Article

1   MFI lending rates: pass-through in the time of non-standard monetary policy

This article presents new evidence about the impact of structural features, macroeconomic developments and other factors on the pass-through mechanism from policy rates to bank lending rates. The article shows that the cost of funding for banks and bank balance sheet characteristics are important driving forces behind changes in pass-through regularities. The article also demonstrates how the ECB's non-standard monetary policy measures have helped to restore the transmission mechanism.

Introduction

This article deals with the transmission of monetary policy to bank lending rates, economic activity and prices. In spite of the growing role of non-bank financing in recent years, the euro area financial system has remained largely bank-based. Bank lending rates represent a main external funding cost for economic agents in the euro area and are consequently an important channel for the transmission of monetary policy to the macroeconomy. It is thus crucial to monitor and assess how euro area banks are affected by monetary policy decisions and impulses, and how they pass on changes in monetary policy rates to their customers.

The protracted financial crisis, with its many developments, has had an important effect on the pass-through, as have changing regulations and supervisory practices. The crisis affected euro area banks' ability to effectively pass on changes in the monetary policy stance to non-financial corporations (NFCs) and households. This resulted in significant heterogeneity in bank lending rates across euro area countries.

Recent non-standard monetary policy measures have contributed to a steady and widespread decline in bank lending rates while narrowing their dispersion across countries. The Eurosystem's non-standard monetary policy measures, in particular the expanded asset purchase programme (APP), the introduction of negative deposit facility rates and the targeted longer-term refinancing operations (TLTROs) have played a major role in this process.[1] These measures have provided abundant liquidity in a low interest rate environment, mitigating distortions in funding

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[1]   Since 2014 the ECB has adopted a number of policy measures with the aim of improving financing conditions for NFCs and households in order to stimulate credit creation, and support a return of inflation to levels below but close to 2% over the medium term. These measures involve (i) TLTROs, (ii) purchases of asset-backed securities, covered bonds, public sector securities and (more recently) corporate bonds, and (iii) a policy of negative deposit facility rates.

markets and reducing the pro-cyclical contraction in lending to the non-financial private sector.

As nominal interest rates move closer to their effective lower bound, the likelihood of non-linearity in bank lending rate transmission increases. While there is substantial uncertainty on the precise level of the effective lower bound, it could be argued that some frictions may arise when nominal rates approach zero or become negative. With reference to banks' liabilities side, this lower bound may result from the reluctance of banks to charge negative rates on retail deposits, as these may damage their relationship with retail customers. In addition, customers may choose to retain more currency to avoid losses from possible fees for current accounts or negative deposit rates. Under these circumstances, banks may delay or refrain from transmitting further monetary accommodation to bank lending rates to avoid a deterioration in loan-deposit margins with a negative impact on their profits. This is contingent on the degree of competition in the market, as well as on bank balance sheet characteristics, including liquidity and capitalisation.[2] So far, there is no evidence that monetary policy transmission in the euro area is being significantly affected by this type of non-linearity. In this regard it should be noted that, even in a situation of lower loan-deposit margins, the negative impact on bank profits can be mitigated via two channels. First, lower lending rates are likely to stimulate loan demand, which should lead to increasing lending volumes. Second, lower lending rates should lead to fewer defaults, thereby reducing impairment-related costs for banks.

This article presents new evidence on the driving forces behind lending rate setting in the euro area in the context of the ECB's non-standard measures and the accompanying reduction in fragmentation following the recent financial crisis. It also attempts to analyse the sources of heterogeneity in the evolution of lending rates in the euro area. The second section presents the driving forces behind lending rate setting in the euro area. The third section discusses heterogeneity in lending rate behaviour in the euro area. The fourth section concludes.

Behaviour of and driving forces behind lending rate setting in the euro area

Bank retail lending rates have declined steadily since 2014 and their dispersion has narrowed considerably across the euro area. These developments follow a period marked by significant heterogeneity in cross-country lending rates. After the first recession in 2008-09, when global demand and uncertainty were common contractionary factors for all euro area economies, the sovereign debt crisis witnessed successive episodes of financial stress which led to acute cross-country heterogeneity in retail bank lending rates. As can be seen in Chart 1, the aggregate cost of borrowing indicator for both NFCs and households
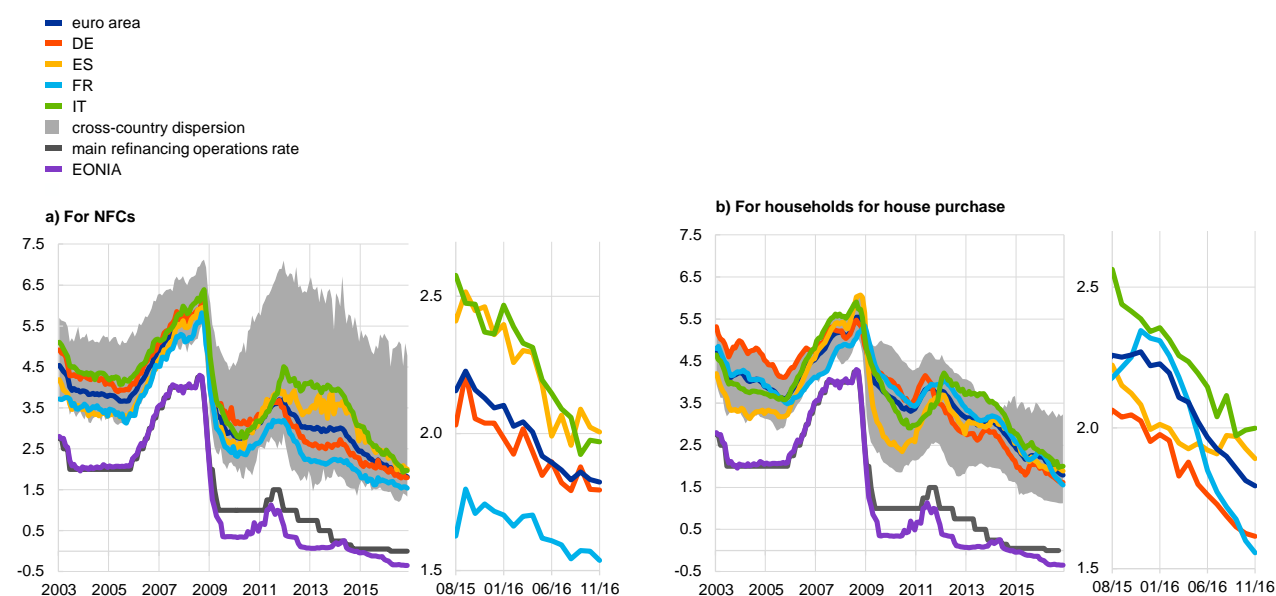
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[2]   See, among others, Brissimis, S.N. and Delis, M.D., "Bank heterogeneity and monetary policy transmission", *Working Paper Series*, No 1233, ECB, August 2010.

increased in the largest euro area countries between 2010 and 2012. Between 2012 and the end of 2013, the indicator declined in Germany and France but remained at an elevated level in Italy and Spain. Since the introduction of the ECB's non-standard policy measures in June 2014, the indicator has declined for both NFCs and households, reaching historical lows in 2016. Cross-country dispersion reached its peak in 2010 for loans to households for house purchase and in 2012 for non-financial corporate loans. Since 2014 there has been a significant reduction in dispersion, although it remains relatively high from a historical perspective.

Chart 1

Composite indicator of the cost of borrowing for NFCs and for households for house purchase

(percentages per annum)

- euro area
- DE
- ES
- FR
- IT
- cross-country dispersion
- main refinancing operations rate
- EONIA

a) For NFCs

b) For households for house purchase

Sources: ECB and ECB calculations.
Notes: The indicator for the total cost of lending is calculated by aggregating short and long-term rates using a 24-month moving average of new business volumes. The cross-country dispersion displays the minimum and maximum range over a fixed sample of 12 euro area countries. The latest observation is for November 2016.
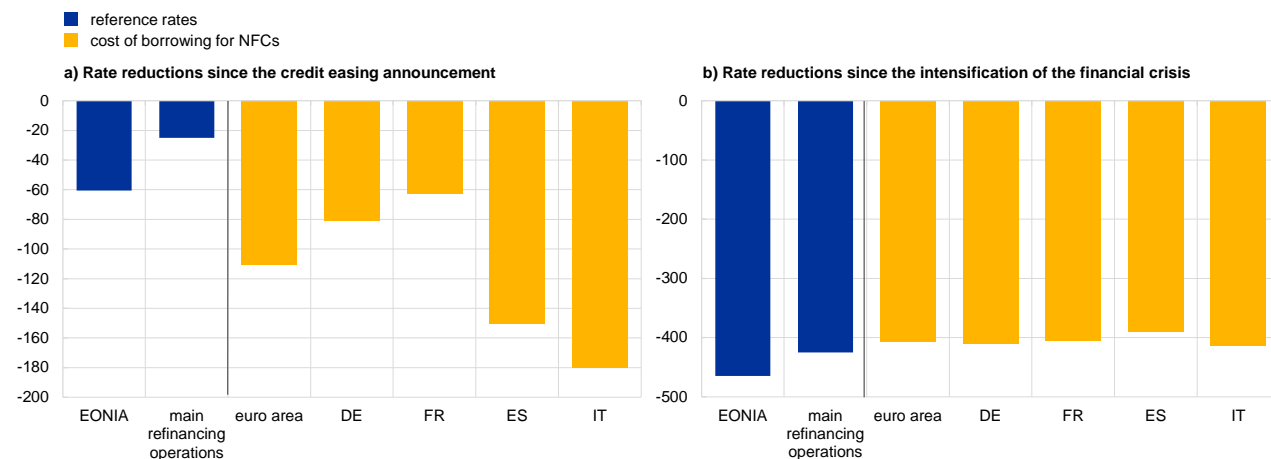
The aforementioned declines in bank lending rates can be compared against the decline in monetary policy reference rates.[3] Focusing on the change in interest rates since the announcement of the credit easing package in early June 2014, it becomes apparent that (i) lending rates have declined significantly more than market reference rates, and (ii) the interest rate pass-through has been quite effective. As can be seen in Chart 2a, the decline in lending rates since May 2014 amounts to 111 basis points for the euro area. Italy and Spain registered much stronger declines (180 and 151 basis points, respectively) than Germany and France (81 and 63 basis points, respectively). Lending rates have thus become gradually less heterogeneous across the largest euro area countries since the introduction of the credit easing package in 2014. In fact, as seen in Chart 2b, the pass-through of changes in policy rates to bank lending rates since the intensification of the financial crisis (August 2008) has become quite similar across the large euro area countries.

