

ANNEXES

ANNEX 1. Non-standard monetary policy measures of the ECB

1. Why non-standard measures in the first place?

Standard or conventional monetary policy primarily refers to a stated price-stability objective of a central bank (most of the time in the form of a target inflation rate) along with the tools employed to achieve the stated objective. In order to implement standard monetary policy, the major central banks normally steer short-term interest rates by signalling monetary policy stance and managing banking system liquidity (Borio, 1997). Signalling provides economic agents with a clear statement about the desired monetary policy stance of the central banks. Most of the time, the stance is identified as a policy operating objective — a level or range of selected short-term market interest rates which is estimated to be consistent with the price stability objective (ranging from the euro overnight rate EONIA for the European Central Bank to the three-month Swiss franc LIBOR for the Swiss National Bank).

The prevailing interest rates are compared to a desired rate and the central bank achieves the desired interest rate level primarily through liquidity operations. Following the 2007–2008 financial crisis, through communication about the desired current and future level of interest rates, central banks also guides the expectations of economic agents of future policy rates. The policy rate is related to a Taylor rule-like function, where the level of interest rates depends on two factors: the state of inflation relative to the assumed inflation objective and the level of output relative to potential output. Liquidity management operations refer to the operations undertaken by central banks in balancing the level of bank reserves with the aim to avoid significant and prolonged deviations of the short-term rate from the target rate. Through open market operations, the central bank will inject or extract liquidity in the system so as to perfectly match the demand from the banking system. This is normally done by lending bank reserves against eligible collateral. The primary mechanism relies on repurchase transactions between the Eurosystem providing liquidity and a credit institution securing the funds with high-quality collateral.

The financial crisis of 2007–2008 impaired the financial intermediation and credit creation functions of the banking sector and led to a dramatic reduction in the ability and willingness of commercial banks to finance the real sector. Firms and households faced difficulties in borrowing for either investment or consumption. Banks needed large injections to improve their liquidity and solvency in repairing their balance sheets and metabolising the effects of the crisis rather than extending financing and credit to the real sector. Commercial banks' reluctance to lend crippled the interest-rate transmission channel. In an effort to support economic growth, target interest rates were gradually lowered down to their nominal zero bound. Central banks became constrained in their capacity to pass lower rates to the real sector beyond this level. The Taylor-rule implied interest rates may be below zero given low levels of inflation and economic activity, yet large negative rates may face implementation challenges in the market. This occurs when firms and households have the ability to hold cash balances rather than deposits (Bech and Malkhozov, 2016) and when demand for credit and financing does not materialise at the level needed to rid the economy of the inauspicious consequences of the financial crisis.

The conventional tools at the disposal of central banks have thus become less effective in conducting monetary policy. This has brought about the need for alternative or non-standard measures. It should be stressed that the choice of non-standard tools has been conditioned by the nature and effects of the 2007–2008 crisis. The need to ensure, in the first stage, a minimum of functionality in the banking sector and financial markets as well as the need to stem liquidity-driven asset sales transformed central banks into financial intermediaries taking on their balance-sheet both public and private debt as well as other risky assets. The subsequent lowering of the target rate to the zero bound forced central banks to look at interest rates beyond the short-term rates. The different degree of financing of the economy by the banking sector further explains the difference in choice and intensity of the use of non-standard tools between the ECB and the FED. The ECB had to replace a comparatively larger volume of bank credit and financing intermediation than the FED as economies in the euro area are much more reliant on the banking sector than the regional counterparties in the US.

2. What is unconventional about the current monetary policy measures?

To overcome the impairments in monetary policy transmission and concerns associated with reaching the zero lower bound, central banks altered the mix and scope of tools used to achieve their price stability objective. The measures won their reputation as non-standard as, in the case of the FED and the Bank of England, the focus was shifted from a policy rate (standard monetary measure) towards changes in the structure and nominal increases of their respective balance sheets — thus earning the name of quantitative easing. Regarding ECB's actions, one may distinguish two qualitatively different phases: the early response to crisis (including the financial and sovereign crisis) and a second period characterised by low uptake of credit, slowly growing consumption and investment as well as increasing fears of deflation. If the first phase (Phase I) is concerned primarily with the well-functioning of the financial sector and ensuring the transmission of the monetary policy stance (Cour-Thimann, 2012), the second phase (Phase II) is driven mainly by developments in the real sector and the evolution of expectations of economic agents (households, firms and commercial banks). The nature and extent of unconventional measures reflect the relatively different underlying drivers of the two phases and their interplay with the prevalent institutional frameworks.

