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Monetary policy measures in the euro area and their effects, since 2014

Directorate General Economics
and International Relations

Following the recession triggered by the sovereign debt crisis, the euro area has, since 2013, experienced a fragile recovery associated with a significant decline in inflation and long-term inflation expectations. In the summer of 2014, in a context that threatened price stability, the Eurosystem embarked on a new, unprecedented, phase of monetary accommodation, marked notably by massive purchases of securities and negative policy rates.

This article presents the monetary policy measures taken in the euro area since the summer of 2014 and the macroeconomic context that motivated them. It then looks at the transmission mechanisms of these measures to asset prices and key macroeconomic variables.

According to Eurosystem estimates, the asset purchase programme and the other non-standard measures taken since 2014 are expected to have an effect on average annual inflation of around 0.5 percentage points over the period 2015-2018 and a cumulative effect on the economic growth of the euro area of about 1.6 percentage points by 2018.

Keywords: monetary policy, Eurosystem, APP

JEL Codes: E52, E58

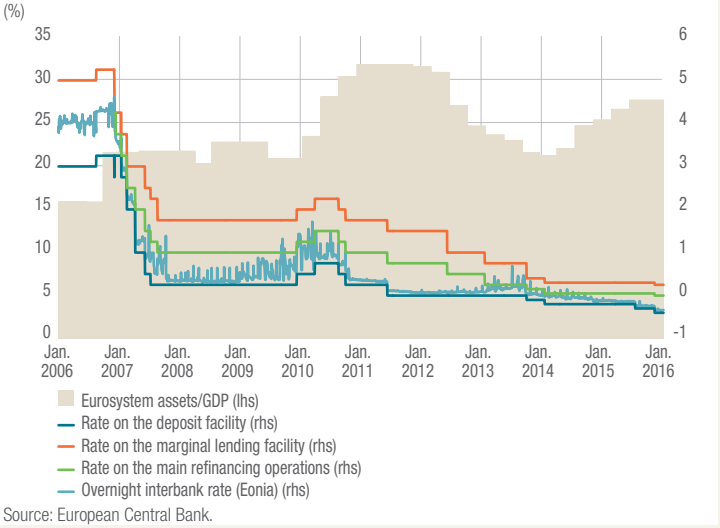
Key Figures

EUR 1,800 billion
the estimated amount of the Eurosystem's securities purchases by March 2017 in the framework of the asset purchase programme (APP)

0% and –0.40%
the rate on the main refinancing operations and on the deposit facility in April 2016

Below, but close to, 2%
the Eurosystem inflation rate target over the medium term

Policy rates, Eonia and size of the Eurosystem balance sheet



Source: European Central Bank.

In the face of the financial crisis and the Great Recession of 2008-2009, then the sovereign debt crisis and the new recession in 2012, the Eurosystem responded by considerably easing its monetary policy stance. The array of instruments used includes key rate cuts as well as longer-term refinancing arrangements and purchases, whether actual or potential, of sovereign debt. These actions contributed to limiting the scale of the recession and, during the sovereign debt crisis, to prevent the euro area from breaking up.

Since 2014, the euro area has launched a third phase of monetary easing. It is characterised by two new and non-standard components: firstly, massive purchases of securities (commonly referred to as quantitative easing or QE), and secondly, negative key interest rates. These measures are articulated with a communication policy on the path of future interest rates (referred to as forward guidance), which already began in the summer of 2013. Some of these non-standard measures have also been taken by the central banks of the United States, Japan, and the United Kingdom since the financial crisis. However, they have innovative and specific dimensions in the euro area.

This article describes the monetary policy measures taken by the Eurosystem since 2014. It first looks at the macroeconomic developments that led to their implementation. These include a sequence of sharp declines in oil prices and a slowdown in the emerging economies against a backdrop of low inflation, the combination of which represents an increased risk of unanchored inflation expectations. It then details the multiple transmission channels of these measures i.e. the way in which they are transmitted to asset prices, such as the interest rates of different maturities, or the exchange rate, and ultimately macroeconomic variables such as inflation and GDP growth. The article summarises and then comments the available assessments of the quantitative impact of these measures on the euro area economy, and finally addresses the risks associated with these monetary policy measures.

1. The Eurosystem responses in the face of a risk to price stability

Lastingly low inflation and the risk of unanchored expectations

From 2013, the euro area economy started to recover. This revival followed two recessions: the Great Recession of 2008-2009 and the recession associated with the sovereign debt crisis of 2011-2012. The actions of the Eurosystem over the period 2008-2013 (described in Drumetz, Pfister and Sahuc, 2015) contributed to the resilience of the euro area to these two crises. In particular, in order to reduce the strains on the interbank market, the Eurosystem eased its open market operations by conducting weekly main refinancing operations with full allotment from October 2008. It then extended the maturity of its longer-term refinancing operations (LTROs),[1] usually to 3 months and variable rate to 6, 12 and 36 months and unlimited amount. Faced with the sovereign crisis, the Governing Council set up in May 2010 a Securities Markets Programme (SMP), replaced in September 2012 by Outright Monetary Transactions (OMT) which provide for, in certain circumstances, the unlimited purchase of sovereign bonds.

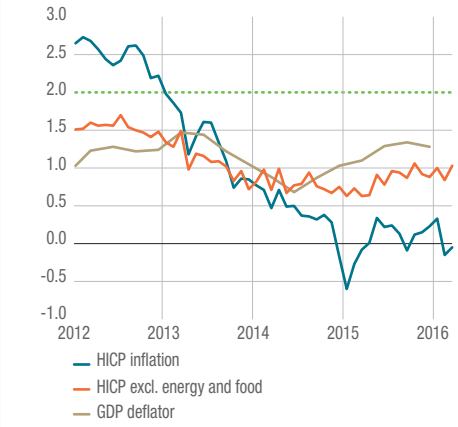
However, since 2014, the macro-economic situation in the euro area has been characterised by several obstacles to recovery as well as a new risk to price stability and the anchoring of inflation expectations.

The first obstacle to the recovery consisted in a de facto tightening of monetary conditions. Despite the accommodative stance of monetary policy in the euro area, market interest rates started to rise in early 2014, notably under the effect of the US recovery. Another obstacle to the recovery of the euro area resided in the fact that monetary conditions were hardly passed onto bank lending, particularly for small and medium-sized enterprises. Finally, the economy of the euro area found itself faced with a new downturn in global demand, caused by a growth reversal in emerging countries.

1 A glossary lists the definitions of acronyms used in the article.

C1 HICP inflation and underlying inflation in the euro area

(% and year-on-year change)



Source: Eurostat.

In addition, a new risk related to inflation dynamics appeared. After a high point at 3% in late 2011, the growth rate of the Harmonised Index of Consumer Prices (HICP) started on a downward trend. It continued to fall until early 2015 and reached values below those used in the Eurosystem's quantitative definition of price stability. Inflation has declined continuously since the beginning of 2012, reaching negative values in mid-2015 and early 2016 (it stood at –0.1% in March 2016) (see Chart 1).

A major underlying factor of this development was the decline in oil prices. The price of Brent crude fell from a level of about USD 110 at the beginning of 2014 (EUR 81), to less than USD 50 in early 2015 (EUR 43) and USD 30 in early 2016 (EUR 28). This drop had a first order negative impact on the price level, which resulted in a temporary slowdown in prices. However, the rate of inflation excluding energy and food (known as "underlying inflation" by many analysts) also declined over the same period.[2] It stood at 1.5% in 2012 (see Chart 1), and subsequently declined to remain below 1% from spring 2014 until spring 2016. The GDP deflator, a measure of inflation for goods and services produced by the euro area, also recorded a decrease from 1.5% in 2013 to 0.7% in early 2015, before picking up to 1.3% in late 2015, a level still well below the 1999-2008 average of 2.0%.

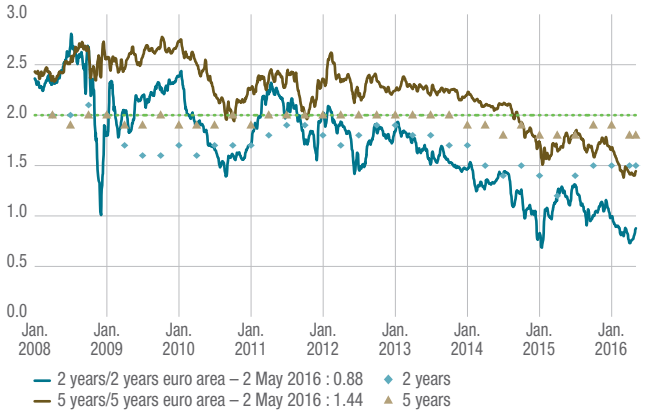
In this context, inflation expectations also declined. According to the professional forecasters surveyed by the ECB in its Survey of Professional Forecasters (SPF), inflation over a 2 year horizon, represented by the blue diamonds in Chart 2, fell from 1.9% in the last quarter of 2012 to 1.7% in the fourth quarter of 2013 and 1.5% in the first quarter of 2016. More worryingly, long-term inflation expectations, at horizons where the effect of temporary shocks such as those on the price of oil should have dissipated, also fell. SPF inflation expectations over a 5-year horizon (brown triangles), stable at a level of 2% between 2010 and 2013, declined to 1.8% in the first quarter of 2016. The market-based measures of inflation expectations[3] posted a sharper decline. This is the case of the 5-year forward inflation rate 5 years ahead, which historically was close to, or greater than, 2% in the euro area. This indicator, represented by the brown curve, dropped to 1.8% in late 2014 and stood at 1.4% in March 2016.

2 Inflation excluding energy is not directly influenced by oil prices (via fuel prices for example), but can be affected by an indirect effect. Indeed, the oil price drop is passed on to the prices of goods and services in the production of which oil is used as an intermediate good and can potentially exert downward pressure on wages.

3 The contracts from which these indicators are derived are inflation swaps.

C2 SPF and ILS (Inflation linked swaps) inflation expectations

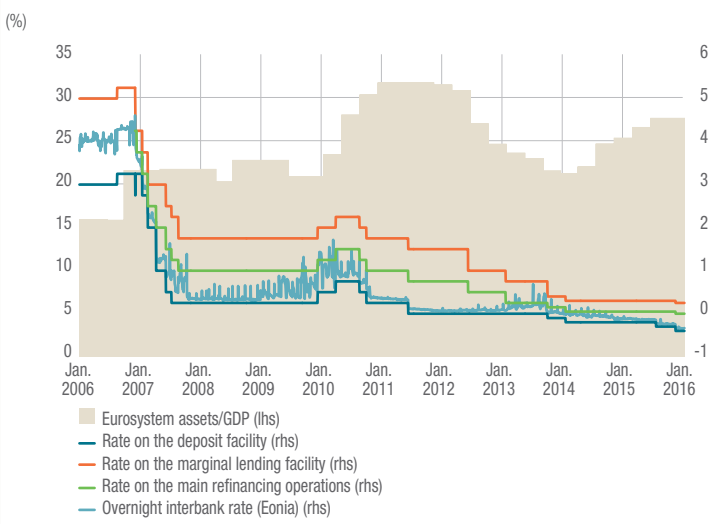
(%)



Source: Bloomberg, ECB.

Overall, price developments in the euro area in 2014 gradually moved away from values consistent with the quantitative definition of price stability used by the ECB Governing Council, i.e. a rate of inflation measured by the HICP of below but close to 2% over a medium-term horizon. The decline in the indicators of long-term inflation expectations suggested a risk of unanchored expectations, and the possibility of low inflation dynamics, and even deflation, fuelled by real interest rates perceived as high and a "wait and see" attitude with regard to spending by economic agents.

C3 Policy rates, Eonia and size of the Eurosystem balance sheet



Source: ECB.

The response of the Eurosystem

Lowering of policy rates into negative territory

Faced with these growing risks of unanchoring expectations, the Eurosystem responded by taking several types of measures, some of which are non-standard. Conventional measures consist mainly in adjusting key interest rates to steer market interest rates at different maturities. It became necessary to have recourse to "non-standard" measures, such as asset purchases, when key interest rates reached values close to zero, the scope for further rate cuts being limited. Chart 3 shows the decline in policy rates over the period. Policy rates are the rate of the main refinancing operations (MRO), the rate on the marginal lending facility and the rate on the deposit facility. These last two rates form a corridor within which the overnight interbank rate (Eonia) fluctuates.[4] In order to provide a synthetic overview of the monetary policy stance, the chart also shows the changes in the size of the balance sheet of the Eurosystem, as a percentage of the euro area GDP. The chronology of measures is detailed in this section, and summarised in the box "Chronology".

In June then in September 2014, to stem the passive tightening of monetary conditions, the Governing Council lowered its policy rates. The main refinancing operations rate dropped from 0.25% to 0.05% and the rate on the deposit facility from 0% to –0.20%.[5] The European Central Bank (ECB) is thus the first central bank in a large monetary area to have introduced negative key interest rates. The negative rate on the deposit facility puts a strain on the excess liquidity that banks deposit with the Eurosystem, which tends to encourage banks to lend to each other, thereby improving the flow of liquidity between banks in the euro area.[6] These rate cuts complemented the forward guidance of interest rates already in place since July 2013. Forward guidance corresponds to a commitment on future interest rate decisions, so as to influence not only the short term rates, which have reached their "lower bound", close to zero, but also longer-term rates which are largely determined by expectations of future short-term rates.

Credit easing through TLTRO

In July 2014, faced with the declining volume of credit granted by banks, the Governing Council decided to set up a new targeted longer-term refinancing operations programme (TLTRO). The objective of the TLTROs was to encourage banks

4 The rate on the marginal lending facility is the rate at which the central bank automatically provides liquidity to commercial banks that request it, with no other limitation than the amount of assets that the latter are able to provide as collateral. The rate on the deposit facility is the rate set by the central bank on the deposits that it receives from banks and other financial institutions.

5 The rate on the marginal lending facility, whose role is less significant over the period, fell from 0.75% to 0.30%.

6 The move into negative territory of the deposit facility rate was accompanied by an alignment of the rate on the excess reserves with the deposit facility rate.

to increase their supply of credit to non-financial corporations (NFCs) and households (excluding housing loans).[7] Initially, the interest rate on these operations was fixed at the rate applied in the main refinancing operations plus 10 basis points, i.e. 0.15% for the first operation with a 4 year maturity. As a comparison, the average 4 year borrowing rate for banks was on average around 5% since 1999. In the second phase of the TLTRO, banks could borrow again from the Eurosystem in each quarter until June 2016, the loan horizon being 2018 in each case. TLTROs carry a form of conditionality: the participating banks which have not increased their credit supply to the private sector beyond a benchmark by 2016 must repay the amounts borrowed without benefiting from the second tranche of the operation. This TLTRO programme complements and strengthens the forward guidance of future rates. In particular, lending at a fixed rate of 0.15% for a period up to 4 years to the banking system has the effect of lowering all of the borrowing rates in the euro area, be it for States, businesses or households. In addition, given that policy rates have reached a level considered as a lower bound, the incentive for banks to participate in operations is maximised.

Asset purchase programmes (ABSPP and CBPP)

In October 2014, the Eurosystem launched a first package of quantitative easing in the form of a double purchase programme: (i) ABSPP, the asset-backed securities purchase programme: it is limited to "simple and transparent" ABS that are already eligible as collateral for Eurosystem refinancing operations, rated at least BBB, and secured by claims against non-financial sector entities, such as home loans, car loans, consumer loans, business loans. A covered bond purchase programme (CBPP) targeting a broad portfolio of bonds denominated in euros and issued by euro area resident banks (covered bonds are mostly issued by the banking sector and secured by mortgages or loans to public sector entities). The ABSPP and CBPP programmes began in mid-October 2014 with purchases - by the ECB and the national central banks, including the Banque de France – on the primary and secondary markets of securities rated at least BBB. The objective was threefold. The first objective was to promote the supply of credit to NFCs by facilitating the securitisation process. This measure complements other Eurosystem initiatives for promoting high-quality securitisation. The second objective was to reduce the risk premium that still put up the lending rates to NFCs. Finally, the third objective was to increase the decoupling between euro area and US rates. A rise in bond yields in the euro area fuelled by US bond yields would have been premature given that the European economic cycle was not aligned with that of the United States.

From September 2014, the President of the ECB Mario Draghi specified[8] a target size for the balance sheet of the Eurosystem, indicating that the Governing Council intended to return to the levels prevailing in early 2012, i.e. a balance sheet of around EUR 3,000 billion (against EUR 2,000 billion at the end of the third quarter of 2014). Previously, a speech by Mr Draghi at Jackson Hole in August 2014 had strengthened the markets' perception of the determination of the Eurosystem to combat low inflation, possibly by having recourse to new measures.

The expanded Asset Purchase Programme (APP)

In January 2015 the Governing Council decided to expand the previous asset purchase programme to include public sector securities (PSPP). At that date, the monthly purchases of public and private sector securities under the expanded programme (APP) amounted to EUR 60 billion[9] and were intended to be carried out until at least September 2016, and in any case at least until a sustained adjustment was seen in the path of inflation consistent with the medium term objective of 2%.

In December 2015, the adverse macroeconomic developments of 2015 led the Governing Council

7 The Bank of England had launched a similar programme in July 2012, the "Funding for Lending" programme.

8 In particular in his address to the European Parliament in September 2014.

9 Purchases began in March 2015. All national central banks and the ECB participate in the asset purchases. The latter will be based on the ECB's capital key and subject to issuer limits (i.e. the maximum share of an issuer's outstanding securities that the Eurosystem is prepared to purchase).

to recalibrate these standard and non-standard measures. In particular, the interest rate on the deposit facility was lowered to –0.30% and the asset purchase programme was extended until at least March 2017. In addition, it was decided to reinvest the principal payments on the securities purchased under the APP as they mature, and to include in the scope of the APP securities issued by regional and local governments.

On 10 March 2016, the ECB announced a new extension of the programme. The new set of measures is fourfold. i) the interest rate on the main refinancing operations of the Eurosystem was lowered by 5 basis points to 0% and the rate on the deposit facility was lowered by 10 basis points to –0.40%. ii) the monthly purchases under the asset purchase programme was expanded from EUR 60 billion to EUR 80 billion.[10] iii) investment-grade euro-denominated bonds issued by NFCs were included in the scope of the asset purchase programme. iv) a series of four targeted longer-term refinancing operations each with a maturity of four years was launched: the TLTRO II. The interest rate under TLTRO II will be fixed at the rate on the Eurosystem's main refinancing operations prevailing at the time of take-up. For banks whose net lending exceeds a benchmark, the rate applied to the TLTRO II will be lower, and can be as low as the interest rate on the deposit facility prevailing at the time of take-up. Besides these measures, the president of the ECB specified that the key interest rates would remain at the level of April 2016, or at lower levels, far beyond the horizon of the asset purchase programme (March 2017).

Are these measures specific to the Eurosystem?

Although the measures adopted by the Eurosystem have specific features related to the euro area, several components have been used at one time or another by other major central banks such as the US Federal Reserve System, the Bank of England and the Bank of Japan. Indeed, asset purchase programmes have been implemented by the Bank of Japan since 2001, by the Federal Reserve since 2008 (QE1) and the Bank of England since 2009. Similarly, forward guidance has also become a commonly used tool. The Federal Reserve (since December 2008) and the Bank of England (since August 2013) have linked the evolution of the path of interest rates to changes in the economy, while the Bank of Japan has linked the maintenance of its purchase programme to its price stability objective (since April 2013). In addition, the Bank of Japan has set up long-term financing operations similar to the LTROs (since December 2012),[11] and has had recourse to negative rates since January 2016.

2. Transmission mechanisms and channels

The effect on the economy of interest rate cuts, a standard measure, is widely documented elsewhere. In this paper, we look at the effect of the asset purchase programmes. The asset purchase programmes are likely to affect the economy through multiple channels. They can be grouped into three major classes of mechanisms: (i) the quantity effect, (ii) the signal effect, and (iii) the effect on excess liquidity. However, these distinctions are somewhat arbitrary as these effects are not always easy to distinguish empirically or theoretically (several taxonomies coexist, see Krishnamurthy and Vissing-Jorgensen, 2011, Drumetz, Pfister and Sahuc, 2015). In addition, the asset purchase programme is linked to the other measures taken by the Eurosystem.

