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THE ECB'S NON-STANDARD MONETARY POLICY MEASURES THE ROLE OF INSTITUTIONAL FACTORS AND FINANCIAL STRUCTURE

Philippine Cour-Thimann and Bernhard Winkler



In 2013 all ECB publications feature a motif taken from the €5 banknote.



NOTE: This Working Paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

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ABSTRACT

This paper aims to make two contributions: to review the ECB's non-standard monetary policy measures in response to the financial and sovereign debt crisis against the background of the institutional framework and financial structure of the euro area; and to interpret this response from a flow-of-funds perspective. The paper highlights how the rationale behind the ECB's non-standard measures differs from that underlying quantitative easing policies. As a complement to rather than a substitute for standard interest rate decisions, the non-standard measures are aimed at supporting the effective transmission of monetary policy to the economy rather than at delivering additional direct monetary stimulus. The flow-of-funds analysis proposes an interpretation of central banks' crisis responses as fulfilling their traditional role as lender of last resort to the banking system and, more broadly, reflecting their capacity to act as the "ultimate sector" that can take on leverage when other sectors are under pressure to deleverage. It also provides examples that trace the impact of non-standard measures across different sectors and markets.

Keywords: Monetary policy, asset purchases, financial structure, economic and monetary union, sovereign debt crisis, flow of funds

JEL: E02, E40, E50, E58

NON-TECHNICAL SUMMARY

The institutional set-up of Economic and Monetary Union (EMU) and the financial structure of the euro area economy – where financing is mostly bank-based rather than market-based – both frame the ECB’s monetary policy. It is particularly important to recognise this specific backdrop when making comparisons of the ECB’s response to the crisis with that of other central banks.

The existence of a single currency in a multi-country area can be seen to create disincentives for individual governments to properly tackle fiscal and structural policies as well as to safeguard financial stability. The crisis has shown that the original institutional set-up of EMU only partially corrected for such disincentives. Excessive debt and leverage had built up prior to the crisis, in private and public, financial and non-financial sectors, with imbalances emerging across the euro area and elsewhere.

The global financial and economic crisis has put the spotlight on central banks using their balance sheets as backstops to the financial system. Against this background the paper reviews the ECB’s specific non-standard monetary policy responses in the three main phases of the crisis, which mutated from a global financial crisis to a sovereign debt crisis in the euro area and was later intertwined with renewed strain in the banking system in parts of the euro area, with significant fragmentation across countries.

The ECB’s approach to date appears to stand out among central banks: its non-standard measures have been aimed not at providing additional direct monetary stimulus to the economy but primarily at supporting the effective transmission of its standard policy. Hence, for the ECB, non-standard measures are a complement to rather than a substitute for standard interest rate policy. By supporting the effective transmission of interest rate decisions to the wider euro area economy they have improved financing conditions and credit flows, in a context of dysfunctional developments in some segments of the financial system.

The largely bank-based structure of the financing of the euro area economy is reflected in the way the ECB’s monetary policy is implemented, which is mainly through lending to a large number of banks against collateral, in normal times as during the crisis, with a relatively limited role for outright asset purchases. This is in contrast to the case of other major central banks, such as the US Federal Reserve System and the Bank of England. The ECB’s non-standard measures have been mainly focused on banks, to improve their funding and liquidity conditions and thereby prevent disorderly deleveraging in the euro area economy.

In this respect, a flow-of-funds perspective is used to illustrate the rotation of savings and leverage among economic sectors over the past decade and to interpret the central banks’ crisis response as fulfilling their traditional role as lender of last resort to the banking system and, more broadly, reflecting their capacity to act as the “ultimate sector” that can take on leverage when other sectors are under pressure to deleverage. While collateralised lending and outright purchases are somewhat different in terms of their impact on the deleveraging of other sectors, both types of operations involve an expansion of the central bank’s balance sheet. Similarly, by accommodating the demand for safe and liquid assets central banks can step in as intermediary of last resort when traditional mechanisms of monetary policy transmission became impaired.

The impact of the ECB's non-standard measures across different sectors and markets is illustrated with a flow-of-funds analysis in the case of the three-year longer-term refinancing operations conducted in December 2011 and February 2012. The analysis shows that even though these lending operations involved bank assets as collateral, they have also affected the leverage of other sectors, creating a crowding-in phenomenon in debt issued by non-bank sectors.

Monetary policy clearly cannot directly address the underlying causes of the crisis and the need for deleveraging by financial and non-financial sectors or the need for rebalancing within the euro area. At the same time, in financial crises central banks have an important role to play in averting disorderly deleveraging as well as, more broadly, in safeguarding monetary policy transmission to ensure price stability.

I INTRODUCTION

The financial crisis erupted five years ago, when the leverage cycle that had accompanied the “great moderation” turned abruptly. It put the spotlight on central banks using their balance sheets as backstops to the financial system. Their non-standard or unconventional responses have differed significantly across central banks. The ECB’s approach to date appears to stand out in that its non-standard measures have been aimed not at providing additional direct monetary stimulus to the economy but primarily at supporting the effective transmission of its standard policy. Hence, for the ECB, non-standard measures are a complement to rather than a substitute for standard interest rate policy.

Is this different approach on the part of the ECB mainly an issue of semantics, as some observers have argued? What is behind the different rationale for introducing non-standard measures? What are the factors framing the ECB’s response that are specific to the euro area?

This paper argues that the ECB’s approach reflects the specificity of the euro area economy and its institutional environment, with a bank-based financial structure and a multi-country context. The ECB’s monetary policy strategy, with its medium-term focus on price stability and the prominent role it gives to money and credit aggregates (within the broader flows of funds), has also framed the analysis of the transmission of monetary policy and thus the design of non-standard measures.

Before reviewing the ECB’s non-standard monetary policy measures adopted in response to the financial crisis, the paper sets out the context of this response in terms of the institutional environment and the financial structure of the euro area (Sections II and III). Section IV highlights three conceptual factors that frame the non-standard measures: anchoring in the ECB’s medium term-oriented monetary policy strategy, complementarity to standard interest rate decisions, and the focus on supporting monetary policy transmission across the euro area. Finally, Section V provides a flow-of-funds perspective on the financial crisis and on the role of central banks in buffering deleveraging pressures in other sectors, accommodating the demand for safe and liquid assets at times of uncertainty, and acting as lender and intermediary of last resort when monetary policy transmission has become impaired.

2 THE CONTEXT OF THE ECB'S MONETARY POLICY RESPONSE

The ECB's monetary policy response to the global financial crisis and the euro area sovereign debt crisis must be seen against the specific backdrop of the institutional set-up of Economic and Monetary Union (EMU) and the financial structure of the euro area economy. This backdrop frames the ECB's monetary policy in a profound way and is particularly important to recognise when making comparisons with the policies of other central banks.

2.1 THE INSTITUTIONAL SET-UP OF EMU

As the euro area is not a federal union, the Treaty on the Functioning of the European Union (henceforth called the Treaty) includes a number of provisions to correct for disincentives to fiscal discipline that the single currency would otherwise imply. These provisions include, in particular, the prohibition of monetary financing by the central bank (Article 123),¹ the prohibition of privileged access by public institutions or governments to financial institutions (Article 124),² the "no-bailout" clause (Article 125), the fiscal provisions for avoiding excessive government deficits (Article 126) and the Stability and Growth Pact (SGP, which is actually separate from the Treaty itself).

The prohibition of monetary financing prevents the ECB from purchasing government bonds in the primary market and limits its intervention in the secondary market to serving specific monetary policy purposes consistent with its primary objective of price stability. Moreover, secondary market intervention cannot be used to circumvent the prohibition of primary market intervention. In this respect, the ECB's recent decision to introduce Outright Monetary Transactions (OMTs) is consistent with the ECB's mandate for the following reasons. OMTs are aimed at ensuring the proper transmission of the ECB's interest rates to the euro area economy and the singleness of its monetary policy. This monetary policy purpose is in line with the ECB's primary objective of price stability. The fact that the Governing Council acts in full independence further guarantees that the purpose in OMTs is one of monetary policy. OMTs are limited to transactions in secondary markets for sovereign bonds: the money goes to investors, not to the sovereign issuer. The transactions are focused on short-term maturities. Finally, and most importantly, OMTs require explicit conditionality attached to an appropriate European Financial Stability Facility (EFSF)/European Stability Mechanism (ESM) programme, to ensure that governments to make the necessary efforts to restore the sustainability of public finances. Thus fiscal soundness and appropriate economic policies as set out in the programme conditions are prerequisites for the activation of OMTs; lack of compliance would trigger an exit from OMTs.

¹ Monetary financing became prohibited in the run-up to EMU following the Maastricht Treaty, for instance in 1994 for the Bundesbank.

² The prohibition of privileged access means that the ECB may not differentiate between public and private institutions and, in particular, must not give public institutions (such as development banks) better conditions in its refinancing operations than private sector banks.

As with the assignment of fiscal policy responsibility, the Treaty gives responsibility for financial stability primarily to governments, and the resolution of banks is squarely in their domain. The Treaty foresees explicitly that the ECB, without prejudice to its primary mandate of price stability, “shall contribute to ... the stability of the financial system” (Article 127(5)).³ The ECB carries out analysis of financial stability. Moreover, EFSF procedures require that the ECB confirm, in some cases, that EFSF interventions are warranted to safeguard financial stability in the euro area.

The single currency also creates disincentives for individual governments to properly tackle financial stability issues. In particular, the Treaty does not include provisions to ensure joint action in the event of cross-border or euro area-wide risks to financial stability. The concept of ensuring the financial stability of the *euro area as a whole* had to be “invented” in the crisis. It was first articulated by the President of the European Council in February 2010 and was put into practice through the agreement on the support programme for Greece and the establishment of the EFSF in May 2010.

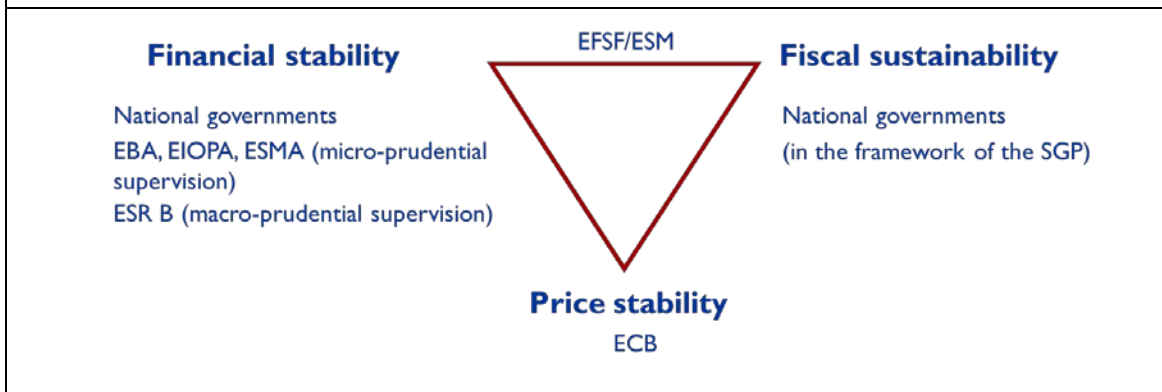
Greater cooperation on financial oversight was established during the financial crisis by transforming the existing “Lamfalussy committees” on banking, insurers and markets into European authorities (respectively the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA) and the European Securities and Markets Authority (ESMA)) with a stronger legal and operational set-up and by creating the European Systemic Risk Board (ESRB) for macro-prudential oversight. The latter is matched by the Financial Stability Oversight Council in the United States and the Financial Stability Committee in the United Kingdom. Even though these authorities work exclusively at the level of the European Union as a whole and are not able to work in a euro area composition, they can at times deal with euro area issues and can thus be seen as part of the euro area’s institutional environment.⁴

To sum up, Figure 1 illustrates the current institutional set-up in the euro area. The responsibility for price stability lies with the ECB; the responsibility for fiscal sustainability lies with individual governments under joint oversight; and financial stability is both an individual and a collective responsibility of governments.

³ There is a long-standing academic debate on the trade-off or the complementarity between price stability and financial stability. See Cukierman (1994) for an early contribution; Oosterloo and de Haan (2004) for a survey of central banks and their financial stability mandates; and Praet (2011) for a review of the role of central banks in financial stability policies.

⁴ At the time of writing, further elements of a financial market union were under preparation.

Figure I Monetary, fiscal, and financial interactions in EMU

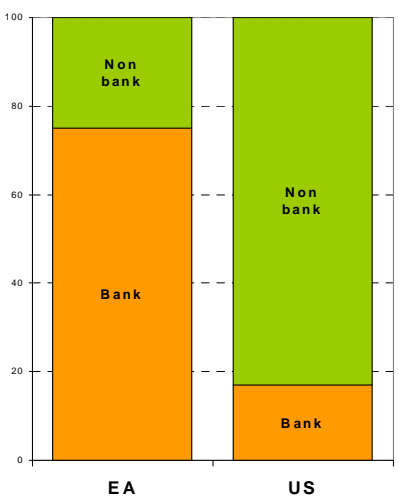
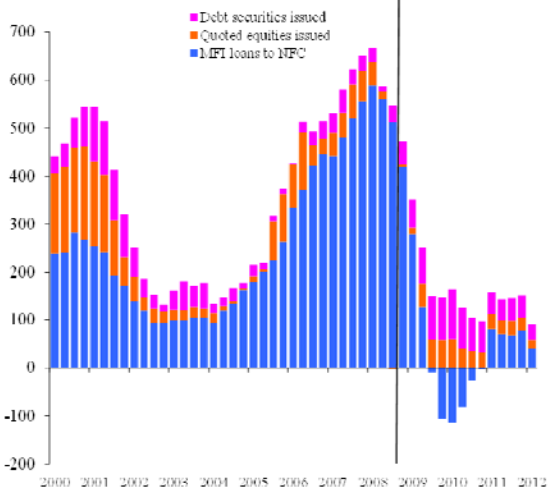


2.2 THE EURO AREA FINANCIAL STRUCTURE

The euro area's financial structure differs from that of other large economies. Financial intermediaries – in particular banks – are the main agents for channelling funds from savers to borrowers (ECB, 2007). Banks are the primary source of financing for the economy, most obviously in the case of households. As for firms, more than 70% of the external financing of the non-financial corporate sector – that is, the financing other than by retained earnings – is provided by banks, and less than 30% by financial markets (and other funding). In the United States it is the other way around (Figure 2).

