Beyond this, the recent significant rise in headline inflation can also be expected to translate over time into higher nominal wage increases in

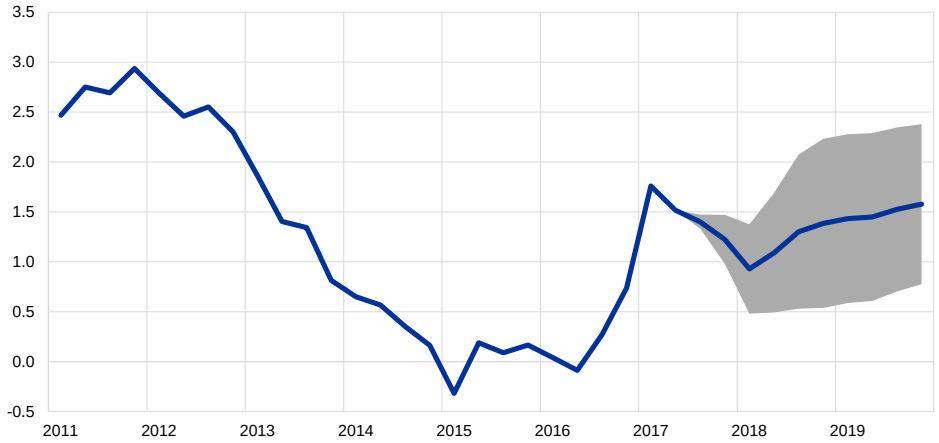
2 See the article entitled "September 2017 ECB staff macroeconomic projections for the euro area", published on the ECB's website on 7 September 2017.

euro area countries where wage formation processes include backward-looking indexation or expectation elements.

Chart 20

Euro area HICP inflation (including projections)

(annual percentage changes)



Sources: Eurostat and the article entitled "September 2017 ECB staff macroeconomic projections for the euro area", published on the ECB's website on 7 September 2017.

5 Money and credit

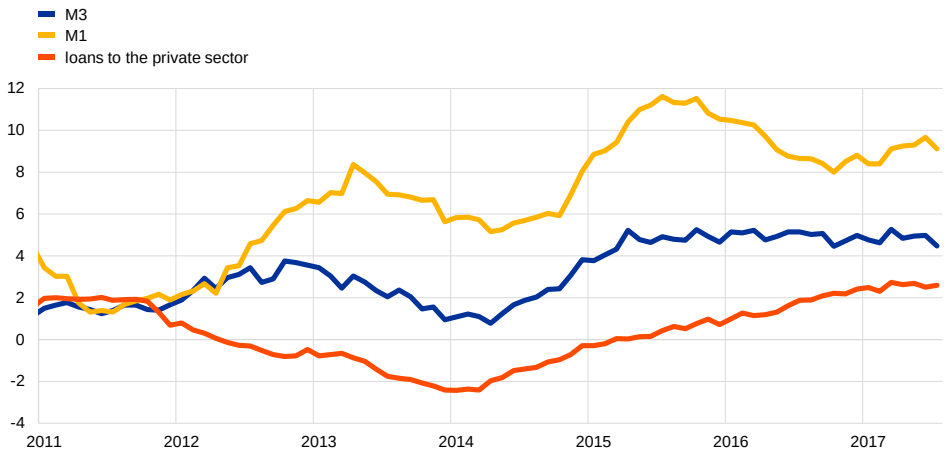
Money growth expanded at the robust pace generally witnessed since mid-2015 in the second quarter of 2017 and showed a moderation in July. The recovery in loan growth to the private sector continued to proceed. And the annual flow of total external financing to non-financial corporations (NFCs) is estimated to have eased somewhat in the second quarter of 2017.

Broad money growth was robust at 5% in the second quarter of 2017, in line with its expansion since mid-2015, and then moderated in July. The annual growth rate of M3 decreased to 4.5% in July 2017, likely on account of temporary factors (see Chart 21). The low opportunity cost of holding the most liquid instruments in an environment of very low interest rates, as well as the impact of the ECB's monetary policy measures, continued to lend support to money growth. However, the contribution of the most liquid components to annual M3 growth decreased, with the annual growth rate of M1 declining to 9.1% in July (compared with 9.3% in the second quarter of 2017 and 9.7% in June).

Chart 21

M3, M1 and loans to the private sector

(annual percentage changes; adjusted for seasonal and calendar effects)



Source: ECB.
Notes: Loans are adjusted for loan sales, securitisation and notional cash pooling. The latest observation is for July 2017.

Overnight deposits continued to be the main driver of M3 growth. Specifically, the annual growth rate of overnight deposits held by households and non-financial corporations remained strong in the second quarter of 2017 but softened in July 2017, likely owing to temporary factors. The annual growth rate of currency in circulation also decreased in July, indicating no tendency on the part of the money-holding sector to substitute deposits with cash in an environment of very low or negative interest rates. Short-term deposits other than overnight deposits (i.e. M2 minus M1) continued to have a negative impact on M3 in the second quarter and in July. The annual rate of change of marketable instruments (i.e. M3 minus M2) – a small component of M3 – became significantly negative in July, contributing to the moderation in M3 growth observed at this time. This development followed a positive contribution in the second quarter of 2017 and was mainly driven by a further decline

in monetary financial institutions' (MFIs) issuance of short-term debt securities. In contrast, the annual growth rate of money market fund shares/units remained positive.

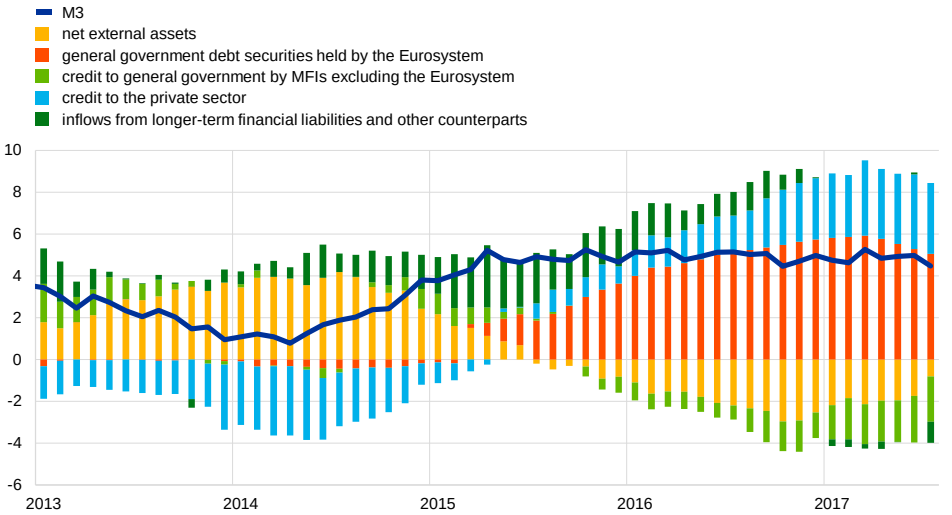
Domestic sources of money creation were again the main driver of broad money growth (see Chart 22). From a counterpart perspective, the Eurosystem's purchases of general government debt securities (see the red parts of Chart 22), conducted mainly in the context of the ECB's public sector purchase programme (PSPP), contributed positively to M3 growth.[3] The ongoing recovery in credit to the private sector (see the blue parts of Chart 22) also continued to support M3 growth. This includes both MFI loans to the private sector as well as MFI holdings of debt securities issued by the euro area private non-MFI sector. As such, it also covers the Eurosystem's purchases of debt securities under the corporate sector purchase programme (CSPP). Longer-term financial liabilities and other counterparts together had a slightly negative effect on M3 growth as a result of the other counterparts (mainly repurchase agreements) (see the dark green parts of Chart 22). The persistent contraction in MFIs' longer-term financial liabilities (excluding capital and reserves), however, helped to increase M3 growth. The annual rate of change of such liabilities has been negative since the second quarter of 2012, partly owing to the impact of the ECB's targeted longer-term refinancing operations (TLTRO-II), which may be acting as a substitute for longer-term market-based bank funding. Finally, government bond sales from euro area MFIs excluding the Eurosystem contributed to the negative annual growth of credit to general government by MFIs excluding the Eurosystem and thus dampened M3 growth (see the light green parts of Chart 22).

[3] See also the box entitled "Base money, broad money and the APP" in this Economic Bulletin, which describes the development of base money during recent years and the impact of the ECB's non-standard measures on base money developments.

Chart 22

M3 and its counterparts

(annual percentage changes; contributions in percentage points; adjusted for seasonal and calendar effects)



Source: ECB.
Notes: Credit to the private sector includes MFI loans to the private sector and MFI holdings of debt securities issued by the euro area private non-MFI sector. It thus includes the Eurosystem's holdings of debt securities in the context of the corporate sector purchase programme (CSPP). The latest observation is for July 2017.

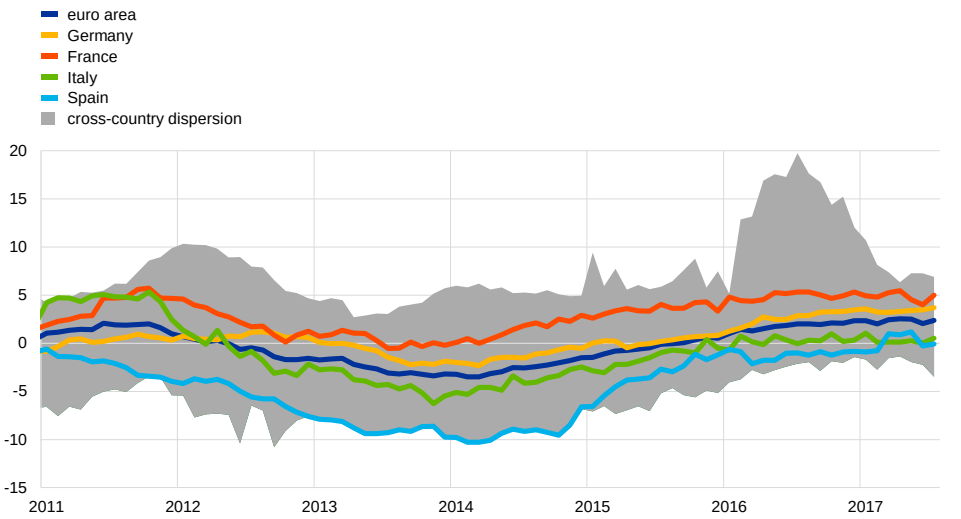
MFIs' net external assets still weighed on annual M3 growth. While the annual flow of net external assets remained negative in the second quarter of 2017 and in July, a monthly inflow was registered in July 2017. This helped to lower the related downward pressure on M3 growth (see the yellow parts of Chart 22). The annual flow continued to reflect capital outflows from the euro area, which were partly explained by PSPP-related sales of euro area government bonds by non-residents. Recent developments suggest no major PSPP-related Eurosystem purchases from non-residents.

The recovery in loan growth observed since the beginning of 2014 has been proceeding. The annual growth rate of MFI loans to the private sector (adjusted for loan sales, securitisation and notional cash pooling) was broadly stable in the second quarter of 2017 and in July (see Chart 21). Across sectors, the annual growth of loans to non-financial corporations increased to 2.4% in both periods, following a temporary decline in June on account of special effects in some countries (see Chart 23). The growth of loans to NFCs has recovered significantly from the trough in the first quarter of 2014. This development is broad-based across the largest countries, although loan growth rates are still negative in some jurisdictions. The annual growth rate of loans to households also increased in the second quarter of 2017, standing at 2.6% in July (see Chart 24). The significant decrease in bank lending rates seen across the euro area since summer 2014 (notably owing to the ECB's non-standard monetary policy measures) and overall improvements in the supply of, and demand for, bank loans have supported these trends. In addition, banks have made progress in consolidating their balance sheets, although the level of non-performing loans remains high in some countries and may constrain bank lending.

Chart 23

MFI loans to NFCs in selected euro area countries

(annual percentage changes)

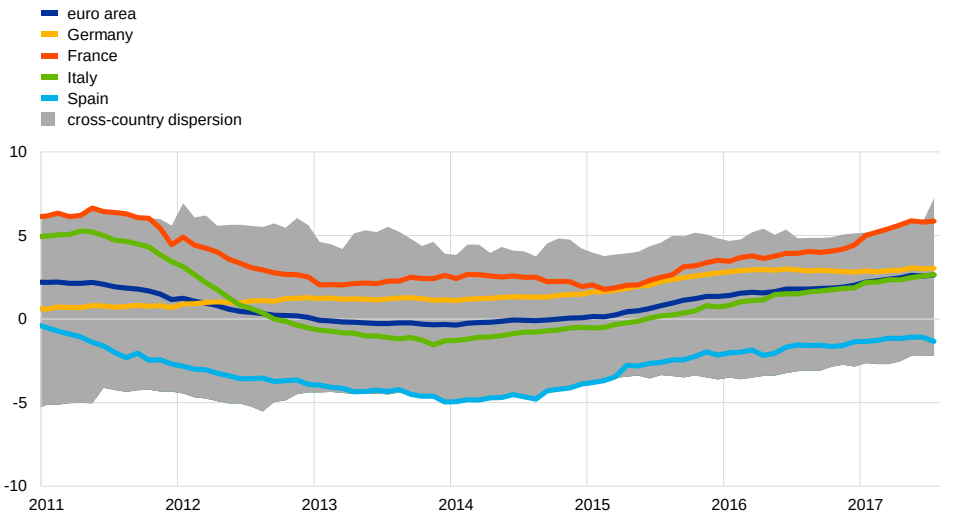


Source: ECB.
Notes: Adjusted for loan sales, securitisation and notional cash pooling. The cross-country dispersion is calculated on the basis of minimum and maximum values using a fixed sample of 12 euro area countries. The latest observation is for July 2017.

Chart 24

MFI loans to households in selected euro area countries

(annual percentage changes)



Source: ECB.
Notes: Adjusted for loan sales, securitisation and notional cash pooling. The cross-country dispersion is calculated on the basis of minimum and maximum values using a fixed sample of 12 euro area countries. The latest observation is for July 2017.

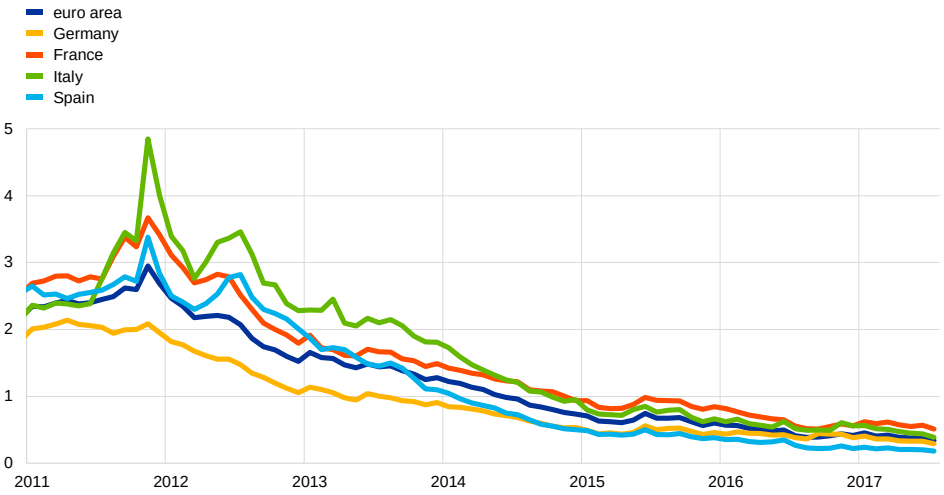
Banks' funding conditions remained favourable. Banks' composite cost of debt financing declined to a new historical low in July, after broadly stabilising in the second quarter of 2017 (see Chart 25). This trend was mainly driven by developments in the cost of deposits, which decreased marginally to a new historical low in July after pursuing a broadly stable path in the second quarter of 2017. In addition, bank bond yields generally stayed steady in the second quarter, despite a temporary increase in June, and declined in July. The ECB's accommodative

monetary policy stance, the net redemption of MFIs' longer-term financial liabilities, the strengthening of bank balance sheets and receding fragmentation across financial markets have all contributed to the favourable conditions on this front.

Chart 25

Banks' composite cost of debt financing

(composite cost of deposit and unsecured market-based debt financing; percentages per annum)



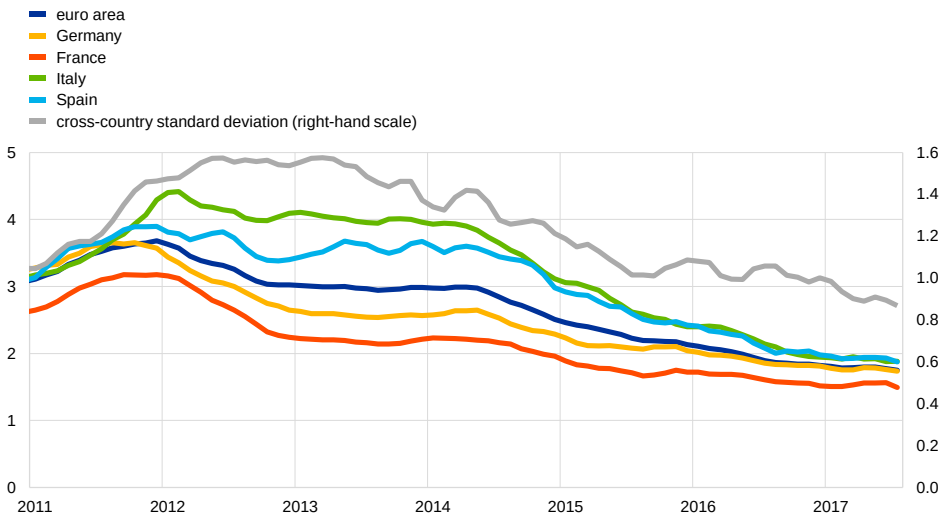
Sources: ECB, Merrill Lynch Global Index and ECB calculations.
Notes: The composite cost of deposits is calculated as an average of new business rates on overnight deposits, deposits with an agreed maturity and deposits redeemable at notice, weighted by their corresponding outstanding amounts. The latest observation is for July 2017.

Bank lending rates for NFCs and households remained at or close to their historical lows in the second quarter of 2017 and in July (see charts 26 and 27). Composite bank lending rates for both NFCs and households declined between early 2014 and end-2016 but have since moved differently, with the composite bank lending rate for housing loans increasing slightly until July 2017 and the composite bank lending rate for NFC loans declining further to reach a new historical low in July. Overall, composite bank lending rates for loans to NFCs and households have decreased by significantly more than market reference rates since the ECB's credit easing measures were announced in June 2014; signalling an improvement in the pass-through of monetary policy measures to bank lending rates. The aforementioned decrease in banks' composite funding costs has supported the decline in composite lending rates. Between May 2014 and July 2017, composite lending rates on loans to NFCs and households fell by 119 basis points and 103 basis points, respectively. The reduction in bank lending rates on NFC loans was particularly strong in vulnerable euro area countries, supporting a more homogeneous transmission of monetary policy to such rates across countries. Over the same period, the spread between interest rates charged on very small loans (loans of up to €0.25 million) and those charged on large loans (loans of above €1 million) in the euro area narrowed considerably and stood close to its historical low in July 2017. This indicates that small and medium-sized enterprises have generally benefited to a greater extent from the decline in bank lending rates than large companies.

Chart 26

Composite lending rates for NFCs

(percentages per annum; three-month moving averages)

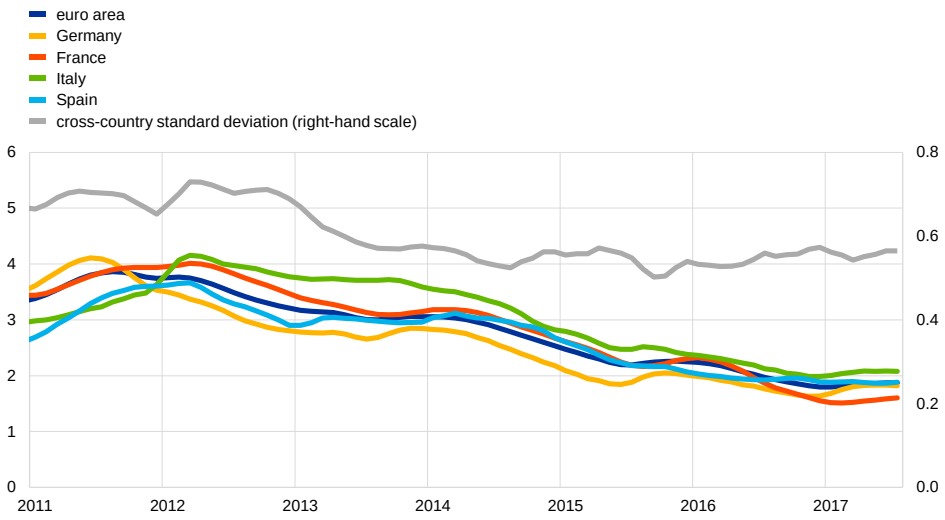


Source: ECB.
Notes: The indicator for the total cost of bank borrowing is calculated by aggregating short and long-term rates using a 24-month moving average of new business volumes. The cross-country standard deviation is calculated using a fixed sample of 12 euro area countries. The latest observation is for July 2017.

Chart 27

Composite lending rates for house purchase

(percentages per annum; three-month moving averages)



Source: ECB.
Notes: The indicator for the total cost of bank borrowing is calculated by aggregating short and long-term rates using a 24-month moving average of new business volumes. The cross-country standard deviation is calculated using a fixed sample of 12 euro area countries. The latest observation is for July 2017.

The annual flow of total external financing to euro area NFCs is estimated to have moderated somewhat in the second quarter of 2017. This moderation reflects a weakening in both bank lending dynamics and debt securities issuance, partly attributable to special factors and of a temporary nature in the case of bank loans. Overall, the recovery in NFCs' external financing observed since early 2014 has been supported by the strengthening of economic activity, further declines in the

cost of debt financing, the easing of bank lending conditions and larger numbers of mergers and acquisitions. At the same time, NFCs' record high cash holdings have reduced the need for external financing.

Gross issuance of debt securities by NFCs was subdued in July and August 2017, after strengthening in June. The latest ECB data indicate that issuance activity was robust in June, following moderations in April and May. Having said this, issuance activity was negative on a net basis owing to significant redemptions of short-term paper. In addition, it should be noted that the market data pointing to low issuance activity in July and August largely reflect seasonal factors. Around this time, net issuance of listed shares by NFCs was more buoyant than in the first months of 2017, when it was dampened by significant share buy-backs.

Financing costs for NFCs remain favourable. The overall nominal cost of external financing for NFCs, comprising bank lending, debt issuance in the market and equity finance, is estimated to have declined slightly to 4.4% in August 2017, after increasing moderately in June and July. These developments largely reflect developments in the cost of equity. The cost of financing now stands 40 basis points above its historical low of July 2016, but remains considerably lower than the level observed in summer 2014 (before markets started to price in expectations about the asset purchase programme). The cost of debt, expressed as the weighted average of the cost of bank lending and the cost of market-based debt, is still fluctuating around its historical low.

6 Fiscal developments

The euro area budget deficit is foreseen to decline further over the projection horizon (2017-19) owing to improving cyclical conditions and decreasing interest payments. The aggregate fiscal stance for the euro area is projected to be mildly expansionary in 2017 and broadly neutral in 2018-19. Although the euro area government debt-to-GDP ratio will continue to decline, it is still elevated. In particular the countries with high debt levels would benefit from additional consolidation efforts to set their public debt ratio firmly on a downward path.

The euro area general government budget deficit is forecast to gradually decline over the projection horizon. Based on the September 2017 ECB staff macroeconomic projections,[4] the general government deficit ratio for the euro area is expected to fall from 1.5% of GDP in 2016 to 0.9% of GDP in 2019 (see the table). The improvement in the fiscal outlook, which is slightly better compared with the June 2017 projections, is mainly supported by favourable cyclical conditions and declining interest payments.

Table

Fiscal developments in the euro area

(percentage of GDP)

	2016	2017	2018	2019
a. Total revenue	46.2	46.0	45.9	45.8
b. Total expenditure	47.7	47.3	46.9	46.6
of which:				
c. Interest expenditure	2.2	2.0	1.9	1.8
d. Primary expenditure (b - c)	45.5	45.3	45.0	44.8
Budget balance (a - b)	-1.5	-1.3	-1.0	-0.9
Primary budget balance (a - d)	0.7	0.7	0.9	0.9
Cyclically adjusted budget balance	-1.5	-1.4	-1.3	-1.2
Structural primary balance	0.7	0.6	0.6	0.6
Gross debt	89.1	87.5	86.0	84.2
Memo item: real GDP (percentage changes)	1.8	2.2	1.8	1.7

Sources: Eurostat, ECB and September 2017 ECB staff macroeconomic projections.
Notes: The data refer to the aggregate general government sector of the euro area. Owing to rounding, figures may not add up. As the projections usually take the most recent data revisions into account, there might be discrepancies compared with the latest validated Eurostat data.

The euro area fiscal stance is projected to be mildly expansionary in 2017 and broadly neutral in 2018-19.[5] The outlook for 2017 is due to a rebound in government investment and a one-off payment in Germany to nuclear power producers.[6] In 2018-19 the expected neutral fiscal stance will reflect offsetting effects

4 See the September 2017 ECB staff macroeconomic projections for the euro area.

5 The fiscal stance reflects the direction and size of the stimulus from fiscal policies on the economy, beyond the automatic reaction of public finances to the business cycle. It is measured as the change in the structural primary balance, i.e. the cyclically adjusted primary balance ratio net of temporary measures, such as government support for the financial sector. For more details on the concept of the euro area fiscal stance, see the article entitled "The euro area fiscal stance", *Economic Bulletin*, Issue 4, ECB, 2016.

6 The one-off payment in Germany amounts to 0.2% of Germany's GDP.

in revenues and government expenditures. At the same time, the broadly neutral fiscal stance indicates that countries are not making full use of the favourable economic growth momentum to build up fiscal buffers.

The high euro area government debt levels are expected to continue to fall. The euro area debt-to-GDP ratio, which peaked in 2014, is predicted to decline from 89.1% of GDP in 2016 to 84.2% of GDP by the end of 2019. The decline is supported mainly by a rise in the primary surplus and a favourable interest rate-growth differential, the latter reflecting the relatively stable macroeconomic outlook. The deficit-debt adjustments are expected to have a small negative impact as of 2018. While the outlook has changed little from the one in the June exercise, the debt level in 2017 is expected to be somewhat lower reflecting in particular a more favourable interest rate-growth differential. The debt outlook, when considered from a country perspective, is forecast to improve in the majority of euro area countries, while in a few countries the government debt ratio is expected to increase over the projection horizon. In particular the countries with high debt levels would benefit from additional consolidation efforts to set their public debt ratio firmly on a downward path. This would help to reduce their vulnerability should there be renewed financial market instability or a rebound in interest rates.

All euro area countries would benefit from stepping up efforts towards achieving a more growth-friendly composition of public finances. Shifting expenditure to the most growth-enhancing categories, such as education and infrastructure, or the tax burden to less distortive taxes like consumption or property taxes can exert positive effects on output growth and thereby contribute to the building-up of fiscal buffers.[7]

Looking ahead, it will be important that the draft budgetary plans, to be submitted by mid-October, are in full compliance with the requirements of the Stability and Growth Pact. The process around the draft budgetary plans, if fully and consistently implemented, is an important and effective early warning and correction tool. Following the submission of the draft budgetary plans by the euro area countries, the Commission will assess whether they are fully in line with the requirements of the Stability and Growth Pact. In the event of non-compliance, the Commission will have to send the draft budgetary plans back to the countries concerned.

[7] See the article entitled "The composition of public finances in the euro area", *Economic Bulletin*, Issue 5, ECB, 2017.

Boxes

1 Investment dynamics in advanced economies since the financial crisis

This box aims to shed some light from a cross-country perspective on the shocks affecting investment in advanced economies since the financial crisis.

It is often argued that one of the key factors holding back the global economic recovery in the current economic cycle has been the subdued pace of investment activity, particularly in advanced economies. This has been attributed to impaired financial markets, public sector budget constraints, heightened policy uncertainty and weak economic prospects. At the same time the lack of dynamism in the business sector appears more accentuated than in previous recoveries, which, together with the sharper decline in investment expenditure in the aftermath of the Great Recession, has led to significant investment gaps, i.e. persistently negative deviations from long-term averages.

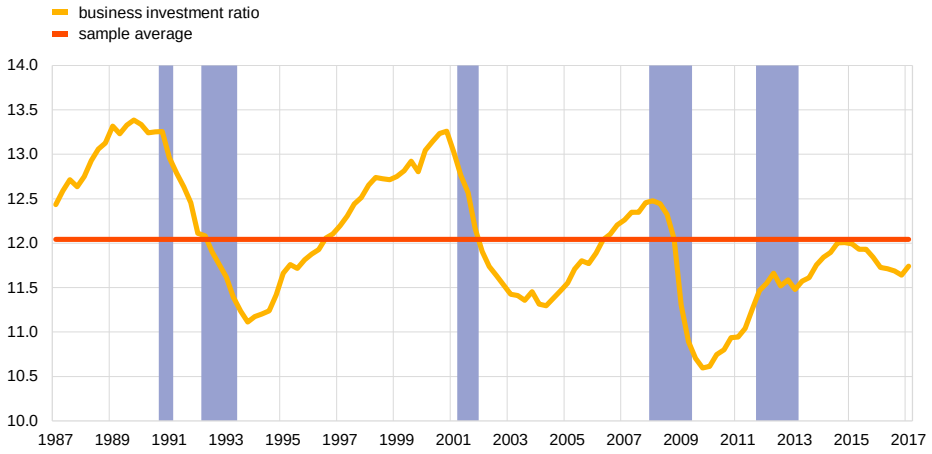
The usual pattern in business investment of reaching a trough soon after a recession and returning relatively quickly to pre-recession levels did not materialise to the same extent after the Great Recession.[8] While this pattern was visible in business cycles in the 1990s and early 2000s, it has not been seen in the current cycle: the initial rebound in investment after the trough in the first quarter of 2009 was interrupted by a second recession in the euro area amid the sovereign debt crisis. This pause in the recovery can be observed in Chart A, which depicts the ratio of investment to GDP in advanced economies. This ratio started to decline from a relatively low level (12.5%) compared with past cycles and fell to close to 10.5% in 2009. At this level, business investment initiated a sustained and quick recovery that was halted by the euro area sovereign debt crisis. The ratio of investment then recorded a renewed decline between the second half of 2015 and the end of 2016. This was mainly caused by commodity producers, such as Canada, Australia and to a lesser extent the United States, reducing their investment, in part because of the sharp fall in commodity prices (particularly oil) to very low levels. Only very recently, at the beginning of 2017, did a rebound in investment emerge. Overall, however, the ratio of business investment to GDP in advanced economies was still below its long-term average in the first quarter of 2017.

[8] The concept of investment adopted here is business investment (private non-residential) and includes private sector investment in structures, equipment (information, industrial and transportation) and intellectual property rights. The concept may vary marginally across countries.

Chart A

Investment-to-GDP ratio in advanced economies

(percentage; quarterly data)



Source: ECB staff calculations based on data from Haver Analytics.
Notes: The sample of advanced economies includes: Australia, Canada, the euro area, Japan, New Zealand, Sweden, Switzerland, the United Kingdom and the United States. The aggregate is a weighted average of business investment ratios across countries, using GDP-purchasing power parity time-varying weights. Shaded areas refer to a combined indicator for the periods of recession in the euro area (Centre for Economic Policy Research) and the United States (National Bureau for Economic Research). The latest observation is for the first quarter of 2017.

Four factors have commonly been considered as potential drivers of investment at a macroeconomic level, namely demand expectations, financial conditions, uncertainty and supply shocks.[9] Since the financial crisis these factors have been central to the debate on investment, from both a theoretical and an empirical perspective. Tight financial conditions and negative demand shocks are seen as detrimental to business investment.[10] In particular, weakening economic prospects globally are expected to lead to a decline in the returns on investment, thereby dampening the formation of new capital and delaying the replacement of old capital. Uncertainty shocks may also have persistently negative effects on business investment.[11] Finally, unexpected negative supply shocks, such as the fall in labour productivity across countries, could diminish future profit expectations and lead to a decline in investment activity.

The patterns of investment following the various shocks considered are empirically confirmed by impulse response functions. Based on the model used, the main findings are that uncertainty shocks have a persistently hump-shaped negative effect on the business investment-to-GDP ratio;[12] deteriorating expected demand and increasing financial constraints lower investment spending; and higher

9 A Bayesian panel vector autoregressive model is used, allowing for cross-country heterogeneity, and estimated for Canada, Japan, the United Kingdom and the United States. Variables include uncertainty, measured by the dispersion of growth expectations among professional forecasters; financial conditions, financial condition indices based on short-term and long-term interest rates, and equity prices; expected growth; and price developments. Structural shock identification is achieved by means of zero, sign and magnitude restrictions.

10 As uncertainty and financial variables are highly correlated, relative magnitude restrictions are used to identify structurally meaningful shocks.

11 For a more in-depth analysis of the effects on business investment in relation to the United States, see Bloom, N., “The impact of uncertainty shocks”, *Econometrica*, Vol. 77, 2009.

12 This empirical finding is in line with available single country estimates and economic theory.

productivity continuously raises business investment. Across countries, demand factors have been the most important driver of investment, accounting for more than half of the variance in the United States, the United Kingdom and Japan, whereas in Canada it was only about 40% (after 16 quarters). The second most relevant determinant is supply factors (in the United States and the United Kingdom), uncertainty (Canada) and financial factors (Japan).

During the Great Recession adverse demand factors were clearly the main driver of the downturn in business investment in the sample of countries analysed; however, in the post-crisis period, developments across countries have been more heterogeneous (see Chart B).[13] By 2012 US investment ratios had returned to their trend, and fluctuated around that level thereafter. The model indicates that receding negative demand, declining uncertainty and favourable financial conditions contributed to the recovery. In 2015, however, investment weakened again, partly owing to the fall in oil prices and its strong impact on investment in the US shale oil industry. In Japan, the recovery was mainly driven by more positive financial conditions, linked to monetary easing, and less negative demand expectations. In Canada, on the other hand, the investment ratio recovered quickly after the Great Recession and moved above trend levels until the second half of 2014. The model suggests that business investment was buoyed by positive demand prospects, low uncertainty and accommodative financial conditions, supported by strong commodity price developments. The fall in commodity prices in 2015 led to a sharp fall in business investment, which was later accentuated by a rise in uncertainty and tighter financial conditions. By contrast, the investment ratio in the United Kingdom mostly remained below its long-term levels. The model suggests that both negative demand and supply shocks more than offset the somewhat favourable financial conditions and the support provided by an environment of low uncertainty. More recently, in the second half of 2016, increased uncertainty following the outcome of the United Kingdom's referendum on membership of the European Union brought the investment ratio down. At the start of 2017 investment ratios were around trend levels in the United States and the United Kingdom, and above trend in Japan, while in Canada the investment gap was negative.

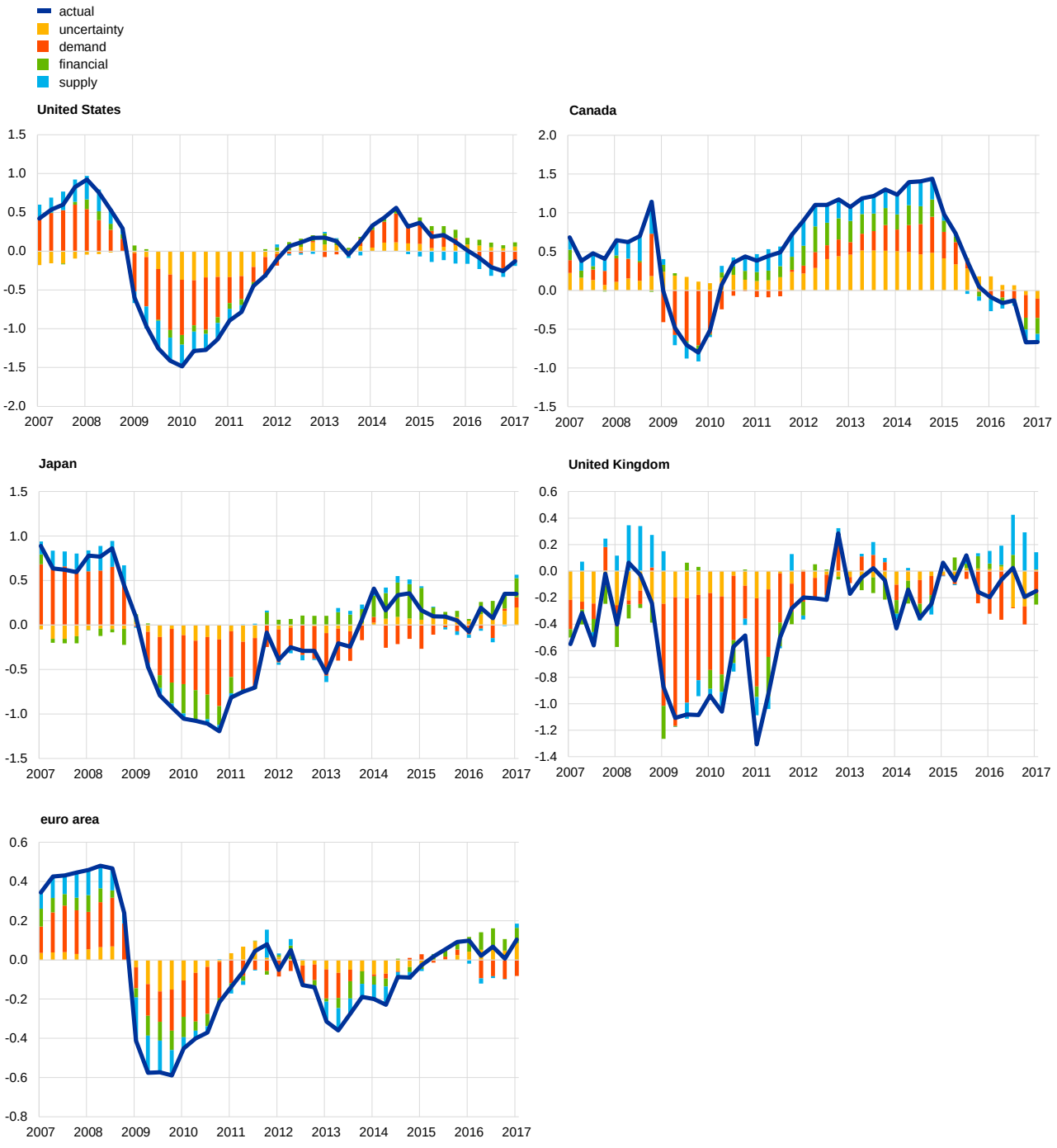
Extending the analysis to the euro area confirms the role of demand factors as the main driver of the downturn in business investment following the financial crisis. However, in contrast to other advanced economies, the recovery in the investment ratio came to a halt when the sovereign debt crisis intensified. This led to renewed negative and persistent demand shocks, together with negative economic uncertainty and financial shocks until early 2015. By early 2017, the euro area investment ratio was slightly above trend levels, pushed by favourable financial conditions and subdued uncertainty.

