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Effectiveness of the transmission mechanism of monetary policy in the Euro area: the role of conventional and unconventional measures

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Firma dello studente

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Introduction

The effectiveness of the transmission of monetary policies on the real variables targeted by qualified authorities has represented a major concern of central banks for decades. The normative importance of assessing the impact of monetary interventions has been the central topic of various streams of international literature, fostered by a number of historical events, which might have undermined the unambiguous effectiveness of the transmission mechanism. Since the creation of the European Monetary Union (EMU), empirical and theoretical research has been directed towards the estimation of cross-country differences in the reaction to centralized monetary stimuli. Many factors have been deemed responsible of nurturing heterogeneity, from individual-country structural ones to those involving inter-country dynamics and connection among them. The other historical event, described in this inquiry, that contributed to exacerbate the existing debate on the impact of monetary policy, is constituted by the dramatic financial crisis occurred in 2008. This extended period of distress and confusion impaired the traditional design and implementation of monetary policy, generating misleading signals about its impact on those variables which have been targeted for years by the central administration, thus fostering the already existing doubts on the effectiveness of its transmission mechanism. A revolution occurred in the way of planning and executing monetary policy interventions, no more centred on the leverage of interest rate to affect the behaviours of economic agents, but directly altering the balance sheet of credit institutions. For this reason, banks represent the exact core of this research work, which, starting from an aggregate perspective on the transmission mechanism, will tighten the focus on the credit channel, deemed to be the most relevant in relation to the research question. The objective of the work is to investigate the dynamics of the effectiveness of monetary measures for both standard and non-standard policies, so to provide normative insights targeted either at policy authorities or current researchers. To add a degree of sophistication, the exploration will be expanded in order to test whether the distributive cross-country homogeneity of the transmission mechanism has improved with the shift between the two categories of measures and investigate the path through which its determinants have been evolving. The methodology designed for this purpose is centred on a comparative overview of conventional and unconventional policies performed through an extensive literature scrutiny. After having largely explored the conventional versus unconventional policy dichotomy and the cross-country heterogeneity issue on a theoretical ground, respectively in chapter 1 and chapter 2, the comparison of the two bank-lending channels will be performed throughout chapter 3, including a discussion of the main results and some precious suggested directions for future research.

Chapter 1

The transition from conventional to unconventional ECB monetary policies: effects on the transmission mechanism

1.1 The traditional ECB monetary policy: an historical overview

The aim of this first chapter of the inquiry is to shed some light on the leading types of monetary approaches which have been adopted by the ECB over time to affect the real economy, focusing on the shift of methodological approach that has been characterizing the most recent years. Such historical overview will prove to be helpful for a second subsequent step, intended to tackle more precisely the heterogeneous distributional effects of monetary policy across Euro countries, questioning the possibility that the above-mentioned transition has led to more homogeneous consequences.

Monetary policy over years has mainly operated by employing a target value for the overnight interest rate in the interbank money market and adjusting the supply of central bank money according to that target through open market operations. In order to minimize the degree of risk exposure of the central bank's balance sheet, all liquidity-providing operations have normally taken place in the form of reverse transactions against a menu of eligible collateral. In other words, in normal times the central bank shall neither be involved in direct lending to the private sector or the government, nor in outright purchases of government bonds, corporate debt or other types of debt instrument. Traditionally, by altering the extent of the key interest rates, the central bank effectively controls liquidity conditions in money markets and pursues its primary goal of granting price stability. This mechanism has proved to be a reliable source of monetary stimulus to the economy during downturns, helpful to contain inflationary pressures during upturns and ensure the sound functioning of money markets (Bini Smaghi, 2009).

What distinguished central banks across countries was the approach chosen to pursue the targeted objectives, which has been evolving over time. Low and steady inflation has become, over time, the primary (or even unique) objective of monetary policy conducted by central banks in most industrialized countries. Contrary to this perspective, however, the US can be considered an exception in view of the so-called dual mandate of the Fed for "maximum employment, stable prices and moderate long-term interest rates". (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013). As a matter of facts, the Mundell-Fleming model ascertains that a fixed exchange rate, capital mobility and national monetary policy cannot be achieved at the same time and, therefore, one of the mentioned variables has to be given up. The Bretton Woods regime allowed for capital controls even if, over time, the effectiveness of capital controls has gradually diminished. As a consequence, in a system characterized by a fixed exchange rate and free capital flows, money growth becomes endogenous. When inflation boomed in several countries during the 70s, several central banks began to pay more

and more attention to money growth variables, inspired by the monetarist adagio that inflation is always and everywhere a monetary phenomenon. (Friedman, 1968) (Johnson, 1971) (Brunner & Meltzer, 1993). According to Benatti and Goodhart, this period came to be known, amongst central bankers and researchers, as "Practical Monetarism", characterised by:

- Trust in the medium/long term reliability of the relationship between monetary growth and nominal incomes/inflation;
- Belief that velocity (demand for money) functions were foreseeable/stable enough to be considered as intermediate targets;
- Conviction that interest rate elasticities allowed appropriate adjustments in both expenditure and other monetary aggregates;
- Deep hostility towards monetary base control methods.

In the US, such "monetarist experiment" started in October 1979, when the FOMC under Chairman Paul Volcker adopted an operating procedure based on the management of non-borrowed reserves (Benati & Goodhart , 2010). This approach was aimed at controlling the growth of M1 and M2 and thereby at managing inflation. The disinflation effort was successful, creating room for the low-inflation regime that the United States has been enjoying since. It shall be said, however, that monetary and credit aggregates have no more played a central role in the formulation of U.S. monetary policy since that episode, although policymakers currently tend to use monetary data as a source of information about the state of the economy (Bernanke B. S., 2006).

In Europe, the context was slightly different. The Bundesbank, committed to a unique mandate for price stability, introducing monetary targeting in 1974. Such strategy was commonly believed to be successful, even though the chosen goals were frequently missed. Although the formulation of new directions was deeply affected by the leading theories of monetarists, the implementation of such strategies in Germany deviated from the theoretical predictions in a number of ways. The first important difference with other geographical areas was that the target adopted by the Bundesbank was not considered in terms of monetary base, but according to a broadly defined monetary aggregate. Secondly, the Bundesbank avoided the direct control the money stock, following an indirect approach of affecting demand of money by modifying key money market rates and bank reserves (namely, a two-stage implementation procedure). Finally, the German central bank stated clearly from the beginning that it would have been committed to reach the monetary target with any degree of precision. Several other European decided, then, to peg their currency to the German Mark (DM) via the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS),

whose effects on the transmission mechanisms will be explored in the following chapter of the overall work. Since 1999, the Governing Council of the ECB has been entrusted of monetary policymaking in the euro area. The Maastricht Treaty definitely designed price stability as the ECB's primary goal but delegated the Governing Council to give a precise meaning to this objective. The primary target, first set by the ECB as inflation less than 2 per cent in the euro area, was made even more precise in 2003, after internal evaluations of the ECB's monetary policy strategy, leading the ECB to clarify its aim for maintaining inflation "below but close to 2 per cent in the euro area in the medium term". The ECB's monetary policy is termed a "two-pillar" strategy that explicitly couples and links the discussion on monetary variables (monetary analysis) with a broad-based non-monetary analysis of the threats to price stability in the short to medium run (economic analysis) (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).

The two-pillar approach has specifically been designed to avoid the dispersion of relevant information during the assessment of the risks to price stability, as well as to secure that necessary consideration is given to different perspectives, warranting the cross-checking of data in order to reach an overall judgement on the risks to price stability. Such approach provides a natural cross-comparison of the indications coming from the shorter-term economic analysis with those from the longer term-oriented monetary analysis. This way, according to the ECB, ensures that monetary policy does not undervalue relevant information, which might prove to be helpful for assessing future inflation trends. The process of accounting for policy decisions and assessing their implications, not only based on short-term indications, stemming from the analysis of economic and financial conditions, but also on the basis of money and liquidity considerations, is thought to prevent ECB from being tempted to take an overly activist position in determining the monetary policy stance. (ECB, The Monetary Policy of the ECB, 2011). The above-mentioned monetary analysis' focus is mainly centred on a medium to long-term horizon. When the ECB's monetary policy strategy was first presented in 1998, the ECB Governing Council announced a quantitative reference value for the yearly growth rate of a broad monetary aggregate (M3). Currently, the monetary activity includes a more comprehensive analysis of the liquidity situation, going well beyond that M3 growth.

Turning briefly to the broad international context, in contrast with the ECB, several central banks opted for inflation targeting, which was first implemented in 1989 by New Zealand as a monetary policy strategy. Since that moment, many other countries tent to target inflation as main policy goal. By the end of 2009, 31 countries had already adopted that goal, involving

public announcement of quantitative targets for inflation, together with a strong commitment of the central bank to price stability as a main monetary objective, surrounded by a high degree of transparency and accountability (Mishkin & Savastano, 2001). The core aspect of this approach is a forward-looking decision-making process recognized as "inflation-forecast targeting", concretely implying that the central bank sets its policy tools in such a way that its inflation forecast (after some time) equals the inflation target (Svensson, 1997). Although, in practice, different techniques of inflation targeting exist, they all share an announced numerical inflation goal and a predefined time horizon. The central bank's forecast for inflation is therefore considered a key measure both when it comes to take decisions and in communicating them to the public (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).

Irrespective of what their strategy is, most central banks tend to employ, alternatively or in concert, two policy instruments, namely policy interest rates and open market operations. The ECB provides two standing facilities, namely the marginal lending facility and the deposit facility, both having an overnight maturity and available to banks on their own initiative. Banks can use these provided facilities if they necessitate liquidity or if they want to stall liquidity. The deposit facility is used for mopping up liquidity from the banks at rates which normally are substantially below market ones, whereas, on the other hand, the marginal lending facility furnishes liquidity to banks at proportions that are usually substantially above market rates. The ECB attempt to influence money market interest rates by rendering more (or less) liquidity to banks if it wants to decrease (increase) interest rates. To make it even simpler, it allocates that given amount of liquidity so to allow banks to fulfil their treasury needs at a price which is aligned with the ECB policy intentions. Liquidity in the money market is managed by steering short-term interest rates through open market operations, namely purchase and selling of financial assets. If such assets are bought from (or, alternatively, sold to) a bank, the reserves of that bank upon the central bank increase (decrease). The most recurrent open market operations of the ECB are the main refinancing operations (MROs) and longer-term refinancing operations (LTROs), techniques which will be widely ongoing mentioned throughout chapter number one (see Table 1). Lending activity, by means of open market operations, is routinely conducted in the form of reverse transactions, whereby the central bank buys assets from a bank under a repurchase agreement (the bank commits to buy the asset back) or grants a loan against assets pledged as collateral. Reverse transactions are therefore considered transitory open market operations, implying the provision of funds for a limited, pre-specified period only. The ECB accepts instruments issued by both private and public debtors as collateral. In addition to the MROs performed

weekly, the ECB also regularly accomplish monthly LTROs with a number of maturities (either six or twelve months). Definitely, such techniques are directed at providing stability and continuity in liquidity terms to the banking sector (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).

The final instrument discussed in the context of this paragraph involves minimum reserve requirements imposed on credit institutions. Under such scheme, banks are requested to hold compulsory deposits with NCBs. The volume of the required reserves is commensurate to the size and composition of the liability items on the balance sheet of the concerned institutions. The two main motives served by the minimum requirement systems are:

- creating enough structural demand for central bank credit;
- contributing to the consolidation of money market interest rates.

In other words, the minimum reserve system attempts to widen the structural liquidity shortage of the banking system. Self-reinforcing, banks' desire to hold reserves with the NCBs makes the demand for central bank credit to increase, which, in turn, eases the conditions for the ECB to drive money market rates through regular liquidity-providing operations. Interest rates are thus normalized by allowing banks to use averaging provisions, that is, adhering to reserve requirements to the extent of average daily reserve holdings over the maintenance period. This mechanism allows the mitigation of liquidity fluctuations, since even temporary imbalances in reserves can be offset by opposite movements produced within the same maintenance period. (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).

Table 1: Main monetary policy instruments of the ECB.