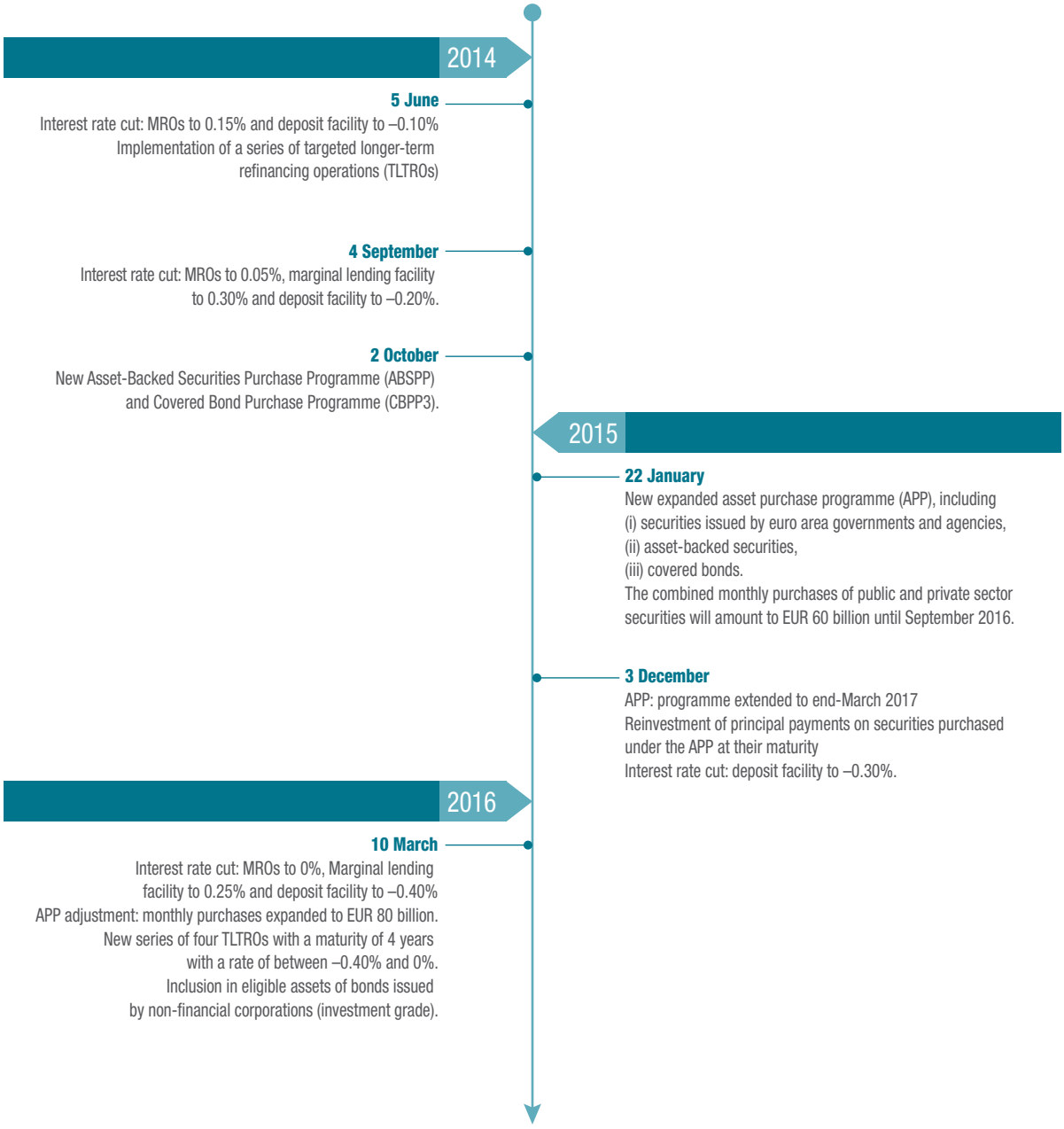
One of the main elements for assessing the transmission of monetary policy is the level of long term interest rates. An important tool for analysing changes in long-term rates is the yield curve, a function which, for a given date, connects each maturity (x-axis) to the corresponding interest rate level (y-axis). It informs investors on the yields at maturity of a security according

10 The issuer limit for securities issued by international organisations was also raised from 33% to 50%. The rate on the marginal lending facility was lowered to 0.25%.

11 Through the Stimulating Bank Lending Facility.

Box

Chronology of the main Eurosystem monetary policy measures since 2014



to its term. The term structure of interest rates suggests that rates for each maturity consist of the average of expected future short term rates and a "term premium" (which is explained by the aversion to risk of investors for a long-term investment compared to a sequence of short-term investments, the inflation risk, the risk of default of the issuer, the liquidity risk etc.). The "short" end of the curve – that associated with maturities of 3 months to 2 years – is mainly related to monetary policy decisions through market expectations about future short-term rates. The "long" end of the curve – that associated with maturities of over two years – is also a function of term and default premia related to unforeseen changes in long-term rates and the uncertainty about the issuer's solvency. The slope of the yield curve, as measured by the spread between long-term rates and short-term rates, is an indicator frequently used to summarise the changes in the shape of the curve and, in particular, changes in expectations about future short-term rates.

The quantity effect

Under the asset purchase programme, the central bank buys long-term bonds by issuing reserves, i.e. liquidity held by banks on the current account with the central bank. When the short-term interest rate is close to zero, the reserves become equivalent in terms of yield to short-term bonds. From the perspective of the Eurosystem counterparties, selling securities under the APP is equivalent to exchanging short-term and long-term bonds. Economic theory is not unequivocal on the effect of such an operation. If these two types of assets were perfect substitutes, bond purchases by the central bank should have no effect: the long-term bond holders would simply agree to hold reserves in their place, without requiring any change in the rate on these bonds.

This situation corresponds to the assumption of financial markets without uncertainty or credit constraints faced by investors. In substance, the long-term securities are perfectly equivalent to a renewed holding of short-term securities. A portfolio can therefore be perfectly duplicated by another and the price of assets does not in principle depend on the outstanding amount of securities in circulation.

Other theoretical frameworks, which are increasingly applied since the crisis, focus on uncertainty and the credit constraints faced by the players in the financial system. In the presence of such constraints, changing the relative amounts of short-term and long-term securities in investors' portfolios may reduce the term premium.

Schematically, these models highlight the imperfect substitutability of financial assets, for example owing to specific characteristics which differ from one investor to another, such as risk aversion, or due to regulatory constraints. If the short-term and long-term bonds are not perfect substitutes, the term premium must depend on their relative outstanding amount in investors' portfolio. An example of non-substitutability is the difference in maturity between short-term and long-term securities. An investor may need to hold long-term assets to cover long-term liabilities. This is particularly the case of insurance companies or pension funds. Such investors will be willing to accept lower long-term rates to keep long-term securities in their portfolio. Another example is the credit or liquidity risk of long-term sovereign bonds, which make them different from short-term securities and money. By reducing the amount of these risks in the portfolio of private investors, the APP should contribute to lowering the corresponding interest rate premiums. In this respect, the situation differs between euro area countries. Through this channel, the APP should have a smaller impact on the government bond yields of core countries such as Germany, whose bonds are considered safe and liquid, than on the yields of peripheral countries such as Spain or Italy, which include a risk or liquidity premium compared to German Bund yields.

A decline in the rate on securities purchased under the APP can also be transmitted to other assets with similar characteristics, i.e. relatively substitutable assets such as corporate bonds or bank loans of similar maturity. The transmission to the prices of other assets may also be due to financial intermediaries. By increasing the liquidity of their assets and reducing their credit risk, the APP can enable them to free up capital to purchase other securities or increase their outstanding loans to the private sector, again leading to lending rate cuts for all borrowers, households and SMEs, that borrow only from banks.

A particular class of assets consists of securities issued by the rest of the world. If these assets are good substitutes for securities purchased by the central bank, the transmission of the decline in long-term rates also takes the form of a depreciation in the nominal exchange rate.

A strengthening of forward guidance

The setting up of an asset purchase programme tells economic players that the central bank is determined to take the necessary steps to achieve its inflation objective. This signal can lead economic agents to revise downward their expectations of future policy rates. The logic behind the functioning of this channel is as follows: the central bank, by exchanging long-term securities for reserves, carries on its balance sheet an interest rate risk which strengthens the credibility of its commitments regarding future rates. Indeed, an unexpected tightening of monetary policy would expose the central bank either to losses – in case of resale because bond prices are inversely proportional to the yield on these bonds – or to the opportunity cost of holding a portfolio whose performance is below the market rate. This signalling effect reinforces forward guidance, i.e. the explicit communication on the trajectory of future interest rates.

Through the interplay of arbitrages, a decline in expected future interest rates causes a change in the valuation of all financial assets: the long-term rates on sovereign and corporate bonds decrease, as well as bank rates, stock prices increase and the nominal exchange rate depreciates.

Excess of liquidity and the interbank market

A transmission channel of the APP that is rarely mentioned by observers is its contribution to the excess liquidity of the banking system, and the ensuing effects on the lower end of the yield curve. This transmission mechanism interacts with the liquidity allocation method used in the Eurosystem's refinancing operations.

Fixed rate refinancing operations and excess liquidity

It is useful to first take a look at refinancing operations to understand this mechanism. Since October 2008, the Eurosystem main refinancing operations and the longer-term refinancing operations are conducted as fixed rate tender procedures with full allotment. In practice, the Eurosystem sets the interest rate that will apply to these operations and the participating banks obtain all the liquidity that they require, subject to supplying adequate collateral. This liquidity allotment procedure has been regularly renewed since end-2008. At the December 2015 Council, the Eurosystem decided to keep it in place at least until the end of the last reserve maintenance period of 2017.

A consequence of this liquidity allotment procedure is a fall in interest rates on the money market. Indeed, following the longer-term refinancing operations (1-year and 3-year LTRO), notably those conducted in 2009 and 2012, the banking system of the euro area found itself in a situation of excess liquidity, causing the Eonia (euro interbank overnight rate) to drop to the level of the deposit facility rate. This reduced banks' need to resort to the interbank market to obtain short-term financing (see Chart 3 above).

In the initial phase of the crisis, these measures were used to correct the effects of the interbank market freeze. They were effective in lowering the spreads between euro area countries in the money market to levels close to those before the crisis. However, as shown in Chart 3, from 2013, as the situation on the money market returned to normal, the level of excess liquidity began to subside, because banks were having less and less recourse to refinancing operations or were paying back amounts that they had borrowed under the 3-year LTRO. An upward pressure started to be exerted on the short end of the yield curve: the shortest rates gradually increased. This "passive tightening" of monetary policy was at a variance with the monetary policy stance chosen by the Governing Council.

The APP perpetuates the excess liquidity

In this context, the implementation of the APP contributed to perpetuating the excess liquidity. The excess liquidity then increased and, via the mechanisms described above, a downward pressure was exerted on the lower end of the yield curve. The communication of the Governing Council on (i) the (minimum) duration of the programme and (ii) the policy of reinvesting the principal payments on the securities purchased under the APP as they mature enabled market players not to anticipate a reduction in excess liquidity during the programme, thereby eliminating the risk of a passive tightening of monetary policy over this horizon.

The anticipated dynamics of the excess liquidity reinforce the combined pressure of the APP and forward guidance on the yield curve. With substantial excess liquidity, the short end of the yield curve is anchored close to the deposit facility rate. Market participants therefore expect the short end of the yield curve to be situated at the level of the deposit facility rate for an extended period of time. Via the arbitrage interplay along the yield curve, these anticipated dynamics were passed on to longer-term rates as soon as the APP was announced (and its technical parameters were clarified). From this perspective, purchases made under the APP also combine with the TLTRO decided in July 2014 and March 2016. Indeed banks' take-up during these operations also contributes to the excess liquidity.

There are thus a large number of complementary transmission mechanisms of asset purchases by the central bank and it is difficult to identify in practice if one of the channels of the APP is predominant in the response of the yield curve. Ultimately, irrespective of the precise mechanisms, the APP is however likely to lead to decreases in sovereign bond yields, especially in the peripheral countries, in bank rates and corporate bond yields and as well as a depreciation in the exchange rate.

In the case of the TLTRO II decided in March 2016, an additional mechanism is at work. By offering a fixed rate over four years (and a rate that may be lower depending on the borrowing bank's credit supply) on a series of operations over two years, the TLTRO II directly compress the short end of the yield curve. In principle, their mere existence is enough to compress the yield curve, even in the absence of effective take-up. Indeed, no four-year financing method with a higher yield than that offered on the TLTRO II can be viable. Moreover, combined with the forward guidance which is regularly renewed by the Governing Council, the TLTRO can extend their effects to distant maturities along the yield curve.

Macroeconomic effects

Given the effect on interest rates and asset prices, the transmission channels to inflation and growth are traditional. Low real interest rates and more favorable financing conditions encourage companies to invest. The low real interest rates also encourage households to increase their consumption, possibly

through a fall in the savings rate, and to invest. Furthermore, the increase in asset prices is likely to generate wealth effects, which facilitate lending by increasing the value of the collateral that can be offered as a guarantee by borrowers. The depreciation of the exchange rate contributes to increasing the competitiveness of euro area firms, promotes exports and tends to limit imports. Non-standard measures should therefore have a positive effect on the various components of demand, and therefore on the nominal growth rate of the economy.

Quantitative easing also helps increase inflation through different channels. Currency depreciation directly raises the price of imported goods and services, which increases the consumer price index. These imported price increases can also be transmitted to companies in sectors exposed to international competition. Moreover, the positive effect of the measures on economic activity and the labour market contributes to raising prices and wages, even in the sectors sheltered from international competition.

Lastly, quantitative easing and the set of measures taken to ease monetary policy are likely to reinforce the anchoring of expectations. In the face of considerable disinflationary forces such as declining commodity prices, the commitment of the central bank is there to remind the social partners and businesses that inflation will remain close to 2% over the medium term. Ultimately, the setting of wages and prices depends on economic agents' expectations regarding inflation developments which will determine their purchasing power.

3. Effects of the measures: empirical elements

Following the programmes launched in 2014 and 2015, the financial conditions in the euro area improved significantly, with a decline in future short-term rate expectations, an even stronger decrease in sovereign bond yields that was passed on to bank rates and a depreciation of the euro. This section describes this improvement, and discusses a few elements for assessing their macroeconomic impact, for which a counterfactual exercise is necessary.

It is important to stress that a large number of speeches preceded the official announcements of non-standard measures; in particular the announcement of the APP programme in January 2015 was preceded by the speech of Mr. Draghi at Jackson Hole in August 2014. The effects measured after the announcement of a programme thus only correspond to the gap between these announcements and their expectations. In other words, macroeconomic effects probably occurred well before the official announcements.

An improvement in financial conditions in the euro area

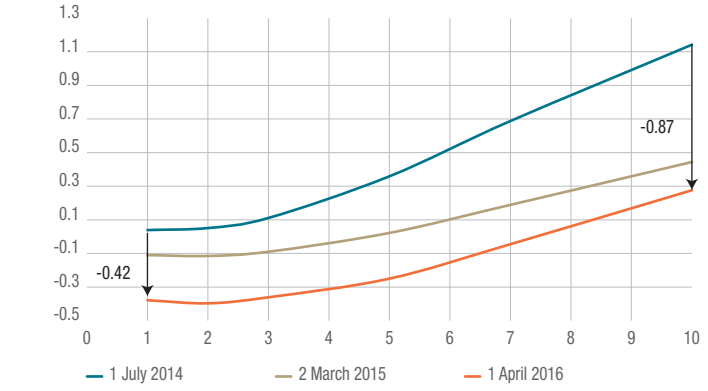
The signal effect of non-standard measures has been confirmed. The monetary policy measures taken since June 2014 have lowered and flattened the yield curve. This is notably illustrated in Chart 4, which shows the yield curve on Eonia swaps.[12] The Eonia swap rates are generally considered the best available proxy for risk-free interest rates at different maturities in the euro area. At the short end of the curve, they reflect the expected short-term rate developments. The curves shown are the yield curve in the summer of 2014, that just before the asset purchase in March 2015 and finally that on 1 April 2016. Following the announcement of the APP, the yield curve flattened, with significant effects in particular on 3 to 10-year rates. This development suggests that the signal effect described in Section 2, coupled with expectations of continued excess liquidity, clearly took place. Between March 2015 and April 2016, the curve shifted downwards, with a greater effect on the short end due to the two decreases in the deposit facility rate.

12 An interest rate swap is a contract in which two counterparties mutually agree to make financial payments to each other calculated on a notional amount for a specified period. Thus, in the case of an Eonia swap, a payer pays a fixed swap rate and receives a floating rate pegged to the daily Eonia setting.

Purchases of sovereign bonds have clearly had a quantity effect on term premia. Chart 5 shows the changes in yields on 10-year sovereign bonds for four major euro area countries and the composite interest rates in the euro area. There has been a marked decline in sovereign bond yields since the summer of 2014, resulting from the combined effect of the decline in the deposit facility rate and the announcement of the asset purchase programme. In total, the composite rates in the euro area fell by 130 basis points between summer 2014 and February 2016. This decline is far greater than the decrease in the 10-year swap rate shown in Chart 4 and does therefore not only reflect lower future rate expectations. It thus seems that the quantity effect of the asset purchases described above has been confirmed. The fall in interest rates was accompanied by a narrowing of sovereign spreads between euro area countries. The sovereign bond yields of peripheral countries such as Spain and Italy benefited more from the asset purchase programme. The fact that they are less substitutable with reserves than securities issued by countries such as Germany and France is a likely explanation.

C4 Eonia swaps yield curve

(rates in %, maturities in years)

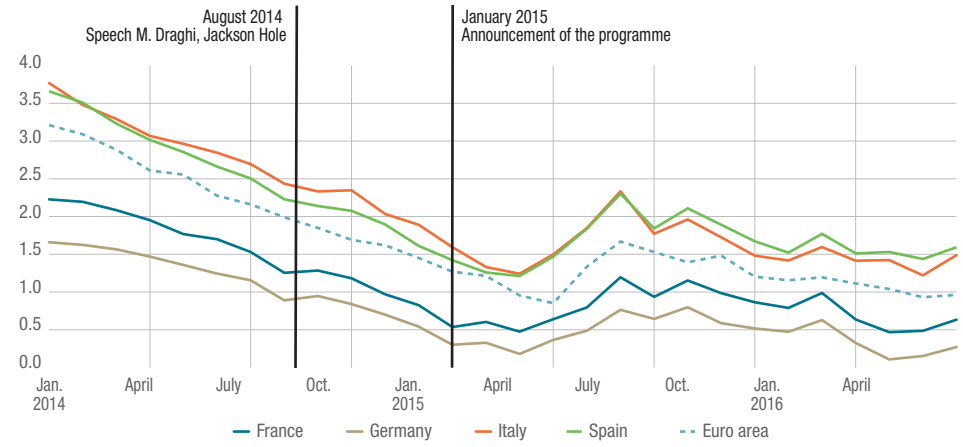


Each curve represents the yield curve at the given date.
Source: Bloomberg.

The decline in sovereign bond yields and lending to banks at very low rates (TLTRO) resulted in a decrease in all lending rates. The decline in sovereign bond yields was partly transmitted to the bond yields of non-financial corporations and banks, as shown in Chart 6. Charts 6a and 6b show the bond rate indicators built by Gilchrist and Mojon (2016) for banks and non-financial corporations. In particular,

C5 10-year sovereign bond yields

(%)

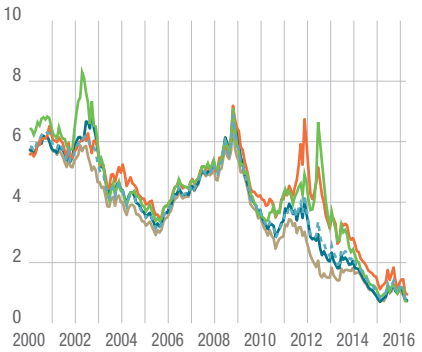


Source: ECB.

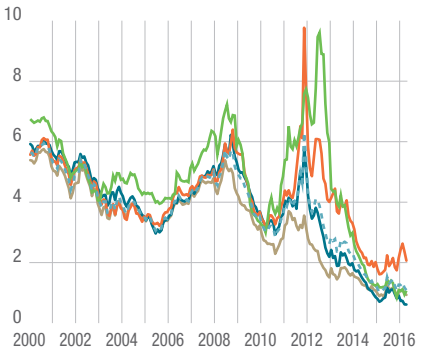
C6 Bond rates

(%)

a) non-financial corporations



b) banks



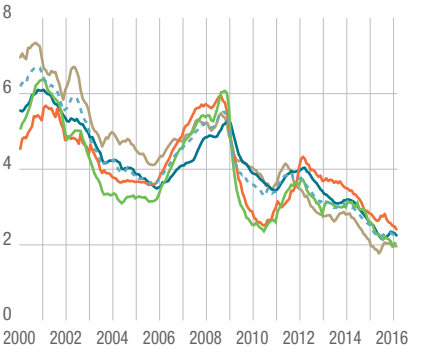
France Germany Italy Spain Euro area

Source: Gilchrist, Mojon (2016).