[13] Results are robust to different measures of uncertainty (economic policy uncertainty), demand and financial factors (including survey measures and activity indicators) and price measures (producer prices).

Chart B

Historical decomposition of investment-to-GDP ratio

(percentage and contributions; deviation from trend; quarterly data)



Source: ECB staff calculations.
Note: The latest observation is for the first quarter of 2017.

Looking forward, the overall improvement in business confidence recorded in the past few months, together with a more positive global outlook, should support the recovery of business investment in advanced economies. In addition, indicators measuring uncertainty, such as the dispersion of growth

expectations among professional forecasters, have been declining since the start of 2017. Moreover, the stabilisation of commodity prices should lead to a resumption of investment by commodity producers.

2 Liquidity conditions and monetary policy operations in the period from 3 May to 25 July 2017

This box describes the ECB's monetary policy operations during the third and fourth reserve maintenance periods of 2017, which ran from 3 May to 13 June 2017 and from 14 June to 25 July 2017 respectively. During this period, the interest rates on the main refinancing operations (MROs), the marginal lending facility and the deposit facility remained unchanged at 0.00%, 0.25% and -0.40% respectively.

In parallel, the Eurosystem continued purchasing public sector securities, covered bonds, asset-backed securities and corporate sector securities as part of its expanded asset purchase programme (APP), with a target of €60 billion of purchases on average per month.

Liquidity needs

In the period under review, the average daily liquidity needs of the banking system, defined as the sum of autonomous factors and reserve requirements, stood at €1,168.7 billion, an increase of €82.5 billion compared with the previous review period (i.e. the first and second maintenance periods of 2017). This increase in liquidity needs was attributable almost exclusively to an increase in average net autonomous factors, which rose by €80.6 billion to a record high of €1,046.3 billion during the period under review, while minimum reserve requirements rose only marginally, by €2 billion, to €122.5 billion.

The growth in aggregate autonomous factors mainly resulted from an increase in liquidity-absorbing factors. The principal contribution came from government deposits, which grew by €25.6 billion to stand at €196.7 billion, on average, in the period under review. Other autonomous factors also increased, rising by €22.5 billion to stand, on average, at €720.5 billion. The demand for banknotes increased, on average, by €16.6 billion, to stand at €1,131.2 billion, largely reflecting additional, seasonal demand over the summer period.

In addition, liquidity-providing autonomous factors decreased over the review period, as a result of the continuing decline in net assets denominated in euro and a slight decrease in net foreign assets. Average net assets denominated in euro fell by €15.4 billion to €332.4 billion relative to the previous review period, largely on account of a decline in financial assets held by the Eurosystem for purposes other than monetary policy. In addition, there was an increase in liabilities held by foreign official institutions with national central banks, thus further lowering the net liquidity-providing effect of this autonomous factor. Average net foreign assets decreased marginally by €0.5 billion to €670 billion.

Table A

Eurosystem liquidity conditions

	3 May 2017 to 25 July 2017		25 January 2017 to 2 May 2017	Fourth maintenance period		Third maintenance period	
Liabilities – liquidity needs (averages; EUR billions)							
Autonomous liquidity factors	**2,048.3**	**(+64.6)**	**1,983.7**	**2,071.6**	**(+46.6)**	**2,025.0**	**(+10.2)**
Banknotes in circulation	1,131.2	(+16.6)	1,114.6	1,136.3	(+10.3)	1,126.0	(+7.7)
Government deposits	196.7	(+25.6)	171.1	229.8	(+66.2)	163.6	(-18.3)
Other autonomous factors	720.5	(+22.5)	698.0	705.5	(-29.9)	735.4	(+20.8)
Current accounts	**1,174.0**	**(+153.0)**	**1,021.0**	**1,169.2**	**(-9.5)**	**1,178.7**	**(+97.6)**
Monetary policy instruments	**717.0**	**(+81.9)**	**635.1**	**717.9**	**(+1.9)**	**716.0**	**(+45.4)**
Minimum reserve requirements	122.5	(+2.0)	120.5	122.6	(+0.3)	122.3	(+1.7)
Deposit facility	594.5	(+79.9)	514.6	595.3	(+1.6)	593.7	(+43.8)
Liquidity-absorbing fine-tuning operations	0.0	(+0.0)	0.0	0.0	(+0.0)	0.0	(+0.0)
Assets – liquidity supply (averages; EUR billions)							
Autonomous liquidity factors	**1,002.4**	**(-15.9)**	**1,018.3**	**983.3**	**(-38.2)**	**1,021.5**	**(+6.7)**
Net foreign assets	670.0	(-0.5)	670.5	656.9	(-26.2)	683.1	(+4.5)
Net assets denominated in euro	332.4	(-15.4)	347.8	326.4	(-11.9)	338.4	(+2.2)
Monetary policy instruments	**2,814.7**	**(+313.4)**	**2,501.3**	**2,853.1**	**(+76.8)**	**2,776.3**	**(+144.8)**
Open market operations	2,814.5	(+313.5)	2,501.0	2,852.9	(+76.8)	2,776.1	(+144.9)
Tender operations	779.0	(+124.4)	654.6	776.8	(-4.3)	781.1	(+55.2)
MROs	11.5	(-12.2)	23.8	9.4	(-4.3)	13.7	(-4.8)
Three-month LTROs	6.1	(-2.1)	8.2	6.7	(+1.2)	5.5	(-1.9)
TLTRO-I operations	21.1	(-11.4)	32.5	20.5	(-1.2)	21.7	(-4.8)
TLTRO-II operations	740.2	(+150.1)	590.1	740.2	(+0.0)	740.2	(+66.7)
Outright portfolios	2,035.5	(+189.1)	1,846.4	2,076.1	(+81.1)	1,995.0	(+89.7)
First covered bond purchase programme	8.0	(-2.3)	10.3	7.7	(-0.6)	8.3	(-1.3)
Second covered bond purchase programme	5.5	(-0.9)	6.4	5.3	(-0.4)	5.7	(-0.3)
Third covered bond purchase programme	221.3	(+8.1)	213.3	223.3	(+3.9)	219.4	(+4.1)
Securities Markets Programme	98.3	(-1.2)	99.5	98.2	(-0.2)	98.4	(-0.8)
Asset-backed securities purchase programme	24.0	(+0.2)	23.8	24.2	(+0.5)	23.7	(-0.4)
Public sector purchase programme	1,585.6	(+163.6)	1,422.0	1,619.7	(+68.1)	1,551.5	(+78.0)
Corporate sector purchase programme	92.8	(+21.7)	71.1	97.7	(+9.8)	87.9	(+10.4)
Marginal lending facility	0.2	(-0.1)	0.3	0.2	(+0.0)	0.2	(-0.1)
Other liquidity-based information (averages; EUR billions)							
Aggregate liquidity needs	1,168.7	(+82.5)	1,086.2	1,211.3	(+85.0)	1,126.2	(+5.1)
Autonomous factors[1]	1,046.3	(+80.6)	965.7	1,088.6	(+84.7)	1,003.9	(+3.5)
Excess liquidity	1,645.8	(+231.0)	1,414.8	1,641.6	(-8.3)	1,649.9	(+139.8)
Interest rate developments (averages; percentages)							
MROs	0.00	(+0.00)	0.00	0.00	(+0.00)	0.00	(+0.00)
Marginal lending facility	0.25	(+0.00)	0.25	0.25	(+0.00)	0.25	(+0.00)
Deposit facility	-0.40	(+0.00)	-0.40	-0.40	(+0.00)	-0.40	(+0.00)
EONIA	-0.358	(-0.004)	-0.354	-0.359	(-0.002)	-0.357	(-0.002)

Source: ECB.
Notes: Since all figures in the table are rounded, in some cases the figure indicated as the change relative to the previous period does not represent the difference between the rounded figures provided for these periods (differing by €0.1 billion).
1) The overall value of autonomous factors also includes "items in course of settlement".

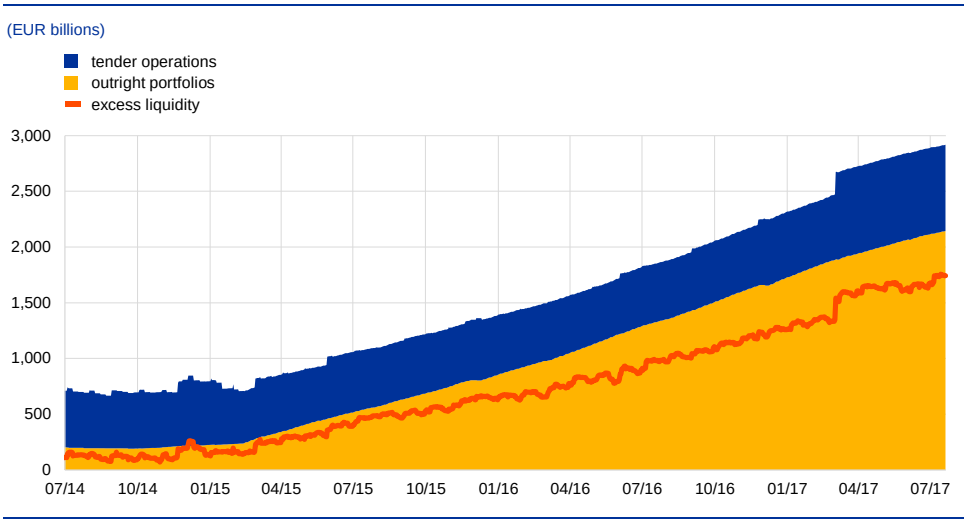
The volatility of autonomous factors remained high and was broadly unchanged from the previous review period. That volatility primarily reflected fluctuations in both government deposits and net assets denominated in euro.

Liquidity provided through open market operations

The average amount of liquidity provided through open market operations – both tender operations and the outright APP purchases – increased by €313.5 billion to stand at €2,814.5 billion (see chart A). This increase was primarily due to the ECB's APP and the fourth targeted longer-term refinancing operation in the second series of TLTROs (TLTRO-II), which was settled for an amount of €233.4 billion on 29 March 2017.

Chart A

Evolution of open market operations and excess liquidity



Source: ECB.

The average amount of liquidity provided through tender operations increased by €124.4 billion to stand at €779 billion. This increase largely reflects the liquidity provided through the fourth TLTRO-II, which, unlike in the previous review period, is fully reflected in the average liquidity conditions of the current review period. The average outstanding amount of TLTROs increased by €138.7 billion as a net effect of the settlement of the fourth TLTRO-II operation and voluntary early repayments for funds borrowed via TLTRO-I operations. Average liquidity provided via MROs and three-month LTROs decreased by €12.2 billion and €2.1 billion respectively.

Liquidity provided through the Eurosystem's outright monetary policy portfolios increased by €189.1 billion to stand at €2,035.5 billion on average, as APP purchases continued. Average liquidity provided by the public sector purchase programme (PSPP), the third covered bond purchase programme, the asset-backed securities purchase programme and the corporate sector purchase programme rose, on average, by €163.6 billion, €8.1 billion, €0.2 billion and €21.7 billion, respectively. The redemption of bonds held under the Securities Markets

Programme and the previous two covered bond purchase programmes totalled €4.4 billion.

Excess liquidity

As a consequence of the developments detailed above, average excess liquidity in the period under review rose by €231 billion compared with the previous period, to stand at €1,645.8 billion (see the chart). As mentioned above, this increase largely reflects the liquidity provided through the APP at a pace of €60 billion per month, as well as the allotment of €233.4 billion from the fourth TLTRO-II, somewhat offset by an increase in liquidity needs resulting from autonomous factors. Focusing only on the period under review, a more detailed analysis shows that excess liquidity increased in the third maintenance period, growing by €139.8 billion on account of liquidity provided by the fourth TLTRO-II operation and the APP purchases. The fourth maintenance period, however, saw a small decline in excess liquidity of €8.3 billion, as the liquidity injected via the APP purchases was more than offset by the increase in the liquidity-absorbing effect of autonomous factors and a decrease in the take-up of MROs and three-month LTROs, as mentioned earlier.

The increase in excess liquidity corresponded to higher average current account holdings, which rose by €153 billion to stand at €1,174 billion in the period under review, while the average recourse to the deposit facility increased by €79.9 billion to stand at €594.5 billion.

Interest rate developments

Overnight money market rates remained close to the deposit facility rate, with some rates falling below it for specific collateral baskets in the secured segments. In the unsecured market, the EONIA (euro overnight index average) averaged -0.358%, down marginally from an average of -0.354% in the previous review period. The EONIA fluctuated within a relatively narrow range, with a high of -0.331% ahead of the Whit Monday holiday in early June 2017 and the historical low of -0.373% in its immediate aftermath. Furthermore, in the secured market, average overnight repo rates in the GC Pooling market declined slightly to stand at -0.433% for the standard collateral basket, down 0.001 percentage points relative to the previous review period, while for the extended collateral basket the respective average overnight repo rate stood at -0.401%, up 0.002 percentage points compared with the previous review period.

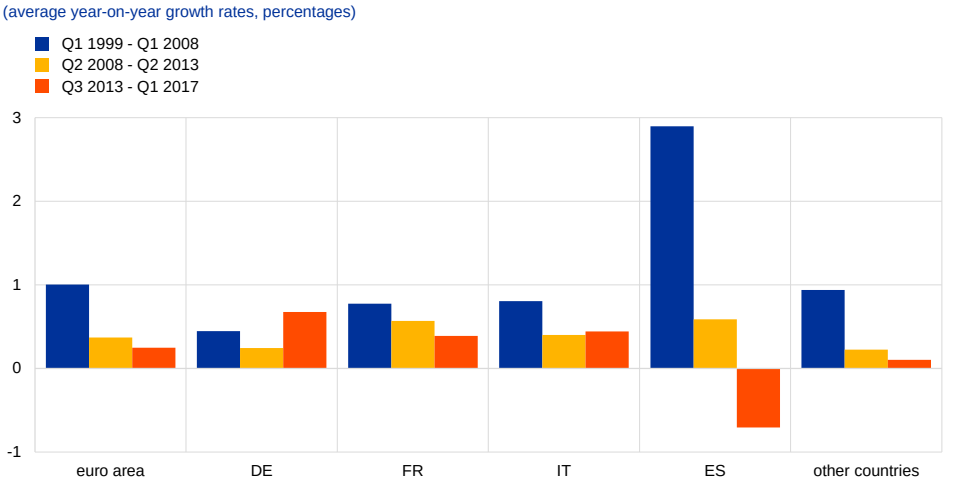
The June 2017 quarter-end decline in the core repo rates was relatively mild compared with the 2016 year-end decline and the March 2017 quarter-end decline. This suggests that market participants have adopted more efficient collateral management practices. Moreover, this development also suggests positive effects from the cash-collateral facility for PSPP securities lending.

3 Recent developments in euro area labour supply

Labour supply developments are an important driver of both the economic recovery and longer-term growth. On the structural side, labour supply can be a significant contributor to potential growth, while, from a cyclical perspective, it has a direct impact on employment and unemployment. Furthermore, it is not only the size of the labour force that matters, but also its composition. Labour supply in the euro area has been increasing for a long time, but, while this has continued during the recent recovery, its growth rate has moderated in comparison with both the pre-crisis and crisis periods (see Chart A). This box looks at the factors underlying the increasing labour supply over the course of the economic recovery and the moderation in its growth rate, as well as the changes in its composition.

Chart A

Average growth rate of the labour force in the euro area and the largest euro area countries



Sources: Eurostat national accounts and short-term statistics.
Note: The labour force is defined as the sum of employment as measured by national accounts and the number of unemployed.

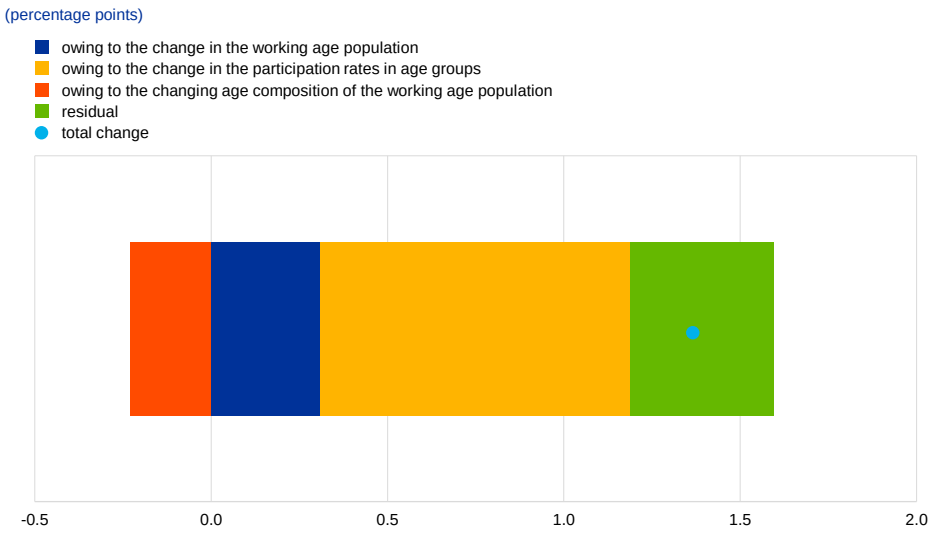
Although the labour supply in the euro area is continuing to rise, over the past decade there has been moderation in the rate at which it is increasing. In the immediate aftermath of the Great Recession, the average growth rate of the labour force moderated in all of the largest euro area countries compared with the pre-crisis period. This moderation continued in the recovery period (from the third quarter of 2013 to the first quarter of 2017), with the notable exception of Germany, where there has been an acceleration in labour force growth that now exceeds the rates of expansion seen before the crisis. The weakening in labour force developments was most dramatic in Spain, which can be explained primarily by the effect of changing migration flows. Before the crisis, there was significant net inward migration to Spain, which reversed after Spain experienced a marked increase in its unemployment rate. This had a large negative impact on both the working age population and labour supply in Spain, and was also reflected in euro area labour supply developments. In the euro area as a whole, however, immigration has made a large positive contribution to the working age population during the recovery, reflecting primarily the inflow of workers from new EU Member States. In turn, this is likely to also have

had a significant impact on the labour force, particularly in Germany and Italy, but also in some smaller euro area economies.

Since the start of the recovery, the rise in the participation rate has been a very important driver of growth in the labour force (see Chart B). The change in the labour force can be decomposed into contributions from changes in the working age population (15-64) on one hand and the participation rate on the other. The slowdown in the growth of labour supply compared to the pre-crisis period reflects a moderation of growth in both the working age population and the participation rate, although the contribution from both components has remained positive over the course of the recovery. However, the largest contribution to the growth in the labour force has come from the rising participation rate.

Chart B

Decomposition of the cumulative change in the labour force since the second quarter of 2013



Source: Eurostat, Labour Force Survey.
Notes: 15-64 age group. Non-seasonally adjusted data. The change in the labour force can be decomposed into the change in the working age population and the change in the participation rate. The latter can be decomposed further into developments in the relative sizes of the age groups in the population and changes in the participation rates of the different age groups. For the calculations, we used five-year age groups. The residual includes other compositional changes, for example by gender.

The euro area labour force is ageing, and more people are remaining economically active later in life. The share of those aged 50-64 in the 15-64 labour force has increased from 30% to 32% over the course of the recovery, following a longer-term upward trend.[14] As this age group has traditionally had relatively low labour force participation rates, its increasing share of the population might be expected to reduce the overall labour force participation rate. However, participation rates have increased among those aged 50-64 in the past four years (between the second quarter of 2013 and the first quarter of 2017 the participation rate increased by 0.7, 3.8 and 7.6 percentage points in the 50-54, 55-59 and 60-64 age groups

[14] The trend increase in the older generations reflects the fact that the post-war “baby boomers” have reached these age categories and the share of younger generations has declined. See “Population structure and ageing”, *Eurostat Statistics Explained*, Eurostat, June 2017, available at http://ec.europa.eu/eurostat

respectively), driven by the increasing pension age in most countries, as well as other factors, for example the increasing education level of the population (which is discussed later). This is driving up the overall participation rate, counterbalancing the otherwise negative impact of the changing age composition (see the red bar in Chart B). Furthermore, the declining share in the population of the 15-24 age group has also contributed to the increase in the overall participation rate, as this age group typically has a relatively low participation rate. This positive compositional effect, however, has been partly offset by a decline in the group's participation rate since 2008.

Continuing a long-term trend, the increase in the labour force during the economic recovery has been driven by the participation of women. While the increasing share of the older age groups is characteristic of both genders, for women, growth in the participation rate over the course of the recovery has been larger and the decline in the prime-age labour force has been smaller (see Chart C). The rising participation rate for women and the way in which female participation differs from male participation are explained to a large degree by diverging developments in the educational levels of men and women. The share of women with tertiary education in the female working age population is greater than the corresponding share for men.[15] It has also increased more steeply over the last decade in both the prime and older age categories and is a major driver of the increasing female participation in the labour force.[16]

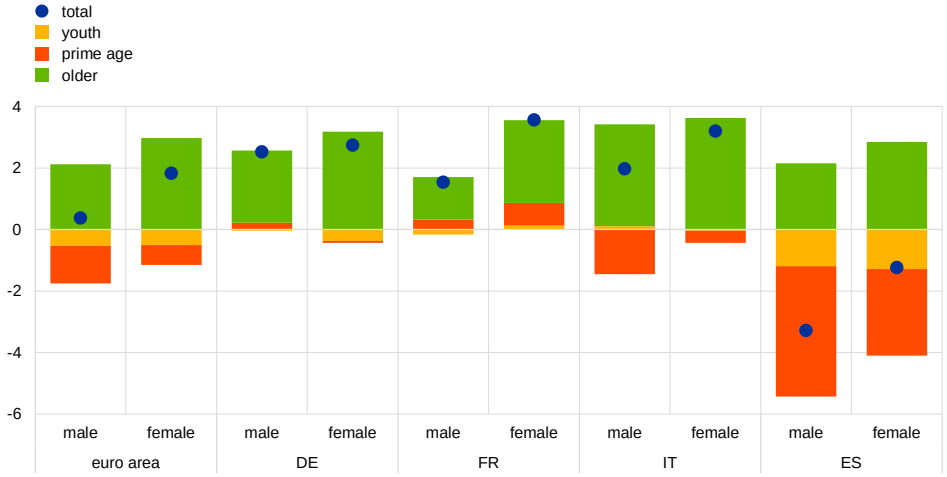
15 In the working age population, the share of those with tertiary education is only lower for women than for men in the older (55-64) age range, but the gap with men has been closing considerably over the last decade.

16 See Thévenon, O., "Drivers of Female Labour Force Participation in the OECD", *OECD Social, Employment and Migration Working Papers*, No 145, OECD, 2013, available at http://www.oecd-ilibrary.org

Chart C

Decomposition of the cumulative change in the labour force by gender and age in the euro area and the largest euro area countries during the economic recovery (from the second quarter of 2013 to the first quarter of 2017)

(percentages of the labour force in the second quarter of 2013)



Source: Labour Force Survey.
Notes: Youth: 15-24, prime age: 25-54, older: 55-64. Non-seasonally adjusted data.

Cyclical effects have contributed to diverging developments in prime-age male and female participation rates. The participation rate of prime-age males has been declining since the start of the crisis, likely driven by the cyclical decline in employment in sectors and positions which are traditionally male-dominated (namely, construction and low-skilled physical work).[17] The recent moderation in this rate of decline over the course of the recovery reflects the improving labour market situation in these male-dominated sectors. At the same time, the female participation rate may have been impacted over the business cycle by the "added worker effect" – the tendency for women to enter the labour market when their male partner loses his job or withdraws from participation. The added worker effect may have become particularly relevant given the strong impact of the crisis on income (and wealth), and thus it is likely to have played a role in the increasing female participation during the crisis in several euro area countries.[18] More recently the participation rate of prime-age women has been increasing at a slower rate during the recovery than before, which again may reflect the fact that, with an increase in male employment, there is now a reduced need for women to enter the labour market solely to maintain family income.

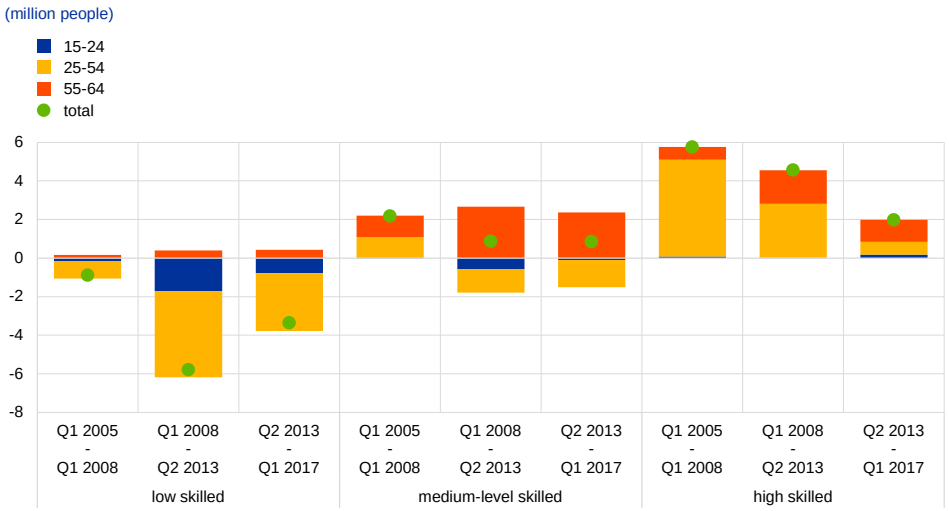
17 See Black, S., Furman, J., Rackstraw, E. and Rao, N., "The long-term decline in US prime-age male labour force participation", VOX, CEPR's Policy Portal, Centre for Economic Policy Research, 2016, available at http://voxeu.org, which explains the reasons for declining prime-age male participation for the United States. Similar factors may be present in the euro area. Among the largest euro area countries, over the course of the crisis, the participation rates of prime-age males have declined most in Italy, but some moderation has also been seen in Germany and France (in the latter, even before the crisis).

18 For an examination of the added worker effect in European countries, see Riedl, A. and Schoiswohl, F. "Is there an added worker effect? – European labor supply during the crisis", *Focus on European Economic Integration*, No Q4/15, Oesterreichische Nationalbank, 2015.

The composition of the labour force by skill is also changing, which is explained by structural forces. Over the course of the recovery, the increase in labour supply has been dominated by the highly skilled. There is a clear longer-term shift towards a growing number of the highly skilled in the labour supply, while the numbers of those who have only primary education or less have been declining since the second quarter of 2013. The number of those with medium-level skills has been increasing only moderately, as a result of increasing labour supply of the medium-level skilled in the older age categories and declines in the prime-age segment (see Chart D). All these changes are driven primarily by developments in the composition of the population by educational level.

Chart D

Composition of the change of in the euro area labour force before the crisis, during the crisis and over the course of the recovery by age and education level



Source: Labour Force Survey.
Notes: 15-64 age group. Low skilled: less than primary, primary and lower secondary education (levels 0-2), medium: Upper secondary and post-secondary non-tertiary education (levels 3 and 4), high: tertiary. Non-seasonally adjusted data.

Overall, while the pace of growth has moderated, the labour supply has continued to increase over the course of the recovery, largely driven by ongoing structural factors. The increase in the participation rates of the older generations is the single most important explanatory factor behind the recent increases, but the growing participation of women has also contributed positively. By contrast, the changing age composition of the labour force and the declining participation of prime-age males and the young have both made a negative contribution to the labour supply. Finally, the increase in the labour force has been driven by the highly skilled, while the supply of low-skilled labour has decreased. These developments follow longer-term trends, while the business cycle has had a smaller impact on labour supply. The increasing contribution of older age groups, women and the highly skilled to the labour supply are also reflected in the changing composition of employment. At the same time, there is potential for policies to enhance labour supply, which is also indicated by the heterogeneity in participation rates across the euro area. Such policies could include, among others, increased flexibility in working time arrangements, tax systems that incentivise the participation

of second earners, availability of quality and affordable child care facilities, and training and retraining policies aligned with labour market needs.

4 Reducing unemployment from a historical perspective

This box reviews the macroeconomic and structural conditions that have led to large reductions in unemployment from a historical perspective. The sample under investigation covers all OECD countries over the past 35 years. By comparing the features of the historical experiences with those of the current job-rich recovery in the euro area it is possible to draw lessons that may be useful in analysing future unemployment developments.

In line with the existing literature, this box defines an episode of large unemployment reduction as one which fulfils three conditions: 1) the unemployment rate declines by at least 3 percentage points in a three-year period after the peak in the unemployment rate; 2) the decline in the unemployment rate over a three-year period is at least 25% of the initial unemployment rate; 3) after five years the unemployment rate remains below that at the beginning of the episode.[19]

When applying these three conditions to the European Union (EU) and other OECD countries over the period 1980-2015, 25 episodes in which there were large unemployment reductions can be identified. On average, for these 25 episodes, the initial level of unemployment was 13.4%; after three years it declined by 4.5 percentage points, representing 35% of the initial unemployment rate; and after five years the unemployment rate was almost halved (see the table). Across the euro area countries, the majority of these episodes started in the mid-1990s.[20] In the first half of the 1990s the unemployment rate reached historically high levels and Europe experienced jobless growth. The period from the second half of the 1990s to the early 2000s coincided with the highest intensity of reforms in labour and product markets. This increase in the momentum of reform was induced not only by the high unemployment rate, but also in all likelihood by the introduction of the euro and the process of EU integration.[21]

Currently, five euro area countries seem to fulfil the above-mentioned criteria (see the table).[22] These countries are Ireland, Spain, Cyprus, Portugal and Slovakia. Other countries with high unemployment, and which are currently observing a reduction in unemployment, are Greece, Italy and Slovenia. However, they do not yet fulfil the three criteria. Italy and Slovenia do not fulfil any of the three criteria, while Greece can be considered a borderline case, as only the second criterion, i.e. a decline that is at least 25% of the initial unemployment rate after three years, has not been met.

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19 Freund, C. and Rijkers, B. adopted a related approach in "Episodes of unemployment reduction in rich, middle-income and transition economies", *Journal of Comparative Economics*, Vol. 42(4), December 2014, pp. 907-923.

20 The euro area countries that underwent episodes of unemployment reduction starting in the mid-1990s were Ireland (1993-98), the Netherlands (1995-2000), Finland (1995-2000) and Spain (1996-2001).

21 See, for example, Dias da Silva, A., Givone, A. and Sondermann, D., "When do countries implement structural reforms?", *Working Paper Series*, No 2078, ECB, June 2017.

22 Given that the current episodes of unemployment reduction started in 2013, the European Commission's June 2017 projections have been used for the years 2017 and 2018 to assess fulfilment of the third criterion.

Table

Current episodes of large reductions in unemployment

	Start of episode	Initial unemployment rate (percentages)	Decline in the unemployment rate after three years (percentage points)	Decline in the unemployment rate after three years (percentages)	Decline in the unemployment rate after five years (percentage points)
Historical average	**-**	**13.4**	**4.5**	**35**	**6.2**
Ireland	2012	14.7	5.3	36	8.3
previous episode	*1993*	*15.6*	*3.9*	*25*	*8.1*
Spain	2013	26.1	6.5	25	10.2
previous episode	*1996*	*19.9*	*6.3*	*32*	*9.3*
Cyprus	2014	16.1	4.4	27	5.5*
Portugal	2013	16.4	5.2	32	7.2
previous episode	*1985*	*9.8*	*3.1*	*32*	*4.2*
Slovakia	2013	14.2	4.5	32	6.6
previous episode	*2004*	*18.3*	*7.1*	*39*	*6.2*
Memo items:					
Greece	2013	27.5	3.9	14	-5.9
Italy	2014	12.7	1.2	9	1.4*
Slovenia	2013	10.1	2.1	21	3.8
euro area	**2013**	**12.0**	**2.1**	**17**	**3.2**

Source: ECB staff calculations based on European Commission data.
Notes: * Data up to four years since the start of the unemployment reduction. The historical average refers to the simple average of the 25 episodes identified across 41 EU and OECD countries between 1980 and 2010.

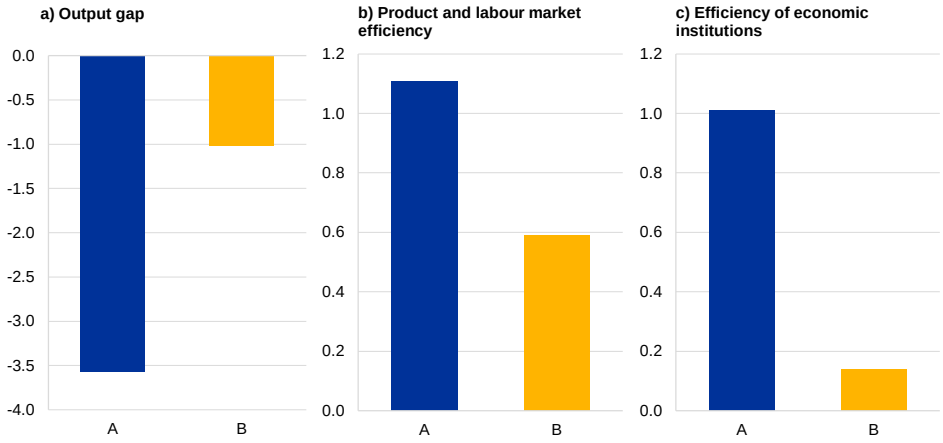
The macroeconomic and structural conditions at the onset of episodes of large reductions in unemployment were significantly different to those where such unemployment reduction did not occur. Chart A compares the macroeconomic and structural features of the 25 episodes of large reductions in unemployment with those of a group of countries that did not experience such an episode, notwithstanding the fact that in the latter group the unemployment rate was at least as high as the average unemployment rate of the former group at the onset of the episode.

Generally, the onset of an episode of large unemployment reduction occurs in the presence of a large degree of economic slack. Chart A(a) shows that countries undergoing an episode of large unemployment reduction have a larger negative output gap than countries in which the unemployment rate remains high.

Episodes of large reductions in unemployment occur in the presence of more efficient structures and institutions. When comparing the group in which there is a large reduction in unemployment with the group in which there is not, the latter is characterised by significantly weaker structures/economic institutions, as measured by product market efficiency and overall efficiency of economic institutions (see Chart A(b) and (c)). This seems to suggest that successful episodes of unemployment reduction come about when structural conditions, including product and labour market regulations and the overall quality of institutions, are more sound.

Chart A

Comparison of macroeconomic and structural features of countries with high unemployment that saw a large reduction in unemployment (A) with those of countries that did not see a large reduction in unemployment (B)



Source: ECB staff calculations based on Eurostat data.
Notes: A refers to observations with average unemployment rate above 13%, followed by a large reduction in unemployment.
B refers to observations with average unemployment rate above 13%, not followed by a large reduction in unemployment.
The 13% threshold relates to the average unemployment rate at the onset of episodes of large reductions in unemployment (see table).

The evolution of key macroeconomic and structural variables around historical episodes of unemployment reduction can shed further light on patterns of unemployment reduction. Chart B shows developments in the unemployment rate, GDP growth, compensation per employee and the reform stance[23] in the countries that witnessed large reductions in unemployment compared with the sample average.[24] It shows that real compensation per employee moderates substantially before an episode of large reduction in unemployment starts and sees hardly any growth until three years after the start of the episode. GDP growth falls substantially in the two years preceding the episode. Following the start of the episode of large reduction in unemployment, GDP grows significantly during the five-year period. In addition to the role played by the economic cycle, the increase in reform efforts is associated with a subsequent reduction in the unemployment rate. This can be seen in Chart B, as the number of reforms peaks before the episode of unemployment reduction starts.