Monetary policy operations	Liquidity provision	Liquidity absorption	Maturity	Frequency
Open market operations				
Main refinancing operations	Reverse transactions	--	One week	Weekly
Longer term refinancing operations	Reverse transactions	--	Three months	Monthly
Standing facilities				
Marginal lending facility	Reverse transactions	--	Overnight	Access at discretion of counterparties

Deposit facility	--	Deposits	Overnight	Access at discretion of counterparties

Source: (ECB, 2011).

To conclude the historical exploration of conventional policies, González-Páramo observed that the ECB's Governing Council, practically, drew a clear demarcation line, within the monetary policy theoretical framework, between decisions and the implementation of such decisions. This "separation principle" entailed the Governing Council to decide separately upon the monetary stance (defining interest rate levels), while liquidity measures and open market operations were just instrumental to concretely implement this stance. This approach allowed the ECB to steer short-term interest rates close to the main policy rate, without risking that fine-tuning liquidity measures would have been sanctioned as modifications in the stance of monetary policy (González-Páramo, 2011).

1.2 The impact of ECB conventional measures on the real economy and price level

The transmission mechanism of monetary policy has been and still currently is one of the most researched themes of monetary economics for at least two motives. First, acknowledging how monetary policy influences the real economy is crucial to assess its extent at a particular point in time. Second, in order to decide the configuration of policy instruments, policy makers shall evaluate precisely the timing and consequent implication of their policies in real terms. To perform this assessment, they shall understand accordingly the mechanisms through which monetary policy impacts key economic activity variables and inflation. Practitioners and researchers in monetary economics have continuously been formulating new thinking and theories on how monetary policy can actually affect the economy, improving the extent of the existing knowledge about the monetary transmission mechanism. Within this field of interest, the most recent updates suggest that there is a strong likelihood that deep modifications in the way monetary policy is transmitted in real and price level terms have occurred; such changes, which have been widely explored in the international bibliography over years, together with further developments of financial markets and new methodological approaches to monetary policy, are believed to be the major determining factors of that evolution (Boivin, Kiley, & Mishkin, 2011).

Monetary policy is a vigorous tool, but one that sometimes has unexpected, uncertain or unwanted aftermaths. Monetary authorities, in the attempt of being successful in the implementation of monetary policy, must possess accurate evaluation expertise with regard to timing and effectiveness of their policies on the economy, thus requiring a deep understanding of the mechanisms through which different real variables might be affected by monetary stimuli. These transmission mechanisms include interest rate effects, exchange rate effects, other asset price effects and the so-called credit channel (Mishkin F. S., 1995). A relevant aspect of many of the mentioned transmission mechanisms has to be researched in the fact that the real (rather than the nominal) interest rate has an influence on other asset prices and spending over the remaining transmission channels. Furthermore, the whole expected path of interest rates, not solely the current value, influences asset prices and spending. Both of these features are in line with a crucial role of expectations in the outcomes of monetary policy actions, as implemented policies can affect both the expected course of nominal interest rates and the outlook for inflation, hence impacting real interest rates (Boivin, Kiley, & Mishkin, 2011). As an implication, the real interest rate, better than the nominal rate, affects spending and offers important insights on how monetary policy can stimulate the economy, even if nominal interest rates hit the zero lower bound, a notion that would prove to be helpful in further developments of ECB policies (Eggertsson & Woodford, 2003).

The transmission of monetary policy through interest rate mechanisms has been a cornerstone of economics theory for over 50 years. It represents the key mechanism, central topic in the basic Keynesian literature, which has been a mainstay of teaching in macroeconomics. The traditional Keynesian perspective of how a monetary tightening impacts the real economy can be characterized by a schematic diagram,

$$M \downarrow => i \uparrow => I \downarrow => Y \uparrow.$$

where M expresses a contractionary monetary policy leading to an increase in real interest rates (i), which in turn make the cost of capital to raise, consequently provoking a decline in investment spending (I), finally inducing a decline in aggregate demand and a fall in output (Y). Although Keynes originally pointed out that this channel mainly operated through businesses' decisions about investment expenditure, later research identified that consumers' decisions about housing and consumer durable spending can also be categorized as investment decisions. As a result, the interest rate channel of monetary transmission laid out in the above schematic equation equally refers to consumer spending, in which "I" stands for residential housing, and consumer durable expenditure.

Considering the discussion on the exchange rate transmission mechanism, operating through impacts on net exports, beyond the purpose of this work, we can turn to the exploration of two additional transmission channel emphasized by monetarist theories. Over years, monetarist practitioners have affirmed the cruciality of evaluating how monetary policy affects the totality of relative asset prices and real wealth. The two theories linked to this perspective are expressed by the Tobin's q theory of investment and the hypothesis of wealth effects on consumption (Mishkin F. S., 1995). The former furnishes an explanation of how monetary policy works on the economy through its impact on the valuation of equities; the term q can be defined as the market value of firms divided by the replacement cost of capital. If the value of q is high, firms' market price is superior relative to the replacement cost of capital, and new plant and equipment capital are cheaper if compared to the market value of business firms. Companies would be then able to issue equity and obtain a higher price for it relative to the cost of the plant and equipment they are purchasing. Consequently, investment expenditure will increase, resulting from firms which can now afford to buy new investment goods with only a small issue of equity. On the other hand, when q is low, firms cannot afford to purchase new investment goods because the market value of firms is low compared to the cost of capital. If companies desire to acquire capital when q is low, they can buy another firm cheaply and acquire old capital instead. Investment spending will be low in this case. The main point of this theoretical argument refers to the existence a connection between Tobin's q and investment spending. But how actually can monetary policy affect equity prices? According to monetarists' perspective, if money supply falls, the public finds itself to possess less money than it wishes and attempts to acquire it accordingly by reducing its spending. This generates repercussions on the stock market, decreasing the demand for equities and consequently lowering their prices. A more Keynesian story achieve a similar result as it interprets the rise in interest rates coming from contractionary monetary policy making bonds more attractive relative to equities, thereby forcing equities 'price to fall. Merging these two perspectives with the fact that lower equity prices (Pe) bring to a lower q, and thus to lower investment spending (I), the following transmission mechanism schematic outline holds:

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow q \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow \text{ (Tobin, 1969).}$$

As an alternative to the model described above, a transmission channel, still operating with equity prices, occurs through wealth effects on consumption. This channel has been strongly defended by Franco Modigliani and, through his MIT-Penn-SSRC (MPS) model. He argued consumption spending to be determined by the lifetime resources of consumers, represented

by human capital, real capital and financial wealth. A relevant element of financial wealth is common stocks. When stock prices decrease, the value of financial wealth fall accordingly, thus reducing the lifetime resources of consumers; all of this shall induce a fall in consumption. Since it has already been observed that contractionary monetary policy might lead to a decline in stock prices (Pe), another schematic transmission mechanism is here outlined:

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow \text{Wealth} \downarrow \Rightarrow \text{Consumption} \downarrow \Rightarrow Y \downarrow \text{ (Modigliani, 1971).}$$

As pointed out in the famous paper by Bernanke and Gertler, well-known cornerstone of the international literature concerning the transmission of monetary policies, the widespread disappointment regarding the traditional theories about how interest rates movements explain the impact of monetary policy on expenditure on long-lived assets has brought to an innovative view, emphasizing how asymmetric information and costly enforcement of contracts creates agency problems in financial markets. The credit channel shall not be commonly thought as a distinct, free-standing alternative approach, opposed to the traditional monetary transmission mechanism, but rather as a set of factors that amplify and propagate conventional interest rate effects. For this reason, the term "credit channel" is something of a misnomer, as this apparatus, which is configurated more precisely as a reinforcing mechanism, shall not to be considered as a truly independent or parallel channel. As a matter of fact, this non-appropriate nomenclature has induced some scholars to explore the behaviour of credit aggregates, methodology which is likely to generate misleading results, as it will be detailed in the final chapter. According to the credit channel theory, the direct concrete implications of monetary policy on interest rates are magnified by endogenous changes in the external finance premium, which is the difference in cost between funds raised externally (by issuing equity or debt) and funds generated internally (by retaining earnings). The quantitative extent of the external finance premium is a proxy for malfunctions in the credit markets, which drive a wedge between the expected return expected by lenders and the costs faced by potential borrowers. According to the credit view, a modification in monetary policy based on open-market interest rates tends to stimulate the movement of the external finance premium in the same direction. Throughout this additional impact of policy on the external finance premium, the overall effect of monetary policy on the cost of borrowing broadly defined and, consequently, on real spending and real activity is amplified. Two consequent sub-channels of monetary transmission arise as a result of agency problems in credit markets: the bank lending channel and the balance-sheet channel. The bank lending channel is based on the practical

idea that credit institutions play a key intermediary role in the financial system because of their suitability to deal with certain categories of borrowers, particularly with regard to small firms widely pronounced problems of asymmetric information. After all, powerful firms can directly access credit through stock and bond markets without necessity of going through banks. Thus, contractionary monetary policy that decreases bank reserves and bank deposits will have an influence by means of its effect on these borrowers. Simplified, the schematic procedure here is:

$$M \downarrow \Rightarrow \text{bank deposits} \downarrow \Rightarrow \text{bank loans} \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow$$

On the other hand, the balance-sheet channel works through the net worth of firms, implying that lenders in practise would find to have less collateral for their loans, so incurring in more probable and higher losses from adverse selection. A reduction in net worth, giving raise to adverse selection problems, leads to lower levels of lending towards finance investment spending. The lower extent of net worth of firms also creates moral hazard problems: owners would find themselves to possess a lower equity stake in their firms, strongly incentivizing them to undertake risky investment projects. Since the latter risky behaviour increases the likelihood that lenders will not be paid back, a fall in business firms' net worth generates a consequent reduction of lending and hence parallel investment spending decrease. In addition, monetary policies can affect firms' balance sheets in a number of ways, which will be under review across subsequent chapter of the dissertation. Austere monetary policy (M) generates a consequent lowering in equity prices (Pe) in accordance with the mechanism described before, reducing the net worth of firms and so bringing to decreased investment expenditure (I) and aggregate demand (Y), due to the adverse selection and moral hazard agency problems. The balance-sheet channel mechanism is schematically described by the following relation:

$$M\downarrow \Rightarrow Pe \downarrow \Rightarrow \text{adverse selection and moral hazard} \uparrow \Rightarrow \text{lending} \downarrow \Rightarrow I \downarrow \Rightarrow Y\downarrow$$

The balance-sheet channel furtherly furnishes a justification for the emphasis on asset price effects highlighted by monetarist theorists. Contractionary monetary policy that raises interest rates also impairs firm's balance sheets because of its deteriorating effect on cash flow. This mechanism drives to the to the following additional schematic procedure for the balance-sheet channel:

$$M\downarrow \Rightarrow i \uparrow \Rightarrow \text{cash flow} \downarrow \Rightarrow \text{adverse selection and moral hazard} \uparrow \Rightarrow \text{lending} \downarrow \Rightarrow I \downarrow \Rightarrow Y\downarrow$$

Notwithstanding with the majority of scholars, stating that the credit channel shall mainly focus on spending by business firms, Bernanke and Gertler argue that it should apply equally

as well to consumer spending. Accordingly, deteriorations in bank lending generated by a monetary contraction should drive a decline in durables and housing purchases by consumers, whose access to other sources of credit is limited. Likewise, interest rate expansions produce sorts of worsening in household balance sheets, impacting their cash flow, which results to be adversely affected. (Bernanke & Gertler, 1995).

An alternative approach for verifying how the balance-sheet channel may be transmitted to through consumers resides in the liquidity effects impacting consumer spending, both durable goods and housing components. According to such view, balance-sheet effects operate through their implications on consumers' inclination to spend rather than on lenders' desire to lend. In this model, consumers expecting a higher probability of finding themselves in financial distress would rather be holding fewer illiquid assets like consumer durables or housing and would strive for holding more liquid financial assets. The underlying rationale here is that, if consumers were requires to sell their durables or housing to raise money, they would then expect to suffer large losses, because the impossibility to obtain the full value in a distress sale. In contrast, current assets like liquidities held in bank, stocks or bonds can, more straightforwardly, be realized at full market value to raise cash. This mechanism explains a further monetary policy transmission, based on the link between money and equity prices. When deteriorating stock prices reduce the value of financial assets, consumer spending on housing or durable goods will decrease accordingly, because of their less secure financial position and the higher expected likelihood of suffering from financial distress. Explained here in a clear-cut schematic form:

$$M \downarrow => Pe \downarrow => \text{financial assets} \downarrow => \text{likelihood of financial distress} \uparrow => \text{consumer durable and housing expenditure} \downarrow => Y \downarrow.$$

The illiquid nature of such goods provides an additional motivation for why a contractionary policy, raising interest rates and thus reducing cash flow to consumers, makes durable goods and housing expenditure to deteriorate. To sum up, the weakening in consumer cash flow boosts the expected probability of financial distress, which in turn negatively affects consumers' durable goods or housing holding, finally incentivizing spending reduction on such goods and thereby causing a fall in aggregate output (Mishkin F. S., 1978).