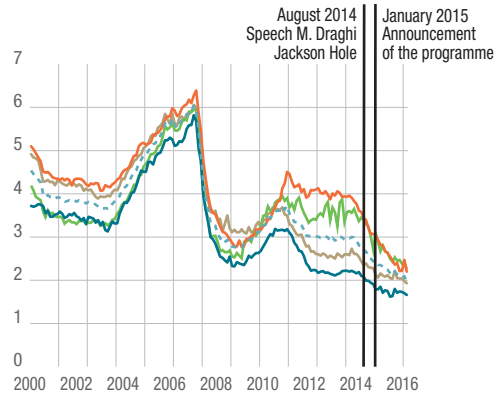
C7 Interest rates on mortgage loans to households and on new loans to non-financial corporations

(%)

a) Households



b) Non-financial corporations



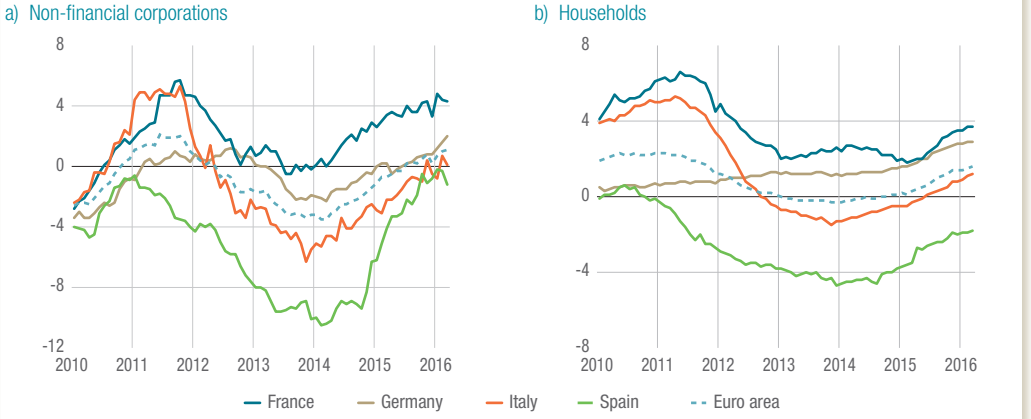
France Germany Italy Spain Euro area

Source: ECB.

bond yields of non-financial corporations in the euro area fell by 40 basis points between mid-2014 and April 2016, those of banks by 24 basis points. The fact that this decline is of a lower magnitude than those of sovereign bond yields suggests that these different classes of assets are not perfect substitutes. In this respect, extending the scope of the APP to bonds issued by NFCs should exert an additional downward pressure specifically on bond yields of NFCs. Chart 7a shows mortgage rates for households which, in the case of the euro area as a whole, have declined by about 60 basis points since mid-2014. Lastly, Chart 7b shows the rates on new loans to non-financial corporations and points to a drop of 70 basis points for the euro area since mid-2014. As for sovereign

C8 Growth in outstanding bank loans to NFCs and households

(%)



Source: ECB.

bond yields, bank lending rates have posted a sharper decline in peripheral countries than in core countries, suggesting that the non-standard measures have mainly been transmitted through the banking system, whereas bond yields of NFCs have decreased in a similar manner across the board.

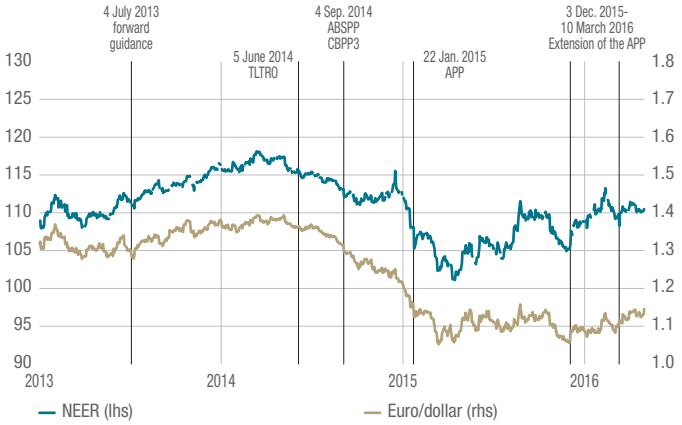
Chart 8 shows the marked recovery of growth in outstanding bank loans to businesses. Between the summer of 2014 and February 2016 the growth rate climbed from –4% into positive territory. The growth in outstanding loans to households recorded a more mixed improvement (+1.7 percentage points over the same period).

The depreciation of the euro against other currencies is shown in Chart 9. This depreciation which started in the summer of 2014 and was accelerated by the asset purchase programme was more marked against the dollar (20% between July 2014 and February 2016) than against all foreign currencies (5% over the same period).

The impact of the programme on inflation expectations can be measured using Chart 2.

C9 Euro dollar exchange rate and nominal effective exchange rate

(%)



Note: the NEER is the nominal effective exchange rate relative to a basket of 38 currencies.
NEER Jan 1999 = 100. Euro dollar exchange rate in dollars per euro.
Source: ECB.

In January 2015, after the announcement of the APP, the downward trend in expectations measured by the markets or by professionals was reversed in the medium and long term. However since January 2016, inflation expectations for all horizons have again been on a downward trend, which many

observers attribute to a correlation with oil prices. They reached historic lows, raising further concerns about an unanchoring of expectations. This led to the decisions of 10 March.

Overall, the non-standard measures therefore seem to have been passed on to private sector interest rates both via a signal effect which affected future rate expectations and the exchange rate, and via a quantity effect which affected the long-term yields of sovereign bonds, in particular in the peripheral countries, with a transmission to the private sector notably through the banking system.[13] The assessment referred to by Praet (2016) is representative of the various quantitative assessments of this transmission: the APP and TLTRO measures have led to a 40 to 60 basis points reduction in bank lending rates in the euro area. According to the ECB (2015), the total effect of both the APP and TLTRO programmes on 10-year composite sovereign bond yields in the euro area amounts to 70 basis points.

Assessments of the macroeconomic impact

The available observations and projections suggest that growth levelled off in 2015 and 2016. According to the Eurosystem forecasts published in March 2016, GDP grew by 1.6% in 2015 and could increase by 1.4% in 2016. The recent Eurosystem projections suggest a sustained near-zero inflation: HICP inflation stood at 0% in 2015 and is expected to reach 0.1% in 2016.[14] However, these developments do not imply that the measures taken by the Eurosystem have no effect on growth and inflation. Indeed, the observed economic conditions and the inflation rate bear the marks of shocks with adverse consequences: the decline in oil prices and the fall in global demand that occurred in particular in 2015.

Assessing the impact of the Eurosystem's measures must be based on a counterfactual exercise, i.e. a quantitative simulation that takes into account the negative shocks to the economy. The appropriate class of tool is that of quantitative macroeconomic models. This type of exercise is inherently subject to different types of uncertainty. First, from a methodological perspective, several approaches are possible: dynamic stochastic general equilibrium (DSGE) models, statistical time series models, or traditional macroeconometric forecasting models. Within each approach modeling assumptions may influence the results. Furthermore, the uncertainty is particularly high as regards the monetary easing measures in the euro area, due to the lack of historical and statistical perspective related to the novelty of the implementation of such measures.

There are few assessments of the effects of asset purchase programmes in the euro area. Cova, Pagano, and Pisani (2015) use a multi-country structural model and obtain an effect of 0.8% on inflation and 1.4% on the level of GDP over one year. Andrade, Breckenfelder, Fiore, Karadi and Tristani (2016) find that the peak of the effect on inflation is about 0.35 percentage point and the peak of the effect on GDP is about 0.60%. Lastly, Blot, Creel, Hubert and Labondance (2015) use a VAR model and find a peak effect of 0.8 percentage point on inflation and 4% on industrial production.

The ECB (2016) presents an assessment taken from the work of a Eurosystem working group based on a series of models drawn up under the different approaches mentioned above.[15] The effect of the APP (excluding the extension of December 2015 and March 2016) on inflation is estimated at half a percentage point in 2016 and a third of a percentage point in 2017. The effect on the level of GDP by 2017 is estimated at almost 1%. Draghi (2016a, 2016b) and Praet (2016) refer to another assessment, which includes the extension of December 2015, where the effect on inflation is at least 0.5 point in 2016 and about 0.5 point in 2017, and the effect on the level of GDP over the period 2015-2018 is about 1.5%. Table 1 summarises these Eurosystem assessments by showing averages over the period 2015-2018.

13 It should be noted that if one takes into account all bank and non-bank credit in the euro area, which accounts for nearly three times the GDP, the rate cuts represent a decline in the interest payment burden for borrowers of hundreds of billion euros. Some borrowers will be able to deleverage more rapidly and others maintain or increase their spending for the same level of debt.

14 In the forecast, the inflation rate increased by 1.6% in 2018.

15 The Banque de France has contributed to this working group by producing figures based on a DSGE model with nominal, real and financial frictions which is derived from Cahn, Matheron and Sahuc (2014).

The assessments referred to focus on the aggregate euro area. The effect may vary according to the country especially as a result of a differentiated improvement in financing conditions, as described in Section 3, of unequal spare capacity to increase production, and of national specificities (for example the price elasticity of foreign trade). The peripheral countries, Italy and Spain, where the sharpest declines in sovereign and bank interest rates were observed, probably benefited more from the measures than the core countries. The effect on France is probably lower than that on the euro area average. Cova and Ferrero (2015) estimate the effect of the APP on inflation in Italy at 0.5 percentage point in 2015 and 0.7 point in 2016. The effect on GDP growth is 0.5 point in 2015 and 0.8 point in 2016. In France, according to a study by INSEE (Heam, Lee, Mark, and Pak, 2015) the impact on 10-year sovereign bond yields is estimated at –80 basis points and the effect of the APP on GDP growth is 0.4 point in 2015.[16]

T1 Estimated impact of non-standard measures on the euro area
(Percentage points)

Source/Assessed measures	Average annual inflation rate	Cumulative GDP growth
	2015-2018	2015-2017 (or * 2018)
BCE (2016) – APP	0.3	1.0
Praet (2016) Expanded APP of December 2015	0.4	1.3 *
Praet (2016) Draghi (2016b) Expanded APP of December 2015 and TLTROs	0.5	1,6 *

NB: Impact on the annual inflation rate and on the cumulative GDP growth rate, in percentage points.
Source: BCE (2016), Draghi (2016b) Praet (2016).

4. Conclusion: an acknowledged support to the economy, risks to be put into perspective

This article looks at the monetary easing conducted since 2014. The Eurosystem responded to a risk of too low inflation in the euro area by implementing a set of measures: policy rate cuts, asset purchase programmes, forward guidance. The analysis of transmission channels and the available assessments of these measures show that they have helped to support growth in the euro area, and to limit the deviation of inflation from levels consistent with the price stability objective.

Various observers point out the risks associated with this monetary easing – see Artus and Viard (2015) for an emblematic essay. A first risk associated with a prolonged period of low interest rates is that it may threaten financial stability by promoting leverage and the emergence of financial asset bubbles. In this environment, financial institutions may be exposed to excessive risk by seeking higher-yield investments, thereby running the risk of recording heavy losses in the event of a market downturn.

A second risk is the decline in the profitability of financial institutions, notably because of the negative deposit facility rate. The traditionally conservative investors (pension funds, insurers through euro funds of life insurance policies) pass on this decline to life insurance policy yields, which can pose problems for the savings built up by households for retirement, in order to make up for the planned reduction of pensions.

A third risk brought up in the public debate is that of growing inequalities associated with these measures, due to the increase in asset prices on the one hand, and to the redistribution between borrowers and creditors in the economy on the other, as a result of lower interest flows.

While the quantification of these risks is beyond the scope of this article, we can make several observations to put them into perspective. The hypothesis of bubbles forming seems hardly likely at the time of writing this article. The evolution of equity indices remains moderate. Similarly, the growth in real-estate prices remains weak. As regards the

16 The two quantitative assessments are based on econometric models (that of the Banca d'Italia for Cova and Ferrero (2015), VAR model and NIGEM model for the INSEE study).

situation of financial system players, monetary easing acts in a contradictory manner. While the yield of bank assets has decreased, their cost of financing has also declined. The impact on banks' profitability is not determined a priori and the available indicators do not currently point to a marked deterioration in interest rate margins of euro area banks. Pension funds and insurance companies have also benefited from capital gains by selling securities to the Eurosystem. As regards both the inequalities and the sustainability of the banking system, it should be recalled that a first order effect of monetary policy is the increase in activity and the reduction in the unemployment rate, which reduces both inequalities and the risk of non-repayment of the credit. Furthermore, the objective of the monetary policy measures in the euro area is price stability. Concerns about the financial stability fall within the province of macroprudential tools (Banque de France 2014), and concerns about inequalities within that of fiscal and tax policies.

Given the recent nature of the experiences of non-standard monetary policy measures, there remains great uncertainty regarding the magnitude and time of their impact. At the same time, these measures have been put in place in the euro area for a long period of time – and it is even possible that these instruments will remain permanently in the toolbox of central banks alongside conventional instruments, beyond the current period. New and more in-depth assessments will therefore be desirable. In this respect the use of microeconomic data - see the work of Andrade, Cahn, Fraisse and Mésonnier (2015), Koijen, Koulischer, Nguyen and Yogo (2016) who document the effectiveness of non-standard monetary policy measures – is a promising avenue for providing information on the transmission channels of these measures.

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Glossary

ABS Asset-Backed Securities
ABSPP Asset-Backed Securities Purchase Programme
APP Asset Purchase Programme or **EAPP** for Extended Asset Purchase Programme
CBPP Covered Bonds Purchase Programme
DSGE Dynamic Stochastic General Equilibrium model
ECB European Central Bank
Eonia Euro OverNight Index Average
HICP Harmonised Index of Consumer Prices
LTRO Longer-Term Refinancing Operations
NFCs Non-Financial Corporations
OMT Outright Monetary Transaction
PSPP Public Sector Purchase Programme
QE Quantitative Easing
SMP Securities Market Programme
SPF Survey of Professional Forecasters
SVAR Structural Vector Autoregression model
TLTRO Targeted Longer-Term Refinancing Operations

Strategies for internationalisation in Pharma

Jean-Luc Cayssials
Martial Ranvier
Sector Surveys
and Statistics Directorate

The French pharmaceutical industry is one of the leading pharmaceutical industries in Europe and stands out as being highly internationalised. Most of the activity in France is performed by 367 multinational companies. These represent more than EUR 80 billion of international trade in goods and services, run a trade surplus of nearly EUR 3 billion and receive an equivalent amount in income from their foreign affiliates

This survey highlights several very different strategies for internationalisation, which fall into three distinct economic models and shape the geography of trade:

- *The first model, known as the "domestic market" model, represents half the multinationals and exists downstream in the value chain. It sources supplies from neighbouring countries for the domestic market. The vast majority of it is composed of foreign groups' affiliates.*
- *Upstream in the chain, the "factories of the world" model comprises industrial subsidiaries, most of which are under French control. They manufacture products in France to supply all the world's markets.*
- *Lastly, the "hybrid" model consists of industrial and trading subsidiaries, often under foreign control. They produce domestically whilst sourcing supplies from neighbouring countries or their country of control. Their outlets are the French market and, beyond that, the European and international markets.*

Keywords: globalisation, multinationals, exports, imports, direct investment, Pharma

JEL Codes: F10, F14, F21, F23

NB: This survey is the result of cooperation between the Institut national de la statistique et des études économiques (National Institute of Statistics and Economic Studies – Insee), the Direction Générale des Douanes et Droits indirects (Directorate General of Customs and Excise) and the Banque de France. The analysis was carried out using data gathered by the three institutions and relating to 2012 (see Annex 1).

Key figures

367
dominant companies in France

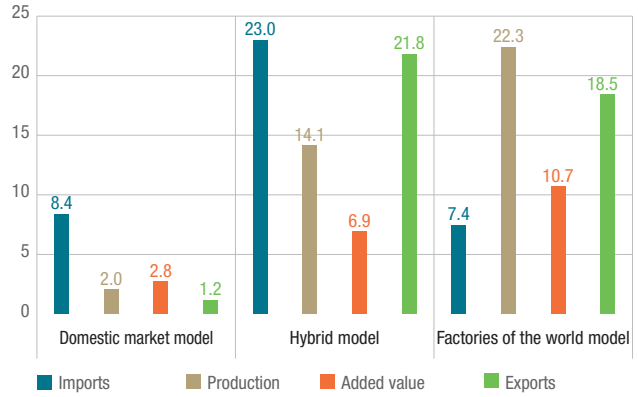
3rd
largest producer in the European Union

EUR 5.7 billion
surplus in 2012

Three economic models

Pharma in France: three economic models

(EUR billion)



Scope: 367 core companies in the pharmaceutical field.
Sources: 2012 database. Banque de France, Customs department, Insee.

1. Multinationals – the core of international trade in pharmaceuticals

Pharma in France: a sector of activity combining openness to international trade and a domestic production base

According to data published by Insee and Eurostat, the pharmaceutical industry in France is both highly internationalised and has a high level of production, positioning it in third place in the European Union.

Trade in goods and services with the rest of the world represented more than 60% of French GDP in 2014, with exports and imports at 30% and 31% of GDP respectively.

The degree of internationalisation varies widely from one sector of activity to another. The pharmaceutical industry is marked by a high level of internationalisation, with exports representing 62% of turnover compared with 16% for all industries in France overall.[1]

Exports and imports of pharmaceutical products have grown much faster than production by the pharmaceutical sector:[2] between 2000 and 2014 exports and imports more than doubled whilst production in the sector grew by only 32%[3] (see Chart 1).

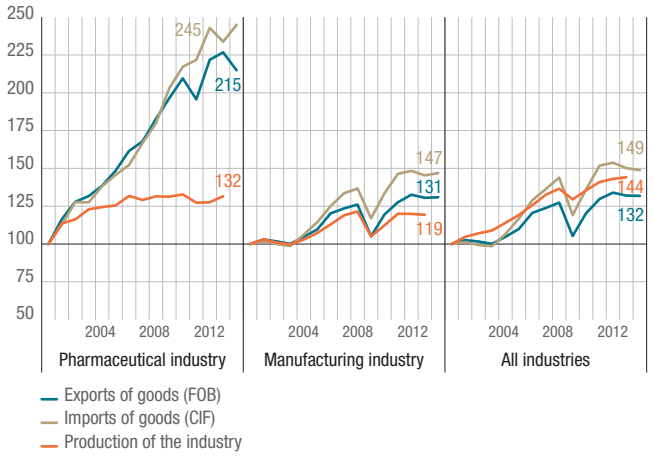
Moreover, the growth in international trade in pharmaceutical products has been much greater than that observed in the French economy as a whole. Whilst trade has stagnated since 2011 in both the French economy and manufacturing industry, it has continued to grow for pharmaceutical products, international trade in which was largely unaffected by the 2009 financial crisis. Exports of pharmaceutical products nonetheless fell in 2011, as the result of a worsening economic climate in several customer countries (the Maghreb, Middle East, Ivory Coast and Japan, for example) and price decreases in many European countries (Spain, Greece and Turkey, for example).

In terms of production, the French pharmaceutical industry is in third place in the European Union, behind Germany and Ireland. This is followed by Italy and the United Kingdom in the ranking of Europe's largest manufacturers of pharmaceutical products (see Chart 2).

In common with Germany and the United Kingdom, France has national players of international stature (Sanofi in France, GlaxoSmithKline in the United Kingdom and Bayer Healthcare in Germany). In Ireland and Italy, the pharmaceutical industry has benefited from the industry's multinationals establishing themselves in those countries.

C1 Very steep rise in imports and exports of pharmaceutical products

(base 100, value in 2000)



Sources: Insee, Customs department.

1 Source: "*Élaboration des statistiques annuelles d'entreprises*" (*Annual activity statistics database* – Esane) 2013.

2 Sector data for production, by product, for imports and exports.

3 By the end of 2013.

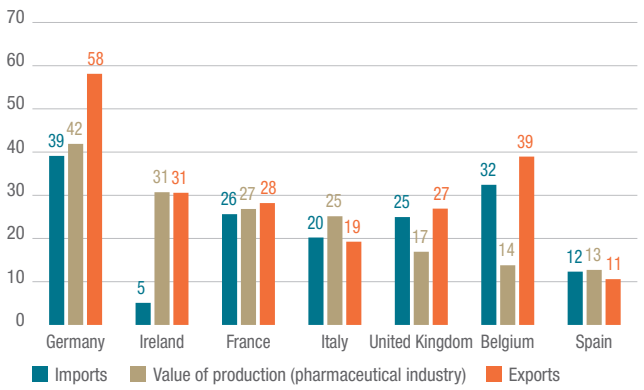
Ireland stands out here. Despite having a small domestic market, its pharmaceutical output exceeds that of France and exports are particularly high, representing half the country's total. Pharma's biggest international groups are located in Ireland and have invested locally, specialising in the manufacture of biological medicinal products (biotherapies).

Belgium too is notable for its substantial imports and exports of pharmaceutical products, especially when compared with its lower level of production. Unlike Ireland, which has a productive base, Belgium appears to be above all a transit area for pharmaceutical products.

Although it has an underlying surplus in France (of an average of more than EUR 3 billion since 2000), the trade balance for pharmaceuticals is much smaller than Germany's (an average of nearly EUR 19 billion between 2012 and 2014). German exports of pharmaceutical products are also twice as high as for the French pharmaceutical industry, which has remained broadly oriented towards its domestic market.

C2 France among the other leading European producers of pharmaceuticals

(average 2012-2014, EUR billion)



Source : Eurostat.

Multinationals: a dominant role in activity and trade

Because pharmaceutical activity in France can be regarded as a highly internationalised sector of activity, it has been used as a field of research for an original study on internationalisation in a particular sphere of business. That work has been carried out collaboratively by the Banque de France, Insee and the Customs department, using detailed individual data gathered by the three institutions and relating to 2012 (see Annex 1).

This new approach has defined a broader scope of analysis than the traditional sectoral approach, which is more appropriate for studying the phenomena of globalisation (see Box 1).

