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# Unconventional Policy Instruments and Transmission Channels: A State-Contingent Toolbox for the ECB



Policy Department for Economic, Scientific and Quality of Life Policies  
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## **Abstract**

We present a general framework apt to explain why central banks care about the co-existence of different transmission channels of monetary policy, and hence they endow themselves with different policy instruments. Within this framework, we then review and examine the key instruments adopted by the ECB to tackle the post-pandemic challenges, with a view to their consistency and efficacy. Finally, we make a few considerations about the future perspectives of monetary policy.

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## LIST OF ABBREVIATIONS

<b>APP</b>	Asset purchase programme
<b>ECB</b>	European Central Bank
<b>DF</b>	Deposit facility
<b>ELB</b>	Effective lower bound
<b>FG</b>	Forward guidance
<b>GDP</b>	Gross domestic product
<b>HICP</b>	Harmonised index of consumer prices
<b>LTRO</b>	Longer-term refinancing operations
<b>MLR</b>	Marginal lending facility
<b>MRO</b>	Main refinancing operations
<b>NIRP</b>	Negative interest rate policy
<b>PEPP</b>	Pandemic emergency purchase programme
<b>TLTRO</b>	Targeted longer-term refinancing operations
<b>TTER</b>	Two-tier system for remunerating excess reserve

## EXECUTIVE SUMMARY

- **The ECB adopted a two-pronged contingent approach:** it expanded its policy toolbox with a view to targeting the transmission channels of monetary policy working better, and it designed new, aggressive measures capable of limiting the problems impairing the various transmission channels. This twofold, contingent, approach required a large dose of judgment, with the ECB recalibrating its measures in consideration of their actual impact and the reaction of financial markets.
- The interaction between negative policy rates, abundant liquidity, massive purchases of financial assets, two-tier reserve requirements and security lending facilities should be understood **considering the segmentation in the money and bond markets** of the euro area across national borders and intermediaries.
- With policy rates at their effective lower bound, a crucial role was played by **quantitative extensions of liquidity and more targeted measures** of balance sheet support. ECB interventions in various segments of the financial markets were also motivated by the attempt to prevent (or stop) self-enforcing negative circles of asset fire-sales, worsening of banks' balance sheets, credit contraction and displacement of non-financial firms.
- Large amounts of liquidity injected through non-standard monetary measures **created downward pressures on interest rates and banks' profitability.** The introduction of a two-tier system for remunerating excess reserve (TTERR) holdings gave relief to banks and brought about a less uneven distribution of liquidity across jurisdictions. Moreover, the combination of TTERR and targeted lending at rates below the deposit facility rate allowed the ECB to set lending rates independently from deposit rates, so as to simultaneously raise the income of both borrowers and lenders.
- **The ECB has more difficulty than other central banks to raise market inflationary expectations** because of its peculiar policy framework. An explicit official statement by the ECB about the tolerance of transitory periods of inflation above 2% could help to lower the expected long-term real interest rates, thus sustaining consumption and investment. This is even more important by considering that a surge of inflation may not appear likely in the medium run, but—given the heightened uncertainty surrounding the post-pandemic outlook—it still remains a possibility.
- The ECB should **ponder and communicate its policy conduct** in compliance with its nature of monetary authority of a collection of sovereigns and its mandate recommending respect for free market principles. On the other hand, we are now in **unchartered waters**, where the economies withstand their weaknesses thanks to the fiscal-monetary scaffolding. This may well remain as the **"new normal" for quite a long time.** Removing the scaffolding will not simply uncover the system in its original state. Great care, prudence, and flexibility will be necessary.



## 1. INTRODUCTION

While 2018 and 2019 saw early attempts by the ECB at unwinding the unconventional measures taken in response to the persistent consequences of the crisis erupted at the beginning of the decade, the outbreak of the COVID-19 pandemic urged the ECB to redeploy a wide array of emergency measures, notably a relaunch of the earlier asset purchases programme (APP) coupled with the new special-purpose pandemic emergency purchases programme (PEPP). Other pre-existing measures, like the targeted longer-term refinancing operation (TLTRO) have been enhanced. Moreover, the measures in the package have been recalibrated (upwards) in the course of 2020 *vis-à-vis* the unfolding of the pandemic effects, the deterioration of the economic outlook, the persistent weakness of price expectations, threats to public and private financial stability (Lane 2020b, Panetta 2020).

A first sight at the tool box created by the ECB – asset purchases, (negative) money market interest rates, reserve tiering, longer-term refinancing operations, collateral easing – may raise legitimate questions about, if not their necessity, their mutual consistency and efficacy as well as compliance with the principle of adequacy to end. Why are all these different instruments deemed necessary? Are they all well targeted (one instrument for one goal is the time-honoured principle). May it be the case that some instruments interfere with others? Is the ECB in a position to deliver timely and transparent information to its institutional counterparties, and the public opinion at large, about the observable conditions under which there will be (gradual) return to normality?

Our aim with this paper is to address these issues in three steps. In the first (Section 2) we shall provide the readers with a general framework apt to explain the reasons why, even in normal times, central banks care about the co-existence of different transmission channels of monetary policy and hence they endow themselves with different policy instruments. Within this general framework, the next step (Section 3) will review and examine the key policy instruments adopted by the ECB to tackle the post-pandemic challenges, with a view to the problem of their consistency and efficacy. Finally (Section 4), presents a few considerations about the future perspectives of normalisation of monetary policy. Section 5 summarises and concludes.

## 2. THE TRANSMISSION OF MONETARY POLICY: DIFFERENT CHANNELS, DIFFERENT INSTRUMENTS

Central banks operate in view of achieving determinate final objectives (targets) by means of a set of tools and operations. The steps leading from tools and operations to the final objective(s) form the so-called **transmission mechanism** of monetary policy. This mechanism is generally marked by some intermediate objectives (targets) that central banks perceive as being more directly under their direct control. In the case of the ECB, the final objective is defined by its single mandate of price stability, translated into an inflation target below but close to 2% over the medium term; other objectives, such as smoothing business, employment or financial fluctuations are subordinate.

### 2.1. The money market

The theatre of monetary policy operations is the money market, i.e. where the central bank interacts with chartered banks, and these among themselves, in the daily demand and supply of liquidity. Like all major central banks, the ordinary *modus operandi* of the ECB hinges on the control of key money market interest rates that regulate interbank demand and supply of liquidity (e.g. EONIA, Euro Over Night Index Average, recently substituted by the euro short-term rate or €STR, and EURIBOR, Euro Inter Bank Offered Rate, in the euro area). The desired level of these rates by the central bank, which can be regarded as the closest intermediate target, may be pursued with different techniques. The one adopted by the ECB is the **corridor** formed by three interest rates applied to operations with banks (see below, Section 3). The "floor" is the rate on the **deposit facility** (DF), i.e. the remuneration on overnight deposits held with the ECB, the "ceiling" is the rate on the **marginal lending facility** (MLF), i.e. the rate charged onto overnight funds on demand, and the central rate is the rate on **main refinancing operations** (MRO), which is charged on funds allotted weekly on a regular basis on the ECB's initiative. As will be seen in detail below, in normal times the corridor works remarkably well as a means to keeping the interbank rates aligned with the desired level of the money market interest rate.

It is also useful to clarify the relationship between these operations and the final monetary aggregates that form **money supply**, the stock of means of payments available in the economy. Clarification is opportune because of entrenched "textbook views" of monetary policy that have become detached from reality (McLeay et al., 2014; Disyatat, 2008).

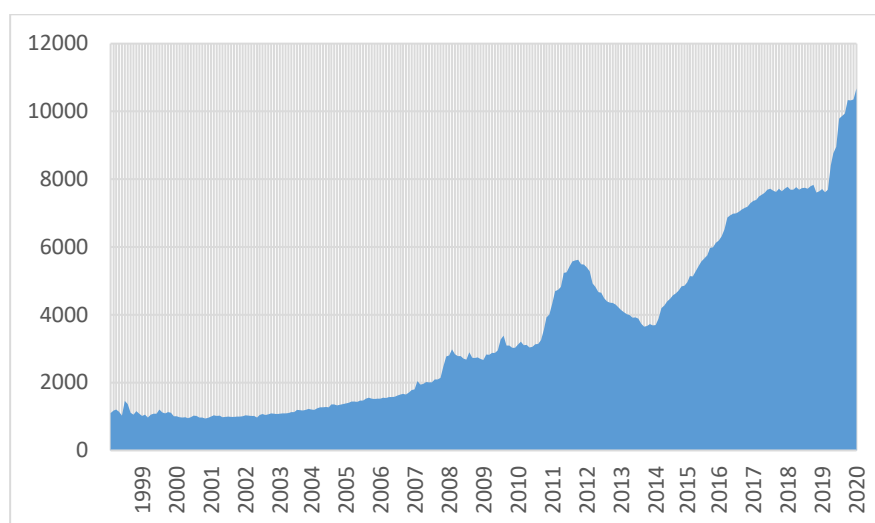
In the first place, central banks do not have direct control of final monetary aggregates, for instance the so-called M3 which is officially monitored by the ECB.<sup>1</sup> The monetary aggregate under closest control of central banks is the **monetary base**, i.e. the sum of currency held by the public and of bank reserves, accounted for in the liability side of the central bank's balance sheet. Generally, the final monetary aggregates are a multiple of the monetary base; the multiplication results from banks' policies regarding credit supply and reserve holdings, and from the public's decisions between holding cash or bank deposits. The monetary base is increased (or decreased) whenever money market operations with the central bank increase (or decrease) bank reserves. Yet, contrary to another "textbook view", banks need not have an impulse of reserve creation in order to increase credit supply. A normal loan operation is backed by the creation of an equivalent deposit; since deposits are the basis of monetary aggregates,

<sup>1</sup> "Monetary aggregates comprise monetary liabilities of MFIs and central government (post office, treasury, etc.) vis-à-vis non-MFI euro area residents excluding central government: M1 is the sum of currency in circulation and overnight deposits; M2 is the sum of M1, deposits with an agreed maturity of up to two years and deposits redeemable at notice of up to three months; and M3 is the sum of M2, repurchase agreements, money market fund shares/units and debt securities with a maturity of up to two years" (Source: ECB, [Monetary Aggregates](#)).

this means that banks have the power to create money, though not without limit.<sup>2</sup> The reserve policy of banks, and of the central bank, is part of their risk management, but it does not constitute a direct constraint on the capacity of credit (and money) creation.