The over 70%/below 30% split is in terms of stock outstanding; in terms of flows, the figures fluctuate significantly. The corporate sector can to some extent substitute bank lending with other sources of finance. After the collapse of Lehman Brothers, bank funding started contracting (i.e. a net redemption) at a rate of €100 billion a year, in sharp contrast to its prior net expansion at a rate which could go up to €600 billion in 2007. Part of the decline in bank funding was offset by a rise in market funding: debt securities issued by corporations (but also quoted shares issued) increased by more than €100 billion a year in net terms (Figure 3). Such substitution is primarily possible for large corporations; it is less so for small and medium-sized firms, which constitute the bulk of employment and activity in the euro area.⁵

⁵ Improved funding conditions for large corporations can also benefit small and medium-sized enterprises indirectly, in particular through two forms of financing within the corporate sector itself: intra-sector loans and trade credits. These represented 40% of the unconsolidated debt of non-financial corporations in the euro area (which itself amounted to €13 trillion in 2011), a share similar to that of bank lending.

<p>Figure 2 Funding of non-financial corporations in the euro area and the United States</p>	<p>Figure 3 Bank funding and net issuance of debt securities and quoted shares for euro area non-financial corporations</p>
<p><i>(shares in accumulated debt transactions 2002-2012Q1)</i></p>  <p>The chart shows two stacked bars. The left bar, labeled 'EA', has an orange bottom section labeled 'Bank' reaching approximately 75% on the y-axis, and a green top section labeled 'Non bank' reaching 100%. The right bar, labeled 'US', has an orange bottom section labeled 'Bank' reaching approximately 15% on the y-axis, and a green top section labeled 'Non bank' reaching 100%.</p>	<p><i>(four-quarter flows in EUR billions)</i></p>  <p>The chart is a stacked area chart with three series: 'MFI loans to NFC' (blue), 'Quoted equities issued' (orange), and 'Debt securities issued' (pink). The x-axis represents years from 2000 to 2012. The y-axis represents flows in EUR billions, ranging from -200 to 700. The total flow peaks at approximately 650 billion EUR in 2008. There is a significant drop in 2009, with flows falling below zero, and a recovery in 2010 and 2011.</p>
<p>Note: EA stands for the euro area. Sources: Eurostat, ECB and Federal Reserve System.</p>	<p>Sources: Eurostat and ECB. Notes: Last observation is for the first quarter of 2012. MFI stands for monetary financial institutions; NFCs stands for non-financial corporations.</p>

Banks still play a pivotal role in the transmission of policy interest rate decisions to the euro area economy. As we will see, the ECB's non-standard response to the crisis has accordingly been primarily focused on banks.

The largely bank-based structure of the financing of the euro area economy is also reflected in the way the ECB's monetary policy is implemented. While monetary policy decisions are centralised at the level of the ECB's Governing Council, their implementation is decentralised and conducted by the Eurosystem, which comprises the 17 national central banks of the euro area countries and the ECB. The operations mainly consist of refinancing operations, to which a large number of counterparties are granted access so as to ensure that the single monetary policy reaches the banking system in all the euro area countries. There are about 6,300 credit institutions established in the euro area, of which around 2,200 fulfil the operational criteria for participation in Eurosystem open market operations. Approximately 200-400 institutions usually participate, with fluctuations: for instance, 800 banks participated in the second three-year longer-term refinancing operation in early 2012.

This is again different from the US set-up, where the Federal Reserve Bank of New York implements monetary policy on behalf of the entire Federal Reserve System and the operations consist mainly of outright purchases and sales of assets in the open market, in line with the

essentially market-based structure of the economy. The number of counterparties involved is relatively small, even after having risen during the financial crisis.

In Eurosystem refinancing operations, the individual national central banks grant loans at normally uniform conditions across the euro area to their counterparties against assets pledged as collateral for a limited, pre-specified period. The list of eligible collateral – about 40,000 assets with a combined value of around €14 trillion or around 150% of GDP in 2012 – contains a very wide range of public and private sector marketable debt securities and also includes some non-marketable assets.

Since they steer the marginal cost of the refinancing of banks, the monetary policy operations are at the beginning of the transmission chain of the policy signal. The monetary policy stance is signalled by three key ECB interest rates: the rates on the main refinancing operations, the marginal lending facility and the deposit facility. Prior to the financial crisis, decisions and expectations regarding the main refinancing rate were smoothly reflected in the money market yield curve, which was the same throughout the euro area. The interbank market seemed fully integrated. The creation of EMU had thus been an engine of financial integration: the distinction between a domestic transaction and a cross-border transaction within the euro area had disappeared. This also meant that if bank transactions during the day led to a net payment outflow, the bank would find the offsetting funding in the interbank market at uniform conditions across the euro area.

More broadly, far-reaching financial integration in banking and funding markets eased financing constraints in Monetary Union.⁶ However, in a context where fiscal and economic policies and banking oversight remained the responsibilities of the individual countries, this contributed to weakening incentives for the various economies to address problems of competitiveness and soundness in banks' business models. In particular, the banking system of a country with persistent current account deficits could easily fund net cross-border payment outflows associated with net imports of goods and services with money raised in the cross-border interbank market or by means of other forms of funding such as attracting foreign direct investment or placing debt securities abroad. As a result, imbalances in the current and financial accounts of the balance of payments of certain euro area countries were left unaddressed by national policies and continued to grow. In turn, this later contributed to greater vulnerabilities during the financial and sovereign debt crisis in a number of euro area countries and thereby to specific challenges for the single monetary policy.

⁶ In particular, prior to the financial crisis, bond yield spreads were virtually nil among euro area sovereigns. The bond yields had converged to the lowest levels of the countries with solid public finances in the run-up to the creation of EMU.

3 THE ECB'S MONETARY POLICY RESPONSE TO THE CRISIS

This section reviews how the ECB and the Eurosystem responded to the financial crisis.⁷ For simplicity, the measures decided by the ECB's Governing Council are described in this paper as 'ECB' measures; they are actually implemented by the Eurosystem as a whole. Beyond the period of financial turmoil that preceded the financial crisis, it is useful for the purpose of the review to distinguish between three phases, marked by the following:

- i. the start of the global financial crisis in September 2008 (Lehman collapse);
- ii. the start of the euro area sovereign debt crisis in May 2010 (Greek crisis);
- iii. the re-intensification of the euro area sovereign debt crisis, coupled with increased banking sector strain from mid-2011 on.

The considerations on the third phase can only be tentative, as the stage was still ongoing when this article was drafted, and the economic and financial environment remained characterized by a continued high degree of uncertainty.

3.1 THE GLOBAL FINANCIAL CRISIS AND THE ECB'S RESPONSE

The ECB had already been actively amending its monetary policy implementation in the 13 months of financial turmoil preceding the eruption of the global financial crisis in September 2008. Banks had started to have doubts about the financial health of their counterparties in the interbank market. This drove money market rates up and threatened the appropriate transmission of the ECB's interest rate decisions. From the first day of tensions in interbank markets on 9 August 2007, the ECB acted by accommodating the funding needs of banks, which were seeking to build up daily liquidity buffers so as to reduce uncertainty about their liquidity positions. In particular, the ECB de facto provided unlimited overnight liquidity to banks, allocating €5 billion on the first day. Later on, the ECB conducted supplementary refinancing operations with maturities of up to 6 months, compared with a maximum of 3 months in normal times. To reduce bank liquidity uncertainty over the turn of the year, all bids above the previous operation's marginal rate were allotted in full in the last main refinancing operation of the year. Temporary swap lines were established with other central banks, primarily to address the mounting pressure in short-term US dollar funding markets. As a result, the tensions in the short-term segment of the euro area money market abated considerably.⁸

Following the bankruptcy of Lehman Brothers on 15 September 2008, the uncertainty about the financial health of major banks worldwide led to a virtual collapse in activity in many financial market segments. Banks built up large liquidity buffers, while shedding risks from their balance sheets and tightening loan conditions. Given the crucial importance of banks for the financing of

⁷ For ECB reviews of this response, see ECB (2010a,b, 2011b,c). See also Drudi et al. (2012).

⁸ For a detailed account of this period of financial turmoil, see for instance Trichet (2010) and ECB (2010b).

the euro area economy and in the ECB's monetary policy implementation, this situation was alarming in view of a high risk of a credit crunch and a high risk of the central bank's inability to steer monetary conditions. The ECB, like other major central banks, rapidly reduced its key interest rates to historically low levels, but a key element of its response to retain effectiveness in influencing monetary conditions consisted of its non-standard policy measures. The aim was to continue preserving price stability, contributing to stabilizing the financial situation, and limiting the fallout on the real economy.

As regards interest rate policy, the ECB cut the main refinancing rate by 50 basis points on 8 October 2008, in a concerted and historic move with other major central banks; it reduced its key interest rates further by a total of 325 basis points within a period of 7 months until May 2009. The main refinancing rate was brought to a historic low of 1%, a level not seen in euro area countries in decades.⁹

At the same time, the ECB adopted a number of non-standard measures to support financing conditions and credit flows to the euro area economy over and beyond what could be achieved through reductions in key interest rates alone (so-called 'enhanced credit support'). The non-standard measures implemented from October 2008 onwards were tailored to the specific, bank-based financial structure of the euro area, aiming at supporting bank liquidity and funding. They comprised five key elements, drawing in part on the experience with non-standard measures during the financial turmoil, namely regarding full allotment, supplementary liquidity provision at longer maturities, and currency swap agreements.

- i. *Fixed-rate full allotment.* A fixed-rate full allotment tender procedure was adopted for all refinancing operations during the financial crisis. Thus, contrary to normal practice,¹⁰ eligible euro area financial institutions have unlimited access to central bank liquidity at the main refinancing rate, as always subject to adequate collateral.
- ii. *Extension of the maturity of liquidity provision.* The maximum maturity of the longer-term refinancing operations (LTROs) was temporarily extended (subsequently to 12 months in June 2009). In combination with the first element, this contributed to keeping money market interest rates at low levels and increased the Eurosystem's intermediation role aimed at easing refinancing concerns of the euro area banking sector, especially for term maturities. Reduced liquidity costs and uncertainty and a longer liquidity planning horizon were expected to encourage banks to continue providing credit to the economy.
- iii. *Extension of collateral eligibility.* The list of eligible collateral accepted in Eurosystem refinancing operations was extended, in fact allowing banks to refinance a larger share of their balance sheet with the Eurosystem. The ability to refinance less liquid assets

⁹ The paper focuses on non-standard measures, subsequent movements in the key policy interest rates are not discussed in detail. Later on, the key ECB interest rates were temporarily increased in 2011, before being reduced again towards end-2011 and in 2012. As of January 2013 and since July 2012, the main refinancing rate stands at 0.75 per cent, the deposit facility rate at 0 per cent and the marginal lending facility rate at 1.50 percent.

¹⁰ In normal times the Eurosystem auctions a pre-set amount of central bank liquidity in a variable rate tender procedure; the minimum bid rate is the key ECB interest rate on the main refinancing operations.

through the central bank provides an effective remedy to liquidity shortages caused by a sudden stop in interbank lending.

- iv. *Currency swap agreements.* The Eurosystem temporarily provided liquidity in foreign currencies, at various maturities, and against euro-denominated collateral. For this, the ECB used reciprocal currency arrangements, notably with the US Federal Reserve.¹¹ A massive shortfall in US dollar funding was thus avoided: euro area banks and associated off-balance-sheet vehicles had significant liabilities in US dollars, having provided major financing to several US market segments, including real estate and subprime.
- v. *Covered bond purchase programme (CBPP).* The Eurosystem committed to purchasing covered bonds¹² denominated in euro and issued in the euro area for a total value of €60 billion gradually over the period between June 2009 and June 2010. The aim of the programme was to revive the covered bond market, which is a primary source of funding for banks in large parts of the euro area. It is the largest and the most active segment of the fixed income market alongside the public sector bond market. Such covered bonds – known as ‘Pfandbriefe’ in Germany, ‘obligations foncières’ in France and ‘cédulas’ in Spain – are long-term debt securities that are issued by banks to refinance loans to the public and private sectors, often in connection with real estate transactions. These covered bonds – unlike mortgage-backed securities – have the specific legal characteristic of ‘double protection’: recourse to the issuer as well as additional security provided by the legal pledge of the assets financed. The size of the programme represented around 2.5% of the total outstanding amount of covered bonds, which in the given context was effective as a catalyst to restart activity in this market.

The evidence available suggests that the non-standard measures taken in October 2008 have been instrumental in stabilizing the financial system and the economy, as well as in ensuring price stability. One empirical perspective is to use model-based exercises. For instance, counterfactual scenarios to address the question of what would have happened if the ECB had not adopted some of its non-standard policy measures following October 2008, highlight the importance of the lengthening in the maturity of the operations in countering the increase in money market spreads.¹³ A structural vector autoregressive (VAR) analysis in which non-standard measures are distinguished from policy interest rate decisions in their orthogonal effects on credit supply indicates that the Eurosystem can effectively stimulate the economy beyond the policy rate by increasing the size of its balance sheet or the monetary base.¹⁴ Another empirical perspective is that of a flow of funds, which is considered in section V.

¹¹ The ECB also provided euro liquidity to selected foreign central banks through repo or swap lines, including non-euro area EU countries.

¹² Covered bonds are securities backed by mortgages; they are held on the consolidated balance sheet of the issuer (contrary to asset-backed securities), but are additionally secured because they provide the investor with a direct claim on the underlying asset in case the issuer defaults.

¹³ See for instance Fahr et al. (2011), Giannone et al. (2011), Lenza et al. (2010) and ECB (2011b).

¹⁴ See Peersman (2011).

3.2 THE ECB'S RESPONSE TO THE EURO AREA SOVEREIGN DEBT CRISIS

In early 2010 the euro area sovereign debt crisis began with acute market expectations about a possible Greek sovereign default, with a risk of impact on Ireland, Portugal, and even Spain and Italy. In May 2010 some secondary markets for government bonds began to dry up completely; large-scale sale offers faced virtually no buy orders and yields reached levels that would have quickly become unsustainable for any sovereign. Given the crucial role of government bonds as benchmarks for private-sector lending rates and their importance for bank balance sheets and liquidity operations, this development was considered to impair the transmission of policy interest rate decisions to the real economy.

To help calm the market down and support a better functioning of the monetary policy transmission mechanism, the ECB established its Securities Markets Programme (SMP) to ensure depth and liquidity in those market segments that were dysfunctional.¹⁵ Under the SMP, Eurosystem interventions could be carried out in the euro area public and private debt securities markets. In line with Treaty provisions, interventions in sovereign bond markets were strictly limited to secondary markets. In addition, they were also fully sterilized through liquidity-absorbing operations, so as to not affect central bank liquidity conditions.¹⁶

Ensuring the proper transmission of monetary policy became a key driver for the ECB's non-standard measures. The analytical and empirical basis for the SMP had to be established from scratch, given that earlier analysis always assumed functioning bond markets. Three main channels of potential disruptions induced by malfunctioning government bond markets were identified.