The approach isolates a population of 640 companies, the "core of Pharma", in which pharmaceutical activity predominates in terms of the workforce employed, turnover, international trade and internal R&D expenditure. This group represents 98% of internal R&D expenditure in Pharma, 95% of international trade in pharmaceutical products, 92% of pharmaceutical turnover and 86% of staff employed in Pharma (see Chart in Box 1).

Nearly 60% of those companies are French or foreign multinationals, and they carry on the bulk of activity (trade and value added), the other core companies being French-based groups or independent units (see Box 1).

Box 1

An innovative approach to the pharmaceutical industry: how can the "core" companies engaged in the activity be identified?

1. A broader definition of the field based on individual company data

The methodology used covers all independent legal units and company groups in which at least one unit is involved in international transactions associated with Pharma (imports, exports, the provision of services including research and development, income from direct investment, etc.), including when that unit is classified in a different industry (research and development, head office or holding company activity, etc.).

The legal units involved in pharmaceutical activity satisfy one of the following four criteria:
- an APE (principal economic activity) code associated with the pharmaceutical industry (21) or the wholesale trade in pharmaceutical products (4646Z) (Esane, Insee);
- turnover in a sector related to the pharmaceutical industry (21) or the wholesale trade in pharmaceutical products (4646Z) (sector surveys, Insee);
- the presence of imports or exports of pharmaceutical products (the Customs department);
- R&D expenditure for the pharmaceutical industry (R&D survey, Ministry of Research).

If a statistical unit (legal unit or group) has a legal unit satisfying the above definition, all its resident affiliates fall within the scope known as the Pharma field, which is broader than the usual concepts of industry and sector.

This approach enables two aspects to be integrated into the study:
- The ancillary and support functions fully involved in the pharmaceutical industry (such as R&D);
- The pooling of resources (royalties, financing and loans, transfers of profits and other international payments, for example) which is sometimes carried out by units in the group other than those directly classified in the pharmaceutical industry.

2. The core Pharma companies

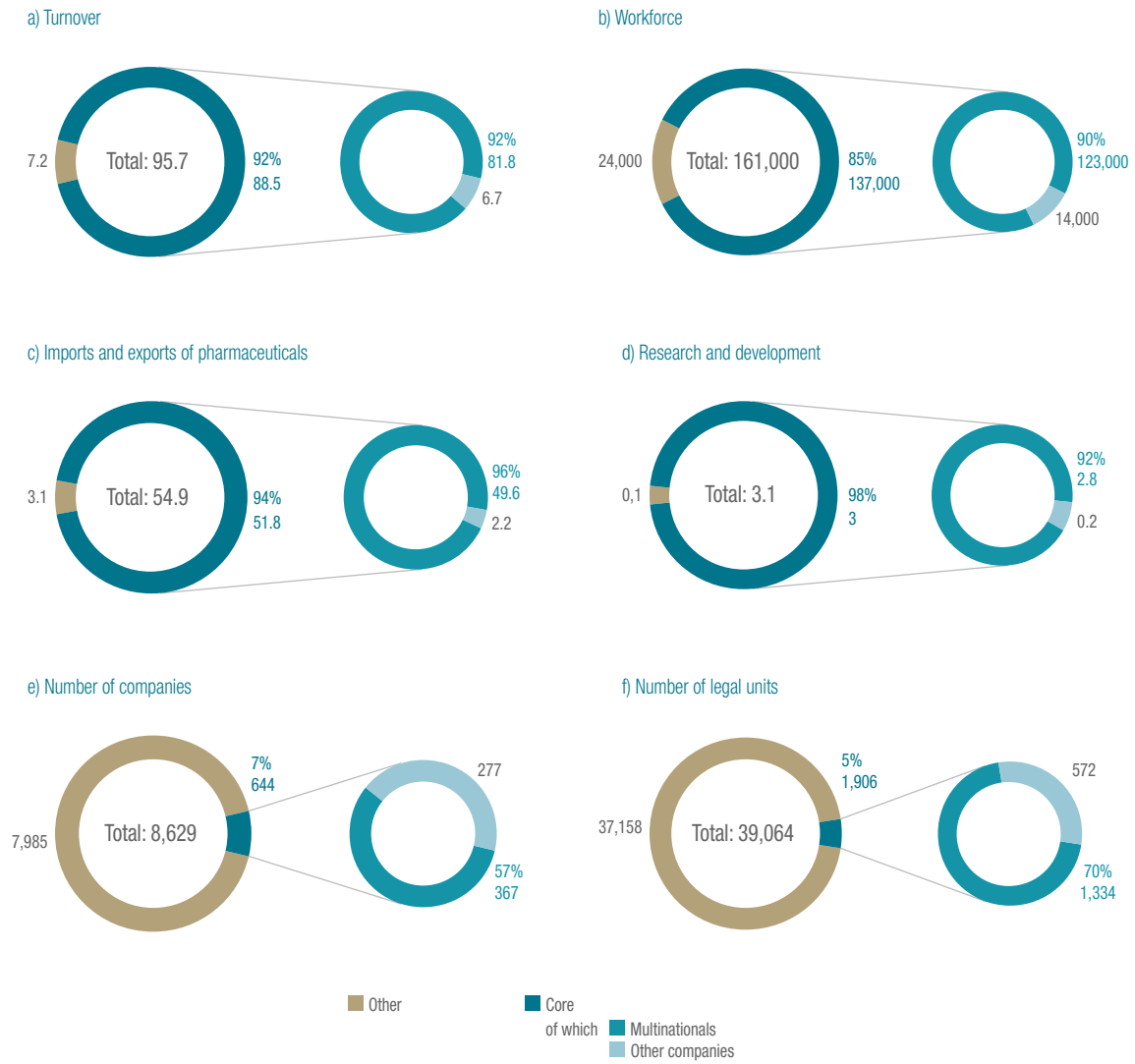
However, applied without any other criterion, that approach leads to the inclusion of highly diversified groups, in which pharmaceutical activity in the strict sense is of little importance. Introducing Pharma-related thresholds in terms of staff employed, turnover, foreign trade and R&D expenditure allows a core to be identified in which pharmaceutical activity is dominant and contributes significantly to the economy. That core is defined as all the statistical units (legal units or groups) for which:
- Pharma represents at least 50% in terms of one of the four indicators (workforce, turnover, foreign trade in goods, R&D expenditure); and
- at least one of those indicators is above a minimum threshold, in order to exclude specialised companies which are too small (EUR 1 million for international trade in pharmaceutical products, EUR 5 million for turnover in the Pharma branch, 250 people for staff employed in Pharma, EUR 1 million for internal R&D expenditure).

3. The dominant role of multinationals: the nucleus of the activity

Of the 640 core Pharma companies, 367 belong to multinationals and account for the bulk of activity, the other core companies being French-based groups and independent units.

Chart Breakdown of the Pharma field

(EUR billion and number, in 2012)



Scope: Pharmaceutical field

Notes:

1) "Pharma" turnover is the total turnover of companies whose principal activity is the manufacture of medicinal products, the wholesale trade in medicinal products or R&D, to which the turnover of the Pharma branch of companies with a secondary pharmaceutical activity has been added. The "Pharma" employees are calculated by adding together the staff employed by affiliates whose principal activity is the manufacture of medicinal products, the wholesale trade in medicinal products or R&D, plus a portion of the employees of companies with a secondary pharmaceutical activity (using the proportion represented by the Pharma branch in those companies). Imports and exports of goods are those of pharmaceutical products (Customs department).

2) For example, out of a workforce of 161,000 employees in Pharma, 85% are employed by core enterprises in the industry, of which the employees of multinationals represent 90% of the total.

Sources: 2012 database. Banque de France, Customs department, Insee.

Multinationals: a significant contribution to current account surpluses and national income

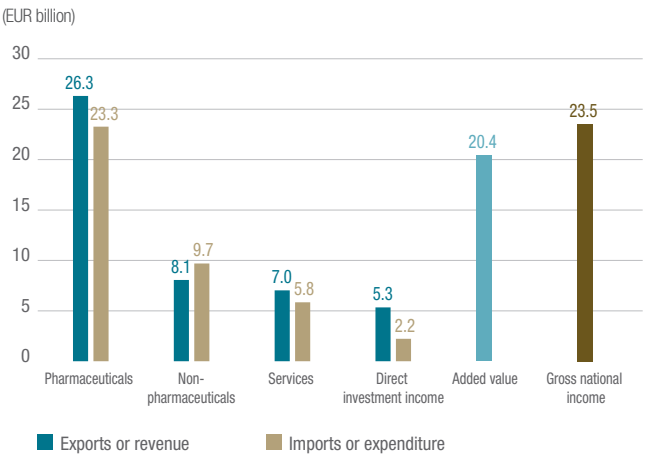
Aggregating individual data makes it possible to reconstitute the contribution of the core multinationals in respect of the various components of the balance of payments current account. Their contribution to the current account balance is quantified by adding together the balance of trade in goods and services and direct investment income (see Chart 3 and Table 2 below).

In 2012, the core multinationals exported goods and services worth EUR 41 billion, of which 26 billion were pharmaceuticals, giving a trade surplus of 3 billion. They exported services worth 7 billion, which were mainly royalties under patents and licences and contributed 1.2 billion to the trade surplus. However, trade by those multinationals in goods other than pharmaceutical products returned a deficit of 1.6 billion. Those goods were mainly chemical products and, to a certain extent, medical instruments (see Table 1). The foreign trade balance of the core multinationals was therefore a surplus of 2.6 billion.

Rather than exporting to another country, a French company may prefer to have a business in that country which produces and sells goods and services there. The company receives direct investment income from that business. Conversely, a French-based affiliate of a foreign group distributes income to that group. The net direct investment income of the core multinationals, 3.1 billion, represents the most significant share of their current account balance, a surplus of 5.7 billion. That income derives primarily from dividends received by French companies from their foreign affiliates.

Combined with value added (20 billion), the balance of investment income calculated as described gives an approximate measure[4] of the share the core pharmaceutical companies contribute to gross national income (24 billion out of more than 2,000 billion for the economy as a whole, that is to say 1.1%), 24% of which comes from their international activity, in the form of trade in goods and services or investment income.

C3 International trade flows of core multinationals



Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

T1 Breakdown of international trade in non-pharmaceuticals

(share in %, amount in EUR billion)

	Exports		Imports	
	Amount	Share	Amount	Share
Chemical products	4.6	56.6	4.6	47.2
Medical instruments and supplies	1.5	18.9	2.5	25.7
General use machinery and equipment	0.6	7.6	0.4	4.1
Plastic products	0.1	1.7	0.4	4.6
Other products	1.2	15.2	1.8	18.4
Total non-pharmaceuticals	8.1	100.0	9.7	100.0

Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

4 This does not take into account the income which those multinationals pay out in the form of dividends to their non-resident minority shareholders.

2. Three economic models encompass the multinationals' strategies for internationalisation

The 367 multinationals comprise 77 French-owned companies and 290 foreign-owned companies. Each of these subgroups records equivalent value added of 10 billion and they account for 14 billion and 9.5 billion of gross national income (GNI) respectively. French companies have large trade surpluses in both goods and services, unlike foreign companies which run deficits. Their direct investment reflects a net credit position compared with the rest of the world and brings in considerable income, in contrast to foreign companies, which have a debit position overall.

However, merely looking at the nationality of control is not sufficient to gain an idea of the strategies which companies use. In order to analyse the individual differences in greater detail, we have looked at the share of total trade (imports and exports) that exports of goods and services represent (see Box 2).

Three subgroups of multinationals emerge. The first, known as "domestic market" multinationals, includes half of them. Oriented towards the domestic market, this group has a trade deficit with the rest of the world. At the other extreme, the "factories of the world" model is composed of net exporters and contains a quarter of companies. In between those two clearly defined models is a "hybrid" model which includes the remaining quarter of core companies (see Charts 4 and 5 below).

T2 Share represented by core multinationals in the current account and gross national income
(amount in EUR billion)

	Credit	Debit	Balance
Trade in goods and services[a]	41.4	38.8	2.6
Pharmaceuticals	*26.3*	*23.3*	*3.0*
Other goods	*8.1*	*9.7*	*-1.6*
Services	*7.0*	*5.8*	*1.2*
Direct investment income	5.3	2.2	3.1
of which dividends[b]	*5.6*	*0.8*	*4.8*
Current account (approximate share)	46.7	41.0	5.7
Added value	na	na	20.4
Gross National Income (approximate share)	na	na	23.5

a) International merchanting is not taken into account here in the trade in goods and services. The amounts in question remain marginal and do not change what can be learned from the table.
b) Investment income may be lower than dividends, in particular when dividends are higher than the operating profit of the investee companies.
Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

Box 2

Constructing the three economic models

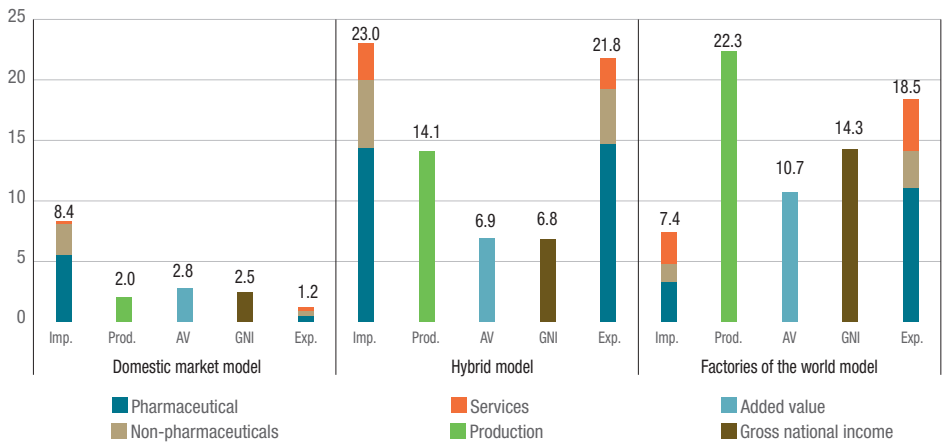
The models are identified using quartiles of the ratio "total exports of goods and services as a proportion of total trade in goods and services (exports + imports)".

By ranking companies from the lowest ratio to the highest they can be ordered from those with the largest international trade in goods and services deficits to those with the biggest surpluses. Nearly two-thirds of multinationals have a deficit, whilst a quarter have a large surplus.

Three subgroups of multinationals are identified on the basis of quartiles of the ratio: the "domestic market" model comprises companies below the median value; the "hybrid model" comprises groups between the median value and the last quartile; the "factories of the world" model comprises companies beyond the third quartile, that is to say those with the largest surpluses.

C4 Breakdown by type of traded products and model

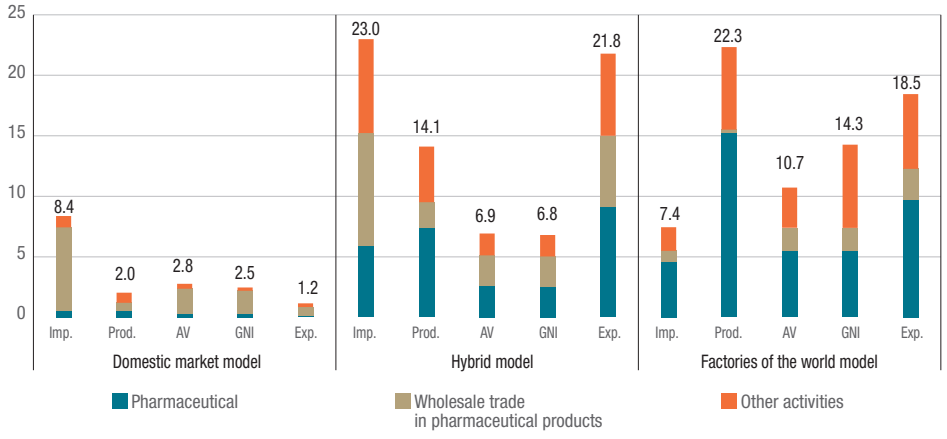
(EUR billion)



Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

C5 Breakdown by activity of legal units and model

(EUR billion)



Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

"Domestic market" model: essentially foreign multinationals which import goods into the domestic market

Most of these companies are the trading affiliates of foreign groups, oriented towards the domestic market, where they sell imported products. However, their productive base is small. They have a structurally negative trade balance (a deficit of 7.2 billion) and represent a modest share (2.8 and 2.5 billion respectively) of the value added and GNI of companies as a whole. This is the preferred model of foreign companies, which hold 58% of these units, as compared with 21% of French companies).

This subgroup is the largest by number but its component companies are relatively small in size with median workforces of slightly more than 50 employees and median value added of 4 million.

However, those characteristics need qualifying, in so far as they only reflect the situation in France. That gives no indication of the overall productive structure of the group globally. Some major global players belong to this subgroup, such as Roche, Novartis and Mylan.

"Factories of the world" model: mainly French-controlled multinationals producing for the domestic and international markets

These units are responsible for over half the production (58%) and value added (53%) of the core pharmaceutical multinationals. They export far more than they import, hence contribute positively to the trade balance, irrespective of the type of trade (pharmaceuticals, non-pharmaceuticals, services). These units also receive significant income from direct investment.

This group consists essentially of industrial affiliates, most of which belong to French companies. This is the commonest model among French companies, which hold 62% of these units (as compared with 15% held by foreign companies).

The "factories of the world" model comprises the biggest players in Pharma, and French players in particular. The ten largest companies alone account for three-quarters of the staff employed and value added in this model. It includes the groups Sanofi, Pierre Fabre, Mérieux, Boiron and Ipsen. These companies produce pharmaceuticals in France, some of which they export. They also export services, in the form of royalties under patents and licences.

These companies also have affiliates abroad which provide them with alternative routes for growth and enable them to obtain revenues in the form of direct investment income and fees paid to the parent company for the use of certain patents.

These major companies exist alongside smaller companies – family-owned laboratories and the affiliates of foreign groups located in order to produce and distribute in Europe or in the Mediterranean basin. Median workforce and value added figures are 270 staff employed and EUR 21 million.

"Hybrid" model: multinationals midway between the two

"Hybrid" model companies borrow some characteristics from each of the two models described above. They typically have significant trade with the rest of the world (more than three times their output). In certain respects this model is similar to that of Pharma in Belgium, where imports and exports of pharmaceuticals are very high compared with production (see Chart 2 above).

They are net importers by virtue of trade in non-pharmaceuticals and services. In terms of pharmaceuticals alone they are nevertheless net

exporters. Moreover, these companies account for substantial volumes of exports: 22 billion in 2012, that is to say 53% of the total exports by core multinationals.

The "hybrid" model does nevertheless have an industrial base in France, responsible for the bulk of production and exports, and a network of commercial affiliates which source supplies from abroad. 27% of foreign companies and 17% of French companies fall within this group.

In terms of size, they fall between the two other subgroups, with median workforces of 160 people and median value added of 16 million (the averages are 600 people and 80 million respectively). Besides the French group Servier, this model includes many large foreign groups: GlaxoSmithKline, Pfizer, Merck, AstraZeneca, etc.

3. Most countries are customers, with suppliers in the minority

Foreign trade surplus, except with countries where group parent companies are located

The individual data also make it possible to break down the current account by counterparty country and economic model.

Trade by the core Pharma companies covers all continents and most countries. It is particularly concentrated in western Europe, North America, Japan, the BRICS countries,[5] the Maghreb and the Arabian Peninsula.

The reconstituted current account balance is a surplus with nearly every country, with the largest surpluses vis-à-vis Belgium, Japan, Russia, Spain, Algeria and the Netherlands.

However, the core Pharma companies have deficits with a number of partner countries. In the case of the United States and Switzerland, that deficit is associated with the presence of group parent companies with affiliates in France whose trade with the parent consists almost solely of imports. The current account balance for those countries turns into a surplus if trade with the group parent country is neutralised.

For Ireland, Austria, Sweden and Singapore the deficit is more general in nature, for both French and foreign companies.

Economic models and the structure of trade

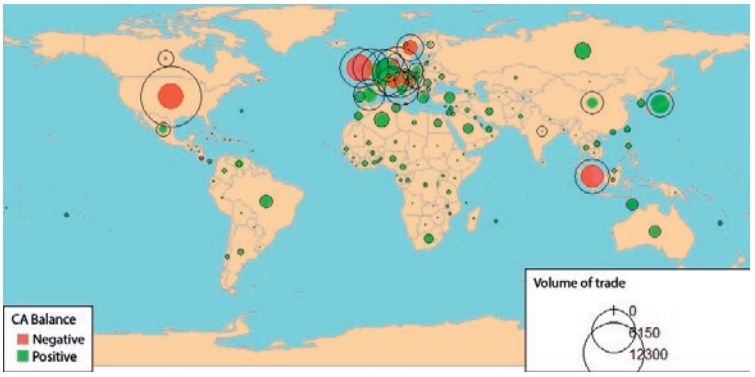
The three economic models defined above also provide a key to understanding, from a French perspective, where countries are positioned in the international value chain.