As a conclusive remark, aimed at better categorizing the studied phenomenon, monetary policy transmission schemes broadly fall into two basic categories: neoclassical channels, which imply financial markets to be perfect, based on the core models of investment, consumption, and international trade behavior theorized during the mid-twentieth century, and non-neoclassical channels, those involving imperfections in financial markets, which are

usually referred to as beloning to the above described credit view. Table 2 summarizes the theoretical concepts behind such distinctions, providing a final recap of the paragraph.

Table 2: Monetary policy transmission mechanisms

Channel	Description
Neoclassical channels	
Interest rate/ cost-of-capital/ Tobin's *q*	Changes in short-term policy rates affect the user cost of capital for consumer and business investment
Wealth effects	Changes in short-term interest rates affect discounted present values and/or Tobin's *q* for various types of assets, and these changes in the market value of assets induce alterations in consumption
Intertemporal substitution	Changes in short-term interest rates affect the slope of the consumption profile
Exchange rate effects	Changes in short-run policy interest rates induce changes in the exchange rate through unconvered-interest parity and/or portfolio balance effects
Non-neoclassical channels	
Regulation-induced credit effects	Restrictions on financial institutions (e.g. deposit rate ceilings, credit restrictions…) affect spending
Bank-based channels	Banks play a special role addressing problems of asymmetric information. Thus, decrease in bank lending capacity impact expenditure
Balance sheet channel	Changes in net worth associated with the asset price effects of monetary actions influence external finance premia facing firms and households

Source: (Boivin, Kiley, & Mishkin, 2011)

1.3 The Great Recession: introducing the major discontinuity point for monetary policy

The period started with the onset of the financial crisis in 2007 has created a new set of complex and ever-seen challenges to confront with for central banks around the world. The early stages of the crisis were characterized by dangers for liquidity and solvency conditions of the most well-known financial institutions, such as Bear Stearns and Lehman Brothers in the US and Northern Rock, the Royal Bank of Scotland, and Halifax Bank of Scotland in the UK. These threats caused a strict impairment of the regular functioning of financial markets. As market players were forced to review their considerations about creditworthiness of financial institutions, together with their willingness to fund the banking sector only at a higher price, if at all. Consequently, substantial credit differentials, wedges between short-term central bank policy rates and the rates facing households and firms, occurred dangerously. This clenching of credit availability and condition has been a characterizing aspect of the period to which scholars now refer to as the 'Great Recession', namely a severe deterioration of economic activity throughout the major economies, unique not only by historical standards but also protracted and followed by a sluggish and as yet incomplete recovery (Bowdler & Radia, 2012). Many possible motivations for such an unexpectedly stagnant restoring from the Great Recession have been argued over years, all implying undervaluation persistently negative impact of the crisis.

Drawing from these considerations, a particularly striking assumption involves the impairment of the transmission mechanism of monetary policy through times of crisis, which renders monetary policy attempts less effective in achieving output and inflation goals, if compared with non-crisis ages (Bouis, Rawdanowicz, Renne, Watanabe, & Christensen , 2013). Financial crises' main features are represented by a sever degree of financial market distress, relevant balance-sheet alterations of financial institutions, private households and firms, an extremely uncertain context which negatively affects firms' and consumers' levels of confidence (Reinhart & Rogoff , 2008) (Bloom, 2009) (Dées & Brinca, 2013). All of these characteristics are potentially harmful for the transmission of monetary policy on the real economy (Bouis, Rawdanowicz, Renne, Watanabe, & Christensen , 2013) (Bloom, 2014). Nonetheless, possible amplified consequences of monetary policy during financial crises can occur, in case central banks attempt to mitigate some of the adverse characteristics which are typical of distress periods, and eventually discourage dangerous feedback loops between the financial sector and the real economy (Bernanke, Gertler & Gilchrist, 1999) (Mishkin F., 2009). Monetary policy during financial turmoil is therefore extremely ambiguous, its effectiveness is furtherly affected by many crisis characteristics that are likely to impair the

transmission to the real economy. As a relevant example, in the context financial market distress, a context of deep uncertainty characterizes the initial and most acute stage of a financial crisis, when recession typically emerges to further complicate the issue. Balance-sheet modifications may be relevant in the succeeding phase of the crisis, when financial market torment and instabilities relax, and the economy begins its hard path to recovery (Jannsen, Potjagailo , & Wolters , 2015).

The contested hypothesis, which matters for purposes of policy conduction, of monetary approaches effectiveness during financial turmoil is, for practical reasons, a great concern for policy makers. If they are thought to be successful, monetary expansions can be used as an important instrument to ease the unfavourable consequences crises on the real economy. On the other hand, if monetary policy transmission, as it seems to be according to recent research, is impaired during financial meltdowns, focus on political interventions may be necessary to achieve a substantial stabilization result, which, in turn, can potentially foster the unintended costs of excessive expansionary policy, namely disproportionate risk-taking, possible risks of asset price bubbles and systemic financial risks (Rajan, 2005) (Altunbasa, Gambacorta, & Marques-Ibanez, 2014) (Jiménez, Ongena, Peydrò, & Saurina, 2014). From the purely academic point of view, a discrete amount of formerly research results suggest that standard monetary policy is less powerful during financial crises as the traditional transmission channels, described in the previous paragraph, are proved to be flawed.

1. First, the credit channel results to be profoundly impaired. Financial institutions, more than many other players in the economy, face considerable losses from credit defaults as well as relevant difficulties in the procurement of new funding, causing them to adjust, manipulate their balance-sheets (Bouis, Rawdanowicz, Renne, Watanabe, & Christensen , 2013). The concrete chance of additional credit defaults boosts due to high vagueness, correspondingly reducing the availability of credit institutes to furnish bank lending (Valencia, 2013) (Buch, Buchholz, & Tonzer, 2014). In this confuse framework, adjustments to monetary policy are likely to become much less relevant for the determination of credit aggregates compared to stable times;

2. Secondly, even the standard interest rate channel risks to be seriously damaged. Firms and individuals tendentially defer investment choices in periods of such high uncertainty. If investments are partially irreversible, investors tend to take time and postpone investment decisions until more fine-grained data are available and their apprehension is, at least, partially evaporated (Bernanke B. S., 1983) (Dixit & Pindyck , 1994). A similar pattern is followed by interest rate responsiveness of investment,

that may eventually weakend during times in which both firms and consumers have very low levels of confidence towards business or employment future (Morgan, 1993). Moreover, it may become even more complicated for central banks to stabilize output in times of high macroeconomic volatility, when firms are used to adjust prices regularly. As a result, monetary magnifications are more likely to generate inflation rather than output growth (Vavra, 2014).

In contrast to such view, other practictioners have been arguing that monetary policy could be more successful in pursuing its objectives during financial turmoil. An evidence of this perspective is represented by a central bank, able to ease the damaging effects of a financial crisis, thereby reestablishing the regular functioning of the credit and interest rate channels. In this particular case, firms and private households are more likely to experience credit constraints during turbolent periods, due to a sudden fall in the value of their financial properties and collaterals, which could be lost. In this concerning eventuality, monetary policy might prove to be efficient in reducing the external finance premium by relieving these constraints through the financial accelerator mechanism (Bernanke & Gertler, 1995) (Bernanke, Gertler , & Gilchrist, 1999). Monetary policy, going through periods of turmoil, might finally play a crucial role in raising confidence up from extremely low levels, directly providing signals about future positive economic prospects (Barsky & Sims, 2012) or indirectly by reducing the likelihood of worst-case outcomes, as well as by conditioning the willingness of agents to make probability assessments about future events (Ilut & Schneider, 2014).

Before the cornerstone represented by the Great Recession, standard monetary policy across the globe was defined exclusively in the traditional terms of a short-term interest rate. As extensively described in the preceding paragraph, policymakers used to commit to a given level of interest rate, while the the monitoring of liquidity conditions was based on granting that a market "reference rate", namely an overnight rate, closely traced the desired interest rate level. The central bank used to hold total monopolistic control over bank reserves, implying the power to set the amount and the extent to which reserves had to be supplied at the margin. Therefore, the central bank has always been able to determine the opportunity cost, or price, of reserves, namely the overnight rate, fixing it to the level it deemed necessary for policy purposes. As a relevant discontinuity point with future policy developments, standard policies could be sustained without substantial modifications to the size of the central bank's balance sheet; such adjustments were traditionally caused by exogenous (autonomous) factors, such as the demand for cash by the public, government deposits, and

reserve requirements (Borio & Disyatat, 2010). With the advent of the first turbolences, generated by financial instabilities, this conventional approach to monetary policy had largely lost its effectiveness. As a first response, central banks attempted to stir broader financial conditions more actively, extensively adjusting their balance sheet to that purpose. These operations generally resulted in considerable alterations in the size and composition of the central bank's assets and liabilities. (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).

Several authors over years have been trying to distinguish some categories within unconventional measures of monetary policy and, theoretically, a distinction can be made between quantitative and qualitative easing. The first implies a widening of the central bank balance sheet which does not touch the configuration of its asset. This way, the mix of assets possessed by the central bank remains unaltered: the share of each asset category in total holdings not experience substantial changes, nor new asset items are added to the balance sheet. The reason of the consequent increase in the monetary base has to be researched in the accumulation reserves by the central bank. Differently, under qualitative easing, the overall magnitude of the central bank balance sheet is left untouched, but here the composition of asset holdings is changed. The very first nonconventional policies initially applied were mainly represente by forms of qualitative easing until the collapse of Lehman, cornerstone event, after which central bank balance sheets started to be adjusted (even as the composition of the asset side continued to evolve accordingly), resulting in a commistion of both quantitative and qualitative easing (Lenza, Reichlin, & Pill, 2010).

During the infancy of the financial crisis, ECB's first moves did not involve the reduction of its policy rates. But in the aftermath of the demise of Lehman Brothers, its key interest rates have been pushed down to historically low levels. The main refinancing rate was cut by a total of 325 basis points to 1 per cent between October 2008 and May 2009. In addition, the Governing Council adopted a first set temporary nonstandard measures, subsequently termed under the umbrella of "Enhanced Credit Support", turning most of the attention to credit institutions. The interbank market suffered from malfuctioning due to solvency concerns relative to other banks. The Enhanced Credit Support is said to be built upon five main blocks:

1. Unlimited liquidity allocation through "fixed rate tenders with full allotment", concerning both the main refinancing operations (MROs) and the long-term refinancing operations (LTROs). Therefore, differently from ordinary times, banks

gained unlimited access to central bank liquidity at the main refinancing rate, if an
adequate collateral could be established;

2. Enlargement of the (already long) list of collateral options, in order to make the share
   of private sector assets to increas to 56 per cent of the nominal value of securities on
   the list;

3. Extension of the maturity terms relative to LTROs, initially to six months, and then, in
   late June 2009, to twelve months, intenting to improve the conditions for commercial
   banks' liquidity planning process;

4. Enhancement of liquidity provision in foreign currencies, particularly U.S. dollars,
   through swap lines with the Federal Reserve. This measure aimed at supporting banks
   which would have otherwise faced a massive shortfall in US dollar funding during the
   financial crisis;

5. Actuation of Covered Bonds Purchase Programmes (CBPPs), whose market had
   virtually dried up in terms of liquidity, issuance and spreads. The aim of the program
   was to revive the covered bond market, which is a very important financial market in
   Europe and a primary source of financing for banks.