In the second place, as a matter of fact, in normal times the bulk of liquidity transactions takes place among banks themselves at the interbank rates. Indeed, central banks, and the ECB as well, stand in the money market as the "lender of last resort" to banks in need of overnight liquidity, and the policy rate (the MRO rate) acts as the gravitation centre of interbank rates in force of the simple mechanism of arbitrage. Suppose that a bank needs a short-term loan: its liquidity manager will compare the interbank rate with the MRO rate and will choose the cheapest window. Hence whenever the interbank rate is below the MRO rate, excess demand for funds will push it upwards, and vice versa when it is above. It is simply the certainty of the central bank's open window that allows the system to work smoothly and precisely, with little, if any, direct liquidity creation by the central bank.<sup>3</sup> This is witnessed by the ECB's balance sheet (Figure 1), which remained fairly constant until the global bank turmoil erupted in 2008, and, subsequently, the ECB engaged in extraordinary lending operations and eventually in outright **quantitative easing**.

Figure 1: The ECB's balance sheet, 1999-2020 (EUR billion)



Source: ECB, Statistical Warehouse.

In fact, quantitative easing, which is now regarded as an *extra-ordinary* monetary policy technique, consists of direct purchases of assets, i.e. creation of monetary base. Central banks announce the amount of assets to be purchased, instead of the interest rate they charge on loans (which is in fact stuck to zero or in negative territory). In basic stylised models of monetary policy, quantitative policy is equivalent to interest rate policy since the central bank can achieve the desired level of the interest rate either ways, by setting it directly or by placing in the market the amount of monetary base such that it is absorbed at the desired level of interest rate (knowing the demand function on the banks' side). Yet, in practice, the two techniques may differ depending on specific conditions, as will be seen below. As

<sup>2</sup> This view has long been matter of controversies going back to Bullionists vs. Chartalists in the 19th century, but has become less controversial now after major central banks have abandoned official targeting of monetary aggregates (McLeay et al., 2014; Disyatat, 2008).

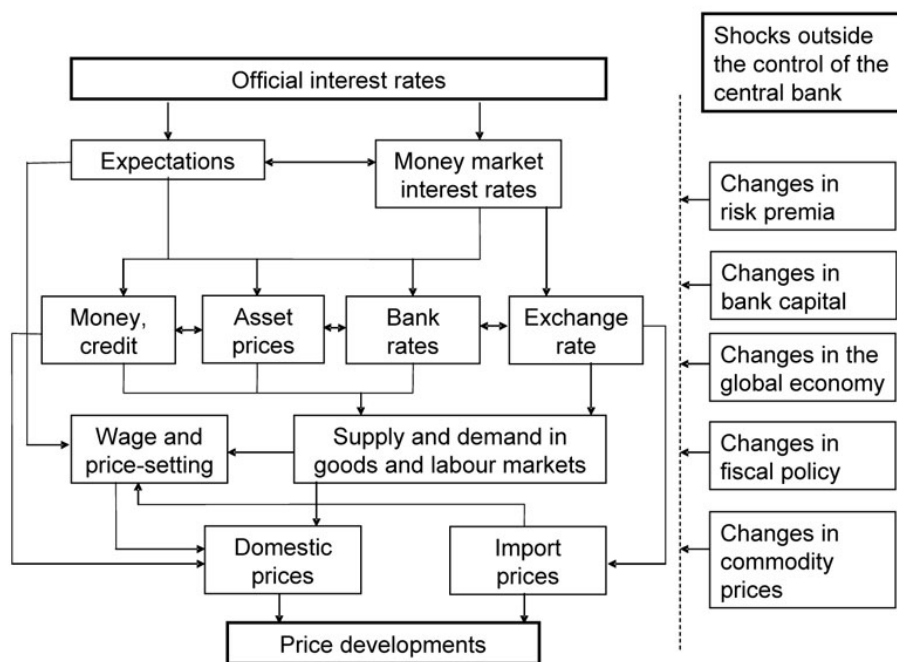
<sup>3</sup> Moreover, the MRO or other liquidity operations with the ECB have very short duration, so that the liquidity created by granting a loan to a bank is reabsorbed automatically.

a matter of fact, central banks have resorted to quantitative policies when their policy rates have reached the zero lower bound, and a different channel of monetary stimulus was necessary.

## 2.2. The transmission channels

It is therefore from the money market that monetary policy transmits the impulses that are supposed to reach its final objective(s). However, the idea of a clear, linear, single-headed impulse-response mechanism is quite remote from reality. The transmission of monetary policy may take **different channels**, some of which operate in parallel, some are more conducive than others, depending on institutional and structural features of the economy, or may break down altogether under adverse circumstances. Therefore, sound monetary policy requires accurate knowledge and monitoring of the different transmission channels, of their complementarities and possible interferences, as well as the availability of a portfolio of **different instruments**. Last but not least, monetary policy is also shaped by the "state of the art", or the "state of science" (Clarida et al., 1999), transmitted to central bankers.

Figure 2: The transmission channels of monetary policy



Source: ECB, <https://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html>.

Figure 2, produced by the ECB, portrays the transmission channels of monetary policy as they are understood in Frankfurt. We shall now briefly review the main points on transmission channels in order to set the stage for the subsequent parts of the paper devoted to the current phase of monetary policy in the euro area.

### 2.2.1. The interest rate channel

The control of the money market interest rate(s) described above is fully consistent with what is today considered the basic transmission channel, i.e. the chain from short- to long-term interest rates relevant to the private sector's expenditure decisions (e.g. Schnabel, 2020). Note, in the first place, that this channel entails another intermediate target, namely the private sector's expenditure decisions, and

through it the final objective, namely the inflation target (Clarida et al., 1999; Woodford, 2003). In the second place, theoretically, this transmission channel requires three conditions.

One is, broadly speaking, **financial efficiency**. That is to say, the chain connecting the very short-term money-market rates to longer-term rates relevant to private consumption (saving) and investment decisions, e.g. the yield curve, is stable and predictable. Most importantly, in spite of the existence of different sources of loanable funds, households and firms have unconstrained access to financial markets, and eventually face a single market-clearing interest rate (that is why macroeconomic textbooks refer to "the" interest rate). Another is that monetary policy has some leverage on the **real interest rate**, i.e. the nominal rate net of (expected) inflation, which is supposed to be the key variable driving expenditure decisions (also known as the absence of money illusion). To this end, some price stickiness is thought to be necessary, which is in fact documented not only in the markets of goods and services, but also in the financial markets, where non-indexed contracts are largely prevalent. Finally, expenditure decisions should actually be **responsive to changes** in the (real) interest rate to the extent required to achieve the final objective.

Complementary to the relationship between interest rate and expenditure is the one with the **exchange rate**<sup>4</sup>. The value of exchange rates is in fact highly sensitive to the worldwide comparison between interest rates in different countries. When the interest rate falls (or rises) in one country, its exchange rate tends to depreciate (or appreciate). Thus, also the foreign trade component of aggregate demand is activated in addition to the domestic one. The external value of the euro is not an objective by itself for the ECB, yet in recent years some episodes when the euro exchange rate appreciated in spite of an accommodating monetary stance or depreciated in association with quantitative easing operations, did not go unnoticed.

The conditions on which the viability of the interest rate channel rests may be impaired owing to either structural factors present in the economy or adverse shocks with more or less extended and prolonged effects. To begin with the latter, a large production of documents and research papers testify how the euro area financial crisis of the early 2010s first, and the consequences of the pandemic now, have crippled the ECB ordinary policy tools almost completely; they also explain the rationale of the unconventional tools adopted along the way (e.g. European Parliament, 2016, 2020; Lane 2020a). Further elements can be found in the next Section.

Schnabel (2020) provides a useful account of the specific problems that arose in the interest rate channel. A first one is that the financial efficiency hypothesis (which is questionable even in normal times, see below) is no longer tenable. Most of the rings in the chain from the MRO rate to the long-term interest rate(s) and unconstrained expenditure decision are broken, those dependent on banks' credit policy in the first place. Recent experience suggests that extremely low, or even negative, policy rates may fail to be transmitted by banks to the public or are even **reversed into a restrictive credit policy** (Brunnermeier and Koby, 2018). Some classes of households and firms lose access to borrowing altogether. A second pathology uncovered by recent research is that at very low levels of the interest rate its **effect on aggregate demand weakens** (the slope of the IS curve in the standard macro-models becomes flatter: Borio and Hoffmann, 2017; Van den End et al., 2020). At the same time, the attempt to operate on the agents' projection of future lower real interest rates by way of **forward guidance** (FG) along the path of future low nominal interest rates and higher inflation, as suggested by theoretical principles (Eggertsson and Woodford, 2004), has delivered mixed results, to say the least (Nakamura

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<sup>4</sup> The exchange rate channel is often treated as an independent channel, but here it can conveniently be seen as a complement.

and Steinson, 2016), possibly because "individuals are far from being as rational and forward-looking as our canonic models assume" (Schnabel, 2020, p. 9).