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[3] The market reference rate mainly reflects the rate at which banks can raise funds in the interbank money market.

(basis points)

■ reference rates
■ cost of borrowing for NFCs

a) Rate reductions since the credit easing announcement

b) Rate reductions since the intensification of the financial crisis

Source: ECB.
Notes: The date of May 2014 was selected as it immediately precedes the ECB's announcement, on 5 June 2014, of certain monetary policy measures taken to enhance the functioning of the monetary policy transmission mechanism (announcement of the modalities of TLTROs and intensification of preparatory work related to outright purchases of asset-backed securities). The date of August 2008 marks the intensification of the financial crisis, Reference rates are monthly averages. The latest observation is for November 2016.
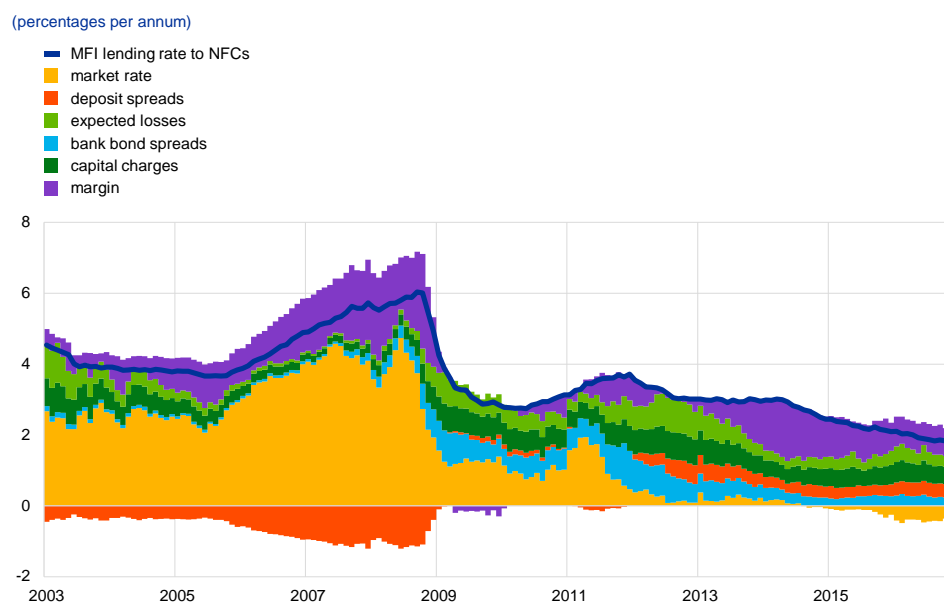
A simplified accounting model of how banks price their loans can be used to illustrate the main factors influencing bank lending rates. Using this simplified approach the lending rate can be broken down into several components, covering banks' refinancing costs, risk spreads and capital charges (see Chart 3). This simplified model assumes that, when pricing a loan, the base rate used by banks is a market reference rate. In addition to this rate, banks pass on to the final borrower a number of spreads to recover the costs they incur in providing the loan. These spreads can be broken down into five main components:

(i)   deposit spreads, which are driven, for example, by a staggered adjustment to market rates;

(ii)   bank bond spreads, which are part of the wholesale bank funding cost;

(iii) bank capital charges since banks need to recoup their cost of equity, which is influenced by non-diversifiable micro risk on the loan book, limited liability, prudential regulation, agency costs in bank financing and bank portfolio rebalancing frictions;

(iv)   credit risk compensation, which arises due to risky debt contracts and expected losses;

(v)   the intermediation margin – obtained as the difference between the bank lending rate and the sum of factors (i) to (iv).

Chart 3

Chart 3

Breakdown of the composite cost of borrowing for NFCs

(percentages per annum)

- MFI lending rate to NFCs
- market rate
- deposit spreads
- expected losses
- bank bond spreads
- capital charges
- margin

Sources: ECB, Moody's and Merrill Lynch Global Index.
Notes: The market rate is the two-year overnight indexed swap rate. Deposit rate spreads are computed as a weighted average of overnight deposits, deposits with agreed maturity and deposits redeemable at notice, with their corresponding new business volumes. The spreads are calculated vis-à-vis the EURIBOR of the closest maturity. Yields for bank bond spreads are taken from the Merrill Lynch Global Index and aggregated on the basis of their corresponding outstanding amounts. The spreads are then calculated vis-à-vis the swap rate of the closest maturity. Capital charges are the cost of the capital required by the Basel II regulations. Expected losses are loss given default (LGD) multiplied by probability of default (PD) where PD is the expected default frequency computed by Moody's, and LGD is fixed at 0.45. The margin is the residual between lending rates and all of the other components.

The margin, shown by the purple area in the chart, is influenced by the structure of the bank credit market, which affects the pricing of banks' retail products (e.g. changes in the demand for loans, banking sector competition and the opportunity costs of lending, which may also depend on incentives for holding sovereign debt).

The evolution of the euro area financial crisis can be described by the interplay of credit risk in the sovereign, banking and corporate sectors. The evolution of the euro area financial crisis can be broken down into three phases: (i) the sovereign market tensions in 2011-12, which saw a surge in sovereign spreads in Italy and Spain due to reappraisals of solvency risk resulting in balance sheet losses for banks in those countries and the incentive for them to reprice and cut down on loans; (ii) the adverse real-financial feedback loop between rising corporate default on the one hand and weak bank asset performance and bank credit supply constraints on the other; and (iii) the bank deleveraging process in times of unprecedented regulatory overhaul, which, in addition to the forces at work in the previous two phases, explains the pervasively high bank lending rates and lacklustre credit dynamics in some countries. As can be seen in Chart 3, in spite of the substantial reduction in market reference rates, reflecting the monetary policy accommodation, bank lending rates have remained elevated up to mid-2014. Based on the simplified accounting model, this can be explained by (i) an increase in deposit spreads, (ii) a higher wholesale bank funding cost wedge, (iii) an increase in bank capital charges due to higher costs of equity, regulatory measures and higher expected losses, and (iv) an increase in credit risk compensation margins due to the

adverse real-financial feedback loop between rising corporate default and the pricing of loans.

Impact of non-standard measures on lending rates

A number of factors have played a significant role in reducing the financial fragmentation observed during the recent financial crisis and have led to the more recent steep decline in lending rates. While the non-standard measures introduced by the ECB since June 2014 are relatively diverse in nature, the broad transmission channels through which they affect the economy are similar and relate to the bank funding cost wedge and bank capital charges. There are three main, mutually-reinforcing bank credit channels through which non-standard measures are transmitted to lending rates.

First, via the direct pass-through channel, non-standard measures ease borrowing conditions in the private, non-financial sector by providing funding cost relief for banks. More specifically, the TLTROs provide banks with liquidity at the interest rate on the Eurosystem's deposit facility, on the condition that they show a sufficiently strong performance in loan origination. The TLTROs trigger more competition in the bank loan market, which, in turn, compresses unit lending margins and the level of borrowing costs for the real economy. Purchases of asset-backed securities and covered bonds under the APP also aim to foster loan creation, with banks given the incentive to re-package loans and sell them on at more favourable prices. Banks have been able to use the liquidity provided by the Eurosystem to substitute more expensive wholesale debt in a context of adverse market conditions, thereby allowing them to reduce lending rates to households and firms.

Second, non-standard measures are transmitted to lending rates via the portfolio rebalancing channel, which involves interventions in the sovereign bond segment under the APP. The compression of returns in the sovereign bond market prompts investments in assets with higher risk-adjusted returns. Banks play a key role in this transmission channel given that sovereign bond purchases under the APP lower term premia and, at the same time, induce a rebalancing of bank balance sheets, including the expansion of lending. Banks are also incentivised to offload the newly created cash reserves, leading to an expansion of asset holdings and lending. The negative interest rate policy has reinforced this incentive.

The third channel through which non-standard measures are transmitted to lending rates is signalling, which, together with forward guidance on future policy rates, is effective in steering expectations. The ECB's forward guidance has led to a downward revision of market expectations for future short-term interest rates and consequently to a compression in bank lending rates. Moreover, the credibility of forward guidance is supported by current asset purchases, as these purchases signal a desire to provide additional stimulus. On the other hand, the net stimulus following asset purchases is partly influenced by expectations regarding Eurosystem adjustments of future short-term interest rates in response to more resilient real activity and inflation sparked by lower term premia in the near term.

In addition to the aforementioned bank credit channels, there are other factors that have helped to reduce financial fragmentation. In particular, the strengthening and harmonisation of the European supervisory, regulatory and resolution framework has led to a strengthening of bank balance sheets, a decline in stress in financial markets and a decrease in the dispersion of the perceived risk of euro area banks and in their wholesale market funding costs. This, in turn, has contributed to a decrease in the dispersion of lending rates.

Heterogeneity in the evolution of lending rates in the euro area

Cross-country divergences in lending rates can reflect cyclical and structural factors[4]. The latter include differences in bank lending rate setting behaviour and cross-country heterogeneity in bank products, as well as institutional differences, for example in fiscal and regulatory frameworks, enforcement procedures and collateral practices. The composite cost of borrowing indicators for NFCs and households comprise rates for loans with different durations, and the share of short-term versus long-term loans differs among countries (see Charts 7 and 8). In addition, lending rates for loans assigned to the same maturity bucket may differ significantly owing to heterogeneity in banking products, for example with regard to non-interest rate charges, collateral and contractual options embedded in the loans.[5] The factors that are likely to explain observed differences in cross-country lending rates can be classified into two groups: demand-side determinants, comprising factors related to the characteristics of the borrowers, and supply-side determinants, comprising factors related to the characteristics of the banking system.[6]

Although composite lending rates, aggregated from individual bank lending rates, reveal cross-country heterogeneity, they mask the micro-perspective of lending rate setting. The micro-perspective is manifested in pronounced intra-country heterogeneity among lending rates charged by individual banks (see Chart 4). Box 1 elaborates on the advantages of using micro data, which provide important insights, especially when the information on individual bank lending rates is combined with bank-specific balance sheet characteristics. The dispersion of granular lending rates remains wider in vulnerable countries, but the transmission of policy rates is becoming increasingly less asymmetric. The wider dispersion of lending rates in vulnerable countries may reflect greater differences in economic conditions at both the country and firm levels, as well as differences across banks

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[4]   Structural differences in how lenders set rates have been analysed extensively in previous publications. See, among others, Kok Søerensen, C. and Lichtenberger, J.-D., "Mortgage interest rate dispersion in the euro area", *Working Paper Series*, No 733, ECB, February 2007.