2.1. Unconventional measures of the ECB: Phase I

More than 70 per cent of the financing needs of the non-financial corporate sector in the EU are provided by the banking sector with an even higher proportion in the case of households. Given large volumes of tangible collateral and long histories of economic activity reflected in public accounting numbers, large corporates have the ability to tap the capital markets should the banking sector curtail credit or financing. This possibility is not available for a large share of SMEs, firms that account for the bulk of employment in the EU. Banks are, therefore, essential not only in ensuring smooth transmission of the policy rate decision of the ECB but also in promoting sustainable growth through proper financing of a very large number of economic agents.

Phase I (August 2007–September 2012) debuted with increased strains in the money markets. Commercial banks' lending and borrowing activities in the interbank market are conducted on an uncollateralised basis, trust in the solvency and liquidity of the counterparties being sufficient to allow day-to-day operations. In August 2007, following the fund withdrawal freeze announcement of BNP Paribas, money market spreads (the difference between EURIBOR and overnight index swap rates) increased dramatically in the span of a few days, signalling a loss of counterparty trust (Cassola and Morana, 2012). Commercial banks faced increased costs in securing short- and medium-term liquidity in the interbank market threatening not only lending to the real economy, but payment settlements as well. The monetary policy stance of the ECB is directly conveyed through changes in the main refinancing rate (MRO). This is the signal driving changes in the EONIA rate (the euro overnight index rate) and the EURIBOR rate used by banks to borrow and lend from each other in the unsecured market. A potential decoupling of the EONIA from the MRO implied that the monetary policy stance would no longer be clearly conveyed to the banking sector and, in turn, to lending and deposit rates for economic agents. Moreover, the failure of Lehman Brothers caused an increased possibility of bank deleveraging through asset sales (in the form of concomitant sales of government bonds and other assets), a gridlock of the securitised market (the valuation difficulties of securitised assets was greatly increased by the lack of liquidity) and a virtual standstill of lending to the real sector.

Hence the first unconventional measures of Phase I have been aimed primarily at restoring the normal functionality of the banking system as a conduit of the monetary policy stance. The measures have been designed and implemented to tackle the situations highlighted before — restoring liquidity and removing uncertainty regarding future liquidity conditions and credit availability. The set of measures has been dubbed by the ECB as the enhanced credit support.