Beyond the extreme events that hit our economies along the last decade, it is worth considering that critical limitations to the conditions underlying the interest rate channel as the failsafe way for successful monetary policy were already brought to the forefront as early as the 1980s by research on various sources of failure of the financial efficiency hypothesis (Stiglitz, 2014) – vindicating to some extent the long-standing practical wisdom of central bankers. As a consequence, other transmission channels have been considered by the ECB in difficult circumstances and will need to be considered also in the future.

### 2.2.2. The credit channel

As said above, the banking sector is the key counterparty of the central bank's operations. As long as the conditions of financial efficiency underlying the interest rate channel hold, the banking sector is seen as a passive pass-through mechanism of the policy rate signal. Yet various kinds of failures of such conditions make of the banking sector an *independent* "credit channel" of monetary policy.

One major reason is that different kinds of fund suppliers face different costs and capacity to **extract asymmetric information** about firms' profitability. Hence firms do not face a single cost of funds regardless of source, and some do not have access to all possible sources (Stiglitz, 1982; Greenwald et al., 1984). As a matter of fact, firms differentiate across different financial sources according to a well-defined hierarchy, dubbed "pecking order", starting from internal funds, then bank credit, and eventually bonds and equities (Fazzari et al., 1988). Ongoing research investigates the extent to which the credit channel is more or less prominent with respect to the others. Evidence accumulated pre- and post-creation of the euro area broadly supports the view that major European continental economies are distinctly "bank-based" economies (Angeloni et al., 2002, 2003; Ciccarelli et al., 2013).

While focus is generally on credit as a source of aggregate demand, credit also plays a prominent role in financing current production, e.g. down payments of wages, raw materials and circulating capital, opening the door to **supply-side effects** of monetary policy (Greenwald and Stiglitz, 1993). Unlike the hypothetical self-financed firm, firms depending on credit for production should take into account the cost of credit and the cost of defaulting on it. Changes in monetary policy and/or credit conditions may thus **affect aggregate demand and supply simultaneously**, with amplified real effects, and smaller price effects, not necessarily due to price stickiness. Passamani and Tamborini (2013) provide econometric evidence of this side of the credit channel in Italy and Germany before and after their euro area membership. The pandemic has vividly shown the disruptive supply-side effects of the breakdown of the payment circuits among firms, and among firms and banks (Baldwin and Weder di Mauro, eds. 2020; Bonatti et al., 2020), enlarging the scope of monetary stimuli to the direct support of productive activities.

In bank-based economies it is vital that the **credit channel works smoothly and effectively**, which not only means that banks are expected to transfer changes in the MRO rate onto the cost of credit swiftly, but also that they are in the condition to extend as much credit as dictated by allocative efficiency without undue constraints in order to reach segments and sectors of the economy with limited or precluded access to other financial funds. In this perspective, great attention is placed by central banks on threats of **credit rationing**, i.e. a discriminatory policy of banks to deny credit to borrowers willing to pay the market interest rate or more, which may have large macroeconomic repercussions (Stiglitz and Weiss, 1981, 1992).

This viability of the credit channel requires also specific attention to the **balance sheet of banks**, and eventually their "willingness to lend" (e.g. Woodford, 2010). A typical feature of a recession is a deterioration of bank assets and unbalanced capital account (this may also happen directly owing to financial mismanagement as was the case with the US crisis of the subprime mortgages). The consequence is both a larger wedge between the credit cost and the borrowers' willingness to pay, and the materialisation of a credit crunch.<sup>5</sup> As in the case of credit rationing, the solution does not come from lowering the policy rate but from quantitative extension of liquidity as well as more targeted measures of balance sheet support. This has been understood by the ECB, whose interventions in various segments of the financial markets were also motivated by the attempt to prevent (or stop) a self-enforcing negative circle of asset fire-sales, worsening of banks' balance sheets, credit contraction and displacement of non-financial firms.

The existential threats to the euro area banking sectors experimented in the crises of the 2010s and with the pandemic have shown both the critical role of the credit channel for the survival of economic activity, and the necessity for the ECB to address the emergency with the kind of specific measures mentioned above (Ciccarelli et al., 2013; Lane, 2020a). In particular, as is well known, euro area banks' exposure to sovereign debt, and in particular of domestic sovereign debt, was contributing to the so-called "doom loops" in the euro area, whereby a crisis originating in the domestic banking system weakens the sovereign whose difficulties worsen the banking system, and vice versa (Farhi and Tirole, 2018).

### 2.2.3. The asset channel

Central banks should also be aware of more indirect effects of their policy decisions in a world of "financial frictions". A third channel, dubbed the "asset channel", may be regarded as the interaction between the previous two. It is a long-standing tenet in the Keynesian view of monetary policy re-elaborated by James Tobin (e.g. Tobin, 1969, 1980) that the interest rate channel mainly works through the substitution between money and risky assets (representative of firms' capital) in risk-averse agents' portfolios. Hence the **private sector's assets** are the crucial link. A monetary expansion induces the private sector to rebalance portfolios towards risky assets, their prices rise, the implied cost of raising funds falls and investment is boosted.<sup>6</sup> In a similar vein, a monetary expansion is the necessary reaction to a financial shock that disrupts asset values and impairs firms' ability to finance investments.<sup>7</sup> It may thus be noted that this view supports the idea that central banks should also take into account financial market developments, a view later reverted and that remains controversial.

Interestingly, in the earlier Tobinian view quantitative policy was believed to be the standard *modus operandi* of the central banks of the time.<sup>8</sup> Hence the portfolio effect described above would be activated by direct injection of liquidity in the money market. Today, this effect is in fact regarded, and monitored, as one of the key mechanisms behind the current wave of quantitative easing around the world (Borio and Disyatat, 2010). This approach also offers a rationale for the central banks' switch to quantitative policies. When policy rates are at zero, it is not necessarily true that all other interest rates relevant to expenditure decisions are at zero too. To a greater extent, this is the case in the euro area, where countries with different financial structures and contingent risk conditions coexists under the same monetary umbrella (e.g. Saraceno and Tamborini, 2020). Consequently, targeted asset purchases,

<sup>5</sup> Woodford speaks about "macroeconomics with two interest rates".

<sup>6</sup> Note that this process involves higher risk-taking, an issue that has recently drawn attention as a by-product of ongoing monetary easing conditions (e.g. Maddaloni and Peydró, 2011; Bonfim and Soares, 2018). In Tobin's view, however, higher risk-taking is not a problem (indeed is part of the solution) provided that portfolios are optimised.

<sup>7</sup> Households' consumption decisions may also be affected according to role of wealth in standard life-cycle models of consumption.

<sup>8</sup> A belief shared with Monetarists, but contested by other scholars of Keynesian inspiration (e.g. Kaldor, 1982).

like the APP or the PEPP, are conducive to portfolio adjustments that sustain segments of the economy penalised by adverse financing conditions. ECB officials have made explicitly reference to “the risk of fragmentation across countries and market segments”: while segmentation across jurisdictions can be easily associated with the effect of heterogeneous perceived risks of default across countries, market segmentation along other dimensions might have to do with shocks that decrease the (limited) substitutability of private assets.

In the earlier version of the asset channel, as in the basic version of the interest rate channel sketched above, there is no explicit role for the banking sector. Though it can easily be included in the picture (Hart and Jaffee, 1974), it remained in an ancillary position. This is no longer the case, if the conditions giving prominence to the credit channel are taken into account. As a matter of fact, borrowers' assets play a key role as **collateral in banks' credit policy** aimed at controlling asymmetric information and moral hazard. The problem is that collateral values follow the booms and busts of financial cycles, thus making credit supply procyclical, expanding in booms and contracting in busts (Bernanke and Gertler, 1989, 1990). This is a major factor that turns financial cycles into real cycles with a typical amplification effect (Borio, 2012). The credit-asset channels interplay reinforces the message that central banks should pay attention to financial developments, and if a financial collapse strikes, they should stand ready to intervene with measures targeted to sustaining collateral values.



### 3. NEGATIVE INTEREST RATES, MONETARY POLICY INSTRUMENTS AND THE TRANSMISSION CHANNELS

In this Section we shall illustrate the intertwined relationship between standard and extraordinary monetary policy instruments in a world characterised by **negative interest rates**, serious **market segmentation** (across financial intermediaries and across sovereigns), and **excess liquidity**.

We shall discuss, in particular, the relationship between the observed changes in the various ECB policy rates and the several extraordinary measures (from the provision of central bank liquidity to the changes in collateral eligibility for liquidity transactions with the Eurosystem, from the establishment of security lending facilities to the creation of a two-tier reserve system) implemented by the authorities.

As will be explained, the persistent segmentation in the money market and in the sovereign bond market across the euro area, the presence of excess central bank liquidity and the adoption of negative monetary policy rates have profoundly affected the transmission channels, forcing the ECB to adapt progressively its tools to the circumstances. A better understanding of the timeline, of the logical connections, and of the causal relationships between the several instruments is of outmost importance not only to appreciate the rationale of the decisions, but also to envisage all the necessary steps in the process of monetary policy normalisation.

#### 3.1. Monetary policy in normal times: the corridor of policy rates further explained

As explained in Section 2, the ordinary monetary policy operations of the ECB are engineered within "**the corridor**" of policy rates, whose main aim is to steer the amount of bank reserves and the short-term interest rates. To understand the mechanisms at play in normal times, a further description of the framework used by the Eurosystem is in order.

In the first place it should be recalled that **central bank liquidity** is important for the banking system because credit institutions established in the euro area are required to hold minimum compulsory reserves, calculated on the basis of their balance sheets. Reserves ensure that banks are capable to settle their transactions in central bank money, when needed. More importantly, setting a minimum amount of reserves to be held with the Eurosystem helps the ECB to manage the overall supply of credit in the economy. The overall demand for liquidity in the euro area, indeed, depends both on the evolution of the commercial banks' balance sheet and of the associated required reserves, and on a number of autonomous factors (ranging from government deposits to the amount of cash circulating in the economy) that absorb liquidity.