A short historical summary of the followed steps is now given. On 10 May 2010 the ECB
decided to launch the Securities Market Programme (SMP), in order to address the severe
tensions in certain market segments. This reflected an attempt of granting an effective
functioning of the secondary market of some euro area government bonds in order to foster
better liquidity conditions and restore an appropriate monetary policy transmission
mechanism. After a first approach to such kind of interventions, the program was re-activated
in August 2011, in response to renewed tensions. It was common belief that failing to pay
appropriate consideration to these severe market tensions, would have created unbearable
downside risks to price stability (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).
ECB policy-makers highlighted in more than an occasion that the concrete finality of the SMP
was not to alter the monetary policy stance, whose key drivers were represented by the key
policy rates (Manganelli, 2012). In November and December 2011, as a reinforcing tool, the
ECB introduced liquidity-enhancing measures aimed at consolidation the liquidity position of
European banks. Finally, on 2 August 2012, the Governing Council of the ECB announced its
intention to perform Outright Monetary Transactions (OMTs) in secondary sovereign bond
markets, an extreme attempt directed towards an appropriate protection of the transmission
mechanism and the uniqueness of the monetary policy. A key pre-requisite for OMTs is strict
and effective conditionality attached to an appropriate European Financial Stability
Facility/European Stability Mechanism (EFSF/ESM) program. Such programs can take the

form of a full EFSF/ESM macroeconomic adjustment programme or a precautionary programme (Enhanced Conditions Credit Line), provided that they include the possibility of EFSF/ESM primary market purchases. The focus was on the shorter end of the yield curve, and in particular on sovereign bonds with a maturity of between one and three years. Importantly, no ex ante quantitative limits were set on the size of OMTs. (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013). A graphic historical narration of the crisis, illustrating the path of the MRO and of the ECB balance sheet, will be shown below, in order to provide some stylized facts on the dramatic entity of what occurred.

Figure 1: Eurosystem balance sheet and Main Refinancing Operations Rate trends
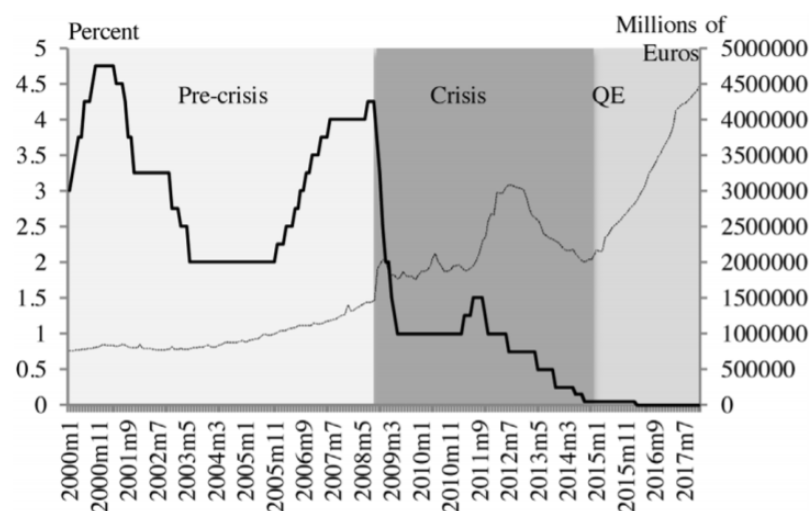
Source: (Dominguez-Torres & Hierro, 2020)

A further distinction, which arises from the international literature, is drawn refering to conventional and unconventional attributes even in the field of non-conventional monetary measures. A wide description of such conventional forms of non-standard measure has already been given throughout this second paragraph, a brief mention to their counterparties is here, for reasons of completeness, given. Central banks have resorted to occasional use of a range of policy tools including forward guidance with regard to short-term interest rates, credit easing schemes and long-term liquidity operations. These measures, respectively aimed at providing relevant information about the future expected path of policy and measures designed to improve conditions in the banking sector (ranging from the extended provision of short-term liquidity, to longer-term schemes that provide funding to banks in order to ease credit conditions), enhancing liquidity policies (although these are primarily extensions of central banks' LOLR functions, rather than monetary policy per se, they have also been deployed to provide funding to banks on a longerterm basis), and reducing funding costs in the banking sector (loosely considered credit easing, defined as any policy that aims to ease

credit conditions by providing funding to lenders), can be broadly aggregated under the frame of unconventional non-standard policies (Bowdler & Radia, 2012).

1.4 Transmission consequences of unconventional measures

A great deal of in-depth research has been conducted over years about the transmission of conventional measures; on the other hand, few trustworthy insights are known about the pass-through effectivenss relative to monetary measures aimed at expandind central bank balance sheets for a given policy rate, even if the extent of the international literature on the mentioned topic has became more consistent since few years. A sound comprehension of the transmission mechanism and the macroeconomic impact of such policies is not only crucial for policymakers, in order to improve their efficiency, it is also fundamental for the reinforcement of conceptual monetary schemes for the analysis of unconventional monetary policy and the financial turmoil, which could eventually prove to be helpful in the future, given the possibility of other turbolent times (Boeckx, Dossche, & Peersman, 2017).

What this paragraph aims at analysing, first through a comprehensive lens and then one by one specifically, the channels through which QE is thought to impact the expenditure and income aggregates in the economy. To shed some light on the nomenclature, the three channels through which QE might affect asset prices are: portfolio rebalancing, signalling, and liquidity. A schematic representation of the trasmission channels relative to quantitative easing policies is given in Figure 2.

Figure 2: Stylized representation of QE trasmission channels.

Source: (Joyce, McLaren, & Young, 2012).

To begin, in accordance with central bank communication issues, a stress on the portfolio rebalancing phenomenon that might arise as a consequence of the balance sheets shock to the

non-bank private sector, mentioned in the anterior paragraph, is explored, further arguing which factors may influence its success. The concern about how asset purchases may operate as signallers for future policy intentions, thereby reducing liquidity premia, is then discussed. The investigation proceeds analysing the extent to which an adjustments of asset prices may be transmitted to to nominal spending, underlining both cost-of-capital and wealth effects. Moreover, some of the distributional concerns generated by QE, such as the differential effects faced by small and large firms, and by households with different levels of financial wealth, including pensioners, are subsequently tackled. Finally, some helpful hints, coming from both monetarist and New Keynesian theory, which have proved their concrete insightfulness for a complete understanding of QE are presented: a monetarist approach actually provides an alternative, but complementary, conceptual approach about the pass-through of QE (as well as helpful insights into the role of bank reserves and bank lending), whereas New Keynesian theory, inspired to Eggertsson and Woodford's work (Eggertsson & Woodford, 2003), implies the starkly different result that QE is always and everywhere ineffective. (Bowdler & Radia, 2012).

As previously discussed, the most common approach for implementation of QE policies has involved the creation of broad money through the purchase of government bonds from investors such as banks, insurance companies and pension funds, in order to directly inject liquidity into the economy. A change in asset prices is the main real result of such intervention, which can be intended as the first step of the transmission mechanism of QE.

The first channel through which QE is thought to impact asset prices is through the portfolio rebalancing that it may encourage. Through the acquisition of assets from the private sector, the central bank attempts to inferfer with the portfolios of the sellers of gilts. At a first glance, the non-bank private sector (to which for example a pension fund might belong) is left retaining money in the form of bank deposits rather than gilts (Bean, 2011) (Dale, 2010). Let's now turn to the effects generated on the balance sheets relative to the private sector, and therefore on portfolios, which may trigger a string of adjustments in asset prices. Two alternatives here shall be distinguished. If the private sector is indifferent between keeping gilts and money, meaning that they are perceived as perfect substitutes, then the process closes there. Concretely, irrespective of the intervention from competent authorities, portfolios remain perfecly balanced. At the zero lower bound, money and short-term bonds can both deemed assets, with no matured interests and insignificant credit risk. Consequently, the private sector absorbs the amount of money which have been created throuh that purchases of bonds. In this context, almost every kind of expansionary monetary approach has

a null impact: the economy is experiencing the so called liquidity trap. Woodford (2012) named such type of transactions as "pure QE", because of its attention on the quantity of money attemped to be injected into the economy (Woodford, 2012). Contrasting with this concept, traditional QE shall be conducted focusing just on assets other than short-dated gilts. The rationale behind such distinction is that other assets are likely to resemble that relation of perfect substitutability. In the eventuality that the two elements are imperfect substitutes, then adjustements in relative holdings of the two will induce portfolio rebalancing and movements in asset prices (Tobin, 1969) (Brunner & Meltzer, 1972).

A second path to explain the impact on asset prices through asset purchases has to do with alterations of the overall extent of interest rate risk in bond markets. The value of fixed income assets, such as government bonds, are connected to expected movements in interest rates, whose extent is termed duration. In the eventuality of investors risk-aversion, they will require a term premium as a compensation for bearing that risk. The purchase of long-term assets by the central banks negatively relates to the aggregate amount of duration risk still existing in the market. Consistently, a reduction of the incentives required by investors as collaterls to hold all remaining bonds carrying duration risk is detected, generating downward pressure on longer-term real interest rates (Sack, 2011). Investors will seek to re-invest the money they hold aiming at rebalancing their portfolio, in search of alternatives to government bonds whose price is substantially higher. Individuals will naturally attempt to purchase slightly more risky assets, which had turned to be relatively cheaper compared to domestic government bonds, either in the form of high-quality corporate bonds, foreign government bonds, or blue-chip equities. Such assets are sold by individuals seeking to restore the balancing of their portfolios by holding increase proportions of riskier assets. The process just described is an iterative one, going on as long as all asset prices have been adjusted in the way that investors, in aggregate, are willing to hold the entirely assets supply. Several elements are connected to the effectiveness of any portfolio rebalancing channel: once the relevance of imperfect substitutability is accounted for, the success of portfolio rebalancing approaches will be dependent upon the degree of substitutability between assets. The likelihood of effectiveness will be the greater the lower the substitutability relationship between money and gilts (or whichever other assets the central bank purchases) and the higher the same correlation for risky assets and gilts. As a matter of fact, the lack of risk appetite may be a proxy for limited investors' desired exposure to risky assets. The extremely modest values on government debt that have been detected in many advanced economies as a consequence of turmoil may be a result of the tendency of investors to attach a safety premium to low-risk, liquid assets (Bowdler & Radia, 2012).

The third channel influencing long-term interest rates via asset purchases operates mainly through disclosure of relevant information about the expected trend of future monetary policy (Bowdler & Radia, 2012). This way of affecting economy shares some appicative similarities with conventional policies: in the same manner, the communication of unconventional measures is an integral part of their transmission mechanism (Blinder, Ehrmann, Fratzscher, de Haan , & Jansen, 2008). Central banks, are committed to announce many details about their undertaken operations. This behaviour is intended to affect public expectations about key factors underlying asset's market valuation, such as expectations regarding the future policy path or their risk and liquidity profiles. Also the disclosure about the central bank management of operations involving illiquid assets is itself a source of investors' confidence booming with regard to those assets, which in turn decreases liquidity premia. As a relevant practical example, considering the euro area, announcements from the ECB might actually condition market understanding of tail risks, what really happened to market reactions to the declaration of the OMTs. If policy approaches are correctly anticipated from the public, investors will assign them a value even before the policy details are announced. The key elements which makes policy announcements effective is represented by the surprise which is delivered to the market (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).The monetary policy authority may seek to furtherly loosen monetary policy through signalling the expectation about policy rates to remain low for a longer period. This strategy shall be coupled with undertaking asset purchases, a way for central banks to show the commitment to their goals and confidence in pursuing them at the zero lower bound. This may be serving the central bank to keep a trustworthy image of itself while keeping inflation expectations anchored (Bowdler & Radia, 2012).

A fourth channel, operating through liquidity, might serve in periods of high financial market stress. Whenever such markets are imperfect, individuals may seek to demand higher returns on assets to counterbalance for the risk that there may not be clients willing to pay for an asset should they deem necessary to sell it. By boosting the amount of trading, and consequently the degree of liquidity of financial markets, asset purchases operated by the central bank may reduce liquidity premia. These real consequences likely occurs only throughout times of asset purchases, and their extent is likely to seem lower in gilt markets, traditionally characterized by high liquidity (Bowdler & Radia, 2012). In case such actions generated a central bank liquidity surplus, a differential among the key policy rate (namely the MRO rate in the ECB context) and the overnight market rate (EONIA) would originate from unconventional measures. Moreover, the pricing procedure relative to relevant financial instruments may be impacted though this mechanism. Inter alia, spreads involving key market interest rates (such

as EURIBOR or LIBOR, namely basic rates for many private credit agreememts) can be reduced for a given level of policy rates, indirectly incentivizing private expenditure (Pattipeilohy, van den End, Tabbae, Frost, & de Haan, 2013).