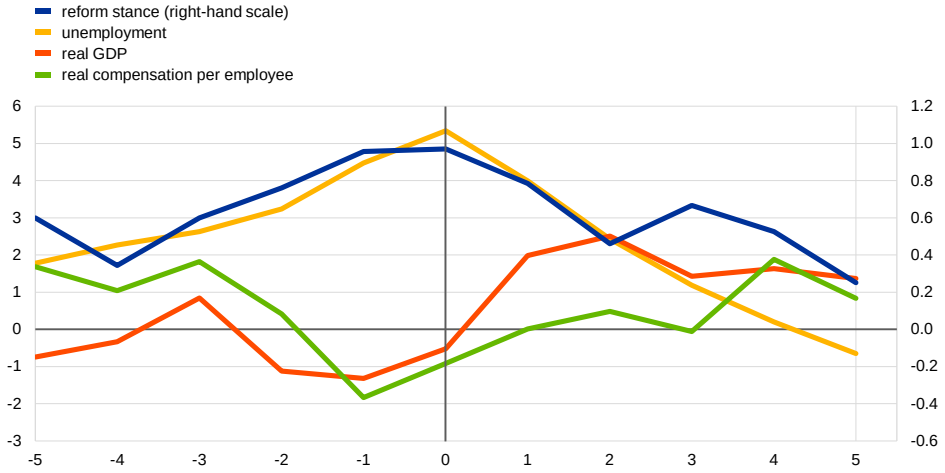
[23] The reform stance is computed using the change in the OECD's indicators of employment protection legislation (EPL) and of regulation in network industries, i.e. energy, transport and communications (ETCR), and a measure of the degree of centralisation of wage bargaining, as compiled by the Fraser Institute. The changes in these series are used as a proxy for labour and product market reforms, which are likely to have an impact on labour demand and supply and thus on the unemployment rate. The focus is on relatively large reforms, which are defined as reforms that exceed two standard deviations of the change in the indicator over all observations in each series. The reform stance indicator assumes a value of 0 if no large reforms are implemented, 1 if a large reform is implemented, 2 if large reforms are implemented in two areas, and 3 if large reforms are implemented simultaneously across the three indicators.

[24] All variables have been demeaned to account for covariate shocks and time trends.

Chart B

Evolution of macroeconomic variables and the reform stance before and after episodes of large reductions in unemployment

(reform stance (index 0-3, demeaned); unemployment rate (as a percentage of the labour force, demeaned); real GDP (annual percentage change, demeaned); real compensation per employee (annual percentage change, demeaned))



Source: ECB staff calculations based on European Commission and OECD data.
Notes: "0" marks the beginning of the unemployment reduction episode. Each variable is demeaned by the sample average of observations in each year. The unemployment rate is expressed as a percentage of the labour force. GDP growth and real compensation per employee are expressed as year-on-year growth rates. The reform stance is measured as an index ranging between 0 (no reforms) and 3, and has been demeaned by the average sample of observations in each year. Data on structural variables are not available after 2013.

Overall, the above static and dynamic analyses of past episodes show that structural factors are key elements for a successful reduction in unemployment. Large and sustained reductions in unemployment took place in the presence of supportive cyclical conditions and responsible wage policies, and after extensive product and labour market reforms.

5 Structural reform needs in the euro area: insights from a survey of large companies

This box summarises the results of an ad hoc ECB survey of leading euro area businesses on structural reforms in the euro area.[25] The importance of structural reforms as a means of increasing the rate of potential growth and strengthening the resilience of the euro area economy has been repeatedly emphasised by policymakers over recent years.[26] But, so far, there have been few attempts to gauge the opinion of the business community on this subject. The survey had three objectives: (1) to gain information on the impact of recently implemented reforms in the euro area and see these from a business perspective; (2) to understand the major perceived obstacles to implementing reforms; and (3) to acquire insights into the reform priorities needed to further improve the euro area business environment and labour markets, as well as to complete the European Single Market.

Responses were received from some 55 leading euro area enterprises, non-financial companies active across a wide range of sectors. Respondents were typically among the leaders in their respective sectors. Together, the 55 companies account for approximately 1% of total euro area employment. In terms of sectoral composition, some 30 respondents were principally active in the broader industrial sector (including construction), while 25 companies were service providers. Around two-thirds of companies were primarily engaged in the provision of business-to-business products and services, while the remaining third were mainly business-to-consumer companies.

The majority of companies indicated that the recent structural reforms have had a positive impact on their business operations. Positive assessments were mainly related to the effect of labour market reforms. Respondents noted, in particular, the impact of the 2012 reforms in Spain[27], which have improved labour market flexibility.

The pace of reform over the period 2013-16 (see Chart A) was characterised as "slow and fragmented" by over 60% of respondents. Just over a quarter of respondents – from a wide range of sectors – perceived implementation to have been "slow but comprehensive". Notable exceptions were companies heavily active in Spain, which tended to be more positive on this front. Overall, however, only a few companies (mainly operating in a services sector) considered reform implementation as "fast", while no respondent characterised recent reforms as "fast and comprehensive".

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25 The survey was sent out in spring 2017.

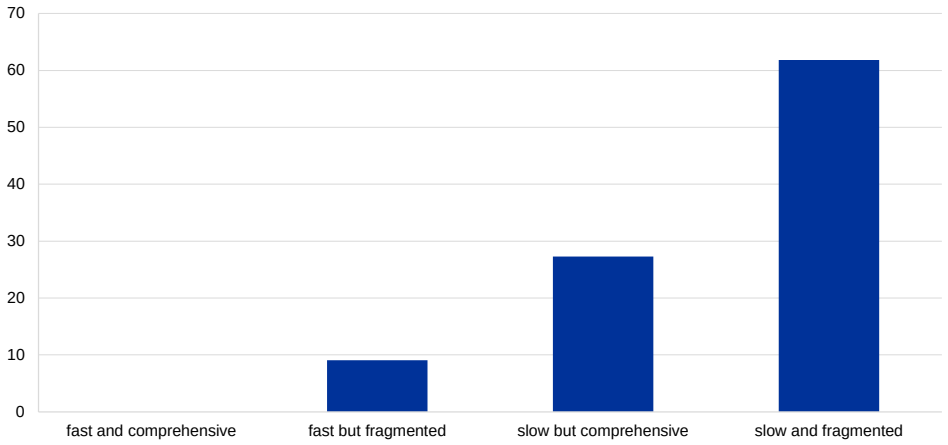
26 For example, see: Draghi, M., *Structural Reforms, Inflation and Monetary Policy*, introductory speech for the ECB Forum on Central Banking, Sintra, 22 May 2015; Praet, P., *The euro area economy, monetary policy and structural reforms*, remarks at the Observatory Group roundtable, New York, 18 November 2016.

27 For Spain, around a third of respondents assessed the reforms enacted since 2008 to have had a positive impact on investment (particularly by increasing the share of total investment allocated to research and development, and thereby enhancing support for innovation). Meanwhile, more than 40% considered reforms supportive to productivity growth, and nearly 40% felt that reforms had contributed to stronger employment growth by reducing the risks (and costs) of hiring and by helping to increase wage flexibility.

Chart A

Pace of reform (2013-16)

(percentage of respondents)

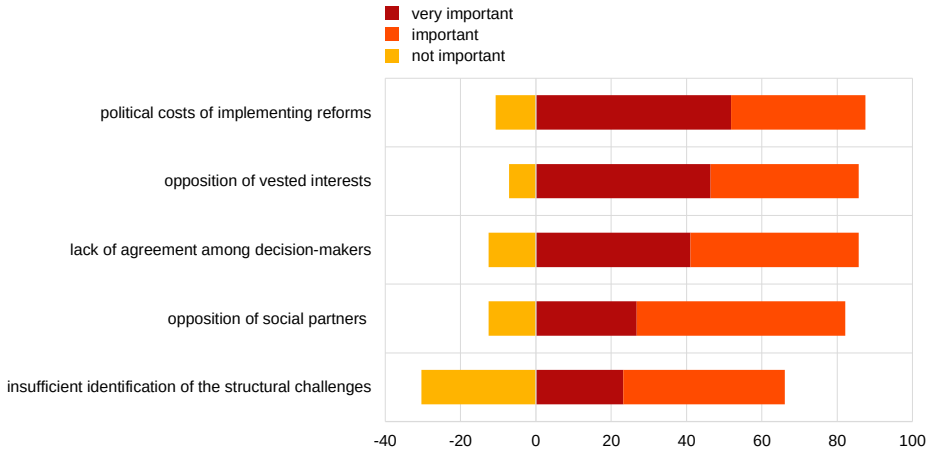


Sources: ECB Structural Reforms Survey and ECB staff calculations.
Note: based on responses to the question "How would you assess the pace of structural reform implementation in euro area countries over the last three years?"

Chart B

Barriers to reform momentum

(percentage of respondents)



Sources: ECB Structural Reforms Survey and ECB staff calculations.
Notes: based on responses to the question "In your opinion, what are the most important barriers to the implementation of structural reforms across the euro area?" Negative percentages refer to respondents reporting elements as "not important".

Obstacles to further reform efforts (see Chart B) were mainly attributed to political constraints and opposition from vested interests. Few survey participants saw reform efforts as having stalled because of a lack of clarity on reform needs. Instead, some 85% of companies suggested that reform implementation was principally hampered by political considerations. Opposition from "vested interests" and a lack of agreement among decision-makers also ranked highly as obstacles to reform efforts (at least 40% of respondents categorised these as "very important" obstacles).

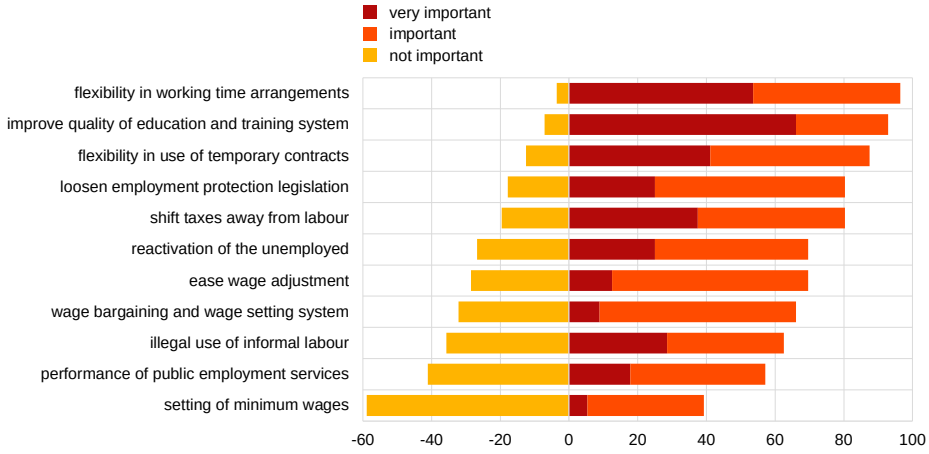
When asked about ongoing reform needs, businesses consistently highlighted labour market reforms as the most pressing area for further action, while further reforms aimed at product markets and the broader business environment were also seen as important. This finding reflects both the consistently higher rankings of labour market variables, rated as "important" and "very important" under standardised questions on reform needs in three different areas (completion of the European Single Market, country-level business environments and labour markets), as well as responses to a more open question requesting respondents to specify "the most pressing" reforms from their point of view.[28]

Concerning the labour market (see Chart C), reforms aimed at further improving workforce "flexibility" were deemed worthy of prioritisation, with efforts supporting more flexible working time arrangements, easier usage of temporary contracts and less stringent employment protection legislation being three of the top four priorities for at least 80% of companies. Moreover, around 50% of respondents suggested that reforms aimed at enhancing workforce flexibility were likely to have the single greatest impact on business outcomes – given their importance for regaining competitiveness and also because they would allow companies to better respond to growing volatility in demand and changing demand patterns.

Chart C

Labour market reform needs in the euro area

(percentage of respondents; responses ranked by overall rating)



Sources: ECB Structural Reforms Survey and ECB staff calculations.
Notes: based on responses to the question "How do you assess labour market reform needs in the euro area countries in your sector?" Negative percentages refer to respondents reporting elements as "not important".

In addition, reforms to improve the quality of education and training systems were highlighted by over 90% of businesses. This was considered particularly

[28] The results are consistent with those of other ECB surveys of large firms, as reflected in previous issues of the Economic Bulletin. See, in particular, the boxes entitled "What is behind the low investment in the euro area? Responses from a survey of large euro area firms" (Issue 8, 2015) and "Global production patterns from a European perspective: insights from a survey of large euro area firms" (Issue 6, 2016).

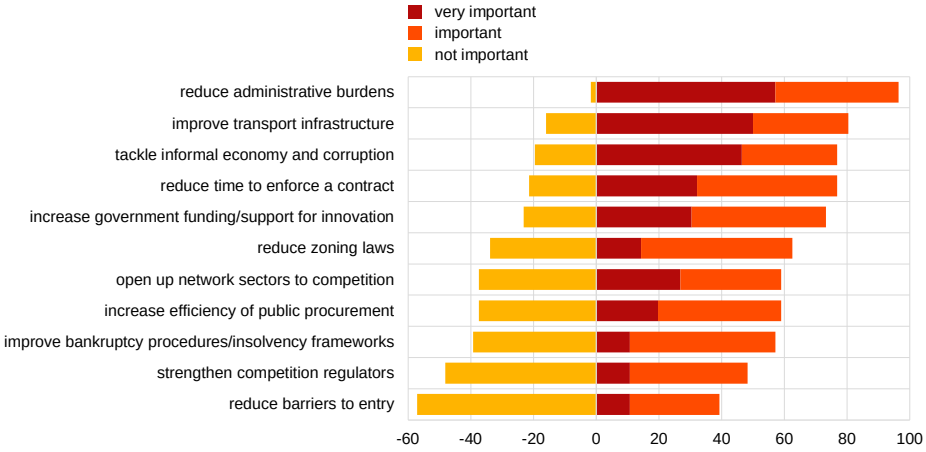
relevant in the light of shifts towards knowledge-intensive skill sets, digitalisation and long-standing structural deficits in engineering skills. Further efforts to move taxes and social charges away from labour were also widely reported as important areas for additional reforms, while further reforms to wage bargaining systems and wage setting frameworks (including minimum wages) were underlined less often.

As regards potential reform priorities for enhancing the wider business environment (see Chart D), efforts to reduce administrative burdens were also emphasised by more than 90% of companies. Indeed, almost 60% indicated that further work in this area was "very important"[29]. Survey participants suggested that such reforms would be likely to help reduce the administrative costs of suppliers, refocus resources away from compliance procedures and speed up the opening of new stores.[30] Network constraints were also deemed important, with around 80% of companies highlighting the necessity of further improvements to the transport infrastructure[31] and 60% emphasising a lack of competition in network sectors.

Chart D

Business environment reform needs in the euro area

(percentage of respondents; responses ranked by overall rating)



Sources: ECB Structural Reforms Survey and ECB staff calculations.
Notes: based on responses to the question "How do you assess structural reform needs relating to the business environment at country level in the euro area in your sector?" Negative percentages refer to respondents reporting elements as "not important".

Reform needs related to the completion of the Single Market (see Chart E) were also highlighted. Around 80% of respondents saw the necessity of further reforms to tackle the complexity and heterogeneity of licencing regulations across euro area countries and 75% indicated that more reforms were still needed to reduce the administrative procedures hindering companies from operating in other euro area countries. Companies noted that, even now, there was considerable complexity in doing business across borders within the Single Market.

29 Only reforms to improve the quality of education and training systems scored higher.

30 Though a clear minority view, one respondent claimed that, in his opinion, administrative burdens have increased since 2008. Meanwhile, others argued that disproportionate regulation and reporting requirements may be a hindrance regarding compliance or supervision by oversight authorities.

31 Companies claimed that improvements to the transport infrastructure would help reduce supply chain costs, boost investment and employment and lead to greater business volumes.

Chart E

Reform needs related to the completion of the Single Market

(percentage of respondents; responses ranked by overall rating)

Sources: ECB Structural Reforms Survey and ECB staff calculations.
Notes: based on responses to the question "In your opinion, which of the following reform needs related to the completion of the Single European Market create difficulties in carrying out business operations across borders in the euro area in your sector?" Negative percentages refer to respondents reporting elements as "not important".

A lack of harmonisation in tax policies was also emphasised. Several companies suggested the need to harmonise tax policies across all EU countries as regards corporate income tax, local taxes and social charges. A more aligned "European approach" to transfer pricing that is acceptable to all European tax authorities was also proposed.

The results of the 2017 ECB Structural Reforms Survey illustrate considerable agreement on the necessity of further reforms to national labour markets, highlight some important areas where additional reforms can be implemented to improve national business environments and also reveal where businesses still see a need for more effort in support of harmonisation across the EU. From a policy perspective, the results of the survey, including the findings on the main barriers to reform implementation, seem to underline the need for further national and supranational coordination and supervision of reform processes. Given the considerable scope for structural reforms to benefit the growth potential of the euro area economy, greater attention to further reforms seems warranted.

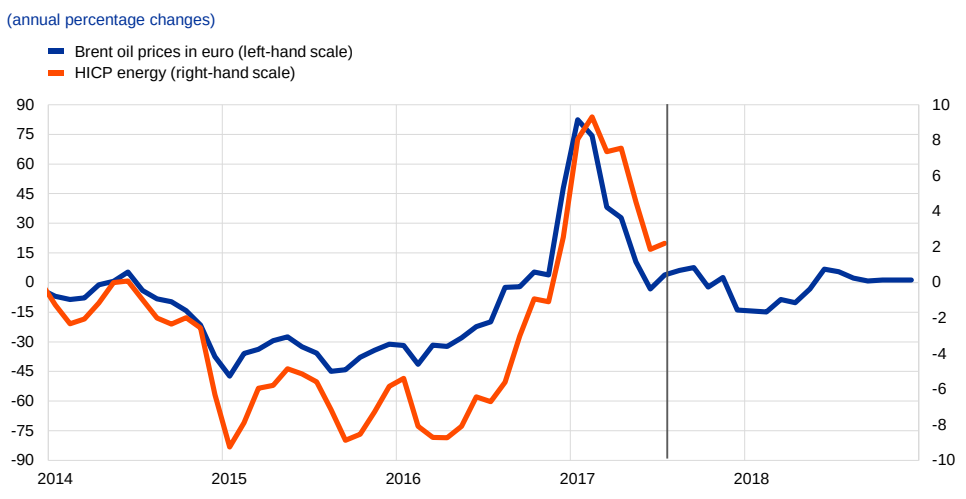
6 The role of base effects in the projected path of HICP inflation

Base effects will exert a strong impact on the projected path for headline HICP inflation in the coming quarters. The September 2017 ECB staff macroeconomic projections for the euro area foresee a V-shaped path for headline inflation developments in the coming quarters, with a trough of 0.9% in the first quarter of 2018.[32] This profile essentially reflects the impact of base effects on the annual rates of change in energy and unprocessed food prices, which are the most volatile components of HICP inflation.

The pronounced swing in the annual rate of change in oil prices will be mirrored in energy inflation one year ahead assuming the current path of futures oil prices. Oil prices increased from early 2016 to February 2017 but then declined up to June 2017. These developments implied large increases in the annual rate of change of oil prices, followed by large declines, with both movements also reflected in HICP energy inflation developments (see Chart A). Looking ahead and assuming that oil prices follow the smooth and moderately upward-sloped path suggested by oil futures prices, this implies that annual rates of change in oil prices and energy inflation will mainly mirror the past swing in oil prices. The pattern of the annual growth rate of oil (and thereby energy) prices will thus be driven by base effects, i.e. “atypical” month-on-month changes in the index 12 months earlier.

Chart A

Oil prices and energy prices



Source: Blomberg and ECB calculations.
Note: The vertical line separates annual rates of change of oil prices calculated on spot prices from those calculated on futures prices of 14 August 2017, the cut-off date for the assumptions of the “September 2017 ECB staff macroeconomic projections for the euro area”.

Unprocessed food inflation also recorded a strong temporary increase in the first few months of 2017. This increase reflected a weather-related upward impact

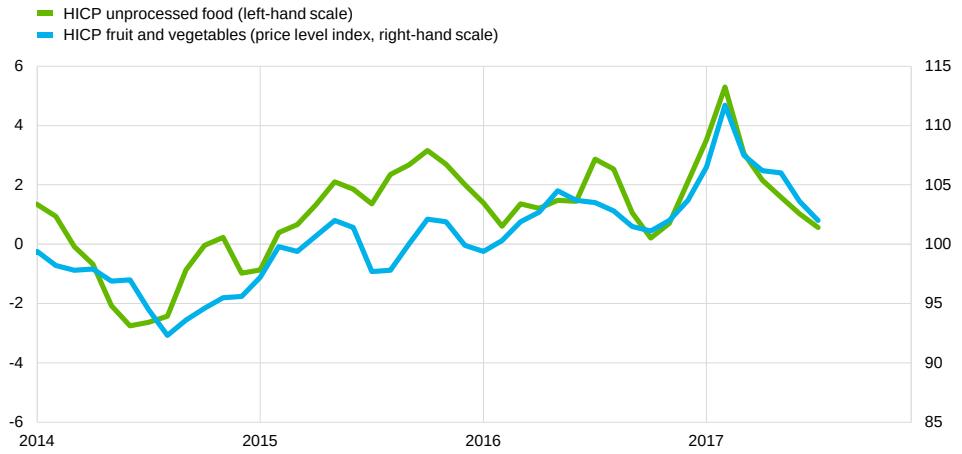
[32] See the article entitled “September 2017 ECB staff macroeconomic projections for the euro area”, published on the ECB’s website on 7 September 2017.

at the turn of the year on the prices of fruit and vegetables, which represent about 40% of the unprocessed food component (see Chart B). As a consequence of the strong changes in these prices, the profile of unprocessed food inflation will also be affected by negative base effects, in particular in February 2018.

Chart B

Unprocessed food inflation

(annual percentage changes, index: 2015=100)



Sources: Eurostat and ECB calculations.

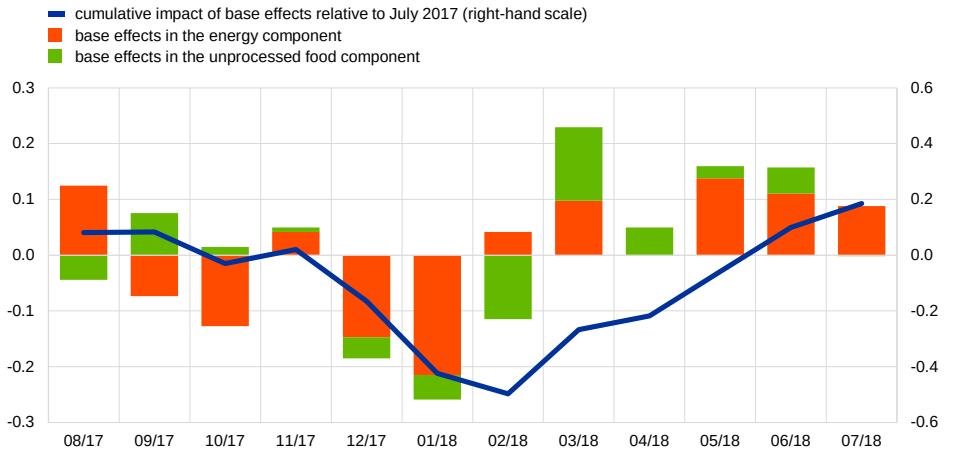
The combined impact of base effects from the energy and unprocessed food HICP components will lower headline inflation in the first quarter of 2018 but raise it in the following quarter. The quantification of base effects is subject to a degree of uncertainty, as there is no single way to compute the impact of an atypical month-on-month change. In past analyses reported in the ECB's Bulletin, this impact has been computed by subtracting the actual month-on-month change from the typical movement (i.e. an estimated seasonal effect and a "trend", quantified as the average month-on-month change since the mid-1990s).[33] Chart C shows the estimated contribution of base effects from the energy and unprocessed food components to the change in the annual HICP inflation rate from one month to the next, which will occur over the rest of 2017 and in the first half of 2018. It is estimated that base effects in the energy component will be mostly negative up to January 2018 and positive thereafter, while for the unprocessed food component they will be negative from December 2017 to February 2018 and positive from March 2018. The cumulative impact of such base effects on overall HICP inflation is always shown relative to a specific reference month. For example, relative to the annual headline inflation rate in July 2017, the cumulative negative impact of these base effects on headline HICP inflation in February 2018 will amount to half a percentage point. However, as base effects will be positive in the following months, the cumulative impact on headline HICP inflation will change sign and amount to about plus 0.2 percentage points by July 2018 (see Chart C).

33 See, for instance, the box entitled "Base effects from the volatile components of the HICP and their impact on HICP inflation in 2014", *Monthly Bulletin*, ECB, February 2014.

Chart C

Contribution of energy and unprocessed food base effects to developments in HICP inflation

(percentage point contributions)



Source: ECB calculations.

Although the future profile of HICP annual inflation will be affected by base effects, it could also be strongly influenced by unexpected price developments. When assessing the impact of base effects on likely outcomes of energy, unprocessed food and headline HICP inflation in the period ahead, it must also be borne in mind that future annual rates of inflation will, of course, also depend on actual month-on-month changes in energy and unprocessed food prices in the intervening period.

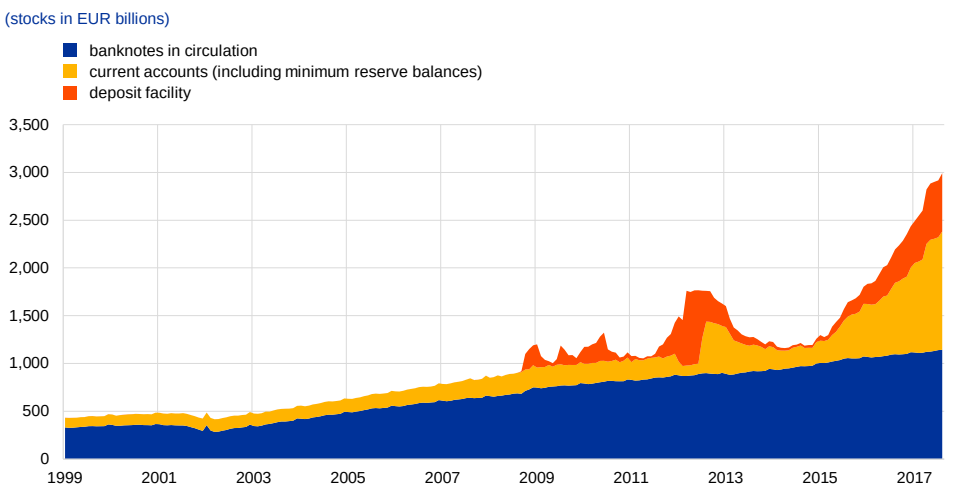
7 Base money, broad money and the APP

The significant expansion in base money induced by the asset purchase programme (APP) has attracted growing public attention. This box provides an overview of recent developments in base money[34] and discusses to what extent they have had implications for broad money[35].

In the pre-crisis period, base money developments largely reflected changes in currency in circulation and required central bank reserves (see Chart A). In periods when interbank markets are functioning normally, the Eurosystem provides the central bank reserves in euro needed by the banking system on aggregate, which are then traded among banks and thereby redistributed within the banking system as necessary. The aggregate demand for central bank reserves is thus effectively accommodated by the Eurosystem with very limited levels of excess reserves. In the pre-crisis period, base money developments in the euro area were therefore largely a reflection of changes in currency in circulation and required central bank reserves.

Chart A

Base money



Source: ECB.
Note: The latest observation is for August 2017.

Prior to the financial crisis, base money and broad money developments were unfolding along similar trends (see Chart B). The growth in base money in the

[34] Base money consists of banknotes in circulation, the deposits that credit institutions are required to hold in their current accounts with the Eurosystem in order to cover the minimum reserve requirement (required central bank reserves) and credit institutions' holdings of highly liquid deposits with the Eurosystem over and beyond the level of required central bank reserves (excess central bank reserves and recourse to the deposit facility).

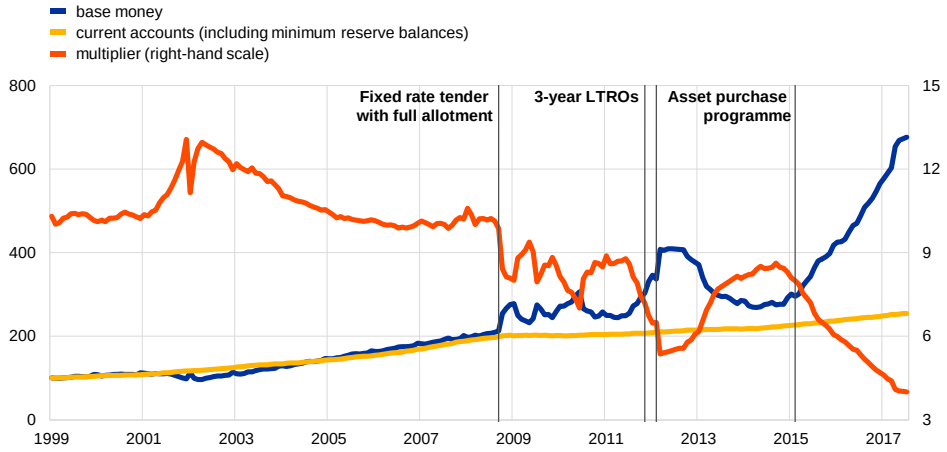
[35] Broad money, or M3, consists of very liquid liabilities of domestic MFIs held by the money-holding sector (i.e. non-MFIs resident in the euro area, except central government): currency in circulation, overnight deposits, deposits with maturities of up to two years, deposits redeemable at notice of up to three months, repurchase agreements, money market fund shares/units and MFI debt securities of up to two years. From a monetary analysis perspective, broad money is relevant because it is associated with the total resources available in the economy for the purchase of goods, services and non-monetary assets as well as for investment expenditures.

euro area mirrored that of broad money, since the injection of central bank reserves in that period was demand-driven, i.e. determined by currency in circulation and the evolution of banks' reserve requirements, which in turn depended on the evolution of banks' short-term liabilities (deposits and debt securities with a residual maturity of up to two years). As a result, the money multiplier (the ratio of broad money to base money) was rather stable.

Chart B

Base money and the money multiplier

(left-hand side: index: 1999=100; right-hand side: money multiplier)



Source: ECB.
Notes: The money multiplier is the ratio of broad money to base money. The latest observation is for July 2017.

Since the financial crisis, base money has been increasingly driven by Eurosystem monetary policy operations. In line with the responses of all major central banks to the financial crisis, the volume of monetary policy operations undertaken by the Eurosystem increased substantially from 2007 onwards and in particular after September 2008. In a situation of malfunctioning money markets and liquidity stress on banks' balance sheets, the Eurosystem supplied central bank reserves to each counterparty elastically at a level well above the banking system aggregate demand, through fixed rate tenders with full allotment. Moreover, in 2009 the first programme of outright purchases of covered bonds (CBPP1) was launched. The resulting increase in excess central bank liquidity was mirrored by a significant expansion of base money (see Chart A). The volume of monetary policy operations increased again sharply in the second half of 2011, mainly as a consequence of the two longer-term refinancing operations (VLTROs) with a three-year maturity conducted in December 2011 and February 2012, and, to a lesser extent, outright purchases of securities under the CBPP2. As a result of these operations, excess reserves and, therefore, base money displayed a further sizeable increase.

Since the introduction of non-standard measures, broad money has stopped closely mirroring developments in base money. Since 2008, the trends in base money and broad money have decoupled, as the expansion in base money due to non-standard measures has not supported a similar uptrend in monetary holdings outside the banking sector. In the context of considerable financial fragmentation, economic uncertainty and weak credit demand, it was not surprising that the

increase in banks' holdings of central bank reserves, often as liquidity insurance, did not result mechanically in an increase in the supply of credit to the non-financial private sector, and hence in broad money, the levels of which remained subdued.[36] At the same time, the expansion in base money was instrumental in avoiding fire sales and a curtailment of credit with potentially severe consequences for the real economy. Given this weak link between base money and broad money, the money multiplier was on a declining path from the onset of the financial crisis until the end of 2012.

In 2013 banks' preference for central bank liquidity waned and base money returned to the levels implied by the pre-crisis trend. Receding financial fragmentation and improved funding conditions in euro area financial markets from mid-2012 reduced the incentive for banks to keep high levels of liquidity. Thus, banks in 2013 used the option offered by the ECB of a voluntary early repayment of the VLTROs, leading to a return of base money closer to the levels implied by the extrapolation of the pre-crisis trend. The decline in base money combined with non-decreasing broad money, which was supported by some recovery in monetary assets, implied an increase in the money multiplier.

The expanded APP marked the start of a new phase of supply-side-induced increases in the volume of base money. The announcement of the APP represented a change in regime that was in clear contrast to the previous practice consisting of banks expressing their demand for central bank liquidity, which was accommodated in an elastic way. Under the APP, the Eurosystem supplies central bank reserves when purchasing assets. Since banks are typically the only entities, apart from central government, that hold deposit accounts with the central bank, purchases are always settled through them, regardless of who the ultimate seller is. Therefore, purchases conducted under the APP resulted in a mechanic, direct increase in base money.

The APP has been an important driving force behind the robust developments in broad money recorded since 2015, with indirect effects playing a major role.[37] Non-residents and banks have so far been the main sellers of government bonds under the public sector purchase programme (the largest purchase programme under the APP), while sales by the domestic money-holding sector have

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36 Ultimately, overall broad money balances in the economy are determined by many other factors, including economic activity and bank lending, banks' preference to fund themselves via retail deposits or via debt securities issuance, and the percentage of securities actually sold by resident banks or the non-resident sector. In addition, the growth of bank credit depends on a set of factors that determine credit demand and on other factors linked to the supply of credit. The demand factors include accumulated debt, borrowing costs and income prospects. Factors relating to the credit supply are the risk-adjusted return on lending, the bank's capital position, its attitude towards risk, the cost of funding and the liquidity risk.

37 The recent expansion of broad money has also benefited from the ECB's other non-standard monetary policy measures, such as negative interest rates, which contributed to reducing the opportunity costs of holding monetary instruments to historically low levels, and the targeted longer-term refinancing operations (TLTROs), which represented a valid alternative to long-term market-based funding. The TLTROs have also contributed to the recent developments in broad money by providing an incentive for expanding lending to firms and households.

been moderate, implying a contained direct impact of the APP on broad money.[38] A large part of the effects of the APP on broad money have materialised via indirect effects. First, indirect effects arise from the portfolio rebalancing that the programme is intended to bring about. Moreover, banks have expanded loans to domestic firms and households, implying an increase in the deposits held by the euro area money-holding sector. Some banks have also used the increased liquidity at their disposal to pay down their more costly liabilities. Further indirect effects of the APP on broad money have materialised via a wide set of channels through which the APP has influenced financial markets and economic activity. The APP has indeed resulted in a broad easing of financing conditions and favourable wealth effects, crucially supporting the recovery in lending and economic growth. The money multiplier has been declining since the start of the APP, mechanically reflecting the proportionately larger positive impact of the programme on base money than on broad money. While the former displays a direct relationship with the purchases, the latter is mainly affected via complex indirect effects, as discussed above.

[38] Direct effects of the APP on broad money only arise when purchases are made from the euro area money-holding sector. For more details, see the article entitled "The transmission of the ECB's recent non-standard monetary policy measures", *Economic Bulletin*, Issue 7, ECB, 2015. For more details on the PSPP purchases by sector, see the box entitled "Which sectors sold the government securities purchased by the Eurosystem?", *Economic Bulletin*, Issue 4, ECB, 2017.

Article

1 Modelling euro banknote quality

Central banks are the guardians of banknote quality. In 2016 euro area national central banks (NCBs) checked 32.3 billion euro banknotes on their high-speed machines for quality and authenticity. Commercial cash handlers (CHs)[39] processed a similar number. CHs disburse banknotes of good quality to their customers and return poor-quality ones (unfit banknotes) and surplus stocks to the NCBs. These destroy all unfit banknotes after a final authenticity check. In 2016 NCBs replaced 5.4 billion unfit banknotes (around 27% of the banknotes in circulation) with new ones. Note consumption and the quality of notes in circulation differ by country. The ECB has therefore developed a computer-based model to better understand the differences in euro area cash cycles. The model simulates a cash cycle using a theoretical approach based on key figures. The simulations identify the resistance of banknotes to soil and defects, the frequency with which banknotes are returned to the NCB and the NCB sensor threshold as the three main drivers of banknote quality and cash cycle costs.