[5]   For example, non-interest rate charges (such as fees and commissions) will not be shown in the lending rate component of the overall costs paid by borrowers. Consumer credits comprise loans for car purchase with solid collateral and relatively low interest rates, and other consumer loans with high interest rates. Floating rate loans may give borrowers the opportunity to reset the loan, choosing to adjust either the amortisation or the term of the loan.
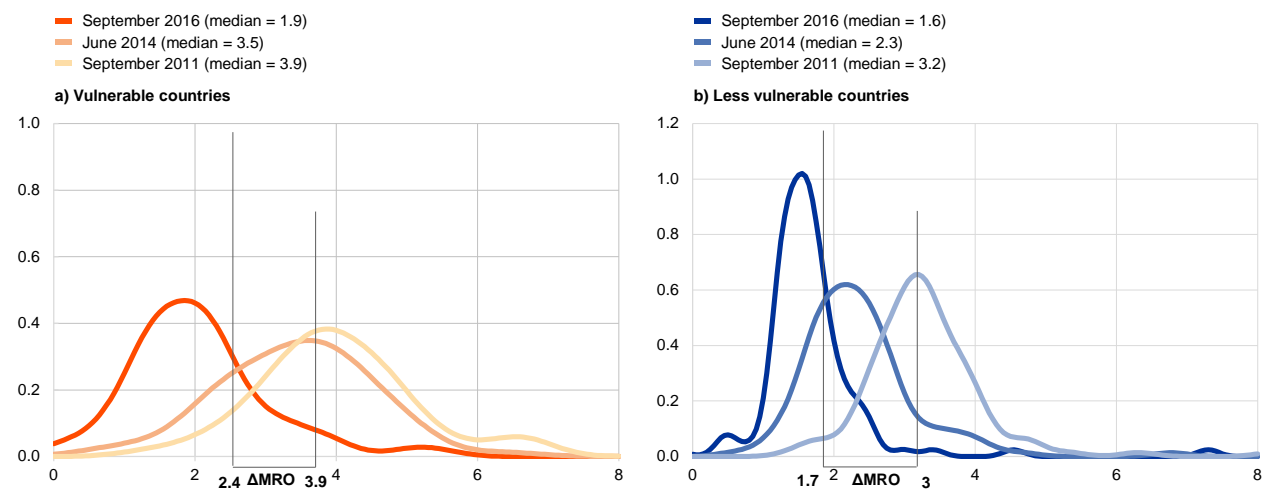
[6]   Demand-side indicators cover, for example, the creditworthiness of borrowers, demand for credit, the availability of alternative market-based sources of financing for corporations, and the disposable income of households and residential property prices in the case of mortgage loans. Supply-side indicators cover bank balance sheet characteristics, other measures of bank soundness, prevailing bank business models, loan securitisation and the degree of bank competition.

(e.g. solvency position, reliance on wholesale funding and degree of excess liquidity).

Chart 4

Changes in composite lending rates to NFCs across individual MFIs in vulnerable versus less vulnerable countries

(percentages per annum)

- September 2016 (median = 1.9)
- June 2014 (median = 3.5)
- September 2011 (median = 3.9)

a) Vulnerable countries

- September 2016 (median = 1.6)
- June 2014 (median = 2.3)
- September 2011 (median = 3.2)

b) Less vulnerable countries

Source: ECB.
Notes: The charts report the density approximation of the lending rate distributions in three different periods (September 2011, June 2014 and September 2016). Chart 4a (vulnerable countries): 92 MFIs from Ireland, Spain, Italy and Portugal. Chart 4b (less vulnerable countries): 142 MFIs from Belgium, Germany, France, the Netherlands and Austria. The charts also show that if the reduction in the rate on the main refinancing operations since September 2011 (150 basis points) had been fully passed on to the median lending rates of the first period (Chart 4b, 3.2), the lending rate in September 2016 would have been 1.7% (Chart 4b).

Box 1

Lending rate setting using bank-level data

Micro data often complement macro data analysis, offering important insights for monetary policy. This box discusses a number of advantages of analysing bank-level data, with particular reference to the heterogeneity of the pass-through and the fragmentation witnessed during the financial crisis.

The crisis has revealed significant heterogeneity in the way that banks, firms and households react to economic shocks, both across euro area countries and within a given country. In the presence of such heterogeneity, micro data can help to shed light on issues that aggregate data analysis is likely to miss or mask. While high-quality granular data can be aggregated to produce useful aggregate information, the opposite does not generally hold true: using aggregate data to draw inferences at a more granular level may lead to conclusions that are seriously biased. For example, if the average interest rate across banks in a given country is higher than the average for euro area banks, it does not necessarily follow that a randomly chosen bank from this particular country is more likely to have interest rates that are higher than the euro area average.

At the same time, the use of micro data entails certain challenges. Reliable micro data analysis depends on harmonised data concepts across countries, high quality standards for data collection and measurement, confidentiality and the use of sound statistical and econometric methods.

Bank-level micro data in particular can be informative, given the significant heterogeneity in lending rates recorded across different jurisdictions during the financial crisis. Lending rates may also differ across banks within a given jurisdiction due to heterogeneity in bank funding costs.

The granular information found in bank-level data can provide helpful insights for monetary policy. Such data enable analysis of heterogeneity in lending rates not only across countries, but also within a given country. They can thus be used to investigate the extent to which heterogeneity in lending rates is associated with bank-specific characteristics such as liquidity or capital. More generally, micro data supply empirical evidence that can be set against specific model-based predictions.[7]

Micro data also potentially enable bank-level information to be "matched" with borrower characteristics. Such combined information could be used to analyse the characteristics of the firms that take up loans and the concentration of these firms by region and/or industry sector, thus shedding light on the pass-through of interest rates to the real economy. Moreover, the risk characteristics of new borrowers could be traced across banks and across time, enabling investigation of whether or not banks adopt a risk-based pricing policy in the new loans they offer.

The "Anacredit" micro dataset is an important initiative to this end. Anacredit aims to provide combined information on both lenders and borrowers and is harmonised across euro area countries.

In sum, micro data can shed light on the forces behind the observed heterogeneity in interest rate pass-through across jurisdictions. Understanding the factors behind these discrepancies can be important for designing policy measures that aim to reduce fragmentation and contribute towards banking union.

The pace of the decline in lending rates also differs according to loan size. Since 2015 lending rates for very small loans have continued to decline at a faster pace than those for large loans, contributing to a further narrowing of the spread between very small and large loans (see Chart 5). At the same time, the lending rates for large loans in vulnerable and less vulnerable countries have reached broadly similar levels. For very small loans, the gap between the two country groups has further reduced owing to the strong decline recorded in vulnerable countries.

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[7] For instance, according to the model in Bluhm et al., banks with high levels of non-liquid assets should be more exposed to negative shocks in the value of these assets. See Bluhm, M., Faia, E. and Krahnen, J.P., "Monetary policy implementation in an interbank network: effects on systemic risk", *Working Paper Series*, No 46, Research Center SAFE – Sustainable Architecture for Finance in Europe, Goethe University Frankfurt, 2014.

Chart 5

Lending rates for very small versus large loans to NFCs

(percentages per annum)

- euro area
- vulnerable countries
- non-vulnerable countries

a) Very small loans
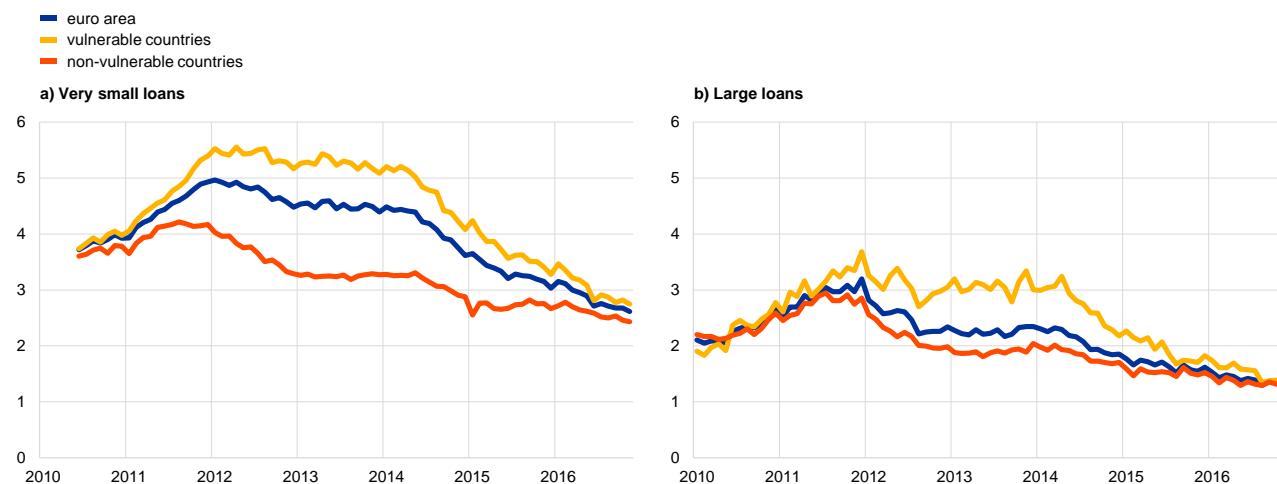
b) Large loans

Source: ECB.
Notes: The euro area series is calculated as a weighted average of country spreads. The "vulnerable" countries are Ireland, Greece, Spain, Italy, Cyprus, Portugal and Slovenia. Very small loans are loans of up to €0.25 million, while large loans are those above €1 million. Aggregation is based on new business volumes.