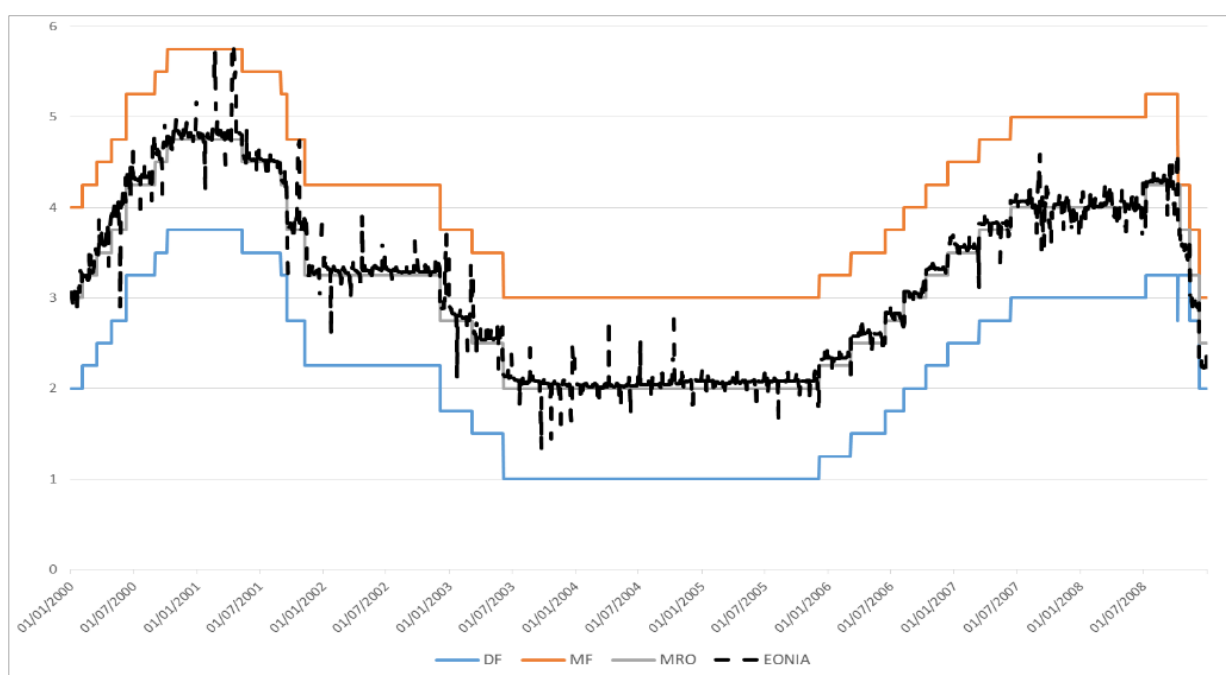
In order to match their liquidity needs, banks participate in the MRO - one-week liquidity-providing operations – and longer-term refinancing operations (LTRO) - three-month liquidity-providing operations in euro. These tenders are designed purposefully to steer the short-term interest rates towards the target rate, and to regulate the overall liquidity in the system, since the MRO rate represents a reference value for all money market transactions, such as the unsecured overnight lending transactions and the secured (i.e. collateralised) repurchase agreements (Repo).

The banks in the euro area can also take the initiative and engage on an individual basis with the Eurosystem to receive additional central bank liquidity through the MLF against the presentation of eligible assets (i.e. collateral). Conversely, they can deposit in the Eurosystem any overnight liquidity that they are unwilling to or incapable of lending to other banks (through the DF). These standing facilities contribute to redistribute and modify the level of overnight liquidity in the system.

When the ECB injects liquidity in the system through its main operations, it creates downward pressures on the interbank rate and on other money market rates. In normal times, the DF rate represents a floor for the interbank rates as banks with excess liquidity in the system would rather make use of the DF than lending privately with lower returns. Conversely, when the ECB absorbs liquidity from the system, there is an upward pressure on the interbank interest rates that move closer to the marginal lending facility rate. Accordingly, the DF rate and the MLF rate create a corridor for the unsecured overnight interbank interest rates (see Bech and Monnet, 2016, for a search-based model of the interbank rate).

Figure 3 illustrates that the unsecured overnight interbank rate (the EONIA rate, until October 2019) has always remained in the corridor and close to the main rate, i.e. close to the ECB target rate, between 2000 and 2008.

Figure 3: Euro area money market rates and ECB policy rates, 2000 – 2008



Source: Authors' elaborations based on ECB, Statistical Warehouse.

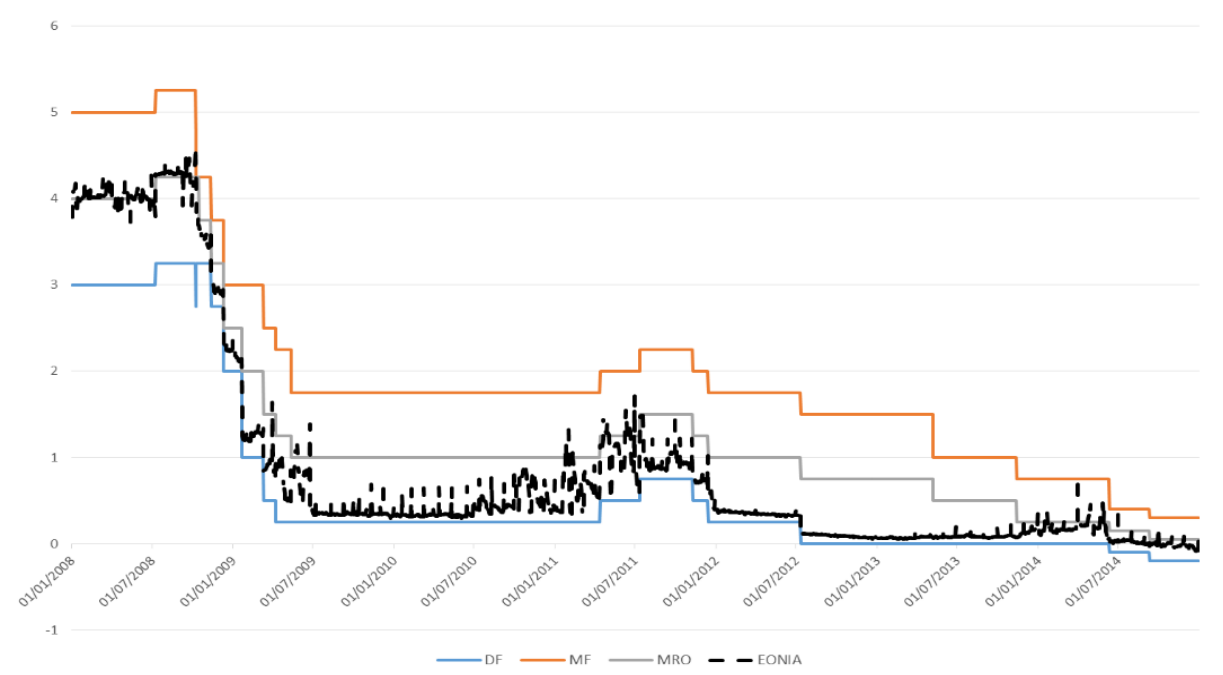
### 3.1.1. Facing new challenges: 2008-2014

With the onset of the global financial crisis and during the European debt crisis, the unsecured interbank rate in the euro area started **moving away from the MRO rate** and towards the DF rate, as shown in Figure 4. These changes were reflected also in other short-term interest rates, such as secured interbank transactions and unsecured transaction involving non-banks and banks outside the euro area. This outcome is the result of the large injection of liquidity in the system operated through extraordinary measures to enhance credit support, such as the three-year LTROs and the TLTROs. Absent this provision of central bank liquidity, the money market rates would have risen significantly above the MRO rate and some banks would have encountered problems in accessing to the interbank market, thereby impairing the monetary policy transmission mechanism.

It is indeed normal that, in an **environment characterised by excess reserves**, the overnight market rate moves from the middle of the corridor towards its floor (Boutros and Witmer, 2020). Yet, in the euro area, specific forces have been at play.

As shown by Vari (2020), the rate for the unsecured overnight interbank transactions fell close to the DF rate also because of the serious fragmentation between the banks in the so-called “core” countries and those in the peripheral countries of the euro area. The banks located in the distressed countries, in particular, could borrow in the market only at a high premium due to the widespread concerns for their (or their countries’) **risk of default and for the possible breakup of the euro area**, whereas the banks in the core countries did not need to borrow in the market as they were already holding excess reserves.<sup>9</sup>

Figure 4: Euro area money market rates and ECB policy rates, 2008 – 2014



Source: Authors' elaborations based on ECB, Statistical Warehouse.

As the ECB could not discriminate between credit institutions on the basis of their nationality, it had to expand the liquidity provision to the entire euro area. The Eurosystem amended its approach to manage liquidity and introduced procedures to allocate unlimited amount of credit to banks at a fixed interest rate (fixed-rate full allotment), often for relatively long periods of time and against an enlarged range of eligible assets. Yet, only the banks in the periphery turned progressively more and more to the ECB for liquidity, and started to rely less and less on the market (reducing their demand for liquidity in the money market); Conversely, the banks located in less vulnerable countries stopped borrowing from the ECB and started hoarding liquidity in the form of excess reserves and deposits with the Eurosystem.

