

## ARTICLES

# MONETARY POLICY TRANSMISSION IN THE EURO AREA, A DECADE AFTER THE INTRODUCTION OF THE EURO



*By removing risks associated with movements in intra-euro area exchange rates and having a central bank with a clear mandate to maintain price stability over the medium term, the introduction of the euro has made a central contribution to the firmer anchoring of inflation expectations in the euro area as a whole and a more effective stabilisation of price and economic developments.*

*At the same time, over the last ten years a number of additional factors, mainly related to changes in the financial sector, are likely to have affected the properties of monetary policy transmission in the euro area. The first decade of the monetary union coincided with an intense process of financial innovation. The fact that banks could easily securitise part of their loan portfolios and have proven increasingly capable of obtaining financing directly from financial markets has rendered the bank lending channel of monetary policy less effective in normal times. Furthermore, the advent of securitisation and, in general, the enhanced ability of banks to transfer credit risk have also led to more intense, sometimes excessive, risk-taking behaviour by banks, as exemplified by laxer lending standards and the proliferation of complex financial structures. These transformations in the financial system may in fact have amplified the impact of monetary policy, in particular as regards its impact on risk-taking attitudes in the financial system. The potential intensification of this transmission channel has posed challenges for the conduct of monetary policy, since monetary policy must focus on price stability as its primary objective. While individually important, all of these different changes are likely to have had offsetting effects on the overall transmission mechanism. In fact, available empirical evidence at the aggregate level suggests that the short to medium-term dynamics of real output and inflation in response to monetary policy changes have not been fundamentally altered.*

*During the recent episode of financial turmoil, it was clear that, in order to keep the interest rate pass-through channel operational, there was a need to introduce non-standard monetary policy measures in a timely manner. The available evidence suggests that these policies have been effective in this regard. Looking ahead, ongoing efforts to enhance the regulatory and supervisory frameworks and the resilience of the financial system will probably also induce certain changes in the properties of monetary policy transmission by curtailing systemic risk and thereby containing macroeconomic fluctuations. While the nature and extent of possible changes in monetary policy transmission are very difficult to assess at the current juncture, regulatory proposals that aim to ensure that banks have more prudent capital ratios and liquidity management should temper banks' risk-taking behaviour over the business cycle, thus diminishing the amplitude of financially induced acceleration mechanisms. The monitoring of such developments and the impact of regulatory changes on the economy as a whole, and the transmission mechanism in particular, is warranted.*

### I INTRODUCTION

The Governing Council of the ECB is responsible for making monetary policy decisions aimed at maintaining price stability over the medium term. The monetary policy transmission mechanism refers to the process through which these decisions affect the economy in general and, in particular, the level of prices. In a very

simplified framework, monetary policy is transmitted, via the central bank's intervention in the money markets, to bank lending and deposit rates. Subsequently, changes in these interest rates affect decisions on consumption and investment, which, in turn, ultimately determine the level of prices. This channel, commonly known as the interest rate channel, can be complemented by the additional effects

of monetary policy on, among other things, the behaviour of banks, the exchange rate and agents' expectations.<sup>1</sup>

In 1999 the Eurosystem launched a research network to study the transmission of monetary policy. The Monetary Transmission Network (MTN) assembled a comprehensive set of studies on how the ECB's monetary policy decisions were affecting the then newly formed euro area, thus providing an exhaustive overview of the information on the transmission mechanism that was available at the time.<sup>2</sup> Its main conclusions can be summarised as follows. Monetary policy affects the economy mainly through the interest rate channel: a tightening of monetary policy was found to lead to a transitory decrease in output, which was estimated to reach its maximum between one and two years after the change in monetary policy. Prices were estimated to decline gradually, responding much more slowly to the change in monetary policy than output. Beyond these aggregate effects, and in line with the credit channel of monetary policy, it was found that interest rate changes could also affect economic activity via its impact on firms' cash flows and the supply of bank loans. The supply of bank loans was found to be related mainly to the impact of these changes on the availability of liquid funds, while other channels, such as the potential role of bank capital in the transmission of monetary policy, were not found to be significant.

Four important developments which are likely to have had an impact on the transmission of monetary policy have occurred in the global and euro area economies since the MTN studies were conducted. The first is the continuous process of structural reform, particularly in the labour and product markets, witnessed in the euro area since its creation. Second, the launch of the euro itself, which brought about important changes, notably the removal of risks associated with movements in intra-euro area exchange rates and the centralisation of monetary policy decisions on behalf of all euro area countries. Third, there has been a

rapid pace of financial innovation, as well as important changes to the regulatory framework governing banks. Financial innovation has been reflected, in particular, in the widespread use of securitisation and new financial instruments to manage risks. Finally, the recent financial crisis posed a serious threat to the proper functioning of the transmission mechanism.

In addition to these developments, research methodologies have progressed considerably over the last decade: new areas, such as the "risk-taking channel" of monetary policy, have been studied in the field of monetary policy transmission, and new and more accurate datasets are now available. The most obvious change in this respect is the availability of more than one decade's worth of genuine euro area data, in contrast with the data employed in the MTN studies, which relied on aggregates of national data from the pre-EMU period.

Thus, the aim of this article is to document what has been learned over the past decade and to assess how and to what extent the transmission of monetary policy in the euro area may have changed in comparison with the findings of the MTN.<sup>3</sup> To this end, the next three sections discuss structural reforms in the euro area labour market, the introduction of a new monetary regime and the process of financial innovation and bank regulation. An assessment of the overall impact of these factors on the transmission mechanism is provided in Section 5. Section 6 discusses the changes in the transmission mechanism caused by the financial crisis. Finally, Section 7 concludes and discusses the potential changes to monetary policy

1 For a detailed description of the various channels through which monetary policy can affect the economy and the price level, see the article entitled "Monetary policy transmission in the euro area" in the July 2000 issue of the Monthly Bulletin.

2 See the webpage of the Eurosystem's Monetary Transmission Network at [http://www.ecb.europa.eu/home/html/researcher\\_mtn.en.html](http://www.ecb.europa.eu/home/html/researcher_mtn.en.html).