Another aspect of heterogeneity relates to the share of fixed versus variable rate loans. This aspect can be assessed on the basis of either outstanding amounts or new business volumes. Weights based on outstanding amounts more accurately capture the financing structure of the economy, as they reflect the economic importance of loans with different maturities in the financing structure of firms.[8] However, aggregating MFI interest rates on the basis of outstanding amounts provides only a rough estimate of the marginal cost of borrowing for economic agents. Aggregation based on new business volumes provides a better measure of the impact of the marginal cost of a new loan on the overall financing cost structure.[9] However, such aggregation overweighs short-term instruments, which are frequently renewed (e.g. overdrafts). Moreover, new business volumes are highly volatile on a monthly basis, as they react relatively quickly to present-day economic conditions, which may favour the issuance of short-term rather than long-term loans. In turn, this volatility might make it difficult to perceive the genuine underlying dynamics in retail lending rates. Chart 6 depicts lending rates based on outstanding amounts. These rates exhibit less volatility than cost of borrowing indicators compiled on the basis of new business volumes (see Chart 1), and a less pronounced pattern of market segmentation. A comparison of Charts 7 and 8 reveals that, despite the current practice of short-term lending for NFCs in Germany and France (where over 80% and about 70% respectively of new business lending is realised through loans with a short-term interest rate fixation or floating rate), the share of short-term lending in loans based on outstanding amounts remains below 40% and 50% respectively.

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[8]   However, outstanding amounts do not reflect the granular statistical breakdown available in MFI interest rate (MIR) statistics. Moreover, methodological differences affect the comparability between MFI balance sheet data and MIR statistics.

[9]   It also helps to overcome issues concerning database mismatches and time series granularity.

Chart 6

Composite outstanding amount lending rates

(percentages per annum)

- euro area
- DE
- ES
- FR
- IT

a) Lending rates for NFCs

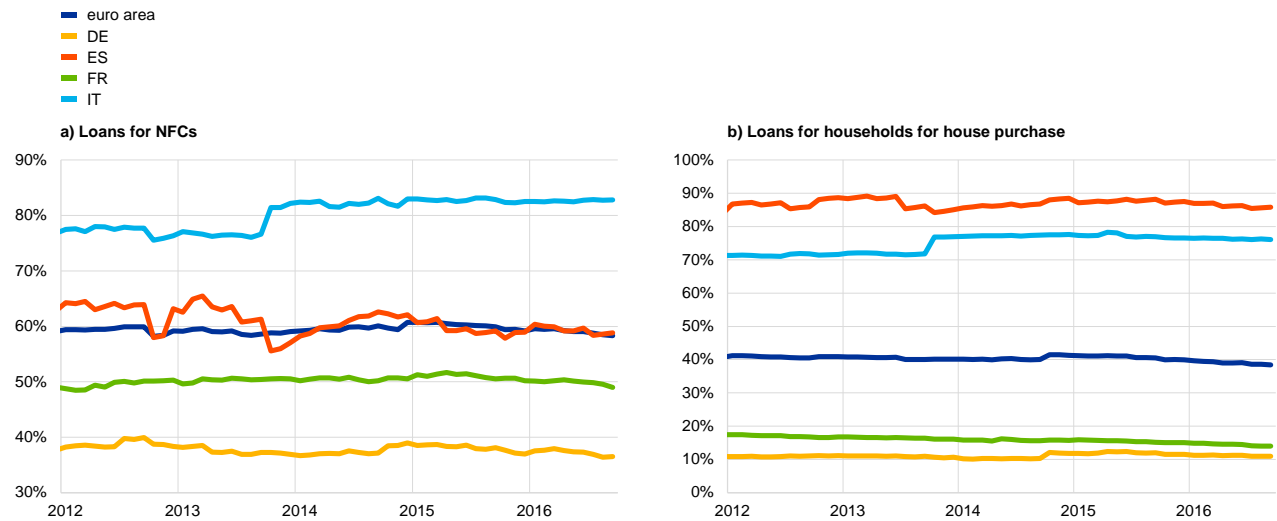**b) Lending rates for households for house purchase**
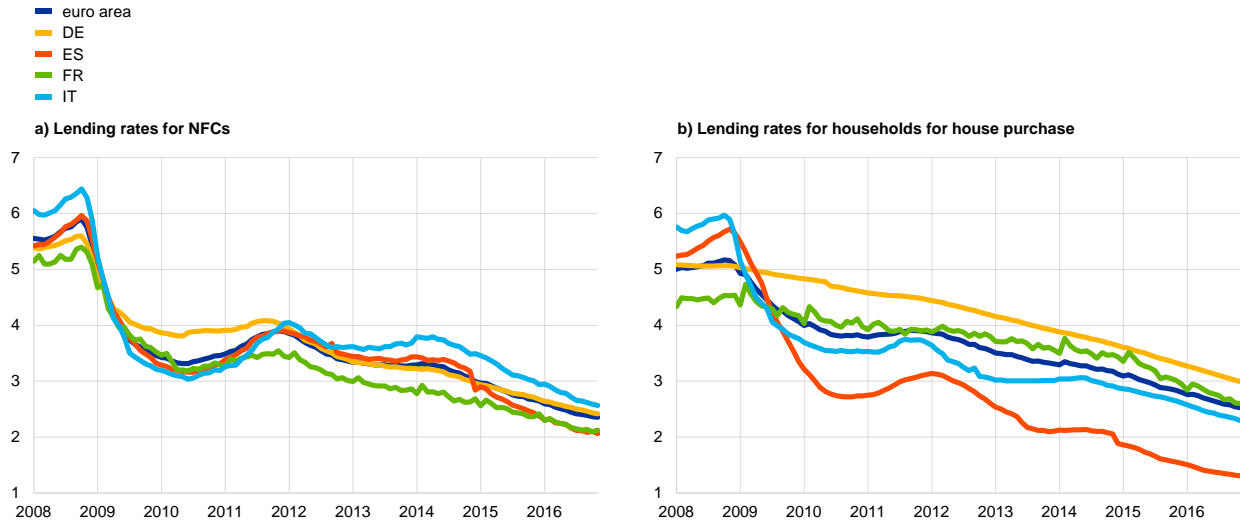
Sources: ECB and ECB calculations.
Note: The indicator for the total cost of lending is calculated by aggregating short and long-term rates.

Chart 7

Share of loans with short-term interest rate fixation based on outstanding amounts

- euro area
- DE
- ES
- FR
- IT

a) Loans for NFCs
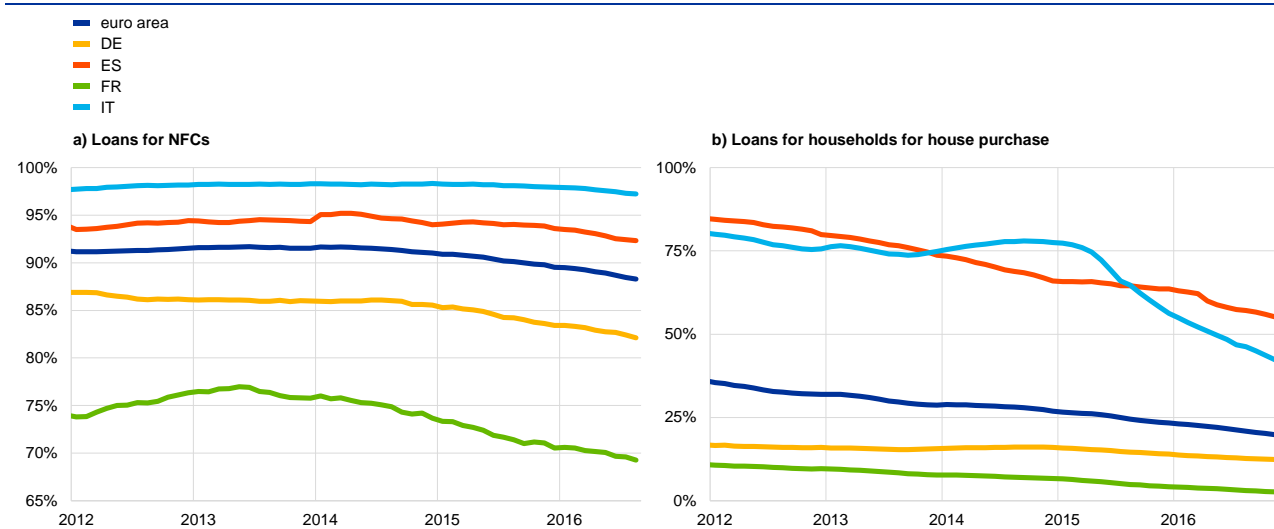

b) Loans for households for house purchase

Sources: ECB and ECB calculations.
Notes: Short-term loans are those with a maturity of up to one year, plus overdrafts and the share of long-term loans issued at a floating rate. These shares are derived from outstanding amounts and are therefore subject to breaks related to reclassifications and/or revaluations. The indicators in the chart are derived from the fourth quarter of 2011 due to breaks in the early period of some of the underlying series, affecting in particular loans with over one year remaining to maturity and an interest rate reset scheduled for within the next year.

Chart 8

Share of loans with short-term interest rate fixation based on new business volumes

Legend:
- euro area
- DE
- ES
- FR
- IT

a) Loans for NFCs

b) Loans for households for house purchase

Sources: ECB and ECB calculations.
Note: Short-term loans are those with a maturity of up to one year, plus overdrafts and the share of long-term loans issued at a floating rate.

Bank retail lending rates cannot be considered separately from the structure of banks' liabilities. The importance of the cost of funding indicator for the setting of lending rates by banks was highlighted in the section entitled "Behaviour of and driving forces behind lending rate setting in the euro area".[10] Camba-Mendez et al. have argued that banks decide simultaneously on the remuneration of depositors and bond holders and on how much to charge borrowers, and show that the interest rate pass-through remained active even when interest rates were very low.[11] In addition, they have shown that an environment of excess liquidity creates a two-tier system for short-term refinancing, whereby some banks borrow at rates close to the deposit facility rate in the money markets while others borrow from the ECB at the main refinancing operations rate; this is subsequently reflected in the pass-through to bank lending rates. Furthermore, easy access to medium-term financing at a favourable cost fosters lower bank lending rates.