First, the *price channel* arises from the link between government bond prices and the prices of assets and costs of borrowing in the economy. Large changes in the price of government bonds can directly translate into higher financing costs for the private sector. Banks also compete with governments in their own efforts to raise funds in the capital market. The correlation between sovereign bond yields and yields on bonds issued by banks in the respective countries is high and immediate. This implies increased funding costs for banks which are then passed on with some lag to bank lending rates.

Second, the *liquidity channel* arises from the role of government bonds in repo transactions (and pledges). Given their normally high liquidity, government bonds are the prime collateral used in European repo markets¹⁷ and can provide a benchmark for determining the haircut for other assets used in such transactions. Disruptions in the government bond market can thus paralyse

¹⁵ In addition, some of the non-standard measures that had been withdrawn earlier were re-introduced, in order to avoid spillovers from domestic sovereign bond markets to other financial markets. In particular, the fixed-rate tender procedure with full allotment in the regular 3-month LTROs was re-introduced for the period starting at the end of May 2010 and a new 6-month refinancing operation with full allotment was conducted. The temporary liquidity swap lines with the US Federal Reserve were also resumed.

¹⁶ The fact that during a handful of the more than 100 weekly sterilization operations not all the liquidity was absorbed because the market had a particularly high liquidity preference, does not change this picture because in all cases the liquidity was fully absorbed in the subsequent week.

¹⁷ The share of repos backed by euro area government bonds in the European repo market was 42 per cent at the time the SMP was launched. It had gradually declined from around 58 per cent in December 2008.

other market segments, making it increasingly difficult for banks to obtain liquidity. This might affect their ability to issue bonds or to use government bonds in the secured interbank market as collateral. A rating downgrade of sovereign bonds can lead to a review of its eligibility as collateral and margin calls, and thereby to reductions in the volume of accessible collateralised credit.¹⁸

Third, the *balance sheet channel* arises from the fact that price-implied changes in the nominal value of government bonds can lead to direct changes in the balance sheet size of financial institutions and an erosion of their capital base. The resulting higher leverage may force banks to shrink their balance sheets with adverse effects on their capacity to extend loans to the private sector. Valuation effects are also relevant for insurance corporations and pension funds, which may need to sell off assets in case of a downgrade in the rating of sovereign bonds they hold. Non-financial firms and households also hold government bonds, whose valuation changes may induce wealth effects.

In alleviating disruptions related to those three channels, the SMP was effective at the outset, and led to some stabilization in markets as well as to an immediate and substantial decline of government bond yields. Its impact was re-enforced by the parallel announcement on the establishment of a European Financial Stability Facility through which governments could provide mutual financing support in adjustment programmes for specific countries.

Even though the SMP was used for monetary policy purposes, it also provided time for governments to find a durable solution to the crisis and restore the sustainability of public finances. ECB policy-makers have been vocal in urging governments to use the time to provide for the necessary fiscal and macroeconomic adjustment and supporting financial stabilization tools. This call was particularly relevant in view of the institutional set-up of EMU mentioned above, where the central bank tools are limited by Treaty provisions.

As it turned out, governments did not use the time effectively. In the Greek programme, significant implementation shortfalls emerged, new debt was discovered, and the fundamental issues of substantially improving tax collection and strengthening competitiveness were not addressed sufficiently resolutely. At the same time, the German government argued strongly that a debt restructuring through ‘private-sector involvement’ was necessary. The justification was not only the Greek case at hand, but a broader desire to create a tangible default risk for investors and thereby achieve again a differentiation of bond yields in EMU. These developments illustrated the limits of the SMP and more generally central bank action on government bond markets without explicit conditionality on adjustment efforts for the benefiting sovereigns.

On the positive side, the SMP helped to avoid for some time an uncontrolled increase in sovereign bond yields and thereby in general financing costs for the economy with adverse

¹⁸ A decline in the price of securities serving as collateral can result in an under-collateralisation of the repo. In this event additional collateral has to be met by the next business day (the margin call), which acts effectively like an increase in the haircut. In order to meet the margin call, banks may have to sell assets under already stressed market conditions.

implications for price stability. In addition, it helped to reduce contagion across countries and thereby shielded monetary policy transmission in large parts of the euro area.

Other non-standard measures also contributed to dampen the implications of impairments in the sovereign bond markets. The ECB mitigated the impact on bank funding through a renewed lengthening in the maturity of its liquidity provision and through changes in its collateral framework. As a result, government bonds amounted to less than 20% of the assets deposited as collateral in Eurosystem operations, compared to close to 30% in 2006. The remaining 80% included covered bonds, asset-backed securities, or other financial instruments.

3.3 THE ECB'S RESPONSE AS THE SOVEREIGN DEBT CRISIS AND BANKING SECTOR STRAINS INTENSIFIED

When the sovereign debt crisis struck Italy and Spain in the summer of 2011 and their government bond markets risked becoming dysfunctional – with all the implications for monetary policy discussed above – the ECB decided to ‘actively implement its Securities Markets Programme’ (Statement by the ECB President, 7 August 2011) that had been dormant for several months. Significant and sustained interventions at varying intensity in the following weeks temporarily eased the situation in government bond markets.

In the autumn, however, the euro area banking system came increasingly under strain as the adverse interaction between the sovereigns and the national banking systems, including via portfolio exposure to foreign sovereigns, took hold. Depressed sovereign bond prices weakened bank balance sheets, markets questioned the viability of a number of banks across a range of euro area countries, and the strained sovereigns were seen as increasingly unable to provide credible backstops. The spiral led to falling sovereign bond prices also well beyond the countries under strain including France, Belgium, and Austria. Bank equity prices fell by up to 70% during the year, bank credit default swaps spreads exceeded the Lehman peak, the interbank market became dysfunctional. In large parts of the euro area bank funding dried up, the bank issuance of covered bonds was severely constrained, and uncovered issuance virtually closed. Banks lacked funding and their liquidity beyond the immediate horizon was also brought into question. In this context the situation of banks across the euro area countries became increasingly differentiated, with some banking systems facing an acceleration in net payment outflows. Indeed, their interbank borrowing and debt securities stopped being rolled over and this was sometimes exacerbated by a reduction in client deposits, notably from non-residents. Other banking systems were net recipients of those inflows and faced excess liquidity.¹⁹

At that time, the European Banking Authority agreed on an additional capital buffer calculated by marking sovereign exposures to market and raised the so-called Core Tier 1 capital ratio to 9%. This was meant to be a stabilizing initiative, but created a capital need in the European banking sector of over €100 billion to be raised within less than a year. Market observers

¹⁹ This situation was reflected in an increase in the Target2 balances of national central banks in the Eurosystem. See also Section IV(iii).

estimated a deleveraging risk of about €1 trillion or more, as banks would reduce risk-weighted assets to improve capital ratios. Available indicators and survey information pointed to a severe credit crunch coming up for the euro area as a whole, well beyond countries under strain.

In this context, a response was needed that provided banks not only with a short-term liquidity support but also with a sufficient perspective so that they would maintain credit lines in this very special environment. Therefore, the policy response consisted of four key elements (announced on 8 December 2011):

- two LTROs with a maturity of 3 years each;
- reduction in the reserve ratio, from 2% to 1%;²⁰
- increase in collateral availability by allowing national central banks to accept additional credit claims, in particular bank loans, on their own responsibility; the set of eligible Asset Backed Securities (ABS) was also expanded;
- encouragement of the development of alternative credit assessment sources for use in the selection of eligible collateral.

The key element was the two three-year operations, scheduled for the same month and for end-February 2012. They provided banks with a guarantee of having sufficient liquidity over the medium term so that they would avoid curtailing credit lines to reimburse bank bonds falling due. The novelty was the duration; it added a roll-over insurance to the existing fixed-rate full allotment procedure. Another novelty was an attached option for counterparties to repay amounts at any time after the end of the first year. Take-up was significant in volume and in the number of banks participating. Around €1 trillion was allotted in total for the two operations; in net terms this corresponded to about €0.5 trillion as banks partly shifted out of other operations. In the second operation in February 2012 some 800 banks participated, including, for small amounts, 460 banks from Germany alone. This demonstrated that liquidity was reaching out to small and very small banks, including those whose primary business is to refinance small and medium-sized enterprises. Available information in the following months gave some positive signs of stabilisation in financial markets and credit flows, although the situation remained fragile.

The reduction in the reserve ratio freed an additional €100 billion in bank liquidity. In addition, under the additional credit claims, €13 billion were submitted, against which, after an average haircut of 53%, about €3 billion of liquidity was provided. Since credit claims correspond to certain types of loans to households and firms, their eligibility as collateral enables euro area banks more readily to access Eurosystem refinancing using assets directly related to their lending activity, thereby potentially also supporting the financing of the real economy. Finally, the encouragement of alternative credit assessment sources reflected the view that the assessment of credit rating agencies would be pro-cyclical and short-sighted, thereby amplifying a mispricing of risks in upturns and precipitating adverse asset price spirals in downturns.

²⁰ The euro area credit institutions are required to hold reserves at their national central banks, which are remunerated at the interest rate on the main refinancing operations.

Taken together, the measures were providing enhanced credit support, with a liquidity arrangement very forthcoming to banks, in particular regarding term liquidity.

This was also the case of the additional measures decided by the Governing Council in the course of 2012 to ensure the availability of adequate collateral in Eurosystem refinancing operations. These included a further expansion of the set of eligible ABS in June, and in July the removal of the rating waiver for Greek government and government-guaranteed securities after the end of the so-called 'buy-back scheme' while waiting for the conclusion of the programme's review. Further measures in September included the acceptance of certain foreign-currency denominated paper issued in the euro area and, in the context of the OMT reviewed below, the waiving of the minimum credit rating threshold for certain paper issued or guaranteed by the central government of countries under an adjustment programme that complied with the attached conditionality, or of programme countries 'regaining market access'.

Notwithstanding the forthcoming liquidity arrangements for banks, in the summer of 2012 there were signs of increasing fragmentation in the funding conditions for households and firms across the euro area countries. The ability of banks to provide credit was seriously hampered with consequences for the real economy. Bank funding costs were pushed up by continued tensions in sovereign debt markets, with pressure on the quality of bank balance sheets; the reduced availability of high-quality collateral was impairing their access to liquidity. For some countries the government bond yields started to incorporate redenomination risk premia; that is, tail risk of an abandon of the euro for a new currency. In such conditions the signal of the policy interest rates was not transmitted appropriately throughout the euro area.

Against this background, the ECB decided on 6 September 2012 on a scheme to intervene in secondary sovereign bond markets subject to strict and effective conditionality, the so-called OMT (see also section II(i)).²¹ The aim is to preserve the singleness of the ECB's monetary policy and to ensure the proper transmission of the monetary policy stance to the real economy throughout the area. The measure is stated to enable the ECB to address severe distortions in government bond markets which originate from, in particular, unfounded fears on the part of investors of the reversibility of the euro. With this measure, the ECB has equipped itself with a backstop to avoid destructive scenarios with potentially severe challenges for price stability in the euro area, sending a strong signal of the irreversibility of the euro. There are 'no ex ante quantitative limits' set on the size of outright monetary transactions. By signalling its readiness to intervene in government bond markets, the ECB could help, in particular, to reduce the likelihood of adverse self-fulfilling equilibria. It addressed tail risk that had started to exert upward pressure on yields in sovereign bonds but also in other assets and to hinder market access of banks. The OMT can thus, ultimately, contribute to aligning financing conditions for households and firms better with policy interest rates throughout the euro area.

However, the ECB measures alone cannot repair the transmission of monetary policy. The effectiveness of the OMT crucially depends on governments taking the necessary steps to

²¹ The operations fall into the scope of outright transactions under Article 18 of the Statute of the ECB in the Treaty.

contribute to the stability of the euro area, individually and collectively.²² This is made clear with the strict conditionality of the OMT. A necessary condition for outright monetary transactions with respect to a specific sovereign bond market is ‘strict and effective conditionality attached to an appropriate European Financial Stability Facility/ European Stability Mechanism programme’, provided it includes the possibility of primary market purchases by the EFSF/ESM. Such a programme involving the financial means of the euro area governments and, in some cases, approval by parliaments, this means that the ECB would wait for the euro area governments collectively to be ready to put their money first before deciding whether central bank money would be used in the sovereign bond markets, if this is warranted from a monetary policy perspective.

In fact, the conditionality of the OMT relates to all relevant parties: the sovereigns themselves, whose bonds may be the object of interventions; the euro area governments collectively, which fund the EFSF/ESM programmes and are stakeholders in its effectiveness and in the country’s compliance; possibly the IMF, depending on its involvement in the programme; and finally the ECB. The ECB explicitly commits itself to suspending the OMT in case of failure on the side of the government to comply with conditionality – or in case of success where the OMT objectives are achieved, thereby setting two cases for exit from the OMT.

Besides strict conditionality and explicit reference to an exit, there are three other modalities in which the OMT differ from the SMP: focus on the short-term maturities in government bond markets; explicit acceptance of *pari passu* status; and transparency with regard to the disclosure of transactions for the countries concerned.²³ With those differences, the ECB aimed at addressing a number of concerns relating to the SMP which was terminated at the same time as the OMT was announced.

²² The Introductory statement of the President on 6 September 2012 emphasizes that ‘governments must stand ready to activate’ the rescue funds ‘in the bond market when exceptional financial market circumstances and risks to financial stability exist – with strict and effective conditionality in line with the established guidelines’.

²³ First, as a way to enhance the incentives for governments to address the public debt sustainability issues, the transactions are to be focused on the shorter maturities, in the range of 1–3 years. Under the SMP, interventions typically concerned up to the 10-year maturity. Second, under the OMT, the ECB receives the same creditor treatment as private or other creditors. This is different from the preferred creditor status in the context of the SMP, which risked discouraging private investors to invest in the bonds of sovereigns under strain. Third, transparency is enhanced: the aggregate OMT holdings and their market values are to be made public, including their average duration and country breakdown.

4 PRINCIPLES UNDERLYING THE ECB'S NON-STANDARD MEASURES

Before comparing the ECB's non-standard measures with the actions of other major central banks, this section identifies three conceptual elements that stand out in the ECB's approach to date: an explicit framing of the non-standard measures within the ECB's monetary policy strategy; their characterization as a complement to decisions on policy interest rates; and, as such, a focus on monetary policy transmission.