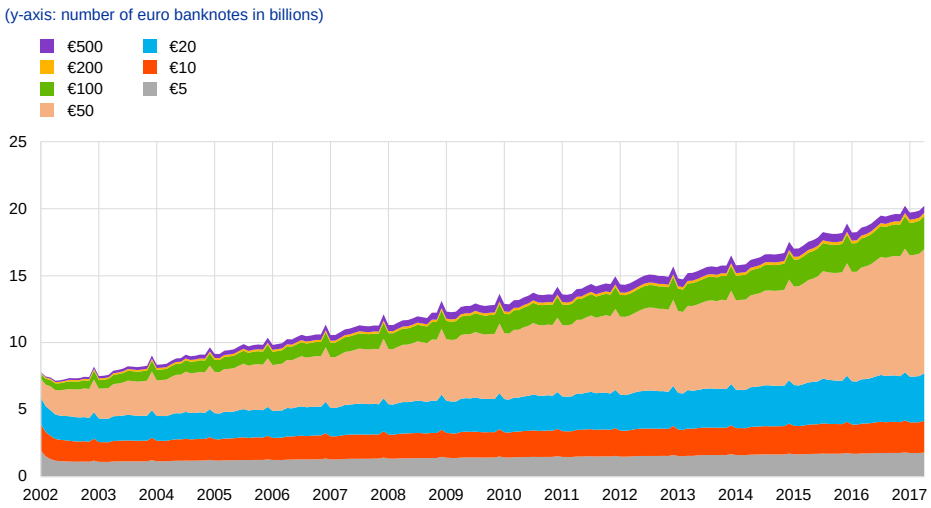
1 Introduction

At the end of December 2016 20.2 billion euro banknotes with a nominal value of €1.12 trillion were in circulation. Compared with end-2015, this marked an increase of 7.0% in volume and 3.9% in value. These figures are in line with the average annual increase over the last five years, which was 7.8% in volume and 6.1% in value (see Chart 1). Euro banknote circulation increases if NCBs issue banknotes; it decreases if NCBs receive banknotes, usually of poor-quality or surplus stocks, from CHs.

[39] CHs are the institutions and economic agents referred to in Article 6(1) of Regulation (EC) No 1338/2001 laying down measures necessary for the protection of the euro against counterfeiting ("Credit institutions, and, within the limits of their payment activity, other payment service providers, and any other institutions engaged in the processing and distribution to the public of notes and coins […]."). In this article all parties other than NCBs processing notes for recirculation are grouped under the term CHs.

Chart 1

Cumulative number of euro banknotes in circulation



Source: Eurosystem Currency Information System 2.
Note: The volumes for the €5 to €50 notes are the sum of first series and Europa series notes.

The Eurosystem has a duty to ensure public confidence in euro banknotes by maintaining their quality in circulation. Poor-quality banknotes are likely to be rejected by vending machines, and also make it less easy for the public and retailers to spot counterfeits. Two factors are mainly responsible for maintaining quality. The first is providing durable banknotes: the lifespan of the Europa series €5 and €10 banknotes has been enhanced by applying an additional protective varnish layer. The second is the involvement of NCBs in the cash cycle, replacing soiled and defective notes detected during machine processing. However, banknote quality in circulation also depends on various other factors. For example, if few ATMs dispense €5 banknotes, these will stay longer in active circulation to make up for their limited availability as change. Retailers will retain them for use rather than return them to the NCB, which is therefore unable to remove any soiled notes from circulation.

Since 2011 CHs have been able to disburse (recirculate) used banknotes, provided they observe the rules set out in ECB Decision ECB/2010/14 on the authenticity and fitness checking and recirculation of euro banknotes (the "Recirculation Framework")[40]. More specifically, any recirculated euro banknotes must have been processed on banknote sorting machines which have been tested by the Eurosystem and are listed on the ECB's website. In addition, CHs are obliged to report every six months on the number and type of machines in use, as well as on the volume of notes processed, recirculated and sorted out as unfit. The Recirculation Framework has been adopted swiftly by CHs. Since the initial reporting of machines used in accordance with the Recirculation Framework the number of compliant banknote handling machines in operation has almost doubled (from

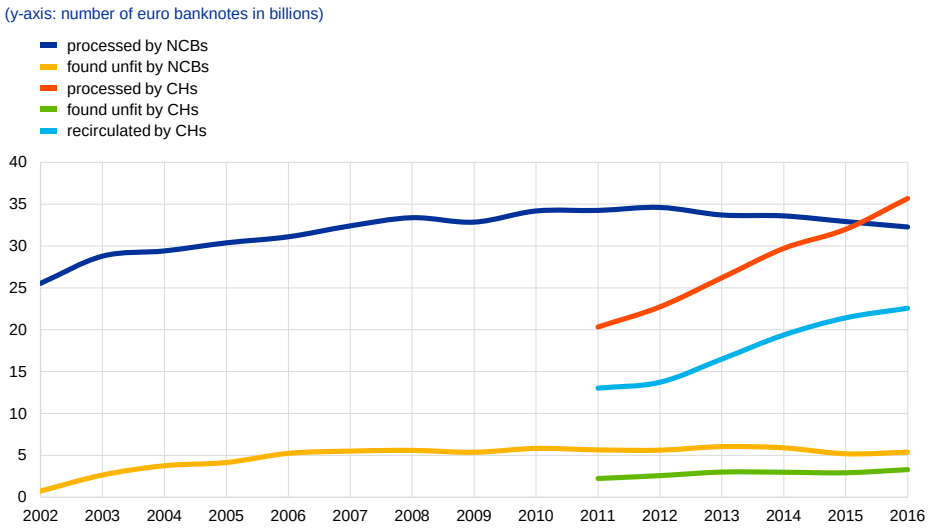
[40] In some euro area countries the recirculation of banknotes was not allowed before that time, in others, recirculation was carried out under bilateral agreements between CHs and the NCB.

around 78,000 in 2012[41] to more than 147,000 by the end of 2016). Recirculating fit banknotes rather than returning them to an NCB allows CHs to save substantial transport and handling costs.

The number of banknotes processed by CHs in 2016 (35.7 billion) exceeded the NCB sorting volume (32.3 billion) for the first time, indicating, on a euro area level, a shift in operational involvement in the cash cycle from NCBs to CHs (see Chart 2). Of the total number of notes processed by the latter, about two-thirds (22.6 billion) were found to be fit and recirculated, with the remainder being returned to the NCBs. Only 2.3 billion of these returned notes were unfit and did not comply with the minimum quality standard stipulated in the Recirculation Framework; the remainder were fit surplus notes.

Chart 2

Number of banknotes processed/recirculated by NCBs and CHs



Source: Eurosystem Currency Information System 2.

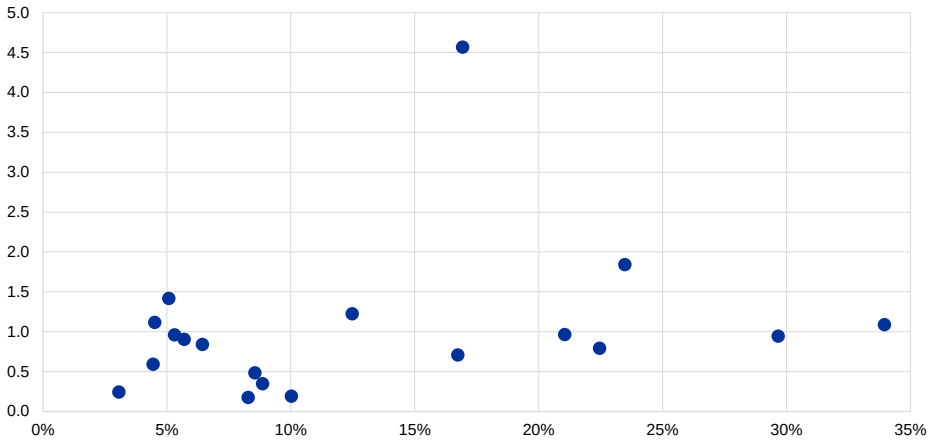
As for the quality of euro banknotes in circulation in different euro area countries, the intuitive assumption is that a higher level of destruction of poor quality banknotes – and replacement with new notes – should result in improved quality. When countries' quality in circulation is compared with the per capita rate of note destruction, however, this is not apparent (see Chart 3). The chart shows a mixed picture, with most countries having a low destruction rate of about one note per person per year, but with significant outliers. Some countries have a lower quality in circulation despite a high destruction rate; others have a very high quality in circulation even though they destroy less than half as many notes as the euro area average. This indicates that differences in national cash cycles play a significant role. These specific national influences are not yet sufficiently understood.

[41] The Recirculation Framework entered into force on 1 January 2011 with a one-year transitional period for statistical reporting.

Chart 3

Quality of €5 banknotes in circulation versus note destruction in euro area countries

(x-axis: banknotes found to be unfit as a percentage of notes in circulation; y-axis: note destruction per capita from May 2014 to April 2015)



Sources: 2015 Eurosystem banknote quality survey, Eurosystem Currency Information System 2, Eurostat population figures (for smaller countries a correction for tourism and migration was introduced using national statistical data sources).
Notes: One data point per euro area country. Percentage of banknotes found to be unfit in a representative sample of a country's notes in circulation versus banknotes destroyed per inhabitant per year for the Europa series €5 banknote. See Section 2.4 for an explanation of how a representative sample of a country's banknotes in circulation was collected. The sampling for the 2015 banknote quality survey was carried out in the period from March to May 2015. Banknote destruction is the total for the period from May 2014 to April 2015.

The ECB has developed a computer-based model which includes all main parameters known to affect a cash cycle and can be applied on both a national and aggregate euro area level. The model is designed to provide a better understanding of the different euro area countries' cash cycles as well as the factors that influence note consumption and note quality.[42] Section 2 of this article looks at the main stakeholders in a cash cycle and the key parameters which influence banknote quality. Section 3 outlines the model. Section 4 shows the results obtained by applying the model to two theoretical national cash cycles.

2 The banknote lifecycle

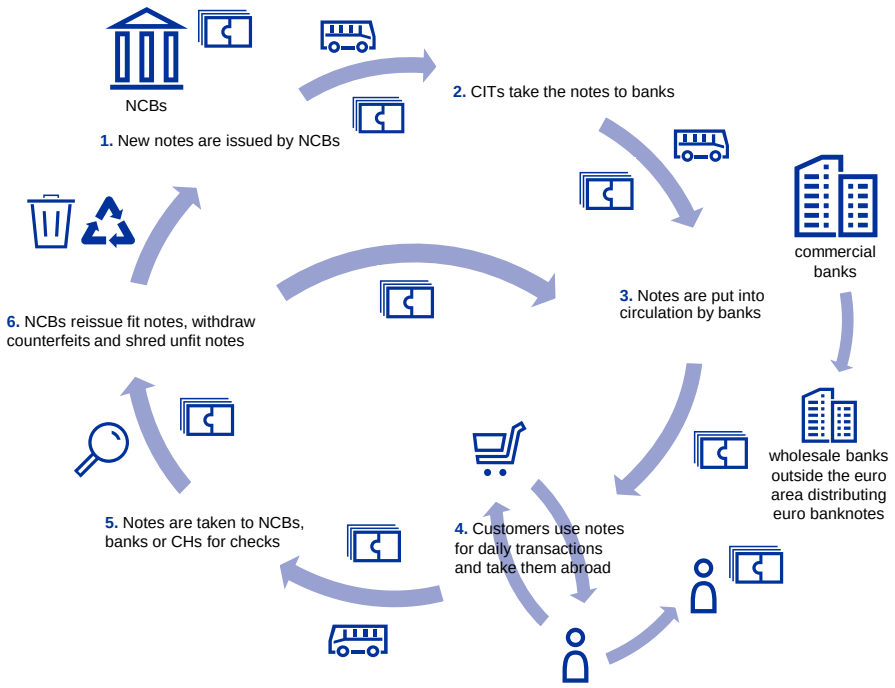
2.1 Overview of stakeholders

The cash cycle involves several interacting processes and stakeholders. An overview of a typical euro area cash cycle is shown in Figure 1. NCBs issue euro banknotes (printed by multiple accredited printing works). From here they are picked up by CHs, usually using cash-in-transit companies (CITs), which deliver them to commercial banks or retailers, or directly to ATMs. The public receive banknotes primarily from ATMs or as change from retailers, and to a lesser extent over the counter at banks. Retailers' excess banknotes are deposited at a bank branch or

[42] The model will be available for download on the ECB's website and can also be applied to non-euro area cash cycles. The simulation of local cash cycles is also of relevance for other (larger) countries where different regions show a similarly mixed picture.

picked up by CITs. They are then either returned to the NCB for quality and authenticity checks or recirculated by a CH. Depending on the denomination of the note and the country, a note may be processed and returned to the cash cycle multiple times before becoming unfit and sorted out for destruction.

Figure 1
The banknote lifecycle



Euro banknotes are also exported to and imported from countries outside the euro area by both specialised CHs (e.g. banknote wholesale banks supplying bureaux de change) and the public, for tourism or commercial purposes. Cumulative net exports to non-euro area countries in the form of bulk shipments of euro banknotes by banknote wholesale banks by the end of 2016 amounted to €172.8 billion. As there are also large unregistered flows, other sources[43] estimate that more than 30% of euro banknotes issued in Germany by value circulate outside the euro area. Estimates of a denominational breakdown are not yet available.

These inflows and outflows from/to outside the euro area, or between the different countries within it, have a substantial impact on national cash cycles. Some euro area countries experience negative net issuance of certain denominations, i.e. an NCB receives more banknotes from CHs than it issues. This occurs when notes migrate into the country from abroad, either from another euro area country or from regions outside the euro area. Banknote migration is caused primarily by tourism and cross-border commuting. To balance these "natural" flows,

43 See *The international role of the euro, Interim report*, ECB, June 2016 or Bartzsch, N., Rösl, G. and Seitz, F., "Foreign demand for euro banknotes issued in Germany: estimation using indirect approaches", *Discussion Paper*, Series 1, No 21, Deutsche Bundesbank, 2011.

the Eurosystem regularly transports large volumes of euro banknotes across borders. These ensure that countries with a positive net issuance are able to meet the demand for banknotes at any time.

While the general cash cycle holds true for all NCBs, the share processed by NCBs and CHs and their respective roles vary considerably from country to country. This is due to national specificities. In 2016 the aggregate ratio of processing by CHs to processing by NCBs was close to 1.1 (see Chart 2), but national figures range from 0 (i.e. no recirculation by CHs at all) to CHs processing more than five times the NCB note volume.

2.2 Banknote fitness as judged by humans and machines

Over their life banknotes deteriorate and their quality, i.e. fitness, decreases. The fitness of a banknote is defined by its soil level and whether it carries any defects. Recent research into the ageing of banknotes has identified soiling as one of the main reasons circulating notes become unfit. Soil consists primarily of human sebum (a waxy substance produced by skin glands) transferred onto notes by handling, and dirt particles.[44] The second unfit category comprises defects such as stains, graffiti markings, tape, dog-ears and tears. While soiling is typically a gradual process, a banknote usually becomes defective at a particular moment in time (e.g. when it is torn or stained).

The difficulty for all automated fitness measurements is to ensure that the machine judgement correlates well with the human perception of the condition of a banknote. Fitness is usually measured by sorting machines that process up to 33 banknotes per second, capture an image of a banknote, apply different algorithms to the image and finally decide whether or not it is fit for circulation. However, the fitness assessment by sorting machine can be influenced by different factors. The most prominent are: (1) imperfections in the note transport and camera system; (2) dust from the processed banknotes (such as residues of paper fibres or ink) affecting the image quality; (3) the gloss on new banknotes, which has been shown to significantly affect soiling assessment; (4) potential production variations, despite strict quality controls, resulting in slight differences in new batches of notes.

To ensure NCBs apply standards that match human perception, the ECB has created a standardised batch or "test deck" of euro notes from circulation for evaluating sorting machines. The test deck contains banknotes of all fitness levels. On the basis of a visual assessment by Eurosystem experts (i.e. human perception), a "true" fitness value has been allocated to each banknote in the test deck. Naturally, no judgement by an automated fitness sensor will exactly match the fitness value derived from human expert judgement, so there will be some cases of misclassification. Either fit banknotes are incorrectly prematurely destroyed (false unfit notes) or unfit banknotes are judged fit and reissued (false fit notes). Eurosystem research has confirmed, by applying the test deck, that different high-

[44] See Balke, P., "From Fit to Unfit: How banknotes become soiled," Watermark 2011, Rostov-on-Don.

speed sorting machines have substantially different classification accuracy,[45] primarily owing to the different technologies and algorithms used.[46]

2.3 Eurosystem standards for measuring banknote fitness

The Eurosystem has defined minimum thresholds at which an NCB must classify a banknote as unfit for circulation (the "Eurosystem threshold[47]"). These thresholds include limits for soiling and all defect categories. All NCBs must adhere to these minimum requirements, and only a small percentage of the notes they reissue are allowed to not fulfil these criteria. This tolerance margin (8% of notes reissued) takes into account the uncertainties of machine note classification. NCBs can apply a stricter sorting policy to counteract low quality of banknotes in the national cash cycle.

The minimum fitness standards for CHs ("CH threshold") are defined in the Recirculation Framework and are lower than those for NCBs. This to ensure that, even including the measuring tolerances, the banknotes reissued by an NCB are fit for the CHs and can be recirculated a number of times before reaching the end of their life.

2.4 How the Eurosystem measures quality in circulation

Every year the Eurosystem collects a representative sample of the "transactional" denominations (€5 – €100) and determines the percentage of unfit banknotes in this sample according to the Eurosystem threshold. Samples taken from circulation in each euro area country are processed on the high-speed sorting machines of two NCBs and the average percentage of unfit notes in each sample, whether due to soil or to defects, is calculated. The results of this annual quality survey among other things help the NCBs decide whether banknote quality in circulation is adequate and if necessary adjust their sorting policy.

The Eurosystem also carries out a survey of public perceptions of note quality (every two years) and an online poll[48] (since 2012), both of which correlate well with the quality survey. Both polls focus on the quality of the €5 and €50 notes. The €5 note usually has a lower quality because it remains in circulation as change, returning to NCBs less often. Taking the euro area average, the quality of the €5 note is considered good, with 75% of participants ranking quality as acceptable or higher (see Chart 4). For the €50 note almost all respondents (99%) consider the note to be of at least acceptable quality. Comparing the national results of the quality survey

45 Alternative methods have also shown that the accuracy of a sensor is dependent on the denomination and is not consistent along a normalised fitness range.

46 See e.g. Buitelaar, T., "The Colour of Soil", DNB Cash Seminar 2008, Amsterdam, 28-29 February 2008.

47 When presenting percentages of unfit notes in circulation, this article refers to notes unfit according to the Eurosystem threshold.

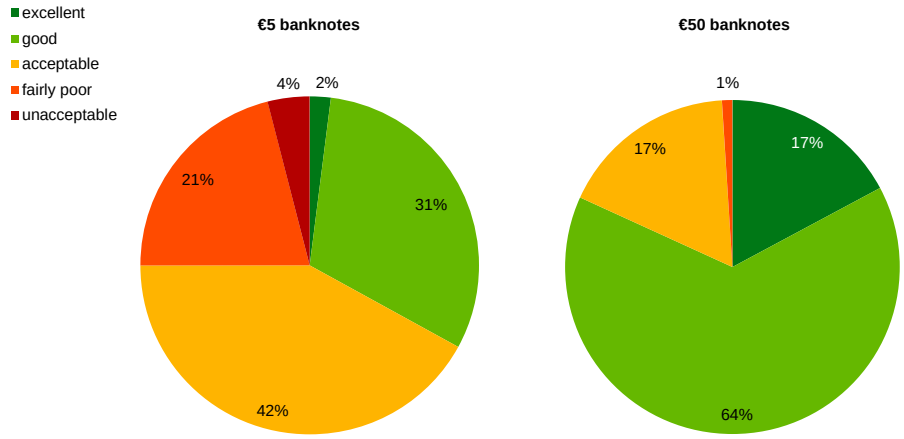
48 See online survey on the quality of euro banknotes.

with the national responses in the online poll reveals a good correlation between the percentage of unfit notes found in a country's sample and public opinion of the €5 note (see Chart 5). However, this pattern is not observed for the €50 note; as this is generally of good quality, there is no data in the unfit/negative responses area (top right) of the graph.

Chart 4

Physical condition of euro banknotes as found in the 2012 public opinion survey

(Eurosystem averages)

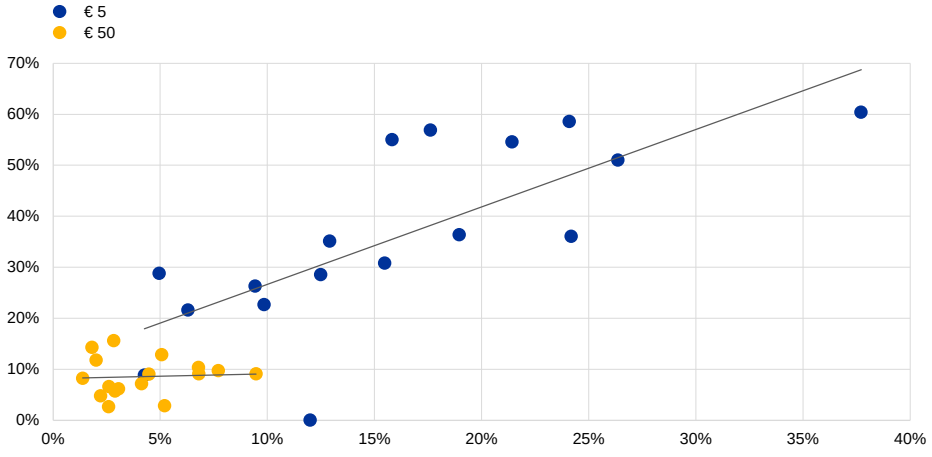


Source: 2012 ECB public opinion survey on euro banknotes.
Notes: Answers to the survey question "How would you generally describe the physical condition of the €5/€50 banknotes in circulation?" Results shown are for 2012, as the latest figures (2014) were affected by the introduction of the Europa series €5 note.

Chart 5

Correlation of unfit banknotes found in circulation with public feedback received per country for €5 and €50 notes

(x-axis: banknotes found to be unfit as a percentage of notes in circulation; y-axis: percentage of negative responses (fairly poor/unacceptable) in the online poll)



Sources: 2012 Eurosystem online survey on the quality of euro banknotes and 2012 Eurosystem quality survey.
Note: One data point per euro area country.

2.5 The lifespan of a banknote

All euro banknotes within a single denomination have the same substrate and print specifications; however, the life of a note from first issuance to destruction at an NCB depends on both its physical durability and national cash cycle characteristics. How banknotes are used by the public (e.g. whether they are stored in wallets or in trouser pockets) and even environmental factors such as humidity play a significant role in the time it takes for a note to become unfit. The frequency with which notes are returned to either CHs or NCBs then has an impact on how soon the unfit ones can be removed from circulation.

The lifespan of a banknote is commonly defined as the total number of notes in circulation divided by the notes destroyed per year. However, this approach does not take into account banknotes that are not actually circulating at all because they are being used as a store of value, have been lost, or have migrated out of the national cash cycle or even out of the euro area entirely.[49] More accurately, the life of a banknote can be stated as:

$$Lifespan[years] = \frac{Notes\ in\ active\ circulation}{Notes\ destroyed\ per\ year}$$

However, the data available does not allow the active circulation for each country and denomination to be determined accurately. The Eurosystem therefore has to rely on estimates which take into account national data on NCB and CH processing and NCB destruction volumes. Known banknote flows due to commuting, tourism or CH shipments are also included in these estimates.

3 The model – definitions and methodology

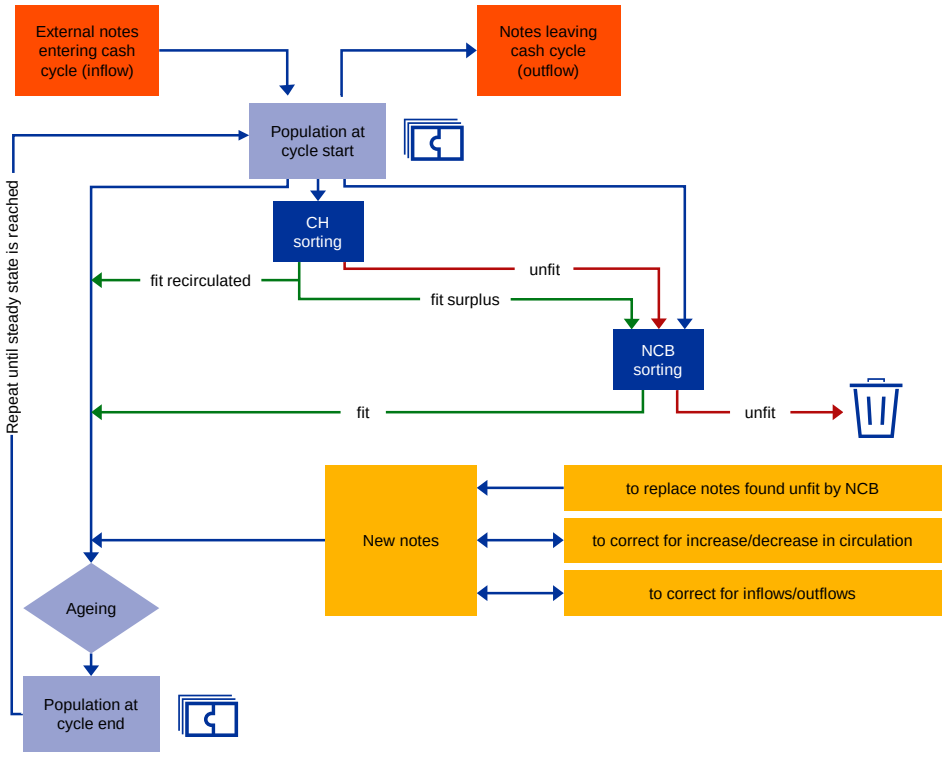
The ECB's model simulates a cash cycle. The most important results generated are the NCB shred rate, the quality in circulation (the percentage of unfit banknotes in circulation), the replacement cost and the actual banknote life in circulation. The model starts with a population of banknotes which can be defined by the operator. After the model is started, the population evolves over a number of iterations until a steady state is reached. Each iteration in the model simulates the sorting and ageing within the cash cycle over one week. Steady state in the cycle is reached at the equilibrium where the sorting activities of CHs and the NCB counteract the ageing of notes in circulation due to soiling and defects, increases or decreases in circulation volume and inflows and outflows.[50] The cash cycle as implemented in the model is shown in Figure 2 and explained in more depth below.

[49] Although the Europa series €5 note has been in issue since May 2013, at the end of 2016 342 million notes of the first series €5 had not yet been returned to the NCBs.

[50] The results presented are based on steady-state cash cycles. The model also allows dynamic step changes in a cash cycle to be simulated and the evolution of parameters to be monitored over time.

Figure 2

The note circulation model



The model defines banknote fitness on a scale of 1 to 100, with the Eurosystem threshold set at 50. A fitness level of 1 is the cleanest new note, and 100 is any note which is more than twice as soiled as the threshold. Defects are binary and assigned a fitness level of 100, which ensures that they are consistently sorted out as unfit by CHs and NCBs.[51] Any population of banknotes in the model has a fitness profile, which shows the frequency of fitness levels within it. The model starts with a note population which represents the banknotes in active circulation. In every iteration the following steps are carried out:

1. Part of the note population is sorted into fit and unfit notes by CHs.

2. A further portion of the notes is then sorted by the NCB. These notes are a mix of notes from circulation, the notes found by CHs to be unfit and notes found by CHs to be fit but sent back to the NCB as surplus. The banknotes processed by the NCB are sorted into fit and unfit, with all unfit banknotes being removed from circulation.

[51] This is the predominant case in reality, as camera systems usually have no problem detecting defects such as dog-ears.

3. New notes are added,[52] equivalent to the number of notes sorted out as unfit by the NCB plus an additional correction for general circulation growth or decrease and compensation for any inflows and outflows.

4. All notes in circulation (i.e. notes not processed in the cycle, notes sorted as fit by CHs and the NCB and any new notes) are aged. Ageing entails applying algorithms to simulate how banknotes gradually become soiled and suffer defects.

5. Lastly, the fitness profile of the population at the end of the cycle is compared with what it was at the beginning. If the two are sufficiently similar, steady state has been reached and the final results are displayed. Otherwise steps 1-5 are repeated as long as necessary.

The ageing of a banknote is simulated in two steps, representing soiling and defects. The average soiling per cycle is determined by the "theoretical note life" and applied to each note via a definable distribution function.[53] The theoretical note life is the time it takes for a new banknote to become unfit, i.e. to go from fitness level 1 to 50. It is an input parameter for the model and dependent on banknote durability but also on environmental factors, such as how intensively banknotes are used by the public in the simulated cash cycle.

In the next step, defects are simulated by the likelihood (expressed as a percentage per year) of each banknote suffering a defect (i.e. being moved instantly from its current fitness level to 100). The defect likelihood is applied to the banknote distribution according to a selectable profile in relation to the notes' fitness levels. With this approach, it can be modelled, for example, that banknotes with a higher soil value have a higher likelihood of becoming defective.[54]

The NCB and CH sorting steps are both simulated by applying a model sensor with inaccuracies following a Gaussian distribution[55] to the fitness profile of incoming notes. The inaccuracy of the model sensor is expressed as standard deviation (SD) in relation to the fitness scale. Chart 6 shows how a fitness sensor, operating at a threshold of a fitness level of 45 and having an inaccuracy modelled by an SD of 5 fitness levels, separates a typical note circulation profile (with 20% unfit notes) into fit and unfit notes. In the example, sensor inaccuracies mean that a small number of the notes sorted as fit are more soiled than the Eurosystem threshold (false fit 0.4%[56]), but also that a substantial number of notes sorted as unfit are well below the Eurosystem threshold (false unfit 9%).

52 The model allows any fitness profile for new banknotes to be specified. Typically, a Gaussian distribution reflecting some production variations is used.

53 A Poisson distribution is used as a standard, with other distribution functions also supported.

54 Studies have shown that the closest correlation to real-life quality data can be achieved by applying, in each cycle, a defect probability which increases linearly with the fitness level.

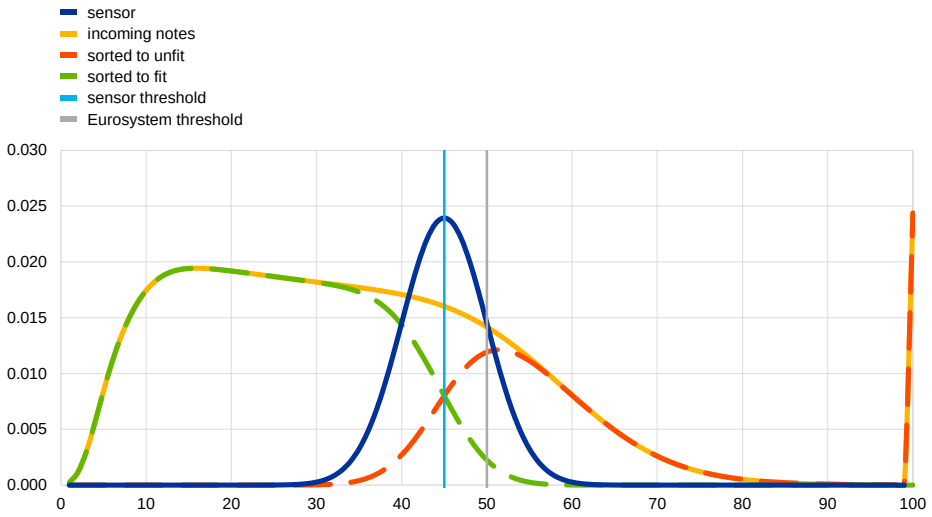
55 The Gaussian behaviour was identified during earlier large-scale studies on sorting machines.

56 False fit and false unfit figures are the share of total sorted notes.

Chart 6

Schematic depiction of the circulation model sorting step

(x-axis: note fitness level (1: new, 50: Eurosystem threshold, 100: very soiled); y-axis: frequency)



Source: ECB Banknote Circulation Model.
Notes: The spike at the 100 fitness level denotes defective and very unfit notes.

Modelled banknote inflows can have any fitness profile. The fitness profile of outflows is assumed to be the same as that of the current note circulation in the cash cycle. Both inflows and outflows are modelled to be neutral to the circulation volume. For outflows this is achieved by replacing the missing notes in each model cycle with additional new notes issued by the NCB. For inflows the volume of new notes added by the NCB as a replacement in each cycle is reduced accordingly.

Total cash cycle costs are modelled as the sum of NCB sorting costs and the note replacement costs. Model inputs for the two cost components are the NCB's sorting costs (per 1,000 notes sorted)[57] and the issuance costs for new notes.[58] As shown in Figure 2 the new notes which have to be issued are equivalent to unfit notes destroyed by the NCB, outflows and any circulation increases.[59] A third component is the processing costs for CHs; this is not modelled as no consolidated data exists.

4 Application of the model to two theoretical cash cycles

The section presents an analysis of two theoretical cash cycles, both of which resemble typical national cash cycles for different NCBs and/or denominations. Following a sensitivity analysis conducted on the two base cases,

57 Including all NCB costs for lodging, unpacking, processing, destruction of unfit notes, repackaging of fit notes, storing and reissuing.

58 Including production, transport, storage and handling costs.

59 For more in-depth studies the model also outputs the residual value of false unfit notes using a linear depreciation from fitness level 1 to a definable residual value at the Eurosystem threshold (50). This aspect is not covered in this article.

the two strongest factors (NCB sorting threshold and theoretical banknote life) are discussed in more detail.

4.1 Definition of two cash cycles

The two cash cycles used, representing the cash cycles of two theoretical countries, are identical in all aspects (e.g. theoretical life of a banknote, accuracy of sorting sensors used) except for the involvement of the CHs and the NCB. In Cash Cycle 1, the NCB is actively involved and recirculation by CHs is limited. Cash Cycle 2 represents a country where CHs recirculate a large share of the volume of banknotes in circulation. The values of the input parameters for the two cycles are shown in Table 1.

Table 1

Overview of the input parameters for the two base cash cycles

Input parameter	Cash Cycle 1	Cash Cycle 2
New note issuance costs	€50 per 1,000 notes	
New note fitness level	1	
New note fitness variation (SD in fitness levels)	5	
Notes in active circulation	1 billion	
Annual change in circulation volume	+5%	
Note inflows/outflows	none	
Ageing model	Poisson	
Theoretical note life (due to soiling)	24 months	
Defect likelihood per year	10% (increasing linearly with the fitness level)	
CH sorting volume per year	2 billion	5 billion
CH share of fit notes sent to NCB (as surplus)	25%	
CH sorting threshold	70	
NCB sorting threshold	50 (i.e. at Eurosystem threshold)	
CH and NCB sensor inaccuracy (SD in fitness levels)	10	
NCB sorting costs	€10 per 1,000 notes	
NCB sorting volume per year	5 billion	2 billion
Eurosystem fit/unfit threshold	50	

Notes: Rounded Eurosystem averages and estimates were used for all input parameters. In this example, the estimates for new note issuance costs and NCB sorting costs are the same for both theoretical cash cycles and do not include any economies of scale due to different NCB sorting volumes or different annual note replacement volumes (see Table 2 below).

The model results for the two theoretical cash cycles are shown in Table 2.

Table 2

Results for the two base cash cycles

Model results	Cash Cycle 1	Cash Cycle 2
Technical		
Percentage of unfit notes in circulation	6.8%	14.7%
NCB destruction (shred) rate	11.5%	23.8%
Annual note replacement volume*	574.6 million	476.5 million
Average note life in circulation	20.9 months	25.2 months
Financial		
Annual note replacement costs	€28.7 million	€23.8 million
Annual NCB sorting costs	€50 million	€20 million
Total costs**	**€78.7 million**	**€43.8 million**

Source: ECB Banknote Circulation Model.
* The note replacement volume and costs quoted here do not include notes needed to increase the circulation volume (as they are not replacing unfit notes). The additional cost due to new notes needed to increase circulation volume is, in this case, €2.5 million in the first year for both cash cycles ([1billion notes in circulation] increased by [5%], at [€50 per 1,000 new notes]).
** Excluding CH processing costs.

The two cycles studied, despite using notes with the same theoretical note life, result in a different note life in circulation. In Cash Cycle 2 fewer banknotes are returned to the NCB (2 billion against 5 billion in Cash Cycle 1), but these are more soiled. This can be seen by the NCB destruction (shred) rate, which is much higher in Cash Cycle 2. Even though a higher percentage of NCB-sorted notes are destroyed in Cash Cycle 2, the absolute volume of shredded banknotes is lower, resulting in a lower annual replacement of about 100 million notes. As a result notes are about 4.5 months longer in circulation, resulting in a substantially lower quality in circulation (14.7% unfit compared with 6.8% for Cash Cycle 1). This is expected, as the CH threshold is more lenient (70) than the NCB threshold (50) and the proportion of notes recirculated is substantially higher in Cash Cycle 2. Cost-wise, Cash Cycle 1 has almost twice the annual costs of Cash Cycle 2. This is due primarily to the substantially higher NCB sorting volume/costs and only to a small extent to the increased replacement costs.

4.2 A sensitivity analysis of the model based on the two cycles

All the model input parameters affect the final note quality in circulation and total costs; this section examines the sensitivity of the results to the input parameters, identifies key drivers and examines whether changing the input parameters affects the two theoretical cash cycles in the same way. The analysis is based on a scenario approach. The base values of the input parameters for the two cash cycles (as defined in Table 1) are modified to give new scenario values. The scenario values are set within ranges considered to be either within the inaccuracy of the respective parameter or within the expected range in which they can be adjusted by the Eurosystem. Parameters which are either fixed (e.g. the NCB or CH sorting volume) or have no impact on quality (e.g. banknote replacement or sorting costs) are not included in the analysis. Table 3 presents an overview of the modification of each model input for each scenario. For most input parameters both an increase and a decrease from the base value are simulated. For every scenario the results for note

quality (expressed as the percentage of unfit notes in circulation) and total cash cycle costs are presented as change in relation to the base case results.