The way and extent to which asset transactions, and in particular purchases, can affect their relative prices is a a typical empirical hypothesis which have been widely researched and tested in recent years. The dominant view revolves around explicit evidence of generalized decline in government bond values resulting from asset purchase campaigns. Corporate bond yields have also been demonstrated to fall, parallelly to increases in equity prices. However, the debate on the existence of persistent disagreement about the amount and duration of such mechanism is still a central topic, as some technical obstacles, like extrication of the different channels through which these effects may arise, seems to be irremovable (Joyce, McLaren, & Young, 2012) (Breedon, Chadha, & Waters, 2012) (Martin & Milas, 2012).

Time to focus on the following transmission step of the whole mechanism, that between asset prices and spending. In particular, hightened asset prices shall give a positive stimulus to private expenditure through a reduction in the cost of capital and an increase in wealth. A certain degree of heterogeneity has been detected across different sectors; consequently, QE may result in a distributive issue affecting the whole economy. Finally, some wealth effects potentially arising from a generalized boom in asset prices are reported, and again some of the distributional consequences of these effects are emphasized (Bowdler & Radia, 2012).

The cost at which economic agents usually access credit is typically related to the riskfree rates at the maturity that they attempt to borrow. Thus, similarly to what happens with conventional measures, a reduction in the yield curve is thought to shift into a fall in the interest rates faced by households and firms. Assuming that banks gain from hightened values of asset likewise non-financial corporations do, then their cost of debt issuance will decrease accordingly. All these factors, combined with a fall in funding costs, will empower banks to reduce the price of loans. The just-described mechanism shall lead to boost both consumption and investment respectively through improved stimuli to borrow and worsened incentives to save (Bowdler & Radia, 2012). In accordance to such impairement of credit channels, central banks have concentrate their communication efforts on the ways in which QE can affect the cost of capital without the necessity to influence also the banking sector. With reference to the specific channels, portfolio rebalancing techniques towards corporate bonds negatively impact borrowing costs for those companies in close contact with capital markets. However, traditionally, privates and small firms are not equipped with an easy access to capital markets and so, cannot take advantage from this channel (England, 2012).

Nevertheless, additional potential feasible transmission channels to small firms exist. First, supply-chain effects may arise, particularly in those sectors charactetized by deep relationships between small firms and large firms. The former will enjoy the advantages of an increased demand or improved trade credit. A second advantage for small businesses has to be researched in inceased competitiveness in the export sector thanks to a depreciation of the domestic currency. As a relevant constraint, the eventuality for the banking sector to remain damaged for other reasons, perhaps connected to financial institutions capital limitations, still endures: in that case, modifications in the cost of issuing debt may have little effect on the price of credit for potential borrowers. The latter mechanism has been concretely deployed by central banks in order to produce a more effective stimulus to lending in response to structural defects of the banking sector (Bowdler & Radia, 2012).

The explored expansions in asset prices shall also stand for improvements in net wealth for their holders. These capital gains are thouht to promote aggregate expenditure by households and firms (which are ultimately owned by households). The major share of such benefits shall be collected by those holding the greatest amount of financial assets, in particular older and more whealty households. Similarly and parallelly, significant proportions of gross household financial assets are owned in the forms of pensions (Joyce , Tong, & Woods, 2011).

A monetarist viewpoint of QE is finally displayed, providing an alternative, complementary approach for sheding light on the transmission mechanism, and also explaining some common conceptual divergencies about the functioning of QE (Bowdler & Radia, 2012). QE can be thouht as well as a shock to money supply, and its transmission mechanism would therefore be explained according to major analysis. Turning back to Figure 1 , QE induces a positive shock of money supply through boosting holdings of the non-bank private sector, in terms of deposits. The nonbank private sector would only be eager to accept this hightened supply of money, once at least one of the elements of money demand has changed. Briefly recapping, money demand is considered either a means for easing transactions ("medium of exchange" function) or a financial asset ("store of value" function). Consequently the demand for money, according to major research, is contingent on three elements: the value of transactions in the economy or nominal spending; the overall value of asset portfolios; and the relative rate of return on money as compared to other assets. One of these factors must be therefore altered, according to a central bank asset purchase campaing. An interesting way though which this rebalancement occurs, takes place via the familiar, already examined, process of portfolio rebalancing. The sellers of gilts pass around the money among themselves, thus restoring their portfolios until the values of non-monetary assets change in a manner that convinces agents to

hold a major stock of deposits. This mechanism represents a complementary monetarist alternative to portfolio rebalancing (Bridges & Thomas, 2012). Some relevant implications of this conceptual argument are: first, the multiplier relative to the transmission from QE to broad money is more likely to be approximable to a unit rather than a much larger multiple based on historical averages (Goodhart & Ashworth, 2012); second, the particular attitude of reserves held by credit institutions seems not to play an important role in the transmission mechanism of QE (Bean , Paustian, Penleaver, & Taylor, 2010).

To conclude, a brief exploration of the motives generating the presumed research vagueness about the effectiveness of unconventional monetary policies is provided.

1. A first issue has to be researched in the simultaneous announcements of policy undertaking attempts by central banks and fiscal authorities in many countries, which generated complexities in disentangling the individualized effects of unconventional measures;

2. A second relevant issue impacting the success of non-standard policies has to be researched in regulatory changes. Briefly, the response of financial markets to these policy initiatives may have evolved over years. For instance, while fiscal stimuli were initally perceived as stabilizing forces, such concerns about sovereign indebtedness evolved from the previous perspective as long as the crisis started its disruptive expansion;

3. Third, further assessment complications may arise because of potentially long and variable policy lags. To be more clear, the implications of unconventional measures are though to be more immediate during crisis, because of the complementary effect of the expectation channel in addition to the standard channels of transmission;

4. Fourth, the continuity characterizing feature of the crisis is likely to impair the effectiveness of any assessement about the evolution of economic and financial conditions which would have occur in absence of a policy response;

5. Fifth and finally, the implications of a particular policy initiative targeted towards a specific issue may not be limited to the intended economic impact, as a discrete likelihood of spillover effects across markets exists. If policies of one country may spill over to other countries, geographical heterogeneity in the trasmission mechanism might be a crucial issue to be tackled for improving the effectiveness of policy makers (the just-described topic will represent one argument of the discussion about cross-country heterogeneity, which will be throughout the following chapters) (Kozicki, Santor, & Suchanek, 2011).

1.5. Conventional or unconventional: different transmission mechanisms

The aftermath of the financial turmoil has been marked by the implementation from the ECB of a variety of unconventional measures, which have been commented throughout the two preceding paragraphs. The relevance, as well as the success, of individual ECB tools of monetary policy, and their transmission, has been constantly maturing over years. Evidence from the wide international literature indicates that each of the multiple stages of QE has had very different impacts and the overall policy has not always generated stock market surges, massive capital inflows or alterations in domestic exchange rates, as probably expected. The heterogeneous impact across countries depends significantly on the type of policy pursued, and even more on the degree of advancement of financial markets (Kucharcuková, Claeys, & Vasícek, 2016).

A brief review of the extensive research background, comparing evidences from conventional and unconventional policies will be now presented, postponing the discussion on the relevance of such comparison for the scope of this work to the conclusive chapter. Lenza et al. (2010) supported the idea that, despite the evident differences in the execution, the concrete consequence of the unconventional measures implemented by the ECB (the evidence involved also both the Fed and the BoE in 2008) was almost equivalent to that of standard monetary policies, with an effect resembling complementarity rather than substitutability between the two (Lenza, Reichlin, & Pill, 2010). Fahr et al. (2011) argued, instead, that the ECB unconventional measures in the post-Lehman period (fixed rate full allotment, extension of maturities, just to mention some) were more successful than the standard ones in reducing credit differentials and incentivizing the concession of credit than playing a signalling role for the future policy stance (Fahr, Motto, Rostagno, Smets, & Tristani , 2011). Peersman (2011) and Boeckx et al. (2017), sharing the same standpoint, better specified the purposes of such interventions, namely targeting a restoration of the credit supply and assistance to the banking sector aimed at avoiding a collapse of the transmission channel. Divergently, they argue that these purposes are responsible for applicative discrepancies between conventional and unconventional monetary policy measures (Peersman, 2011) (Boeckx, Dossche, & Peersman, 2017). Gambacorta et al. (2014) found that an expansionary unconventional monetary policy shock results in a significant but transient increase in output and price levels, an outcome that has been confirmed through a number of robustness checks involving various interferences of their model specification. The output effects are qualitatively alike to those typically described by researches relative to conventional monetary policy. The impact on the price level, however, resulted to be less persistent and powerful (Gambacorta , Hofmann, & Peersman,

2014). A conceptually different approach, which will be then reutilized in the following chapter, involving some interesting results, has been contributed by Kucharcuková et al (2016), who studied differing impacts of monetary policies types with a focus on international policy spillover phenomenon. The evidence provided by their results confirm that ECB unconventional shocks spill over to other countries outside the euro area. Conventional policies, on the other hand, has a considerably similar effect on industrial output and the exchange rate in all the euro nations they studied, but their impact on inflation results to be less significant or totally insignificant. Exchange rates tend to respond quickly, but the impact on output is less generalised compared to standard interest rate innovations. The heterogeneity observed depends on the characteristics of policies pursued in these countries, as well as on structural characteristics that explain trade and financial integration, a factor which proved to be fundamental for discussions on distributive equity of policies (Kucharcuková, Claeys, & Vasícek, 2016).

Aggregating those evidences, many points of contact in macroeconomic consequences might be detected: both kinds of shock share a hump-shaped impact on economic activity flowing into a consistent higher level of consumer prices. Therefore, both types of instruments are helpful when applied for the purposes of policymakers. However, there are slight applicative divergencies that need to be highlighted in terms of aggregate consequences. In particular, the effects of policies targeted at affecting balance sheets turn out to be more sluggish in action. Approximately, whilst the impact on economic activity and consumer prices takes almost a year, in case of traditional interest rate policies, to peak, an equivalent approach takes about six months more in the eventuality innovations to the monetary base. Furthermore, bank interest rate differentials boost significantly, as well as rapidly, after an expansionary conventional shock, by contrast, such spreads consistently decrease after the implementation of a policy targeting the size of the ECB balance sheet (Peersman, 2011). Finally, orthodox interest rate policies imply the absence of considerable liquidity effects in the short-term, demonstrating the existence of a larger credit multiplier, which allows the concession of new loans. Instead, the multiplier results to be significantly weakened for a rise in bank lending which is caused by unconventional measures. Both the described aspects might be a consistent proxy of a potentially stronger risk-taking channel following interest rate shifts (Adrian & Shin, 2010) (Borio & Zhu, 2008). As a matter of meaning, what some practitioners sought to underline is that ECB's policy reaction to the turmoil were not entirely "unconventional" in their essence (Borio & Disyatat, 2010). To better clarify this sentence, it is well known that the target of the major ECB policy approaches in the wake of the financial crisis was directed towards an enlargement of the central bank balance sheet extent, together

with the attempt of affecting longer term money market and bank lending interest rates. However, in normal times, the ECB would have attempted to affect interest rates both in credit and money markets without altering its main policy rate, for instance just by changing its signalling strategy (Peersman, 2011).