3 With a view to understanding the implications that these four major developments have had for the transmission of monetary policy, the ECB held a workshop entitled "Monetary policy transmission mechanism in the euro area in its first ten years" in Frankfurt am Main on 28-29 September 2009. The articles presented at this workshop can be found at <http://www.ecb.europa.eu/events/conferences/html/moneymechanism.en.html>.

transmission that can be expected from the new regulatory framework currently under discussion.

## 2 STRUCTURAL REFORMS IN THE LABOUR MARKET AND THE RESPONSE OF REAL WAGES TO MONETARY POLICY SHOCKS

The implementation of much needed reforms in labour and product markets was part of the guidelines put forward in the Lisbon agenda to promote a competitive and knowledge-based economy. Progress with structural reforms since the introduction of the euro has materialised in the form of strong employment growth and record low levels of unemployment in many euro area countries prior to the economic downturn. Importantly, reforms in labour and product markets which affect the reduction of nominal rigidities have a crucial impact on the conduct of monetary policy.

According to the predictions of standard textbook models, in a model where wage stickiness is the dominant friction, real wages should fall in response to an expansionary monetary policy shock, because demand shocks lead to an increase in prices and output. In a model with a non-Walrasian labour market and rigid nominal wages, the resulting increase in the level of prices generates a decline in real wages. By contrast, in a model where price stickiness is the dominant friction, monetary policy shocks should have the opposite effect on real wages.

An early study found a small negative response of real wages to monetary policy shocks in the euro area.<sup>4</sup> While in that study the confidence bands were large, this result would suggest that, prior to the introduction of the euro, wage stickiness may have been the dominant friction. Interestingly, studies which have repeated the exercise using more recent data and improved methodologies have found that the sign of the response may have changed. Two studies in particular found that real wages increased in response to expansionary monetary policy

shocks.<sup>5, 6</sup> This change in the response of real wages might therefore suggest that, over the years, the relative importance of wage stickiness could have decreased. One possible explanation is that, in the light of the labour market reforms and globalisation that have taken place over the past two decades, real wages have become more responsive to cyclical conditions.

According to standard models, a lower degree of wage rigidity makes monetary policy more effective.<sup>7</sup> In other words, monetary policy changes are transmitted more quickly to inflation, while generating lower fluctuations in economic activity.

The available empirical evidence, however, suggests that downward wage rigidity remains a key feature of the euro area.<sup>8</sup> The impact of this kind of wage rigidity on the overall transmission of monetary policy is currently an active area of research.<sup>9</sup>

## 3 THE IMPACT OF THE INTRODUCTION OF THE EURO ON THE TRANSMISSION OF MONETARY POLICY

The introduction of the euro was a major structural change that transformed Europe's financial architecture. The available empirical evidence suggests that it has had two particularly relevant effects: first, the elimination of risks associated with intra-euro area exchange rates

4 F. Smets and G. Peersman, "The monetary transmission mechanism in the euro area: more evidence from VAR analysis", *Working Paper Series*, No 091, ECB, 2001.

5 A. McCallum and F. Smets, "Real wages and monetary policy transmission in the euro area", *Kiel Working Papers*, No 1360, 2007.

6 See also F. Smets and R. Wouters, "An estimated dynamic stochastic general equilibrium model of the euro area", *Journal of the European Economic Association*, 1(5), 2003, pp. 1123-1175.

7 See K. Christoffel, K. Kuester and T. Linzert, "The role of labor markets for euro area monetary policy", *European Economic Review*, 53(8), 2009, pp. 908-936.

8 See the Wage Dynamics Network at [http://www.ecb.int/home/html/researcher\\_wdn.en.html](http://www.ecb.int/home/html/researcher_wdn.en.html).

9 See, for instance, S. Fahr and F. Smets, "Downward wage rigidities and optimal monetary policy in a monetary union", presented at the conference entitled "Wage dynamics in Europe: findings from the Wage Dynamics Network" in Frankfurt am Main on 24 June 2008.

and the subsequent removal of the exchange rate risk premium, thereby fostering trade and financial integration among the euro area countries; and second, the introduction of a new monetary regime firmly oriented towards maintaining price stability, which has contributed to a better anchoring of inflation expectations across the euro area.

### THE ELIMINATION OF INTRA-EURO AREA EXCHANGE RATES

The elimination of intra-euro area exchange rates was perhaps the most immediate consequence of the introduction of the euro. The previous monetary arrangement allowed for bilateral realignments vis-à-vis the anchor currency. As a result, changes in interest rates in the anchor country were often associated with differential effects on the exchange and domestic interest rates of ERM countries. With the irrevocable fixing of exchange rates and the single monetary policy, this phenomenon has been eliminated and, as a result, the exchange rate channel is more uniform across countries.<sup>10</sup>

The elimination of the intra-euro area exchange rate risk has implied a reduction in transaction costs and higher capital market integration. While the exact magnitude differs across studies, most of them confirm that the euro has contributed to a significant increase in trade, the aggregate impact of which has been estimated to be in the range of 5-10%.<sup>11, 12</sup> The increase in cross-border bank holdings and transactions has also been significant, an effect that can essentially be attributed to the elimination of currency risk.<sup>13</sup>

### A NEW MONETARY REGIME

The centralisation of monetary policy decisions and the creation of a common central bank in charge of the euro area's single monetary policy brought with them a new monetary regime characterised by a high degree

of credibility and a clear focus on maintaining price stability. An immediate impact of this was better and more solidly anchored inflation expectations. Measures of inflation expectations extracted from both survey-based data and long-term government bonds corroborate this fact.<sup>14, 15</sup>

In addition, there is evidence of a flattening of the Phillips curve over recent years, i.e. a weaker relationship between the output gap and inflation.<sup>16</sup> One possible explanation for this is that monetary policy has become more credible since the introduction of the euro. As a result, a rise in economic activity is less likely to lead to an increase in expected inflation. Instead, households and businesses expect monetary authorities to take the necessary steps to ensure that inflation is kept in line with price stability. Upside pressures on wages and prices are therefore more easily contained.