4.1 EXPLICIT ANCHORING WITHIN THE ECB'S MONETARY POLICY STRATEGY

The first key conceptual element of the ECB's non-standard measures is that, within the framework of its price stability objective, the ECB has determined, and phrased, its non-standard actions in line with its monetary policy strategy. This strategy includes a quantitative definition of the price stability objective, a medium-term orientation whereby price stability is to be maintained over the medium term, and a two-pillar base for the assessment of risks to price stability. The two pillars include an economic analysis, geared to short-to-medium-term conjunctural developments, and a monetary analysis, which takes into account the link between money and inflation at longer horizons. This allows a binocular and thereby three-dimensional picture of the situation.

The quantitative definition of the price stability objective and the credibility of the ECB in reaching this objective granted by its inflation track-record have helped to cushion the repercussions of the crisis on the euro area economy and guard against both deflation and inflation risks. In particular, longer-term inflation expectations remained more strongly anchored than in other regions. The definition of the ECB's price stability objective itself could arguably also be seen as granting little room for a monetary policy crisis response focused on financial asset markets. Measured in terms of the consumer price index, where asset prices play only an indirect role, the price stability objective would rather provide a rationale for monetary policy measures focused on enhancing credit flows and price conditions for firms – which set such consumer prices – and households – the consumers themselves.

The ECB's explicit medium-term orientation has also helped anchoring inflation expectations because it has made clear that despite the financial crisis, its long-standing monetary policy strategy has remained in place. It has allowed the ECB to react with non-standard measures while stressing their consistency with its established monetary policy framework. Non-standard measures are characterized as temporary and extraordinary steps taken in response to exceptional circumstances. In this response the central bank exercises a delicate balancing act.²⁴ Leaving non-standard measures for too long could yield distortions in markets and may set

²⁴ See for instance Praet (2012). “On one hand, the central bank may need to provide backstops to remove tail risks that could otherwise result in severe downward pressure on price stability. On the other hand, by mitigating a crisis which largely reflects shortcomings in other policy areas and excesses in the financial sector, the central bank may alter incentives for different actors to correct imbalances.”

adverse incentives, with ensuing risks of financial and price instability down the road.²⁵ Accordingly, in order to counter any threat to price stability over the medium term, the ECB has emphasized that the liquidity provided will be absorbed when necessary.

Regarding the monetary analysis, the ECB's focus on money and credit developments for monetary policy purposes has been particularly useful to identify the causes and dynamics of the crisis and the impairments in the transmission of monetary policy, and thereby to design appropriate non-standard measures. The monetary analysis had enabled the dynamics of asset prices to be taken into account for monetary policy decisions. For instance, it played a major role in the decision to raise the key ECB interest rates in December 2005. The monetary analysis helped to identify the root causes of the financial crisis – in the global build-up of leverage and under-pricing of financial risk – which first erupted in the United States as the world's largest and most innovative financial market. Money and credit developments were then most helpful in understanding how in Europe the crisis exposed vulnerabilities due to an insufficient enforcement of the Stability and Growth Pact and macroeconomic imbalances in the euro area, and subsequently transformed into a sovereign debt crisis with severe implications for the transmission of monetary policy. The analysis of this transmission relies largely on money and credit developments and is used in turn to design the appropriate non-standard monetary policy response.

4.2 NON-STANDARD MEASURES AS A COMPLEMENT

The ECB has to date always considered its non-standard measures primarily as a *complement* to its interest rate instrument, not as a *substitute*, as is the case for the bulk of unconventional policies of other major central banks.

To date and throughout the crisis, the ECB's monetary policy stance has continued to be signalled by its policy interest rates. The non-standard measures did not take up any such signalling role. Instead, they are there to ensure the effective transmission of standard policy to the euro area economy (see section IV(iii)). The only difference to the pre-crisis period is that while the key ECB interest rate on the main refinancing operations could signal the ECB's monetary policy stance by itself, in the exceptional circumstances of the financial crisis all the three key ECB interest rates have played a role in this signalling. The implementation of the ECB's monetary policy has continued to aim at keeping the overnight interest rate in line with the key interest rates, albeit no longer in a very close relationship with the main refinancing rate alone (see also ECB, 2010b).²⁶

²⁵ The financial crisis itself has shown that the economic fallout from a mis-pricing of risks and bursting bubbles can be considerable.

²⁶ The overnight interest rate, notably the EONIA, is essentially kept within the corridor formed by the other two key ECB interest rates, on the deposit facility and the marginal lending facility. In the presence of excess central bank liquidity resulting from the full accommodation of the liquidity demand of solvent banks, the EONIA has been close to the deposit facility rate. In fact, the effective marginal cost of refinancing of a bank at the start of the transmission of monetary policy can be closer to one or the other of the three key interest rates depending on the liquidity position of the bank and its access to the interbank market. For banks in countries under strain, the marginal cost of refinancing can be closer to the marginal lending facility rate.

As a *complement*, the ECB's non-standard measures can, in particular, be adjusted regardless of the prevailing level of interest rates; and vice versa, interest rates can be adjusted with non-standard measures still in place. One key illustration of this complementarity is the indexation of the interest rate in LTROs on the future main refinancing rate over the lifetime of the operations. This indexation means that an increase in the policy interest rate is immediately translated to increased costs for the remainder of the outstanding operations. Without such indexation, the LTROs could interfere with the signalling of the monetary policy stance through the key ECB interest rates. This was the case in the first 1-year operation in June 2009 which met very large liquidity demand possibly in part because of expectations of future increases in the policy interest rates. The indexation feature was introduced in December 2009 and has been kept in most of the subsequent refinancing operations of a maturity above 3 months.

By contrast, the US Federal Reserve, Bank of England, and Bank of Canada appear to consider unconventional monetary policy centred on outright asset purchases as a *substitute* for interest rate decisions and therefore a way to provide extra stimulus to the economy and mitigate deflationary pressures once policy rates have reached a lower bound. In line with the role of expectations and prescriptions from New-Keynesian macro-models, such measures are often combined with communication or forward guidance on the expected path of future policy rates. Such models indicate that it may even be optimal to try and raise inflation expectations in order to 'implement a reduction in real interest rates'.²⁷

The characterization of the ECB's non-standard measures as a complement, different to unconventional policies by other major central banks, is in part reflected in semantic choices. Whereas the ECB considers as non-standard *specific measures* taken separately from standard interest rate policy, for the US Federal Reserve and Bank of England these appear to be associated with the zero-lower-bound becoming a binding constraint and *monetary policy turning unconventional* or 'quantitative', operating on the size of central bank balance sheets.

This difference of characterization is also reflected in the different periods considered for the introduction of the non-standard measures and unconventional policies. For the ECB, which has considered them as a complement from the outset, non-standard measures were introduced already in October 2008, and in fact already during the financial turmoil which started in August 2007, when there was still a large margin for reducing policy interest rates. By contrast, the literature on the US Federal Reserve and Bank of England experiences usually focuses on the period since the spring of 2009, once policy interest rates had reached a lower bound, after the initial focus on liquidity support to financial intermediaries and 'credit easing' aimed at reviving and reducing risk premia in impaired markets.

²⁷ The focus on the zero lower bound contrasts in turn with richer, quantity-based notions of a liquidity trap in the older literature, which from a flow-of-funds perspective hinges on the degree of asset substitutability between money, bonds and other assets.

4.3 FOCUS ON SUPPORTING THE MONETARY POLICY TRANSMISSION

In their function as a complement, non-standard measures aim at supporting the effective transmission of the policy interest rate signal to the euro area economy when transmission is hampered by the exceptional economic and financial situation.

Given its financial nature and, in particular, its first manifestations in the interbank market, the global financial crisis was set to have serious implications for the transmission in the bank-based euro area economy.²⁸ Therefore, the main channel of action targeted with the ECB's non-standard measures has been bank lending. This differs from the targeted channels of unconventional policies, and accordingly the ways to assess their impact. The targeted channels for the US Federal Reserve and Bank of England have been the yield curve and, more generally, asset prices and market-based inflation expectations, to be affected through a reduction in risk premia plus portfolio rebalancing effects associated with asset purchases. Accordingly, the impact of the responses to the crisis has been mostly assessed by the respective central banks themselves and in the academic literature in different ways. For the ECB this has been more on the basis of financing conditions and lending to households and non-financial corporations. For the US Federal Reserve and Bank of England (except in the context of the Bank's recent Funding for Lending Scheme) this has been more on the basis of financial market performance.

A key feature in the implementation of the ECB's monetary policy, which has attracted a lot of attention also from a political viewpoint, has been the asymmetric distribution of its action across the euro area, consistent with the aim to support the effective transmission of policy interest rate decisions throughout the euro area. There has not only been fragmentation in financial markets (see section II(ii)) but also a highly uneven distribution of strain and financial stress: acute in the periphery, neutral or modest in the semi-core, and capital abundance resulting from flight-to-quality capital movements in countries such as Germany. The ECB's liquidity support to banks has been taken up in an uneven way by those national banking systems whose sovereigns face a debt crisis. In turn, central bank liquidity has appeared to migrate to the stronger countries, such as Germany, the Netherlands, Finland, and Luxembourg, where residents have continued to receive payments due from the periphery, reduced their investments there, and where banks have been recipients of some shifts in retail deposits. This is manifested in the Target2 balances on the Eurosystem central banks' balance sheets, with Target2 claims for these countries and Target2 liabilities for countries such as Spain, Italy, and the three programme countries Greece, Ireland, and Portugal, and some other vulnerable countries such as Cyprus.²⁹

The ECB's non-standard measures have ensured that solvent banks throughout the euro area have not faced liquidity constraints, so that they have been able to continue lending to firms and

²⁸ The issue of monetary policy transmission has been a long-standing and highly researched issue at the ECB. See Angeloni et al. (2003) for a set of studies on the subject. The financial crisis has led to the emergence of a new stream of research on transmission in presence of systemic risk. For instance, Moutot (2011) proposed a model which combines heterogeneity and financial frictions to measure their impact on the transmission process of monetary policies.

²⁹ See, for instance, Bindseil et al. (2012) and ECB (2011a, 2012a).

households. Disorderly deleveraging and adjustments in the banking sectors and economies have been meant to be avoided and time has been given for orderly adjustments – improvements in countries’ economic fundamentals and banks’ financial positions.³⁰ In that sense, the ECB’s monetary policy has bought time for governments and banks to adjust, and the litmus test of the overall approach is to see that such time will be used effectively.

4.4 ECB’S NON-STANDARD MEASURES VERSUS ACTIONS OF OTHER CENTRAL BANKS

The question is sometimes raised whether the ECB’s non-standard measures are tantamount to quantitative easing and equally amount to ‘printing money’. A number of observations show that this was not the case, at least in the first stages of the crisis before its epicentre clearly moved to the euro area and even though in terms of their effects on the economy the two approaches have similarities, as is seen in section V(iii).

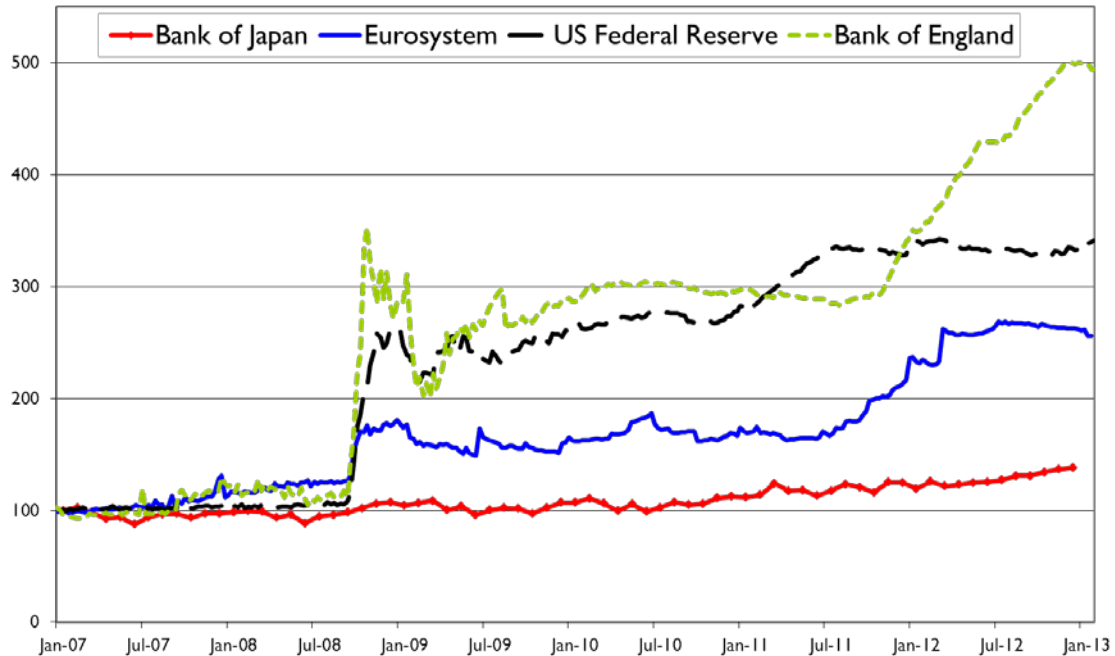
First, the quantitative response has been different. During the phase of the global financial crisis (2008–11) before the re-intensification of the euro area sovereign debt crisis, the epicentre of the crisis was in the US and the UK. In line with this and with the choice of the policy response, the balance sheets of the US Federal Reserve and Bank of England increased by about 150%, whereas that of the Eurosystem only rose by about 50% during the period (see Figure 4). As the epicentre of the crisis then moved to the euro area, the Eurosystem balance sheet has been significantly widening, similar to the cases of the other two central banks. Second, with the exception of the purchase programmes – which to date have been relatively limited in scope (the CBPP and the SMP amounting in 2012 to about 3% of GDP) –, the ECB has focused on lending against collateral rather than on purchasing assets. With such lending operations the ECB has not sought to boost market prices. Rather, it has taken for the collateral market prices as given (with daily adjustments to price fluctuations) and, moreover, applied a haircut that can be considerable for some asset classes.³¹ Third, at least until late 2011 the ECB made clear that non-standard measures were not the new regime but exceptional means that were temporarily required and should be measured in dimensions and phased out as soon as possible. Phasing-out is actually embedded as a design feature of the bulk of the ECB’s non-standard measures. One of the reasons for this more measured approach was the need, in the EMU context, to avoid moral hazard on the side of the various governments: they should not rely on monetary policy to stand in for their own responsibilities.