The pricing of banks' liabilities is important for retail lending rate setting. Given that financial intermediaries' decisions are not solely driven by the level of policy rates per se, but instead by the spread between the interest rate they pay and the interest rate they earn for a unit of funds they intermediate, it is important to consider the pricing of banks' liabilities. The present-day downward rigidity in the pricing of deposits is evident in the distribution of individual deposit rates, which are increasingly stacking up against the zero line. Limited scope for further deposit rate

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[10]   For example, one component of the overall cost of funding for banks, the cost of borrowing from capital markets (i.e. bank bond yields), has been higher in vulnerable rather than less vulnerable euro area countries, especially during the period 2011-12. This difference reflects the higher opportunity cost of investing in securities issued by banks operating in vulnerable countries, where sovereign yields are higher. Additionally, the deterioration in sovereign creditworthiness as a result of the sovereign debt crisis has had a significant effect on the credit risk of banks operating in vulnerable countries, where high exposure to domestic sovereign bonds has adversely influenced their funding costs.

[11]   See Camba-Mendez, G., Durré, A. and Mongelli, F.P., "Bank interest rate setting in the euro area during the Great Recession", *Working Paper Series*, No 1965, ECB, September 2016.

reduction would imply mounting pressure on bank margins, as the pricing of the assets side has more downward flexibility. In October 2016 only 5.3% of the reported rates on new NFC deposits and 0.5% of those on new household deposits were below zero (see Chart 9). Negative rates on deposits thus remain a highly contained phenomenon, affecting NFC deposits mainly in Germany, with only very isolated instances in a small number of other countries as banks avoid charging negative rates on retail deposits. So far, the existence of a zero lower bound on deposit rates does not seem to have been excessively restrictive. Indeed, in the case of households, as of October 2016 only 40% of new deposits have been yielding a 0% return (compared with 53% in the case of NFCs), indicating that, in this segment, the scope for repricing may still not have been exhausted. At the same time, for households, there is a higher share of savings deposits for which a non-zero interest return is expected, owing to interest rate setting practices.

Chart 9

Distribution of deposit rates for households and NFCs across individual MFIs

(x-axis: deposit rates as percentages per annum; y-axis: frequencies as percentages)

- October 2016
- June 2014

a) NFCs

b) Households
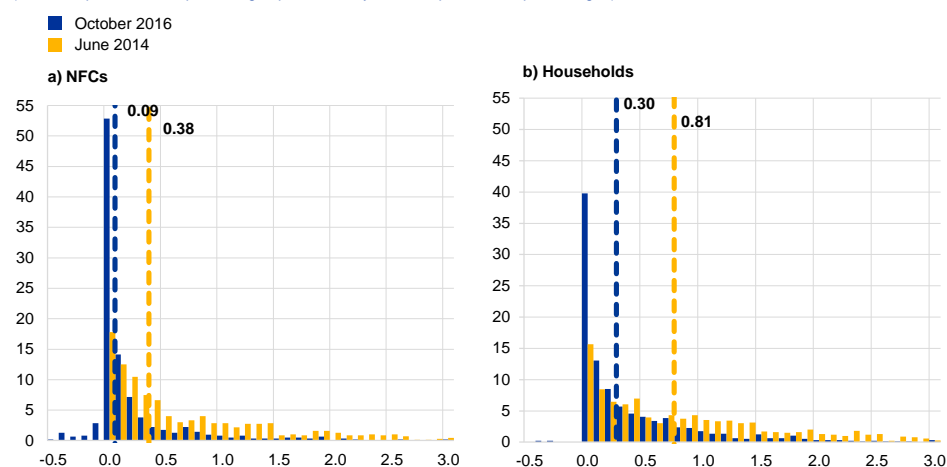
Source: ECB.
Notes: Deposit rates on new business are used as reported by individual banks for each of the available product categories. The dotted lines show the weighted average deposit rates in June 2014 and October 2016.

Recent evidence shows that the introduction of the negative interest rate policy has been translated into a compression of bank loan-deposit interest rate margins. From the introduction of the credit easing package in June 2014, when the negative interest rate policy was first adopted, the median spread between banks' composite lending and deposit rates has narrowed (see Chart 10). The reduction has been more pronounced in the case of banks in vulnerable countries, although the spread is still considerably wider in these countries, with the median standing at 2.3 percentage points as at October 2016, compared with 1.7 percentage points in less vulnerable countries. The margins are not unprecedentedly narrow, although they also incorporate a still elevated credit risk component, particularly in vulnerable countries.

Chart 10

Spread between composite lending and deposit rates

(percentages per annum)

- euro area median
- less vulnerable countries median
- vulnerable countries median
- interquartile range
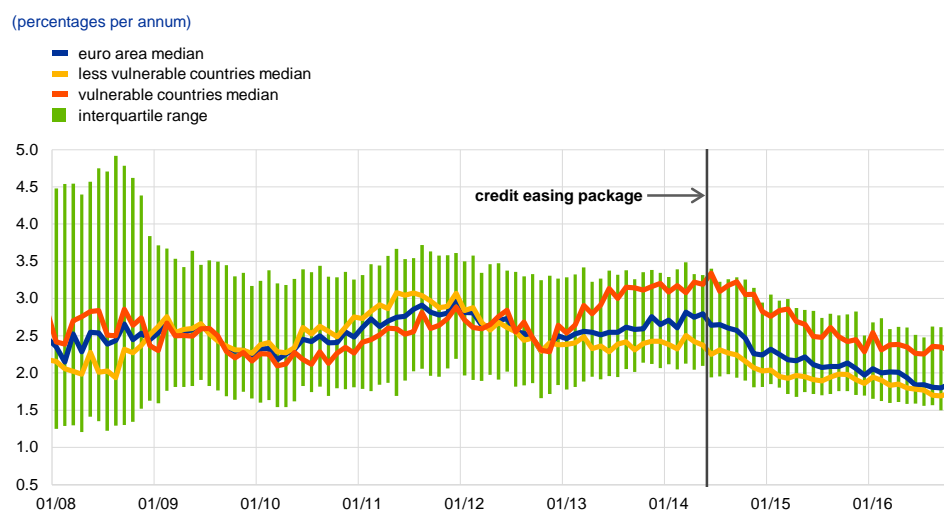
Source: ECB.
Notes: The composite deposit rate for each bank is calculated as the weighted average of rates on new deposits offered by the bank. New business volumes are used as weights. In the case of overnight deposits the change in the outstanding amount of deposits (if positive) is used as the weight. The composite lending rate for each bank is calculated as the weighted average of rates on new fixed-term loans offered by the bank. New business volumes are used as weights.

Additional qualitative information on the impact of the crisis and sovereign debt tensions, as well as the ECB's non-standard measures and introduction of the negative deposit facility rate, on bank funding and bank lending conditions, has been gathered by an ad hoc question in the euro area bank lending survey.[12] Banks' responses to the survey indicate that the initial strong impact of the sovereign debt crisis on bank funding conditions and credit standards in the fourth quarter of 2011 subsided following the three-year longer-term refinancing operations and the announcement of the Outright Monetary Transactions, which began to have an easing impact in the second half of 2013. Responses to the ad hoc question on the impact of the negative deposit facility rate introduced in April 2016 highlighted a decline in banks' net interest income, a decrease in lending rates and a narrowing of loan margins. According to the respondents, the ECB's non-standard measures[13] had a positive impact on their liquidity position (in particular, the TLTROs had a predominantly positive impact) and a mixed impact on their profitability. Banks' assessment of the impact of the TLTROs on their profitability is more positive compared with the impact of the APP; this reflects the attractive TLTRO funding conditions, in particular those of TLTRO-II. The responses indicate that both the TLTROs and the APP have had an impact on banks' liquidity and funding conditions, which has allowed them to pass through eased monetary policy conditions to their customers. In this respect, the TLTROs and the APP have contributed to enhancing monetary policy transmission and repairing the bank lending channel.

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[12] See Köhler-Ulbrich, P., Hempell, H.S. and Scopel, S., "The euro area bank lending survey", *Occasional Paper Series*, No 179, ECB, September 2016.

[13] The TLTROs in June 2014, TLTRO-II in March 2016 and the announcement of the APP in January 2015. See, for example, "The transmission of the ECB's recent non-standard monetary policy measures", *Economic Bulletin*, Issue 7, ECB, 2015.

Changes in pass-through regularities

The traditional monetary policy transmission mechanism assumes that policy rates – and therefore market reference rates – are the most direct determinants of retail bank lending rates. Yet, today, this framework is ill-equipped to explain two important phenomena: the increased heterogeneity in bank retail lending rates observed since the start of the financial crisis in 2008 (see Chart 1) and wide differences in the pass-through of recent ECB non-standard measures. Chart 11 displays the evidence from the standard pass-through models, which link developments in lending rates exclusively to the development of market reference rates.[14] The chart shows forecasted and actual changes in short-term lending rates for NFCs (Chart 11a) and households for house purchase (Chart 11b) for two periods: (i) between January 2011 (when the sovereign debt crisis intensified) and March 2014 (just before the introduction of the credit easing package), and (ii) between January 2011 and November 2016. The actual changes in lending rates are greater than the forecasted changes during the first period and not as great during the second period in the case of Italy and Spain, confirming that the standard pass-through models are ill-equipped to explain the high lending rates during the sovereign debt crisis and the impact of the current non-standard policy measures on lending rates.