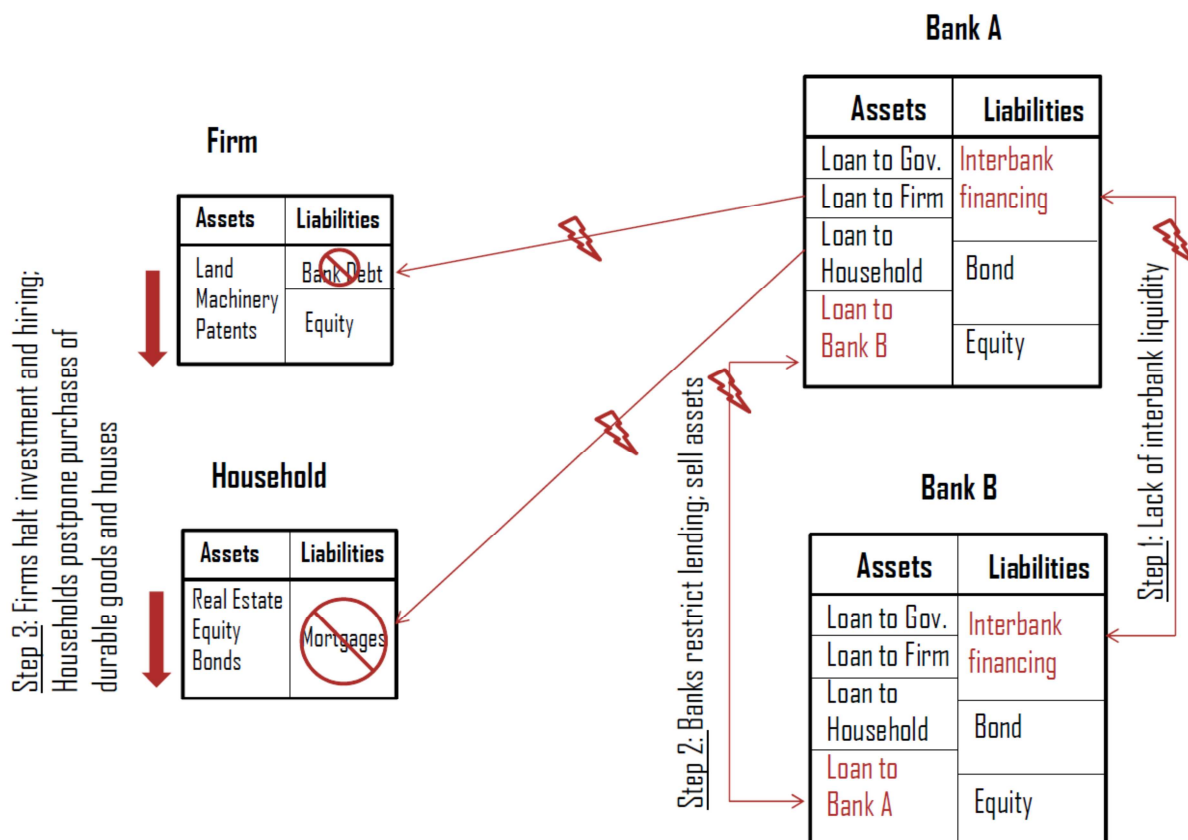
Several changes have been implemented to ensure an effective transmission of the policy stance (ECB, 2010). If prior to Phase I central bank liquidity was auctioned in a fixed amount in a variable rate tender, during Phase I the ECB changed to a fixed-rate full allotment procedure in order to meet liquidity requirements of bidding institutions. This was aimed at improving the interest-rate channel, the process through which policy rates are transmitted to short-term interest rates and, subsequently, to investment-relevant long-term rates. In addition, maturities of liquidity operations were prolonged (long term refinancing operations saw their maturities go up to 12 months from 3 months prior) and eligibility criteria for collateral pools were changed. The list of counterparties allowed to participate in these operations was expanded as well. At the same time, the ECB launched a programme to unlock the covered bond market. The malfunctioning of this market segment caused an inability of valuation, transaction and new issuance in covered bonds. Through the covered bond purchase programmes (CBPPs), the Eurosystem became the buyer of last resort, unlocking thus a vital financing source for banks, while at the same time improving market transparency. Currency swap agreements with the FED and the SNB provided foreign currency liquidity against euro-denominated collateral. As a result of these measures, liquidity of banks improved considerably. This did not initially translate in a one-to-one change in lending as banks engaged to some degree in liquidity hoarding, the levels of daily liquidity surpluses went up from an average of EUR 10 billion per day to well over EUR 100 billion per day. As a result, the EONIA rate moved close to the lower band of the target rate range. Figure 1 provides a schematic representation of the inter-bank market freeze.