³⁰ See, in particular, Cour-Thimann (2012).

³¹ Haircuts are a function of the credit quality, maturity, and risk-bearing features. To give some orders of magnitude, as at mid-2012 haircuts are up to 10 per cent for long-term government bonds, up to 30 per cent for some covered bank bonds, and up to 40 per cent for some uncovered bank bonds. For some of the securities accepted as additional credit claims in early 2012, the haircut is up to 75 per cent and on average 53 per cent.

Figure 4 Balance sheet sizes of selected central banks

(value of total assets with reference to January 2007)



Source: ECB, US Federal Reserve, Bank of England, Bank of Japan.

Note: Last observations are respectively 11 January, 9 January, 9 January 2012 and end-December 2012.

While those elements continue to apply, the intensification of the sovereign debt crisis in the summer of 2011 has raised new challenges, in particular including the perception of risks with respect to the integrity of the euro area. As mentioned, the OMT scheme has been announced as being ‘*ex ante* unlimited in size’, which has been clarified as meaning being adequate to reach its objectives.

In general, for all central banks the balance sheet is typically lengthened and transformed during the financial crisis, with assets of a potentially lower quality in a context of a depressed economy. Table 1 provides an overview of the non-standard measures taken by the ECB (greyed areas) in comparison with measures taken by other major central banks during the financial crisis, and their associated risk profile.

Table I Typology of ECB's non-standard measures in the spectrum of unconventional central bank policies

Support to funding of banks												
Measure	Outright purchases of						Asset swaps	Lending operations				
	Liabilities			Assets held by banks				Securities against illiquid assets	Collateral/counterparty eligibility	LTRO	FX swap lines	Non-recourse loans
	Covered bonds	Commercial Paper, other securities	Equity	Debt securities	Other securities	Equity holdings						
Balance sheet risk	full risk						tail risk	counterparty risk				

Other interventions, in												
Measure	Acting on non-bank financial intermediaries					non-financial sector					sovereign bond markets	
	Outright purchases		Asset swaps	Lending		Lending	Outright purchases		Asset swaps		Outright purchases	
	Mortgage-Backed Securities	Equity	ABS and other	to targeted intermediaries (e.g. non-recourse)	Money Market Funds	Lending to targeted sectors	Commercial paper, trade credit	Asset-Backed Commercial paper	Corporate bonds	Other	Large-scale, in primary market	Sterilised, in secondary market
Balance sheet risk	full risk		counterparty risk		counterparty risk	full risk		tail risk		full risk		

Note: The ECB's non-standard measures are represented in the greyed areas in the spectrum of the main types of measures (and associated assets) considered or undertaken by central banks during the financial crisis.

The ECB's non-standard action directed primarily at providing liquidity support to the banking system in collateralised operations implies a specific risk profile for the Eurosystem. Compared with that of the central banks conducting large-scale outright asset purchases, the Eurosystem risk profile essentially involves counterparty risk³² more than valuation risk, and is also bound in time. The central bank funds that have flowed to the economy have a maturity date which is known in advance for each repo operation (with a possibility of advance repayment for the three-year refinancing operations) so that the unwinding of those flows of funds is natural (see Figure 5). Such 'natural' phasing-out for the bulk of the non-standard action was emphasized by Trichet (2009d). Despite its temporary nature, its effects can still be extended over time through the renewal of the non-standard measures. For instance, at several occasions the ECB re-introduced measures which it had phased out earlier, as also visible in Figure 5.³³

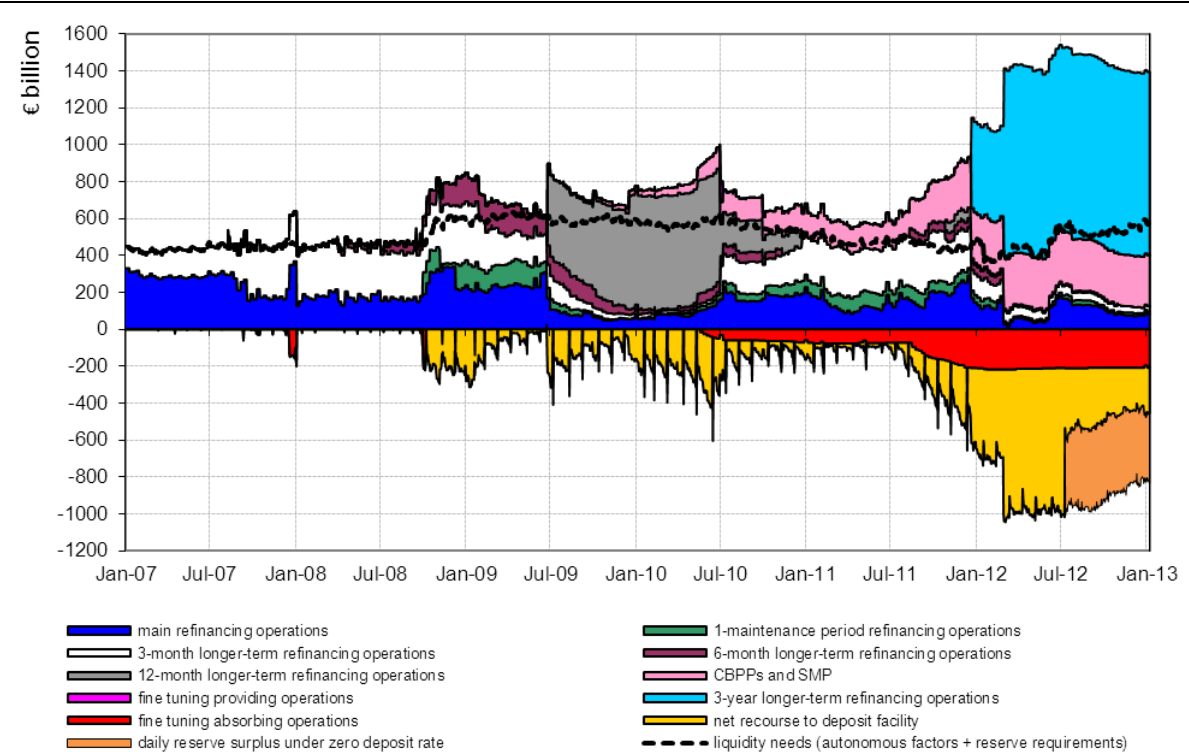
By contrast, there is no such natural due date for the unwinding of the flows of funds associated with large-scale purchase programmes by other central banks, such as in the case of the US Federal Reserve, where Treasuries and non-Treasury securities constitute the bulk of the assets

³² The value of the collateral which would need to be recovered in case of a counterparty defaulting on its Eurosystem central bank loan is not necessarily lower than pre-crisis. While the list of eligible collateral has been widened and the credit quality threshold lowered during the crisis, the haircuts have been adjusted, with significant increases for the more risky assets. In addition, as mentioned, marketable assets used as collateral are marked to market on a daily basis.

³³ In particular, the ECB decided to re-introduce the fixed-rate full allotment tender procedure for the regular 3-month refinancing operations in May 2010 as the sovereign debt crisis emerged, which had stopped being applied for operations of that maturity after December 2009. The ECB also re-introduced 6-month refinancing operations.

(see Figure 6). The maturity of the assets purchased is for a large part long-term. This raises questions on when and how to unwind purchases.³⁴

Figure 5 Eurosystem monetary policy operations

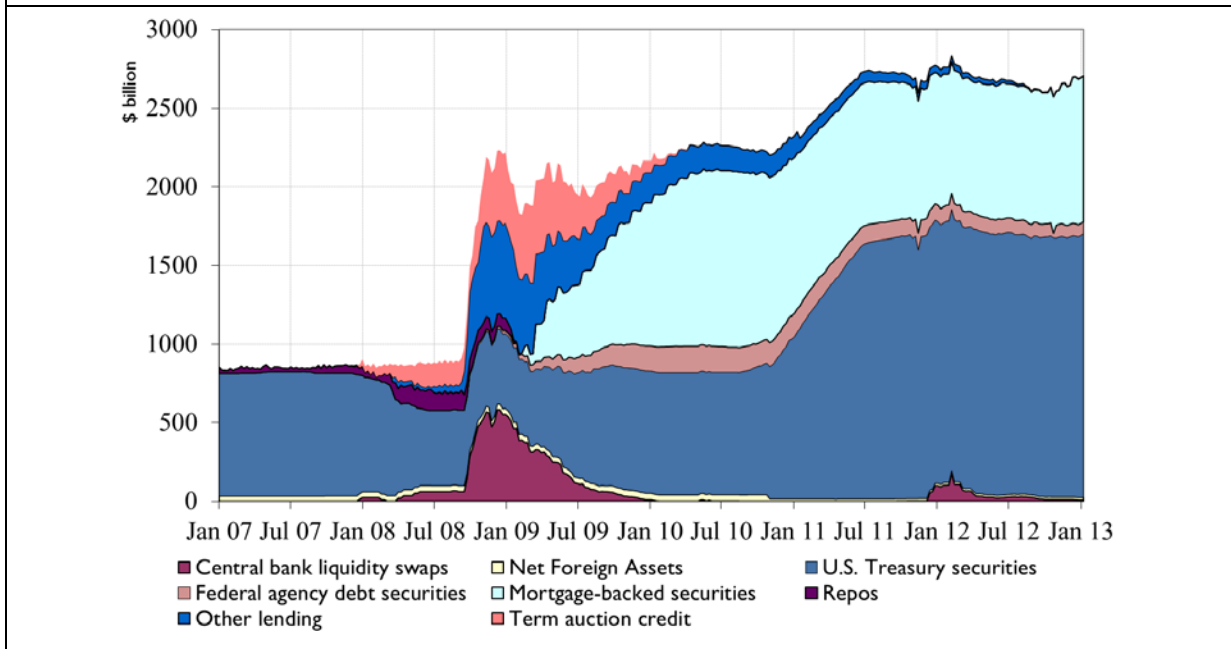


Source: ECB.

Notes: Last observation: 11 January 2013. For a reading in black-and-white, the largest items at the beginning of the period are, in order, 'main refinancing operations' and '3-month longer-term refinancing operations'. The largest item between mid-2009 and mid-2010 corresponds to '12-month longer-term refinancing operations'. The two largest positive items at the end of the period are, in order, '3-year longer-term refinancing operations' and 'CBPPs and SMP'.

³⁴ In this respect the smaller-scale ECB assets purchased under the SMP and the CBPP have been planned to be kept to maturity. There is no such plan concerning the OMT.

Figure 6 Simplified asset side of the balance sheet of the US Federal Reserve



Source: US Federal Reserve data.

Notes: Last observation: 9 January 2013. For a reading in black-and-white, the two largest items at the end of the period are, in order, 'US Treasury securities' and 'Mortgage-backed securities'. The item 'Central bank liquidity swaps' corresponds to the area that shows two humps at the turn of 2009 and the turn of 2012.

5 A FLOW-OF-FUNDS PERSPECTIVE ON NON-STANDARD MEASURES

This section looks at non-standard measures through the lenses of the flows of funds, building on the analysis in ECB (2011d). It proposes an interpretation of non-standard measures as a response to deleveraging pressures across other sectors, leaving the central banks as the ‘last sector’ with the capacity to leverage or avoid disorderly deleveraging in the economy by acting as ‘intermediary of last resort’ when traditional transmission mechanisms are impaired. It then illustrates the ‘rotation’ across sectors in balances of savings and investment and leverage observed in the euro area during the crisis, before providing an interpretation of central banks’ outright purchases and collateralised liquidity support as responses to sectoral deleveraging and dis-intermediation pressures. Finally, as an example, the impact of non-standard measures across different sectors and market segments is illustrated in the case of the ECB’s very long-term refinancing operations around the turn of 2012.

5.1 THE ‘PARADOX OF DELEVERAGING’ AND THE ROLE OF CENTRAL BANKS IN A FINANCIAL CRISIS

Given the roots of the financial crisis in excess leverage and financial imbalances that had been building up during the credit boom, the fallout of the crisis involves the need for an orderly rebalancing and reduction of leverage.³⁵ The challenge for governments and central banks in this situation is to accompany such deleveraging of the indebted sectors while limiting the adverse impact on activity and destabilizing effects on debt and asset markets. This challenge can be motivated by a *paradox of deleveraging*.

Going back to Keynes, it is well understood from a flow-of-funds perspective that, if all sectors in an economy simultaneously attempt to increase savings *ex ante*, the likely result will not be higher savings, but lower GDP. This example of a fallacy of composition – where rational behaviour at the individual level leads to an unintended outcome in the aggregate – is known as the *paradox of thrift*. It emerges because the depressing impact of lower consumption arises well before, or is more potent than, the favourable impact on investment stemming from the ‘classical’ effect via lower interest rates (especially when the economy is at the zero-interest-rate-bound or in a ‘liquidity trap’). In an analogy to this well-known savings paradox, expressed in terms of flows, there is a similar *paradox of deleveraging*, which we propose to describe as follows with reference to stock adjustments in sectoral balance sheets.

Consider the need for any given sector to reduce leverage L defined as the ratio of debt to assets D/A , which can be re-written as follows:

³⁵ In this respect, the work of Hyman Minsky on the mechanisms of debt accumulation that pushes an economy towards a crisis and its resolution has received revived attention during the current financial crisis.

$$L = \frac{D}{A} = \frac{1}{\left(\frac{A-D}{D} + 1\right)}$$

From this expression leverage can be reduced either by increasing net assets (A–D), typically via savings,³⁶ or by repaying debt D holding net assets constant, which, however, requires the liquidation of assets, A.

An attempt by all sectors to deleverage simultaneously by redeeming debt collides with the desire of sectors to keep accumulating (non-equity) financial assets, as one sector’s debt is another sector’s asset. The only way for each sector to deleverage by redeeming debt without disposing of debt assets themselves or without higher savings, is by selling equity or non-financial assets, but this leads to ‘fire-sales’ putting downward pressure on asset prices. Hence, attempts to deleverage by all sectors will lead to self-defeating dynamics in aggregate, with leverage increasing as a result of lower asset prices, when measured at market value. At the same time, leverage reductions via savings and increases in net assets (A–D) require parallel increases in net liabilities by other agents in the economy, i.e. agents that would be willing to increase leverage to accommodate the additional saving (by the deleveraging agents) with additional expenditure.