Overall, while evaluating precisely how these documented changes could have modified the transmission mechanism remains difficult, there is agreement on the benefits of central bank credibility. In this respect, economic literature finds that the perceived credibility of central banks can indeed affect the transmission of monetary policy, by making

10 J. Boivin, M.P. Giannoni and B. Mojon, "How has the euro changed the monetary transmission?", *NBER Working Papers*, No 14190, 2008.

11 See for instance R. Baldwin, V. DiNino, L. Fontagné, R. A. De Santis and D. Taglioni, "Study on the impact of the euro on trade and foreign direct investment", *Economic Papers 321*, European Commission, 2008.

12 R.E. Baldwin, "The euro's trade effect", *Working Paper Series*, No 594, ECB, 2006.

13 See S. Kalemli-Ozcan, E. Papaioannou and J.L. Peydró, "What lies beneath the euro's effect on financial integration: currency risk, legal harmonization, or trade?", *NBER Working Papers*, No 15034, 2009.

14 M. Ehrmann, M. Fratzscher, R.S. Gürkaynak and E.T. Swanson, "Convergence and anchoring of yield curves in the euro area", *Working Paper Series*, No 817, ECB, 2007.

15 M.J. Beechey, B.K. Johannsen and A. Levin, "Are long-run inflation expectations anchored more firmly in the euro area than in the United States?", *CEPR Discussion Papers*, No 6536, 2007.

16 A. Calza, "Globalisation, domestic inflation and global output gaps", *Working Paper Series*, No 890, ECB, 2008.

stabilisation policies more effective and less costly to implement.<sup>17, 18</sup>

#### 4 FINANCIAL INNOVATION, CHANGES TO THE REGULATORY FRAMEWORK AND BANKS' RESPONSE TO MONETARY POLICY CHANGES

Economic literature analysing the transmission of monetary policy has suggested that, in addition to their direct effect on final demand, investment and prices, interest rate changes may also have an impact on the real economy through their indirect effect on the cost to firms of obtaining external financing and on banks' ability to lend.<sup>19</sup> The impact of monetary policy changes on the supply of bank loans is known as the bank lending channel. The following is a traditional textbook example of this channel: an increase in the policy-driven interest rates leads, over time, to a reduction in the availability of bank deposits (especially those with a short maturity). Unless banks are able to increase their funding via other sources, the reduction in the availability of bank funds may induce a downward adjustment of bank assets, including loans, independent of changes in the demand for loans. Such an effect is more likely to affect banks of a smaller size, with lower capital positions and insufficient liquidity buffers.

As regards this transmission channel, partly reflecting developments in financial markets, recent literature has highlighted new dimensions that enrich the current understanding of how monetary policy affects banks' capacity to grant loans and their willingness to bear risks. In this respect, particular attention has recently been devoted to analysing the implications of securitisation, market funding and financial innovation in general for the transmission of monetary policy, as well as the impact of supervisory regulations governing the capital adequacy of banks' and their incentives to take on risk as determinants of banks' loan supply. The study of these aspects is of particular importance in the case of the euro area, where financing by banks constitutes the most important

source of external financing for households and non-financial corporations.<sup>20</sup> The following two sub-sections analyse these aspects in detail.

#### SECURITISATION, MARKET FINANCING AND THE BANK LENDING CHANNEL

Leaving aside the financial market turmoil, the process of financial innovation in credit markets has been widespread across developed financial systems over the last ten years. This process was particularly rapid and dramatic in the euro area, favoured by the introduction of the euro and the associated increase in financial market integration. It was characterised by a dramatic expansion of securitisation activities and an increased reliance on market-based sources of funding.<sup>21</sup>

The possibility of securitising bank loans (i.e. issuing fixed-income securities backed by a pool of bank loans), together with an increasing recourse to other non-deposit sources of funding, such as bonds and covered bonds, opens up the opportunity for banks to obtain extra funds, thereby reducing the weight of deposits as a liability-side constraint to the expansion of bank loans. This is complemented with the possibility of moving risk off balance sheet via derivative instruments, such as credit default swaps, which further facilitates the provision of credit by helping to relieve capital constraints. As a

17 M. Darracq Pariès and S. Moyon, "Monetary policy and inflationary shocks under imperfect credibility", *Working Paper Series*, No 1065, ECB, 2009.

18 C.J. Erceg and A.T. Levin, "Imperfect credibility and inflation persistence", *Journal of Monetary Economics*, 50(4), 2003, pp. 915-944.

19 Monetary policy may have effects on variables that are typically used by lenders to assess borrowers' net worth and creditworthiness. This could, therefore, affect the cost to borrowers and their ability to obtain external financing. This is commonly referred to as the balance sheet channel of monetary policy.

20 See, in particular, the following articles in recent issues of the Monthly Bulletin: "The role of banks in the monetary policy transmission mechanism", August 2008; "The external financing of households and non-financial corporations: a comparison of the euro area and the United States", April 2009; and "Monetary policy and loan supply in the euro area", October 2009.

21 See the article entitled "Securitisation in the euro area" in the February 2008 issue of the Monthly Bulletin.

result, financial innovation tends to render the bank lending channel less effective under normal conditions, which was indeed in evidence in the euro area prior to 2007.<sup>22,23</sup>

However, while a lower dependence on bank deposits can shelter banks from potential funding constraints, it also increases the impact of financial market conditions on banks' ability to obtain funds. As suggested by the financial crisis, there is a risk that the role of securitisation as a shock absorber for bank lending could reverse when financial markets are experiencing difficulties. In fact, recent evidence suggests that the impact of supply-side constraints, especially those related to disruptions to banks' access to wholesale funding and their liquidity positions, has intensified since the onset of the financial crisis.<sup>24</sup>

#### **SUPERVISORY REGULATIONS, THE ROLE OF BANK CAPITAL AND THE RISK-TAKING CHANNEL**

The level of a bank's own resources, or bank capital, has also been identified by economic literature as a factor with the potential to affect the supply of bank loans. The basic argument is that banks with higher capital have easier access to finance, thus allowing them to grant more credit to firms. Poorly capitalised banks would, therefore, be more strongly affected by a tightening of monetary policy, as this would increase their marginal cost for obtaining external finance. This mechanism, which reinforces the bank lending channel, is usually referred to as the bank capital channel of monetary policy.