Table 3

Sensitivity analysis of key model parameters for the two cash cycles

(Changes in percentage points for unfit notes in circulation and EUR millions for total costs)

			Results			
			Cash Cycle 1		Cash Cycle 2	
			Unfit notes in circulation	Total costs	Unfit notes in circulation	Total costs
Base case results			**6.8%**	**78.73**	**14.7%**	**43.82**
Scenario input	**Base cash cycle value**	**Scenario value**				
Note production parameter						
New note fitness variation (SD in fitness levels)	5	1	-0.5	-1.96	-0.6	-1.04
		15	+1.2	+5.60	+3.5	+4.43
Note circulation parameters						
Notes in active circulation	1 billion	0.9 billion	-0.9	-2.33	-1.3	-1.86
		1.1 billion	+0.9	+2.27	+1.2	+1.82
Annual change in circulation volume*	+5%	0%	+0.3	+1.02	+0.8	+1.01
		+15%	-0.5	-1.90	-0.9	-1.37
Note inflow (5% unfit)	0	0.25 billion	+1.5	-7.31	+3.4	-8.10
Note inflow (20% unfit)	0	0.25 billion	+2.3	-5.87	+4.7	-6.67
Note outflow	0	0.25 billion	-1.4	+7.44	-3.2	+8.17
Note lifespan parameters						
Theoretical note life (due to soiling) in months	24	18	+2.8	+6.66	+4.6	+5.96
		30	-1.7	-4.57	-2.5	-3.27
Defect likelihood per year	10%	5%	-0.5	-1.09	+0.2	-0.84
		15%	+0.3	+0.86	+0.1	+1.14
CH parameters						
CH share of fit notes sent to NCB (as surplus)	25%	15%	-0.1	+0.02	-0.3	+0.08
		35%	+0.1	-0.02	+0.4	-0.09
CH sorting threshold	70	60	-0.3	+0.12	-2.3	+0.71
		80	+0.1	-0.04	+1.7	-0.24
CH sensor inaccuracy (SD in fitness levels)	10	5	+0.1	-0.03	+0.8	-0.21
		15	-0.1	+0.05	-0.7	+0.27
NCB parameters						
NCB sorting threshold	50	45	-2.6	+2.88	-2.6	+2.54
		55	+3.5	-3.38	+4.0	-1.35
NCB sensor inaccuracy (SD in fitness levels)	10	5	+1.0	-2.87	+1.0	-0.41
		15	-1.0	+3.60	-0.1	+1.86

Source: ECB Banknote Circulation Model.
* The note replacement volume and costs quoted here do not include notes needed to increase the circulation volume (as they are not replacing unfit notes). Additional costs for new notes due to a circulation increase for the two scenarios would be zero (for the no growth scenario) and €7.5 million (for the +15% scenario).

The table above shows that the parameters which have the largest impact on the final quality of notes in circulation are – for both cycles – the NCB sorting

threshold and theoretical banknote life. These parameters are studied in more detail in Sections 4.3.1 and 4.3.2. Other parameters such as banknote outflows have a comparable impact, but they are outside the control of a central bank.

The new note fitness variations, which in the model are expressed as SD in fitness levels, also significantly affect quality and costs. For Cash Cycle 1, changing the SD between 1 (highly uniform production) and 15 (substantial variations which affect soil detection[60]) fitness levels can result in either savings of €1.96 million or additional costs of €5.60 million compared with the base case. The overall range covers about 10% of the total cash cycle costs. In addition, the simulated increase compared with the base case has a negative impact on quality, adding an additional 1.2 percentage points to the proportion of unfit notes in circulation. The same trend is visible for Cash Cycle 2, with, however, a slightly different magnitude regarding quality and costs.

The – difficult to determine – number of notes in active circulation has a substantial impact on the model results. As a larger note circulation volume results in notes being returned less frequently to the NCB or CHs,[61] this leads to more unfit notes in circulation. Subsequently the NCB note destruction volume increases, resulting in additional replacement costs. The behaviour is similar for both cycles. For an accurate modelling of any specific national cash cycle a good knowledge of the active circulation is required.

Changes to the NCB sensor accuracy and CH sorting threshold or sensor accuracy affect the two cash cycles very differently. Cash Cycle 2 reacts about ten times more strongly to changes in the CH sensor performance (expressed as SD in fitness levels) or sorting threshold than Cash Cycle 1. This was expected, but to a lesser extent, considering that the CH sorting volume in Cash Cycle 2 is only 2.5 times the CH sorting volume in Cash Cycle 1. Yet it is a clear indication that in cash cycles with substantial recirculation, the performance of the machines used by CHs needs to be carefully monitored. NCB sensor accuracy has an impact on cash cycle costs which is about 3-7 times higher for Cash Cycle 1, indicating that efforts to improve the NCB sensor performance are most cost-effective where the NCB accounts for the largest share of note sorting. The result that better CH or NCB sensors lead to a slightly lower note quality in circulation is counter-intuitive. The reason is that “bad” sensors sort out a substantial amount of fit notes which are close to the threshold (e.g. notes with 40 – 50 fitness levels), which are in turn replaced with brand new notes. This has the side-effect of cleaning the circulation, at the expense of destroying still fit notes.

The model confirms that inflows and outflows of notes play a substantial role in the national cash cycles of the euro area. In the sensitivity analysis annual inflows and outflows of one-quarter of the total note circulation volume are

60 Such as, for example, differences in the watermark or paper tint. The estimations of the SD for production variations are based on internal ECB studies and in the past are estimated to have occurred. The Eurosystem is constantly trying to reduce such production variations.

61 At constant sorting volumes, which is the case in this simulation.

simulated.[62] As outflows are replaced in the model with new banknotes, an increase in the quality in circulation, together with an increase in the replacement costs, is observed. For incoming notes, the sensitivity analysis studies inflows of two note quality levels (5% and 20% unfit in the note population). Even when banknotes of good quality (with 5% unfit) enter a cash cycle, such an inflow has a negative impact on the circulation quality as it restricts the NCB's possibility to issue new notes. This effect becomes more pronounced the lower the incoming note quality becomes. In both inflow cases the NCB has a substantially lower need for new notes as a result of the inflows and accordingly lower replacement costs. The impact is very similar for both cash cycles.

The impact of other parameters, such as the ageing model or the defect likelihood in relation to note fitness (increasing or constant), is small and therefore not included in Table 3.

4.3 Detailed analysis of key cash cycle parameters

The sensitivity analysis above changed individual model parameters, but kept the NCB sorting threshold at the Eurosystem threshold (50). In reality, however, an NCB can modify the sorting threshold on its machines. This section looks at the possibility of adjustments of the NCB sorting threshold, to steer the note quality (4.3.1) or benefit from an extended note life (4.3.2).

4.3.1 NCB sorting threshold

An adjustment of the sorting threshold by an NCB has an impact both on the quality in circulation and replacement costs. In real life NCBs select a sorting threshold which meets the requirements of the cash cycle in their country. Cash cycles can be different owing to geographical, cultural and societal differences. Chart 7 shows the effect of adjusting the NCB sorting threshold on the two cash cycles. The dotted parts of the lines indicate sensor thresholds where the notes reissued by the NCB would include too many unfit notes (false fit > 8%) and no longer conform to the minimum note quality allowed within the Eurosystem.[63]

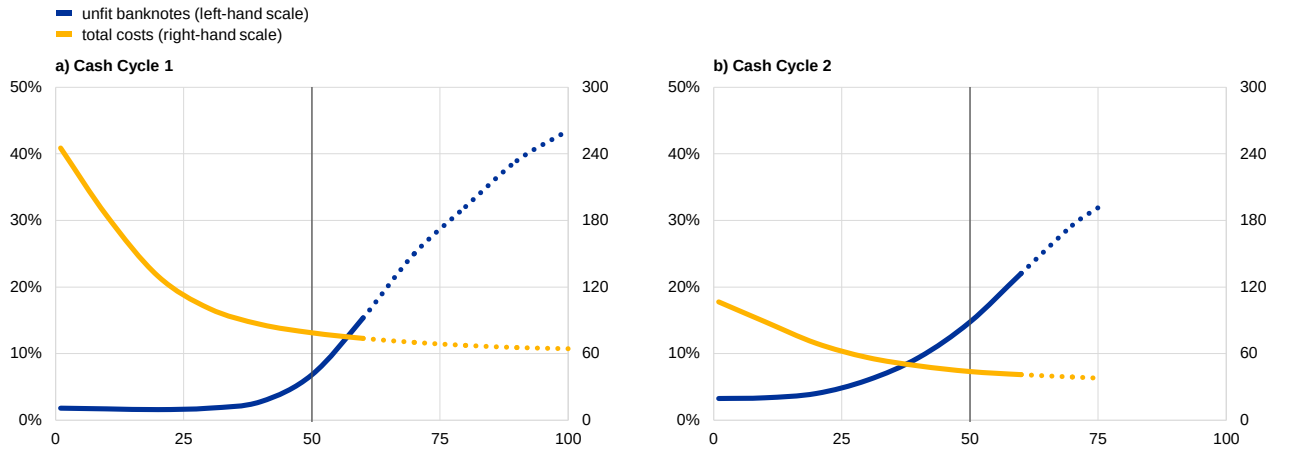
62 On the basis of Eurosystem estimates, such inflows and outflows commonly occur in national cash cycles.

63 Additionally, for Cash Cycle 2, no steady-state condition could be derived at NCB sensor settings higher than 75 as the resulting quality in circulation would be too low and the number of notes returned by CHs as unfit would be larger than the total annual NCB sorting capacity of 2 billion notes.

Chart 7

Quality in circulation and total cash cycle costs as a function of the NCB sorting threshold

(x-axis: NCB sorting threshold; left y-axis: percentage of unfit notes in circulation; right y-axis: total cash cycle costs in EUR millions)



Source: ECB Banknote Circulation Model.
Note: The vertical lines at 50 refer to the base cases as defined in Section 4.1. The dotted parts of the lines correspond to NCB sensor thresholds where the notes reissued by the NCB would contain too many unfit notes (false fit > 8%).

As expected, for more severe (lower) sorting thresholds, the total cash cycle costs increase and note quality improves in both cash cycles. However, the magnitude is very different in the two cycles. In Cash Cycle 1, with more severe sorting, the quality can be improved to about 2% unfit notes in circulation. In Cash Cycle 2, even with all notes received destroyed and replaced with new notes,[64] the best quality that can be reached is about 4% unfit notes in circulation. The total costs for Cash Cycle 1 remain in all cases higher than for Cash Cycle 2 owing to the constant difference of €30 million p.a. for the additional NCB processing in Cash Cycle 1 (5 billion notes compared with 2 billion for Cash Cycle 2).

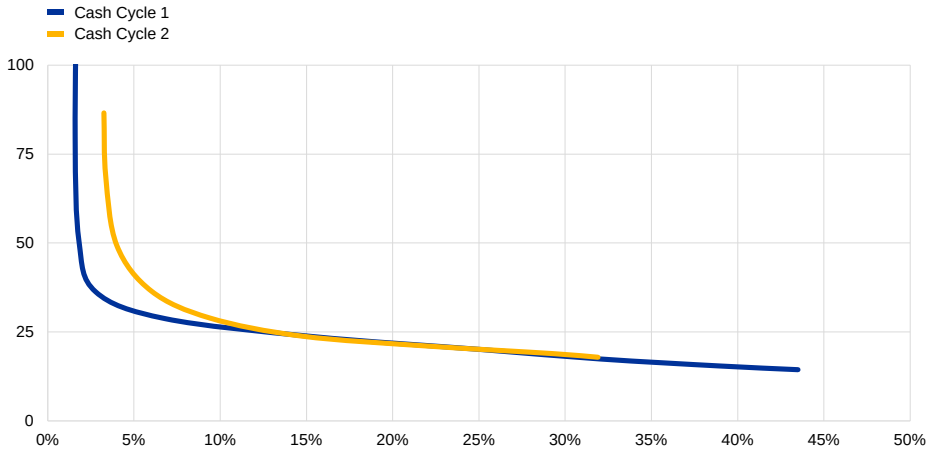
The question arises of whether a higher NCB sorting volume is beneficial. This is not immediately evident from Cash Cycles 1 and 2, as a substantial difference in the cash cycle costs is due to a different quality in circulation but also to the different annual NCB processing costs. To answer this question we therefore need to look at note replacement costs for the two cash cycles in relation to the percentage of unfit notes in circulation (see Chart 8).

[64] By sorting at an NCB fitness threshold of 1.

Chart 8

Annual replacement costs as a function of note quality

(x-axis: percentage of unfit notes in circulation; y-axis: annual note replacement costs in EUR millions)



Source: ECB Banknote Circulation Model.
Note: The chart reflects the change in circulation note quality produced by adjustment of the NCB sorting threshold.

Chart 8 shows that as long as there are more than about 10% unfit notes in circulation, the replacement costs are identical in both cycles. However, with a higher frequency of notes being returned to the NCB (as in Cash Cycle 1), the quality of notes in circulation can be raised to about 5% with only a linear increase in replacement costs. If NCB processing volumes are lower (Cash Cycle 2), the point where any further improvement in note quality comes at exponentially higher replacement costs is already at about 10% unfit in circulation.

Understanding the relationship between the extent of NCB note processing, the note replacement volume and the achievable note quality in circulation is especially relevant for the Eurosystem. The replacement costs for banknotes are shared by an allocation of the total note production volume according to each NCB's share in the ECB's capital.[65] The NCB note processing costs are, on the other hand, covered by the NCB in question. Each NCB must therefore ensure that its involvement in the cash cycle is sufficient to achieve the required national note quality without an overproportionate note consumption. The level of the NCB's involvement also needs to take into account the other factors influencing the national cash cycle, such as national differences in note life, inflows/outflows or the role of CHs.

4.3.2 Increasing banknote life

As already mentioned, one input in the model is the theoretical note life, which is the average time a note takes to become gradually soiled from new (fitness level 1) to the Eurosystem threshold (50). An increase in this parameter corresponds either to

[65] Using a key which is linked to the countries' shares in the total population and gross domestic product of the EU.

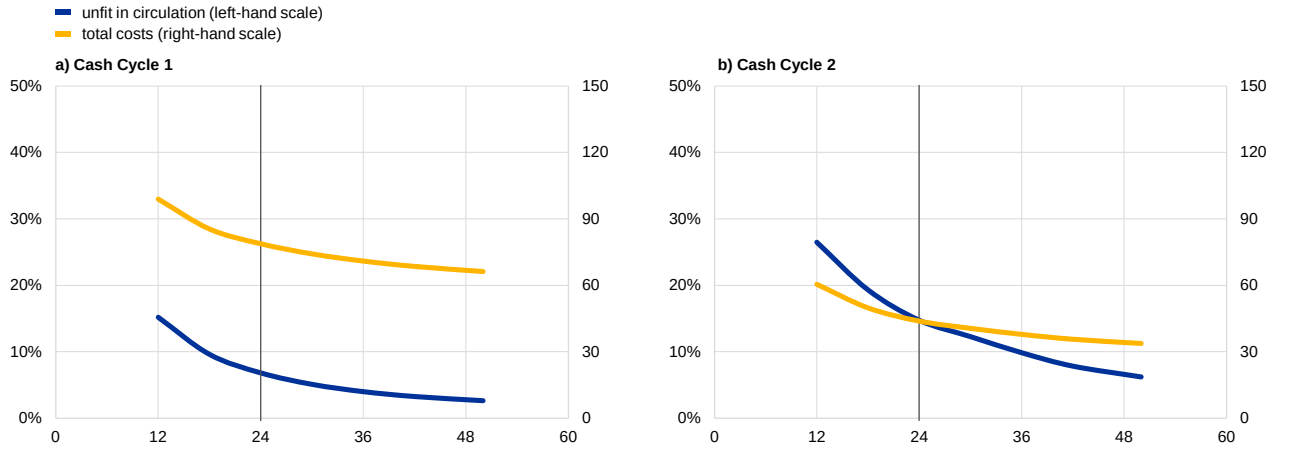
an increase in soil resistance or people treating banknotes more carefully. The actual average life of a note until destruction is then dependent on the frequency at which notes are returned to the NCB and the NCB's sorting threshold.

Chart 9 shows the – unsurprisingly – very positive effect of an increased theoretical note life on total cash cycle costs owing to reduced note replacement needs, as well as a significant increase in the note quality in circulation. If the theoretical life increases from 24 to 36 months, the note replacement costs drop for Cash Cycle 1 from €28.7m to €20.9m and for Cash Cycle 2 from €23.8m to €17.8m, and quality improves by 2.8 and 4.9 percentage points respectively.[66]

Chart 9

Impact of an increase in theoretical note life on quality and total cash cycle costs

(x-axis: theoretical note life in months; left y-axis: percentage of unfit notes in circulation; right y-axis: total annual cash cycle costs (NCB processing and replacement costs) in EUR millions)



Source: ECB Banknote Circulation Model.
Note: The vertical lines at 24 months refer to the base cash cycles as defined in Section 4.1.

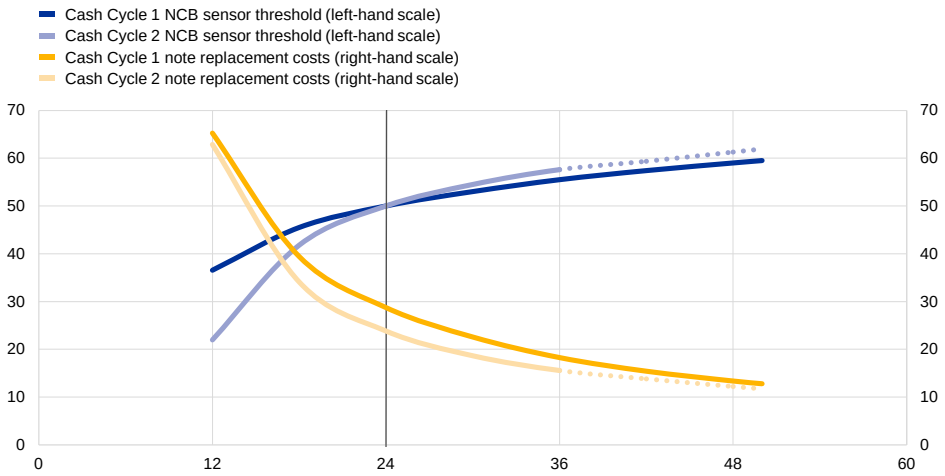
The total cost savings due to an extended note life could become even larger if the NCB decides to maintain its existing level of quality in circulation despite issuing notes with a longer life. An NCB can achieve this by adjusting its sorting threshold to settings which are more lenient than the Eurosystem threshold. This change in sorting policy is of course only possible within the limit of 8% false fit notes which can be reissued by the NCB. Chart 10 shows that if such a policy is implemented, the same increase in note life (from 24 to 36 months) further reduces replacement costs for Cash Cycle 1 to €18.3m (-€2.6m) and for Cash Cycle 2 to €15.6m (-€2.2m).

66 The improvement in quality is larger in Cash Cycle 2 owing to the lower note quality of the base case.

Chart 10

Increasing theoretical note life while keeping constant note quality

(x-axis: theoretical note life in months; left y-axis: NCB sensor threshold; right y-axis: replacement costs in EUR millions)



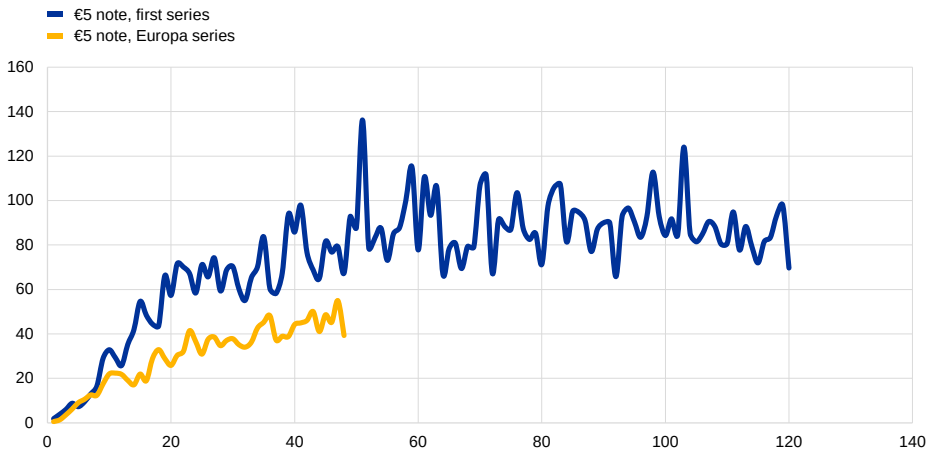
Source: ECB Banknote Circulation Model.
Notes: The chart shows the impact of an increase in the theoretical note life on replacement costs at constant quality in circulation. The blue lines indicate the required adjustment to the NCB sorting threshold to keep the constant quality in circulation. For Cash Cycle 2, unfeasible scenarios (more than 8% unfit in notes reissued by the NCB) are indicated by dotted curves.

These model results are very much in line with the Eurosystem experience with the Europa series €5 (introduced in May 2013) and €10 (September 2014) banknotes, which have been protected against soiling by an additional varnish layer. Varnishing has resulted in a substantial decrease of about 50% in the note replacement volume, resulting for the €5 note in annual savings of about 500 million new banknotes at a stable quality in circulation as found by the quality survey. The 2012 annual destruction of the first series €5 notes amounted to 1.1 billion notes, whereas from May 2016 to April 2017 only 0.57 billion Europa series €5 notes had to be replaced at a similar note volume in circulation. Chart 11 shows this reduction very clearly by comparing the monthly note replacement in the months after first issuance. For the €10 note a similar reduction in the replacement rate is currently emerging.

Chart 11

Monthly destruction of the first series €5 and the Europa series €5 notes

(x-axis: months after first issuance of the series; y-axis: monthly note destruction in millions)



Sources: Eurosystem Currency Information System 2.
Notes: For the first series, data are from January 2002 onwards, for the Europa series, data are from May 2013 onwards.

The savings for the Eurosystem from the varnishing of the Europa series have and will continue to substantially outweigh the additional production costs.

Box 1

Modelling country-specific cash cycles based on real data

The circulation model developed can be a valuable tool for decision-making. In the case of well-defined cash cycles, such as those presented in the sensitivity analysis, the impact of various policy-related factors can be comprehensively studied and better informed decisions can be made.

When, however, more detailed quantitative results are needed for a specific country, the success of such an analysis depends heavily on how well the cash cycle can be defined, in other words on the calibration of the model. Some of the parameters are known for every country: for example, the NCB sorting threshold or the NCB and CH processing volumes. Other parameters of the model, however, might not be well defined, or even not obtainable from the data currently available. Such parameters are the active circulation, the theoretical note life, the likelihood of defects, or the inflows/outflows. In this case, the inputs for the model are calibrated on the basis of expert estimation, which carries the danger of inaccuracy or error.

With an increasing volume of real-life data becoming available and increasing possibilities for processing incoming data streams, it becomes less and less necessary to rely on expert estimation to model a cash cycle. There is currently a clear trend towards new sorting machines collecting and storing detailed fitness data per banknote. This in principle allows banknotes to be monitored individually and the model parameters that govern the main steps of the cash cycle to be extracted.

With this outlook in mind, the possibility of building an alternative circulation model based on available data from sorting centres was explored. Data were taken from an external circulation trial (ECT) that took place in three countries. An ECT is an exercise, designed to accurately simulate country-specific cash cycles, where one or more NCBs issue within a very short

period (1-2 weeks) a statistically relevant number of banknotes, which are then monitored, typically by serial number reading in NCB cash centres. The alternative model treats each banknote as an independent agent, which has a number of attributes: soil value, age (since issuance) and time since last sorting. This allows more complex relationships to be modelled. The work carried out focused on extracting statistical estimates of the ageing rate, the return frequency and the defect likelihood.

The alternative model's results were validated for the three countries participating in the ECT against known figures on a number of aspects, covering the quality in circulation and the unfit rates at NCB and CH sorting. The overall results were considered to be relatively promising. In most of the cases the quality in circulation was predicted with reasonable accuracy, taking into account the uncertainty of the real-life figures on note quality in circulation. However, there were some non-negligible discrepancies between the model results and the real-life figures. These were attributed mainly to inaccuracies in the data (due for instance to technical limitations of fitness sensors or the difficulty of accounting for effects of CH sorting on the note quality at the NCB) or unknown/not included parameters (e.g. migration was not modelled because of the absence of information on the fitness profiles of inflowing notes).

Lessons were learnt from this modelling approach. The data collection used was not specifically designed for the purposes of modelling banknotes in circulation. It is clear that the quality of the data has a significant impact on the quality of the data-based model itself. Moreover, simulating all the relevant aspects of a cash cycle can be challenging owing to the lack of accurate data, for instance data on the CH sorting. The success of such a modelling approach, therefore, lies in the existence of a well-designed and controlled data collection, reflecting the actual circulation and mitigating technological limitations.

5 Conclusions

Applying the ECB's computer-based circulation model to two theoretical cash cycles enabled significant parameters governing banknote quality and overall cash cycle costs to be identified. The model showed that the quality of notes in circulation increases when (1) notes are returned more frequently to the central bank, (2) sorting at the central bank becomes more severe and (3) banknotes have an increased resistance to soil and defects. The first two factors imply additional costs, however; the former for note processing and transport, and the latter for replacement notes. A balance between the ideal return frequency and severity of central bank sorting must be struck for each individual cash cycle. Increasing banknotes' resistance to soil increases the note quality in circulation and reduces the annual replacement costs. Further savings can be achieved if a central bank applies a more lenient sorting policy, so that the increase in quality is traded for additional savings in the replacement note volume.

The model also quantified the impact of additional factors. Increasing the accuracy of NCBs' fitness sensors yields savings primarily in cash cycles with a higher NCB involvement in the sorting of notes directly from circulation. Changes to the variations in the production of new banknotes or the severity of note sorting by

CHs play a substantial but comparatively smaller role in quality and cash cycle costs. Model assumptions for note ageing were shown to have an even smaller impact on note quality.

The studies showed that the note quality in a cash cycle is also heavily influenced by factors outside the control of the Eurosystem such as the active circulation volume and inflows and outflows of banknotes due to migration and tourism. While data on such factors are difficult to obtain, a consistent individual data recording of the fitness properties of each single banknote processed at NCB level would, while ensuring an anonymous use of banknotes, substantially improve figures compared with current estimates.

The Eurosystem is currently working to evaluate and improve its fitness sensors and algorithms in order to deliver consistent and linear fitness values which are linked to human perception. This will allow NCBs to better monitor and adjust their circulation quality as well as provide more reliable data to be used in future modelling.

Statistics

Contents

Further information

ECB statistics can be accessed from the Statistical Data Warehouse (SDW):	http://sdw.ecb.europa.eu/
Data from the statistics section of the Economic Bulletin are available from the SDW:	http://sdw.ecb.europa.eu/reports.do?node=1000004813
A comprehensive Statistics Bulletin can be found in the SDW:	http://sdw.ecb.europa.eu/reports.do?node=1000004045
Methodological definitions can be found in the General Notes to the Statistics Bulletin:	http://sdw.ecb.europa.eu/reports.do?node=10000023
Details on calculations can be found in the Technical Notes to the Statistics Bulletin:	http://sdw.ecb.europa.eu/reports.do?node=10000022
Explanations of terms and abbreviations can be found in the ECB's statistics glossary:	http://www.ecb.europa.eu/home/glossary/html/glossa.en.html

Conventions used in the tables

-	data do not exist/data are not applicable
.	data are not yet available
...	nil or negligible
(p)	provisional
s.a.	seasonally adjusted
n.s.a.	non-seasonally adjusted

1 External environment

1.1 Main trading partners, GDP and CPI

	GDP [1] (period-on-period percentage changes)						CPI (annual percentage changes)						
	G20 [2]	United States	United Kingdom	Japan	China	Memo item: euro area	OECD countries		United States	United Kingdom (HICP)	Japan	China	Memo item: euro area [3] (HICP)
							Total	excluding food and energy					
	1	2	3	4	5	6	7	8	9	10	11	12	13
2014	3.5	2.6	3.1	0.3	7.3	1.3	1.7	1.8	1.6	1.5	2.7	2.0	0.4
2015	3.4	2.9	2.2	1.1	6.9	2.0	0.6	1.7	0.1	0.0	0.8	1.4	0.0
2016	3.1	1.5	1.8	1.0	6.7	1.8	1.1	1.8	1.3	0.7	-0.1	2.0	0.2
2016 Q3	0.8	0.7	0.5	0.3	1.8	0.5	1.0	1.8	1.1	0.7	-0.5	1.7	0.3
Q4	0.9	0.4	0.7	0.4	1.7	0.6	1.5	1.7	1.8	1.2	0.3	2.2	0.7
2017 Q1	0.9	0.3	0.2	0.4	1.3	0.5	2.4	1.8	2.5	2.1	0.3	1.4	1.8
Q2	.	0.8	0.3	1.0	1.7	0.6	2.1	1.8	1.9	2.7	0.4	1.4	1.5
2017 Mar.	-	-	-	-	-	-	2.3	1.8	2.4	2.3	0.2	0.9	1.5
Apr.	-	-	-	-	-	-	2.4	1.9	2.2	2.7	0.4	1.2	1.9
May	-	-	-	-	-	-	2.1	1.8	1.9	2.9	0.4	1.5	1.4
June	-	-	-	-	-	-	1.9	1.8	1.6	2.6	0.4	1.5	1.3
July	-	-	-	-	-	-	2.0	1.8	1.7	2.6	0.4	1.4	1.3
Aug. [4]	-	-	-	-	-	-	.	.	.	.	.	.	1.5

Sources: Eurostat (col. 3, 6, 10, 13); BIS (col. 9, 11, 12); OECD (col. 1, 2, 4, 5, 7, 8).
1) Quarterly data seasonally adjusted; annual data unadjusted.
2) Data for Argentina are currently not available owing to the state of emergency in the national statistical system declared by the government of Argentina on 7 January 2016. As a consequence, Argentina is not included in the calculation of the G20 aggregate. The policy regarding the inclusion of Argentina will be reconsidered in the future depending on further developments.
3) Data refer to the changing composition of the euro area.
4) The figure for the euro area is an estimate based on provisional national data, as well as on early information on energy prices.

1.2 Main trading partners, Purchasing Managers' Index and world trade

	Purchasing Managers' Surveys (diffusion indices; s.a.)									Merchandise imports [1]		
	Composite Purchasing Managers' Index						Global Purchasing Managers' Index [2]					
	Global [2]	United States	United Kingdom	Japan	China	Memo item: euro area	Manufacturing	Services	New export orders	Global	Advanced economies	Emerging market economies
	1	2	3	4	5	6	7	8	9	10	11	12
2014	54.2	57.3	57.9	50.9	51.1	52.7	53.3	54.1	51.5	2.7	3.8	2.0
2015	53.2	55.8	56.2	51.4	50.4	53.8	51.8	53.7	50.3	0.9	3.7	-0.9
2016	51.6	52.4	53.4	50.5	51.4	53.3	51.8	51.9	50.2	0.9	1.2	0.7
2016 Q3	51.4	51.9	51.6	49.6	51.7	52.9	51.8	51.3	50.1	0.9	1.1	0.8
Q4	53.2	54.6	55.5	52.0	53.1	53.8	53.4	53.2	50.5	1.7	-1.3	3.9
2017 Q1	53.3	54.3	54.6	52.5	52.3	55.6	53.4	53.3	51.8	2.0	1.3	2.4
Q2	53.1	53.6	54.8	53.0	51.3	56.6	52.5	53.3	51.5	0.0	1.6	-1.1
2017 Mar.	53.2	53.0	54.9	52.9	52.1	56.4	53.5	53.1	51.6	2.0	1.3	2.4
Apr.	53.0	53.2	56.1	52.6	51.2	56.8	52.7	53.1	51.6	-0.1	0.3	-0.4
May	53.1	53.6	54.3	53.4	51.5	56.8	52.6	53.3	51.4	0.3	1.4	-0.4
June	53.1	53.9	53.8	52.9	51.1	56.3	52.1	53.4	51.7	0.0	1.6	-1.1
July	53.1	54.6	54.1	51.8	51.9	55.7	52.5	53.3	51.6	.	.	.
Aug.	.	56.0	54.0	51.9	52.4	55.7	52.6	.	52.3	.	.	.

Sources: Markit (col. 1-9); CPB Netherlands Bureau for Economic Policy Analysis and ECB calculations (col. 10-12).
1) Global and advanced economies exclude the euro area. Annual and quarterly data are period-on-period percentages; monthly data are 3-month-on-3-month percentages. All data are seasonally adjusted.
2) Excluding the euro area.

2 Financial developments

2.1 Money market interest rates
(percentages per annum; period averages)

	Euro area [1]					United States	Japan
	Overnight deposits (EONIA)	1-month deposits (EURIBOR)	3-month deposits (EURIBOR)	6-month deposits (EURIBOR)	12-month deposits (EURIBOR)	3-month deposits (LIBOR)	3-month deposits (LIBOR)
	1	2	3	4	5	6	7
2014	0.09	0.13	0.21	0.31	0.48	0.23	0.13
2015	-0.11	-0.07	-0.02	0.05	0.17	0.32	0.09
2016	-0.32	-0.34	-0.26	-0.17	-0.03	0.74	-0.02
2017 Feb.	-0.35	-0.37	-0.33	-0.24	-0.11	1.04	-0.01
Mar.	-0.35	-0.37	-0.33	-0.24	-0.11	1.13	0.00
Apr.	-0.36	-0.37	-0.33	-0.25	-0.12	1.16	0.02
May	-0.36	-0.37	-0.33	-0.25	-0.13	1.19	-0.01
June	-0.36	-0.37	-0.33	-0.27	-0.15	1.26	-0.01
July	-0.36	-0.37	-0.33	-0.27	-0.15	1.31	-0.01
Aug.	-0.36	-0.37	-0.33	-0.27	-0.16	1.31	-0.03

Source: ECB.
1) Data refer to the changing composition of the euro area, see the General Notes.

2.2 Yield curves
(End of period; rates in percentages per annum; spreads in percentage points)

	Spot rates					Spreads			Instantaneous forward rates			
	Euro area [1], [2]					Euro area [1], [2]	United States	United Kingdom	Euro area [1], [2]			
	3 months	1 year	2 years	5 years	10 years	10 years - 1 year	10 years - 1 year	10 years - 1 year	1 year	2 years	5 years	10 years
	1	2	3	4	5	6	7	8	9	10	11	12
2014	-0.02	-0.09	-0.12	0.07	0.65	0.74	1.95	1.45	-0.15	-0.11	0.58	1.77
2015	-0.45	-0.40	-0.35	0.02	0.77	1.17	1.66	1.68	-0.35	-0.22	0.82	1.98
2016	-0.93	-0.82	-0.80	-0.47	0.26	1.08	1.63	1.17	-0.78	-0.75	0.35	1.35
2017 Feb.	-0.87	-0.88	-0.90	-0.54	0.25	1.13	1.56	1.05	-0.92	-0.86	0.34	1.46
Mar.	-0.75	-0.74	-0.73	-0.36	0.38	1.12	1.36	1.01	-0.75	-0.64	0.47	1.52
Apr.	-0.78	-0.77	-0.73	-0.35	0.38	1.15	1.21	1.03	-0.75	-0.61	0.48	1.50
May	-0.73	-0.74	-0.74	-0.39	0.36	1.10	1.05	0.88	-0.76	-0.67	0.43	1.54
June	-0.69	-0.65	-0.59	-0.17	0.54	1.19	1.07	0.93	-0.60	-0.41	0.65	1.63
July	-0.71	-0.71	-0.67	-0.21	0.58	1.29	1.07	0.93	-0.70	-0.51	0.72	1.75
Aug.	-0.78	-0.77	-0.73	-0.35	0.38	1.15	0.89	0.92	-0.75	-0.62	0.48	1.52

Source: ECB.
1) Data refer to the changing composition of the euro area, see the General Notes.
2) ECB calculations based on underlying data provided by EuroMTS and ratings provided by Fitch Ratings.

2.3 Stock market indices
(index levels in points; period averages)

	Dow Jones EURO STOXX indices												United States	Japan
	Benchmark		Main industry indices											
	Broad index	50	Basic materials	Consumer services	Consumer goods	Oil and gas	Financials	Industrials	Technology	Utilities	Telecoms	Health care	Standard & Poor's 500	Nikkei 225
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2014	318.7	3,145.3	644.3	216.6	510.6	335.5	180.0	452.9	310.8	279.2	306.7	668.1	1,931.4	15,460.4
2015	356.2	3,444.1	717.4	261.9	628.2	299.9	189.8	500.6	373.2	278.0	377.7	821.3	2,061.1	19,203.8
2016	321.6	3,003.7	620.7	250.9	600.1	278.9	148.7	496.0	375.8	248.6	326.9	770.9	2,094.7	16,920.5
2017 Feb.	353.2	3,293.1	728.9	257.0	644.9	312.5	166.6	563.0	431.7	239.1	334.6	839.5	2,329.9	19,188.7
Mar.	365.7	3,427.1	740.4	261.7	671.6	314.2	174.7	578.4	450.3	252.1	349.6	870.0	2,366.8	19,340.2
Apr.	373.9	3,491.8	753.7	271.1	683.6	319.4	178.0	598.4	459.3	260.7	349.8	893.3	2,359.3	18,736.4
May	387.1	3,601.9	765.9	281.9	707.5	318.8	186.4	616.2	477.1	272.5	363.8	935.1	2,395.3	19,726.8
June	383.6	3,547.8	767.8	283.0	698.8	299.9	182.4	617.2	475.2	283.6	355.4	927.3	2,434.0	20,045.6
July	377.8	3,483.9	745.3	270.9	685.3	289.5	187.7	606.5	465.2	273.5	339.7	891.3	2,454.1	20,044.9
Aug.	375.1	3,451.3	727.5	266.5	681.4	288.8	187.3	596.2	467.4	284.4	340.3	861.1	2,456.2	19,670.2

Source: ECB.