The ‘paradox of thrift’ and the ‘paradox of deleveraging’ are thus linked. The redeeming of debt by a sector that increases savings could take place without problems if other sectors reduce savings and are willing to dispose of (non-equity) financial assets. Thus, if private sectors suddenly increase savings, it is common to suggest that governments typically would, or should, do the opposite and dissave to accommodate the extra savings, such as to establish a new equilibrium at unchanged income. By the same token, if private sectors aim at redeeming debt while continuing to take on (non-equity) financial assets, governments naturally would or should increase the supply of debt either to fund a deficit or to acquire assets,³⁷ so as to prevent an excessive fall in asset prices. Note that we abstract here from the rest of the world, which can of course also accommodate extra savings or deleveraging needs.³⁸ The rest of the world cannot accommodate or absorb saving at fixed demand instantaneously, given that time is needed to move net exports, all the more so in a fixed exchange rate regime. By contrast, the rest of the world can contribute more immediately to deleveraging absorption if it is net seller of non-equity assets but net buyer of equity.

However, the euro area sovereign debt crisis illustrates the limit to the capacity for governments to dissave and increase leverage when other sectors increase savings or deleverage. Governments’ dissaving cannot provide a counterpart to private sectors’ savings indefinitely,

³⁶ Alternatively, net assets (A–D) can be increased by replacing debt with equity as source of financing.

³⁷ If they are non-financial assets, this also results in higher government deficit. Alternatively the government can also invest in equity (e.g. recapitalization of the private sector), which would have no effect on government deficit, but still have an upwards effect on government leverage. Finally, the government can use the funds raised to buy private debt and thus limit deleveraging pressures and the need for selling assets by other sectors.

³⁸ At the same time, the euro area as a whole has been rather close to external balance since the creation of EMU, which suggests that the accommodative role of external debt in domestic deleveraging might be limited.

because destabilizing debt-to-income ratios can be reached. This is one illustration of the importance of ‘stock-flow consistency’ considerations and the build-up of balance sheet vulnerabilities (see Bezemer, 2013, and Barwell and Burrows, 2013) which can easily be overlooked if one focuses only on flow relationships. This is also one advantage of looking at the ‘paradox of thrift’ from the perspective of financial (rather than non-financial) flows, as financial flows cumulate and are reflected in changes of financial assets and liabilities in sectoral balance sheets.

The ‘paradox of thrift’ finds its most satisfactory resolution in higher investments or in higher current account balances, as a counterpart to higher savings without depressing effects on consumption. The ‘paradox of leverage’ points to a similar solution: more accumulation of non-financial assets for the economy as a whole so that total-economy leverage ratios can improve via the denominator (the assets) instead of via the numerator (debt). A further solution to the paradox of leverage (which is not available in the case of the paradox of thrift) is to foster a switch by investors towards equity investment (instead of debt assets) and by debtors to step up equity funding.

In line with this interpretation, obtaining a higher valuation of assets can be seen to be the implicit, if not explicit, rationale for large-scale asset purchases/quantitative easing by some major central banks and can contribute to addressing the ‘paradox of leverage’. Higher valuation following purchases can both foster the switch to equity of investors and debtors alike, as well as boost non-financial investment (Tobin’s Q; see Driffill and Miller (2011)). Similarly, measures providing liquidity to the financial system via collateralised lending as in the case of the ECB might also indirectly support asset valuation by helping to avoid disorderly deleveraging and fire sales by banks.

Thus, the ECB’s bank-based non-standard measures can also be interpreted from a flow-of-funds perspective as involving an asset market channel of transmission, to the extent that enhanced credit and money flows to households and firms can be used either for transactions in goods and services or for the purchase of other assets (see Winkler, 2010, for an overview). By supporting the capacity of the banking system to perform their intermediation role and by addressing dysfunctional markets, the ECB’s non-standard measures have prevented disorderly deleveraging by the banking sector and have indirectly supported the asset and debt markets across all sectors (as will be illustrated in the example of the three-year LTROs in section V(iii)). Counterfactual exercises on the role of liquidity support measures adopted during the first phase of the financial crisis undertaken by Giannone et al. (2012) indeed suggest that these measures have not been less powerful with respect to avoiding more adverse impacts of the crisis on GDP and inflation than has been shown by similar studies for central banks undertaking large-scale asset purchases/quantitative easing.

Turning to other recent papers that have also adopted a flow-of-funds perspective, Cobham and Kang (2012) make use of a simplified flow-of-funds matrix to trace the effects of quantitative easing and a range of financial shocks on broad money and the flow of funds. Carpenter et al. (2012) analyse the beneficiaries of the asset purchases by the Federal Reserve by sector in the US flow-of-funds accounts. Bonci (2011) analyses the transmission of a contractionary

monetary policy shock in the euro area. Bindseil and Winkler (2012) analyse the role of central banks as providing liquidity buffers to the banking system and/or security markets during the financial crisis, thereby pre-empting self-defeating fire-sales and collateral shortage. The authors focus on dual funding crises affecting the banking sector and governments simultaneously, and review the related flow-of-funds and constraints under alternative monetary regimes (gold standard, paper standard with flexible exchange rates, paper standard with fixed exchange rates, monetary union).

5.2 THE ROTATION OF FINANCIAL BALANCES AND LEVERAGE ACROSS SECTORS DURING THE FINANCIAL CRISIS: THE CASE OF THE EURO AREA

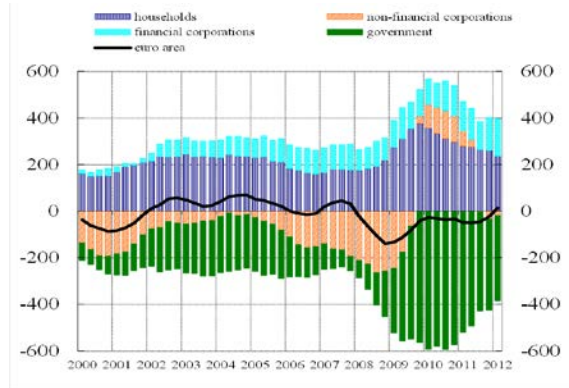
As an illustration of the ‘paradox of thrift’ this section reviews the evolution of financial balances (net lending/net borrowing) by institutional sectors, as shown in Figure 7 (where the central line indicates the euro area external surplus/deficit). Throughout the whole period of Monetary Union, both households and financial corporations have been net lenders (i.e. showing an excess of savings over capital formation). During the run-up to the crisis in 2004–8, non-financial corporations increased their net borrowing substantially to finance the excess of investment over retained earnings (i.e. savings), while households only slightly reduced their net lending. Owing to growing income and savings, governments were, at the same time, able to reduce their deficits during the boom period, but in aggregate not eliminating them or building sufficient buffers for the downturn to come. With the net lending of households and financial corporations broadly offsetting the borrowing needs of non-financial corporations and governments, the external balance of the euro area economy remained broadly unchanged for most of the period.

After the Lehman insolvency in 2008, both households and non-financial corporations improved their financial balances simultaneously: households widened their surplus, while non-financial corporations swung sharply from deficit into surplus. The increased savings by private sectors was counter-balanced by much larger deficits in the government accounts.

To illustrate the build-up of imbalances inside the euro area, as the flip-side of increased financial integration and divergence in competitiveness within the Monetary Union, Figure 8 shows the sectoral net savings patterns for government and private sectors for two country groupings comprising current account surplus and deficit countries, respectively. During the pre-crisis boom, the deficit countries showed pronounced net borrowing for the private sector and continued deficits for the government sectors, with private balances reversing strongly post-Lehman. From a flow perspective the internal dimension of the crisis has been widely characterized in terms of a classic balance-of-payments crisis, in particular when focusing on divergence in competitiveness and hence in corporate margins underlying savings–investment balances (ECB, 2012a,b).

Figure 7. Euro area net lending/net borrowing

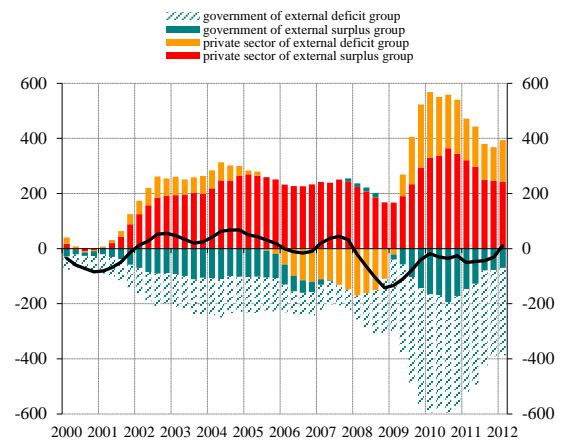
(four-quarter sum of transactions; € billion)



Note: Net lending adjusted for transactions in non-produced assets such as mobile phone licenses (UMTS). Last observation: 2012Q1.
Sources: Eurostat and ECB.

Figure 8. Euro area net lending/net borrowing

(four-quarter sum of transactions; € billion)



Note: "Surplus countries" are those running external current account surpluses for most of the recent period until the crisis hit: Belgium, Germany, Luxembourg, the Netherlands, Austria and Finland. All other euro area countries are grouped as 'deficit countries'.
Sources: Eurostat and ECB.

The need for sectoral rebalancing and deleveraging in the unfolding of the financial and sovereign debt crisis in turn had an impact on the heterogeneity of monetary policy transmission across the euro area and posed particular challenges for the single monetary policy. On the one hand, official loans from euro area governments and the IMF contributed to closing the funding gap for a number of countries. On the other hand, asymmetric recourse to the Eurosystem's non-standard measures and, in particular, the concentration in the distribution of central bank liquidity to banking systems in countries under stress (see section IV(iii)), compensated for a retrenchment of private cross-border financing, *de facto* intermediating liquidity flows inside the euro area via the Eurosystem balance sheet.

Turning from a flow perspective to developments in sectoral debt and leverage, Figure 9 illustrates that the increase in indebtedness (in relation to GDP) in the euro area was largely a private-sector phenomenon until 2008, consistent with high housing investment and corporate net borrowing, although less pronounced than in the US. After the collapse of Lehman, government debt ratios increased considerably, under the joint influence of very large deficits and falling GDP, and helped to stabilize the debt ratios of the private sectors. In the case of the US a more pronounced government debt build-up is observed, consistent with stronger deleveraging by households and, particularly, financial corporations. Conversely, it can be argued from Figure 9 that for the euro area in aggregate, private debt, notably in the household sector, had remained at more moderate levels and had accelerated less pre-crisis. This would suggest, on the whole, less of a need for private-sector deleveraging and rebuilding of household

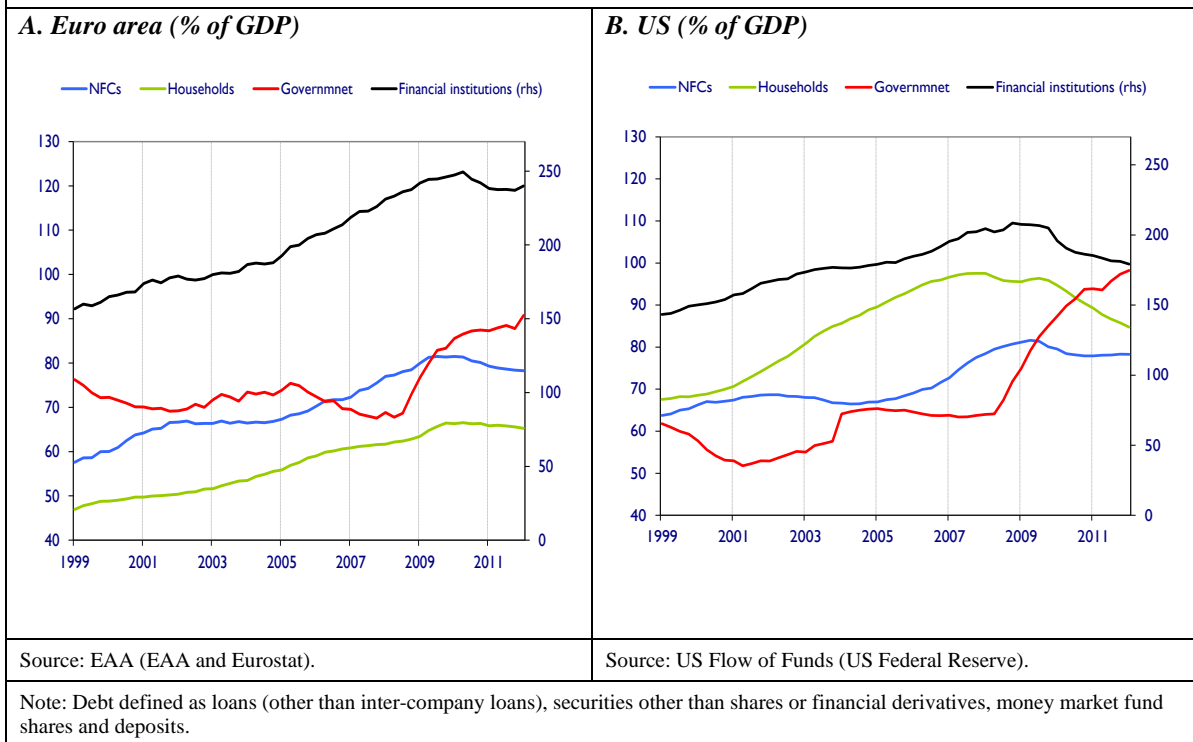
savings compared to the US. At the same time, national governments in a monetary union are perceived to be subject to tighter constraints, in particular in the absence of a fiscal union. This is why, from a sectoral balance sheet perspective, for the euro area as a whole the crisis has been mainly characterized as a twin banking and sovereign debt crisis. This contrasts with the greater role of corporate sector and household sector deleveraging, respectively, as drivers of the Japanese and US cases of ‘balance sheet recessions’ in the wake of credit booms (see Koo, 2008, and ECB, 2012c).

Fuelling the increases in debt by non-financial private sectors in the run-up to the crisis was a substantial build-up of leverage in the financial sector, especially in the other financial intermediaries (OFI) sector. The OFI sector comprises *inter alia* off-balance-sheet securitization vehicles and other special investment vehicles at the core of the initial subprime crisis originating from the US. The higher debt ratio of financial institutions in the euro area in Figure 9 also reflects the greater role of banks in financial intermediation compared to the more market-based US financial system.³⁹

As the financial crisis hit in 2007–8, asset prices declined sharply, thereby increasing sectoral leverage ratios measured as debt/assets at market prices (Figure 10). The market funding sources of banks suddenly became highly constrained owing to money market tensions, a situation mitigated by the ample liquidity promptly made available by the Eurosystem in August 2007 to backstop bank intermediation and substitute for hampered interbank markets.