This channel is particularly relevant in bad times, when capital is scarcer and banks find it more difficult to raise capital. In fact, recent evidence supports the view that banks with lower capital grant fewer loans when GDP growth is lower.<sup>25</sup>

The capital adequacy of banks is closely steered by supervisory regulations. In this respect, the Basel II accord published in June 2004, which aimed to create international standards on

supervisory regulations governing the capital adequacy of banks, is likely to have brought non-negligible changes to the transmission of monetary policy.

A new stream of literature has recently developed which suggests that monetary policy may also affect banks' incentive to bear risk when providing loans. This mechanism, usually referred to as the risk-taking channel of monetary policy, complements the understanding of the bank lending channel. While the traditional bank lending channel focuses on the quantity of loans supplied, the risk-taking channel emphasises the effects of monetary policy on the risks that banks are willing to accept when granting loans.

The risk-taking channel is thought to operate mainly via two mechanisms. First, low interest rates boost asset and collateral values. This, in conjunction with the belief that the increase in asset values is sustainable, leads both borrowers and banks to accept higher risks. Second, low interest rates makes riskier assets more attractive, as agents search for higher yields. In the case of banks, these two effects usually translate into a softening of credit standards, which can lead to an excessive increase in loan supply. From a policy perspective, an intensification of the risk-taking channel could pose challenges for the conduct of monetary policy, since monetary policy must focus on price stability as its primary objective.

While the empirical testing of this transmission channel is subject to a number of challenges,

22 See Y. Altunbas, L. Gambacorta and D. Marquéz-Ibañez, "Securitisation and the bank lending channel", *European Economic Review*, 53(8), November 2009, pp. 996-1009.

23 See E. Loutsikina and P.E. Strahan, "Securitisation and the declining impact of bank finance on loan supply: evidence from mortgage acceptance rates", *NBER Working Papers*, No 11983, 2006.

24 See H.S. Hempell and C. Kok Sørensen, "The impact of supply constraints on bank lending in the euro area: crisis-induced crunching?", presented at the ECB workshop on "Challenges to monetary policy implementation beyond the financial market turbulence" in Frankfurt am Main on 30 November 2009.

25 See Y. Altunbas, G. de Bondt and D. Marquéz-Ibañez, "Bank capital, bank lending and monetary policy in the euro area", *Kredit und Kapital*, May 2004; and A. Maddaloni and J.L. Peydró, "Bank lending standards and the origins and implications of the current banking crisis", ECB Research Bulletin No 9, March 2010.

there does seem to be evidence – for both the euro area and the United States – of a link between monetary policy stance and the degree to which banks take risks.<sup>26</sup> According to this literature, low short-term interest rates lead to an increase in banks' appetite for risk in terms of both quantity (increase in size and number of loans granted) and prices (lower interest rates on loans granted). This effect is stronger when focusing on short-term interest rates, and also increases with higher levels of securitisation activity.<sup>27</sup>

The advent of securitisation and, in general, the possibility of transferring credit risk observed over the past ten years may have contributed to more risk-taking by banks, as exemplified by laxer lending standards and insufficient monitoring. Indeed, according to the Eurosystem's bank lending survey, one of the main drivers of the cumulative net tightening of euro area banks' credit standards since the beginning of the financial turmoil was the disruption of the securitisation market. In this respect, it is worth recalling that the proliferation of complex financial structures not subject to sound regulatory supervision and prone to high levels of financial leverage was one of the factors that triggered the financial crisis. On the other hand, more prudent capital and liquidity management by banks induced by regulatory changes, such as those put forward in the Basel II Accord published in June 2004 or improvements to national regulatory frameworks in general, reduce banks' risk-taking behaviour over the cycle. As a result the relevance of the risk-taking channel is likely to have been alleviated somewhat.<sup>28, 29</sup>

## 5 THE TRANSMISSION OF MONETARY POLICY TO INFLATION AND OUTPUT

The various developments identified in the previous sections are likely to have individually led to changes in the transmission mechanism of monetary policy. However, these developments may affect the transmission in different ways, with some tending to strengthen the impact of interest rate changes on output and prices,

while others would tend to diminish these effects. In order to assess the overall effect, empirical macroeconomic analysis, based on either vector autoregressive analysis or the use of structural models, can be employed. In fact, analysis suggests that the evidence regarding changes in the overall transmission mechanism is ambiguous. This is illustrated in Chart 1, which compares the effects of a change in monetary policy on real GDP and inflation before and after the introduction of the euro.<sup>30</sup> Panel A suggests that the impact of monetary policy on economic activity would have been somewhat less in the period after 1999, while inflation seems to respond faster. However, as shown by Panel B, the differences between the two periods are not statistically significant. Based on this empirical evidence, it is therefore difficult to conclude that the overall impact of monetary policy on output and inflation has changed over the past decade.

Empirical analysis based on DSGE models suggests larger and more significant changes in the overall response of the economy to monetary policy actions.<sup>31</sup> However, it should be stressed that the results are very much dependent on the specific model employed, with different models giving different results. In summary, it is fair to say that the empirical evidence regarding changes in the overall effects of monetary policy on the economy is ambiguous.

26 Y. Altunbas, L. Gambacorta and D. Marquéz-Ibañez, "Does monetary policy affect bank risk-taking?", *BIS Working Papers*, No 298, Bank for International Settlements, 2010.

27 See A. Maddaloni and J.L. Peydró, "Bank risk-taking, securitisation, supervision and low interest rates: evidence from lending standards", *Working Paper Series*, ECB, forthcoming.

28 Prominent among those changes to the national regulatory frameworks in the euro area is the prudential regulatory mechanism of dynamic provisioning introduced by the Bank of Spain in the late 1990s.

29 See A. Maddaloni and J.L. Peydró, "Bank risk-taking, securitisation, supervision and low interest rates: evidence from lending standards", *Working Paper Series*, ECB, forthcoming.