Trade with companies organised in line with the "domestic market" model consists almost exclusively of imports. In this model the foreign countries - with the exception of "micro markets" in Africa - are suppliers from which the companies

5 Brazil, Russia, India, China and South Africa.

M1 CA balance and trade volume by country

(EUR million)



Note: the radii of the black circles are proportionate to the volume of trade with the country (exports + imports). The radii of the coloured discs are proportionate to the current account balance. These discs are red where there is a trade deficit and green where there is a trade surplus. Where the coloured disc has the same diameter as the black circle, the CA balance and the volume of trade are the same. This occurs when trade consists solely of imports (red disc) or solely of exports (green disc).

source supplies to serve the domestic market, giving priority to proximity. Indeed, those suppliers are most often located in bordering countries (Germany, Belgium, Spain, Italy and Switzerland) or neighbouring countries (Austria, Hungary, Ireland, the Netherlands and the United Kingdom) where there are production or packaging centres. Other supplies are procured primarily from the United States and Japan.

In the "hybrid" model, in contrast, most adjacent and neighbouring countries are found to be customer countries. The resident affiliates act as points of entry supplying continental Europe, with Belgium as the hub, and beyond that the whole of Eurasia, in particular the Russian, Chinese and Japanese markets. Suppliers are located in northern Europe (Ireland, the United Kingdom and Sweden), Austria or in the country where the group parent is located (Germany and the United States in particular). Singapore also stands out as a supplier of several major groups in English-speaking countries.

Lastly, the "factories of the world" model is that in which products manufactured or transformed locally, possibly using foreign inputs, are intended to supply every market on the planet. Most countries are primarily customer countries. The main surpluses which emerge appear to be less due to how the companies themselves are organised than to the size of the markets served.

The biggest trade surpluses are those vis-à-vis the United States, Japan, Russia and the largest countries in the European Union. For the latter, the current account balances are accentuated by net direct investment income, from Germany and the United Kingdom in particular.

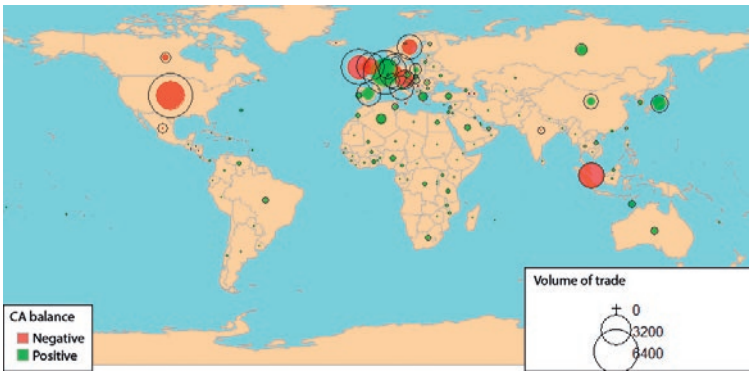
Lastly, reconstituting the share of the current account balance which the core companies represent by major geographical area and economic

M2 Current account balance and trade by country

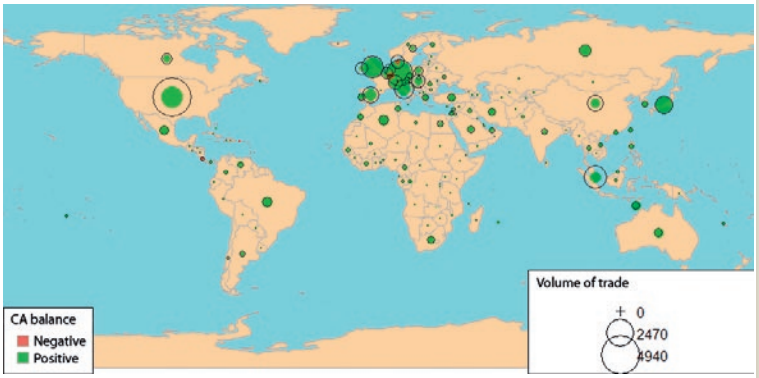
(EUR million)

Domestic market model

Hybrid model



Factories of the world model



T3 Current account balance by model and geographical area
(EUR billion)

	Domestic market	Hybrid			Factories of the world	Total
		of which country where group parent is located	of which other countries	Total		
Africa	*0.1*	*0.0*	*1.4*	*1.4*	*1.5*	*3.0*
Near and Middle East	*0.0*	*0.0*	*0.3*	*0.3*	*0.7*	*1.0*
Americas	*-1.0*	*-3.0*	*0.4*	*-2.6*	*2.7*	*-0.9*
Asia	-0.6	0.0	-0.8	-0.8	2.6	1.2
EU	*-4.9*	*-1.1*	*1.0*	*-0.1*	*5.8*	*0.8*
Europe excluding EU	-1.1	0.0	0.8	0.7	1.4	1.0
Other	0.0	0.0	-0.3	-0.3	0.0	-0.3
Total	-7.6	-4.2	2.8	-1.3	14.6	5.7

Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.
Note: the country where the group parent is located is identified only for the "hybrid" model, where the differences are most significant.

model gives a more finely-tuned diagnosis of the competitiveness of Pharma in France.

Accordingly, Africa and the Near and Middle East are major outlets irrespective of the economic model, with a current account surplus of nearly EUR 4 billion.

The situation in other continents is more varied. Europe, with which there is a surplus of nearly 2 billion, is both a major customer (the factories of the world model) and a major supplier (the domestic market model). Asia appears as both a supplier (Singapore, hybrid model) and a major outlet (the factories of the world model) and has a surplus of 1 billion. The Americas, the only continent with which the core companies have a current account deficit, must for their part be regarded as a natural outlet for both models with an industrial dimension, after excluding trade by the affiliates of American enterprises (see Table 3 above).

Annex 1
Sources of individual data used and members of the working group

Data used to define the pharmaceutical field

Initial information on legal units was located using the following sources:
- SIRENE/SIRUS registers (Insee): to identify the APE codes
- *Enquête Annuelle de Production* (Annual Production Survey – EAP – Insee): for branch turnover
- *Déclarations d'Échanges de biens* (Declarations of Trade in Goods – DEB – the Customs department): for imports/exports
- R&D survey (Ministry of Research): for internal R&D expenditure

The groups to which those legal units belong and the list of their affiliates are taken from the following databases:
- *Liaisons Financières* (Financial links – Lifi – Insee): to define the extent of each group
- Outward FATS (O-FATS – Insee): supplementing identification of the nationality of control

Quantitative data used to analyse the pharmaceutical field

The information on persons employed and profit and loss accounts (turnover, value added, EBITDA, etc.) come from:
- The *Fichier Approché des Résultats d'Esane* (Esane approximate results database FARE – Insee): for the majority of companies
- AGRIFIN documentation: for agricultural and financial affiliates

Information on international transactions by companies comes from the following data collections:
- Declarations of Trade in Goods (DEB – the Customs department): imports/exports of goods
- *Relevé des Transactions Économiques* (Statement of Economic Transactions – RTE)/*Enquête Complémentaire sur les Échanges Internationaux de Services* (Supplementary Survey of International Trade in Services – ECEIS) (*Direction Générale des Statistiques* [Directorate General for Statistics – DGS]/Banque de France): imports/exports of services
- *Déclarations d'Échanges de Services* (Declarations of Trade in Services – DES – the Customs department): intra-Community imports/exports of services, supplementing the foregoing sources.
- *État des créances et des dettes financières vis-à-vis des non-résidents* (Statement of financial claims and debts relating to non-residents – EFI)/*Enquête annuelle sur les créances and dettes commerciales vis-à-vis des non résidents* (Annual survey of trade receivables and debts relating to non-residents – ECO)/ COLID data collection (DGS/Banque de France): for direct investment stocks, flows and income.

Of these, the RTE, ECEIS, EFI and ECO surveys are based on random samples designed for the purposes of compiling the Balance of Payments. These samples are taken at legal unit level in order to be representative of trade at national level. Therefore, the information they contain is inherently only partial, for two reasons:
• in terms of coverage of the affiliates of a particular group, data are only available for the affiliates actually present in the samples;
• in terms of the pharmaceutical industry, because the sample was not specifically designed to be representative of that industry.

In practice, the effect of those limitations is offset by the fact that the samples systematically include the biggest known traders, which fall under a specific regime known as *Déclaration Directe Générale* (General Direct Declaration – DDG).

In addition, in the case of services, exhaustive intra-Community customs data partially makes up for the fact that there are no relevant companies in the RTE/ECEIS samples.

Data type	Source	Characteristic		
		Exhaustive	Exhaustive (threshold)	Sample
Register of companies	Insee	✓		
Financial links	Insee		✓	
Accounting data	Insee		✓	
International trade in goods	Customs department		✓	
International trade in services (intra EU)	Customs department	✓		
International trade in services	Banque de France		✓	✓
Intragroup loans	Banque de France		✓	✓
Direct investment in capital	Banque de France		✓	
Research and development expenditure	Ministry of Research			✓

Members of the working group

In addition to the authors of this article, the following individuals took part in this study:

Elisabeth Kremp – Banque de France – Insee
Frédéric Boccara – Insee
Tristan Picard – Insee
Laurent Gasnier – *Direction Générale des Douanes et Droits indirects* (Directorate General for Customs and Excise)
Jeannot Rasolofoarison – *Direction Générale des Douanes et Droits indirects*

Annex 2
Breakdown of international trade by product/sector of activity (core multinationals)

The individual data on companies enable trade to be broken down according to the type of traded products as well as the underlying activities of the legal units engaged in the trade. The work carried out on those data, which is innovative in this and other respects, therefore gives a breakdown of international trade by the core Pharma companies, by type of product and sector of activity simultaneously (see Charts A and B below).

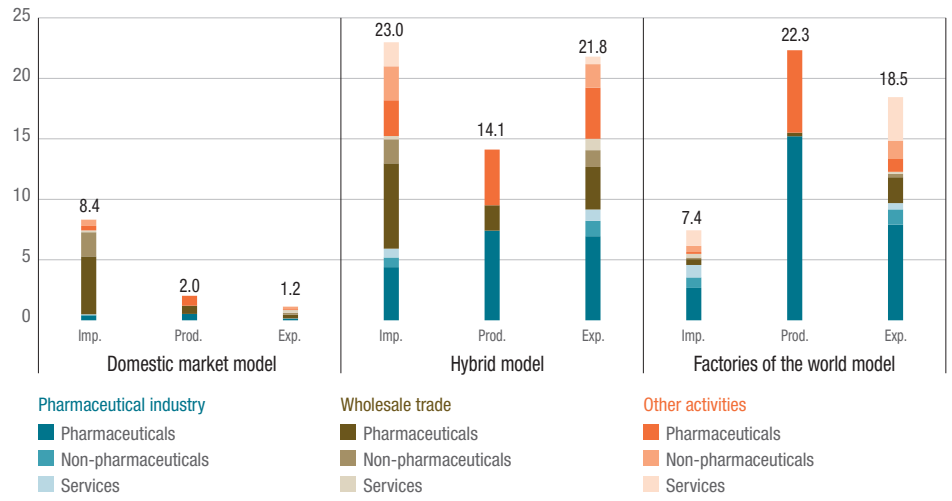
The "domestic market" model is almost exclusively a net importer of pharmaceuticals and non-pharmaceuticals. Those goods are imported by commercial companies.

The "factories of the world" model is oriented primarily towards industrial production. It is a net exporter of pharmaceutical products and of services. Services are exported by units classified under head office activities. Imports are of relatively small amounts and consist primarily of pharmaceuticals and services.

The "hybrid" model is made up of industrial units which are net exporters, primarily of pharmaceuticals, and which produce in France. It also includes affiliates (in particular commercial affiliates) which are net importers of goods and services. This model is the most internationalised model.

CA Breakdown of trade by activity and type of traded products

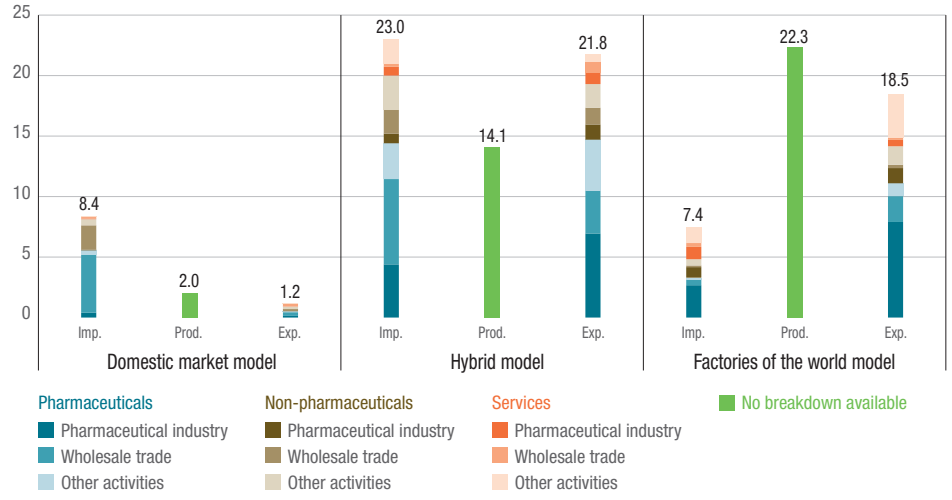
(EUR billion)



Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

CB Breakdown of trade by type of traded products and by activity

(EUR billion)



Scope: 367 core multinationals in the Pharma field.
Sources: 2012 database, Banque de France, Customs department, Insee.

Impact of uncertainty shocks on the global economy

Summary of the workshop 12-13 May organised by the Banque de France and University College of London

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Uncertainty is often considered to be one of the key drivers of the collapse in global economic activity in 2008-2009 as well as one of the factors hampering the ensuing economic recovery. While it has long been acknowledged that uncertainty has an adverse impact on economic activity it is only recently that the interest in measuring uncertainty and its effects on economic activity has flourished. However, up to now, the literature has mainly focused on the domestic impacts of uncertainty, while recently we have empirically observed large cross-boarders spillovers of uncertainty, stemming from some emerging countries or from specific policies implemented in advanced economies and propagating to the global economy. In this respect, the Banque de France, in collaboration with University College in London, organised on 12-13 May in London a workshop entitled "Impact of uncertainty shocks on the global economy", with the goal of presenting and discussing recent academic papers dealing with an international perspective of uncertainty. Note that a selection of the papers presented during this workshop will appear in a special issue of the Journal of International Money and Finance.

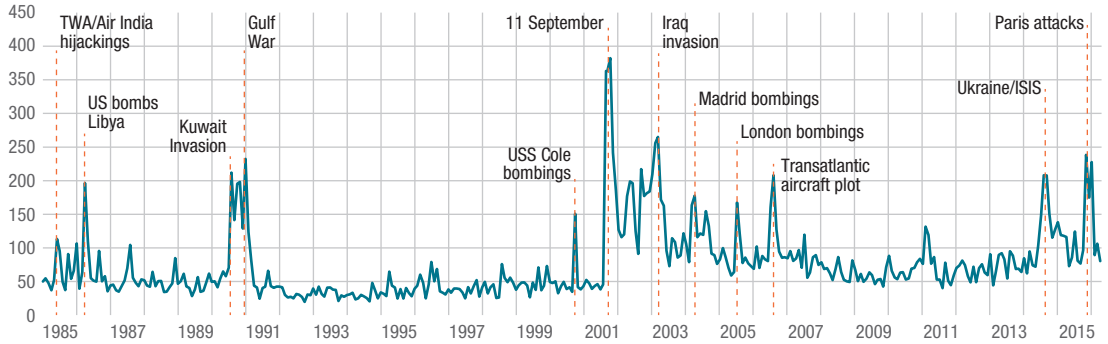
Keywords: Economic uncertainty, policy uncertainty, international economy, business cycles

JEL Codes: D81, E32, F32, G15

Key figures

The Geopolitical Risk Index (GPR)

(Index 2000-2009 = 100)



Source: Caldara and Iacoviello (2016).

Uncertainty is often considered to be one of the key drivers of the Great Recession in 2008-2009 as well as one of the factors hampering the ensuing economic recovery. While it has long been acknowledged that uncertainty has an adverse impact on economic activity, it is only recently that the interest in measuring uncertainty and its effects on economic activity has flourished (see, for example, the literature review in Bloom, 2014). However, up to now, the literature has mainly focused on the domestic impacts of uncertainty, while recently we have empirically observed large cross-borders spillovers of uncertainty, particularly stemming from some emerging countries and propagating to the global economy.

Against this background, the Banque de France co-organised with University College in London the 2nd workshop on macroeconomic uncertainty entitled "Impact of uncertainty shocks on the global economy" with the goal of presenting and discussing recent academic papers dealing with an international perspective of uncertainty. To this end, the organisers gathered together well-known academics and researchers from numerous international and national institutions.[1] In addition, two well-known keynote speakers delivered illuminating speeches. First, Nick Bloom (Stanford University) presented a recent research paper (joint with Alfaro and Lin) in which he described all the causal mechanisms through which uncertainty is likely to impact macroeconomics and financial variables. Specifically focusing on the financial side, he shows that an increase in uncertainty tends to cut debt (especially short-term, thus increasing maturity), cut equity payout and increase cash holdings. Then, Barbara Rossi (University Pompeu Fabra, joint with Sekhposyan and Soupre) presented an approach to distinguish between the concepts of deep uncertainty, according to Franck Knight's seminal definition,[2] and risk. She developed a methodology based on density forecasts, using information from the Survey of Professional Forecasters. This distinction appears very relevant from a policy side, as different types of uncertainty require different policy responses.

For this workshop, we gathered a set of papers dealing with international issues of uncertainty. First, some of the papers focused on the measurement of global uncertainty. Second, international comparisons and cross-border spillovers were assessed based on open economy models (econometric and structural) used in the literature on international finance. Lastly, many of the results concerned the international propagation of monetary policy uncertainty. Below we present the main results of the workshop according to this classification.

1. How to measure uncertainty?

This workshop showed that research is rapidly advancing with respect to one of the main challenges in this literature: how to measure uncertainty? To this aim, several new objective (realised) and subjective (perceived) measures of uncertainty were proposed. Furthermore, two additional positive developments were observed. First, these measures are now being constructed for many developed and emerging countries allowing researchers to conduct interesting cross-country comparisons (see for example the papers of Scotti, 2013, Istrefi and Mouabbi, 2016 and Ozturk and Sheng, 2016). Second, the literature not only considers country-specific but also measures of global uncertainty, with the aim of capturing developments in common uncertainty across the world (i.e. Caldara and Iacovello, 2016, or Ozturk and Sheng, 2016).

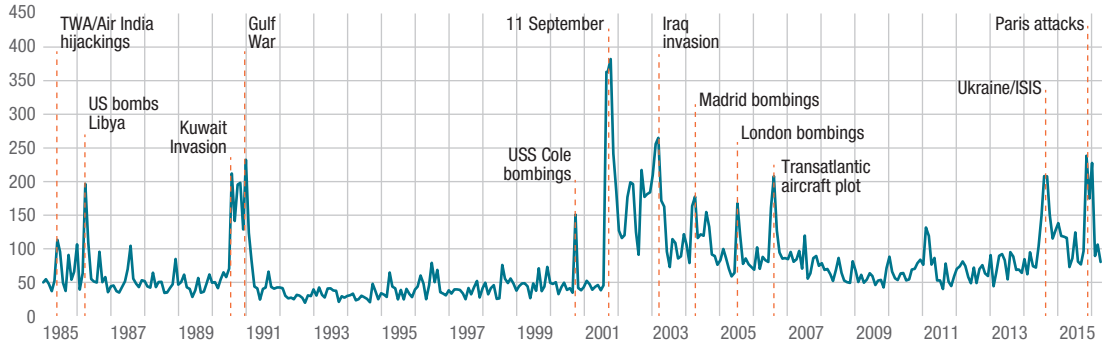
One of the global measures has been put forward by Caldara and Iacoviello (2016). They construct an index of global geopolitical risk (GPR) representing risk resulting from political instability in a country or a region. This index is based on the frequency of words related to geopolitical tensions in leading international newspapers and aims to capture events which are perhaps more exogenous to macroeconomic conditions. Figure 1 shows that the GPR index spikes during the Gulf War, the 2003 invasion of Iraq, around 9/11 and more recently, it spikes up both during the Ukraine/Russia crisis, and around the Paris terrorist attacks.

1 The academic speakers at the workshop were from LSE, UCL, American University, University of Notre Dame, University Pompeu Fabra, Northwestern University, University of Padova and University of Chapel Hill, and institutions were represented by researchers from the Federal Reserve Board, the IMF, the ECB, the Bank of Canada, Banca d'Italia and the Banque de France.

2 Franck Knight (1921) makes the distinction between risk, describing a situation where the probability distribution over a set of events is known, and uncertainty, a situation where people are not able to forecast the likelihood of events happening.

F1 The Geopolitical Risk Index (GPR)

(Index 2000-2009 = 100)



Source: Caldara and Iacoviello (2016).

Chiara Scotti on the other hand presented an uncertainty index that measures how uncertain agents are about current real activity conditions, constructed for several countries (Scotti, 2013). Not surprisingly, the highest spikes in their index correspond to the latest financial crisis for both the US and euro area. Interestingly, the euro area uncertainty index reaches its highest values just before and after the 2008-09 recession. While uncertainty in the United States appears subdued following this recession, the debt crisis kept the levels of uncertainty at elevated levels for the euro area.