2 Financial developments

2.4 MFI interest rates on loans to and deposits from households (new business) [1), 2)]

(Percentages per annum; period average, unless otherwise indicated)

	Deposits				Revolving loans and overdrafts	Extended credit card credit	Loans for consumption			Loans to sole proprietors and unincorporated partnerships	Loans for house purchase					
	Overnight	Redeemable at notice of up to 3 months	With an agreed maturity of:				By initial period of rate fixation		APRC [3)]		By initial period of rate fixation				APRC [3)]	Composite cost-of-borrowing indicator
			Up to 2 years	Over 2 years			Floating rate and up to 1 year	Over 1 year			Floating rate and up to 1 year	Over 1 and up to 5 years	Over 5 and up to 10 years	Over 10 years		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2016 Aug.	0.08	0.51	0.52	0.83	6.48	16.78	5.43	6.01	6.37	2.40	1.86	1.95	1.86	1.88	2.31	1.90
Sep.	0.08	0.50	0.50	0.79	6.50	16.78	5.16	5.75	6.14	2.35	1.80	1.98	1.85	1.85	2.28	1.86
Oct.	0.08	0.49	0.44	0.75	6.42	16.78	5.16	5.69	6.11	2.43	1.78	1.90	1.80	1.81	2.25	1.81
Nov.	0.08	0.49	0.43	0.78	6.39	16.71	4.91	5.74	6.12	2.43	1.76	1.91	1.76	1.79	2.24	1.79
Dec.	0.08	0.49	0.43	0.76	6.33	16.68	4.78	5.48	5.87	2.31	1.77	1.90	1.80	1.75	2.24	1.78
2017 Jan.	0.07	0.48	0.42	0.75	6.34	16.62	5.05	5.87	6.24	2.27	1.76	1.88	1.80	1.76	2.28	1.81
Feb.	0.07	0.48	0.40	0.76	6.38	16.68	5.09	5.72	6.17	2.39	1.77	1.89	1.84	1.81	2.29	1.85
Mar.	0.06	0.48	0.40	0.74	6.39	16.69	4.99	5.62	6.08	2.39	1.74	1.88	1.85	1.82	2.25	1.85
Apr.	0.06	0.47	0.40	0.74	6.34	16.70	4.83	5.58	5.96	2.36	1.73	1.89	1.91	1.85	2.26	1.87
May	0.06	0.47	0.39	0.83	6.33	16.70	5.08	5.78	6.22	2.44	1.73	1.90	1.90	1.87	2.23	1.87
June	0.06	0.47	0.38	0.79	6.31	16.83	4.68	5.74	6.20	2.41	1.69	1.89	1.91	1.89	2.21	1.87
July [p]	0.05	0.46	0.38	0.76	6.28	16.81	4.95	5.84	6.28	2.36	1.75	1.91	1.90	1.90	2.21	1.88

Source: ECB.

1) Data refer to the changing composition of the euro area.

2) Including non-profit institutions serving households.

3) Annual percentage rate of charge (APRC).

2.5 MFI interest rates on loans to and deposits from non-financial corporations (new business) [1), 2)]

(Percentages per annum; period average, unless otherwise indicated)

	Deposits			Revolving loans and overdrafts	Other loans by size and initial period of rate fixation									Composite cost-of-borrowing indicator
	Overnight	With an agreed maturity of:			up to EUR 0.25 million			over EUR 0.25 and up to 1 million			over EUR 1 million			
		Up to 2 years	Over 2 years		Floating rate and up to 3 months	Over 3 months and up to 1 year	Over 1 year	Floating rate and up to 3 months	Over 3 months and up to 1 year	Over 1 year	Floating rate and up to 3 months	Over 3 months and up to 1 year	Over 1 year	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2016 Aug.	0.09	0.16	0.47	2.74	2.69	3.02	2.46	1.87	1.95	1.80	1.22	1.48	1.54	1.83
Sep.	0.09	0.12	0.47	2.73	2.65	2.96	2.42	1.83	1.86	1.73	1.28	1.61	1.63	1.86
Oct.	0.08	0.15	0.49	2.68	2.63	3.04	2.37	1.81	1.84	1.72	1.28	1.40	1.63	1.83
Nov.	0.07	0.12	0.42	2.65	2.60	2.91	2.38	1.82	1.82	1.68	1.29	1.43	1.52	1.82
Dec.	0.07	0.12	0.59	2.64	2.58	2.84	2.30	1.83	1.84	1.68	1.33	1.46	1.62	1.81
2017 Jan.	0.06	0.12	0.51	2.64	2.68	2.80	2.30	1.81	1.86	1.73	1.22	1.37	1.62	1.79
Feb.	0.06	0.10	0.53	2.64	2.58	2.78	2.35	1.77	1.76	1.71	1.18	1.31	1.53	1.76
Mar.	0.06	0.08	0.58	2.58	2.52	2.79	2.35	1.76	1.79	1.72	1.31	1.63	1.58	1.82
Apr.	0.06	0.10	0.40	2.56	2.55	2.69	2.35	1.79	1.78	1.70	1.34	1.50	1.64	1.81
May	0.05	0.10	0.43	2.52	2.49	2.77	2.37	1.76	1.73	1.71	1.20	1.47	1.63	1.76
June	0.05	0.06	0.43	2.51	2.46	2.68	2.34	1.74	1.71	1.67	1.26	1.43	1.55	1.76
July [p]	0.05	0.11	0.35	2.45	2.45	2.76	2.36	1.75	1.74	1.71	1.23	1.33	1.65	1.74

Source: ECB.

1) Data refer to the changing composition of the euro area.

2) In accordance with the ESA 2010, in December 2014 holding companies of non-financial groups were reclassified from the non-financial corporations sector to the financial corporations sector.

2 Financial developments

2.6 Debt securities issued by euro area residents, by sector of the issuer and initial maturity

(EUR billions; transactions during the month and end-of-period outstanding amounts; nominal values)

	Outstanding amounts							Gross issues [1]						
	Total	MFIs (including Euro-system)	Non-MFI corporations			General government		Total	MFIs (including Euro-system)	Non-MFI corporations			General government	
			Financial corporations other than MFIs	FVCs	Non-financial corporations	Central govern-ment	Other general govern-ment			Financial corporations other than MFIs	FVCs	Non-financial corporations	Central govern-ment	Other general govern-ment
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Short-term														
2014	1,322	544	132	.	59	538	50	410	219	34	.	38	93	25
2015	1,269	517	147	.	62	478	65	347	161	37	.	33	82	34
2016	1,242	520	135	.	59	466	62	351	161	46	.	32	79	33
2017 Jan.	1,276	536	135	.	73	469	63	420	203	49	.	39	88	41
Feb.	1,303	550	141	.	79	466	66	348	168	49	.	31	72	29
Mar.	1,315	547	131	.	82	480	74	389	171	52	.	43	90	33
Apr.	1,302	525	136	.	91	479	72	357	155	47	.	43	75	36
May	1,301	522	138	.	93	481	68	358	173	43	.	37	84	21
June	1,284	508	140	.	80	484	72	341	145	50	.	33	81	33
Long-term														
2014	15,143	4,055	3,165	.	995	6,285	643	220	65	43	.	16	85	10
2015	15,250	3,784	3,288	.	1,059	6,482	637	215	68	45	.	13	81	9
2016	15,281	3,641	3,217	.	1,140	6,643	641	210	59	48	.	17	78	8
2017 Jan.	15,340	3,645	3,227	.	1,142	6,688	638	317	103	82	.	15	108	9
Feb.	15,370	3,667	3,232	.	1,145	6,686	641	246	80	54	.	12	89	12
Mar.	15,404	3,648	3,221	.	1,155	6,735	644	298	65	103	.	24	97	9
Apr.	15,378	3,633	3,240	.	1,155	6,717	632	252	54	94	.	13	87	5
May	15,449	3,635	3,242	.	1,158	6,780	634	259	63	73	.	18	101	4
June	15,442	3,627	3,229	.	1,158	6,791	637	213	60	36	.	23	84	9

Source: ECB.

1) For the purpose of comparison, annual data refer to the average monthly figure over the year.

2.7 Growth rates and outstanding amounts of debt securities and listed shares

(EUR billions; percentage changes)

	Debt securities							Listed shares			
	Total	MFIs (including Eurosystem)	Non-MFI corporations			General government		Total	MFIs	Financial corporations other than MFIs	Non-financial corporations
			Financial corporations other than MFIs	FVCs	Non-financial corporations	Central government	Other general government				
	1	2	3	4	5	6	7	8	9	10	11
Oustanding amount											
2014	16,464.5	4,598.5	3,296.2	.	1,053.6	6,823.2	693.0	5,958.1	591.3	782.2	4,584.6
2015	16,518.9	4,301.6	3,434.4	.	1,120.3	6,960.1	702.4	6,745.0	586.4	907.6	5,251.0
2016	16,523.6	4,160.2	3,352.2	.	1,199.2	7,108.5	703.4	7,029.3	538.8	1,020.0	5,470.5
2017 Jan.	16,616.6	4,181.7	3,362.4	.	1,214.7	7,156.9	700.9	7,015.4	542.5	1,018.4	5,454.5
Feb.	16,672.8	4,217.3	3,373.1	.	1,223.9	7,151.8	706.8	7,201.4	539.1	1,028.8	5,633.4
Mar.	16,718.9	4,195.5	3,352.3	.	1,237.6	7,216.0	717.4	7,509.3	610.0	1,058.8	5,840.5
Apr.	16,680.0	4,158.0	3,376.5	.	1,245.7	7,195.8	704.0	7,689.7	636.9	1,077.2	5,975.6
May	16,749.9	4,156.2	3,379.9	.	1,250.7	7,261.0	702.1	7,781.6	631.3	1,070.8	6,079.5
June	16,725.9	4,134.5	3,369.4	.	1,237.5	7,275.3	709.2	7,630.9	640.5	1,067.8	5,922.7
Growth rate											
2014	-0.8	-8.1	0.1	.	5.0	3.1	1.1	1.6	7.2	2.0	0.7
2015	0.2	-7.0	5.5	.	4.5	1.8	0.6	1.1	4.5	1.5	0.6
2016	0.2	-3.1	-1.8	.	7.2	2.1	-0.1	0.5	1.2	1.0	0.4
2017 Jan.	0.8	-2.1	-0.6	.	9.1	2.2	-0.2	0.6	1.5	1.1	0.4
Feb.	1.3	-1.7	1.6	.	10.0	1.6	0.8	0.7	4.1	1.3	0.3
Mar.	1.6	-1.4	2.6	.	9.7	1.7	0.8	0.8	5.8	0.9	0.3
Apr.	1.8	-2.0	3.8	.	8.7	2.2	0.2	0.8	5.8	1.1	0.3
May	1.9	-1.9	4.1	.	8.6	2.2	0.1	0.8	5.8	1.2	0.3
June	1.9	-2.1	5.6	.	8.5	1.7	0.4	0.7	4.8	1.2	0.3

Source: ECB.

2 Financial developments

2.8 Effective exchange rates [1)]

(period averages; index: 1999 Q1=100)

	EER-19						EER-38	
	Nominal	Real CPI	Real PPI	Real GDP deflator	Real ULCM [2)]	Real ULCT	Nominal	Real CPI
	1	2	3	4	5	6	7	8
2014	101.4	97.2	96.4	90.6	96.4	98.5	114.3	95.4
2015	91.7	87.6	88.6	82.3	80.9	88.0	105.7	87.0
2016	94.4	89.5	90.8	84.5	79.9	89.1	109.7	89.3
2016 Q3	94.8	90.0	91.3	84.9	79.9	89.3	110.0	89.5
Q4	94.5	89.6	90.5	84.3	79.7	88.9	109.4	88.9
2017 Q1	93.8	89.0	89.6	82.9	79.0	88.0	108.6	88.1
Q2	95.3	90.3	91.0	.	.	.	110.2	89.1
2017 Mar.	94.0	89.2	89.8	-	-	-	108.6	88.0
Apr.	93.7	89.0	89.6	-	-	-	108.3	87.7
May	95.6	90.5	91.4	-	-	-	110.5	89.3
June	96.3	91.3	91.9	-	-	-	111.5	90.1
July	97.6	92.4	93.0	-	-	-	113.4	91.6
Aug.	99.0	93.8	94.2	-	-	-	115.1	93.0
Percentage change versus previous month								
2017 Aug.	1.5	1.5	1.3	-	-	-	1.5	1.5
Percentage change versus previous year								
2017 Aug.	4.4	4.2	3.1	-	-	-	4.6	3.8

Source: ECB.

1) For a definition of the trading partner groups and other information see the General Notes to the Statistics Bulletin.

2) ULCM-deflated series are available only for the EER-18 trading partner group.

2.9 Bilateral exchange rates

(period averages; units of national currency per euro)

	Chinese renminbi	Croatian kuna	Czech koruna	Danish krone	Hungarian forint	Japanese yen	Polish zloty	Pound sterling	Romanian leu	Swedish krona	Swiss franc	US Dollar
	1	2	3	4	5	6	7	8	9	10	11	12
2014	8.186	7.634	27.536	7.455	308.706	140.306	4.184	0.806	4.4437	9.099	1.215	1.329
2015	6.973	7.614	27.279	7.459	309.996	134.314	4.184	0.726	4.4454	9.353	1.068	1.110
2016	7.352	7.533	27.034	7.445	311.438	120.197	4.363	0.819	4.4904	9.469	1.090	1.107
2016 Q3	7.443	7.493	27.029	7.442	311.016	114.292	4.338	0.850	4.4646	9.511	1.089	1.117
Q4	7.369	7.523	27.029	7.439	309.342	117.918	4.378	0.869	4.5069	9.757	1.080	1.079
2017 Q1	7.335	7.467	27.021	7.435	309.095	121.014	4.321	0.860	4.5217	9.506	1.069	1.065
Q2	7.560	7.430	26.535	7.438	309.764	122.584	4.215	0.861	4.5532	9.692	1.084	1.102
2017 Mar.	7.369	7.423	27.021	7.436	309.714	120.676	4.287	0.866	4.5476	9.528	1.071	1.068
Apr.	7.389	7.450	26.823	7.438	311.566	118.294	4.237	0.848	4.5291	9.594	1.073	1.072
May	7.613	7.432	26.572	7.440	309.768	124.093	4.200	0.856	4.5539	9.710	1.090	1.106
June	7.646	7.410	26.264	7.438	308.285	124.585	4.211	0.877	4.5721	9.754	1.087	1.123
July	7.796	7.412	26.079	7.437	306.715	129.482	4.236	0.886	4.5689	9.589	1.106	1.151
Aug.	7.876	7.405	26.101	7.438	304.366	129.703	4.267	0.911	4.5789	9.548	1.140	1.181
Percentage change versus previous month												
2017 Aug.	1.0	-0.1	0.1	0.0	-0.8	0.2	0.7	2.8	0.2	-0.4	3.1	2.6
Percentage change versus previous year												
2017 Aug.	5.7	-1.1	-3.4	0.0	-1.9	14.3	-0.8	6.5	2.7	0.6	4.7	5.3

Source: ECB.

2 Financial developments

2.10 Euro area balance of payments, financial account

(EUR billions, unless otherwise indicated; outstanding amounts at end of period; transactions during period)

	Total [1]			Direct investment		Portfolio investment		Net financial derivatives	Other investment		Reserve assets	Memo: Gross external debt
	Assets	Liabilities	Net	Assets	Liabilities	Assets	Liabilities		Assets	Liabilities		
	1	2	3	4	5	6	7	8	9	10	11	12
Outstanding amounts (international investment position)												
2016 Q2	22,882.6	23,691.0	-808.5	9,940.6	8,276.0	7,430.2	9,989.1	-65.1	4,855.0	5,425.9	721.8	13,618.7
Q3	23,116.4	23,859.3	-743.0	9,911.5	8,142.6	7,690.0	10,166.4	-62.1	4,849.9	5,550.4	727.0	13,617.3
Q4	23,598.0	24,253.6	-655.5	10,246.5	8,382.5	7,883.9	10,324.0	-53.8	4,813.8	5,547.1	707.7	13,616.0
2017 Q1	24,733.9	25,094.7	-360.8	10,613.8	8,559.8	8,223.2	10,601.2	-51.3	5,221.6	5,933.7	726.6	13,959.6
Outstanding amounts as a percentage of GDP												
2017 Q1	228.6	231.9	-3.3	98.1	79.1	76.0	98.0	-0.5	48.3	54.8	6.7	129.0
Transactions												
2016 Q3	218.8	87.7	131.0	55.8	-79.4	127.5	14.8	23.9	3.8	152.4	7.7	-
Q4	95.4	11.7	83.7	120.1	102.9	14.6	-78.2	15.2	-59.1	-13.0	4.6	-
2017 Q1	566.7	513.6	53.1	147.2	110.5	167.7	91.2	15.5	238.8	311.9	-2.5	-
Q2	184.8	66.8	118.0	11.2	27.6	196.5	122.8	-4.4	-16.8	-83.6	-1.7	-
2017 Jan.	350.2	362.6	-12.5	52.5	64.8	43.0	31.4	2.2	257.6	266.4	-5.1	-
Feb.	219.7	197.7	22.0	85.4	53.0	82.5	26.9	8.1	41.7	117.8	2.0	-
Mar.	-3.2	-46.7	43.5	9.3	-7.3	42.2	32.9	5.2	-60.5	-72.3	0.6	-
Apr.	150.2	135.3	14.9	28.0	7.7	44.0	-5.8	1.0	81.7	133.3	-4.5	-
May	97.8	89.3	8.5	22.9	15.2	79.1	94.5	3.1	-8.7	-20.4	1.4	-
June	-63.1	-157.7	94.6	-39.7	4.7	73.4	34.0	-8.5	-89.8	-196.5	1.4	-
12-month cumulated transactions												
2017 June	1,065.7	679.8	385.9	334.3	161.6	506.3	150.5	50.2	166.8	367.8	8.1	-
12-month cumulated transactions as a percentage of GDP												
2017 June	9.8	6.3	3.6	3.1	1.5	4.7	1.4	0.5	1.5	3.4	0.1	-

Source: ECB.

1) Net financial derivatives are included in total assets.

3 Economic activity

3.1 GDP and expenditure components

(quarterly data seasonally adjusted; annual data unadjusted)

	GDP											
	Total	Domestic demand								External balance [1]		
		Total	Private consumption	Government consumption	Gross fixed capital formation				Changes in inventories [2]	Total	Exports [1]	Imports [1]
						Total construction	Total machinery	Intellectual property products				
	1	2	3	4	5	6	7	8	9	10	11	12
	Current prices (EUR billions)											
2014	10,153.7	9,781.8	5,633.1	2,128.2	1,993.7	1,003.8	600.7	384.2	26.7	371.9	4,539.6	4,167.8
2015	10,498.2	10,009.4	5,745.1	2,167.6	2,070.3	1,016.3	635.9	413.0	26.4	488.8	4,856.5	4,367.7
2016	10,772.9	10,287.6	5,882.4	2,217.8	2,179.6	1,051.3	669.1	454.2	7.7	485.4	4,944.1	4,458.7
2016 Q3	2,695.7	2,577.0	1,471.7	555.6	546.7	262.8	167.1	115.6	2.9	118.8	1,235.7	1,117.0
Q4	2,722.1	2,609.4	1,487.3	558.8	556.1	267.1	169.8	118.0	7.2	112.6	1,266.9	1,154.3
2017 Q1	2,740.2	2,623.9	1,501.2	561.8	556.4	271.8	170.0	113.4	4.5	116.2	1,299.8	1,183.6
Q2	2,768.0	2,643.1	1,511.6	565.2	562.8	275.5	171.1	114.9	3.5	124.9	1,309.5	1,184.6
	as a percentage of GDP											
2016	100.0	95.5	54.6	20.6	20.2	9.8	6.2	4.2	0.1	4.5	-	-
	Chain-linked volumes (prices for the previous year)											
	quarter-on-quarter percentage changes											
2016 Q3	0.5	0.5	0.3	0.2	0.1	0.5	-0.3	-0.2	-	-	0.4	0.5
Q4	0.6	0.8	0.6	0.4	1.3	1.6	1.3	0.6	-	-	1.5	2.0
2017 Q1	0.5	0.1	0.4	0.2	-0.3	1.6	1.0	-6.2	-	-	1.3	0.4
Q2	0.6	0.5	0.5	0.5	0.9	0.8	0.9	1.1	-	-	1.1	0.9
	annual percentage changes											
2014	1.3	1.3	0.8	0.7	1.7	-0.7	4.7	3.5	-	-	4.6	4.7
2015	2.0	1.9	1.7	1.3	3.1	0.7	5.1	6.4	-	-	6.6	6.8
2016	1.8	2.3	2.1	1.7	4.4	2.3	5.0	8.9	-	-	3.2	4.6
2016 Q3	1.7	2.3	1.9	1.6	4.6	2.5	4.8	9.4	-	-	3.0	4.3
Q4	1.9	2.4	2.0	1.6	4.4	2.4	2.6	12.1	-	-	3.6	4.7
2017 Q1	2.0	1.9	1.6	1.0	3.8	3.3	3.2	6.0	-	-	4.5	4.7
Q2	2.3	2.0	1.8	1.2	2.0	4.5	2.9	-4.8	-	-	4.4	3.9
	contributions to quarter-on-quarter percentage changes in GDP; percentage points											
2016 Q3	0.5	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	-	-
Q4	0.6	0.8	0.3	0.1	0.3	0.2	0.1	0.0	0.1	-0.2	-	-
2017 Q1	0.5	0.1	0.2	0.0	-0.1	0.2	0.1	-0.3	-0.1	0.4	-	-
Q2	0.6	0.5	0.3	0.1	0.2	0.1	0.1	0.0	-0.1	0.1	-	-
	contributions to annual percentage changes in GDP; percentage points											
2014	1.3	1.2	0.5	0.2	0.3	-0.1	0.3	0.1	0.3	0.1	-	-
2015	2.0	1.9	1.0	0.3	0.6	0.1	0.3	0.2	0.0	0.1	-	-
2016	1.8	2.2	1.1	0.4	0.9	0.2	0.3	0.3	-0.1	-0.4	-	-
2016 Q3	1.7	2.2	1.0	0.3	0.9	0.2	0.3	0.4	-0.1	-0.4	-	-
Q4	1.9	2.3	1.1	0.3	0.9	0.2	0.2	0.5	0.0	-0.3	-	-
2017 Q1	2.0	1.8	0.9	0.2	0.8	0.3	0.2	0.2	0.0	0.1	-	-
Q2	2.3	1.9	1.0	0.3	0.4	0.4	0.2	-0.2	0.2	0.4	-	-

Sources: Eurostat and ECB calculations.

1) Exports and imports cover goods and services and include cross-border intra-euro area trade.

2) Including acquisitions less disposals of valuables.

3 Economic activity

3.2 Value added by economic activity

(quarterly data seasonally adjusted; annual data unadjusted)

	Gross value added (basic prices)											Taxes less subsidies on products
	Total	Agriculture, forestry and fishing	Manufacturing energy and utilities	Const-ruction	Trade, transport, accom-modation and food services	Infor-mation and com-munica-tion	Finance and insurance	Real estate	Professional, business and support services	Public ad-ministration, education, health and social work	Arts, enter-tainment and other services	
	1	2	3	4	5	6	7	8	9	10	11	12
	Current prices (EUR billions)											
2014	9,119.2	150.0	1,781.2	462.2	1,718.4	417.5	459.4	1,049.8	981.1	1,777.5	322.1	1,034.5
2015	9,426.7	151.1	1,899.9	468.6	1,777.2	430.6	464.6	1,068.4	1,026.3	1,811.3	328.8	1,071.5
2016	9,665.1	149.7	1,935.5	488.3	1,829.4	448.1	453.1	1,095.3	1,070.5	1,858.2	337.0	1,107.9
2016 Q3	2,417.9	37.4	482.3	122.4	457.4	112.8	112.8	274.4	268.3	465.8	84.3	277.9
Q4	2,440.7	38.6	489.8	123.6	462.8	113.8	111.8	276.5	270.5	468.6	84.8	281.3
2017 Q1	2,457.6	39.1	489.8	125.7	467.7	114.1	112.1	278.6	274.9	470.6	85.1	282.6
Q2	2,482.7	39.4	496.9	127.6	473.7	115.1	112.1	280.8	278.3	473.0	85.7	285.3
	as a percentage of value added											
2016	100.0	1.5	20.0	5.1	18.9	4.6	4.7	11.3	11.1	19.2	3.5	-
	Chain-linked volumes (prices for the previous year)											
	quarter-on-quarter percentage changes											
2016 Q3	0.5	-0.3	0.8	0.5	0.5	2.0	-0.3	0.2	0.2	0.3	0.2	0.7
Q4	0.6	-0.4	1.2	0.4	0.8	0.8	-0.4	0.3	0.7	0.4	0.2	0.9
2017 Q1	0.6	1.6	-0.1	1.5	0.9	1.1	0.0	0.5	1.3	0.2	0.3	0.5
Q2	0.6	-0.9	1.1	1.0	0.7	1.0	0.1	0.3	0.8	0.2	0.3	0.8
	annual percentage changes											
2014	1.4	1.4	2.7	-0.9	1.6	3.9	-1.4	0.4	2.7	0.5	0.1	1.2
2015	1.9	3.0	4.2	0.2	1.6	3.0	0.1	0.5	3.0	0.9	0.3	3.2
2016	1.7	-1.3	1.8	1.7	2.3	3.0	-0.1	0.9	2.9	1.2	1.0	2.8
2016 Q3	1.6	-1.5	1.4	2.2	2.2	3.5	0.1	0.9	2.7	1.3	1.0	2.8
Q4	1.9	-2.7	2.5	1.8	2.6	3.8	-0.8	1.1	2.8	1.5	1.1	2.2
2017 Q1	1.9	0.3	1.6	2.6	2.6	4.5	-1.0	1.3	3.4	1.2	1.0	2.5
Q2	2.2	-0.1	3.0	3.5	2.9	5.0	-0.6	1.2	2.9	1.1	1.0	2.9
	contributions to quarter-on-quarter percentage changes in value added; percentage points											
2016 Q3	0.5	0.0	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	-
Q4	0.6	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	-
2017 Q1	0.6	0.0	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.0	-
Q2	0.6	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	-
	contributions to annual percentage changes in value added; percentage points											
2014	1.4	0.0	0.5	0.0	0.3	0.2	-0.1	0.0	0.3	0.1	0.0	-
2015	1.9	0.0	0.8	0.0	0.3	0.1	0.0	0.1	0.3	0.2	0.0	-
2016	1.7	0.0	0.4	0.1	0.4	0.1	0.0	0.1	0.3	0.2	0.0	-
2016 Q3	1.6	0.0	0.3	0.1	0.4	0.2	0.0	0.1	0.3	0.2	0.0	-
Q4	1.9	0.0	0.5	0.1	0.5	0.2	0.0	0.1	0.3	0.3	0.0	-
2017 Q1	1.9	0.0	0.3	0.1	0.5	0.2	0.0	0.1	0.4	0.2	0.0	-
Q2	2.2	0.0	0.6	0.2	0.6	0.2	0.0	0.1	0.3	0.2	0.0	-

Sources: Eurostat and ECB calculations.

3 Economic activity

3.3 Employment [1)]

(quarterly data seasonally adjusted; annual data unadjusted)

	Total	By employment status		By economic activity										
		Employees	Self-employed	Agriculture, forestry and fishing	Manufacturing, energy and utilities	Construction	Trade, transport, accommodation and food services	Information and communication	Finance and insurance	Real estate	Professional, business and support services	Public administration, education, health and social work	Arts, entertainment and other services
	1	2	3	4	5	6	7	8	9	10	11	12	13
Persons employed													
as a percentage of total persons employed													
2014	100.0	85.1	14.9	3.4	15.1	6.1	24.7	2.7	2.7	1.0	13.0	24.3	7.1
2015	100.0	85.3	14.7	3.3	14.9	6.0	24.8	2.7	2.6	1.0	13.3	24.2	7.1
2016	100.0	85.5	14.5	3.2	14.8	5.9	24.9	2.7	2.6	1.0	13.5	24.2	7.1
annual percentage changes													
2014	0.5	0.6	0.0	0.0	-0.4	-1.6	0.7	0.5	-0.9	0.2	2.2	1.0	0.5
2015	1.0	1.2	-0.4	-1.2	0.2	0.0	1.1	1.3	-0.2	1.8	3.0	0.9	0.8
2016	1.4	1.6	-0.2	-0.6	0.6	0.1	1.9	2.3	0.1	1.6	2.9	1.2	0.9
2016 Q2	1.4	1.6	-0.2	-0.8	0.6	-0.2	2.0	2.0	0.1	1.0	2.8	1.3	1.0
Q3	1.3	1.6	0.0	-0.3	0.6	0.0	1.9	2.2	0.2	1.9	2.7	1.3	0.6
Q4	1.4	1.6	0.2	0.2	0.7	0.5	1.8	2.7	0.3	1.9	2.6	1.2	0.5
2017 Q1	1.5	1.7	0.2	0.9	0.7	1.3	1.7	2.6	-0.2	1.7	3.0	1.2	0.9
Hours worked													
as a percentage of total hours worked													
2014	100.0	80.3	19.7	4.4	15.6	6.8	25.6	2.9	2.7	1.0	12.7	22.0	6.3
2015	100.0	80.6	19.4	4.3	15.5	6.8	25.6	2.9	2.7	1.0	13.0	22.0	6.3
2016	100.0	80.7	19.3	4.2	15.4	6.7	25.8	2.9	2.6	1.0	13.2	21.9	6.3
annual percentage changes													
2014	0.6	0.8	-0.5	-0.4	0.0	-1.3	0.3	0.5	-1.0	0.0	2.3	1.3	0.2
2015	1.1	1.4	-0.3	-0.3	0.6	0.7	0.8	2.4	0.0	2.3	3.1	0.9	0.8
2016	0.8	1.0	-0.1	-0.4	0.3	-0.5	1.5	1.1	-1.3	1.4	2.5	0.2	0.6
2016 Q2	1.0	1.1	0.7	-0.1	0.4	-0.5	1.9	1.1	-0.9	1.6	2.9	0.2	0.7
Q3	0.6	0.8	-0.3	-0.6	0.0	-0.7	1.6	0.6	-1.6	1.2	1.8	0.1	0.0
Q4	0.7	0.9	-0.2	-0.7	0.5	-0.7	1.5	1.4	-1.4	1.6	2.2	0.1	0.2
2017 Q1	1.0	1.2	0.1	-0.4	0.6	0.5	1.2	2.1	-0.9	1.7	2.6	0.4	0.9
Hours worked per person employed													
annual percentage changes													
2014	0.0	0.2	-0.5	-0.4	0.4	0.3	-0.3	0.0	-0.1	-0.2	0.1	0.3	-0.3
2015	0.1	0.2	0.1	0.9	0.4	0.7	-0.3	1.1	0.2	0.5	0.1	0.0	0.0
2016	-0.6	-0.6	0.1	0.2	-0.4	-0.6	-0.3	-1.1	-1.4	-0.2	-0.3	-1.0	-0.2
2016 Q2	-0.4	-0.6	0.9	0.7	-0.1	-0.3	-0.2	-0.8	-1.0	0.6	0.1	-1.1	-0.3
Q3	-0.7	-0.8	-0.3	-0.3	-0.6	-0.7	-0.3	-1.5	-1.8	-0.7	-0.8	-1.2	-0.6
Q4	-0.7	-0.6	-0.4	-0.9	-0.2	-1.3	-0.4	-1.3	-1.6	-0.4	-0.5	-1.1	-0.3
2017 Q1	-0.5	-0.5	-0.1	-1.3	-0.1	-0.7	-0.4	-0.5	-0.7	0.1	-0.3	-0.8	0.0

Sources: Eurostat and ECB calculations.

1) Data for employment are based on the ESA 2010.

3 Economic activity

3.4 Labour force, unemployment and job vacancies

(seasonally adjusted, unless otherwise indicated)

	Labour force, millions [1]	Under-employ-ment, % of labour force [1]	Unemployment											Job vacancy rate [2]
			Total		Long-term unemploy-ment, % of labour force [1]	By age				By gender				
						Adult		Youth		Male		Female		
			Millions	% of labour force		Millions	% of labour force	Millions	% of labour force	Millions	% of labour force	Millions	% of labour force	% of total posts
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
% of total in 2016			100.0			81.8		18.2		52.2		47.8		
2014	160.334	4.6	18.637	11.6	6.1	15.216	10.4	3.421	23.7	9.933	11.5	8.704	11.8	1.4
2015	160.600	4.6	17.446	10.9	5.6	14.295	9.8	3.151	22.3	9.254	10.7	8.192	11.0	1.5
2016	161.882	4.3	16.228	10.0	5.0	13.279	9.0	2.950	20.9	8.474	9.7	7.755	10.4	1.7
2016 Q3	162.280	4.1	16.072	9.9	4.8	13.162	8.9	2.910	20.6	8.376	9.6	7.696	10.3	1.6
Q4	162.306	4.2	15.755	9.7	4.9	12.873	8.7	2.882	20.4	8.243	9.4	7.512	10.0	1.7
2017 Q1	161.634	4.3	15.380	9.5	4.8	12.632	8.5	2.748	19.6	7.970	9.1	7.410	9.9	1.9
Q2	.	.	14.896	9.2	.	12.213	8.2	2.682	19.2	7.705	8.8	7.190	9.6	1.9
2017 Feb.	-	-	15.350	9.5	-	12.620	8.5	2.729	19.5	7.944	9.1	7.406	9.9	-
Mar.	-	-	15.249	9.4	-	12.537	8.5	2.713	19.3	7.902	9.1	7.348	9.8	-
Apr.	-	-	14.985	9.2	-	12.293	8.3	2.692	19.2	7.741	8.9	7.244	9.7	-
May	-	-	14.915	9.2	-	12.221	8.2	2.694	19.3	7.714	8.8	7.201	9.6	-
June	-	-	14.787	9.1	-	12.126	8.2	2.661	19.0	7.661	8.8	7.126	9.5	-
July	-	-	14.860	9.1	-	12.190	8.2	2.670	19.1	7.681	8.8	7.179	9.6	-

Sources: Eurostat and ECB calculations.

1) Not seasonally adjusted.

2) The job vacancy rate is equal to the number of job vacancies divided by the sum of the number of occupied posts and the number of job vacancies, expressed as a percentage.

3.5 Short-term business statistics

	Industrial production						Con-struction produc-tion	ECB indicator on industrial new orders	Retail sales				New passenger car regis-trations
	Total (excluding construction)	Main Industrial Groupings							Total	Food, beverages, tobacco	Non-food	Fuel	
		Manu-facturing	Inter-mediate goods	Capital goods	Consumer goods	Energy							
	1	2	3	4	5	6	7	8	9	10	11	12	13
% of total in 2010	100.0	86.0	33.6	29.2	22.5	14.7	100.0	100.0	100.0	39.3	51.5	9.1	100.0
annual percentage changes													
2014	0.8	1.7	1.1	1.8	2.6	-5.3	2.0	3.1	1.5	0.7	2.4	0.0	3.8
2015	2.1	2.3	1.0	3.6	2.5	0.8	-0.9	3.6	2.6	1.7	3.2	2.3	8.8
2016	1.4	1.5	1.8	1.7	1.1	0.1	2.2	0.2	1.4	1.3	1.5	1.8	7.2
2016 Q3	1.0	1.3	1.7	0.8	1.3	-0.5	3.6	-0.2	0.9	1.3	0.5	2.5	6.4
Q4	2.3	1.8	2.4	1.7	1.2	5.4	2.3	3.3	2.3	1.7	3.0	1.4	4.1
2017 Q1	1.4	1.3	2.2	1.4	-0.6	2.0	1.8	5.7	2.1	1.4	2.9	1.4	4.8
Q2	2.5	2.7	3.6	2.4	1.7	1.6	3.3	6.7	2.8	2.7	3.2	1.3	6.0
2017 Feb.	1.4	1.2	2.1	1.6	-1.6	2.4	5.4	6.6	2.1	1.1	3.1	1.3	4.8
Mar.	2.2	3.2	3.8	3.6	2.1	-4.9	4.1	7.5	2.9	1.6	4.3	1.2	5.5
Apr.	1.2	1.5	3.1	0.3	0.8	-0.9	3.3	6.6	2.7	3.4	2.6	-0.1	4.3
May	3.9	4.3	3.9	5.4	3.1	1.0	2.7	7.3	2.6	2.1	3.5	-0.1	7.1
June	2.6	2.4	3.8	1.6	1.1	5.1	3.4	6.1	3.3	2.7	3.6	4.2	6.5
July	.	.	.	.	.	.	.	.	2.6	1.5	3.9	0.8	.
month-on-month percentage changes (s.a.)													
2017 Feb.	-0.2	0.5	1.2	1.1	-1.2	-5.7	5.5	2.2	0.6	0.2	0.9	-0.3	0.8
Mar.	0.4	0.8	0.7	0.9	1.9	-2.9	-0.9	1.0	0.3	0.2	0.6	0.6	-0.6
Apr.	0.4	0.0	0.2	-1.1	0.2	3.8	0.3	-1.2	0.0	1.2	-0.8	-0.6	0.2
May	1.2	1.3	0.5	2.2	1.2	0.2	-0.2	1.1	0.3	-0.6	0.8	1.2	3.0
June	-0.6	-0.9	-0.3	-1.9	-0.5	1.8	-0.5	0.5	0.6	0.6	0.5	0.9	-1.9
July	.	.	.	.	.	.	.	.	-0.3	-0.5	0.1	-0.9	.