³⁹ See Adrian and Shin (2011) for an account of pro-cyclical leverage targeting by financial intermediaries, in particular investment banks, and the proliferation of financial intermediation chains in the US. Adrian et al. (2010) highlight the impact of financial intermediary balance sheets on asset prices, risk premia, and macroeconomic dynamics. Giron and Mongelluzzo (2013) analyse bank leverage behaviour for euro area countries, while ECB (2012d) examines the interplay of financial intermediaries in the euro area.

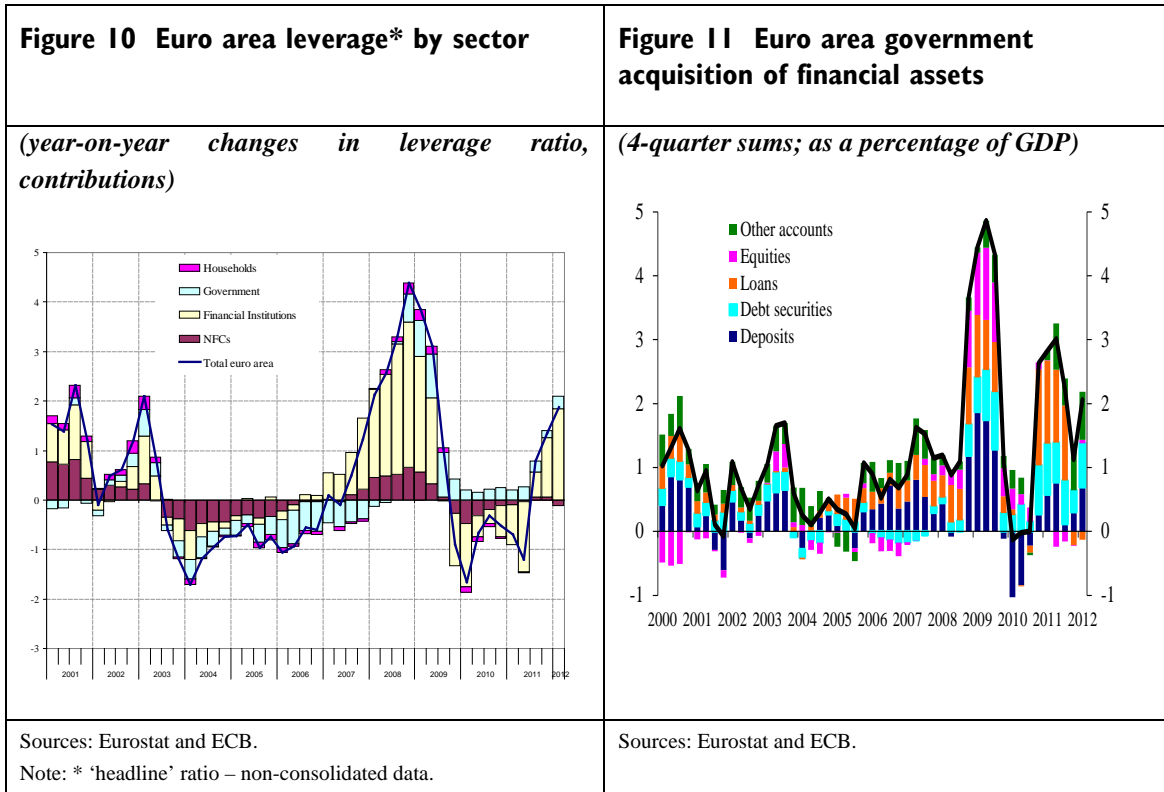
Figure 9 Sector decomposition of debt ratios



When looking at leverage measured by debt to assets (rather than debt to income) and its changes over time, a few features can be observed in Figure 10:

- i. The 2006–8 leverage boom was driven by financial corporation debt (to a large extent reflecting also intra-financial sector claims) unlike the boom in 1999–2001, then dominated by corporate leverage. (This was associated with the telecom/ internet bubble, and was to a large extent equity financed).
- ii. The change in leverage is magnified by the use of marked-to-market pricing: falling asset prices contributed considerably to increasing leverage until early 2009; subsequently recovering prices contributed to deleveraging. Conversely, the build-up of underlying (rather than ‘headline’) leverage during the pre-crisis boom was masked by strong valuation gains on assets (see ECB, 2011d).
- iii. Deleveraging has been significant for both non-financial and especially financial corporations, for which the leverage has already come back to levels close to those observed before the boom. By contrast, deleveraging by households has been very limited.
- iv. Finally, while the government sector contributed to deleveraging between 2003 and 2008, after the collapse of Lehman it was the sole sector to contribute significantly to leveraging. This resulted from higher deficits, but also from active purchases of financial assets, in support of the banking system (equity purchases, bond purchases, and sometimes merely depositing) as shown in Figure 11. In acting as backstop to

national banking systems, governments de facto also temporarily took over a role as financial intermediary, including via the creation of ‘bad banks’. This, however, found its limits soon after with the onset of the sovereign debt crisis.



5.3 NON-STANDARD MEASURES AS A RESPONSE TO THE SECTOR ROTATION OF LEVERAGE

The flow-of-funds perspective on the rotation of savings and leverage across sectors during the financial crisis set out in the previous section now serves as a backdrop to interpret the policy response by central banks in a situation when other sectors are under pressure to deleverage. The pace of de- or re-leveraging by various financial and non-financial private sectors, for instance as shown in Figure 9, can help to explain and, in turn, reflects the measures taken by governments and central banks as a response to the crisis and the differences in approach between the euro area and the US.

As set out in section V(i), from a Keynesian flow perspective, governments are typically called upon to accommodate excess saving or ‘provide’ leverage when private sectors aim at deleveraging. From a sectoral balance sheet perspective, the need for deleveraging in the wake of a credit boom has to be seen against the role of debt as an asset for other sectors. In this vein, a financial crisis is characterized, on the one hand, by agents seeking to redeem debt and, on the other hand, by agents in search of safe assets issued by highly rated debtors. To some extent,

governments can serve as the issuer of risk-free assets during downturns and times of uncertainty. However, as mentioned, the euro area national governments have reached limits to leverage – and to a lesser extent also the US government. The central bank can then be thought of as the ‘ultimate sector’ with a capacity to issue safe and liquid liabilities, which are readily accepted (despite low remuneration) by other sectors. It is the ultimate sector which can ‘leverage up’, in case of need, by expanding its balance sheet as well as by changing its composition and risk profile.⁴⁰

Non-standard measures and unconventional policies of central banks in the financial crisis have been commonly classified into those operating via the size of central bank balance sheets (‘quantitative easing’) or its composition (‘credit easing’). This classification was adopted, for example, in an early survey of the Bank of International Settlements (Borio and Disyatat, 2009). The financial crisis has led to a renewed need to conceive monetary policy actions in terms of quantities – such as the money supply or other balance sheet variables – rather than operating solely through an interest rate channel.

The monetary policy actions are assessed using a monetary and flow-of-funds perspective, which is also extended to the ‘counterpart’ flows and balance sheets of banks, in the first instance, and ultimately of all other sectors. The focus on the size and composition of central bank balance sheets obviously contrasts with the irrelevance proposition on non-standard policy measures put forward in the neo-Wicksellian tradition. Such measures would be seen as irrelevant even when the zero lower bound has been reached, to the extent that they do not change the future expected path of interest rates (Eggertson and Woodford, 2003). However, interest rates and associated risk premia, while disregarding quantity variables, would not appear sufficient to capture the way monetary policy operates when the efficiency of financial markets and financial intermediation are impaired amidst deleveraging pressures and heightened uncertainty and risk aversion. In such circumstances the role of the central bank as the issuer of the ultimate safe and liquid asset – money – and its capacity as intermediary and risk absorber of last resort come to the fore. This has been the case for the Eurosystem and the US Federal Reserve alike.⁴¹

From a flow-of-funds perspective the most relevant dimensions of non-standard measures to assess their impact on leverage and the liquidity of other sectors relate, first, to the choice between collateralised lending and outright purchases and, second, to the identity of the issuing sector (bank, non-bank private sector, or government sector). Those two dimensions are reflected in the typology of non-standard measures in Table 1. In addition, the maturity and the marketability of instruments are important to assess their risk and liquidity properties.

⁴⁰ The parallel between governments and central banks’ leveraging is, however, only partially correct. This is because central banks can issue debts only by acquiring claims, and thus cannot be a net issuer of claims. Central banks cannot be in deficit, whereas governments can – by their nature – have deficits (reflecting an excess of expenditures over revenues).

⁴¹ There are nonetheless limits to the capacity of the central bank to issue safe assets. Issuing too much money could ultimately lead to an erosion of its value, through inflation. The central bank, as intermediary and risk absorber of last resort, also has its limits, to the extent that the central bank must continue to remain financially independent from the government so as to be able to ensure price stability.

COLLATERALISED LENDING VERSUS OUTRIGHT PURCHASES

Both the ECB's bank-focused non-standard measures and the US Federal Reserve's large-scale asset purchase programmes/quantitative easing expand the central bank balance sheet. They augment base money, and thus create the same potential and similar incentives for banks to expand their own balance sheets. Hence, in normal circumstances, collateralised lending and asset purchases transmit to the economy broadly in the same fundamental way: by supporting the capacity of the monetary and financial institutions sector as a whole (that is banks and the central bank) to acquire assets and hence affect asset prices and lending. However, in case of extreme stress and impaired monetary policy transmission (possibly aggravated by the presence of stringent capital requirements on banks), or at the lower bound, those two modes of central bank intervention can impact the economy somewhat differently.

Asset purchases have the natural advantage of directly creating scarcity in the instrument being purchased, mechanically exerting upward pressure on prices. This direct impact is magnified by substitution effects that drive up the price of other assets, depending on asset substitutability (portfolio rebalancing). Asset purchases are thought to be most effective in market-based (rather than bank-based) financial systems like the US, where households are sensitive to asset prices and wealth effects are sizeable, or where equity finance is important for firms and equity prices have a significant impact on corporate investment (Tobin's Q argument). In the US, the asset composition of the household sector's balance sheet, together with the prevalence of private pension schemes, favours marketable instruments, while in the euro area the financial portfolios of households primarily include bank deposits and insurance products.

However, direct asset purchases involve a considerable challenge for the central bank: they force it to take a decision on which (private or public) assets to buy, necessarily interfering with relative asset prices. Such interference also has implications for income distribution, and thus a *quasi* fiscal character. The central bank is also directly exposed to the risks associated with the assets purchased: market risk and credit risk (see also section IV(iv)). Collateralised lending, by contrast, effectively 'outsources' to the banking system (i.e. to many 'private' agents) the role of selecting which assets to buy or sell; that is, leaving the price discovery process and the allocation of savings to market mechanisms.

Another important difference between collateralised lending and outright purchases relates to their impact on the leverage of other sectors. Outright purchases contribute more directly to deleveraging by banks and the private sector than collateralised lending, which leaves the underlying debt on the balance sheets of the counterparties. This is consistent with the faster pace of deleveraging observed in the US financial sector compared with more inertia in the euro area (see Figure 9).⁴²

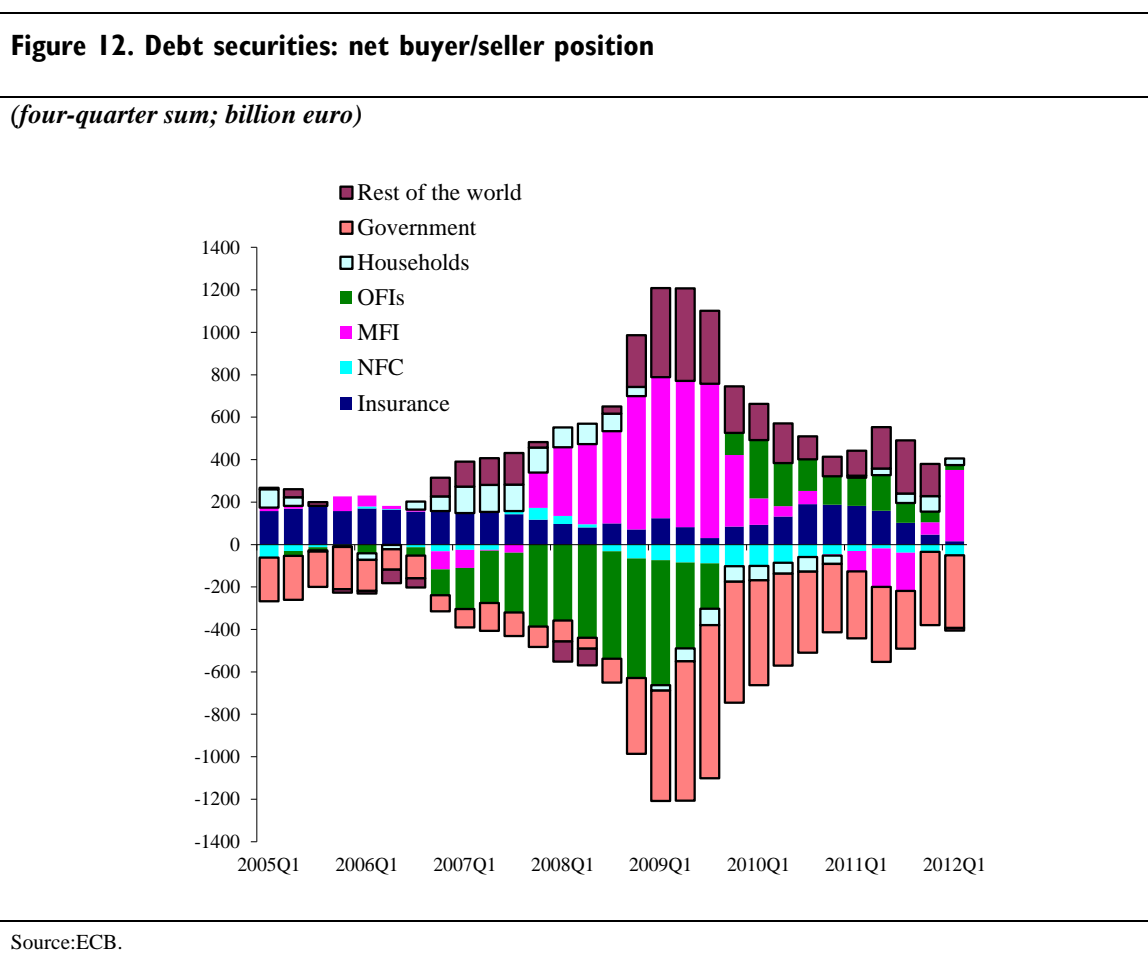
A further distinction relates to the issuing sector of instruments that are absorbed by the central banks, whether via outright purchases or collateralised lending. By contrast to bank assets taken

⁴² The faster deleveraging also reflects difference in legal systems allowing for swifter write-downs of debt and assets, including wide-spread non-recourse loans and household insolvencies / repossession in the US mortgage markets.

as collateral in the case of the ECB, in the case of the US Federal Reserve the bulk of purchases relates to debt issued by the non-bank sectors, as illustrated in Figure 4. The assets purchased include government bonds, government mortgage agencies, commercial paper, and, to some extent, portfolios of long-term bonds, thus effectively bypassing the banking system to a large extent and supporting asset markets more directly.