The model developed by Vari (2020) shows that, in such a policy setting and in the presence of large imbalances in the net external financial positions of the different countries, a) excess liquidity arises

<sup>9</sup> Secured and unsecured loans to the peripheral banks started being considered as similar because banks tend to hold (Saka 2020) and use as collateral domestic assets that share their same country risk; hence, the market rates on unsecured overnight interbank transactions did not differ much from those for secured exchanges (Vari, 2020).

endogenously in the system, and b) unsecured interbank rates depend on the few unsecured transactions carried out by the banks in the core. These forces contribute to drive the market rates far from the MRO rate and very close to the DF rate.<sup>10</sup> Moreover, as capital flights associated with portfolio reallocations across sovereign bonds increase the funding needs for the banks in the periphery, the segmentation between banks in the euro area eventually mapped, *ceteris paribus*, into large TARGET2 imbalances.

Notably, such asymmetric conditions in the core and peripheral banks contributed to create two intertwined phenomena negatively affecting the traditional monetary policy transmission: the interbank rate tracked more closely the DF rate than the MRO rate, and the Eurosystem's balance sheet increased with the growing liquidity provision to the peripheral banks. When the liquidity and the interbank interest rates fluctuate according to the demand and supply forces associated with the risks of financial fragmentation along the national borders, the monetary transmission in the euro area is impaired: the ECB loses the ability to "control" the overall liquidity and to steer effectively the short-term interest rates towards the target rate.

This account of the problems affecting the money market and the monetary policy transmission during the period contributes to explain why reducing the concerns for sovereign defaults and a breakup of the euro and interrupting flight-to-safety dynamics in the area was necessary for the ECB to preserve the normal functioning of the transmission mechanism. The ECB could not simply continue to increase central bank liquidity: it had to tackle the self-fulfilling expectations of disordered sovereign defaults and a breakup of the euro. The ECB had to give its contribution to **preserve financial stability** and a **smooth functioning in all segments** of the financial markets in order to be able to pursue price stability. This understanding, together with other considerations, led the Eurosystem to undertake the massive APP. Moving to quantitative policies, factors typical of the asset channel introduced in Section 1, such as portfolio effects, become prominent.

Quantitative easing programmes, in fact, tend to saturate banks with liquidity and reduce their need to borrow both from the ECB and in the interbank market; this, in turn, contributes to push and anchor the interbank rate closer to the DF rate (Vari, 2020). With an interbank market rate steadily close to the DF rate and below the MRO rate, the ECB could not operate as usual by setting the main MRO rate close to the target rate, as central banks using the corridor do. The ECB, as well as other central banks, had to adapt and started manoeuvring the DF rate so as to steer the interbank rate closer to the target rate.

But when the system is washed with liquidity, central banks may also need to **reduce liquidity hoarding**: the ECB started charging banks for holding excess reserves so as to encourage them to expand their lending, and set a negative rate on the excess reserves held with the Eurosystem.

Negative policy rates help the central bank to lower the market interest rates below zero along the entire yield curve, thereby boosting the monetary accommodation. Indeed, investors tend to demand more longer-dated assets when short-term rates are negative. Accordingly, the ECB introduced a negative interest rate policy (NIRP) in mid-2014.

As mentioned above, when the policy rates enter into negative territory, the ability of the central bank to work with the corridor and with the traditional policy rates is severely affected. Although they manage to bring nominal and real short-term rates below the zero lower bound, they still face an effective lower bound associated with the possibility for individual and financial intermediaries to turn to cash (Boutros and Witmer, 2020). While banks can charge negative rates on wholesale deposits

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<sup>10</sup> In a perfectly integrated banking system, the model shows, a fixed-rate full allotment would be conducive to the same level of liquidity and the same interbank rate that one would observe in a system where the central bank controls the overall liquidity. It is the fragmentation that, in the model, magnifies the impact of the countries' net external financial positions.

(Altavilla et al., 2019, show that, in 2018, euro area banks charged negative rates on 20% of the deposits of non-financial institutions), there is indeed a limit to the banks' ability to pass-through negative rates to their depositors. It follows that the policy rates can be negative but, short of banning cash, they cannot be too negative. And there remains the risk that they remain above the target rate, that is the rate bringing the economy to a price stability path.

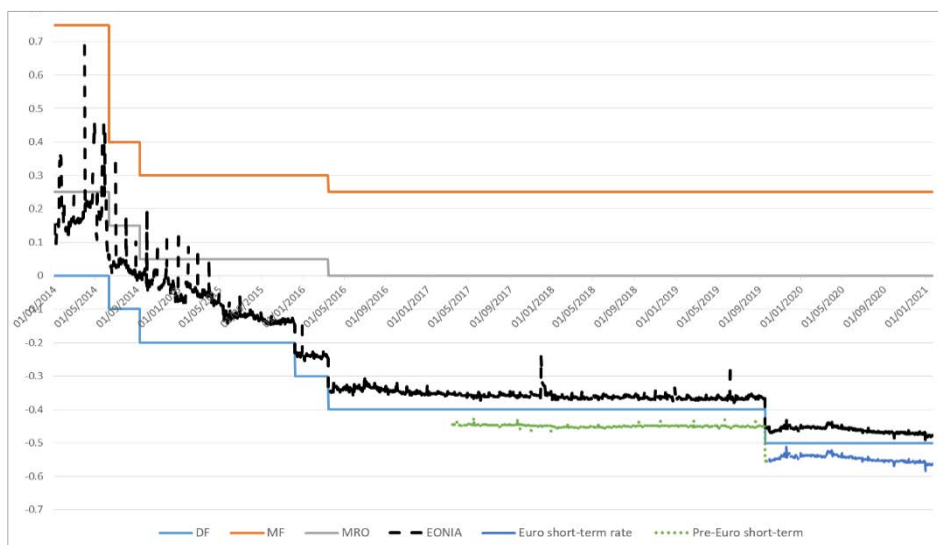
All these considerations show that there exists an effective lower bound for the central bank on its policy rates, even when it decides to establish a NIRP. Moreover, as we shall illustrate in what follows, the realisation of a NIRP that is compatible with the smooth functioning of the transmission framework requires the adoption of several collateral policy measures and other adjustments.

### 3.1.2. Money market rates after 2015

As said, negative policy rates were adopted by the ECB since mid-2014 as part of its renewed strategy to address worrying disinflationary forces. Once the DF rate and the **interbank rates turned into negative territory**, a number of unusual phenomena emerged.

To start, the interest rates on the unsecured transactions between banks and non-banks, mapped in the €STR rate since 2017, moved far below the EONIA and the DF rate (Figure 5). This phenomenon can be explained by referring to the **institutional differences between banks and non-banks in the euro area**. As only banks have access to the DF with the Eurosystem, they started acting as intermediaries for the non-banks. In doing so, they exploited the privileged access to the central bank and their market power, and started charging (very) negative rates to accept to absorb non-banks' excess liquidity (Arrata et al., 2020).<sup>11</sup> The difference between the EONIA and the €STR, thus, is due to a segmentation driven by the differentiated institutional position of the financial intermediaries with and without access to the Eurosystem's facilities. This segmentation differs from, and adds up to, the segmentation across banks in peripheral and in core countries discussed above.

Figure 5: Euro area money market rates and ECB policy rates, 2014 – 2021



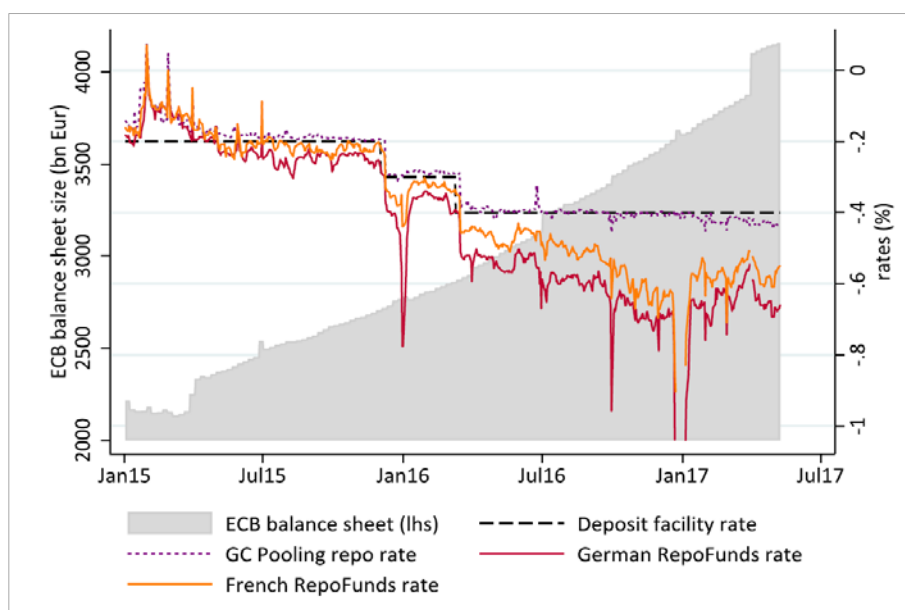
Source: ECB Statistical Warehouse.

<sup>11</sup> This segmentation-related phenomenon has been present also in the US, as shown by Bech and Klee (2011).

A second unusual phenomenon in the money market occurred since 2015. The secured repurchase transactions backed by sovereign bonds quoted at rates below the DF rate in negative territory, and the rates on the repos backed by German and French government bonds (among others) reached levels far lower than those of the repos backed by a pool of bonds and of repos covered by distressed sovereign bonds (Figure 6).

As repos represent the largest segment of the euro area money market and a key component of the monetary transmission channel, this situation is as much bizarre as it is important to understand. The first bizarre aspect to consider is that secured transactions in the money market were traded at rates below the unsecured transactions and the DF rate. The second surprising aspect to mention is that the dispersion across repo rates started growing at the very same time when the Eurosystem was implementing a massive programme of asset purchases to reduce the (abnormal) dispersion in the long-term rates.