30 R. Gerke, A. Weber and A. Worms, "Has the monetary transmission process in the euro area changed? Evidence based on VAR estimates", *BIS Working Papers*, No 276, Bank for International Settlements, 2009.

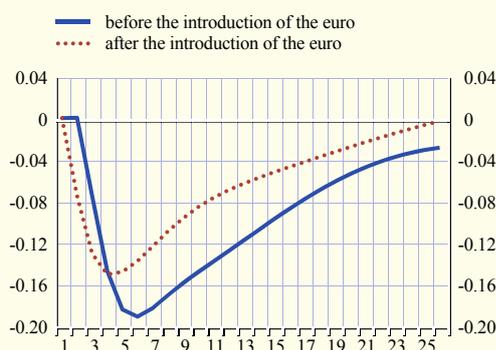
31 See M. Cecioni and S. Neri, "The monetary transmission mechanism in the euro area: has it changed and why?", presented at a joint lunchtime seminar at the ECB on 31 March 2010.

## Chart I Impulse response of output and inflation to an unexpected increase in short-term interest rates

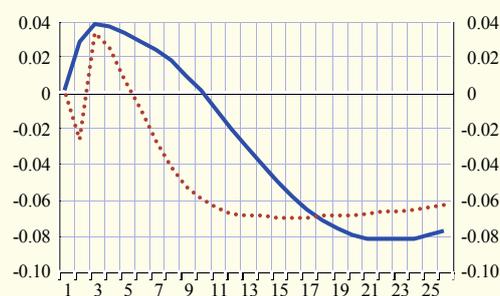
(percentage points)

### Panel A

Impulse response of euro area real GDP to an unexpected increase in the short-term interest rate

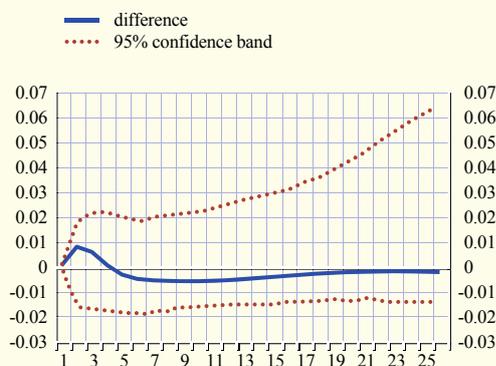


Impulse response of the euro area inflation rate to an unexpected increase in short-term interest rate

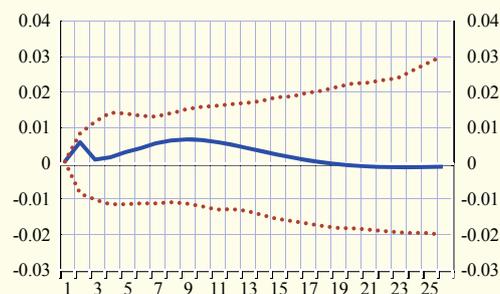


### Panel B

Differences between the response of euro area real GDP to an unexpected increase in the short-term interest rate before and after the introduction of the euro



Differences between the response of euro area real GDP growth rate to an unexpected increase in the short-term interest rate before and after the introduction of the euro



Notes: The periods before and after the introduction of the euro area are 1980-1996 and 1999-2006 respectively. The size of the increase in the short-term interest rate is equal to one standard deviation. Changes in real GDP and the inflation rate are expressed in percentage points. The horizontal axes refer to the number of quarters following the change in the short-term interest rate.

## 6 MONETARY POLICY TRANSMISSION UNDER FINANCIAL DISTRESS

The financial turmoil first manifested itself late in the summer of 2007 as risk premia on interbank loans soared and transactions within the interbank market declined rapidly. Uncertainty among banks about counterparts' creditworthiness became widespread.<sup>32,33</sup> By September 2008, when the possibility emerged of a failure of the financial system at large, key

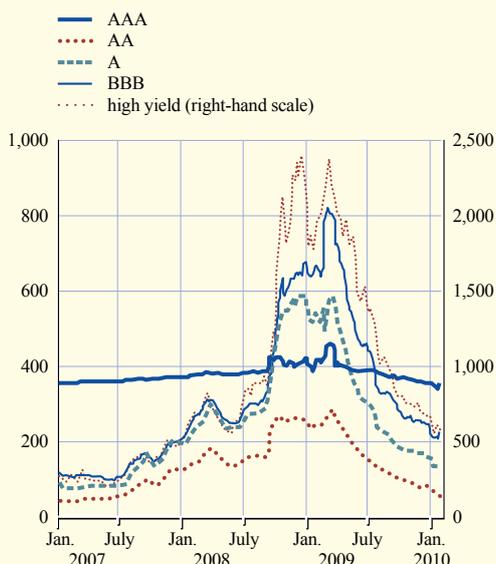
financial market spreads reached historically high levels. The worsening of conditions in the money markets was also reflected in higher estimates of interest rate volatility, making it difficult to measure or even assess the stance of monetary policy. As a result, there was a severe

32 See N. Cassola et al, "A research perspective on the propagation of the credit market turmoil", ECB Research Bulletin No 7, June 2008.

33 See C. Holthausen and H. Pill, "The forgotten markets: how understanding money markets helped us to understand the financial crisis", ECB Research Bulletin No 9, March 2010.

Chart 2 Euro area corporate bond spreads

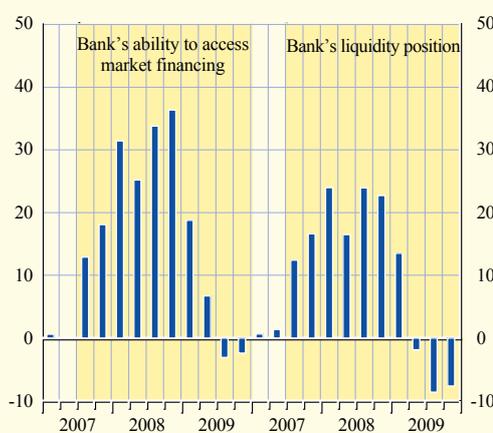
(basis points; daily data)



Source: Reuters.