Sources: Eurostat, ECB calculations, ECB experimental statistics (col. 8) and European Automobile Manufacturers Association (col. 13).

3 Economic activity

3.6 Opinion surveys
(seasonally adjusted)

	European Commission Business and Consumer Surveys (percentage balances, unless otherwise indicated)								Purchasing Managers' Surveys (diffusion indices)			
	Economic sentiment indicator (long-term average = 100)	Manufacturing industry		Consumer confidence indicator	Construction confidence indicator	Retail trade confidence indicator	Service industries		Purchasing Managers' Index (PMI) for manufacturing	Manufacturing output	Business activity for services	Composite output
		Industrial confidence indicator	Capacity utilisation (%)				Services confidence indicator	Capacity utilisation (%)				
	1	2	3	4	5	6	7	8	9	10	11	12
1999-13	100.0	-6.1	80.7	-12.8	-13.6	-8.7	7.0	-	51.0	52.4	52.9	52.7
2014	101.4	-3.8	80.5	-10.1	-26.6	-3.1	4.7	87.7	51.8	53.3	52.5	52.7
2015	104.2	-3.1	81.4	-6.2	-22.4	1.6	9.2	88.4	52.2	53.4	54.0	53.8
2016	104.8	-2.6	81.9	-7.7	-16.6	1.5	11.2	89.1	52.5	53.6	53.1	53.3
2016 Q3	104.2	-2.9	82.0	-8.3	-16.0	0.3	10.3	89.3	52.1	53.7	52.6	52.9
Q4	106.9	-0.6	82.4	-6.5	-13.1	1.8	12.4	89.4	54.0	54.9	53.5	53.8
2017 Q1	108.0	1.1	82.6	-5.5	-11.0	2.0	13.2	89.4	55.6	56.9	55.1	55.6
Q2	110.0	3.3	82.9	-2.7	-5.0	3.2	13.4	89.8	57.0	58.3	56.0	56.6
2017 Mar.	108.0	1.3	-	-5.1	-9.9	1.8	12.8	-	56.2	57.5	56.0	56.4
Apr.	109.7	2.6	82.6	-3.6	-6.0	3.1	14.2	89.4	56.7	57.9	56.4	56.8
May	109.3	2.8	-	-3.3	-5.6	2.0	12.8	-	57.0	58.3	56.3	56.8
June	111.1	4.5	-	-1.3	-3.5	4.4	13.3	-	57.4	58.7	55.4	56.3
July	111.3	4.5	83.2	-1.7	-1.8	3.9	14.2	90.2	56.6	56.5	55.4	55.7
Aug.	111.9	5.1	-	-1.5	-3.3	1.6	14.9	-	57.4	58.3	54.7	55.7

Sources: European Commission (Directorate-General for Economic and Financial Affairs) (col. 1-8) and Markit (col. 9-12).

3.7 Summary accounts for households and non-financial corporations
(current prices, unless otherwise indicated; not seasonally adjusted)

	Households							Non-financial corporations					
	Saving ratio (gross) [1]	Debt ratio	Real gross disposable income	Financial investment	Non-financial investment (gross)	Net worth [2]	Housing wealth	Profit share [3]	Saving ratio (net)	Debt ratio [4]	Financial investment	Non-financial investment (gross)	Financing
	Percentage of gross disposable income (adjusted)		Annual percentage changes					Percentage of net value added		Percentage of GDP	Annual percentage changes		
	1	2	3	4	5	6	7	8	9	10	11	12	13
2014	12.7	94.6	0.9	1.8	1.4	2.7	1.0	32.8	4.9	131.1	2.7	7.3	1.5
2015	12.4	93.9	1.6	2.1	2.8	3.4	2.5	34.0	6.3	133.3	3.9	3.5	2.2
2016	12.2	93.5	1.9	1.9	4.7	4.4	4.5	33.5	7.7	132.9	3.2	4.7	1.5
2016 Q2	12.4	93.5	2.4	2.3	5.9	3.2	3.7	33.6	7.2	133.4	3.6	3.3	2.0
Q3	12.4	93.5	1.6	2.3	4.9	4.4	4.1	33.6	7.6	132.0	3.4	2.9	1.7
Q4	12.2	93.5	1.3	1.9	4.3	4.4	4.5	33.5	7.7	132.9	3.2	9.1	1.5
2017 Q1	12.2	93.1	1.7	2.0	9.4	4.8	4.8	33.5	7.2	132.7	3.7	12.0	2.0

Sources: ECB and Eurostat.
1) Based on four-quarter cumulated sums of both saving and gross disposable income (adjusted for the change in the net equity of households in pension fund reserves).
2) Financial assets (net of financial liabilities) and non-financial assets. Non-financial assets consist mainly of housing wealth (residential structures and land). They also include non-financial assets of unincorporated enterprises classified within the household sector.
3) The profit share uses net entrepreneurial income, which is broadly equivalent to current profits in business accounting.
4) Based on the outstanding amount of loans, debt securities, trade credits and pension scheme liabilities.

3 Economic activity

3.8 Euro area balance of payments, current and capital accounts

(EUR billions; seasonally adjusted unless otherwise indicated; transactions)

	Current account											Capital account [1]	
	Total			Goods		Services		Primary income		Secondary income			
	Credit	Debit	Net	Credit	Debit	Credit	Debit	Credit	Debit	Credit	Debit	Credit	Debit
	1	2	3	4	5	6	7	8	9	10	11	12	13
2016 Q3	907.1	812.1	95.0	526.6	433.6	197.6	177.9	155.8	133.3	27.2	67.5	6.6	5.5
Q4	940.1	864.1	76.0	545.1	456.5	199.6	205.0	167.2	138.5	28.2	64.0	9.6	10.0
2017 Q1	958.3	867.5	90.8	559.0	478.2	208.0	187.8	163.4	146.8	27.8	54.7	6.7	22.3
Q2	945.5	870.8	74.6	555.9	477.3	203.5	191.5	160.9	135.0	25.2	67.0	5.6	4.6
2017 Jan.	317.9	295.1	22.8	183.2	159.4	68.7	66.2	57.4	48.2	8.6	21.3	2.3	10.9
Feb.	319.2	284.9	34.3	187.2	159.1	69.9	61.7	53.2	50.4	8.9	13.7	2.4	5.3
Mar.	321.2	287.4	33.8	188.6	159.6	69.4	59.8	52.9	48.3	10.3	19.7	2.0	6.1
Apr.	312.4	289.4	23.0	182.0	157.5	68.1	61.0	54.0	44.0	8.2	26.9	1.6	2.0
May	321.2	290.7	30.5	188.8	162.2	67.3	64.6	56.0	44.7	9.1	19.2	1.6	1.3
June	311.9	290.7	21.2	185.0	157.6	68.0	65.9	50.9	46.3	7.9	20.9	2.4	1.3
12-month cumulated transactions													
2017 June	3,751.0	3,414.6	336.5	2,186.6	1,845.6	808.6	762.2	647.4	553.6	108.4	253.2	28.5	42.4
12-month cumulated transactions as a percentage of GDP													
2017 June	34.7	31.6	3.1	20.2	17.1	7.5	7.1	6.0	5.1	1.0	2.3	0.3	0.4

1) The capital account is not seasonally adjusted.

3.9 Euro area external trade in goods [1] , values and volumes by product group [2]

(seasonally adjusted, unless otherwise indicated)

	Total (n.s.a.)		Exports (f.o.b.)					Imports (c.i.f.)					
			Total				Memo item:	Total				Memo items:	
	Exports	Imports		Intermediate goods	Capital goods	Consump-tion goods	Manu-facturing		Intermediate goods	Capital goods	Consump-tion goods	Manu-facturing	Oil
	1	2	3	4	5	6	7	8	9	10	11	12	13
Values (EUR billions; annual percentage changes for columns 1 and 2)													
2016 Q3	-0.2	-1.7	508.9	237.4	103.4	154.3	426.3	443.7	244.8	72.8	117.6	328.1	43.9
Q4	2.3	2.4	525.8	244.9	108.8	157.5	439.9	461.2	256.9	74.9	119.5	335.3	50.1
2017 Q1	10.9	13.8	539.7	256.9	108.9	160.8	449.4	485.0	279.1	77.3	119.8	343.6	59.9
Q2	5.2	9.4	544.6	.	.	.	454.1	484.5	.	.	.	349.4	.
2017 Jan.	12.8	17.7	177.6	84.9	35.1	53.3	146.3	162.5	93.2	26.4	39.9	114.7	20.7
Feb.	5.1	7.0	179.0	85.6	36.4	52.7	149.9	160.8	92.8	25.7	39.3	113.9	20.7
Mar.	14.6	16.8	183.1	86.5	37.5	54.8	153.2	161.6	93.1	25.3	40.7	115.0	18.5
Apr.	-1.6	4.2	179.9	85.4	36.2	53.6	149.6	161.1	91.5	25.6	40.0	116.0	17.7
May	13.6	17.9	184.1	86.6	38.0	55.1	154.5	165.1	93.5	26.1	42.0	119.3	17.5
June	3.9	6.2	180.6	.	.	.	150.0	158.3	.	.	.	114.1	.
Volume indices (2000 = 100; annual percentage changes for columns 1 and 2)													
2016 Q3	0.6	1.8	118.2	116.2	113.5	124.1	117.3	109.3	108.4	107.0	112.1	112.3	101.0
Q4	1.5	0.8	120.5	118.2	118.6	124.9	120.0	109.8	108.9	107.0	111.9	112.4	104.6
2017 Q1	6.4	3.3	121.1	121.0	117.8	124.2	120.4	110.3	111.4	107.2	109.8	112.3	110.0
Q2	.	.	.	.	.	.	.	.	.	.	.	.	.
2016 Dec.	4.8	-0.1	122.3	119.2	125.7	124.2	122.6	108.8	107.5	105.3	111.4	111.0	102.9
2017 Jan.	9.0	6.9	119.9	119.9	114.2	124.4	118.1	110.5	111.4	109.9	108.2	112.2	112.4
Feb.	1.0	-3.3	120.6	121.1	117.8	122.5	120.8	109.8	111.0	106.6	108.5	111.9	113.3
Mar.	9.2	6.2	122.7	121.9	121.2	125.7	122.5	110.7	111.7	105.1	112.8	112.7	104.2
Apr.	-6.2	-4.8	120.9	120.8	117.1	123.6	119.9	110.9	110.7	106.3	111.0	113.9	101.3
May	8.7	9.6	123.5	122.5	122.8	126.6	123.5	114.7	114.6	110.5	116.3	117.6	104.5

Sources: ECB and Eurostat.

1) Differences between ECB's b.o.p. goods (Table 3.8) and Eurostat's trade in goods (Table 3.9) are mainly due to different definitions.

2) Product groups as classified in the Broad Economic Categories.

4 Prices and costs

4.1 Harmonised Index of Consumer Prices [1)]

(annual percentage changes, unless otherwise indicated)

	Total					Total (s.a.; percentage change vis-à-vis previous period) [2)]						Memo item: Administered prices	
	Index: 2015 = 100	Total		Goods	Services	Total	Processed food	Unprocessed food	Non-energy industrial goods	Energy (n.s.a.)	Services	Total HICP excluding administered prices	Administered prices
			Total excluding food and energy										
	1	2	3	4	5	6	7	8	9	10	11	12	13
% of total in 2017	100.0	100.0	70.9	55.4	44.6	100.0	12.1	7.5	26.3	9.5	44.6	86.8	13.2
2014	100.0	0.4	0.8	-0.2	1.2	-	-	-	-	-	-	0.2	1.9
2015	100.0	0.0	0.8	-0.8	1.2	-	-	-	-	-	-	-0.1	0.9
2016	100.2	0.2	0.9	-0.4	1.1	-	-	-	-	-	-	0.2	0.2
2016 Q3	100.3	0.3	0.8	-0.4	1.1	0.3	0.1	1.1	0.0	0.3	0.4	0.3	0.3
Q4	101.0	0.7	0.8	0.4	1.1	0.4	0.3	-0.1	0.1	2.4	0.3	0.8	0.3
2017 Q1	101.0	1.8	0.8	2.3	1.1	0.6	0.3	1.9	0.1	3.3	0.3	2.0	0.5
Q2	102.0	1.5	1.1	1.5	1.6	0.1	0.7	-1.2	0.1	-1.4	0.6	1.6	1.3
2017 Mar.	101.7	1.5	0.7	2.0	1.0	-0.1	0.1	-1.6	0.1	-0.8	0.0	1.7	0.7
Apr.	102.0	1.9	1.2	1.9	1.8	0.2	0.2	-0.5	0.0	0.3	0.5	2.0	1.3
May	101.9	1.4	0.9	1.5	1.3	-0.1	0.4	-0.1	0.0	-1.2	-0.1	1.4	1.2
June	102.0	1.3	1.1	1.0	1.6	0.0	0.2	-0.5	0.1	-0.9	0.3	1.3	1.3
July	101.4	1.3	1.2	1.1	1.6	0.1	0.2	0.2	0.1	-0.7	0.2	1.3	1.1
Aug. [3)]	101.7	1.5	1.2	.	1.6	0.2	0.2	0.6	0.0	0.7	0.1	.	.

	Goods						Services					
	Food (including alcoholic beverages and tobacco)			Industrial goods			Housing		Transport	Communication	Recreation and personal	Miscellaneous
	Total	Processed food	Unprocessed food	Total	Non-energy industrial goods	Energy		Rents				
	14	15	16	17	18	19	20	21	22	23	24	25
% of total in 2017	19.6	12.1	7.5	35.8	26.3	9.5	10.7	6.5	7.3	3.2	15.1	8.2
2014	0.5	1.2	-0.8	-0.5	0.1	-1.9	1.7	1.4	1.7	-2.8	1.5	1.3
2015	1.0	0.6	1.6	-1.8	0.3	-6.8	1.2	1.1	1.3	-0.8	1.5	1.2
2016	0.9	0.6	1.4	-1.1	0.4	-5.1	1.1	1.1	0.8	0.0	1.4	1.2
2016 Q3	1.1	0.5	2.1	-1.3	0.3	-5.1	1.1	1.0	0.9	0.0	1.5	1.3
Q4	0.8	0.6	1.0	0.2	0.3	0.2	1.2	1.2	1.2	-0.1	1.3	1.2
2017 Q1	2.0	0.9	4.0	2.4	0.3	8.2	1.3	1.2	1.7	-1.1	1.4	0.7
Q2	1.5	1.4	1.6	1.5	0.3	4.6	1.3	1.3	2.6	-1.4	2.3	0.8
2017 Mar.	1.8	1.0	3.1	2.1	0.3	7.4	1.3	1.2	1.9	-1.2	0.9	0.8
Apr.	1.5	1.1	2.2	2.2	0.3	7.6	1.3	1.3	3.3	-1.2	2.8	0.8
May	1.5	1.5	1.6	1.4	0.3	4.5	1.3	1.3	2.1	-1.4	1.8	0.8
June	1.4	1.6	1.0	0.8	0.4	1.9	1.3	1.3	2.4	-1.6	2.4	0.9
July	1.4	1.9	0.6	0.9	0.5	2.2	1.3	1.2	2.2	-1.8	2.5	0.8
Aug. [3)]	1.4	2.0	0.6	.	0.5	4.0	.	.	.	.	.	.

Sources: Eurostat and ECB calculations.

1) Data refer to the changing composition of the euro area.

2) In May 2016 the ECB started publishing enhanced seasonally adjusted HICP series for the euro area, following a review of the seasonal adjustment approach as described in Box 1, *Economic Bulletin*, Issue 3, ECB, 2016 (https://www.ecb.europa.eu/pub/pdf/ecbu/eb201603.en.pdf).

3) Estimate based on provisional national data, as well as on early information on energy prices.

4 Prices and costs

4.2 Industry, construction and property prices

(annual percentage changes, unless otherwise indicated)

	Industrial producer prices excluding construction [1]										Con-struction	Residential property prices [2]	Experimental indicator of commercial property prices [2]
	Total (index: 2010 = 100)	Total		Industry excluding construction and energy						Energy			
			Manu-facturing	Total	Intermediate goods	Capital goods	Consumer goods						
							Total	Food, beverages and tobacco	Non-food				
	1	2	3	4	5	6	7	8	9	10	11	12	13
% of total in 2010	100.0	100.0	78.1	72.1	29.4	20.1	22.6	13.8	8.9	27.9			
2014	106.9	-1.5	-0.9	-0.3	-1.1	0.4	0.1	-0.1	0.3	-4.3	0.3	0.3	1.0
2015	104.0	-2.7	-2.4	-0.5	-1.3	0.7	-0.6	-0.9	0.2	-8.2	0.2	1.6	2.9
2016	101.6	-2.3	-1.5	-0.5	-1.7	0.4	0.0	0.0	0.1	-6.9	0.4	3.2	5.2
2016 Q3	101.9	-2.0	-1.3	-0.6	-1.8	0.4	0.0	0.0	0.1	-5.9	0.4	3.3	7.1
Q4	103.1	0.4	1.0	0.4	0.0	0.5	0.8	1.3	0.1	0.4	1.1	3.7	5.1
2017 Q1	104.7	4.1	4.0	2.1	3.1	0.8	1.7	2.6	0.2	9.9	1.9	3.9	.
Q2	104.2	3.3	3.1	2.4	3.5	0.9	2.4	3.5	0.2	5.7	.	.	.
2017 Feb.	104.8	4.5	4.4	2.1	3.4	0.8	1.7	2.6	0.1	11.4	-	-	-
Mar.	104.5	3.9	4.0	2.5	3.9	0.9	2.0	3.0	0.2	8.1	-	-	-
Apr.	104.5	4.3	3.9	2.6	4.0	0.9	2.3	3.5	0.2	9.0	-	-	-
May	104.2	3.4	3.1	2.4	3.6	0.9	2.3	3.5	0.2	5.8	-	-	-
June	104.0	2.4	2.1	2.2	3.0	0.9	2.4	3.4	0.3	2.5	-	-	-
July	104.0	2.0	2.3	2.1	2.7	0.9	2.1	3.2	0.3	2.0	-	-	-

Sources: Eurostat, ECB calculations, and ECB calculations based on MSCI data and national sources (col. 13).

1) Domestic sales only.

2) Experimental data based on non-harmonised sources (see https://www.ecb.europa.eu/stats/ecb_statistics/governance_and_quality_framework/html/experimental-data.en.html for further details).

4.3 Commodity prices and GDP deflators

(annual percentage changes, unless otherwise indicated)

	GDP deflators								Oil prices (EUR per barrel)	Non-energy commodity prices (EUR)					
	Total (s.a.; index: 2010 = 100)	Total	Domestic demand				Exports [1]	Imports [1]		Import-weighted [2]			Use-weighted [2]		
			Total	Private consump-tion	Govern-ment consump-tion	Gross fixed capital formation				Total	Food	Non-food	Total	Food	Non-food
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
% of total										100.0	45.4	54.6	100.0	50.4	49.6
2014	104.5	0.9	0.6	0.5	0.8	0.7	-0.7	-1.5	74.1	-3.4	2.0	-8.5	-0.4	4.6	-6.4
2015	105.9	1.3	0.4	0.2	0.6	0.7	0.4	-1.9	47.1	0.0	4.2	-4.5	2.9	7.0	-2.7
2016	106.8	0.8	0.4	0.3	0.6	0.8	-1.4	-2.4	39.9	-3.5	-3.9	-3.2	-7.3	-10.3	-2.9
2016 Q3	106.8	0.6	0.4	0.3	0.6	0.8	-1.5	-2.2	41.0	-0.5	-2.1	1.4	-5.8	-10.6	1.3
Q4	107.1	0.7	0.8	0.7	0.6	1.0	0.0	0.1	46.5	9.1	1.1	18.6	3.3	-6.7	18.5
2017 Q1	107.3	0.7	1.4	1.5	1.0	1.3	2.7	4.6	50.8	18.3	5.9	33.2	13.0	0.1	32.4
Q2	107.7	1.0	1.3	1.4	1.0	1.4	2.5	3.3	45.6	6.8	-2.7	18.2	6.7	-2.4	19.9
2017 Mar.	-	-	-	-	-	-	-	-	48.7	14.6	2.7	28.5	10.5	-2.2	29.3
Apr.	-	-	-	-	-	-	-	-	49.6	11.4	1.2	23.2	9.9	-0.5	24.8
May	-	-	-	-	-	-	-	-	46.0	7.0	-2.1	17.7	6.9	-1.8	19.7
June	-	-	-	-	-	-	-	-	41.7	2.3	-7.1	13.7	3.2	-4.8	15.1
July	-	-	-	-	-	-	-	-	42.2	1.0	-6.0	8.9	2.0	-3.9	10.1
Aug.	-	-	-	-	-	-	-	-	43.5	1.1	-8.7	12.1	1.2	-7.6	13.0

Sources: Eurostat, ECB calculations and Bloomberg (col. 9).

1) Deflators for exports and imports refer to goods and services and include cross-border trade within the euro area.

2) Import-weighted: weighted according to 2009-11 average import structure; use-weighted: weighted according to 2009-11 average domestic demand structure.

4 Prices and costs

4.4 Price-related opinion surveys
(seasonally adjusted)

	European Commission Business and Consumer Surveys (percentage balances)					Purchasing Managers' Surveys (diffusion indices)			
	Selling price expectations (for next three months)				Consumer price trends over past 12 months	Input prices		Prices charged	
	Manu-facturing	Retail trade	Services	Construction		Manu-facturing	Services	Manu-facturing	Services
	1	2	3	4	5	6	7	8	9
1999-13	4.7	-	-	-2.0	34.7	57.7	56.7	-	49.9
2014	-0.9	-1.5	0.9	-17.4	15.1	49.6	53.5	49.7	48.2
2015	-2.8	1.3	2.7	-13.2	-0.2	48.9	53.5	49.6	49.0
2016	-0.4	1.7	4.4	-7.3	0.2	49.8	53.9	49.3	49.6
2016 Q3	-0.2	1.0	4.5	-6.6	0.6	51.4	54.0	49.6	49.8
Q4	4.6	3.1	4.9	-5.4	2.4	58.6	54.9	51.6	50.5
2017 Q1	9.0	5.5	6.4	-3.7	12.9	67.8	56.7	55.0	51.4
Q2	7.8	4.2	5.9	1.8	12.3	62.5	55.9	54.6	51.5
2017 Mar.	9.6	5.1	6.1	-2.9	15.6	68.1	56.8	55.6	52.2
Apr.	8.2	5.5	6.7	2.3	13.5	67.1	56.5	55.4	51.7
May	8.2	3.6	5.1	-0.5	11.8	62.0	55.9	54.1	51.7
June	7.1	3.4	5.8	3.6	11.7	58.4	55.3	54.3	50.9
July	7.5	4.4	6.2	5.3	10.1	57.8	55.2	53.7	51.0
Aug.	8.3	4.0	6.3	0.0	9.9	59.4	55.6	54.3	51.3

Sources: European Commission (Directorate-General for Economic and Financial Affairs) and Markit.

4.5 Labour cost indices
(annual percentage changes, unless otherwise indicated)

	Total (index: 2012 = 100)	Total	By component		For selected economic activities		Memo item: Indicator of negotiated wages [1]
			Wages and salaries	Employers' social contributions	Business economy	Mainly non-business economy	
	1	2	3	4	5	6	7
% of total in 2012	100.0	100.0	74.6	25.4	69.3	30.7	
2014	102.6	1.2	1.3	1.2	1.3	1.2	1.7
2015	104.2	1.6	1.9	0.4	1.6	1.6	1.5
2016	105.7	1.4	1.4	1.4	1.3	1.6	1.4
2016 Q3	102.5	1.4	1.5	1.1	1.2	1.8	1.5
Q4	112.1	1.4	1.6	1.4	1.5	1.4	1.4
2017 Q1	100.4	1.5	1.4	1.5	1.3	1.7	1.6
Q2	.	.	.	.	.	.	1.4

Sources: Eurostat and ECB calculations.
1) Experimental data based on non-harmonised sources (see https://www.ecb.europa.eu/stats/ecb_statistics/governance_and_quality_framework/html/experimental-data.en.html for further details).

4 Prices and costs

4.6 Unit labour costs, compensation per labour input and labour productivity

(annual percentage changes, unless otherwise indicated; quarterly data seasonally adjusted; annual data unadjusted)

	Total (index: 2010 =100)	Total	By economic activity									
			Agriculture, forestry and fishing	Manu-facturing, energy and utilities	Con-struction	Trade, transport, accom-modation and food services	Information and commu-nication	Finance and insurance	Real estate	Professional, business and support services	Public ad-ministration, education, health and social work	Arts, enter-tainment and other services
	1	2	3	4	5	6	7	8	9	10	11	12
						Unit labour costs						
2014	104.4	0.6	-1.2	-0.9	1.1	0.3	-1.1	2.4	1.7	1.1	1.6	1.5
2015	104.6	0.2	-3.3	-2.3	0.5	0.8	0.7	0.7	2.5	1.6	1.2	1.4
2016	105.5	0.8	1.6	0.0	-0.4	0.7	0.3	1.3	4.0	1.2	1.4	2.0
2016 Q2	105.3	0.7	1.0	-0.1	-0.8	1.4	0.8	1.2	3.6	0.2	1.2	1.4
Q3	105.6	0.8	1.9	0.4	-0.6	1.0	-0.6	1.5	4.2	0.4	1.4	1.8
Q4	105.9	0.9	3.7	-0.3	0.1	0.9	-0.2	2.3	4.7	0.6	1.3	1.7
2017 Q1	106.2	1.0	0.9	0.7	0.3	0.6	-0.6	2.1	3.7	1.5	1.5	1.8
						Compensation per employee						
2014	106.6	1.4	0.2	2.1	1.9	1.2	2.3	1.8	1.9	1.7	1.1	1.2
2015	107.9	1.2	0.8	1.6	0.7	1.3	2.4	1.0	1.2	1.5	1.2	0.9
2016	109.3	1.2	0.8	1.1	1.2	1.2	1.1	1.1	3.3	1.3	1.4	2.1
2016 Q2	109.0	1.0	1.1	0.9	0.9	1.5	1.0	1.0	3.5	0.7	1.1	1.5
Q3	109.5	1.2	0.6	1.2	1.6	1.3	0.7	1.4	3.1	0.4	1.4	2.2
Q4	110.0	1.4	0.7	1.5	1.4	1.7	0.9	1.2	3.8	0.7	1.6	2.3
2017 Q1	110.5	1.5	0.3	1.7	1.7	1.5	1.2	1.2	3.3	2.0	1.5	1.8
						Labour productivity per person employed						
2014	102.1	0.8	1.4	3.0	0.8	1.0	3.4	-0.6	0.1	0.5	-0.4	-0.4
2015	103.2	1.0	4.3	4.0	0.2	0.5	1.7	0.3	-1.3	-0.1	0.0	-0.4
2016	103.6	0.4	-0.8	1.1	1.6	0.5	0.7	-0.2	-0.7	0.0	0.0	0.1
2016 Q2	103.5	0.3	0.1	1.0	1.8	0.1	0.3	-0.2	-0.1	0.5	-0.1	0.1
Q3	103.7	0.4	-1.3	0.8	2.2	0.3	1.3	-0.1	-1.0	0.0	0.1	0.4
Q4	103.9	0.6	-2.9	1.8	1.2	0.7	1.1	-1.1	-0.8	0.1	0.3	0.6
2017 Q1	104.1	0.5	-0.6	0.9	1.3	0.9	1.9	-0.9	-0.4	0.4	0.0	0.1
						Compensation per hour worked						
2014	108.5	1.3	1.1	1.6	1.4	1.4	2.2	1.8	1.7	1.2	0.8	1.2
2015	109.7	1.1	0.9	1.1	0.1	1.3	1.2	0.9	0.8	1.2	1.2	0.9
2016	111.7	1.9	0.0	1.4	2.1	1.6	2.3	2.9	3.7	1.7	2.4	3.0
2016 Q2	111.1	1.6	-0.1	1.0	1.7	1.8	2.1	2.6	3.5	1.1	2.2	2.7
Q3	111.8	2.0	0.4	1.8	2.7	1.6	2.3	3.5	4.4	1.3	2.4	3.5
Q4	112.6	2.1	1.0	1.7	2.5	2.1	2.4	3.1	4.3	1.1	2.5	3.3
2017 Q1	113.0	2.0	0.7	1.8	2.9	1.9	1.7	2.0	3.9	2.1	2.4	2.4
						Hourly labour productivity						
2014	104.2	0.8	1.9	2.6	0.4	1.3	3.4	-0.5	0.4	0.4	-0.7	-0.1
2015	105.2	0.9	3.4	3.5	-0.6	0.8	0.7	0.0	-1.7	-0.1	0.0	-0.5
2016	106.2	1.0	-0.9	1.5	2.2	0.8	1.9	1.2	-0.5	0.3	1.1	0.4
2016 Q2	105.6	0.7	-0.6	1.1	2.1	0.3	1.1	0.8	-0.6	0.4	1.0	0.4
Q3	106.2	1.2	-1.0	1.4	2.9	0.6	2.9	1.7	-0.3	0.8	1.2	1.0
Q4	106.6	1.2	-2.0	2.0	2.5	1.1	2.4	0.6	-0.5	0.6	1.4	0.9
2017 Q1	106.8	1.0	0.7	1.0	2.1	1.3	2.4	-0.2	-0.5	0.8	0.8	0.1

Sources: Eurostat and ECB calculations.

5 Money and credit

5.1 Monetary aggregates [1)]

(EUR billions and annual growth rates; seasonally adjusted; outstanding amounts and growth rates at end of period; transactions during period)

	M3											
	M2							M3-M2				
	M1			M2-M1								
	Currency in circulation	Overnight deposits		Deposits with an agreed maturity of up to 2 years	Deposits redeemable at notice of up to 3 months			Repos	Money market fund shares	Debt securities with a maturity of up to 2 years		
	1	2	3	4	5	6	7	8	9	10	11	12
Outstanding amounts												
2014	969.5	4,970.5	5,939.9	1,581.7	2,147.6	3,729.4	9,669.3	121.5	430.3	109.2	661.0	10,330.3
2015	1,036.5	5,566.3	6,602.8	1,439.2	2,159.8	3,599.1	10,201.8	74.6	485.5	75.4	635.5	10,837.3
2016	1,073.1	6,117.1	7,190.2	1,320.3	2,175.8	3,496.1	10,686.3	70.4	523.7	95.8	689.9	11,376.2
2016 Q3	1,066.6	5,946.7	7,013.3	1,393.3	2,172.6	3,565.8	10,579.2	80.5	504.0	92.3	676.8	11,255.9
Q4	1,073.1	6,117.1	7,190.2	1,320.3	2,175.8	3,496.1	10,686.3	70.4	523.7	95.8	689.9	11,376.2
2017 Q1	1,088.6	6,303.7	7,392.2	1,306.0	2,180.0	3,486.0	10,878.2	73.5	533.5	102.4	709.5	11,587.7
Q2	1,095.0	6,435.6	7,530.5	1,259.1	2,195.1	3,454.2	10,984.8	68.3	515.1	80.5	663.9	11,648.7
2017 Feb.	1,086.1	6,208.5	7,294.6	1,325.0	2,178.0	3,503.0	10,797.6	66.7	514.0	96.6	677.4	11,475.0
Mar.	1,088.6	6,303.7	7,392.2	1,306.0	2,180.0	3,486.0	10,878.2	73.5	533.5	102.4	709.5	11,587.7
Apr.	1,092.3	6,345.9	7,438.2	1,279.4	2,183.0	3,462.4	10,900.6	72.3	518.6	81.0	671.9	11,572.5
May	1,092.4	6,379.6	7,472.0	1,263.9	2,190.4	3,454.4	10,926.4	72.5	518.4	81.8	672.8	11,599.2
June	1,095.0	6,435.6	7,530.5	1,259.1	2,195.1	3,454.2	10,984.8	68.3	515.1	80.5	663.9	11,648.7
July [p]	1,093.9	6,459.6	7,553.5	1,244.7	2,200.8	3,445.6	10,999.1	66.7	512.7	75.7	655.1	11,654.1
Transactions												
2014	59.0	374.9	433.9	-91.8	3.7	-88.1	345.8	3.6	11.9	13.0	28.5	374.3
2015	65.9	562.6	628.5	-135.4	12.3	-123.0	505.5	-48.0	49.8	-26.6	-24.8	480.7
2016	36.7	544.5	581.3	-109.2	15.9	-93.3	488.0	-4.3	38.1	16.4	50.2	538.2
2016 Q3	12.0	127.9	139.9	-15.7	2.3	-13.5	126.5	-3.7	13.1	-3.2	6.3	132.7
Q4	6.5	156.1	162.6	-66.7	3.2	-63.5	99.1	-10.4	19.7	4.2	13.5	112.6
2017 Q1	15.5	189.1	204.5	-11.7	4.1	-7.6	197.0	3.1	9.9	6.0	19.1	216.0
Q2	6.4	151.4	157.9	-37.2	14.7	-22.5	135.4	-4.7	-18.1	-20.1	-43.0	92.4
2017 Feb.	4.3	50.0	54.3	-5.3	-0.2	-5.4	48.9	-8.5	-5.4	2.0	-11.9	37.0
Mar.	2.4	97.4	99.8	-18.2	2.0	-16.2	83.6	6.9	19.5	6.1	32.4	116.1
Apr.	3.7	46.8	50.5	-25.1	3.1	-22.0	28.5	-1.1	-14.9	-21.5	-37.5	-9.0
May	0.1	44.9	45.0	-8.5	6.9	-1.5	43.5	0.5	-0.1	0.0	0.4	43.9
June	2.6	59.8	62.4	-3.7	4.7	1.1	63.4	-4.1	-3.2	1.3	-5.9	57.5
July [p]	-1.1	30.2	29.1	-12.3	2.5	-9.8	19.3	-1.4	-2.4	-3.0	-6.8	12.5
Growth rates												
2014	6.5	8.4	8.0	-5.4	0.2	-2.3	3.7	2.9	2.9	19.2	4.6	3.8
2015	6.8	11.3	10.5	-8.6	0.6	-3.3	5.2	-39.1	11.4	-25.0	-3.7	4.6
2016	3.5	9.8	8.8	-7.6	0.7	-2.6	4.8	-5.8	7.8	21.6	7.9	5.0
2016 Q3	3.7	9.3	8.4	-3.3	0.5	-1.0	5.0	-12.8	7.7	13.7	5.4	5.1
Q4	3.5	9.8	8.8	-7.6	0.7	-2.6	4.8	-5.8	7.8	21.6	7.9	5.0
2017 Q1	3.7	10.1	9.1	-7.5	0.8	-2.5	5.1	-14.4	12.9	4.2	8.0	5.3
Q2	3.8	10.7	9.7	-9.4	1.1	-3.0	5.3	-18.6	5.0	-13.9	-0.6	5.0
2017 Feb.	3.9	9.2	8.4	-6.3	0.7	-2.1	4.7	-24.4	7.2	7.0	2.9	4.6
Mar.	3.7	10.1	9.1	-7.5	0.8	-2.5	5.1	-14.4	12.9	4.2	8.0	5.3
Apr.	4.2	10.2	9.3	-8.7	0.9	-2.9	5.1	-17.8	7.9	-16.0	1.1	4.8
May	3.9	10.3	9.3	-8.7	1.0	-2.8	5.1	-17.0	7.1	-9.4	1.6	4.9
June	3.8	10.7	9.7	-9.4	1.1	-3.0	5.3	-18.6	5.0	-13.9	-0.6	5.0
July [p]	3.4	10.1	9.1	-10.0	1.2	-3.2	4.9	-18.5	3.6	-21.5	-2.8	4.5

Source: ECB.

1) Data refer to the changing composition of the euro area.