Figure 6: Selected money market rates in the euro area



Source: Arrata et al. (2020), p. 838.

In fact, the situation was not bizarre. Rather it was the by-product of unusual circumstances (negative policy interest rates, euro area banking and financial market segmentation along national borders) and of the extraordinary expansionary interventions by the Eurosystem.

To understand this, it is worth recalling that **financial institutions may need certain specific assets** for a number of purposes (e.g., high-value collateral in secured transactions, short sales, regulatory reasons, portfolio rebalancing, ...). From this it follows that credit and financial institutions may enter a repo transaction with the goal of borrowing the asset, against cash, rather than obtaining cash, against the asset. When the interest of the lenders is in receiving the collateral, rather than in providing the cash, they may be willing to accept a lower rate in the transactions: this is the source of a *premium* on the asset used as collateral and it creates a phenomenon that, after the work of Duffie (1996), is known as the *specialness* of an asset.

As maintained by Arrata et al. (2020), with its massive APP, the Eurosystem has decreased the net supply of safe/special bonds, and this has **increased their specialness premia**. This implies that the ECB's

attempt to lower the long end of the yield curve has contributed to lower the very short end, altering the money market rates and the monetary transmission framework.

The concept of specialness does not only help to explain why repo rates declined in the euro area below the DF rate, but also why the Repo rates backed by different sovereign bonds were quoted at different rates. This is the effect of the wide variation in the specialness *premia* associated with diverse long-term bonds in the euro area that is in turn a manifestation of the concerns for the sustainability of Member States' public finances and the integrity of the euro area. Accordingly, the divergence in repo rates backed by different sovereign bonds represents another channel through which the perceived risks of sovereign defaults and of a euro area breakup contributed to segment the money market in the euro area.

As pointed out by Isabel Schnabel at the ECB Conference on Money Markets (on 23 November 2020), *"increases in dispersion indicate that money market rates do not move in tandem, which can signal impairments in the pass-through of the monetary policy stance to private market rates."* Even in an environment washed with liquidity and with negative policy rates (and with limited concerns for the euro area collapse), substantial differences in the perceived safety of sovereign bonds across Member States has continued to alter the monetary policy transmission. It should then not surprise that preserving financial stability and a smooth functioning of all segments of the financial market is an implicit intermediate objective of a central bank that has price stability as main goal: without achieving the former, it is impaired to achieving the latter.

### 3.1.3. The short circuit of policy measures

As argued above, the **impact of asset specialness is particularly strong** when there is a (perceived) shortage of the desired asset. This shortage did not depend exclusively on variations in demand due to precautionary motives and flight-to-safety pressures. Two additional factors contributed to the growing scarcity of safe collateral in the euro area: the massive purchases of sovereign bonds by the Eurosystem under the APP, and the modifications of various regulatory norms, pushing banks and other institutions to increase their holdings of the safest securities.

The (inevitable) **short circuit in the implementation of monetary policy** is thus apparent. On the one hand, the Eurosystem intervenes on the sovereign bond markets to reduce the concerns about a breakup of the euro area and to ensure that the monetary stimulus is transmitted effectively across jurisdictions and intermediaries. On the other hand, the quotas of assets to purchase have to respect the ECB capital key, and hence the Eurosystem withdraws from the money market large amounts of special assets in high demand (i.e. German bonds), thus increasing their specialness premia and expanding the dispersion in the short-term rates across the euro area.

The recognition of the problems associated with such paradoxical outcome led the ECB to establish a **securities lending programme** with a view to lending the holdings under the APP and the PEPP. The aim of this programme was indeed "to support bond and repo market liquidity without unduly curtailing normal repo market activity". Over time, this instrument has been revisited several times and in late 2016, for instance, the Eurosystem allowed the national central banks (NCBs) to accept cash as collateral for their public securities lending facilities.

But this is not the only part of the monetary framework that had to be adjusted. The Eurosystem had to **revise various rules regarding the eligibility** of marketable and non-marketable financial securities that can be used as collateral in secured transactions with the ECB and the NCBs. Although in normal times the Eurosystem collateral framework is meant to limiting banks' excessive borrowing and to protecting the Eurosystem from losses associated with its loans, the expansion of the range of

eligible assets was part and parcel of the ECB’s attempt to prevent fire sales of assets, reduce the segmentation in financial markets, and support banks’ balance sheets. In the face of increasing credit risk heterogeneity among euro area, the ECB has to improve both the functioning of certain segments of the financial markets and the overall monetary transmission mechanism.

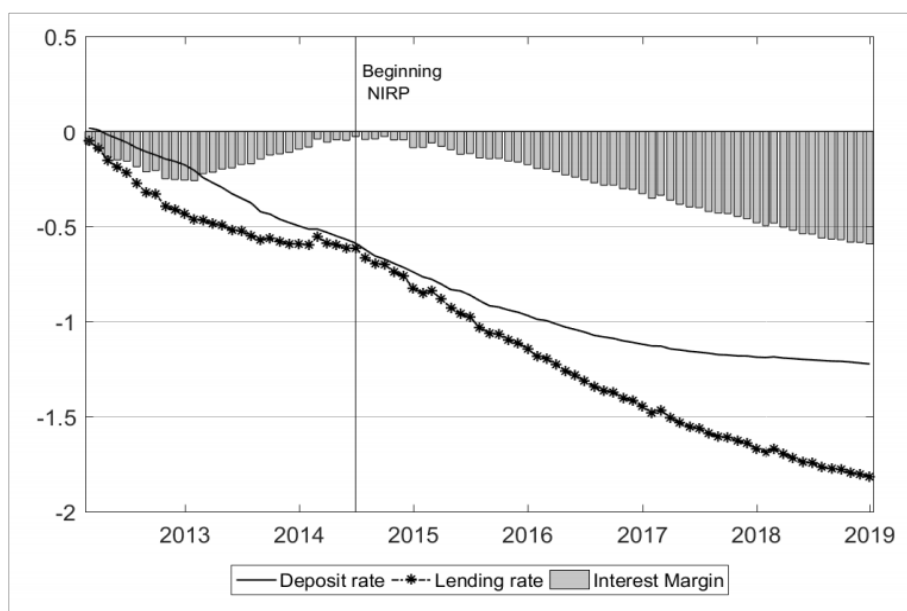
### 3.2. NIRP, remuneration on excess reserves and banks’ profitability

As the pass-through of negative interest rates differs across banks, **the impact of NIRP on the profitability of banks** is diversified. Some banks manage to reduce their cost of funding and can expand loans, whereas others may suffer a large contraction in the interest rate margin and in the net interest income, and reduce lending altogether.

As European banks earn most of their total profits from interest-bearing assets and liabilities (see Figure 7), many have been concerned about the low bank profitability and a reduction in banks’ lending capacity despite the negative rates and the abundant liquidity available.

Although the research on this aspect is still ongoing, European banks seem to have adapted fast their business practices, expanded new lending and **exploited other opportunities to raise profits** (Klein 2020). For instance, core banks exploited the positive differential between the DF rate and their repos rates (see the Sections above) to intermediate, with a positive return, the excess liquidity of non-banks. Bubeck et al. (2020) show that systemic banks were also induced to reach-for-yield by investing in assets.

Figure 7: Cumulative changes in the lending rate and deposit rate for euro area banks



Source: Klein (2020), p. 6.

Yet, the effects are very diversified and **small banks may have been hit the hardest**. Evidence from the euro area bank lending survey suggests that bank profitability was indeed negatively affected by the extraordinary measures, and in particular low capitalised banks suffered the most. All in all, however, the banks’ balance sheets expanded as expected (Klein, 2020).

It remains also true that any unpleasant direct impact of the NIRP on the profitability of small banks has to be weighed against a realistic counterfactual scenario of no-NIRP, that is an economy contracting

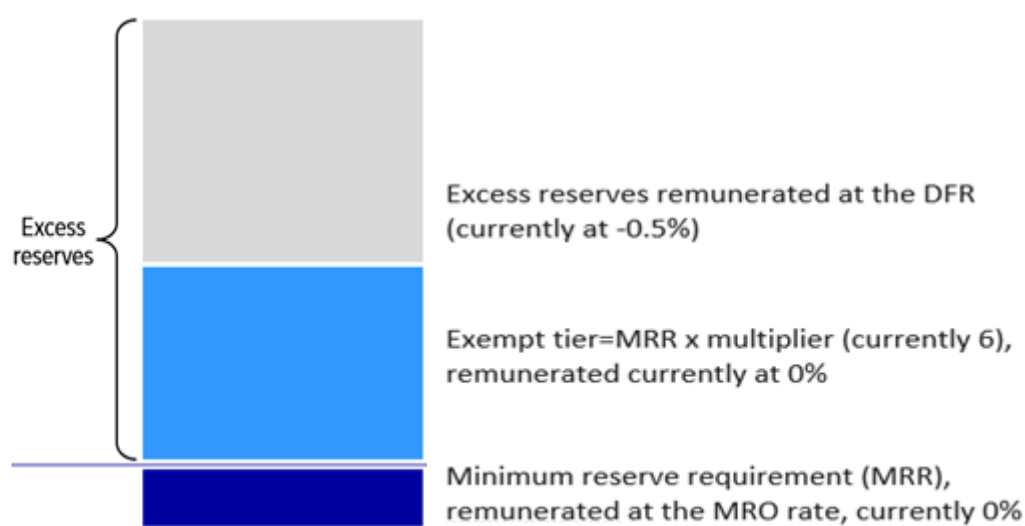


even more and with more non-financial companies exiting the market (ECB, 2020). It follows that the actual implications of NIRP and of negative money market rates on banks are not straightforward, and an assessment would require a dedicated analysis.