Chart 3 Liquidity-related factors affecting credit standards in the euro area

(net percentages of banks reporting a contribution to the tightening of credit standards; quarterly data)

Source: ECB bank lending survey.  
Note: Credit standards applied to the approval of loans and credit lines to enterprises.

risk that the first link in the transmission chain between the central bank and credit institutions could become broken or impaired. Importantly, given that a considerable fraction of bank loans are indexed to unsecured money markets, the widening of the spread had a direct impact on lending rates. The impact of the financial turmoil was equally visible in the increased cost of market financing. Euro area credit spreads in the corporate bond market widened to historic levels in the fourth quarter of 2008 (see Chart 2). Non-financial firms faced some increases in corporate bond yields, but the widening of credit spreads was most pronounced for financial firms. As a result of the decline in banks' ability to raise funds, the credit standards applied to the approval of loans and credit lines to enterprises were raised significantly (see Chart 3).

In an economic environment where the monetary policy transmission channels had been hampered, the standard monetary policy response alone (i.e. to reduce key ECB interest

rates) might have been insufficient to ensure the maintenance of price stability.

Three main issues needed to be promptly addressed. First, tensions in money markets (the first link in the transmission chain) needed to be alleviated. Second, policy interest rates had to be rapidly adjusted to very low levels. Third, the situation of the banking system, including the tightening of credit standards by banks – which was also affected by supply factors, namely banks' impaired ability to raise funds – required the implementation of non-standard monetary policy measures if the further links of the transmission chain (from banks to households and corporations) were to be kept fully operational.<sup>34</sup>

<sup>34</sup> The strengthening of banks' balance sheets has also come to the fore as a key condition for the effective transmission of the monetary policy stance to households' and corporations' financing costs.

## THE PASS-THROUGH OF REDUCTIONS IN KEY ECB INTEREST RATES

The adjustment of retail bank interest rates in response to changes in policy rates, usually referred to as the interest rate pass-through process, appears to have remained effective during the financial turmoil.<sup>35</sup>

Banks' short-term lending rates, which are generally affected by movements in the three-month EURIBOR, declined by 341 basis points between September 2008 and February 2010, while the three-month EURIBOR declined by around 436 basis points during the same period. Long-term bank lending rates declined over this period by 151 basis points, while seven-year government bond yields declined by 121 basis points.

Turning to the cost of bank financing in nominal terms, euro area MFI bank lending rates to non-financial corporations declined almost in parallel with the key ECB interest rates (see Chart 4).<sup>36</sup> Most bank interest rates on loans to

households for house purchase and consumer credit also declined, albeit to a lesser extent than rates on loans to non-financial corporations (see Chart 5).<sup>37</sup>

However, the reductions in money market rates which followed the cuts to key ECB interest rates passed through to bank lending rates with a significant lag, in line with past regularities. This was primarily reflected in the widening of the spread between money market rates and bank lending rates. The level of this spread is,

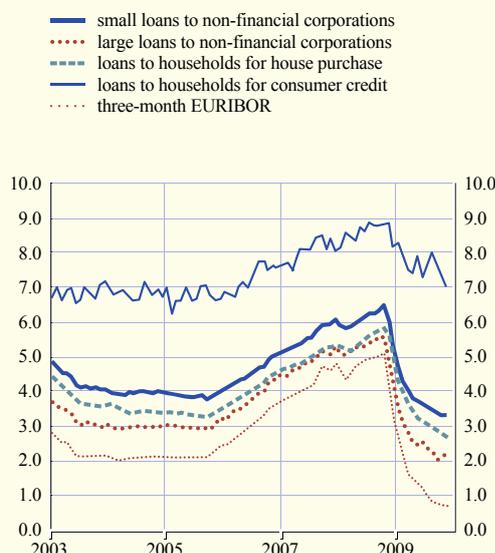
<sup>35</sup> See the article entitled "Recent developments in the retail bank interest rate pass-through in the euro area" in the August 2009 issue of the Monthly Bulletin.

<sup>36</sup> Short-term euro area MFI interest rates on loans to non-financial corporations with a floating rate and an initial rate fixation period of up to one year decreased by around 330 basis points between September 2008 and February 2010. In the same period, long-term MFI interest rates on loans to non-financial corporations with an initial rate fixation period of over five years declined slightly less, by around 150-200 basis points.

<sup>37</sup> Short-term MFI interest rates on loans to households with a floating rate and an initial rate fixation period of up to one year declined by around 200-300 basis points between September 2008 and February 2010. In the same period, long-term MFI interest rates on loans to households with an initial rate fixation period of over five years declined less, by around 90-120 basis points.

Chart 4 Short-term MFI bank lending rates

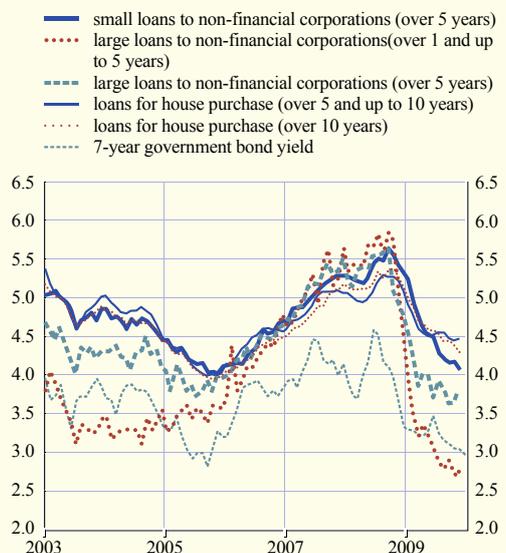
(percentages per annum; rates on new business)



Source: ECB.