Let's now mention a connection which will prove its helpfulness in discussing the hypothesis of the overall work, namely heterogeneous implications of the bank lending channel. The theoretical background of this topic will be extensively explored throughout the second chapter. To shed more light on such consideration, an increase in the monetary base, typical effect of an unconventional policy action, is assumed. The increase of bank lending, resulting from the supposed liquidity injection, is connected to lending rates and therefore to the interest rate spread determined by banks as well. As a matter of fact, the credit multiplier declines significantly in the very first moments after the implementation and progressively returns to its former level after approximately one year. Hence, only a small share of the unconventional is passed on the amount of bank lending in the long run. In parallel, but in case of a policy easing, a traditional adjustment to the policy rate generates a significant rise of the interest rate spread determined by banks. More accurately, the conventional measure implemented by the ECB is transmitted to bank lending rates, but less than proportionally. The combined effect of decline in bank lending rates and the growing interest rate spread results in an increase of both credit demand and supply and, consequently, in a straightforward transmission to economic activity and inflation. The resulting additional divergency point is represented by a more rigid credit multiplier, which is rarely altered, together with the absence of significant liquidity effect in the short run. This differing response of the credit multiplier after both monetary policy shocks is particularly interesting. A potential explanation has to do with the so-called risk-taking channel of monetary transmission. (Mishkin F. , 2010) (Walsh, 2010). Precisely, following an interest rate decline, households typically tend to hold more currency than interest-bearing deposits. Consequently, less liquidity flows back to the banks, reducing the ability to provide loans accordingly and hence the credit multiplier as well is affected. In a similar fashion, a lower interest rate means reduced opportunity cost for banks to hold excess reserves, which also lowers the credit multiplier. At least two other effects, connected with the risk-taking channel are expected to influence the lending capacity of banks (Adrian & Shin, 2010) (Borio & Zhu, 2008). First, the effects of an expansionary monetary policy are deemed to be connected with the quality and value of outstanding bank loans through an increase in collateral and the expected associated repayment flows. Accordingly, the value of the bank's capital on the market boosts, thus increasing its balance sheet capacity and risky behaviours of the whole banking system, which

ultimately enlarges the proportion of loan supplies. Financial intermediaries will seek alternative allocations of their capital surplus. On the liability side, they take on more debt. On the assets side, they search for borrowers, which in turn expands the credit multiplier. Second, risk-taking attitudes of financial intermediaries are directly conditioned by bank's interest rate differentials. When such spreads rise, the value of bank equity again raises, influencing their risk appetite and supply of credit. Crucially, the interest rate spread increases significantly after a conventional interest rate fall, whereas there is a significant decline following non-standard policy disturbances. The main point for the comparison is that this risk-taking channel of transmission appears to be much more powerful for a conventional approach relative to unconventional. This channel might, hence, represent an additional potential source of the substantial divergency in the predicted reaction of the credit multiplier after both kinds of monetary policy shock (Peersman, 2011). The argument explained above gives a potential reason for different transmission implications of conventional and unconventional measures adopted by the ECB, providing support to the hypothesis of a stronger risk-taking channel for an interest rate innovation as the main responsible of heterogeneities.

The study of the credit channel, inclusive of the bank-lending and balance-sheet subdimensions, is relevant in the context of international research on heterogeneity topics, and it will prove to be helpful as well for the overall purpose of this work. Here, the discussion will be limited to few insights, in line with the objective of the paragraph, as the more detailed explanation will be a critical point for the discussion of further chapters of this work. Namely, conventional and unconventional measures are thought to have opposite implications on banks' future capital position and thus on monetary policy transmission: while a traditional reduction in the short-term interest rate is typically associated with a steepening of the yield curve and an increase in the banks' net interest income (bank capital channel), some unconventional measures are likely to generate a specular but opposite flattening of the yield-curve, which erodes future profitability, giving raise to the so-called reverse bank capital channel (Van den Heuvel, 2002). The gradual shift from conventional to unconventional policies ensured the normalisation of lending standards, mitigating the cross-sectional fragmentation of lending rates and granting a wider pass-through in the medium run. The ease of lending standards for non-financial corporations materialised through the beneficial effects on the pass-through mechanism and the alleviation of dynamic funding cost relief and signalling effects. As evidenced by research, credit institutions with a major level of non-performing loans and less capitalized were actually the most receptive to the polices and the adjustments of lending rates were more widespread among banks with higher stakes in the

credit easing program rather than banks not targeted by the central bank. Non-standard measures also played a major role for the standardization of the lending rates dynamics to privates, as a second stage of the transmission apparatus. It is common knowledge that the pass-through of standard policies to household lending rates is generally weaker compared to the response of non-financial corporations, and the reason of this different implication has to be researched in non-competitive pricing feature issues. Even though the mentioned effect is less significant, it shall be highlighted that even lending rates to privates fell substantially in response to non-standard measures and the major fact that many banks, in line with certain

structural categories, were the most responsive to such policies, will be one of the cornerstones of the research question relative to the overall work. (Altavilla, Canova, & Ciccarelli, 2016).

A deeper overview of the various factors, as well as the motives, influencing the response of banks to a ECB monetary stimulus, will be given throughout chapter number 2, exploring the issue of heterogeneity in policies pass-through, and chapter 3, focusing on those banks' balance sheet items which are thought to generate heterogeneity in such responses, according to the prominent theory of the bank lending channel. The transition in the perspective about how monetary policy is conducted, according to new objectives, directly targeting banks' liquidity, could be explored as a potential factor for reducing that heterogeneous response, which is the centrepiece of most of the literature on the topic and that has been a major concern for monetary authorities over years.

Chapter 2

Cross-country heterogeneity in the transmission mechanism of monetary policy across the Euro area

2.1 From Pre-EMU uncertainties to crisis issues: a comprehensive literature review

The overwhelming objective of the second chapter as a whole is to shed more light on a number of distributive issues related to the transmission mechanism of monetary policy, moving from the existing international literature relative to the period prior to the establishment of the European Monetary Union (EMU), characterized by a wide concern about the potential heterogeneous implications of traditional interest rate innovations, as a result of a unified financial system. Researchers are more vague when discussing similar apprehensions relative to unconventional policies that have been applied subsequently the Great Recession: empirical evidences are still contradictory and a common conclusion has not been reached yet, even if it seems, looking at aggregate results at the level of bank lending, that a tendency towards homogeneity might be in progress.

Since the last decade of the previous century, in the attempt of establishing a unique currency and unifying the relative financial market, the countries of continental Europe have become more and more similar in many aspects (Cecchetti, 1999). As long as the new members of the European Monetary Union (EMU) arranged the path for the beginning of the euro-era, whose starting point was set on January 1st of 1999, their approaches to monetary policy proved to be substantially more homogeneous and uniform. At that time, all the eleven countries initially present in the new euro area have virtually cancelled inflation threats and taken considerable steps toward fiscal consolidation. Such countries were consequently forced to adjust their monetary and fiscal measures to achieve these common goals, which made their business cycle fluctuations to have become apparently more synchronized as well (Angeloni & Dedola, 1998). Although this mechanism may appear to ease the task of the Eurosystem (composed by the ECB plus the national central banks of the eleven monetary union members), a number of methodological issues were still concerning. Primary and more disturbing among these doubts was about how approaching policy-making in presence of the eventuality that it may generate non-homogeneous consequences across the target countries. Such applicative differentials in the transmission mechanisms of monetary stimuli in Europe imply that uniform policy impulses by the European Central Bank (ECB) lead to asymmetries in various business cycles. These, in turn, may finally make adjustment problems to arise, additionally generating tensions in the decision-making process of the ECB, which may likely lead to sub-optimal solutions (Clausen & Hayo, 2006). In other words, the introduction of the euro seemed to generate adjustments in the mechanisms of the member countries, and these alterations would likely modify the extent and modes of the connection between the moves of the central bank and the real economy, creating a political environment surrounded by a serious degree of

uncertainty (Cecchetti, 1999). The concentration of power for the conduction of monetary policy in the hands of a single entity has resulted in a unique decision-making process for all the EMU members, preventing national monetary institution from adopting individualized actions to buffer against country-specific shocks. In this scenario, the gradual conformity between the business cycles of the member economies, together with the pursued homogeneity of monetary transmission mechanisms, would be crucial for an effective rollout of the Eurosystem's monetary policy strategy. As a result, a major level of identification among national business cycles might involve heightened symmetry in the propagation of shocks across the EMU countries (Altavilla & Landolfo, 2005). As a matter of facts, even prior to the EMU founding, the future member countries were experiencing a sort of considerable convergence in their cycles (ECB, 1999). These signals of a common path towards coordinated business cycles became stronger and stronger after the official establishment of EMU, reinforcing expectations of convergence (Clausen, 2001). Notwithstanding, even in the years following the constitution of the monetary union, some relevant divergencies in transmission patterns were still likely to persist, even in the financial sphere, being the major point towards which researcher and practitioners directed their efforts (Mojon, 2000).

Three basic criteria have been defined for establishing the value of empirical studies related to the pre-EMU period, in order to furnish consistent and reliable information on monetary transmission in the expected aftermath of the monetary union. These widely accepted criteria will serve as starting point for discussing the evolution of research on the topic across years.

1. First, the direct implication of an interest rate shock on real variables could have been disentangled from its indirect counterpart via exchange rates. The latter channel had, in turn, to be separable into an intra-EMU and an extra-EMU component, within which the first lost its power after the constitution of EMU;

2. The second requirement refers to the allowance, in the context of a research empirical setup, of a simultaneous change of monetary policy in all EMU countries; this would have an influence on the ways of modelling a common monetary policy in Europe. The rationale behind such criteria had to be researched in the occurrence of spillover effects within Europe, capable of modifying individual national responses;

3. The third criteria reflected the emphasis placed on the empirical approach chosen, which shall provide informational support to the significance of asymmetries in the transmission mechanism (Dornbusch, Favero, & Giavazzi F., 1998).

In the theoretical context of such criteria, some authors were predicting a quick adaptation of countries' economic behaviours to the new monetary regime. According to this prominent perspective, research works based on the use of pre-EMU data have a very limited helpful informational role, from which the ECB might benefit. While some convergence in transmission mechanisms across the EMU over time was widely predicted and expected, there was general agreement on the conviction that these adjustments were likely to occur gradually.

The one on convergence is not the only theoretical issue being the centre of researchers' attention and efforts. The advent of the unique currency in Europe and the constitution of the European Central Bank (ECB), together with its eligibility as main actor for the conduction of monetary policy across the single currency area, have reignited the debate on optimal currency areas (Alesina & Barro, 2000). This debate was fuelled, in particular, by worries about the possibility that heterogeneities in the transmission mechanism of monetary policies across EMU members could worsen the existing cyclical divergencies, further complicating the task of the ECB in designing and implementing policies for the euro area. Additional complexities, arisen in recent times, namely increasing inflation spreads, divergent growth paths and premonitory signals of stagflation, have emphasized the challenges faced by the ECB, implying the necessity of a sound comprehension of the mechanisms of monetary policy transmission in the euro area (Clements, Kontolemis, & Levy, 2001). The results from pre-EMU research evaluating the effects of the monetary transmission mechanism, though the wide use of comparative methodologies aimed at testing relevant heterogeneities, in (the soon to be) euro-area countries have shown a considerable amount of variation, although sharing a few common topics. In an influential study, Gerlach & Smets (1995) concluded that the differential in the impact of monetary policy shocks across country was not so relevant; it was marginally more successful in Germany than in France or Italy (Gerlach & Smets, 1995). A different result was found by Dornbusch et al. (1998), who demonstrated that the effect of conventional stimuli on output, given the internal exchange rate constant, was about twice as large in Italy as in Germany and France, and about three times as large as in Spain, increasing the heterogeneity spread (Dornbusch, Favero, & Giavazzi F., 1998). On the same path, Ramaswamy & Sloek (1998) discovered that the full impact of an unanticipated tightening of monetary measures on output in Austria, Belgium, Finland, Germany, and the Netherlands took twice as long to occur and was twice as deep as in France, Italy, Portugal, and Spain (Ramaswamy & Sloek, 1998). Definitely, despite the general disagreement of practitioners on the precise nature of a given individual country's reaction to monetary policy measures, just few observation proved to be shared by almost all the literature of the period, most notably

that output in Germany and France was more affected by monetary condition alterations than in either Spain or Italy.