The liquidity-improving measures have also had some second-order positive effects in improving the capital position of credit institutions (see, for example, Heider *et al.*, 2010). This enhanced the bank capital channel, unlocking the supply of loans to the broader economy. The bank capital channel posits that better capitalised banks will have a higher supply of loans. The authors indicate that for Spain both monetary policy (through higher short-term interest rates) and the business cycle (lower GDP growth) reduce the supply of credit. These effects are stronger for banks with weak capital and liquidity positions. The authors provide evidence in favour of the importance of the bank capital channel using individual loan applications from the Credit Register of Spain matched against the granting banks' balance-sheet characteristics. Separating loan demand from loan supply determinants, the authors found that both bank capital and bank liquidity ratios are important factors in the loan-granting decision. Higher short-term interest rates (associated with a tightening in monetary policy) or lower GDP growth rates reduce the probability that a loan application is accepted. On top of this, the lower the capital or liquidity level of the processing bank, the higher the negative effects from higher interest rates. When comparing weak and strong banks (where weak banks are defined as being in the 10th percentile of capital and liquidity levels, strong banks being in the 90th percentile of capital and liquidity), an increase in the interest rate affects weak banks comparatively stronger than strong banks. Following 100 basis points increases in the interest rate, weak banks will decrease their loans 11 per cent more than the strong banks. Lack of liquidity and capital availability at the bank level may thus lead to a credit reduction to the real economy. The results reflect the operation of the bank lending channel up to 2008 (the authors indicate using data up to 2010 as robustness check). It is uncertain if asymmetric effects may be

present, if similar size decreases in the interest rates are expected to produce the same magnitude changes in lending. Ciccarelli *et al.* (2015) indicate that these results are heterogeneous across bank and borrower sizes, highlighting the role and importance of the firm and household balance-sheet channel. As small banks lend to small firms, weakness in the balance-sheets of this duo will greatly amplify shocks from the bank credit channel (Ciccarelli *et al.*, 2013).

The second part of Phase I started with an emphasis on sovereigns and their solvency. As the banking regulatory framework attached zero risk weights on holdings of sovereign debt commercial banks were not required to set aside any risk capital for investment in sovereign fixed income securities. This factor, together with the high liquidity and wide acceptance in central bank lending, caused a high concentration of sovereign exposure in most banks. The potential weaker economic growth leading to lower tax revenues along with the possible need to recapitalise distressed banks cast doubt on the riskless nature of sovereign debt. The expectations of an imminent Greek government default accelerated these mechanisms, bringing under close scrutiny the fiscal position of other countries as well (Portugal, Ireland, Spain and Italy). This set in motion a vicious feedback loop whereby banks located in the previously mentioned countries, holding large amounts of sovereign bonds, increased the probability of rescue through tax-payer contributions and hence led to higher default likelihood of government bonds. This raised borrowing costs for sovereigns further depressing their valuations, weakening, in turn, the balance sheet of banks. At the same time, in order to maintain the integrity of their balance-sheets, banks curbed lending and required higher quality collateral. Figure 1 indicates how this mechanism operates. To stop the operation of this loop, the ECB engaged in purchases of government debt under the Securities Market Programme (SMP), extended LTROs maturities to 3 years and established the Outright Monetary Transactions (OMT) programme to further purchase government bonds conditional on fiscal adjustments. The OMT programme is an instance of successful communication strategy, relieving the policy institution of the need to actually intervene in the markets. Also, collateral eligibility criteria were relaxed, allowing national central banks to accept bank loans.

Figure A. A simplified representation of the cascading effects of the breakdown in the interbank market