Chart 5 Long-term MFI bank lending rates

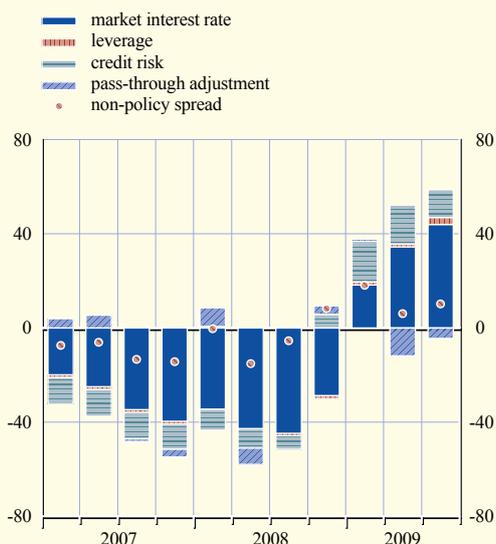
(percentages per annum; rates on new business)



Source: ECB.

**Chart 6 Short-term composite bank lending rate spread of loans to non-financial corporations**

(basis points; quarterly data)

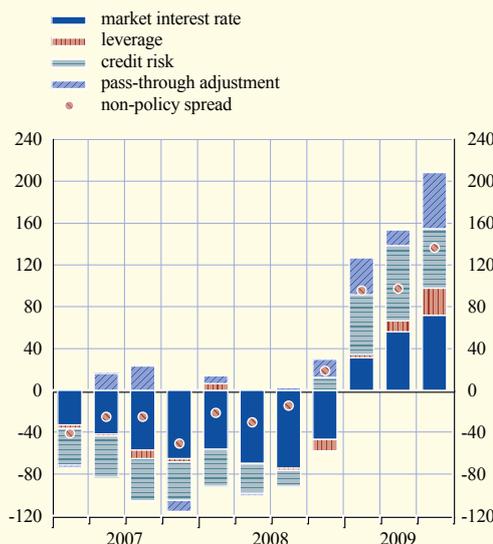


Source: ECB and ECB calculations.

Note: The contributions from the market interest rate, leverage and credit risk components are mean-adjusted, which explains the negative contributions over certain periods.

**Chart 7 Short-term composite bank lending rate spread of loans to households for private consumption**

(basis points; quarterly data)



Source: ECB and ECB calculations.

however, dependent on the level of market interest rates, which are controlled by the central bank.<sup>38</sup> It is, therefore, of interest to disentangle the component of the bank lending rate spread which may not be dependent on the actions of the central bank. A simple econometric model allows the computation of the different components that add up to the bank lending rate spread.<sup>39</sup> These are shown in Charts 6 and 7. The bank lending rate can be split into two major components: the equilibrium spread and the “pass-through adjustment term”. The pass-through adjustment term reflects temporary departure from an equilibrium and hence does not represent a fundamental value. The equilibrium spread has been defined as having three main components: the effect resulting from changes in the market interest rate, the effect resulting from changes in credit risk, and the effect resulting from changes in banks’ capital-to-assets ratio. The component of the bank lending rate spread which may not be dependent on the actions of the central bank is defined as the “non-policy spread” in Charts 6

and 7. The non-policy spread is the sum of the pass-through adjustment term, the leverage effect and the credit risk effect.

Several conclusions can be drawn from this decomposition of the bank lending rate spread. First, the short-term bank lending rate spreads observed during the financial turmoil increased

38 In particular, euro area spreads are usually wider when money market rates are low. This may be explained by the fact that whenever the volume of loans increases following a reduction of market rates, unit operating costs may decline but banks’ risk aversion may increase with the increase in leverage. Declining unit operating costs would allow banks to operate with smaller margins (smaller bank lending rate spread). On the other hand, increased risk aversion would lead to a demand for greater margins (larger bank lending rate spread).

39 The model employed is an extension of the error correction mechanism (ECM) model of the interest rate pass-through shown in Box 1 of the article entitled “Recent developments in the retail bank interest rate pass-through in the euro area” in the August 2009 issue of the Monthly Bulletin. The extension adds proxies for the cost of equity financing ( $CE_t$ ) and credit risk ( $CR_t$ ) to the ECM model, as follows:  $\Delta BR_t = \mu + \gamma(BR_{t-1} - \beta_1 MR_{t-1} - \beta_2 CE_{t-1} - \beta_3 CR_{t-1}) + \alpha_1 \Delta MR_t + \alpha_2 \Delta BR_{t-1}$ , where  $BR_t$  denotes the bank lending rate, and  $MR_t$  refers to the market interest rate.

significantly from the fourth quarter of 2008 onwards, after having remained broadly constant between the second quarter of 2007 and the third quarter of 2008. Second, the decline in the EURIBOR that began in October 2008 has made a significant contribution to the widening of the short-term bank lending rate spreads. Third, credit risk has also been an important factor behind the widening of the bank lending rate spreads, particularly since the third quarter of 2008.

In this respect, empirical evidence on the evolution of the spreads for bank lending rates to households suggests that the widening of these spreads primarily reflects higher levels of credit risk than those recorded under normal economic conditions. Recent studies also suggest that the recent financial turmoil may have contributed to an increase in the heterogeneity of the pass-through of short-term rates across euro area countries.<sup>40</sup> This notwithstanding, the interest rate pass-through remained operational during the financial turmoil, and the nature of the transmission did not differ much from that displayed during periods of economic and financial stability.

#### **THE ROLE OF NON-STANDARD MONETARY POLICY MEASURES**

As mentioned earlier, tensions in money markets meant that banks' ability to provide funding to the economy was hampered. Furthermore, securitisation activity, which had been an important source of loans prior to the financial turmoil, came to a halt. All in all, this suggests that without the enhanced credit support policies introduced by the ECB, the reduction in the key ECB policy rates would have been less effective.

The enhanced credit support policies had a direct effect on both interest rates and the supply of credit. The effect on interest rates was first reflected in a clear decline in the key money market rates that euro area banks typically use as benchmarks to reset floating rate loans and price new short-term loans, which in turn

led to sharp declines in these types of loan to both households and firms. The impact on credit supply, meanwhile, may be best gauged through two complementary channels. First, all measures contributed to the expansion of credit by improving banks' funding liquidity. Second, the outright purchase of covered bonds (one of the credit support policies implemented) facilitated the funding of banks in a key segment of the capital market. In particular, the measures helped, therefore, to unplug the bank lending channel in an environment in which some banks were experiencing problems in their recourse to the capital markets and where the functioning of the money markets was severely hampered.