Being as it may, there is wide consensus that the large amount of liquidity injected in the euro area through non-standard monetary policy measures (at least those not directed to stimulate bank lending to the real economy) created strong pressures on market interest rates and on banks' usual business practices. The ECB decision to establish a **two-tier system for remunerating excess reserve** holdings can be reasonably related to these concerns.

In fact, the new remuneration scheme adopted by the ECB starting on 30 October 2019 has two distinct rates, which are applicable to different parts of the excess reserves held by the euro area banks, i.e., balances held in reserve accounts with the Eurosystem in excess of the minimum reserve requirement (that is remunerated at the average MRO rate, currently at 0%). According to this scheme, the fraction of the excess reserve holdings up to the "allowance" is exempted from the rate at which excess reserve holdings are normally remunerated, that is either at 0% or at the DF rate (currently at -0.5%), whichever is lower (Figure 8). The allowance is calculated as a multiple (currently six times) of the minimum reserve requirement, that is mainly dependent on banks' customers' deposits, thus making the two-tier scheme particularly calibrated on banks relying on deposit funding, which are typically the main lenders to the real economy in the euro area. Both the multiplier whereby the allowance is calculated and the rate at which the excess reserves up to the allowance are remunerated (currently 0%) may be adjusted by the ECB's Governing Council over time.

Figure 8: Reserve remuneration in the Eurosystem



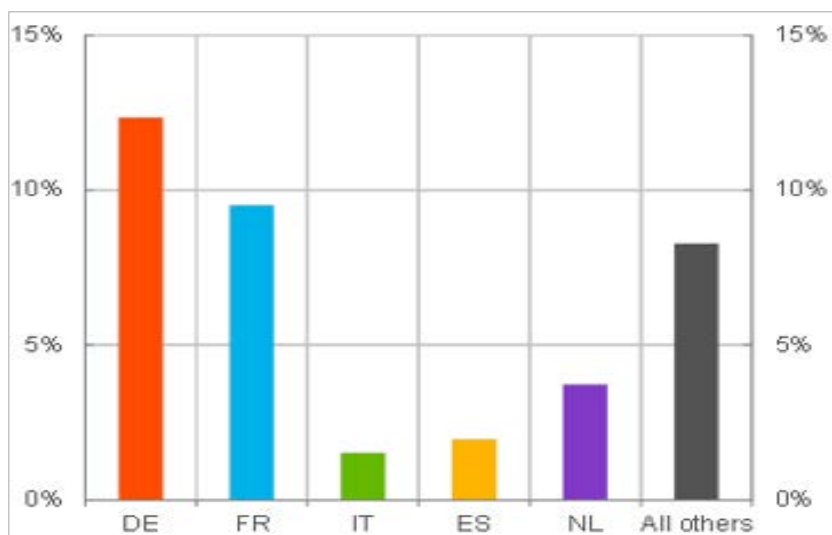
Source: ECB, Nordea.

The introduction of the two-tier excess reserve remuneration (TTERR) system creates **incentives for trading liquidity among banks in the money market**, at rates currently ranging between -0.5% (DF rate) and 0.0% (the rate paid on the exempted fraction of excess reserves). Banks with excess reserves above exemption allowances are willing to lend on the interbank market at rates higher than the DF rate; those with unused allowances to borrow at rates lower than the zero remuneration rate on the exempted fraction. To find a satisfactory trade-off between maintaining short-term money market rates at very low levels on the one hand, and reducing money market fragmentation and banks' costs on the

other hand, the ECB has to calibrate carefully both the multiplier and the rate at which exempted excess reserves are remunerated. In particular, the amount of un-exempted reserves should be kept at a level large enough to prevent the short-term money market rates from rising too much above the DF rate (see Secchi, 2019).

In general, the presence of abundant central bank liquidity, which has been further increased since March 2020 in response to the COVID-19 crisis, lowers banks' incentives to transact with each other. In this context, one should expect that the TTERR can contribute to bring about a **less uneven distribution of liquidity across jurisdictions** than that emerged since the Great Recession and the European debt crisis. When the TTERR was introduced, indeed, excess liquidity holdings in the euro area were highly concentrated in the core countries (Figure 9). As Cœuré (2019) rightly remarked, *"Such concentration levels are, in principle, of little concern to policymakers in the presence of a deep and active money market across the euro area – that is, as long as banks with excess liquidity holdings are willing and able to smooth liquidity shortages elsewhere in the system. If there is fragmentation, however, then temporary spikes in interest rates are also possible in the euro area, despite the remarkable excess liquidity levels we are currently seeing."*

Figure 9: Excess liquidity across euro area countries as a share of total Eurosystem assets, (September 2019)



Source: ECB.

Following the implementation of the two-tier system, banks holding less excess liquidity than their exemption allowance increased their excess liquidity holdings by borrowing from banks exceeding their exemption allowances, with some redistribution of excess liquidity away from Belgium, Germany and the Netherlands and towards countries with unused allowances, such as Italy (Baldo et al., 2019; Cœuré, 2019). However, this redistribution occurred, by and large, in the secured market, where the use of collateral and central clearing can reduce counterparty risk, while unsecured interbank lending remained overwhelmingly domestic, especially in countries with high excess reserves. Thus, it appears that the TTERR stimulates cross-border lending as far as banks have sufficient collateral, but its introduction suggests that *"we may still be facing a situation in which banks in some parts of the euro area may hold on to excess liquidity while those in other parts of the currency union may face a liquidity shortage"* (Cœuré, 2019).

In addition, the TTERR is meant to provide the euro area banks with some cost relief by allowing them to reduce the negative interest rates that they have to pay because of their excess liquidity.<sup>12</sup> In general, policy-rate cuts have ambiguous effects on bank profitability, since they reduce intermediation margins by flattening the yield curve and lowering term and risk premia, while at the same time they stimulate aggregate demand, improve the creditworthiness of borrowers and lower provisioning needs. But once policy rates turn very negative, banks may find increasingly difficult to support their profitability through commissions and fees, since their cheaper wholesale funding may become insufficient to offset the impossibility to lower their deposit rates much below zero (IMF, 2017).

It was noticed (Loneragan and Greene, 2020) that the combination of TTERR and targeted lending at interest rate below the DF rate (the interest rate applied on all TLTRO III operations is currently 50 basis points below the DF rate) imply that the ECB can set lending rates independently from deposit rates, thus allowing it to simultaneously raise (or lower) the income of both borrowers and lenders. Loneragan and Greene (2020) rightly emphasize that this is a very important departure from conventional monetary policy that typically leaves the net interest income of the private sector unchanged and works only either through inter-temporal substitution of consumption (a price effect) or through the differential marginal propensities to consume for borrowers and lenders. Hence, this unconventional monetary policy is quasi-fiscal in its implications, as it becomes apparent by considering that the Eurosystem's foregone profits due to its implementation translate into foregone revenues for the euro area governments.

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<sup>12</sup> Before the introduction of the TTERR, the annual gross cost of the excess liquidity for euro area banks (at the DFR of -0.40%) was estimated to be around EUR 7.5bn, which has to be compared to the annual profits for the banking sector as a whole that in 2017 was approximately EUR 100bn, with some small countries – such as Finland and Luxembourg – bearing a much larger share of the excess reserves relative to the size of their economies (von Gerich and Størup Nielsen, 2019).

## 4. LOOKING AHEAD: FORWARD GUIDANCE IN THE EURO AREA

In this final Section we wish to address the issue of "normalisation" of monetary policy from the specific point of view of different instruments for different channels developed in our paper. In this perspective, a central bank should ideally be able, and willing, to communicate to the public the observable conditions under which the various extraordinary programmes and tools will be (gradually) turned off. This is, indeed, the basic principle behind FG, the role of which among the ECB instruments has been introduced in Section 2 (Lane, 2020a). However, the implementation of this principle, in the complex multi-task scenario describe above, is fraught with difficulties.

Although the possibility of lending to commercial banks at rates below the rates at which the central bank remunerates their reserves pushes the effective lower bound (ELB) to the central bank's policy rates further into negative territory, the ECB—as other central banks—is still **using FG to amplify the expansionary effects** of its policy in an environment where short-term interest rates are close to their ELB. As mentioned above, the capacity of central banks to lower real expected interest rates by convincing market participants about their determination to keep future policy rates low enough, and for a period sufficiently long, so as to raise the inflation rate close to their targets, is limited by people's (including professional forecasters') bounded rationality and myopia (Levin and Sinha, 2020; Gabaix, 2020). However, one could argue that the **ECB has more difficulty than other central banks** to raise market inflationary expectations close to its target because of its peculiar policy framework.

Before discussing what is at the origin of this difficulty, one can observe that after that in July 2013 the ECB began using FG, the euro area annual inflation has systematically undershot the target ("below, but close to, 2 percent"). Since the COVID-19 pandemic hit Europe, the members of the Executive Board have reiterated the ECB commitment to **preserve favourable financing conditions well into the future**, in order to counter the negative pandemic shock to the inflation process and secure convergence towards the inflation aim over the medium term (e.g. Lane, 2020b; Panetta, 2020; Lagarde, 2021). Hence, the ECB's FG is currently linking the expectations on the future policy rates to the projected path of inflation, which the ECB itself provides to the public: the baseline scenario of the December 2020 Eurosystem staff macroeconomic projections foresees annual inflation at 0.2% in 2020, 1.0% in 2021, 1.1% in 2022 and 1.4% in 2023 (even the Eurosystem staff's most optimistic scenario foresees annual inflation quite below 2% over the medium run: at 1.1% in 2021, 1.3% in 2022 and 1.5% in 2023).