2. International aspects: Cross-country comparison and spillovers

Despite a large number of uncertainty measures available in the literature, there is a fairly general consensus on the macroeconomic effects of uncertainty, in that domestic uncertainty shocks are typically associated with a broad-based decline in economic activity. In particular, private investment is often estimated to exhibit a strong adverse reaction to uncertainty shocks. When focusing on international aspects, the workshop provided empirical evidence of cross-border spillovers.

Focusing on macroeconomic variables, Ric Colacito pointed out that an output volatility shock is not fully translated into a consumption volatility shock of the same magnitude, among a set of advanced economies (Colacito, Croce, Liu and Shaliastovich, 2016). This incomplete pass-through suggests evidence of international risk sharing. For all the countries, they compute an index of international volatility pass-through, taking a value of 0 in case of autarky and 1 in case of perfect international risk sharing, and show that risk-sharing is higher in small countries meaning that their consumption volatility is less impacted by output volatility.

The trade channel is clearly one important channel of propagation of uncertainty and volatility shocks. Giovanni Caggiano showed that the Canadian business cycle is directly related to uncertainty shocks originating in the US (Caggiano, Castelnuovo and Figueres, 2016). In addition they highlight non-linear effects in the sense that uncertainty has much larger effects during recession phases than during expansions. A point that was also raised by Pierre Guérin in the framework of high-frequency uncertainty shocks (Ferrara and Guérin, 2016).

Turning to exchange rates, a key variable in international macroeconomics, it seems that they are also related in some way to global uncertainty, beyond traditional factors such as differential interest rates and output growth. Nelson Mark identified country macroeconomic fundamentals whose

first and higher-ordered moments have predictive power for currency excess returns (Berg and Mark, 2016). Using this identification in conjunction with the carry trade, they form portfolios of profitable currency excess returns and study the determinants of their cross-sectional variation and find that global macro factors (such as high-minus-low conditional skewness of the unemployment gap) are priced in currency excess returns.

There is a long literature showing that uncertainty reduces growth and investment, but also total factor productivity. This generally occurs because uncertainty increases the misallocation of factors across firms (see for example Bloom, 2014). Based on such results, Davide Furceri looked at the sectorial effects of uncertainty and finds that an increase in aggregate uncertainty reduces productivity growth more in industries that heavily depend on external finance, such as real estate, construction or mining (Choi, Furceri, Huang and Loungani, 2016). In their model, when there are credit constraints, the ratio of short-term to long-term investment goes up during an uncertainty period, as firms switch to short-term investment in an attempt to maintain output and liquidity. This switch in the composition of investment lowers productivity, as well as aggregate output.

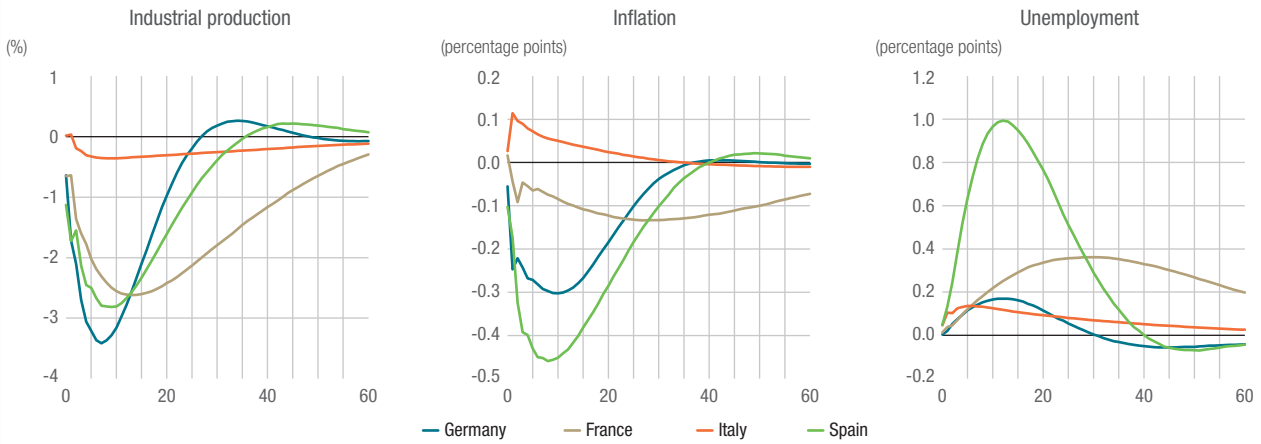
At a more aggregated macroeconomic level, when comparing advanced and emerging economies, this dependence on external financing renders emerging countries more sensitive to uncertainty shocks. Indeed, it is well known that the output volatility in emerging countries is larger than that in advanced ones, mainly because of higher volatility in total factor productivity. Nathan Converse showed that when maturity mismatch is widespread, as the case of emerging economies, fluctuations in capital flows volatility (mainly portfolio debt flows) contribute to the volatility of both output and productivity (Converse, 2016). He develops a small open economy model in which financial frictions force firms to fund long-term projects with short-term debt. Greater uncertainty regarding the future availability of foreign borrowing causes firms to cut long-term investment, depressing aggregate investment and generating an endogenous drop in aggregate productivity.

3. Monetary policy uncertainty

The literature regarding uncertainty also focuses particularly on uncertainty about economic policy, which has been unusually high since 2008. A consensus is forming in the literature around the view that high levels of policy uncertainty cause households and businesses to hold back on spending, investment and hiring. This workshop contributed in this respect, with a special attention on the uncertainty about monetary policy (MPU) and its effect on the macroeconomy. Three different measures as proxy of MPU were presented, one reflecting uncertainty about interest rates across 10 developed countries and two related to the monetary policy in the United States.

Within the category of policy uncertainty, Klodiana Istrefi presented a subjective measure of interest rate uncertainty for several developed countries (Istrefi and Mouabbi, 2016). This measure reflects market perceptions of interest rates as expressed by professional forecasters in the Consensus Economics survey and takes account of both disagreement among forecasters and the perceived variability of future aggregate shocks. Their measures show common spikes during the recent financial crisis. Moreover, at the height of the crisis, they observe that while other macro and financial uncertainty measures used in the literature continue rising, the uncertainty about interest rates is falling. This reflects the reach of the zero lower bound (ZLB) on nominal interest rates and the forward guidance communication by several central banks to keep rates low for long. With respect to outcomes, they find that subjective interest rate uncertainty has large, negative and persistent effects on the economy. The negative effect in production varies across countries from 0.5 to 3 percent and the rise in unemployment rate varies from 20 to 100 basis points.

F2 Responses to interest rate uncertainty shock for selected euro area countries



Notes : Responses to a four standard deviation shock.[3] The solid line denotes median impulse response from country individual VARs with the vector of variables y = (interest rate uncertainty, industrial production (IP), CPI inflation, unemployment). IP enters in levels and inflation and unemployment rates in per cent. VARs include an exogenous variable, oil prices, a constant and a time trend. Horizontal axis is in months. Source: Istrefi and Mouabbi (2016).
Source: Istrefi et Mouabbi (2016).

Interestingly, for the euro area countries the effects of interest rate uncertainty are heterogeneous, both in terms of the magnitude and persistence of responses, even though they are under a common monetary policy, with highly correlated short-term interest rates and uncertainty about them. Figure 2 below shows that while the peak effect on industrial production is similar for Germany, France and Spain (a drop of about 2.5%) the effects on inflation and unemployment vary considerably. This in part reflects different price and labour market rigidities across these countries. For example, Germany and Spain represent the extremes in respect to the unemployment response, in line with their very different labour market flexibilities.

With respect to the monetary policy in the United States, John Rogers presented a measure of MPU that captures the degree of uncertainty the public perceives about Federal Reserve's policy actions and their consequences (Husted, Rogers, and Sun, 2016). The MPU is based on the frequency of newspaper articles related to monetary policy uncertainty, with the assumption that increased newspaper coverage indicates that the public perceives more uncertainty about central bank actions. They showed that uncertainty was notably high during the financial market turmoil and also in expectation of the timing for the lift-off. The index falls before the December 2015 when the Fed actually lifted the interest rate off the zero bound. They also show that, as the FOMC began to rely increasingly on forward guidance, the MPU around the FOMC meetings declines compared to previous experiences, highlighting the importance of enhanced policy communication.

Furthermore, Andrea Vedolin showed the implications of uncertainty about monetary policy for exchange rates (Mueller, Tahbaz-Salehiz and Vedolin, 2015). Using different proxies for monetary policy uncertainty in the United States, they show that an increase in market participants' uncertainty is associated with higher returns around FOMC announcement days. In particular, they find that a portfolio consisting of currencies with low interest rates earns an average daily return of 5.71 basis points during days when the Federal Reserve makes an announcement, compared to an average of 0.55 basis points on all other days. The explanation for these large returns around announcement days is that they reflect a premium for heightened monetary policy uncertainty or more generally a tightening of financiers' risk-bearing capacity.

3 Studying high level of shocks is common practice in the literature of uncertainty. For example, for the case of Spain, a four standard deviation shock represents about 70 percent of the increase in short-term interest rate uncertainty during the recent financial crisis.

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The labour market: institutions and reforms

Summary of the fourth Labour Market Conference held in Aix-en-Provence on 3-4 December 2015, organised by the Aix-Marseille School of Economics and the Banque de France

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The École d'économie d'Aix-Marseille (Aix-Marseille School of Economics – AMSE) and the Banque de France organised, in December 2015, their fourth conference on the labour market bringing together academics and representatives of international organisations and central banks. The discussions focused, on the one hand, on the functioning of European labour market institutions, in particular during last crisis and, on the other hand, on the effects of minimum wages on employment. The papers presented highlighted the major role of the institutions in the recent diverging trends in European labour markets. The topic of discrimination was also addressed, notably regarding older workers.

Key words: labour market, reforms, minimum wage,

JEL code: J2, J3, J5, J6, J7

Key figures

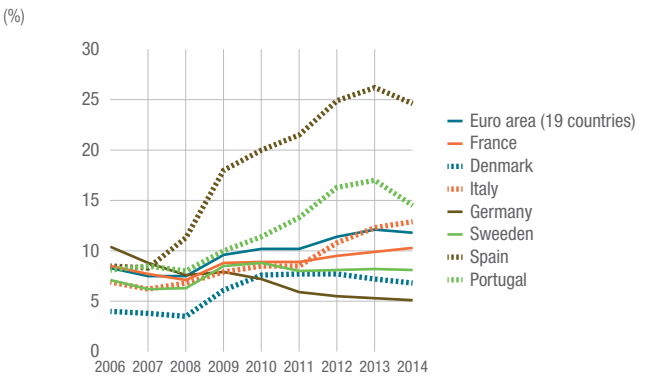
25%
of young people (15-24 year olds) were unemployed in the euro area in 2014.

30%
of companies reduced their wage costs in the wake of the crisis according to the Wage Dynamics Network (WDN).

72%
of Europeans of working age population participate in the labour market.

The ESCB's Wage Dynamics Network (WDN) is a working group created to study the importance of wage and price dynamics for monetary policy.

Unemployment rate for 15-64 year olds



Source: Eurostat.

The Aix-Marseille School of Economics (AMSE) and the Banque de France organised in Aix-en-Provence their fourth conference on the labour markets aimed at academics and representatives of international organisations and central banks.[1] In addition to the three thematic sessions during which around a dozen recent academic contributions were presented, the conference included two presentations during plenary sessions and a round table.

Jean-Stéphane Mésonnier (Banque de France) and Alain Trannoy (AMSE) opened the conference by first highlighting the fruitfulness of the exchanges between the two institutions, of which the conference is an illustration. The subjects addressed related to structural issues that have become crucial given the divergences in the economies of the different countries in the euro area, which makes the conduct of the monetary policy more difficult. The findings of the European System of Central Banks (ESCB) survey conducted within the Eurosystem, the *Wage Dynamics Network* (WDN), and all labour market analyses, are tools that provide valuable information for governments and central banks. By bringing together academics and central bank economists, this conference allows the former to debate central bank issues and the latter to consider academic analyses.

1. Labour market institutions and adjustments during the Great Recession

Juan Jimeno (Banco de España) analysed the reactions of the different European labour markets during the recession of 2009-2013. Unemployment rates converged during the 2000s, before diverging in the wake of the financial crisis of 2008-2009. The unemployment rate then remained high in Europe, compared with in the United States and Japan. This is partly attributable to the 2011 debt crisis, which did not affect the other developed countries and which exacerbated the differences across European countries. Three groups of countries were identified: those in which the unemployment rate has varied little since the crisis (Germany and the United Kingdom); those, including France, in which unemployment has risen moderately; and those, including the Mediterranean countries, characterised by a sharp increase in unemployment. According to Juan Jimeno labour market "institutions", defined as unemployment insurance rules, employment protection legislation, etc. account for a significant share of these differences. Indeed, only half of the differences in the changes in unemployment across countries during the crisis can be explained by GDP changes.

Moreover, the work of Juan Jimeno[2] shows that flows from unemployment to employment and vice versa vary significantly across countries, but also depending on the socio-demographic characteristics of the individuals. The comparative analysis across countries suggests that the impact of the different labour market institutions on the return to employment and the probability of job loss varies considerably.

Changes in GDP and unemployment are generally negatively correlated (an empirical regularity known as "Okun's law", named after the American economist Arthur Okun who described this relation for the United States in 1962). In order to identify the specific effect of a negative demand shock (with an adverse impact on GDP) on the unemployment rate, more refined data need to be considered. Juan Jimeno and his co-authors used companies' responses to the WDN Survey conducted by the Eurosystem. By taking account of the proportion of companies reporting that they were affected by the demand shock, the authors were able to estimate the share attributable to variations in aggregate demand in fluctuations of unemployment of each country, as opposed to other possible causes. The y-axis of Chart 1 shows the share of changes in unemployment in the 2010-2013 period that is not explained by aggregate demand, but by other factors, including

1 The conference programme can be consulted at *https://www.banque-france.fr/economie-et-statistiques/la-recherche/seminaires-colloques-et-symposiums/conference-amse-banque-de-france-labor-markets-paris-3-et-4-decembre-2015.html*

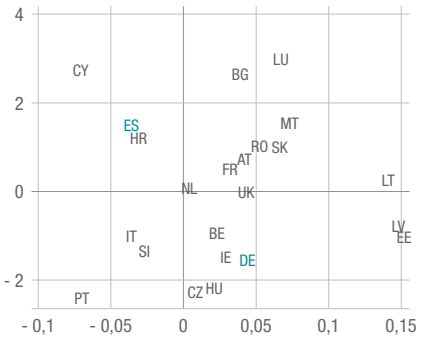
2 See Casado, Fernandez and Jimeno (2015).

institutions. The x-axis shows cumulative GDP growth over the period. Spain and Germany are in opposite positions vis-à-vis the x-axis in this chart. Indeed, these two countries reacted very differently to the euro area debt crisis: Germany reduced the number of hours worked per capita while maintaining jobs, whereas Spain directly reduced employment. Countries that were able, such as Germany, to adjust intensive margins (hours worked per week, wages, etc.) have generally been more resilient than those that simply reduced temporary employment.

Countries have little incentive to carry out reforms during a crisis period due to the recessionary effects they can have in the short run. However, is it necessary to conduct reforms to give greater flexibility to firms to adjust more efficiently to crises? Juan Jimeno was in favour of reforms in order to speed up the convergence of the labour

C1 Instrumented Okun's law (2010-2013)

(%; x-axis: change in GDP; y-axis: instrumentation residual)



Source: Juan Jimeno, "Institutions et ajustements durant la Grande Récession" (2015).

market institutions in the European Union while conducting them in good conditions to ensure that they have the desired effect. In particular, he advocated a supranational approach for the European reform agenda, and highlighted the expected benefits of a European unemployment and pension insurance system.

2. Results of the WDN survey

The first session of the conference focused on the WDN's work on the importance of price and wage dynamics for monetary policy. A survey of companies was conducted in 2014 for the 2010-2013 period in 24 European countries, including France, in order to identify the effects of the crisis on the environment and adjustment behaviour of firms. As the data were not yet stabilised, notably concerning the weighting of certain countries, the results must be interpreted with caution.

According to the survey results, presented by Ana Lamo, the effects of the crisis differed considerably across European countries. In the majority of countries, including France, Spain and Italy, over 40 % of firms experienced a negative demand shock. Spain and Italy were the main countries encountering credit access difficulties. Clients generally experienced greater difficulties in paying their invoices and this impacted over half the companies in France, Hungary and in the Mediterranean countries. Countries that suffered a major demand shock were also those whose firms struggled to access credit. To address this, companies sought to reduce their costs, but this proved more difficult than in the past and most firms merely contained them. Cuts centred on financing costs and labour costs. 30% of firms reduced their headcount. Nominal wage rigidities limited wage cuts, for example by decreasing the number of hours worked per employee, in order to reduce labour costs. Other channels to limit compensation were used, such as reducing bonuses, bringing down the wages of new entrants, and changes in the composition of the workforce. The crisis also triggered a large number of institutional changes in the labour market reflected by the responses of some countries to questions such as "compared with the situation in 2010, it is now easier to…". France and Spain are on opposite ends of the spectrum; in the former few changes were observed whereas in the latter major changes were

made, in particular concerning redundancies, the adjustment in hours worked and wage mobility.

Stephen Millard (Bank of England) presented an article on the relationship between the structure of labour market and the economy's responses to a shock, based on the observation of a divergence in countries' reactions to the crisis. Stephen Millard, Aurelijus Dabusinskas and Istvan Konya study the link between labour market characteristics and the response of unemployment to shocks. The dynamic stochastic general equilibrium (DSGE) model proposed sets out to describe three countries characterising three types of response to the crisis and different labour market situations, Estonia, Finland and Spain. Estonia has a very flexible labour market, Finland has significant nominal wage rigidities and Spain's labour market is relatively inflexible. The model allows for the presence of nominal wage rigidities but the degree of rigidity can vary between incumbent workers and new entrants. These variations stem from the elasticity of the matching function between employers and employees and not all wages are negotiated. The latter are therefore linked to inflation. The model is calibrated using the first WDN Survey. In particular, the parameters for the rate of trade union membership, wage variations, labour market flows and wage rigidity are from the survey. Spain was the country worst affected by the crisis. According to the model, the massive rise in unemployment is partially due to the lower staff turnover rate, as well as to the effects of a more significant recessionary financial shock in this country than in the two others.

Eliana Viviano (Banca d'Italia) presented a joint paper with Katalin Bodnár and Győző Gyöngyösi (Magyar Nemzeti Bank), Ludmila Fadejeva (Latvijas Banka), Marco Hoeberichts (De Nederlandsche Bank), Mario Izquierdo (Banco de España), Christophe Jadeau (Banque de France) and Srdan Tatomir (Bank of England). This paper aimed to study the responses of employment in the wake of a debt crisis and in particular access to the credit market as well as firms' labour – TD adjustment methods. To this end, the WDN Survey was matched with firms' administrative balance sheet data held by the different central banks. These data can be used to make European comparisons and distinguish between the extensive employment margin (hiring, firing) and the intensive employment margin (differences in hours worked).

3. Labour market dynamics and institutions

The article presented by Clémence Berson (Banque de France) examined the different financial incentive schemes aiming to reduce the duality[3] of the French labour market: introducing a tax on layoffs, internalising the social cost associated with dismissals,[4] reducing employer social security contributions in line with employment seniority, and implementing an additional contribution for temporary contracts, reimbursed in the event of hiring on a long-term contract. The article develops an augmented matching model taking into account temporary and permanent contracts. Having calibrated this model on French data, the article reaches the following conclusions. Introducing into contracts contributions that decrease in line with seniority, or a tax on dismissals and temporary contract terminations, reduces segmentation but at the expense of greater labour market rigidity and lower productivity. Compared with the tax, decreasing contributions are less favourable to new entrants and lead to a greater increase in the average duration of unemployment. Excess contributions on temporary jobs also reduce labour market segmentation without adversely impacting labour market flexibility and productivity. The decrease in duality is however less pronounced than in the two previous reforms.

Stephen Bazen (AMSE) studied the integration of young people into the labour market during the first years following the end of their initial

3 The labour market is segmented between workers with permanent contracts and those alternating between short-term contracts and periods of unemployment.

4 Cf. *Experience rating* in the United States.

training.[5] The idea was to examine whether, and how fast, young workers reach their earnings potential (which depends on their human capital). The estimated differential between actual earnings and their maximum potential is then interpreted as a measure of labour market inefficiency (income inefficiency). The theoretical sequential job search model put forward by the authors reflects such a differential and predicts a gradual convergence towards earnings potential. The results of the estimate suggest that young French workers achieve on average around 80% of their potential three years after finishing their studies. Income inefficiency declines over time in that actual earnings increase faster than estimated earnings potentials.