Chart 11

Forecasted and actual changes in short-term lending rates between January 2011 and March 2014 and between January 2011 and November 2016

(changes in basis points)
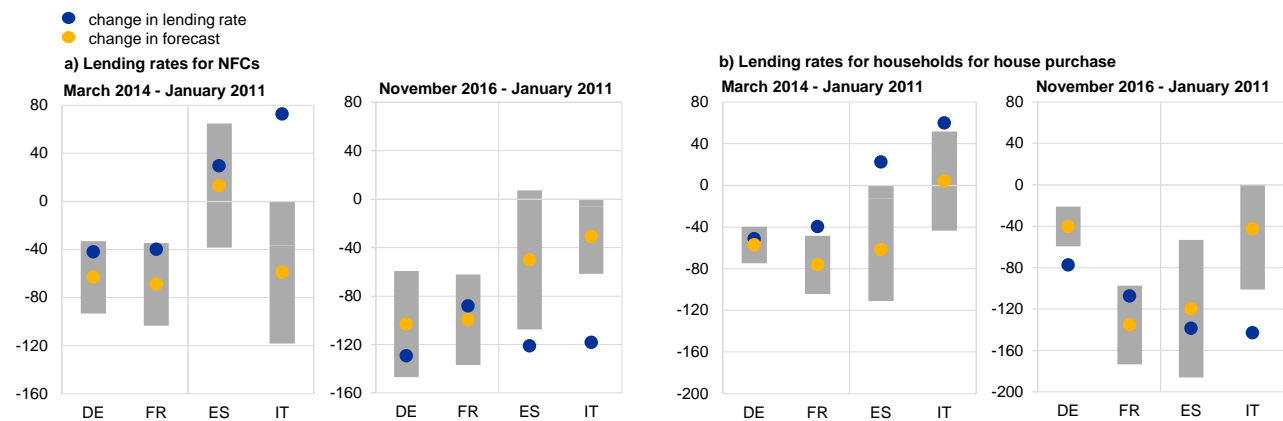
Sources: ECB and ECB calculations.
Notes: Forecasts are compiled on the basis of the standard pass-through models. Lag specifications for the country-specific error-correction equations are obtained by employing the general-to-specific approach. The rectangles show the average 95% confidence interval over the forecast period for a model estimated over the full sample.

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14   This follows the methodology described in Darracq Pariès et al., with some modifications. See Darracq Pariès, M., Moccero, D., Krylova, E. and Marchini C., "The retail bank interest rate pass-through: the case of the euro area during the financial and sovereign debt crisis", *Occasional Paper Series*, No 155, ECB, August 2014. The standard simple single equation pass-through model assumes the absence of any explanatory variables in the lending rate adjustment mechanism, except the market reference rate, i.e. the rate at which banks can raise funds in the interbank money market. It is modelled by an error correction mechanism, which includes the long-term equilibrium pass-through and the short-term correction adjustment. This equation is estimated employing the general-to-specific approach. The general equation is estimated recursively. The most insignificant parameter, describing short-term adjustment, with the highest p-value, is eliminated from regressions at each step; the procedure is repeated until only significant lags are left in the obtained specific equation.

A synthetic way to assess the changes in the pass-through mechanism is to consider the rolling empirical impulse response functions (IRFs) to an increase in policy rates. The breakdown of standard pass-through relationships[15] has previously been illustrated in the literature by (i) comparing cumulative changes in lending rates with cumulative changes in the ECB policy rate for different periods, (ii) comparing the forecasted changes with the actual changes in lending rates[16] or (iii) checking the stability of the common long-run pass-through coefficient in a panel model[17]. However, the lag structure influences and mitigates the overall pass-through; it is therefore not sufficient to focus only on the long-run pass-through coefficients. A synthetic way to assess the cumulative responses to a policy rate shock is to consider the rolling empirical IRFs to a 1% increase in market reference rates. This analysis shows that the pass-through is sluggish: the impulse from a policy rate shock is not immediately transferred to lending rates but takes approximately one year. In addition, as shown in previous studies, pass-through was stronger in 2007-10 and started to decline subsequently. Recent developments highlight the increase in impulse responses of both short and long-term corporate lending rates in the vulnerable countries in the sample (Italy and Spain).

Some research findings point to the necessity of using the marginal cost of funding for banks instead of policy or market reference rates in empirical models of the pass-through mechanism. As banks obtain funds from different sources, encompassing liabilities of different maturities and risk characteristics, the weighted average bank cost of funding may diverge significantly from policy rates. For example, von Borstel et al. decomposed the pass-through into its various elements, capturing the transmission from (i) policy rates to risk-free rates, (ii) risk-free rates to sovereign funding costs, (iii) sovereign funding costs to bank funding costs, and (iv) bank funding costs to retail lending rates.[18] Their framework uses a large number of variables to explain the pass-through, accounting for lending and deposit rates, and sovereign and CDS spreads, and includes weighted average bank funding costs. Illes et al. used a panel cointegration framework, where the long-run pass-through coefficients between lending rates and funding costs were common among countries but short-term adjustment was country-specific.[19] They documented a stable long-run relationship between lending rates and funding costs over the sample, which spanned both the pre- and post-crisis periods.[20] A similar

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[15] In contrast, von Borstel et al. used FAVAR models and found that, while the transmission of conventional monetary policy to bank lending rates has not changed with the financial crisis, the composition of the pass-through has changed. See von Borstel, J., Eickmeier, S. and Krippner, L., "The interest rate pass-through in the euro area during the sovereign debt crisis", *Discussion Paper*, No 10, Deutsche Bundesbank, 2015.

[16] As in Darracq Pariès et al. (see footnote 14).

[17] See Illes, A., Lombardi, M.J. and Mizen, P., "Why did bank lending rates diverge from policy rates after the financial crisis?", *BIS Working Papers*, No 486, February 2015.

[18] See reference in footnote 15.

[19] See footnote 17.

[20] In contrast, Harimohan et al. examined the pass-through of individual bank funding costs to retail loan and deposit rates in the United Kingdom and found that the common component of funding costs passes through quickly and completely, but that cost changes which are not homogeneous across banks exhibit slower pass-through and are affected by market competition. See Harimohan, R., McLeay, M. and Young, G., "Pass-through of bank funding costs to lending and deposit rates: lessons from the financial crisis", *Staff Working Paper*, No 590, Bank of England, April 2016.
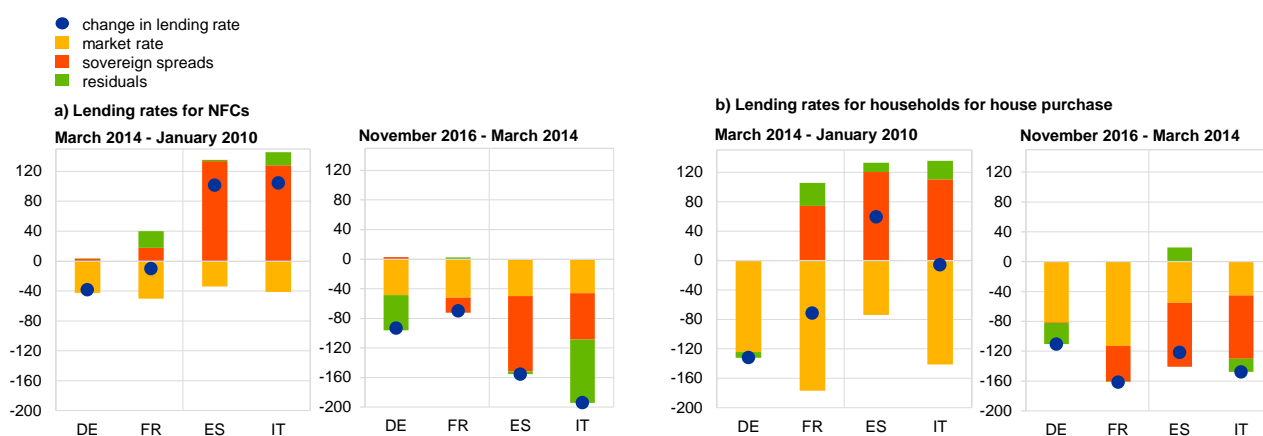
exercise, employing single-equation error-correction models instead of panel approaches, provides less stable empirical response functions compared with models which use market reference rates instead of funding costs[21].

Recent publications have highlighted a large number of additional factors[22] **behind the changes in pass-through regularities.** The small scale of error-correction models does not enable many explanatory variables to be inputted; therefore, these models concentrate solely on the most important ones. Non-standard ECB monetary policy measures aim to restore the bank lending channel and contribute to repairing the policy transmission mechanism; assessing their impact on the overall pass-through is a challenging task, however.

Chart 12
Contribution of explanatory factors to the changes in composite lending rates

(percentage per annum)

- ● change in lending rate
- ■ market rate
- ■ sovereign spreads
- ■ residuals

a) Lending rates for NFCs

b) Lending rates for households for house purchase

Sources: ECB and ECB calculations.
Notes: Lending rates are decomposed on the basis of pass-through models, including sovereign spreads as a risk factor. Contributions for composite lending rates are compiled from contributions for short and long-term lending rates using a weighting scheme based on smoothed new business volumes. EURIBOR three-month and two-year swap rates are used as market reference rates for short and long-term lending rates respectively. Lag specifications for the country-specific error-correction equations are obtained by employing the general-to-specific approach.

The introduction of the sovereign spread as an additional explanatory variable in the pass-through process sheds light on how sovereign market tensions have influenced the transmission mechanism. Chart 12 displays a breakdown of lending rates by explanatory variables. The decline in market reference rates from the start of the sovereign debt crisis in 2010 until March 2014 put downward pressure on retail lending rates in all countries in the sample, but was offset by the sharp increase of sovereign spreads in Italy and Spain. This even led to an increase

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[21] This involves the construction of the country-specific weighted average of banks' funding costs, aggregating traditional funding through retail deposits, issuances of bank bonds and net Eurosystem borrowing. Aggregation is based on outstanding amounts. Deposit rates are computed as a weighted average of overnight deposits, deposits with agreed maturity and deposits redeemable at notice, with their corresponding new business volumes. Lag specifications for the country-specific error-correction models are obtained by employing the general-to-specific approach.

[22] For example, Blagov et al. employ a Markov-switching VAR with endogenous transition probabilities to show that (i) global risk factors have contributed to higher lending rates in Italy and Spain, (ii) problems in the banking sector help to explain the impairment in Spain, and (iii) fiscal problems and contagion effects have contributed to the interest rate pass-through impairment in Italy and Ireland. See Blagov, B., Funke, M. and Moessner, R., "Modelling the time-variation in euro area lending spreads", *BIS Working Papers*, No 526, November 2015.

in corporate lending rates in Italy and Spain over this period. At the same time, the fall in German government bond yields, due to the flight-to-quality and liquidity effects during the crisis, put extra downward pressure on short-term lending rates in Germany, causing them to decline slightly more than foreseen by historical regularities. In contrast, the decline in sovereign bond yields from 2014 onwards led to a more pronounced reduction in lending rates in Italy and Spain compared with other countries, which resulted in a further contraction of the cross-country dispersion of lending rates.