Some lessons from the recent literature about the effectiveness of FG can be relevant for the euro area. This literature emphasized that, when the central bank informs the public that its future policy rate will be pegged for a certain period at—or close to—its ELB, households, firms and investors could interpret this FG as the central bank's commitment to keeping its policy rate anchored at its ELB over that lapse of time, or alternatively they could interpret it as the central bank's announcement of its most appropriate future policy rates conditional on its projection of the future path of inflation and output gap (Janson and Jia, 2020). **These interpretations can have opposite effects.** The former induces the public to believe that even if there will be an unexpected burst of inflation, or the recovery may arrive sooner or be stronger than predicted, the central bank will stick to its pegging, thus increasing their expectations of future inflation and output growth, with a boosting effect on current real demand and inflation. The latter induces the public to believe that the bank's policy will remain expansionary only so far as the inflation will stay well below the bank's target and the economy will stagnate, thus decreasing their expectations of future inflation and output growth, with a depressing effect on current real demand and inflation. In other words, if the central bank's FG is interpreted as providing insights about the bank's policies contingent on its predictions of the future economic trajectory, it could unintentionally reinforce the public's pessimism about the future economic outlook, which may lead

consumers, firms and investors to behave in the present in such a way that the economy remains depressed and their pessimism about the future will be validated. In contrast, interpreting the FG as a policy commitment not contingent on future events may clash with a problem of credibility, since it implies the central bank's promise to setting future policy rates at levels that could be lower than those optimal at a later date for achieving the bank's inflation target ("Odyssean" FG).<sup>13</sup>

Hence, it is not only people's bounded rationality which may prevent promises to keeping policy rates low in the future from having full effect on price setting, demand and output today (Gabaix, 2020), but also the people's perception that the **central bank's announced policy is time inconsistent** and that it could renege on its promise and raise its policy rates sooner than promised (Coenen et al., 2017). However, this is not necessarily the case whenever the central bank is concerned about its reputation and is aware that, if it were to renege on its promise of overheating the economy in the aftermath of a crisis, the public would not believe similar promises in the next crisis, thus causing larger declines in inflation and output (Nakata, 2018). Thus, **concern for maintaining its reputation** can provide the central bank with an incentive to keep the promise of not raising its policy rates immediately after the end of a crisis. Obviously, such promises make sense and are credible only if they are consistent with a mild and transitory overshoot of inflation above the central bank's target (Coenen et al., 2017).

It was noticed that the Federal Reserve is attempting to address the problem of time inconsistency outlined above by switching since August 2020 to a policy of "flexible average inflation targeting" (Janson and Jia, 2020), according to which—following periods of inflation running persistently below 2 percent—it is expected to promote inflation "moderately above 2 percent for some time" (so that inflation averages 2 percent over time). A similar explicit official statement by the ECB about the tolerance of transitory periods of inflation above the 2 percent threshold could help in a context of policy rates close to their ELB to lower the expected long-term real interest rates in the midst of the COVID-19 pandemic, thus sustaining consumption and investment in the euro area. This is even more important if one considers that nowadays a surge of inflation may not appear a likely event in the medium run, but—given the heightened uncertainty surrounding the post-pandemic economic outlook—it still remains a possibility.

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<sup>13</sup> According to the distinction between "Odyssean" and "Delphic" FG, an Odyssean FG implies that the central bank commits to stay the course, just as Odysseus resisted the sirens' calls by having himself bound to the mast of his ship, while with Delphic FG, the central bank only communicates its forecast, preserving the right to re-optimize its plan in every future period (hence, it need not follow the predicted path of interest rates should circumstances change) (Campbell et al., 2012; Coenen, 2017). According to Angeletos and Sastry (2018), the optimal Odyssean strategy should shift from instrument-based to target-based FG, that is, instead of focusing on future policy rates, FG communications should focus on the macroeconomic variables targeted by the central bank.

## 5. CONCLUSION

Throughout our review of different instruments for **different channels of the transmission of monetary policy**, we have shown how the ECB has sought to target and calibrate its interventions in an extremely complex situation where some transmission channels broke down and others need to be enhanced. We have also highlighted the necessity that due attention should be paid to the mutual consistency and overall efficacy of the various interventions.

While central banks care about the co-existence of different transmission channels of monetary policy at all times, as they need to take into account how their policy measures are mediated by and interact with financial intermediaries, investors, households, firms and fiscal authorities, it is worth noticing that **the design, the coordination and the (re-)calibration of the various policy instruments** adopted to tackle the post-pandemic challenges represent a fundamental issue for the ECB.

To start, the euro area authorities need to determine the most effective and efficient interventions given that the actual economic and financial environment in which they operate differs remarkably both from usual conditions and from the ideal representation of the economy in the sophisticated macroeconomic and financial models underpinning their quantitative analyses. In particular, the extreme events that hit the euro area in the last decade, together with numerous market failures and fundamental asymmetries across the jurisdictions, contributed to impair most channels of transmission.

This has forced the ECB to adopt, *de facto*, **a two-pronged contingent approach**. On the one hand, the ECB had to expand its policy toolbox with a view to targeting the transmission channels working better at each moment in time. On the other hand, it had to design new, aggressive measures capable of limiting, if not redressing, the problems impairing the monetary transmission along the various channels. This approach to policy has required a large dose of judgment, with the ECB designing and re-calibrating its measures in consideration of their actual impact, as well as of the reaction of the financial markets. To a certain extent, under the current exceptional circumstances, it has become very difficult to distinguish the measures directed to support the real economy, inflation and inflation expectations, on the one hand, from those necessary to preserve a smooth payment system and to alleviate the serious market segmentation across financial intermediaries and sovereigns, on the other hand. To achieve its price stability mandate over the medium term, in other words, the ECB had to intervene repeatedly to preserve the integrity of the transmission channels, before being able to use them to affect the euro area with its stimuli.

In this paper, in particular, we have shown that the interaction between negative official interest rates, abundant central bank liquidity, massive purchases of financial assets, two-tier reserve requirements and security lending facilities cannot be properly understood without considering the **remarkable segmentation in the money and bond markets** along the national borders and across intermediaries. Such segmentation has been one of the most distinctive factors impairing the smooth functioning of the transmission channels: the ECB could not simply choose to operate on those channels (if any) allowing to dodge such hurdles, but it had to intervene to tackle them. As we shall discuss below, this has required and will continue to demand the adoption of a contingent, realistic and experimental approach to policy.

The ECB has publicly addressed most of these issues, thereby contributing to the understanding of its decisions. Much of the research on these aspects has been done by the economists at the Bank and the members of the Executive Board have regularly communicated with the general public and market operators so as to ensure that the rationale behind their choices was well understood. As pointed out in the paper, however, there is a **potential tension in the communication of such a contingent**

**approach.** In particular, to be highly effective, forward guidance would require an unconditional commitment to perform an accommodative course of action in the future, whereas a contingent approach paying attention to the status of the transmission channels and to the evolution of inflation would require at most a conditional commitment to preserve accommodative conditions. We believe that, once the economic and financial conditions will start to normalise, this tension will become stronger and the ECB will have to make a choice.

Moreover, to be effective, a contingent approach that is sensitive to the status of the transmission channels requires much elasticity. Given the institutional framework characterising the euro area, this could be viewed as problematic by some, because this kind of operational flexibility requires the **exercise of judgement** about the nature of the distortionary forces marring the transmission. The policy debate characterising the sovereign debt crisis period has shown that the ECB measures can be questioned on a number of (more or less legitimate) political grounds. The severe market segmentation across jurisdictions observed during the sovereign debt crisis was fully addressed only when the authorities started making reference to the notion of non-fundamental volatility in the sovereign credit spreads, in turn connected with the concepts of multiple equilibria and self-fulfilling expectations. For the quantitative easing measures to be politically palatable, the ECB had first to convince its interlocutors that, given the economic and financial context, it could not operate without addressing this fundamental problem. It is possible that, when the economic and financial conditions will start to normalise, similar tensions about the legitimate policy space of the ECB will emerge again.

Let us conclude with a note more on normative grounds. The transmission channels work in interaction with markets: the money and interbank market, and financial markets more broadly. Concerns may arise that interaction becomes **interference with "market discipline"**, an allocution meaning the unfettered work of market forces determining the value and creditworthiness of assets and their issuers. Indeed, the red line between interaction and interference may be thin. Central banks should carefully ponder the nature and extent of their interventions, especially the ECB in compliance with its nature of monetary authority of a collection of sovereigns, and with its mandate that explicitly recommends respect for free market principles.

On the other hand, **the idea of an immaculate "neutral" monetary policy is a chimera** with potentially dangerous implications. Monetary policy is *policy*, that is decisions entrusted to a public agency pursuing goals of common interest that are supposed not be served by unfettered market forces. As explained above, it does matter for the transmission of monetary policy that financial markets are prone to wide deviations from perfection, to "indiscipline" rather than "discipline", which not only damage welfare but also the functionality of the instruments that are supposed to assist the monetary authority in accomplishing its duties.

These general considerations extend to the path ahead towards normalisation. If the ECB should communicate this path as clearly as possible, the idea of a simple end-of-alarm ring would be naïve and misleading. We are now in **unchartered waters** in which the economies withstand their weaknesses, "frictions" and "failures" thanks to the scaffolding erected by policy authorities. This may well remain as the "new normal" for quite a long time. Removing the scaffolding will not simply uncover the system in its original state. Something unexpected or unintended may emerge. Great care, prudence, and flexibility will be necessary.

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We present a general framework apt to explain why central banks care about the co-existence of different transmission channels of monetary policy, and hence they endow themselves with different policy instruments. Within this framework, we then review and examine the key instruments adopted by the ECB to tackle the post-pandemic challenges, with a view to their consistency and efficacy. Finally, we make a few considerations about the future perspectives of monetary policy.

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