The article presented by Joan Monras (Sciences Po, Paris) analyses minimum wage increases in a spatial framework, both from a theoretical and empirical perspective. The article explicitly models the geographical breakdown of minimum wages and examines the extent to which internal migrations are affected by their increases. Empirically, the author finds that the rise in the minimum wage increases the average wage and decreases the employment rate of low-skilled workers. The magnitude of the coefficients suggests an elasticity of local labour demand slightly higher than 1. The theoretical model predicts in these conditions a decline in the share of local unskilled workers, which is confirmed empirically. The results concerning the employment of workers under the age of 20, a population on which much of the literature focuses, are not significant despite being negative.

4. The minimum wage and labour markets

Participants in the round table, chaired by Gilbert Cette (Banque de France), all gave their analysis of the effects of the minimum wage on the labour market. Stephen Bazen (AMSE) discussed the latest minimum wage developments in France, the United Kingdom and the United States. Juan Jimeno (Banco de Espana) presented the Spanish context, David Neumark (University of California) presented the latest studies examining the effects of the minimum wage on employment and Alain Trannoy (AMSE) analysed the minimum wage in the theoretical public economy framework.

Stephen Bazen compared the minimum wage policies of the United Kingdom, France and the United States over the past ten years. France is the country with the highest minimum wage relative to other wages, but it has increased less rapidly in recent years than in the United States. He also stressed the growing popularity of the minimum wage in Europe, with notably the introduction of a national "living wage" in the United Kingdom and a minimum wage in Germany. This trend can also be observed in the United States, where 21 States have opted for a minimum wage that exceeds the federal minimum wage. In the French case, the speaker considered that in view of the development of precarious forms of employment (part-time work, fixed-term contracts, etc.) the minimum wage could not be the only tool for ensuring the well-being of low-paid workers.

Juan Jimeno presented the minimum wage in Spain, in the light of the experiences of other European countries. At the end of the 1990s, Spain significantly hiked its minimum wage and abolished any age-based differences, to the detriment of employment rates for young workers. The unemployment rate of 15-24 year olds was 20% in Spain in 2008 (i.e. before the full impact of the Great Recession was felt on the labour market) and reached over 50% in August 2014. While the impact of the minimum wage appeared low for workers as a whole between 2007 and 2013, it rose in 2013, in particular in the case of young workers (15-24 year olds), as reflected by the rise in the Kaitz index (ratio of the nominal legal minimum wage to average wage) for this population, for both current and newly-signed contracts. Juan Jimeno summed up by showing that most of the inequalities in terms of labour

5 The econometric part of this article develops a stochastic frontier model, a technique initially used in the framework of production efficiency analysis.

income in Spain can be attributed to the differences in employment access and not to wages earned by people in employment. Consequently, the minimum wage does not seem to be a very efficient tool for fighting inequality in this country.

David Neumark presented a review of the recent empirical literature examining the impact of the minimum wage on employment and the poverty rate. As regards the impact on employment, Neumark and Wascher (2007)[6] found that two-thirds of the hundred or so studies reviewed, or even 85% taking into account their methodological quality, considered that the minimum wage had a negative impact on the employment of low-skilled workers. Since 2007, several articles qualify the conclusions of this review of the literature, by using more accurate statistical methods based on the description of groups particularly concerned by the minimum wage (groups defined using geographical, sectoral or age criteria). Nevertheless, the literature on this topic in the United States is evolving rapidly and its conclusions still vary greatly. As regards the impact of a rise in the minimum wage on the poorest population, David Neumark shows that most low-paid workers do not live in households below the poverty threshold: in 2003, only 17% of low-paid workers live in poor households while 34% of them live in households whose income exceeds the poverty threshold by three times (See Table 1). Consequently, the minimum wage does not appear to be an efficient tool for redistribution or for fighting against poverty, especially since poor households tend to consume low-skill intensive goods, whose price tends to rise when the minimum wage increases.

Alain Trannoy presented a theoretical analysis of the minimum wage. His analysis is based on a situation in which a minimum wage generates involuntary unemployment in a neoclassical labour market. In this framework, he seeks to determine the optimal policy (in terms of social welfare), under the constraint that workers have an income equal to the initial minimum wage and in a context where lump-sum transfers cannot be implemented. He envisages two types of reform. The first consists in abolishing the minimum wage and subsidising workers' wages so that their income is equivalent to the initial minimum wage. The second consists in keeping the minimum wage while subsidising firms, so that the cost of labour paid by firms is equal to that of the laisser-faire equilibrium. Alain Trannoy shows that the second reform results in greater social welfare than the first. By combining the subsidy to firms with a minimum wage it is indeed possible to limit the distortions associated with this subsidy while in the case of the first policy, part of the subsidy aimed at workers is in reality captured by firms, which makes the programme more costly for public finances. To conclude, Alain Trannoy highlighted two obstacles to the implementation of an optimal subsidy to firms in France: the laisser-faire equilibrium wage is not observed in practice and the amount of the subsidy to firms would probably exceed the current decrease in the employer contributions.

T1 Share of low-paid workers by household income level to which the workers belong, in the United States
(%)

	1939	1959	1979	2003
Income-to-poverty ratio				
Below 1 (poverty)	85	42	20	17
1 -1.24	5	10	7	7
1.25 -1.49	3	10	7	8
1.5 -2.00	4	12	12	13
2 -2.99	2	16	20	22
3 or more	0	10	34	34

Note: In 1959, 42% of low-paid workers lived in households below the poverty threshold.
Source: David Neumark.

5. Age discrimination in hiring

David Neumark presented the results of his research[7] aiming to better identify discrimination in hiring against older workers. Against the background of the general ageing of the population in all

6 See Neumark and Wascher (2007).

7 See Neumark, Burn and Button (2015).

Western countries, it is important to encourage older workers to remain in employment for as long as possible, in order to contribute to pension financing. Yet age discrimination may prevent such dynamics.

The high number of observations (to date, the highest among studies of this type) and the use of the specific characteristics incorporated in the *Curriculum vitae* (CV) allow the author to show that discrimination towards 64-66 year olds is greater than that towards 49-51 year olds. The level of discrimination measured is not very sensitive to whether the job in question is a transition job or not. This result is important in that such jobs could be used to facilitate the transition of older workers to retirement. As the study was conducted in several towns, we observe that discrimination is less pronounced in those where anti-discrimination laws are more stringent. Lastly, for the sales jobs, for which both men and women can apply, age discrimination seems to be greater for women than men.

6. Discrimination

The session on discrimination, chaired by Stephen Bazen, started with a presentation by Sébastien Roux (Banque de France) who examined the differences between male and female workers in accessing the most highly-paid jobs, with a comparison across the public and private sectors.[8] His study suggests that the differences between men and women, in terms of the probability of obtaining a job at a given level of compensation, have a similar profile in both sectors. The difference is slightly higher in the public sector for jobs situated between the median and the 85^{the} percentile of compensation, and a little lower for jobs higher up the compensation scale. He also showed that the observable characteristics (certificates, age, work experience, etc.) played a less marked role in explaining these differences, except for public sector jobs situated below the median. The wage differential between men and women in the private sector is almost five percentage points higher than that observed in the public sector. However, it is not clear whether this difference is linked to the fact that women really have greater difficulties in accessing the best-paid jobs in the private sector or to the fact that there is greater wage dispersion in the private sector than the public sector. The model presented by Sébastien Roux isolates the mechanism associated with this difference in access and shows that if employees in the public sector were assigned to jobs in the same way as in the private sector, the average wage difference between men and women would only be one percentage point.

Linas Tarasonis (AMSE) examined how the 2008 crisis affected changes in male-female wage differentials in the European Union,[9] notably by – changing their labour market participation behaviour. In particular, he showed that the destruction of a large number of unskilled jobs held by male workers led to a reduction in the employment rate of men and thus to an increase in their average wage due to a composition effect. Yet, the crisis did not have the same effect on the jobs mainly held by women: on the one hand, it prompted some women to raise their labour market participation due to their partner's job loss ("additional worker effect"), which resulted in a decrease in the selection of women in the labour market; on the other hand, the sharp decline in labour demand prompted others to withdraw from the labour market, which led to an increase in their selection. All in all, while the gross wage differential between men and women fell by three percentage points, by adjusting it for selection effects it would have fallen by four percentage points. This difference can chiefly be attributed to the selection applied to male jobs in the Southern EU states.

The final presentation of the session was made by Morgane Laouénan (Université Paris 1) and focused on ethnic discrimination on the US labour market.[10] The starting-point of this article is that African-Americans are over-represented

8 See Gobillon, Meurs and Roux (2015).

9 Cf. Dolado, Garcia-Peñalosa and Tarasonis (2015).

10 See. Laouénan (2013).

among the unemployed and less often hold public-contact jobs. Ethnic discrimination can stem from two mechanisms: employers may be reluctant to employ black workers (employer discrimination), or clients may be reluctant to deal with black workers, which means that employers do not hire them (consumer discrimination). By comparing - at the level of a spatial unit (the county) - the employment probabilities of black and white workers in the sectors exposed to the public and non-exposed sectors as well as their unemployment rates with indicators reflecting the reluctance of white households to interact with black people, it is possible to distinguish between these explanations and therefore to identify the differences in performance between black and white workers on the labour market. Since the discriminatory behaviour of white households towards black people can be partly endogenous, the article is based on the opinions of white households reflecting their prejudices towards other minorities to extrapolate their prejudices towards black people. This method makes it possible to estimate the intensity of the discrimination of employers as well as consumers towards black people. The results show that discrimination exists on the part of consumers that penalises the hiring of African-Americans on the US labour market.

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Euro banknotes and coins in France in 2015

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In 2015, withdrawals of banknotes at the Banque de France and the Institut d'émission des départements d'outre mer (IEDOM) amounted to EUR 169.0 billion, while lodgements reached EUR 164.6 billion. Thus, for the fourth consecutive year, cash transactions at Banque de France counters declined, in particular due to the development of direct banknote recirculation by private operators, to the economic environment and to competition from other means of payment.

Net issuance of banknotes in France stood at EUR 112.8 billion at 31 December 2015, up 4.1% in value terms compared to end-2014. This increase reflects the ongoing strong expansion of euro banknote circulation, in particular as a result of its use for hoarding purposes.

Both the French net issues and flows were characterised by the relative importance of the EUR 20 banknote (49.7% of French net issues in value terms). However, the share of the EUR 50 progressed, bringing France close to the situation observed at the European level.

As regards coins, net issues and operations at the Banque de France and IEDOM remained marked by the low rate of return of copper coins. Withdrawals reached EUR 763 million and lodgements EUR 646 million. Overall, the French net issuance of coins rose by 3.8% and amounted to EUR 3.2 billion at end-2015.

Keywords: cash, currency in circulation, net issuance, withdrawals, lodgements, coins, banknotes.

JEL codes: E5, E50

Key Figures

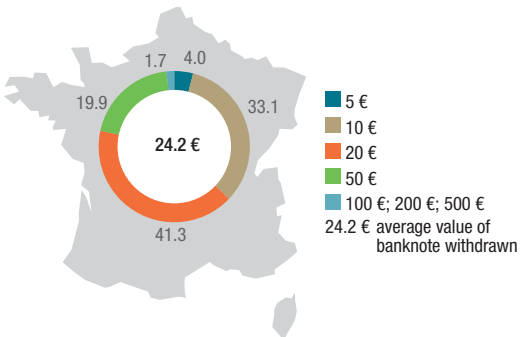
EUR 1,083.4 billion
The value of banknotes issued by the Eurosystem at 31 December 2015.

EUR 24.20
The average value of a banknote withdrawn at Banque de France counters in 2015 (including IEDOM)

16.8 %
The growth rate of net issues of EUR 50 banknotes in 2015

The structure of withdrawals at Banque de France counters in 2015 (including IEDOM)

(%)



Source: Banque de France.

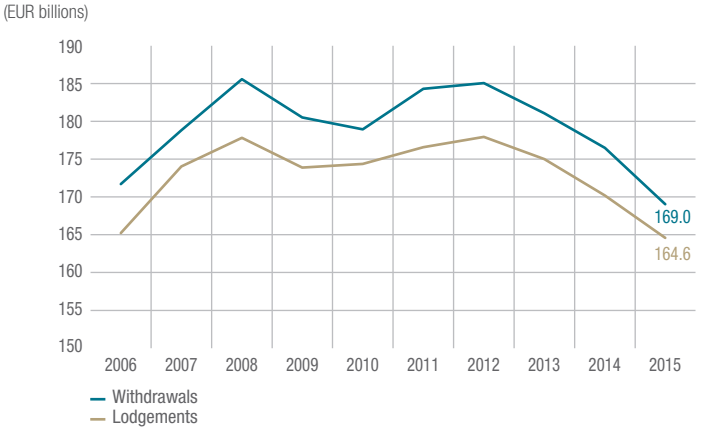
1. Flows of banknotes at Banque de France counters: a further decline in 2015

In the framework of their missions defined by the Monetary and Financial Code, the Banque de France and the *Institut d'émission des départements d'outre-mer* (IEDOM – the French Overseas Departments' note-issuing bank) issue and maintain euro banknotes through their branch network (see Box 1).

In 2015, the value of withdrawals and lodgements at Banque de France counters fell for the fourth year running. Withdrawals reached EUR 160.1 billion (6,682 million banknotes), representing a decrease of 4.5% in value terms and 4.2% in volume terms compared to the previous year. Lodgements amounted to EUR 156.4 billion (6,438 million banknotes), down 3.5% in value terms and 4.0% in volume terms.

At the six cash centres of the IEDOM, operations increased slightly: withdrawals amounted to EUR 8.9 billion (303 million banknotes), up 0.4% in value terms and 1.2% in volume terms compared to 2014. Lodgements reached EUR 8.2 billion (285 million banknotes), representing an increase of 0.6% in value terms and 1.2% in volume terms (see Chart 1).

C1 Withdrawals and lodgements at Banque de France and IEDOM counters, in value terms



Source: Banque de France.

Box 1

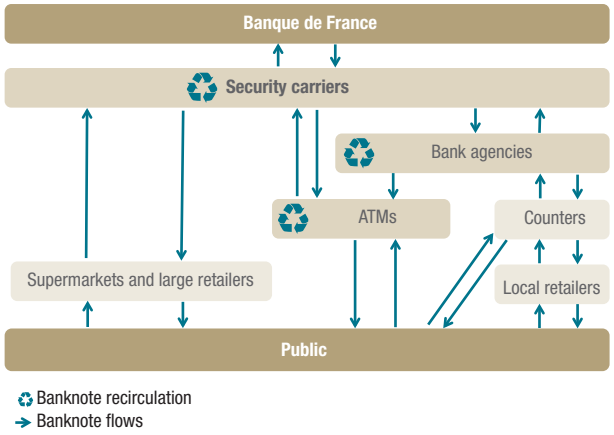
The role of the Banque de France and the *Institut d'émission des départements d'outre-mer* in the cash cycle

Under the Treaty on the Functioning of the European Union, banknotes fall within the remit of the European Central Bank (ECB) and the national central banks of the euro area Member States. Thus, the issuance, maintenance and management of the quality of circulation of euro banknotes are among the core tasks of the Banque de France, as defined by Article L141-5 of the French Monetary and Financial Code.

At end-2015, the Banque de France counted 56 institutional cash centres in metropolitan France (see Appendix 1), to put into circulation banknotes among credit institutions and sort returned banknotes, in order to remove banknotes unfit for circulation (used banknotes, counterfeits) (see diagram).

In the overseas departments and regions as well as in the communities of Saint Pierre and Miquelon, Saint Barthelemy and Saint Martin, these missions are carried out by the IEDOM which acts "in the name, on behalf and under the authority of the Banque de France" and whose activity is included in the data mentioned in this article.

Diagram The organisation of the cash industry: the circuit of banknotes



Source: Banque de France.

Furthermore, since the entry into force in France of the legal framework relating to recirculation, the Banque de France controls private operators which directly recycle banknotes that are returned to them in order to put them back into circulation via ATMs.[1]

The organisation of the issuance and maintenance of coins remains the responsibility of the State.[2] In practice, the Treasury relies on three operators:

- The Monnaie de Paris mints euro coins;
- The Banque de France puts coins into circulation and withdraws them from circulation in metropolitan France on behalf of the Treasury, which it also advises in determining the minting plan;
- The IEDOM puts coins into circulation and withdraws them from circulation in its catchment area on behalf of the Treasury.

1 The "framework for the detection of counterfeits and fitness sorting of euro banknotes by credit institutions and other professional cash handlers", adopted in 2004, entered into force in France in 2006. It was replaced by the ECB decision on the authenticity and fitness checking and recirculation of euro banknotes, which became applicable on 1 January 2011 and which includes the main provisions of the framework.

2 However, the ECB retains control over the volume of coins in circulation: Article 128 of the Treaty on the functioning of the European Union, paragraph 2, stipulates that "Member States may issue euro coins, subject to approval by the European Central Bank of the volume of the issue."

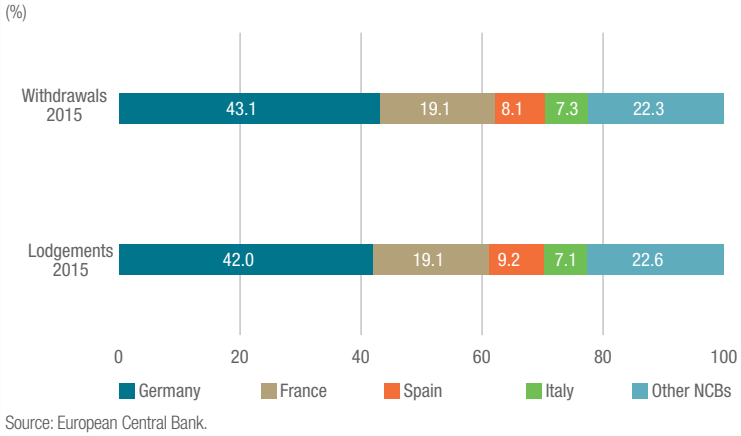
Several factors contribute to reducing the number and value of banknotes withdrawn and deposited at Banque de France counters.

First, the currency needs of the public for transaction purposes are moderated by the economic situation (stability of consumer prices, low growth of household consumption expenditure in 2015) but also by the competition from cashless payment instruments, in particular bank cards.

In addition, the fact that private operators are directly putting banknotes back into circulation has decisively contributed to reducing the recourse to Banque de France counters. Since 2006, these operators (mainly cash management companies and credit institutions) have a legal framework that specifies the conditions under which they are able to supply ATMs with banknotes that are not withdrawn directly at central bank counters. In 2015, 1,210 million banknotes were put back into circulation in this manner, representing a 15.9% increase compared to 2014.

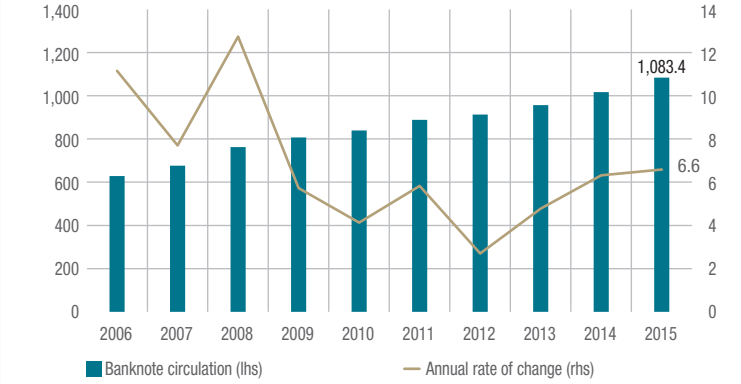
At the level of the Eurosystem, banknote withdrawals reached EUR 1,143.5 billion (36.5 billion banknotes) and lodgements amounted to EUR 1,075.6 billion (35.1 billion banknotes). In terms of the size of the flows of banknotes processed at Banque de France counters, France ranks second among euro area countries (see Chart 2).

C2 Share of the main Eurosystem national central banks in euro area flows in 2015, in volume terms



Source: European Central Bank.

C3 Circulation of euro banknotes issued by the Eurosystem at 31 December, in value terms



Source: Banque de France.

2. Banknote circulation and net issuance: a strong increase

The circulation of euro banknotes is defined as all euro banknotes made available to the public by Eurosystem central banks, including those held outside the euro area. It is calculated as the difference between banknote withdrawals and lodgements at the counters of all Eurosystem central banks, since the introduction of the single currency in its cash form.

At the level of each Member State, the difference between banknote withdrawals and lodgements since joining the euro area is associated with the notion of net issuance. Indeed, due to the migrations of banknotes between the different countries of the monetary union, the net issuance of a central bank cannot be equated to the number of banknotes in circulation in the country in

question. These migrations, which are fueled in particular by tourism and cross-border trade, mean that each euro area country displays negative net issues for at least one of the seven denominations in the range (with the exception of Germany and Slovakia). These countries have therefore recorded for these denominations more lodgements than withdrawals at the counters of their central bank.

At the level of the Eurosystem, as at 31 December 2015, the total value of euro banknotes amounted to EUR 1,083.4 billion (18.9 billion banknotes), up 6.6% in value terms compared to circulation at end-December 2014 (a 7.8% increase in the number of banknotes). This stronger growth is due to the international role of the euro, which is still dynamic,[1] but also to the crisis that Greece experienced in 2015. During the negotiations between Greece and its creditors, for fear of the country exiting the euro area, Greek investors withdrew their holdings from banks. In value terms, the increase in Greek net issuance accounts for close to a quarter of the rise in circulation of euro banknotes in 2015. This phenomenon confirms that euro banknotes are often held for hoarding purposes, in particular during periods of economic, financial or political crisis.