The introduction of negative deposit facility rates embodies a special case of a conventional easing policy which, due to frictions or institutional arrangements, may lead to non-linearity in the pass-through mechanism. The existence of cash offers a zero-yielding alternative to deposits, introducing downward rigidity in the pricing of deposits (see Chart 9). Certain institutional features permeating the financial system contribute to additional frictions within the transmission mechanism (e.g. in some jurisdictions, legal restrictions on the application of negative rates, differing tax treatments of negative interest rate income and specifications of financial contracts, according to which payments from lenders to borrowers are not permitted). Theoretical and empirical literature covering this topic is in short supply. Brunnermeier and Koby have developed a theoretical model in which it is possible for accommodative monetary policy to reverse its effect and become contractionary; this occurs when an interest rate reaches the certain "reversal interest rate", which depends on several characteristics of the banking system and pass-through regularities.[23] Heider et al. have used granular data on the characteristics of lenders and their borrowers to show that the transmission of negative rates depends on banks' funding structure (high-deposit banks take on more risk and lend less than low-deposit banks; cautious borrowers switch from high-deposit to low-deposit banks).[24] Demiralp et al. have documented special bank balance sheet adjustments in the face of negative deposit facility rates.[25] Overall, negative deposit facility rates are accompanied by a compression of bank interest margins and a decline in bank profitability.

Box 2
Monetary policy pass-through and bank balance sheet characteristics

This box evaluates the pass-through of recent non-standard monetary policy announcements on bank lending rates.[26] More precisely, the box answers two questions. First, did the targeted

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[23] Brunnermeier, M.K. and Koby, Y., "The reversal interest rate: an effective lower bound of monetary policy", *Working Paper*, Princeton University, 2016: presented at *Monetary policy pass-through and credit markets – ECB conference 27-28 October 2016*, Frankfurt am Main, 2016.

[24] Heider, F., Saidi, F. and Schepens, G., "Life below zero: bank lending under negative policy rates", *Working Paper*, presented at *Monetary policy pass-through and credit markets – ECB conference 27-28 October 2016*, Frankfurt am Main, 2016.

[25] Demiralp, S., Eisenschmidt, J. and Vlassopoulos, T., 2016, "The impact of negative interest rates on bank balance sheets: evidence from the euro area", paper presented at *Non-Standard Monetary Policy Measures – ECB workshop 18-19 April 2016*, Frankfurt am Main, 2016.

[26] The methodology used in this box draws on Altavilla, C., Canova, F. and Ciccarelli, M., "Mending the broken link: heterogeneous bank lending and monetary policy pass-through", *Working Paper Series*, No 1978, ECB, November 2016.

longer-term refinancing operations (TLTROs), announced in June 2014, and the asset purchase programme (APP), announced in January 2015, help to change the dynamics of the distribution of lending rates and reduce the heterogeneity in lending prices across banks? Second, what are the characteristics of the banks most affected by Eurosystem non-standard policies?

According to the conventional view on the relationship between monetary policy transmission and bank balance sheet characteristics, in normal times, larger, better capitalised and more liquid banks are more resilient to monetary contractions. On average, these banks can more easily substitute sources of external financing, absorb expected future losses and divert liquidity to satisfy increases in loan demand.[27]

In periods of financial distress, however, economic and regulatory constraints might alter the effectiveness of monetary policy. This box re-examines the monetary pass-through to lending rates in the euro area during the turbulent period of 2007-15 using a monthly disaggregated dataset covering 260 banks. The dataset is sufficiently large and disaggregated to avoid cross-sectional and time series heterogeneity biases.

Analysis was conducted using a panel vector autoregressive (VAR) methodology, which accounts for dynamic interactions between bank lending, funding conditions and the macroeconomy.[28] In contrast to static pass-through equations, which are typically estimated with single-equation panel techniques, this approach has two main advantages. First, it allows for endogenous interaction between lending and funding conditions within a bank in response to monetary policy changes – interaction not covered by single equation methodologies. Second, it permits dynamic feedback between lending and funding conditions. These dynamic repercussions are disregarded in static models and improperly measured in single equation dynamic set-ups.

The impact of monetary policy on lending rates was computed in two steps. First, using a high-frequency event study methodology, the responses of asset prices to announcements of non-standard measures were calculated from May 2014 to December 2015.[29] A comparison was then made between (i) lending rate dynamics obtained by mapping the policy-induced component of these variables onto individual bank lending rates, and (ii) those obtained by assuming that these variables have evolved unconditionally since May 2014.

Such a two-step approach is appealing because it captures the instantaneous effects of non-standard measures on financial markets – effects which are likely to be washed out when monthly data are used.

The estimates suggest that the combined effects of the non-standard measures implemented since June 2014 have significantly lowered yields in a broad set of financial market segments. The results

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[27]   See Kashyap, A.K. and Stein, J.C., "What do a million observations on banks say about the transmission of monetary policy?", *American Economic Review*, Vol. 90, No 3, 2000, pp. 407-428; Peek, J. and Rosengren, E.S., "Bank lending and the transmission of monetary policy", in Peek, J. and Rosengren, E.S. (eds.), *Is Bank Lending Important for the Transmission of Monetary Policy?*, Federal Reserve Bank of Boston Conference Series, No 39, June 1995, pp. 47-68; and Kishan, R.P. and Opiela, T., "Bank size, bank capital, and the bank lending channel", *Journal of Money, Credit and Banking*, Vol. 32, No 1, February 2000, pp. 121-141.

[28]   See footnote 26.

[29]   See Krishnamurthy, A. and Vissing-Jorgensen, A., "The effects of quantitative easing on interest rates: channels and implications for policy", *Brookings Papers on Economic Activity*, Vol. 43, Issue 2, pp. 215-287; and Altavilla, C., Carboni, G. and Motto, R., "Asset purchase programmes and financial markets: lessons from the euro area", *Working Paper Series*, No 1864, ECB, November 2015.

point to a sizeable impact for long-term sovereign bonds, with the median cumulative decline in ten-year yields amounting to about 100 basis points across euro area countries at the end of the sample period. The spillovers to yields of untargeted assets are significant in the case of euro area financial corporate bonds (see Chart A). The median reduction in bank bond yields across MFIs equals almost 40 basis points by the end of 2015.

Chart A
Changes in sovereign yields and bank bond yields due to non-standard measures

(percentages per annum)
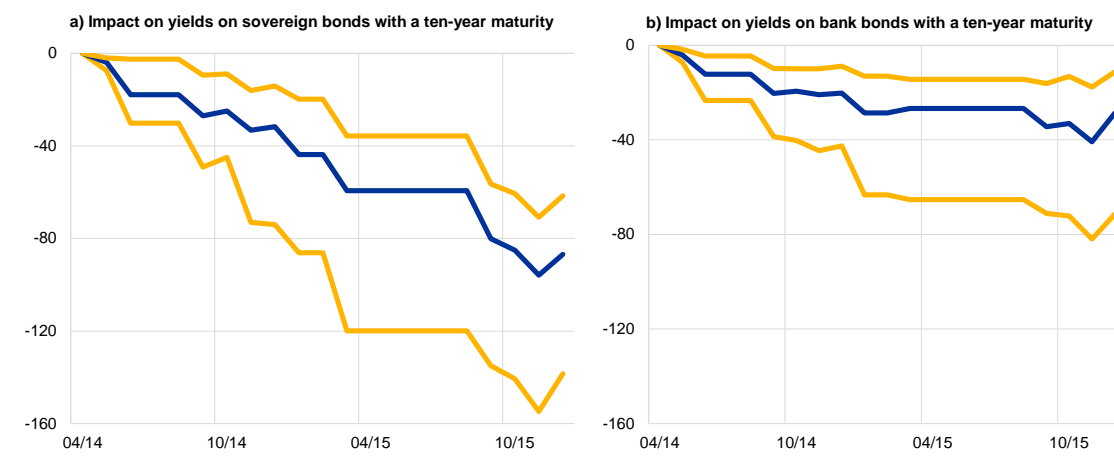
Source: Altavilla, C., Canova, F. and Ciccarelli, M., "Mending the broken link: heterogeneous bank lending and monetary policy pass-through", *Working Paper Series*, No 1978, ECB, November 2016.
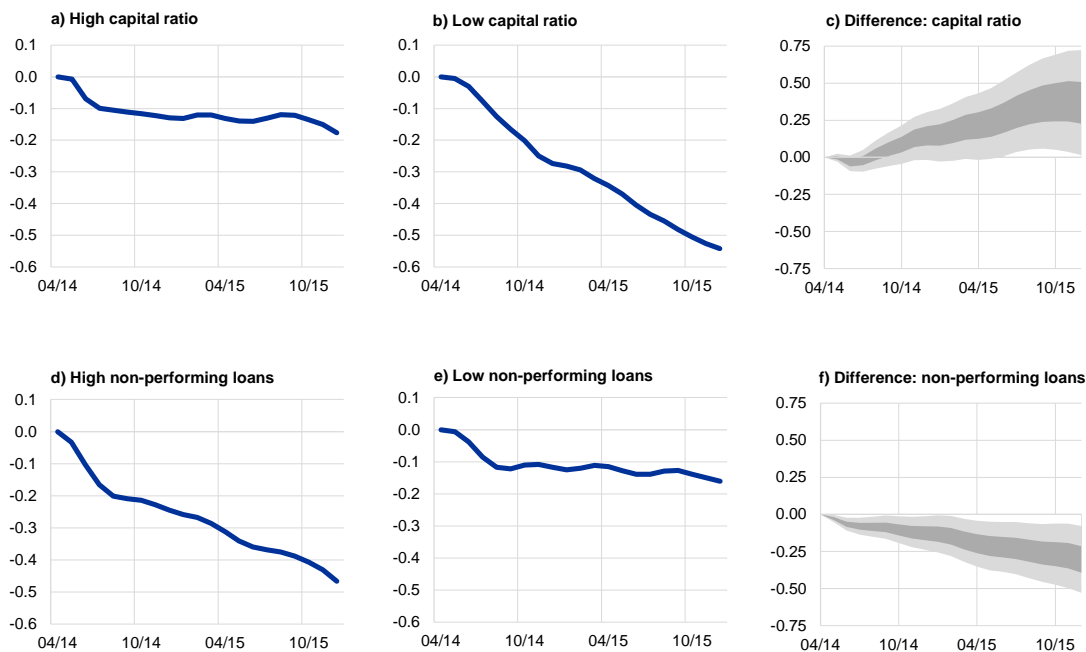Notes: The charts report the cumulated effects of non-standard measures on sovereign yields (equal for all banks operating in the same country) and on bank bond yields (different for each bank). The blue solid line is the median; red lines denote the 5th and 95th percentiles of the distribution.