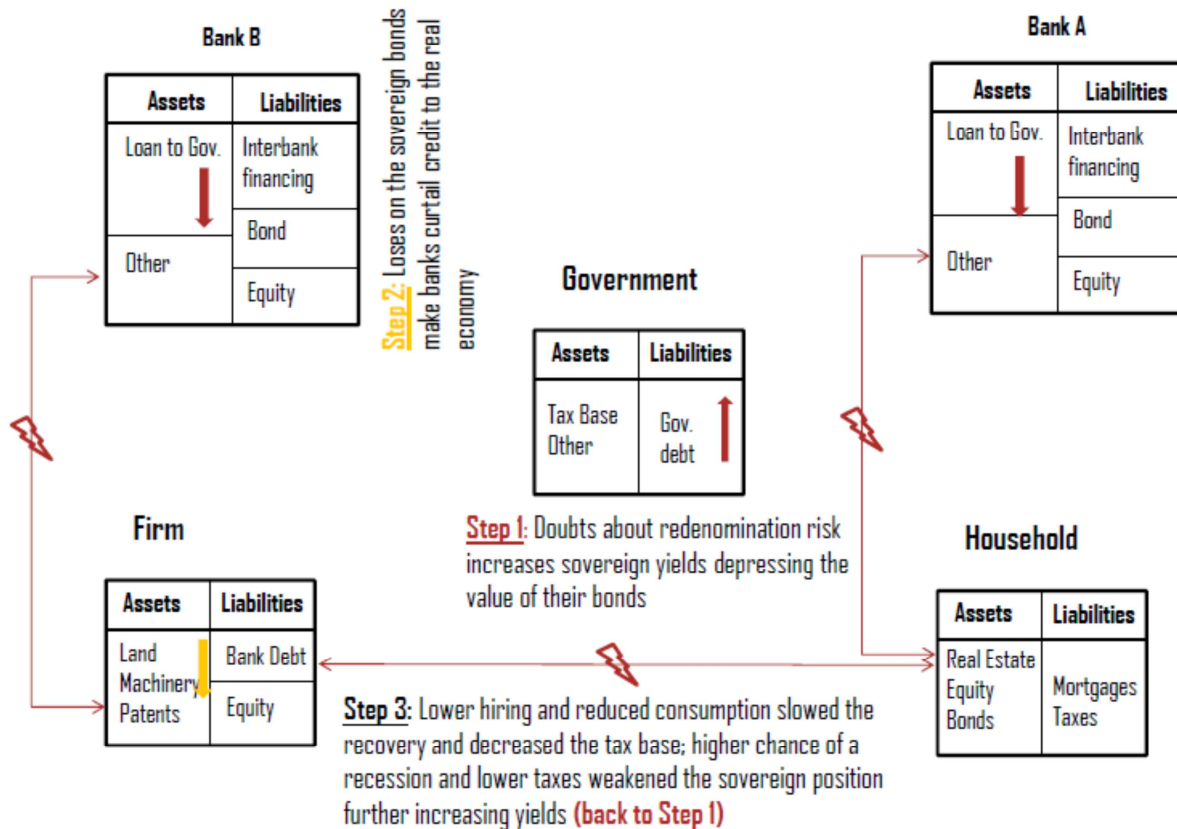
These programmes were aimed at ensuring that liquidity remained ample while at the same time addressing the then emerging premium associated with redenomination risk — the possibility that the issuing country under distress would opt to leave the euro area, forcing the reconversion of the euro-denominated debt in a local currency (at an unfavourable rate). Krishnamurthy *et al.* (2015) use an event study to test whether the SMP, OMT and LTRO had the expected consequences and document the channels through which these programmes alleviated market stress. The authors show that the SMP and the OMT induced a substantial decrease in the government bond yields, while the LTROs produced relatively lower impact on yields. The analysis is carried out by disentangling the individual country yield level in two distinct groups:

- Euro-area common components: an expectation hypothesis component and a euro-rate term premium;
- Country specific components: default risk premium (the premium expected by investors to compensate for the

possibility of default), redenomination risk (the premium expected by investors to compensate for the possibility of redenominating the bond in a depreciated local currency) and market segmentation (valuation differentials caused by the different constraints of investors).

The study shows that the first group carries little weight in explaining the changes in yields, while the second represents the main channel of operation of the SMP and OMT. For example, two days after announcements regarding SMP purchases, Italian 2-year sovereign bond yields decreased on average by 183 basis points, while Portuguese 2-year sovereign bond yields decreased by 550 basis points. OMT announcements are estimated to have produced, by and large, similar decreases in yields from an average decrease of 248 basis points for Spain to 74 (statistically insignificant) for Portugal. The authors also found that the programmes had spill-over effects increasing equity pricing in both core and non-core countries.