For France, as at 31 December 2015, net issuance of banknotes amounted to EUR 112.8 billion (4.5 billion banknotes), representing an increase of EUR 4.5 billion compared to end-2014 (+4.1%). At this date, France's contribution to the circulation of euro banknotes amounted to 10.4% in value terms and 23.7% in volume terms.

3. Composition of banknote flows and net issuance: national specificities

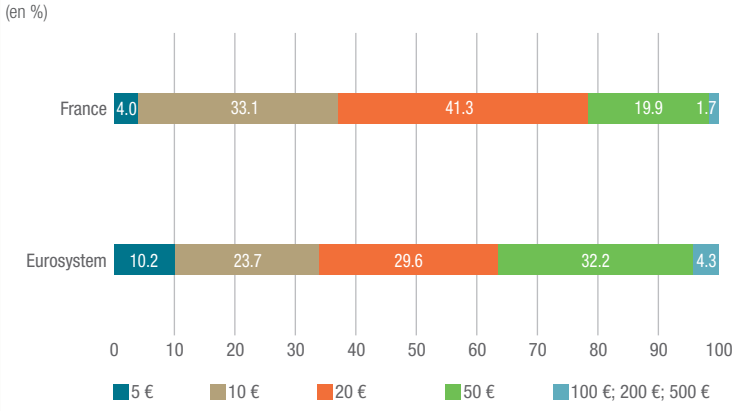
In 2015, out of the 7.0 billion banknotes withdrawn at French note-issuing banks, 3 out of 4 banknotes correspond to a EUR 10 or EUR 20 denomination. These two denominations account for a relatively larger share of French flows than in partner countries where the EUR 50 denomination ranks first (see Chart 4). This difference results from the payment habits of the French, reinforced by the predominance of these two banknotes in ATMs across the country. The average banknote value in France is therefore EUR 24.2, one of the lowest values in the Eurosystem.

The predominance of the EUR 20 banknote, the new series of which was put into circulation in 2015 (see Box 2), is confirmed as regards net issuance. With 2.8 billion EUR 20 banknotes issued in France for a total of EUR 56.0 billion, this denomination represents 62.5% in volume terms and 49.7% in value terms of French net issuance, compared with only 18,2% in volume terms and 6.3% in value terms of currency in circulation in the Eurosystem (see Chart 5).

However, the structure of French flows is drawing closer to that observed in the Eurosystem. Although the EUR 20 banknote prevails in the wallets of the French, the EUR 50 banknote records a sustained growth rate in net issuance: 16.8% against +5.3% for the EUR 20 banknote and +6.0% for the EUR 10 banknote in 2015 (see Chart 6).

1 The value of euro banknotes held outside the euro area is estimated at around 25% of total banknotes in circulation

C4 Share of denominations in the withdrawals at central bank counters in 2015, France and Eurosystem, in volume terms



Source: Banque de France.

Box 2

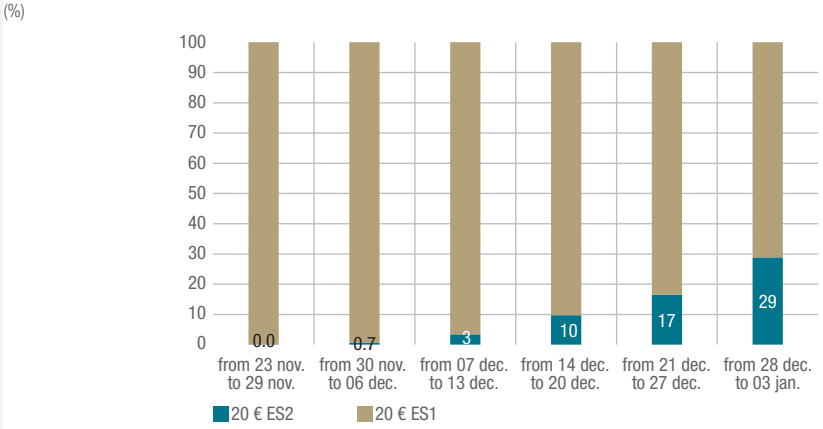
The new range of euro banknotes

In the framework of the Eurosystem, euro area national central banks are responsible for ensuring the quality of euro banknotes in circulation and maintaining public confidence in the currency. Thanks to important technological advances, they have designed a second series of euro banknotes known as Europa (ES2, "Euro Series 2") with security features that are easier to control via the FLT (feel-look-tilt) method and harder to counterfeit.

The Europa series will be introduced gradually over several years. To date, three ES2 denominations are to be found in consumers' wallets: the EUR 5 banknote (2013), the EUR 10 banknote (2014) and more recently the EUR 20 banknote (2015).

These three new denominations were rapidly adopted by the public and replaced the old series with no difficulty. At 31 December 2015, based on banknote sorting data, the ES2 denominations accounted for 97% of EUR 5 denominations and 98% of EUR 10 denominations deposited at Banque de France and IEDOM branches. After six weeks of issuance, the share of the ES2 series in French lodgements of EUR 20 banknotes was estimated at 29%. Thus, the new denomination rapidly increased in importance, due to its presence in ATMs.

Share of the ES2 EUR 20 in the inflows of EUR 20 in France in 2015



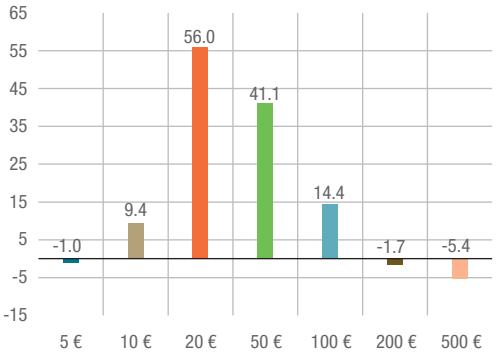
Note: Estimation based on sorting.
Source: Banque de France.

With 822.3 million banknotes issued in France at end-2015, the volume of EUR 50 banknotes is approaching the issuance volume of EUR 10 banknotes (939.7 million). In value terms, the EUR 50 banknote is more in competition with the EUR 20 banknote and is close to European standards: 36.5% of French net issues against 38.8% at the European level (see Charts 5 and 6). At the level of the Eurosystem, the EUR 50 banknote consolidates its position with a growth rate of circulation of 11.8% against +6.4% for the EUR 20 banknote and +3.6% for the EUR 10 banknote. This increase in the EUR 50 banknote can be attributed to the developments in the Greek situation during the year.

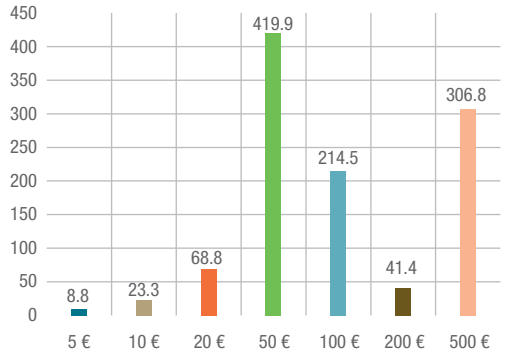
C5 Net issuance by denomination at 31 December 2015, France and Eurosystem

(EUR billions)

a) France



b) Eurosystem

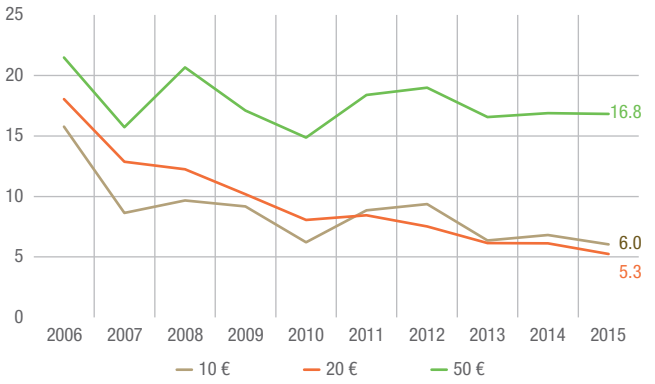


Sources: Banque de France and European Central Bank.

The high-denomination banknotes (EUR 100, EUR 200 and EUR 500) are traditionally underrepresented in France. Only the net issues of the EUR 100 denomination are positive, reaching EUR 14.4 billion. At the level of the Eurosystem, the situation differs: the high denominations account for 15.7% of the banknotes in circulation for a value of EUR 562.6 billion, or more than half of the value of European circulation. Given their high face value, these banknotes are indeed a hoarding instrument for building up precautionary savings. However, due to concerns regarding the illicit activities to which the EUR 500 banknote could give rise, the Eurosystem decided in May 2016 to put an end to the production and issuance of this banknote (see Box 3).

C6 Growth rate of French net issuance of denominations used for transactions

(%)



Source: Banque de France.

4. Flows and net issues of coins: the predominance of copper coins

In 2015, flows of coins at Banque de France and IEDOM branches declined. Lodgements posted a 1.8% year-on-year decrease in volume terms with 973 million coins deposited for a total of EUR 646 million (–2.7%). Withdrawals reached 1,801 million coins for a total of EUR 763 million, representing a decrease of 3.5% in volume terms and 2.8% in value terms compared to 2014 (see Chart 7).

At the Eurosystem level, the situation is slightly different with volumes of coin withdrawals recording an increase over the last two years, in particular following the accession of new countries to the euro area (Latvia in 2014 and Lithuania in 2015). Overall, 19,976 million coins were withdrawn

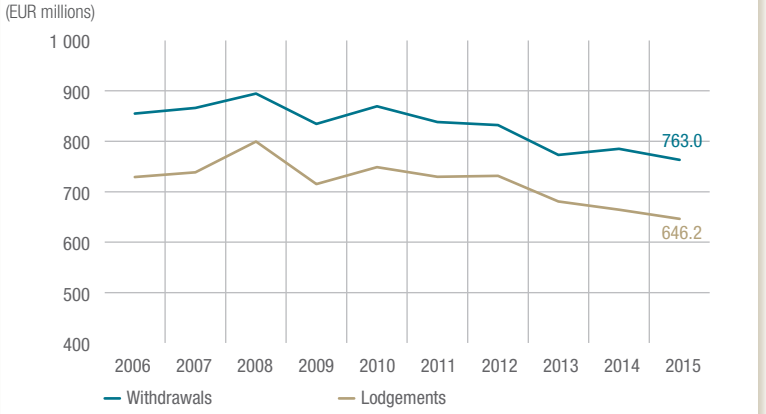
from euro area national central banks for a total of EUR 7,078 million, representing a year-on-year increase of 1.2% in volume terms and 0.6% in value terms. Like French lodgements, lodgements at the Eurosystem level were also down with 14,718 million coins deposited for a total of EUR 6,066 million (–0.3% in volume terms and –2 8% in value terms).

As regards the structure of flows, more than two out of five coins withdrawn from French note-issuing banks are copper coins (1, 2 and 5 cent coins). This phenomenon is even more pronounced at the level of the Eurosystem where more than one coin out of two belongs to this category.

The preponderance of low face value denominations is confirmed with French net issues and also in European circulation. At end-2015, copper coins accounted for 70.6% of French net issuance in volume terms and 63.6% of euro area net issues (see Chart 8). This situation is due to a consistently lower rate of return of copper coins (between 16.0% and 34.5%) compared to other coins (between 56.9% and 100.5%). 1, 2 and 5 cent coins are hardly used for payments and most often stored or lost.

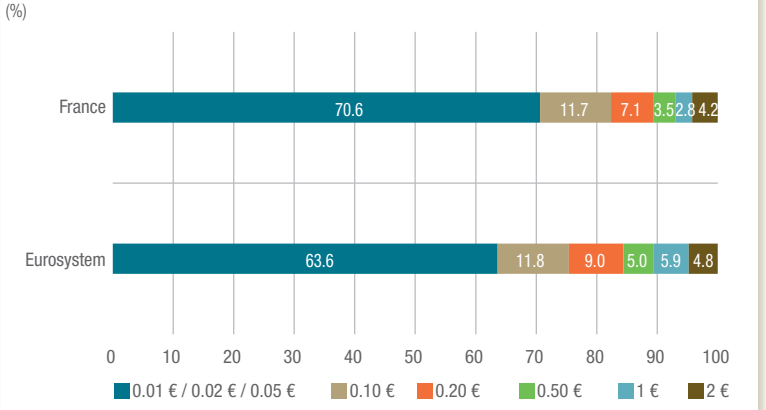
Overall, at 31 December 2015, the circulation of coins throughout the Eurosystem amounted to 116.2 billion coins for a total of EUR 26.0 billion, up 4.7% in volume terms and 4.0% in value terms. With 18.8 billion coins issued, France generates 16.2% of the volume of coins issued in the euro area for a total of EUR 3.2 billion. The growth of French net issuance remains relatively strong in both volume and value terms: respectively +4.6% and +3.8%.

C7 Withdrawals and lodgements of coins at Banque de France and IEDOM counters in value terms



Source: Banque de France.

C8 Structure of net issues at 31 December 2015, France and Eurosystem, in volume terms



Sources: Banque de France and European Central Bank.

Box 3

The end of the production and issuance of EUR 500 banknotes

On 4 May 2016, the Governing Council of the European Central Bank (ECB) decided to put a definitive end to the production of EUR 500 banknotes. This denomination will no longer be issued by the end of 2018: on that date, the central banks of the euro area will cease to put into circulation EUR 500 banknotes. The other denominations, from EUR 5 to EUR 200, are maintained.

Why stop the production and issuance of EUR 500 banknotes?

This decision is part of the stepping up of the fight against money laundering and the financing of terrorism. It is a response to the concerns about the illegal activities that the EUR 500 banknote could facilitate.

What is the share of the EUR 500 banknote in France?

Although the EUR 500 banknote accounted for 28.3% in value terms of the banknotes issued by the Eurosystem in 2015, this denomination is hardly used in France because of payment habits (preference for EUR 5 to EUR 50 banknotes) and restrictions on cash payments (for French residents, cash settlements are capped at EUR 1,000). Since the introduction of the euro in 2002, the Banque de France has received more EUR 500 banknotes at its counters that it has issued: at end-2015, the difference was – EUR 5.4 billion, resulting in particular from flows in tourist spending.

When will the EUR 500 banknote stop being issued?

The EUR 500 banknote will stop being issued when the EUR 100 and EUR 200 denominations in the Europa series are introduced towards the end of the year 2018. Until then, the Eurosystem will put in place the necessary measures to ensure that the remaining banknotes are available to the public in sufficient quantities.

What is to be done with the EUR 500 banknotes?

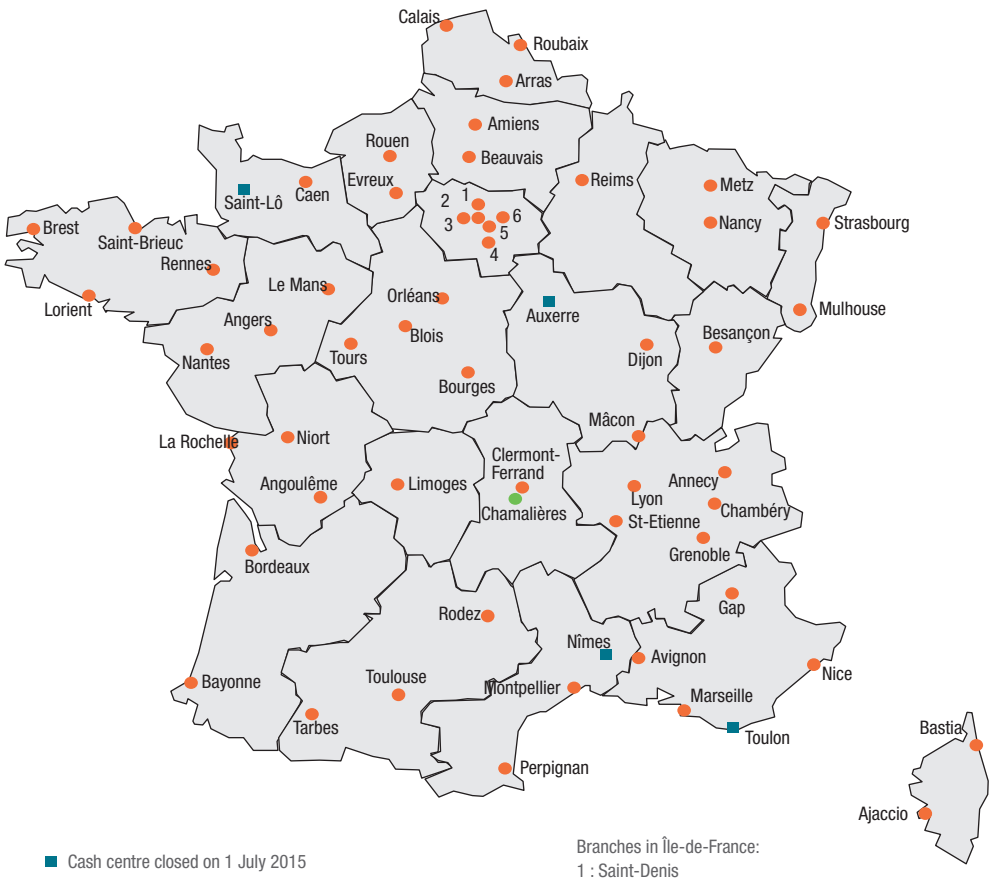
The EUR 500 banknotes continue to be legal tender. Thus, even after this denomination has stopped being produced towards the end of 2018, it will be possible to use them, as now, to settle transactions or for hoarding purposes. Moreover, they will be exchangeable at the counters of the Banque de France or other national central banks of the euro area for an unlimited period.

Is the aim of this measure to reduce the use of cash?

The Eurosystem, including the Banque de France, has no desire to do away with cash: banknotes are a practical and reliable means of payment which is part of consumers' freedom to choose the payment method they wish to use.

Appendix 1

The Banque de France branch network linked to banknote processing in 2015



- Cash centre closed on 1 July 2015
- Cash centre in activity at 31/12/2015
- Chamalières: banknote sorting centre

Branches in Île-de-France:
1 : Saint-Denis
2 : Paris
3 : Nanterre
4 : Évry
5 : Créteil
6 : Marne-la-Vallée

Appendix 2

Currency-related statistics in 2015

Banknotes

(value in EUR billions; volume in millions of banknotes; change in %)

France	Value	Year-on-year change	Volume	Year-on-year change
Withdrawals	169.0	-4.2	6,985	-4.0
Lodgements	164.6	-3.3	6,723	-3.8
Net issues	112.8	4.1	4,481	6.2
Eurosystem	**Value**	**Year-on-year change**	**Volume**	**Year-on-year change**
Withdrawals	1,143.5	-1.2	36,508	-0.9
Lodgements	1,075.6	-2.0	35,149	-2.0
Net issues/circulation	1,083.4	6.6	18,895	7.8

Coins

(value in EUR millions; volume in millions of banknotes; change in %)

France	Value	Year-on-year change	Volume	Year-on-year change
Withdrawals	763	-2.8	1,801	-3.5
Lodgements	646	-2.7	973	-1.8
Net issues	3,218	3.8	18,767	4.6
Eurosystem	**Value**	**Year-on-year change**	**Volume**	**Year-on-year change**
Withdrawals	7,078	0.6	19,976	1.2
Lodgements	6,066	-2.8	14,718	-0.3
Net issues/circulation	26,012	4.0	116,182	4.7

Glossary

Currency in circulation

Since the introduction of euro banknotes and coins on 1 January 2002, this notion retains a meaning only at the level of the entire Eurosystem and not at the level of each member country.

It corresponds to all euro banknotes and / or coins in circulation, including outside the euro area. It is calculated as the difference between the amount of banknotes and / or coins put into circulation and the amount of banknotes and / or coins withdrawn from circulation by the Eurosystem central banks since joining the euro area.

At the national level, the notion used is net issuance.

Net issuance

For a national central bank, this corresponds to the cumulative sum of the differences between withdrawals and lodgements at its counters since the adoption of the euro by that country. At the level of the Eurosystem, the sum of net issues of member countries is equal to the currency circulation.

Eurosystem

The Eurosystem is made up of the European Central Bank and the national central banks of the Member States of the European Union that have adopted the euro. At 31 December 2015, the Eurosystem comprised 19 countries.

Withdrawal

Flow of banknotes and coins whose withdrawal was recorded at the counters of a national central bank and ultimately delivered to the public.

Recirculation (external recycling)

For an authorised operator (credit institution, security carrier, retailer), this consists in authenticating and checking the quality of banknotes/coins received in order to put them back into circulation through ATMs.

Since the adoption at the European level of the "Framework for the detection of counterfeits and fitness sorting of euro banknotes by credit institutions and other professional cash handlers" in 2004 and its entry into force in 2006, third parties have a legal framework for putting currency back into circulation, subject to the signing of an agreement with the Banque de France, and under its control.

Deposit

Flow of banknotes and coins whose deposit was recorded at the counters of a national central bank.

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