The above-mentioned stream of literature has been signed by a sort of shift of perspective concerning theoretical and practical uncertainties about the geographically unfair implications that a unique currency and a financial union would have caused. The traditional wisdom of the topic has always been centred on the assumption that some sectors of the economy are more reactive to interest rate shocks than others, so explaining differential effects across industries. The innovative perspective, based on the concept of financial structure of a country, both involves the former reasoning and adds further complexity by detecting that some firms are more dependent on bank financing than others, and that this holds both across and within industries. The mentioned mechanism, in accordance with the "lending view" of the transmission mechanism, assumes the capability of monetary policy actions to alter the extent of the reserves available to the banking system, in turn conditioning the willingness of banks to provide credit, directly proportional to the supply of loans. This mechanism would heterogeneously impinge individual firms' reactions depending on the financing alternatives they can choose from. The greatest impact has been detected on firms that are closely dependant on credit institutions for their funding. Furthermore, the more vigorous banks would be able to adjust their asset composition according to the policy changes more fluently than other, less healthy banks. The most relevant distributional effect implied by the so-called lending view of monetary policy transmission generates clear and concerning implications for the euro area. Countries in which firms are more bank dependent and banking systems are less healthy will be more sensitive to the Eurosystem's decisions to implement conventional monetary measures (Cecchetti, 1999). In the context of the lending view, some commentators speculate that the increased liquidity of European financial markets subsequent to the advent of the monetary union would lead to significant consolidation of banks, with mergers at both the national and the international level, as well as a direct substitution of traded equities and bonds for bank loans (McCauley & White, 1997).

The attention moved then at identifying which where the factors responsible for the variation in financial structures across euro countries. Traditionally, taxes and legal regulations have been chosen to explain such variance by many researchers (Dornbusch, Favero, & Giavazzi F., 1998) (White, 1998). Others, similarly, identified a number of barriers to change in national financial structure and highlighted the significance of the historical path that has brought each country's bank system to its current state. Searching for the origin of such distributional heterogeneities, it has been stated that, generally, legislative discrepancies

among EU states and, in particular, the absence of some uncontested form of European corporate law, contributed relevantly to explaining the geographical segmentation of Europe in terms of policy effectiveness (Danthine, Giavazzi, Vives, & von Thadden, 1999). Definitely, differences in countries' legal structure might be identified as a proxy for their dissimilar financial frameworks, which might explain a large share of the heterogeneity in the transmission mechanism of monetary policy. A correlation has been detected between these two variables: the financial structure of a nation depends on the extent of the rights protecting shareholders and creditors of the same country, as well as on the degree to which these laws are enforced. The nature of the laws is, in turn, a direct consequence of the legal tradition on which the civil codes of a country have been developed. Combining this argument with the preceding lending perspective of the transmission mechanism, one might state the possibility that the legal system in a country forms the basis for the structure of financial intermediation and, hence, for the heterogeneous impact of monetary policy on real variables across countries (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997). The majority of the wide international literature just summarized here agreed on the fact that unless the individual countries' legislations, involving shareholder and creditor positions, together with the enforcement of those laws, are harmonized across the members of the European Monetary Union, the heterogeneity in the real effects of monetary policy would not disappear. If such legal convergence did not occur, financial structures would remain heterogeneous, and so will the monetary transmission mechanism, and the main task of the ECB will be therefore to plan and implement appropriate policies, taking these asymmetries into consideration (Cecchetti, 1999).

To conclude the discussion on the motives of pre-EMU, introducing at the same time the following stream of research, it is worth to mention again the contribution of Dornbusch et al. (1998), who defined those three basic requirements for the validity of empirical studies related to the pre-EMU period. In particular, avoiding the repetition of the three requirements, which have been investigated in this paragraph, a fourth condition can be added. The creation of EMU and the corresponding change in the policy regime may result in a structural break in the transmission mechanisms in Europe. Indeed, some authors expect a rapid adjustment of economic behaviour to the new monetary regime (Arnold & De Vries, 2000). According to this view, analyses using pre-EMU data provide very limited information for the ECB. While we expect some convergence in transmission mechanisms across the EMU over time, these adjustments are likely to take place gradually (Hayo, 1999). In this particular case, historical data and related empirical studies continue to provide useful information about the transmission mechanism after the formation of EMU (Clausen & Hayo, 2006).

Years of research passed and the uncertainty about the original cause of such heterogeneity, hampered by hypothesis of convergence towards a more homogeneous framework, has not been clarified yet. Additionally, the proliferation of the financial meltdown, started in 2008, has contributed to enhance complexity and to tighten the debate around such issues. With the spatially diverging impact that results from implementing monetary measures having repeatedly been demonstrated since the pre-EMU era, one question characterizing this more recent period is if these effects are still geographically distributed or if countries are instead clustering around different levels of responsiveness to monetary policy. A monetary cluster is defined, according to the major international literature, as a set of countries whose main economic variables react in a similar fashion to a specific ECB monetary policy. In the theoretical field analysed up to now, an analysis of monetary clusters might be intended to shed light on whether the dispute generated within the euro area regarding the nature of the measures implemented by the ECB since the break out of the economic and financial crisis has been related to the heterogeneous spatial impact arising from monetary policy or whether, by contrast, it is related to ideological issues (Dominguez-Torres & Hierro, 2020).

As described in the preceding chapter, in the aftermath of the collapse of Lehman Brothers in September 2008, the main central banks around the world were forced to approach unconventional monetary policy (UMP) measures, aimed at adhering to their mandate of price stability. In the case of the ECB, the monetary policy response to the crisis has been shaped by the particularly large degree of heterogeneity across euro area members (Burriel & Galesi, 2018). A wide branch of literature has been published over the last decade, exploring issues related to heterogeneity in the transmission mechanism. Georgiadis (2015) showed that the transmission of unconventional monetary policy shocks across economies of the euro area displays asymmetries which are driven by a number of key country-specific structural characteristics (Georgiadis, 2015). Ciccarelli et al. (2013) empirically proved that this heterogeneity has substantially enlarged with the financial and sovereign debt crisis (Ciccarelli, Maddaloni, & Peydró, 2013). Using bank-level data for the euro area, Altavilla et al. (2016) showed that the heterogeneity of pass-through of interest rate shocks on lending rates depends on bank-level characteristics such as the capital ratio, the exposure to sovereign debt, and the percentage of non-performing loans (Altavilla, Canova, & Ciccarelli, 2016). The main doubt would be related to the validity of the same bank-level characteristics for measures not involving interest rate shocks. Boeckx et al. (2017) assessed the effects of unconventional monetary policies in the euro area and documented that countries with less capitalized banks feature lower output effects (Boeckx, Dossche, & Peersman, 2017).

Most of the vagueness that could be inferred by having a look at the available bibliography still have to be connected to evidences at the micro level, analysing the behaviours of banks in response to actions from the ECB. Again, the bank lending channel seems to represent a central element in the determination of such geographical divergencies. Postponing the deep discussion of the motives of such relevance and possible implications related to the research question, the context of uncertainty, protagonist of an ongoing bibliographical debate, surrounding such unpredictably heterogeneous implications of monetary policy is perfectly synthetized by Mario Draghi, who, in 2013, stated: "during the crisis, normal heterogeneity has turned into detrimental fragmentation: a landscape with natural diverse scenery has turned into a dangerous surface with jagged cliffs and stumbling blocks" (Holton & Rodriguez D'Acri, 2015). Furtherly, the hypothesis of a potential convergence towards homogeneity, related to the purpose itself of unconventional monetary policy, will be argued subsequently in the course of the overall research work.

2.2 A focus on the explored structural determinants of geographical asymmetries

The discussion about cross-country heterogeneity, which could reasonably be considered the centrepiece of this second chapter, will now move towards and revolve around a brief description of those which have been depicted to be the major organic determinants of such asymmetries, throughout the extent of the international literature existing on the topic. Such initial overview is intended to provide some general information about the phenomenon, before delving into the details of that source of heterogeneity which appears to be more relevant in relation to the scope of this work, described throughout the subsequent paragraphs

As highlighted in the preceding paragraph, partially in contrast with the prediction of potential convergence between the transmission mechanisms relative to EMU's countries, some relevant asymmetries in such transmission patterns are still reluctant to be alleviated (Cecchetti, 1999) (Mojon, 2000). Moreover, the outlook of a future further EMU enlargement, with countries maintaining very different transmission profiles, keeps institutional concerns of monetary authorities in monitoring such asymmetric transmission across Europe (Clausen & Hayo, 2006). Europe's progressive steps towards a monetary union has been accompanied by an extensive ongoing debate on whether the transmission mechanism of monetary policy in the potential member economies would have been converging sufficiently in the following years, and if not so, whether this heterogeneity could represent a concerning shortcut for the survival of the European Monetary Union (EMU). If such divergencies were generated by economic agents that are independent from the establishment of the single currency, the

centralized monetary policy setting, defined by the European Central bank, would likely drive to asymmetric consequences. On the other hand, however, up to a certain extent the institutional revolution brought by EMU is likely to alter the traditional functioning of the transmission mechanism, analysed in the previous chapter, and systemically start an incremental convergence process (Ehrmann, Comparing Monetary Policy Transmission , 2000).

The potential perspective of a unique currency immediately raised, among practitioners and researchers, the key doubt of whether the consequences would have touched all Member States in the same way. The answer would then have depended crucially on the individual approach of each economy to a single currency, which is not straightforward to be acknowledged a priori. According to the traditional theory, it can be assumed that, in the long run, alterations in the stock of money will be fully transmitted to the price level, with insignificant or null effect on real output. But wages and prices are not completely elastic in the short to medium run. Therefore, modifications of monetary policy stances may generate repercussions on real output, differently from the long run. This nominal stickiness may partly be explained by incomplete adjustment of economic agents' inflation expectations, and partly by the costs of gathering information about the adequate price to charge and of changing prices accordingly. Some theorists assert that these real implications of the transmission mechanism are largely the consequence of "structural" elements, like institutional dispositions or underlying components of individual attitudes that are independent from alterations in fiscal and monetary policy. These features help defining the accompanying significance of the different channels of monetary transmission. As a consequence, all of this may imply that such organic differences among states may be the reason for divergent responses to changes in monetary policy (Britton & Whitley, 1997).

The above-mentioned debate, around the motives and means of cross-country heterogeneity, does not come without problems. One of them relates to the lack of agreement, among researchers, on what is meant by structural. Those asymmetries whose cause has been named as structural, can refer indifferently to the main channels of the transmission mechanism, described in the first chapter of this work: from alterations in policy interest rates to changes in market interest rates, including adjustments to the demand for goods and money, to the exchange rate, and so through, finally, to output and prices. It can be detected, nevertheless, that some of the asymmetries just outlined may not actually be structural, and that the connection between such structural differences and the real variables, like output and prices, may not be straightforward. Furthermore, in a few words, as this topic will be extensively

covered in the following paragraphs, the variance among countries may relate also to the power of the banking sector to alter lending. This may be an implication of varying competitive pressure between the banking sectors of individual countries. The response of banks and other lending institutions depends inter alia on how long the alteration is predicted to be enduring, and partly on the costs of taking action in reply. Therefore, this rection is likely to be different according to diverse policy measures. Focusing now on the second stage of the transmission mechanism, that is, how initial changes in policy rates affect the real activity, the effectiveness of the procedure depends somewhat on how policy rates translate into interest rates more generally, as above, and also to some extent, on how interest rates impact households' and firms' decisions on expenditure and investment. As a review, modifications in nominal interest rates are likely to drive real behaviour of economic agents by impacting short-term real interest rates, which in turn may alter the rate at which households and firms replace future for current expense. These consumption decisions will also be affected by the current level of indebtedness, which may be partly determined by structural features (Britton & Whitley, 1997). The entity of any of the mentioned policy effects in each economy depends on a number of factors: the identity of both creditors and borrowers; their relative marginal propensities to consume; the magnitude of liquidity constraints. As an example, a significant grade of gross indebtedness may be a proxy for the absence of liquidity constraints and, with a given amount of net indebtedness, will be associated with weaker rather than stronger real interest rate effects on expenditure (Mayer, 1994).

Furthermore, among such "structural" features, even house ownership plays a role in contributing to divergencies in the transmission mechanism across countries. The funding for house purchasing across various states is often singled out as a primary reason for asymmetries in how real factors responds to shifts in interest rates. More specifically, greater owner occupation and a more frequent use of variable-rate finance have been mentioned as main reasons why real demand in the United Kingdom has been demonstrated to be more sensitive than in its European neighbours to alterations in the policy stance. The same elements are valid also for the funding activity of companies: whether their financing is at a variable or fixed rate will make no difference to the investment decisions they make in response to a shock, unless they are liquidity constrained. The adjustment to a new steady-state inflation rate is then determined in either case by the extent of nominal stickiness, which in turn depends on how quickly agents learn about monetary policy as well as on institutional contract arrangements. So, a common monetary policy regime, as in monetary union, might cause the degree of nominal stickiness in different economies to converge to some extent. A

reduction in nominal stickiness would reduce the real costs of adjustment to any shock. The behaviour of agents in the labour market is a key factor determining the extent of nominal stickiness. So, the degree of nominal stickiness may change as labour market reforms are introduced. For example, reducing the bargaining power of the unions, and increasing the flexibility of contract arrangements. Further asymmetries may be researched in the field of the exchange rate channel of the transmission mechanism, but this would be at the risk of losing the focus on the channel which will be investigated more carefully throughout the course of this work (Britton & Whitley, 1997).