5 Money and credit

5.2 Deposits in M3 [1]

(EUR billions and annual growth rates; seasonally adjusted; outstanding amounts and growth rates at end of period; transactions during period)

	Non-financial corporations [2]					Households [3]					Financial corporations other than MFIs and ICPFs [2]	Insurance corporations and pension funds	Other general government [4]
	Total	Overnight	With an agreed maturity of up to 2 years	Redeemable at notice of up to 3 months	Repos	Total	Overnight	With an agreed maturity of up to 2 years	Redeemable at notice of up to 3 months	Repos			
	1	2	3	4	5	6	7	8	9	10	11	12	13
Outstanding amounts													
2014	1,863.4	1,366.3	365.1	112.6	19.4	5,555.6	2,749.5	812.1	1,991.1	2.8	847.2	222.2	332.9
2015	1,950.8	1,503.1	321.8	117.5	8.4	5,748.9	3,059.7	695.1	1,991.7	2.4	949.7	225.8	364.7
2016	2,077.2	1,656.4	293.9	118.3	8.6	6,049.8	3,399.6	643.6	2,004.8	1.7	979.5	196.6	380.6
2016 Q3	2,069.0	1,622.9	317.7	119.3	9.1	5,977.7	3,301.8	672.0	2,001.3	2.6	953.9	206.2	386.3
Q4	2,077.2	1,656.4	293.9	118.3	8.6	6,049.8	3,399.6	643.6	2,004.8	1.7	979.5	196.6	380.6
2017 Q1	2,170.9	1,743.5	303.6	117.4	6.4	6,139.8	3,503.3	620.0	2,013.7	2.7	972.5	190.9	389.1
Q2	2,196.1	1,775.3	295.4	118.9	6.5	6,188.7	3,560.9	599.1	2,026.4	2.3	975.1	198.0	400.2
2017 Feb.	2,142.7	1,717.1	301.5	117.3	6.8	6,111.5	3,469.4	627.2	2,012.0	2.8	937.2	195.5	391.2
Mar.	2,170.9	1,743.5	303.6	117.4	6.4	6,139.8	3,503.3	620.0	2,013.7	2.7	972.5	190.9	389.1
Apr.	2,164.8	1,746.1	294.8	117.1	6.8	6,156.5	3,524.2	611.5	2,017.6	3.2	962.0	199.7	397.6
May	2,172.7	1,753.3	294.5	118.8	6.2	6,173.6	3,542.3	605.5	2,023.2	2.7	966.6	195.8	397.7
June	2,196.1	1,775.3	295.4	118.9	6.5	6,188.7	3,560.9	599.1	2,026.4	2.3	975.1	198.0	400.2
July [p]	2,177.8	1,761.9	290.6	119.1	6.2	6,200.4	3,573.4	593.1	2,031.8	2.0	992.3	193.7	407.6
Transactions													
2014	68.7	91.1	-26.7	1.5	2.8	140.7	208.8	-65.0	-1.4	-1.7	52.7	7.3	21.0
2015	83.9	123.7	-33.5	4.9	-11.2	193.6	303.0	-109.9	0.9	-0.4	84.0	-0.1	30.3
2016	128.7	152.9	-24.7	0.2	0.2	300.8	334.9	-46.8	13.4	-0.8	28.6	-28.2	17.1
2016 Q3	35.2	29.9	3.9	0.7	0.7	73.8	87.7	-16.6	3.2	-0.5	-0.2	-4.2	6.2
Q4	4.2	28.2	-22.3	-1.2	-0.5	70.6	92.6	-24.5	3.4	-0.9	21.2	-8.9	-4.9
2017 Q1	96.5	88.5	11.1	-1.0	-2.2	90.1	104.1	-23.9	8.8	1.1	-5.4	-5.2	8.6
Q2	34.9	37.8	-5.1	1.9	0.2	52.1	60.8	-20.0	11.8	-0.5	19.1	7.5	10.8
2017 Feb.	19.9	17.8	2.3	0.0	-0.2	22.7	30.3	-9.3	1.5	0.1	-6.2	0.9	-1.2
Mar.	30.0	27.6	2.7	0.0	-0.4	28.8	34.2	-7.1	1.7	-0.1	36.3	-4.4	-2.5
Apr.	-2.6	4.4	-7.2	-0.3	0.5	17.9	21.8	-8.3	4.0	0.5	-8.8	9.0	8.2
May	11.9	10.2	0.6	1.7	-0.6	18.4	19.6	-5.6	5.0	-0.6	17.1	-3.7	0.1
June	25.5	23.2	1.5	0.5	0.4	15.7	19.5	-6.2	2.8	-0.4	10.8	2.2	2.5
July [p]	-14.7	-10.7	-4.0	0.2	-0.3	9.5	13.1	-5.7	2.4	-0.2	20.7	-4.0	7.5
Growth rates													
2014	4.0	7.6	-6.6	1.3	15.9	2.6	8.2	-7.4	-0.1	-37.8	6.6	3.9	7.0
2015	4.5	9.0	-9.4	4.4	-57.4	3.5	11.0	-13.6	0.0	-15.1	9.7	0.0	9.1
2016	6.6	10.2	-7.7	0.2	2.2	5.2	10.9	-6.8	0.7	-31.2	3.0	-12.5	4.7
2016 Q3	7.5	9.9	-1.3	1.8	-8.5	5.1	10.6	-4.9	0.4	-18.2	0.9	-5.7	7.7
Q4	6.6	10.2	-7.7	0.2	2.2	5.2	10.9	-6.8	0.7	-31.2	3.0	-12.5	4.7
2017 Q1	8.1	11.8	-5.0	-0.3	-32.6	5.3	11.5	-10.1	1.0	2.1	1.6	-12.3	3.6
Q2	8.4	11.6	-3.9	0.3	-21.3	4.9	10.7	-12.4	1.4	-25.5	3.6	-5.1	5.4
2017 Feb.	7.5	10.9	-4.8	-0.4	-26.7	5.4	11.5	-9.0	0.9	-4.8	-2.2	-14.8	5.1
Mar.	8.1	11.8	-5.0	-0.3	-32.6	5.3	11.5	-10.1	1.0	2.1	1.6	-12.3	3.6
Apr.	7.0	10.6	-6.9	-0.5	-20.0	5.2	11.4	-11.1	1.2	-9.9	1.3	-6.6	5.4
May	7.5	10.8	-5.7	0.5	-22.4	5.1	11.2	-11.7	1.3	-24.0	2.8	-8.0	4.9
June	8.4	11.6	-3.9	0.3	-21.3	4.9	10.7	-12.4	1.4	-25.5	3.6	-5.1	5.4
July [p]	6.8	9.7	-5.2	1.0	-25.1	4.5	10.1	-12.6	1.4	-30.3	5.9	-8.8	5.8

Source: ECB.

1) Data refer to the changing composition of the euro area.

2) In accordance with the ESA 2010, in December 2014 holding companies of non-financial groups were reclassified from the non-financial corporations sector to the financial corporations sector. These entities are included in MFI balance sheet statistics with financial corporations other than MFIs and insurance corporations and pension funds (ICPFs).

3) Including non-profit institutions serving households.

4) Refers to the general government sector excluding central government.

5 Money and credit

5.3 Credit to euro area residents [1)]

(EUR billions and annual growth rates; seasonally adjusted; outstanding amounts and growth rates at end of period; transactions during period)

	Credit to general government			Credit to other euro area residents								
	Total	Loans	Debt securities	Total	Loans						Debt securities	Equity and non-money market fund investment fund shares
					Total		To non-financial corpor-ations [3)]	To house-holds [4)]	To financial corporations other than MFIs and ICPFs [3)]	To insurance corporations and pension funds		
						Adjusted loans [2)]						
	1	2	3	4	5	6	7	8	9	10	11	12
Outstanding amounts												
2014	3,615.6	1,135.0	2,478.5	12,506.8	10,454.5	10,725.2	4,317.2	5,200.2	808.1	129.0	1,280.0	772.4
2015	3,904.2	1,112.3	2,789.5	12,599.4	10,512.0	10,805.8	4,291.4	5,306.9	790.1	123.5	1,305.1	782.3
2016	4,397.8	1,081.9	3,302.7	12,838.1	10,671.8	10,978.5	4,313.5	5,407.7	838.2	112.5	1,382.1	784.2
2016 Q3	4,272.2	1,105.2	3,153.7	12,768.5	10,623.5	10,926.2	4,303.6	5,378.2	832.6	109.1	1,364.5	780.5
Q4	4,397.8	1,081.9	3,302.7	12,838.1	10,671.8	10,978.5	4,313.5	5,407.7	838.2	112.5	1,382.1	784.2
2017 Q1	4,439.1	1,070.3	3,354.7	12,971.0	10,755.0	11,046.5	4,334.2	5,456.5	851.5	112.9	1,423.8	792.2
Q2	4,457.9	1,065.2	3,378.5	12,967.2	10,725.8	11,041.7	4,300.9	5,486.2	826.2	112.5	1,439.9	801.6
2017 Feb.	4,400.1	1,073.1	3,313.2	12,908.2	10,717.7	11,013.6	4,334.6	5,441.6	830.0	111.6	1,397.5	793.0
Mar.	4,439.1	1,070.3	3,354.7	12,971.0	10,755.0	11,046.5	4,334.2	5,456.5	851.5	112.9	1,423.8	792.2
Apr.	4,465.9	1,072.2	3,379.5	12,953.3	10,741.3	11,044.1	4,337.2	5,465.7	823.9	114.4	1,423.4	788.7
May	4,477.8	1,066.3	3,397.1	12,975.4	10,746.2	11,058.1	4,341.5	5,473.0	820.6	111.0	1,439.9	789.4
June	4,457.9	1,065.2	3,378.5	12,967.2	10,725.8	11,041.7	4,300.9	5,486.2	826.2	112.5	1,439.9	801.6
July [p)]	4,492.3	1,058.3	3,419.6	12,988.5	10,735.2	11,070.9	4,304.7	5,484.6	831.6	114.4	1,456.7	796.6
Transactions												
2014	73.8	16.4	57.4	-99.9	-47.1	-32.6	-60.6	-14.9	16.7	11.7	-89.8	37.0
2015	296.1	-21.1	316.9	84.9	58.2	76.2	-13.7	98.1	-20.5	-5.7	25.1	1.5
2016	489.5	-34.8	524.2	316.8	234.4	258.3	81.2	120.2	44.1	-11.1	78.1	4.3
2016 Q3	78.1	-7.3	85.2	113.1	70.3	72.5	4.0	33.7	27.5	5.2	20.7	22.1
Q4	161.4	-20.2	181.7	79.6	62.6	69.2	22.1	36.1	1.1	3.3	15.3	1.6
2017 Q1	77.9	-10.9	88.3	149.0	98.9	87.5	29.6	51.2	17.6	0.5	40.6	9.5
Q2	21.6	-3.2	24.7	55.5	18.8	42.0	-2.3	39.0	-17.6	-0.3	20.8	16.0
2017 Feb.	8.0	-13.0	20.9	24.5	20.0	15.3	3.8	20.1	-0.9	-3.0	0.2	4.4
Mar.	47.6	-3.2	50.8	73.1	48.4	45.8	7.1	17.1	22.8	1.3	25.3	-0.6
Apr.	24.2	1.8	22.3	-7.9	-4.7	6.6	7.1	12.0	-25.4	1.6	-0.4	-2.7
May	13.7	-3.4	17.0	31.1	14.3	22.9	9.0	9.1	-0.5	-3.3	16.9	0.0
June	-16.3	-1.6	-14.5	32.3	9.2	12.5	-18.3	17.9	8.2	1.5	4.3	18.7
July [p)]	34.5	-6.4	40.8	34.6	22.6	44.7	11.8	0.3	8.5	2.0	17.4	-5.5
Growth rates												
2014	2.1	1.5	2.4	-0.8	-0.4	-0.3	-1.4	-0.3	1.8	11.9	-6.6	4.6
2015	8.2	-1.9	12.8	0.7	0.6	0.7	-0.3	1.9	-2.5	-4.4	2.0	0.2
2016	12.5	-3.1	18.8	2.5	2.2	2.4	1.9	2.3	5.6	-9.0	6.0	0.6
2016 Q3	10.8	-2.5	16.3	2.0	1.9	2.1	1.4	2.1	5.4	-10.7	3.5	0.8
Q4	12.5	-3.1	18.8	2.5	2.2	2.4	1.9	2.3	5.6	-9.0	6.0	0.6
2017 Q1	10.9	-4.2	16.8	3.1	2.4	2.7	1.8	2.5	4.9	3.6	8.2	4.6
Q2	8.1	-3.7	12.5	3.1	2.4	2.5	1.2	3.0	3.6	8.3	7.2	6.5
2017 Feb.	10.7	-3.9	16.3	2.6	2.0	2.3	1.5	2.4	4.2	-11.5	6.3	3.7
Mar.	10.9	-4.2	16.8	3.1	2.4	2.7	1.8	2.5	4.9	3.6	8.2	4.6
Apr.	10.3	-4.4	15.9	2.9	2.2	2.6	1.7	2.6	2.5	1.5	7.6	4.5
May	9.5	-4.8	14.9	2.9	2.2	2.7	1.6	2.8	2.1	0.2	8.1	3.9
June	8.1	-3.7	12.5	3.1	2.4	2.5	1.2	3.0	3.6	8.3	7.2	6.5
July [p)]	7.7	-4.0	11.9	3.0	2.2	2.6	1.2	2.9	3.3	3.8	7.4	5.5

Source: ECB.

1) Data refer to the changing composition of the euro area.

2) Adjusted for loan sales and securitisation (resulting in derecognition from the MFI statistical balance sheet) as well as for positions arising from notional cash pooling services provided by MFIs.

3) In accordance with the ESA 2010, in December 2014 holding companies of non-financial groups were reclassified from the non-financial corporations sector to the financial corporations sector. These entities are included in MFI balance sheet statistics with financial corporations other than MFIs and insurance corporations and pension funds (ICPFs).

4) Including non-profit institutions serving households.

5 Money and credit

5.4 MFI loans to euro area non-financial corporations and households [1)]

(EUR billions and annual growth rates; seasonally adjusted; outstanding amounts and growth rates at end of period; transactions during period)

	Non-financial corporations [2)]					Households [3)]				
	Total		Up to 1 year	Over 1 and up to 5 years	Over 5 years	Total		Loans for consumption	Loans for house purchase	Other loans
		Adjusted loans [4)]					Adjusted loans [4)]			
	1	2	3	4	5	6	7	8	9	10
Outstanding amounts										
2014	4,317.2	4,270.2	1,112.3	724.9	2,480.0	5,200.2	5,545.5	562.9	3,860.9	776.4
2015	4,291.4	4,273.3	1,041.1	762.2	2,488.2	5,306.9	5,640.0	595.2	3,948.4	763.3
2016	4,313.5	4,312.8	998.3	798.3	2,516.8	5,407.7	5,724.3	615.0	4,044.9	747.7
2016 Q3	4,303.6	4,295.8	1,011.5	789.1	2,503.1	5,378.2	5,700.0	607.3	4,018.2	752.6
Q4	4,313.5	4,312.8	998.3	798.3	2,516.8	5,407.7	5,724.3	615.0	4,044.9	747.7
2017 Q1	4,334.2	4,332.9	1,004.3	803.0	2,526.9	5,456.5	5,768.2	626.5	4,085.6	744.4
Q2	4,300.9	4,313.5	988.8	797.4	2,514.7	5,486.2	5,798.4	634.8	4,114.0	737.3
2017 Feb.	4,334.6	4,327.5	1,011.4	798.9	2,524.3	5,441.6	5,754.9	622.7	4,072.4	746.5
Mar.	4,334.2	4,332.9	1,004.3	803.0	2,526.9	5,456.5	5,768.2	626.5	4,085.6	744.4
Apr.	4,337.2	4,339.5	998.2	805.3	2,533.7	5,465.7	5,776.2	628.5	4,096.4	740.8
May	4,341.5	4,344.3	1,001.2	804.7	2,535.6	5,473.0	5,792.3	635.2	4,096.7	741.1
June	4,300.9	4,313.5	988.8	797.4	2,514.7	5,486.2	5,798.4	634.8	4,114.0	737.3
July [p)]	4,304.7	4,327.7	985.2	801.7	2,517.8	5,484.6	5,808.5	639.0	4,111.9	733.7
Transactions										
2014	-60.6	-67.1	-14.1	2.6	-49.0	-14.9	5.6	-3.0	-3.2	-8.7
2015	-13.7	22.9	-64.2	32.0	18.5	98.1	76.4	21.8	80.0	-3.6
2016	81.2	98.7	-18.1	44.3	55.0	120.2	113.8	23.4	106.0	-9.2
2016 Q3	4.0	12.3	-23.7	13.5	14.2	33.7	27.9	5.0	32.5	-3.8
Q4	22.1	32.5	-9.5	9.0	22.5	36.1	31.4	9.2	31.5	-4.5
2017 Q1	29.6	32.3	9.3	6.8	13.5	51.2	46.2	11.3	40.1	-0.1
Q2	-2.3	9.7	-2.1	0.6	-0.8	39.0	40.5	10.2	29.0	-0.3
2017 Feb.	3.8	5.3	-2.7	-1.1	7.6	20.1	12.5	2.1	18.6	-0.7
Mar.	7.1	14.6	-4.6	5.9	5.8	17.1	14.9	4.3	13.9	-1.1
Apr.	7.1	9.9	-4.0	3.6	7.5	12.0	11.4	2.3	10.8	-1.1
May	9.0	8.6	6.7	1.0	1.3	9.1	18.0	7.1	1.1	0.9
June	-18.3	-8.9	-4.8	-3.9	-9.6	17.9	11.1	0.8	17.1	-0.1
July [p)]	11.8	23.6	-0.3	5.9	6.1	0.3	12.6	4.6	-1.9	-2.4
Growth rates										
2014	-1.4	-1.5	-1.3	0.4	-1.9	-0.3	0.1	-0.5	-0.1	-1.1
2015	-0.3	0.5	-5.8	4.4	0.7	1.9	1.4	3.8	2.1	-0.5
2016	1.9	2.3	-1.8	5.8	2.2	2.3	2.0	3.9	2.7	-1.2
2016 Q3	1.4	2.0	-3.0	6.5	1.8	2.1	1.8	3.3	2.4	-0.9
Q4	1.9	2.3	-1.8	5.8	2.2	2.3	2.0	3.9	2.7	-1.2
2017 Q1	1.8	2.4	-2.7	5.0	2.6	2.5	2.4	4.5	3.0	-1.2
Q2	1.2	2.0	-2.5	3.8	2.0	3.0	2.6	5.9	3.3	-1.2
2017 Feb.	1.5	2.0	-2.2	3.9	2.3	2.4	2.3	4.2	2.8	-1.0
Mar.	1.8	2.4	-2.7	5.0	2.6	2.5	2.4	4.5	3.0	-1.2
Apr.	1.7	2.5	-3.0	5.0	2.6	2.6	2.5	4.6	3.0	-1.1
May	1.6	2.5	-2.5	5.0	2.4	2.8	2.6	6.3	2.9	-1.0
June	1.2	2.0	-2.5	3.8	2.0	3.0	2.6	5.9	3.3	-1.2
July [p)]	1.2	2.4	-2.0	3.7	1.8	2.9	2.6	6.6	3.1	-1.3

Source: ECB.

1) Data refer to the changing composition of the euro area.

2) In accordance with the ESA 2010, in December 2014 holding companies of non-financial groups were reclassified from the non-financial corporations sector to the financial corporations sector. These entities are included in MFI balance sheet statistics with financial corporations other than MFIs and insurance corporations and pension funds (ICPFs).

3) Including non-profit institutions serving households.

4) Adjusted for loan sales and securitisation (resulting in derecognition from the MFI statistical balance sheet) as well as for positions arising from notional cash pooling services provided by MFIs.

5 Money and credit

5.5 Counterparts to M3 other than credit to euro area residents [1)]

(EUR billions and annual growth rates; seasonally adjusted; outstanding amounts and growth rates at end of period; transactions during period)

	MFI liabilities						MFI assets			
	Central government holdings [2)]	Longer-term financial liabilities vis-à-vis other euro area residents					Net external assets	Other		
		Total	Deposits with an agreed maturity of over 2 years	Deposits redeemable at notice of over 3 months	Debt securities with a maturity of over 2 years	Capital and reserves		Total	Repos with central counter-parties [3)]	Reverse repos to central counter-parties [3)]
	1	2	3	4	5	6	7	8	9	10
Outstanding amounts										
2014	269.4	7,131.5	2,186.6	92.2	2,391.5	2,461.1	1,389.0	219.7	184.5	139.7
2015	284.8	6,996.9	2,119.7	79.8	2,254.0	2,543.5	1,353.7	261.7	205.9	135.6
2016	318.8	6,921.4	2,054.4	70.6	2,144.3	2,652.0	1,142.6	237.9	205.9	121.6
2016 Q3	310.1	6,966.7	2,068.5	72.4	2,130.8	2,695.0	1,210.7	281.3	209.2	129.1
Q4	318.8	6,921.4	2,054.4	70.6	2,144.3	2,652.0	1,142.6	237.9	205.9	121.6
2017 Q1	304.1	6,880.5	2,033.2	69.2	2,100.3	2,677.8	1,110.1	252.1	182.2	111.8
Q2	296.6	6,772.2	2,003.4	67.0	2,066.1	2,635.7	1,031.1	261.2	154.2	109.7
2017 Feb.	295.7	6,920.3	2,028.4	69.6	2,125.3	2,697.0	1,126.4	256.4	171.3	104.4
Mar.	304.1	6,880.5	2,033.2	69.2	2,100.3	2,677.8	1,110.1	252.1	182.2	111.8
Apr.	335.9	6,848.5	2,023.4	69.3	2,082.5	2,673.3	1,095.2	242.4	175.4	103.7
May	310.5	6,832.0	2,015.7	67.0	2,080.9	2,668.4	1,044.0	244.5	162.4	104.3
June	296.6	6,772.2	2,003.4	67.0	2,066.1	2,635.7	1,031.1	261.2	154.2	109.7
July [(p)]	322.4	6,724.8	1,989.9	63.5	2,058.1	2,613.3	1,058.6	161.8	128.1	76.4
Transactions										
2014	-4.0	-171.0	-120.8	2.0	-160.1	107.9	238.7	-13.2	0.7	17.8
2015	9.2	-213.6	-106.2	-13.5	-216.1	122.2	-85.3	-19.3	21.4	-4.0
2016	31.0	-107.8	-73.3	-9.1	-111.0	85.5	-273.7	-71.2	12.8	-12.0
2016 Q3	-9.2	-45.0	-25.8	-2.0	-41.7	24.6	-97.7	-15.0	-19.2	-13.7
Q4	6.6	-12.5	-21.6	-2.6	-11.9	23.6	-41.9	-92.4	-0.2	-7.5
2017 Q1	-16.2	-14.8	-15.0	-1.4	-31.4	33.1	-32.8	-9.1	-22.6	-9.1
Q2	-7.6	-11.1	-22.3	-2.1	3.4	9.9	-20.7	17.3	-28.0	-2.1
2017 Feb.	-8.2	13.5	-10.9	-0.2	-5.6	30.2	-34.0	43.8	-5.1	-2.0
Mar.	8.4	-7.1	5.8	-0.4	-20.9	8.4	-5.2	1.9	10.8	7.5
Apr.	31.8	-18.4	-8.2	0.2	-6.0	-4.3	-3.8	-8.1	-6.8	-8.2
May	-25.4	14.9	-5.6	-2.3	14.3	8.4	-27.9	16.4	-13.0	0.6
June	-14.0	-7.6	-8.4	0.0	-4.9	5.7	11.0	9.0	-8.2	5.4
July [(p)]	25.8	-24.7	-11.5	-1.1	5.5	-17.7	46.9	-102.4	-26.0	-33.3
Growth rates										
2014	-1.6	-2.3	-5.1	2.2	-6.3	4.5	-	-	0.4	14.6
2015	3.6	-3.0	-4.8	-14.5	-8.8	4.9	-	-	11.6	-2.9
2016	10.9	-1.5	-3.5	-11.5	-5.0	3.3	-	-	6.3	-9.0
2016 Q3	5.3	-2.1	-4.3	-12.2	-6.2	3.8	-	-	1.5	-8.2
Q4	10.9	-1.5	-3.5	-11.5	-5.0	3.3	-	-	6.3	-9.0
2017 Q1	-4.6	-1.1	-4.0	-10.1	-4.6	4.5	-	-	-21.2	-25.3
Q2	-8.2	-1.2	-4.0	-10.8	-3.7	3.5	-	-	-30.7	-22.6
2017 Feb.	-1.7	-1.0	-4.4	-10.5	-3.4	3.9	-	-	-25.7	-25.7
Mar.	-4.6	-1.1	-4.0	-10.1	-4.6	4.5	-	-	-21.2	-25.3
Apr.	5.5	-1.5	-4.4	-9.0	-4.6	3.8	-	-	-20.9	-24.8
May	3.2	-1.3	-4.4	-11.6	-3.9	3.8	-	-	-23.5	-23.6
June	-8.2	-1.2	-4.0	-10.8	-3.7	3.5	-	-	-30.7	-22.6
July [(p)]	-2.4	-1.2	-4.2	-11.4	-2.7	2.5	-	-	-35.6	-39.5

Source: ECB.

1) Data refer to the changing composition of the euro area.

2) Comprises central government holdings of deposits with the MFI sector and of securities issued by the MFI sector.

3) Not adjusted for seasonal effects.

6 Fiscal developments

6.1 Deficit/surplus

(as a percentage of GDP; flows during one-year period)

	Deficit (-)/surplus (+)					Memo item: Primary deficit (-)/ surplus (+)
	Total	Central government	State government	Local government	Socual security funds	
	1	2	3	4	5	6
2013	-3.0	-2.6	-0.2	-0.1	-0.1	-0.2
2014	-2.6	-2.2	-0.2	0.0	-0.2	0.1
2015	-2.1	-1.9	-0.2	0.1	-0.1	0.3
2016	-1.5	-1.7	0.0	0.2	0.0	0.7
2016 Q2	-1.8	.	.	.	.	0.5
Q3	-1.8	.	.	.	.	0.5
Q4	-1.5	.	.	.	.	0.7
2017 Q1	-1.3	.	.	.	.	0.9

Sources: ECB for annual data; Eurostat for quarterly data.

6.2 Revenue and expenditure

(as a percentage of GDP; flows during one-year period)

	Revenue						Expenditure						
	Total	Current revenue				Capital revenue	Total	Current expenditure					Capital expenditure
			Direct taxes	Indirect taxes	Net social contributions				Compen-sation of employees	Intermediate consumption	Interest	Social benefits	
	1	2	3	4	5	6	7	8	9	10	11	12	13
2013	46.7	46.2	12.6	13.0	15.5	0.5	49.7	45.6	10.4	5.3	2.8	23.0	4.1
2014	46.7	46.3	12.5	13.1	15.5	0.5	49.3	45.3	10.3	5.3	2.7	23.0	4.0
2015	46.4	45.9	12.6	13.1	15.3	0.5	48.5	44.6	10.1	5.2	2.4	22.8	3.9
2016	46.3	45.8	12.6	13.0	15.4	0.5	47.8	44.3	10.0	5.2	2.2	22.8	3.5
2016 Q2	46.3	45.8	12.5	13.1	15.3	0.5	48.1	44.2	10.0	5.2	2.3	22.8	3.8
Q3	46.3	45.8	12.6	13.1	15.4	0.5	48.1	44.3	10.0	5.2	2.2	22.8	3.8
Q4	46.3	45.8	12.6	13.0	15.4	0.5	47.8	44.3	10.0	5.2	2.2	22.8	3.5
2017 Q1	46.3	45.8	12.7	13.0	15.3	0.4	47.6	44.1	10.0	5.1	2.2	22.8	3.5

Sources: ECB for annual data; Eurostat for quarterly data.

6.3 Government debt-to-GDP ratio

(as a percentage of GDP; outstanding amounts at end of period)

	Total	Financial instrument			Holder			Original maturity		Residual maturity			Currency	
		Currency and deposits	Loans	Debt securities	Resident creditors	MFIs	Non-resident creditors	Up to 1 year	Over 1 year	Up to 1 year	Over 1 and up to 5 years	Over 5 years	Euro or participating currencies	Other curren-cies
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2013	91.4	2.6	17.5	71.2	46.4	26.3	45.0	10.4	81.0	19.4	32.1	39.9	89.3	2.1
2014	92.0	2.7	17.1	72.1	45.2	26.0	46.8	10.0	82.0	18.8	31.9	41.2	89.9	2.1
2015	90.3	2.8	16.2	71.3	45.5	27.5	44.7	9.3	81.0	17.7	31.1	41.5	88.2	2.1
2016	89.2	2.7	15.5	71.0	47.8	30.3	41.5	9.0	80.3	17.3	29.5	42.5	87.2	2.1
2016 Q2	91.2	2.7	16.0	72.5	.	.	.	.	.	.	.	.	.	.
Q3	90.0	2.7	15.6	71.7	.	.	.	.	.	.	.	.	.	.
Q4	89.2	2.7	15.4	71.1	.	.	.	.	.	.	.	.	.	.
2017 Q1	89.5	2.7	15.1	71.7	.	.	.	.	.	.	.	.	.	.

Sources: ECB for annual data; Eurostat for quarterly data.

6 Fiscal developments

6.4 Annual change in the government debt-to-GDP ratio and underlying factors [1)]

(as a percentage of GDP; flows during one-year period)

	Change in debt-to-GDP ratio [2)]	Primary deficit (+)/ surplus (-)	Deficit-debt adjustment								Interest-growth differential	Memo item: Borrowing requirement
			Total	Transactions in main financial assets					Revaluation effects and other changes in volume	Other		
				Total	Currency and deposits	Loans	Debt securities	Equity and investment fund shares				
	1	2	3	4	5	6	7	8	9	10	11	12
2013	1.9	0.2	-0.2	-0.8	-0.5	-0.4	-0.2	0.4	0.2	0.4	1.9	2.6
2014	0.6	-0.1	-0.1	-0.3	0.2	-0.2	-0.3	0.0	0.0	0.2	0.8	2.5
2015	-1.7	-0.3	-0.9	-0.5	0.2	-0.2	-0.3	-0.1	-0.1	-0.3	-0.5	1.3
2016	-1.0	-0.7	-0.3	0.2	0.2	-0.1	0.0	0.1	-0.3	-0.2	-0.1	1.5
2016 Q2	-0.9	-0.5	0.1	0.4	0.8	-0.2	-0.2	0.0	-0.1	-0.2	-0.5	2.0
Q3	-1.4	-0.5	-0.5	-0.2	0.2	-0.1	-0.3	0.0	-0.2	-0.1	-0.4	1.4
Q4	-1.0	-0.7	-0.3	0.3	0.2	0.0	0.0	0.1	-0.3	-0.3	-0.1	1.5
2017 Q1	-1.6	-0.9	-0.5	-0.1	-0.1	-0.2	0.0	0.1	-0.2	-0.2	-0.2	1.0

Sources: ECB for annual data; Eurostat for quarterly data.
1) Intergovernmental lending in the context of the financial crisis is consolidated except in quarterly data on the deficit-debt adjustment.
2) Calculated as the difference between the government debt-to-GDP ratios at the end of the reference period and a year earlier.

6.5 Government debt securities [1)]

(debt service as a percentage of GDP; flows during debt service period; average nominal yields in percentages per annum)

	Debt service due within 1 year [2)]					Average residual maturity in years [3)]	Average nominal yields [4)]						
	Total	Principal		Interest			Outstanding amounts					Transactions	
			Maturities of up to 3 months		Maturities of up to 3 months		Total	Floating rate	Zero coupon	Fixed rate		Issuance	Redemption
											Maturities of up to 1 year		
	1	2	3	4	5	6	7	8	9	10	11	12	13
2014	15.9	13.8	5.1	2.0	0.5	6.4	3.1	1.6	0.4	3.5	2.8	0.8	1.6
2015	14.7	12.8	4.3	1.9	0.5	6.6	2.9	1.4	0.1	3.3	3.0	0.4	1.2
2016	14.7	12.9	4.8	1.7	0.4	6.7	2.6	1.2	-0.1	3.0	2.9	0.2	1.2
2016 Q2	15.4	13.6	4.8	1.8	0.5	6.7	2.7	1.3	-0.1	3.1	2.9	0.3	1.1
Q3	15.0	13.2	4.0	1.8	0.4	6.8	2.6	1.3	-0.1	3.1	2.8	0.2	1.2
Q4	14.7	12.9	4.8	1.7	0.4	6.9	2.6	1.2	-0.1	3.0	2.9	0.2	1.2
2017 Q1	14.6	12.8	4.6	1.7	0.4	6.9	2.6	1.2	-0.2	3.0	2.9	0.2	1.1
2017 Feb.	14.4	12.7	4.3	1.7	0.4	6.9	2.6	1.2	-0.2	3.0	2.9	0.2	1.3
Mar.	14.6	12.8	4.6	1.7	0.4	6.9	2.6	1.2	-0.2	3.0	2.9	0.2	1.1
Apr.	14.2	12.5	4.6	1.7	0.4	7.0	2.6	1.2	-0.2	3.0	2.7	0.2	1.2
May	14.3	12.6	4.6	1.7	0.4	7.0	2.5	1.2	-0.2	2.9	2.6	0.1	1.2
June	13.8	12.1	4.3	1.7	0.4	7.1	2.5	1.2	-0.2	2.9	2.6	0.2	1.2
July	13.5	11.8	4.3	1.7	0.4	7.1	2.5	1.2	-0.2	2.9	2.6	0.2	1.3

Source: ECB.
1) At face value and not consolidated within the general government sector.
2) Excludes future payments on debt securities not yet outstanding and early redemptions.
3) Residual maturity at the end of the period.
4) Outstanding amounts at the end of the period; transactions as 12-month average.

6 Fiscal developments

6.6 Fiscal developments in euro area countries

(as a percentage of GDP; flows during one-year period and outstanding amounts at end of period)

	Belgium	Germany	Estonia	Ireland	Greece	Spain	France	Italy	Cyprus
	1	2	3	4	5	6	7	8	9
	Government deficit (-)/surplus (+)								
2013	-3.1	-0.2	-0.2	-5.7	-13.1	-7.0	-4.0	-2.9	-5.1
2014	-3.1	0.3	0.7	-3.7	-3.7	-6.0	-3.9	-3.0	-8.8
2015	-2.5	0.7	0.1	-2.0	-5.9	-5.1	-3.6	-2.7	-1.2
2016	-2.6	0.8	0.3	-0.6	0.7	-4.5	-3.4	-2.4	0.4
2016 Q2	-2.6	0.7	0.8	-1.5	-3.7	-5.3	-3.2	-2.4	-1.3
Q3	-3.0	0.5	0.5	-1.6	-1.8	-4.8	-3.3	-2.4	-1.0
Q4	-2.6	0.8	0.3	-0.7	0.7	-4.5	-3.4	-2.4	0.4
2017 Q1	-2.3	1.0	0.0	-0.5	1.3	-4.2	-3.4	-2.3	0.7
	Government debt								
2013	105.6	77.5	10.2	119.5	177.4	95.5	92.3	129.0	102.2
2014	106.7	74.9	10.7	105.3	179.7	100.4	94.9	131.8	107.1
2015	106.0	71.2	10.1	78.7	177.4	99.8	95.6	132.1	107.5
2016	105.9	68.3	9.5	75.4	179.0	99.4	96.0	132.6	107.8
2016 Q2	109.7	70.2	9.7	74.9	179.7	101.1	97.9	135.4	107.5
Q3	108.7	69.4	9.6	75.1	176.3	100.4	97.2	132.7	110.6
Q4	106.0	68.3	9.5	72.8	179.0	99.4	96.3	132.6	107.8
2017 Q1	107.7	66.9	9.2	74.3	176.2	100.4	98.7	134.7	107.0

	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Austria	Portugal	Slovenia	Slovakia	Finland
	10	11	12	13	14	15	16	17	18	19
	Government deficit (-)/surplus (+)									
2013	-1.0	-2.6	1.0	-2.6	-2.4	-1.4	-4.8	-15.1	-2.7	-2.6
2014	-1.6	-0.7	1.4	-2.0	-2.3	-2.7	-7.2	-5.4	-2.7	-3.2
2015	-1.3	-0.2	1.4	-1.3	-2.1	-1.1	-4.4	-2.9	-2.7	-2.7
2016	0.0	0.3	1.6	1.0	0.4	-1.6	-2.0	-1.8	-1.7	-1.9
2016 Q2	-0.4	0.4	1.4	0.4	-1.0	-0.9	-3.5	-1.8	-2.3	-2.4
Q3	0.2	0.2	1.5	0.8	-0.4	-0.6	-3.7	-1.7	-2.0	-2.2
Q4	0.0	0.3	1.6	1.0	0.4	-1.6	-2.0	-1.8	-1.7	-1.9
2017 Q1	-0.1	0.7	1.3	2.1	1.0	-1.2	-1.7	-1.4	-1.5	-1.6
	Government debt									
2013	39.0	38.7	23.4	68.7	67.7	81.3	129.0	71.0	54.7	56.5
2014	40.9	40.5	22.4	64.3	67.9	84.4	130.6	80.9	53.6	60.2
2015	36.5	42.7	21.6	60.6	65.2	85.5	129.0	83.1	52.5	63.7
2016	40.1	40.2	20.0	58.3	62.3	84.6	130.4	79.7	51.9	63.6
2016 Q2	38.9	40.1	21.4	61.0	63.2	86.2	131.6	82.5	52.9	61.7
Q3	37.9	41.3	20.9	59.8	61.5	83.7	133.1	82.8	52.7	61.7
Q4	40.1	40.2	20.0	58.3	61.8	84.6	130.3	79.7	51.9	63.1
2017 Q1	39.0	39.3	23.0	59.0	59.6	82.6	130.5	81.4	53.5	62.6

Source: Eurostat.

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