THE EXAMPLE OF THE CROSS-SECTORAL IMPACT OF THE THREE-YEAR LTROS

The flow-of-funds perspective is now applied to analyse the transmission of the three-year LTROs conducted by the ECB in December 2011 and February 2012. In line with their objective to address funding stress in the banking system, the three-year LTROs provided funding certainty and liquidity support for banks, thus reducing risks of a severe credit crunch that had appeared (see section III(iii)).

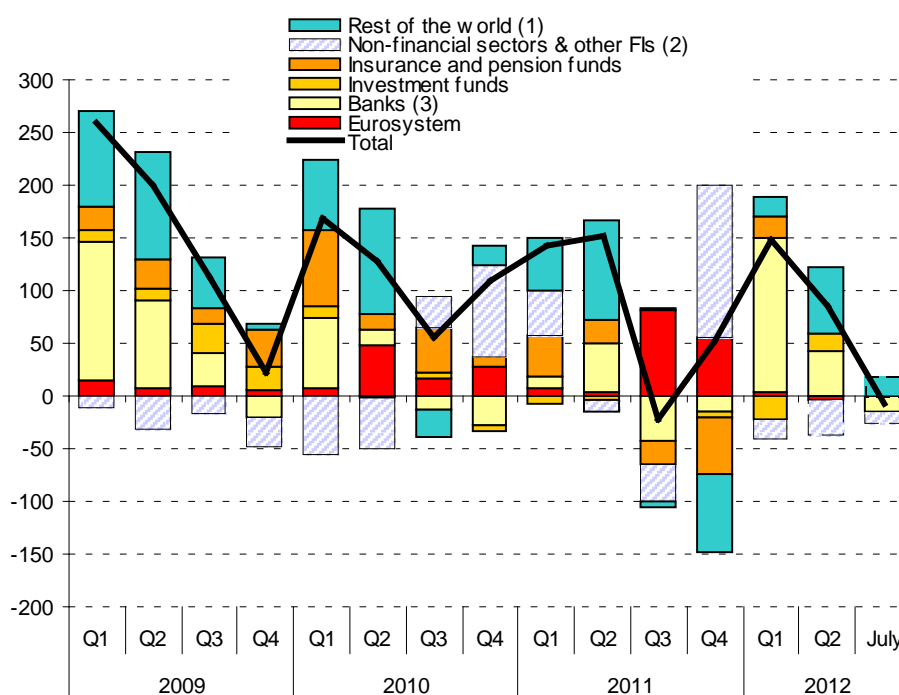


The liquidity provided by the three-year LTROs allowed banks, on the one hand, to redeem their debt securities without needing to roll them over (thus reducing their debt supply), and on

the other hand to use the liquidity to acquire assets, including debt securities (thus increasing debt demand by banks). As a result, the net supply of debt securities by banks was reduced markedly (or net demand increased, see Figure 12). Faced with a diminished net supply of debt securities, other investors started to return to the market. This illustrates the role of the central bank in preventing disorderly deleveraging by other sectors and, at the same time, providing means that facilitate the accumulation of assets by creditor sectors.

Figure 13. Net issuance of government debt securities by purchasing sectors

(€billion)



Source: Euro Area Accounts, Monetary Statistics, Balance of Payments, Securities Issues Statistics.

- 1) For July 2012 total acquisitions of non-MFI debt securities by non-residents
- 2) MFIs other than Eurosystem.
- 3) Households, non-financial corporations, government and OFI other than investment funds. For 2012Q2 it also includes insurance companies and pension funds (ICPFs). For July it includes ICPFs and investment funds. Given its residual nature, the aggregate is affected by valuation differences, estimation errors and statistical discrepancies.

Together with the reduction in the perceived liquidity risk affecting the euro area banking sector, the three-year LTROs triggered crowding-in phenomena in debt issued by non-bank sectors. The reduction in the net supply of bank debt contributed to improvements in government bond markets but also allowed, via substitution effects in portfolios of investors, a rebound in bond issuance of non-financial corporations. Moreover, the three-year LTROs were widely seen to provide an opportunity for banks to conduct arbitrage trades by borrowing from

the ECB at the prevailing 1% key interest rate and buying medium-term government paper at around 2–5% yield with matching maturity. By providing liquidity against collateral, compared with outright operations such as the SMP, decisions determining the demand and supply in capital markets were thus outsourced to the banking sector, including the choice of whether to purchase government or private paper, to invest in paper of a maturity of up to 3 years (arbitrage) or in longer-term bonds (carry trade), or to lend liquidity on to the private sector.⁴³

Figure 13 shows the net issuance of euro area government bonds broken down by purchasing sector. It illustrates the large amount of government paper absorbed in 2009 in the context of banks wishing to improve their balance sheet risk profile in the wake of the financial crisis. Since the sovereign debt crisis has emerged and after the SMP was launched in May 2010, a substitution between the SMP and government bond purchases by banks and insurance and pension funds has been observed.

Given the three-year maturity of the LTROs, their indirect effects on spread compression became evident in short-term government paper, while there was less of a systematic effect for long-term bonds. The three-year LTROs can thus be seen to be less subject to moral-hazard problems with respect to governments than had been argued to be the case for the SMP. The three-year LTROs stabilized the banking system, cutting tail risk for adverse scenarios, which naturally increased demand from investors, including for government bonds, but as a side-effect. From this perspective, the decisions on the OMT envisage again outright transactions rather than bank-intermediation, while limiting moral hazard through strict conditionality and by focusing on shorter maturities that are broadly consistent with the horizon of the three-year LTROs.

⁴³ In fact, national regulators can also influence the choice of banks to some extent, for instance towards a home bias in buying sovereign bonds.

6 CONCLUSIONS

This paper has reviewed the ECB's non-standard monetary policy measures during the global financial crisis and the euro area sovereign debt crisis. Monetary policy clearly cannot directly address the underlying causes of the crisis and the associated need for deleveraging by financial and non-financial sectors or the need for rebalancing within the euro area. This requires reforms and action on the part of governments and regulators, individually and collectively, with respect to fiscal consolidation, structural reforms, financial regulation and the European governance framework. At the same time, in financial crises central banks have an important role to play in providing liquidity, averting disorderly deleveraging and fire-sales of assets, and hence adverse self-fulfilling dynamics, as well as, more broadly, in safeguarding monetary policy transmission to ensure price stability.

Against this background a number of elements have contributed to the ECB's choice of non-standard measures, including the institutional framework in Monetary Union, the ECB's monetary policy strategy and the financial structure of the euro area. The ECB's response to the crisis has, in particular, relied on banks as intermediaries to ensure the continuous financing of households and firms, rather than intervening in asset markets directly. The rationale of safeguarding monetary policy transmission across the euro area and addressing dysfunctional market segments differs from that behind quantitative easing, which is aimed at providing extra monetary stimulus via outright transactions when the lower bound for policy rates has been reached. At the same time, both approaches operate via the size and composition of central bank balance sheets and provide safe and liquid assets to the bank and non-bank sectors of the economy in response to impairments in financial intermediation and deleveraging pressures weighing on sectoral balance sheets.

REFERENCES

- Adrian, T., and Shin, H. S. (2011), 'Financial Intermediary Balance Sheet Management', *Annual Review of Financial Economics*, **3**, Federal Reserve Bank of St Louis, 289–307.
- Moench, E., and Shin, H. S. (2010), 'Financial Intermediation, Asset Prices and Macroeconomic Dynamics', Federal Reserve Bank of New York, Staff Report No. 422, January.
- Angeloni, I., Kashyap, A., and Mojon, B. (eds) (2003), *Monetary Policy Transmission in the Euro Area*, Cambridge, Cambridge University Press.
- Barwell, R., and Burrows, O. (2013), 'Growing Fragilities? Balance Sheets in *The Great Moderation*', in B. Winkler, P. Bull, and A. van Riet (eds), *A Flow-of-funds Perspective on the Financial Crisis: Lessons for Macro-financial Analysis*, Palgrave Macmillan, forthcoming.
- Bezemer, D. (2013), 'Analyzing Unsustainable Macro-financial Processes with Stock-flow Consistent Models', in B. Winkler, P. Bull, and A. van Riet (eds), *A Flow-of-funds Perspective on the Financial Crisis: Lessons for Macro-financial Analysis*, Palgrave Macmillan, forthcoming.
- Bindseil, U., and Winkler, A. (2012), 'Dual Liquidity Crises Under Alternative Monetary Frameworks: A Financial Accounts Perspective', Working Paper Series No. 1478, European Central Bank, October.
- Cour-Thimann, P., and König, P. (2012), 'Target2 and Cross-border Interbank Payments During the Financial Crisis', *CEifo Forum Special Issue*, January.
- Bonci, R. (2011), 'Monetary Policy and the Flow of Funds in the Euro Area', Working Paper Series No 1402, Frankfurt am Main, European Central Bank.
- Borio, C., and Disyatat, P. (2009), 'Unconventional Monetary Policies: An Appraisal', BIS Working Paper No. 292.
- Carpenter, S., Bowbeer, M., Demiralp, S., Ihrig, J., Klee, E., and Senyuz, Z. (2012), 'Analyzing Federal Reserve Asset Purchases: From Whom does the Fed Buy?', Board of Governors of the Federal Reserve System, mimeo.
- Cobham, D., and Kang, Y. (2012), 'Financial Crisis and Quantitative Easing: Can Broad Money Tell Us Anything?', *The Manchester School*, Supplement 2012, 54–76.
- Cour-Thimann, P. (2012), 'Target Balances and the Crisis in the Euro Area', forthcoming.
- Cukierman, A. (1994), 'Central Bank Independence and Monetary Control', *The Economic Journal*, **104**, 1437–48.
- Driffill, J., and Miller, M. (2011), 'Liquidity When It Matters Most: QE and Tobin's Q', CEPR Discussion Paper No. 8511, August.
- Drudi, F., Durré, A. and Mongelli, F. (2012), 'The interplay of economic reforms and monetary policy: the case of the euro area', ECB *Working Paper* No. 1467, September.

ECB (2007), ‘Corporate Finance in the Euro Area’, Occasional Paper Series No. 63, June, by the Task force of the Monetary Policy Committee of the European System of Central Banks.

— (2010a), ‘The ECB’s Response to the Financial Crisis’, *Monthly Bulletin*, October.

— (2010b), ‘The ECB’s Monetary Policy Stance During the Financial Crisis’, *Monthly Bulletin*, January.

— (2011a), ‘Target2 Balances of the Euro Area National Central Banks’, *Monthly Bulletin*, October.

— (2011b), ‘The ECB’s Non-standard Measures—Impact and Phasing-out’, *Monthly Bulletin*, July.

— (2011c), ‘The Monetary Policy of the ECB’, 159 pages.

— (2011d), ‘The Financial Crisis in the Light of the Euro Area Accounts’, *Monthly Bulletin*, October, 99–120.

— (2012a), ‘A Sectoral Account Perspective of Imbalances in the Euro Area’, *Monthly Bulletin*, February, 37–43.

— (2012b), *Financial Integration in Europe*, Special Feature E, ‘Sectoral Balances and Euro Area Financial Integration’, April, 102–8.

— (2012c), ‘Comparing the Recent Financial Crisis in the United States and the Euro Area with the Experience of Japan in the 1990s’, *Monthly Bulletin*, May, 95–112.

— (2012d), ‘The Interplay of Financial Intermediaries and its Impact on Monetary Analysis’, *Monthly Bulletin*, January, 59–73.

Eggertsson, G., and Woodford, M. (2003), ‘The Zero Bound on Interest Rates and Optimal Monetary Policy’, *Brookings Papers on Economic Activity*, 1, 139–211.

Fahr, S., Motto, R., Rostagno, M., Smets, F., and Tristani, O. (2011), ‘A Monetary Policy Strategy in Good and Bad Times: Lessons from the Recent Past’, Working Paper Series No 1336, ECB, May.

Giannone, D., Lenza, M., Pill, H., and Reichlin, L. (2012), ‘The ECB and the Interbank Market’, Discussion Paper No. 8844, CEPR, February.

Giron, C., and Mongelluzzo, S. (2013), ‘Bank Leverage and the Credit Cycle in the Euro Area: A Bayesian Semi-parametric Approach’, in B. Winkler, P. Bull, and A. van Riet (eds), *A Flow-of funds Perspective on the Financial Crisis: Lessons for Macro-financial Analysis*, Palgrave Macmillan, forthcoming

Koo, R. (2008), *The Holy Grail of Macroeconomics: Lessons from Japan’s Great Recession*, Singapore, John Wiley & Sons.

Lenza, M., Pill, H., and Reichlin, L. (2010), ‘Monetary Policy in Exceptional Times’, *Economic Policy*, **62**, 295–339.

Moutot, P. (2011), 'Systemic Risk and Financial Development in a Monetary Model', Working Paper Series No. 1352, ECB, June.

Oosterloo, S., and de Haan, J. (2004), 'Central Banks and Financial Stability: A Survey', *Journal of Financial Stability*, **1**, 257–73.

Peersman, G. (2011), 'Macroeconomic Effects of Unconventional Monetary Policy in the Euro Area', Working Paper Series No. 1397, ECB, November.

Praet, P. (2011), 'The (Changing) Role of Central Banks in Financial Stability Policies', speech at the 14th international banking conference, organized by the Federal Reserve Bank of Chicago and the European Central Bank, 10 November.

Praet, P. (2012), 'Deleveraging and monetary policy', speech at the Hyman P. Minsky Conference on Debt, deficits and unstable markets, Berlin, 26 November.

Trichet, J. C. (2010), 'State of the Union: The Financial Crisis and the ECB's Response between 2007 and 2009', *Journal of Common Market Studies*, **48**, Annual Review, 7–19.

Winkler, B. (2010) 'Cross-checking and the Flow of Funds', in L. Papademos and J. Stark (eds), *Enhancing Monetary Analysis*, Frankfurt am Main, European Central Bank, 355–80.