Balance sheet characteristics matter for explaining the reduction in the spread of the lending rate response distribution. The effect on individual banks' lending rates was obtained by taking the difference between the policy-induced lending rates and the lending rates that, in the absence of the policy, would have prevailed since May 2014. The results suggest that non-standard measures were particularly effective in lowering lending rates for banks with a high share of non-performing loans and low capital. The median difference between the upper and lower quartiles of the distribution sorted by these characteristics is up to 40 basis points and differences become highly significant after about 18 months (see Chart B).

Chart B

Lending rate differences by bank characteristics

(percentage points)

a) High capital ratio

b) Low capital ratio

c) Difference: capital ratio

d) High non-performing loans

e) Low non-performing loans

f) Difference: non-performing loans

Source: Altavilla, C., Canova, F. and Ciccarelli, M., "Mending the broken link: heterogeneous bank lending and monetary policy pass-through", *Working Paper Series*, No 1978, ECB, November 2016.
Notes: The charts show the average responses in the top and bottom quartiles of the lending rate distribution sorted by bank characteristics. Shaded areas in the third column are the interquartile (dark grey), and the 95% (light grey) ranges. Posterior distributions are obtained using a VAR for each bank with the bank bond yield variable.

The improved credit conditions in the euro area have aided in pushing the monetary policy accommodation through the intermediation chain to reach households and firms. Non-standard measures have helped to normalise lending conditions, reduce the cross-sectional dispersion of lending rates and produce a larger pass-through in the medium run. Better lending conditions for NFCs materialised because of an improvement in the instantaneous pass-through and because of dynamic funding cost relief and signalling effects. The positive impact on banks' funding costs has incentivised them to pass on the cost relief to final borrowers by granting more credit on better conditions.

Box 3

The propagation of bank lending rates to the broader economy: perspectives from a dynamic stochastic general equilibrium model

This box evaluates the pass-through to bank lending rates through the lens of the Darracq Pariès, Jacquinot and Papadopoulou macro-financial model[30] (hereinafter the DJP model) by simulating the effect on lending rates and output of the decrease in sovereign yields resulting from the combined impact of the non-standard measures implemented from June 2014 to June 2015. More precisely,

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[30]   See Darracq Pariès M., Jacquinot, P. and Papadopoulou, N., "Parsing financial fragmentation in the euro area: a multi-country DSGE perspective", *Working Paper Series*, No 1891, ECB, April 2016.

the box shows how the main factors influencing lending rates in the simple accounting model can be mapped and modelled in the DJP model.[31] As explained in Darracq Pariès, Jacquinot and Papadopoulou[32], the factors that lay in the interplay of credit risk in the sovereign, banking and corporate sectors during the crisis indeed result in a widening of lending rate spreads and increased fragmentation.[33] Through the lens of the same model, the box also tries to shed light on the macroeconomic transmission of unconventional monetary policy measures and their impact on lending rates following the full package of non-standard measures introduced by the ECB from June 2014 up to the June 2015 and the concomitant decrease in sovereign yields.[34] Simulation results can explain the narrowing of lending rate spreads, receding fragmentation and improvement of economic conditions.

The DJP model is a multi-country dynamic stochastic general equilibrium (DSGE) model for the euro area, which considers granular banking, sovereign and financial frictions, and wide cross-country heterogeneity through a six-region global model. It is calibrated for Germany, Spain, France, Italy, the rest of the euro area and the rest of the world. It features a reduced-form sovereign-banking nexus, risky banks acting in a monopolistic manner, financial frictions associated with corporate default, and cross-border lending. These features render the model suitable for analysing the heterogeneity in bank lending rates observed across euro area countries and the role of sovereign and financial spillovers in the international propagation of shocks.

In the model, impairments in the transmission mechanism of monetary policy are related to both the demand and supply of credit and can be identified by decomposing the final lending rate into a chain of four distinct segments of financing costs faced by different agents. This decomposition is consistent with, mirrors and can be linked to the simplified accounting model on lending rate determination exemplified in the section entitled "Behaviour of and driving forces behind lending rate setting in the euro area" in this article. It can represent the intermediation wedges which constitute specific typologies of financial frictions that can independently represent the epicentre of a specific financial disturbance that emerged during the euro area financial crisis and had a bearing on the pass-through to commercial lending rates. Furthermore, the intermediation wedges can also constitute the basic elements for analysing the recent unconventional monetary policy measures introduced by the ECB. The first financing segment relates to banks' funding costs, which correspond to the monetary policy rate augmented to compensate for sovereign risk, approximating the spillovers from domestic sovereign tensions to bank funding conditions. The second segment considers the banker's decision problem, which features financial frictions associated with bank-specific vulnerabilities in the form of weak capital positions and funding constraints. The third segment of the financial intermediation focuses on the monopolistic margins in lending rate setting by retail branches. The fourth segment relates to the final stage of the financial intermediation, involving the compensation of credit risk in the provision of loans to firms.

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[31] See the section entitled "Behaviour of and driving forces behind lending rate setting in the euro area".
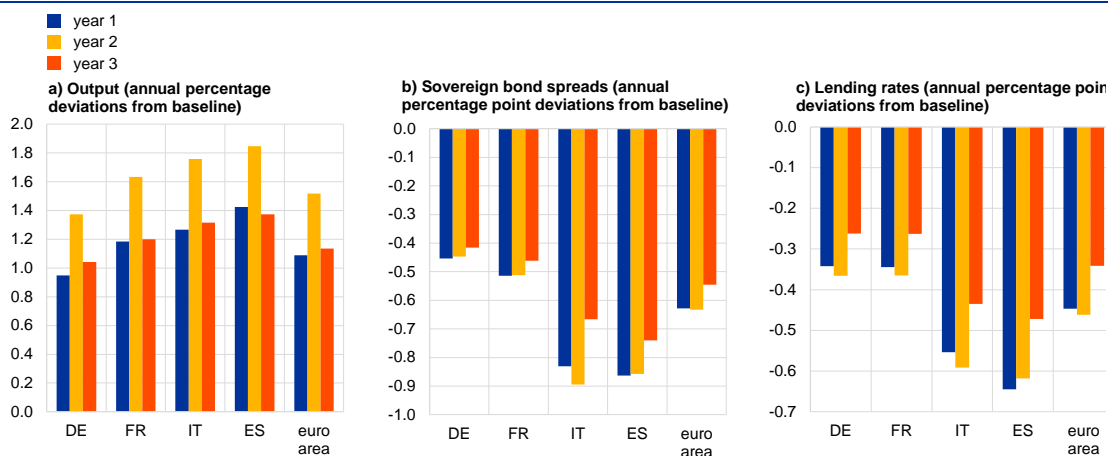
[32] See footnote 30.

[33] See the section entitled "Behaviour of and driving forces behind lending rate setting in the euro area".

[34] As estimated in Altavilla, C., Canova, F. and Ciccarelli, M., "Mending the broken link: heterogeneous bank lending and monetary policy pass-through", *Working Paper Series*, No 1978, ECB, November 2016.

Chart A

Macroeconomic impact of APP subject to the zero lower bound

a) Output (annual percentage deviations from baseline)

b) Sovereign bond spreads (annual percentage point deviations from baseline)

c) Lending rates (annual percentage point deviations from baseline)

Source: ECB calculations based on Darracq Pariès, M., Jacquinot, P. and Papadopoulou, N., "Parsing financial fragmentation in the euro area: a multi-country DSGE perspective", *Working Paper Series*, No 1891, ECB, April 2016.
Note: Simulations are conducted based on an endogenous zero lower bound on interest rates, which binds for approximately two years.

In the aftermath of the financial crisis, the ECB embarked on a series of non-standard monetary policy measures in an attempt to mitigate the adverse consequences of the financial crisis. These measures have helped to narrow lending rate dispersion via the compression of sovereign yields and to improve economic activity in times when interest rates have reached the zero lower bound. The decrease in sovereign yields up to June 2015, resulting from the full package of non-standard measures, was simulated in an attempt to shed light on the aggregate impact on output and lending rates. As Chart A shows, the macroeconomic impact is stronger for vulnerable countries, such as Italy and Spain. The compression of sovereign yields is expected to spread through the economy, lowering lending rates and narrowing spreads via the indirect pass-through channel of non-standard measures, which ease borrowing conditions in the private non-financial sector by providing funding cost relief for banks.

Conclusions

This article has analysed lending rate pass-through in the time of non-standard measures. Empirical evidence shows that lending rate dispersion increased during the recent financial crisis, with a high degree of fragmentation, and reversed more recently, in particular since the introduction of the credit easing package in 2014. Many factors have played an important role in the transmission of conventional and unconventional monetary policy to lending rates.

Empirical evidence has shown that the simple pass-through models are ill-equipped to describe the behaviour of lending rates. This appears to be the case for both the euro area financial crisis and the periods in which non-standard measures have been in force. The introduction into the models of additional factors influencing pass-through regularities improves both the forecasting and the stability of the pass-through mechanism.

The sovereign-banking nexus has been a key source of concern during the euro area sovereign debt crisis. This is due to the fact that banks' holdings of domestic sovereign debt increase the transmission of sovereign stress to bank lending and solvency risk in vulnerable countries. As argued above, the implementation of non-standard measures by the ECB significantly reduced the short and medium-run costs of the financial crisis.

Against this background, banking union is crucial in order to resolve remaining structural weaknesses and eliminate the sovereign-banking nexus, thereby leading to a more robust banking system in the euro area and a more uniform transmission of monetary policy. EU institutions took historic steps towards banking union by agreeing to establish a Single Supervisory Mechanism and a Single Resolution Mechanism for banks. In November 2015, as a further step towards fully operational banking union, the European Commission put forward a proposal for a European deposit insurance scheme (EDIS) to provide a more solid and harmonised form of insurance cover for all retail depositors.