## **7 CONCLUSIONS AND OUTLOOK**

The monetary policy transmission mechanism in the euro area has been affected by a number of developments since the introduction of the euro. At the macro level, a new and credible monetary policy regime for the area as a whole and the removal of intra-euro area exchange rates have contributed to a firmer anchoring of long-term inflation expectations.

The introduction of the euro also coincided with an acceleration of the process of financial innovation. This process has expanded banks' range of possibilities for funding. Financial innovation has also increased banks' risk-taking options, thereby giving greater prominence to the risk-taking channel of monetary policy. However, the financial turmoil demonstrated that the situation may reverse in times of financial distress, when market-based funding options are squeezed or even disappear, with the excessive risks previously acquired materialising.

The recent financial turmoil put the first link in the monetary policy transmission chain, namely

<sup>40</sup> See C. Kok Sørensen and T. Werner, "Bank interest rate pass-through in the euro area: a cross country comparison", presented at the ECB workshop on "The monetary policy transmission mechanism in the euro area in its first ten years" in Frankfurt am Main on 28 September 2009.

the link between ECB policy rates and interbank rates, at severe risk of impairment. The above-mentioned developments necessitated the implementation of non-standard monetary policy measures in order to complement the standard monetary policy measures, namely those based on ECB interest rate decisions.

Looking ahead, it is still premature to assess to what extent the transmission mechanism may be more permanently affected by the consequences of the crisis. It may be argued in this respect that the current attempts to set up a more comprehensive, stricter regulatory framework and to strengthen the resilience of the banking sector may contribute to banks playing a more stable role in the transmission of monetary policy.<sup>41</sup> This may be so for a number of reasons. First, more stringent capital requirements might strengthen the bank capital channel of monetary policy transmission,<sup>42</sup> as a larger number of banks would become less well capitalised and might, as a consequence, react more strongly to changes in policy rates by adjusting their loan supply. However, it might also be expected that banks will respond to the new, more stringent capital requirements by simply increasing their capital buffers and hence reducing the need to adjust loan supply in response to changes in monetary policy rates.

Second, the introduction of higher requirements with regard to securitisation should lead to more limited funding opportunities, thereby reinforcing the strength of the traditional bank lending channel.<sup>43</sup> The interest rate channel may also be affected as previous studies have found that securitisation speeds up the pass-through of policy rates to bank lending rates.<sup>44</sup>

Third, more prudent capital and liquidity management by banks may reduce banks' risk-taking behaviour over the cycle and hence the relevance of the risk-taking channel might be alleviated somewhat. However, were the new measures to contribute to improving the quality of securitisation by banks, it cannot be excluded that the net effect, in terms of the impact of

monetary policy on bank lending, would be reinforced.

Fourth, the introduction of more stringent requirements regarding banks' liquidity management is likely to imply that banks will operate with higher liquidity buffers in the future. A common finding in literature on this subject is that banks with higher liquidity ratios are typically better able to shield their borrowers from changes in monetary policy.<sup>45</sup> However, ceteris paribus, more stringent liquidity requirements would, by definition, make liquidity more scarce, thus having the same effect as an increase in interest rates on average, with restrictive implications for the economy of a magnitude very difficult to gauge.

Finally, aligning banks' internal credit risk models with regulatory requirements was one of the main purposes of Basel II. It was argued

41 For example, in December 2009 the Basel Committee on Banking Supervision published two consultative documents outlining a set of new global regulatory standards enhancing the current Basel II capital adequacy framework and also introducing a new global liquidity standard. The new regulatory proposals include: i) raising the quality of regulatory capital; ii) enhancing the risk coverage of the capital framework (including more stringent requirements for complex securitisation exposures); iii) introducing a leverage ratio; iv) reducing pro-cyclicality and promoting counter-cyclical buffers; v) possibly imposing additional capital requirements on systemically important banks; and vi) introducing a global liquidity standard. See Basel Committee on Banking Supervision, "Strengthening the resilience of the banking sector", December 2009; and Basel Committee on Banking Supervision, "International framework for liquidity risk measurement, standards and monitoring", December 2009.

42 See, for example, Y. Altunbas, G. de Bondt and D. Marqués, "Bank capital, bank lending, and monetary policy in the euro area", *Kredit und Kapital*, May 2004; L. Gambacorta and P.E. Mistrulli, "Does bank capital affect lending behaviour?", *Journal of Financial Intermediation*, 13(4), 2004, pp. 436-457; and C. Merkl and S. Stolz, "Banks' regulatory buffers and monetary policy transmission", *Applied Economics*, 41(16), 2009, pp. 2013-2024.

43 See Y. Altunbas, L. Gambacorta and D. Marqués-Ibañez, "Securitisation and the bank lending channel", *Working Paper Series*, No 838, ECB, 2007.

44 See A. Estrella, "Securitization and the efficacy of monetary policy", *Economic Policy Review*, 8(1), Federal Reserve Bank of New York, May 2002, pp. 243-255.

45 See, in particular, A.N. Kashyap and J.C. Stein, "What do a million observations on banks say about the transmission of monetary policy?", *American Economic Review*, 90(3), 2000, pp. 407-28.

that, as a consequence, banks' pricing of credit would become more discriminatory in the sense of better reflecting the actual underlying risks pertaining to individual exposures.<sup>46</sup> In this sense, it might be assumed that, under the more risk-sensitive Basel II framework, banks' provision of credit is more sensitive to the actual borrower net worth. This might suggest that the balance sheet channel was reinforced with the introduction of Basel II. To the extent that the new proposals somewhat sever this close link between required capital and underlying risk, some relaxation of the borrower balance sheet channel could be observed.

<sup>46</sup> See, for example, R. Repullo and J. Suarez, "Loan pricing under Basel capital requirements", *Journal of Financial Intermediation*, 13(4), 2004, pp. 496-521.