Figure B. A simplified representation of the negative feedback loops in the economic system



2.2. Unconventional measures of the ECB: Phase II

In 2014 the ECB announced new stimulus measures, expected to address the persistently weak inflation outlook and the sluggish economic recovery. The TLTRO programme was launched, allowing commercial banks to finance their operations over a period of up to 4 years subject to a fixed interest rate. The borrowing limits were set in accordance with their stock of eligible loans and, later on, with the net lending amounts to non-financial corporations and households (excluding mortgages). This measure allowed banks to replace interbank and market funding sources with stable fixed-cost Eurosystem financing. It brought a higher degree of certainty as far as bank funding is concerned, matching better the duration of liabilities to that of assets. An APP was launched. The APP is composed of three elements: the covered bond purchase programme 3 (CBPP3), the asset-backed securities purchase programme (ABSPP) as well as a module focusing on purchases of public sector securities through the public sector purchase programme (PSPP). The PSPP is the Eurosystem's equivalent of a Quantitative Easing programme. The PSPP has been an essential change in monetary policy implementation towards pro-active large-scale purchases instead of passive reliance on bank demand for lending facilities as witnessed in the programmes launched before it. The ABSPP provided a certain demand source for eligible asset backed securities allowing banks to reactivate their activity in securitisation and selling loans.

The primary target of the TLTRO was to ensure that the accommodative monetary policy stance is better reflected in the borrowing costs of final users of credit. Previously, the risk averse behaviour of commercial banks led to liquidity hoarding and very little lending, preventing the pass-through of lower funding costs into lower lending rates. These effects have been more pronounced in the countries under sovereign and intense firm and bank balance sheet distress. The 125 basis points reduction in the MRO rate over 2011–2014 has translated in a median decrease of 92 basis points for Germany and France but only a median decrease of 28 basis points for Ireland, Spain or Italy. Following the announce-

ment of the Phase II package, the reduction in borrowing costs has been higher in GIIPS countries (113 basis points) as compared to the rest of the euro area (50 basis points) (see ECB 2015). The APP is estimated to have reduced sovereign bond yields by as much as 80 and 78 basis points for Spanish 10- and 20-year bonds (statistically significant estimate) and as little as 13 basis points (statistically insignificant estimate) for the German 20-year bonds. Beneficial spillover effects include a 200 basis points increase in the Dow Jones Euro Stoxx as well as a decrease in corporate spreads of 63 and 50 basis points for financial and non-financial corporations respectively (Altavilla *et al.*, 2015).

The more intense reliance on ECB funding was matched by a lower use of traditional market-based funding — issuance of debt securities and interbank borrowing. A lower supply of debt securities, given constant or increasing demand raised their price, improving thus the balance-sheet positions of firms and households holding these assets. The lower the holding of fixed-income securities by households is, the lower the potential wealth-induced benefits are. Moreover, the wealth effect is expected to work more for gains perceived to be less volatile over time, such as those from house price appreciation as opposed to equity markets or bond markets during distress periods (Lettau and Ludvigson, 2004).

When the Eurosystem purchases government or private bonds, it pays for the assets by creating central bank reserves. These reserves remain within the banking system if the seller is a bank (changes in bank asset side only) or become a deposit if the seller is a private individual (deposits+100 | bank reserves+100). Through its acquisitions of both private and public bonds, the above-mentioned programmes have thus altered the structure of portfolios held by the private sector (as well as the balance-sheet of the ECB itself). These changes in the composition of portfolios, exchanging longer maturity assets (such as public or private bonds) for shorter maturity assets (such as cash or reserves), may affect the yield on still other assets due to the imperfect substitutability of assets. As cash or deposits are not a perfect substitute for the sold assets, economic agents seek to acquire similar maturity/duration assets in the market. In their search for alternatives, they bid up prices and thus lower the financing costs for those companies or industries (Joyce *et al.*, 2012). This is the portfolio rebalancing channel. One issue that remains open is whether the extra credit risk coming from purchasing commercial debt as a substitute for similar maturity government debt is properly hedged. Of interest are also the economic implications for banks, pension plans and insurance companies deriving from setting aside higher capital charges associated with such purchases as required in a standard ALM risk management framework (Basel III or Solvency II).

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