The domestic demand, together with other real variables, will also be impacted differently in the short run by a change in real interest rates, depending on the economy being open or closed. (Britton & Whitley, 1997). Theory predicts monetary policy to affect the economic response of various economies through several different channels, whose relative importance is a direct consequence of the degree of openness of the given economy. In closed economies, monetary measures impact market agents mainly through modifying the relative cost of borrowing and generating balance sheet effects. Thus, monetary stimuli are primarily passed down to the economy via their effect on consumption and investment demand. In open economies, on the other hand, the transmission of monetary policy results to be more complex, including a number of different channels, which operate through both the demand and supply side of the economy (Berument, Konac, & Senay, 2007). The demand channel, through which openness affects economic performance, functions through relative changes in the demand for domestically and foreign produced traded goods due to changes in the real terms of trade following the exchange rate response to monetary policy changes (Devereux & Engel , 2003). The exact magnitude of this demand channel effect depends on the extent of the expenditure switching between domestic and foreign tradable goods. In turn, the strength of the expenditure switching effect depends on the elasticity of substitution between domestic and foreign tradable goods (Sutherland, 2006). The portion of tradable goods in total consumption and production can also be considered a crucial feature in determining the demand effects of monetary policy. In relatively more open countries, this share is higher so the demand effects of a depreciation of the domestic currency are stronger. The theoretical literature adds a number of important explanations to reasonably foresee the impact of monetary policy to depend on the degree of openness. Berument et al. showed that the extent of openness of a given country carries different implications for the effectiveness of monetary policy on both output growth and the inflation rate among the sample used. A number of different specifications, including those using alternative definitions of money aggregates and the price level, alternative lag lengths, sample periods and exchange rate regimes all support

the diversity of results. That is, the significance, the nature and the direction of the relationship between the degree of openness and the effectiveness of monetary policy on output growth and inflation respectively, are found to differ widely across countries under all the different specifications estimated. This may suggest that the relationship between the degree of openness and the effectiveness of monetary policy depends upon other factors, which are characterizing each considered country: real differences in exchange rate regimes, the degree of independence of central banks, the country's exposure to international financial crises, terms-of-trade shocks, different monetary policymaking and the degree of capital controls could all potentially affect the transmission mechanism of monetary policy and thus have an impact on the relationship between openness and monetary policy effectiveness (Berument, Konac, & Senay, 2007). Definitely, other researchers confirmed such relationship, which has also proved to be significative in terms of generating that heterogeneity which is the major topic of the thesis. Karras (1999, 2001) carried out panel data analyses of different groups of countries finding that, respectively, for a panel of 38 countries (Karras, 1999) and of eight countries (Karras, 2001), a negative relationship exists between openness and the effectiveness of monetary policy on output growth and a positive relationship between openness and the effect of monetary policy on inflation can be detected. The diverse results highlighted in these papers imply that the effectiveness of monetary policy may depend on the different characteristics of each country, therefore contributing to generate cross-country heterogeneity.

As mentioned in the previous paragraph, the changing extent of financial frictions and, more generally, institutional barriers among countries may play a major role in explaining that cross-country heterogeneity that has been explored so far. Credit channel effects have been widely incorporated into general equilibrium models through costly state verification to enhance the empirical relevance of these models (Bernanke, Gertler, & Gilchrist, 1999). A key result from these models is that the strength of monetary transmission increases with the level of financial frictions. In particular, in financial systems where financial frictions such as the cost of monitoring (state verification cost) are more pronounced, monetary policy has a larger impact on output. Cross-country empirical tests of this result, however, are scarce. A key implication of this statement is that lowering the level of financial frictions may weaken the ability of central banks to affect economic activity. Monetary transmission appears to be more potent in other countries depending on the characteristics of a country's financial institutions. In countries with greater financial frictions, borrowers may be more sensitive to a shift in the health of their balance sheet, making them sensitive to a rise in the external finance premium. These findings complement a broader literature on the effect of institutions

on the effectiveness of monetary policy. Specifically, deregulation and the ensuing financial innovation may have decreased monetary policy's impact on banks' ability to raise funds, which generates divergencies across different countries, thereby affecting the credit channel of the transmission mechanism (Aysun, Brady, & Honig, 2010).

More in-depth insights about the structural features that matter for the transmission mechanism has been provided by Borio (1995), who investigated many components of credit to the non-government sector, providing a comparative overview of how these differently shape the individual response of different countries. According to the prominent theory, credit has traditionally been more debated in policy discussions in several continental European countries than in some Anglo-Saxon ones, especially the United States, partly because of a less pervasive monetarist tradition and the active use of direct controls on lending in the implementation of policy. At the same time, these differences have tended to narrow in recent years, as long as central authorities have abandoned direct control practises. In the wake of the broader deregulation process, financial structures have moved closer together; under the impetus of new analytical tools, the economics profession has revalued the role of credit in the context of asymmetric information between providers and users of funds. Several aspects of potential interest are considered: who provides the credit; who receives it; its currency composition; whether it takes the form of loans or securities; its maturity breakdown; the adjustability of the contractual interest rates charged; terms and conditions that may limit the suppliers' ability to control the amounts extended in the short term; and collateral. They affect the incidence of policy as between different sectors, such as households and businesses. They help to determine the relative significance of the channels of transmission, such as those operating through changes in the cash flow and balance-sheet positions of agents and those taking effect via changes in interest rates at the margin. They can affect the intensity of the response of private agents to a given policy impulse. Some of the main findings of that inquiry may be more easily summarised with the help of Table 3. The table highlights certain key characteristics of credit to the non-government sector. For any given characteristic, it assigns to each country a score ranging from 1 ("comparatively very low") to 4 ("comparatively very high"), highlighting small but significant differences across countries in responding to monetary stimuli (Borio C. , 1995).

The following paragraphs will be dedicated to the more precise exploration of further potential reasons for the heterogeneous effectiveness of the transmission mechanism. After that, the focus will move towards the credit channel, whose main aspects have been already described in this work, mentioning its relevance for the theoretical field of the transmission

mechanism and, in particular, why it may be pointed out as the main responsible of cross-country heterogeneity.

Table 3: Key characteristics of credit to the non-government sector

	AU	CA	UK	US	AT	BE	FR	DE	IT	JP	NL	ES	SE	CH
Total credit	2	2	3	3	1	1	1	3	1	4	3	1	4	4
Credit to households[2]	3	4	4	4	2	3	2	2	1	1	3	2	2	3
Securitised credit	3	4	4	4	1	2	3	2	1	2	1	2	1	1
Non-bank credit	3	4	4/2[3]	4	1	1	3/2[4]	1	1	4	2	1	4	2
OFI loans	4	4	4/1[3]	4	1	1	3/1[4]	1	1	4	3	1	4	2
Short-term credit	4	1	3	1	2	2	1	1	4	3	1	4	2	2
Adjustable rate credit[5]......................	4	3	4	1	1	2	2	1	4	1	1	2	1	1
households	4	3	4	2	..	1	1	2	2-3	1	1	..[6]	..	2
businesses	2	4	3	1	..	4	4	2	4	2	2	..[6]	..	1
Real estate collateral[7]	2	4	4	4	2	2	3	2	2	..	2	2	4	4
Credit lines[7]	2	2	1	2	4	1	1	1-2	3	1	2	2	..	2
Foreign currency credit[7]	1-2	3	1-2	..	1	2	1	I	4	2	1	1	3	1

[1] Scores on a cardinal scale ranging from 1 ("comparatively very low") to 4 ("comparatively very high"). The key shares together with the corresponding ranges are shown in Box 1. [2] Narrowly defined; where not available, based on likely size of the unincorporated sector. [3] Excluding/including building societies from/in the definition of banks. [4] Excluding/including specialised financial institutions from/in the definition of banks. [5] Related to short-term rates. [6] Probably similar to France and Belgium. [7] Where no precise figures are available, the classification is only approximate.

Source: (Borio C. , 1995).

2.3. The potential role of spillover effects in amplifying cross-country heterogeneity

This brief paragraph aims at adding a degree of complexity to the topic of structural features amplifying differences across countries, which in turn make the responses of individual country to differ accordingly. Another point that is worth mentioning, before delving into the detail of the credit channel, which may be said to represent the link with that bank-lending channel, is the one of international spillovers. Those are especially relevant in the context of a monetary, commercial and political union, fertile ground for spillover phenomena, as they might be accounting for a variable share of that cross-country heterogeneity that has been described up to this point of the work.

Aside country-specific structural asymmetries, which account for a sizeable share of heterogeneity in the rollout of monetary policies, also linkages among members of the euro area play a crucial role in determining the effectiveness of unconventional measures, rather than conventional ones, through spillover effects. In this respect, President Draghi, in 2013 also observed that (Burriel & Galesi 2018):

- "Today's economic and monetary union is larger and more diverse than a single country, such as Germany. It is highly integrated but still at times fragmented. And it comprises a very large number of policymakers on fiscal, structural and other economic matters. All policymakers have to recognise that we belong to EMU

together and that policies as well as policy inaction create spillovers for other members. This is an enormous responsibility for governments and other economic policy-makers." (Draghi, 2013).

Monetary policy adjustments operated by a major central bank tend to spill over to other neighbouring countries. In addition, the close integration in trade and financial markets foreseen by the European Union (EU) is likely to cause spillovers from centralized policies across member states. Moreover, it has been demonstrated that EU countries might be affected by a single monetary policy targeted to the Euro area, even without being members of the monetary union. For this reason, the orientation and magnitude of such phenomena generate great concern among policy makers and central banks in non-Euro area countries. Specifically, those countries shall stand ready to react to spillover phenomena caused by the European Central bank implementing a highly expansionary monetary policy, since the recent financial and Eurozone crises, as well as from a future withdrawal from that strategy. Turning to the positive side, to the extent that these countries actually experiment similar economic conditions, as belonging to the Euro area, symmetric spillovers derived from a Euro area monetary measure can act as an important stimulus which can play a crucial role in helping to close the output gap in these countries. If, on the other hand, such non-Euro area economies are already at a point of the business cycle where no additional monetary stimulus is needed, symmetric spillovers may imply a risky overheating of the economy with lower levels of risk perceptions, capital inflows and rising asset prices. A complete comprehension of such spillover phenomenon, together with its pro and cons, thus results to be essential for the design and implementation of appropriate domestic monetary and macroprudential policies, which in the ultimate case should allow to reap the benefits from strong economic and financial integration within the Euro area, while alleviating the associated dangers (Chen, Filardo, He, & Zhu, 2012), (Potjagailo, 2016).

Spillovers of monetary policy are at the core of the discipline of international economics. The "impossible trinity" of a fixed exchange rate, free capital flows and an independent monetary policy arises from the sensitivity of international capital flows to monetary policy (Buch, Bussierè, Goldberg, & Hills, 2019). The literature on the international transmission of monetary policy stands to be complementary to the predominantly "closed economy" theory on which monetary policy transmission is based on. The leading methodology adopted lies down to various identification mechanisms of vector autoregressive models. These open-economy VARs, which track the dynamics of both domestic and external variables, allow the international transmission of monetary shocks and macroeconomic spillovers in general to be

evaluated. The majority of the empirical evidence examined in this work relates to the dynamics of external variables following monetary shocks. Identification relies in most cases on the assumption that a small economy is subject to shocks arising from a larger one (Kucharcuková, Claeys, & Vasícek, 2016). Typically, these dynamics have been researched with regards to the US, studying its relationship with smaller neighbouring countries, but, recently, research has been conducted on Europe as a whole, considering the evolution of international links that is a natural consequence of unification. Mackowiak (2006) provided some important empirical evidence for the Czech Republic, Hungary and Poland that a relevant share of the deviation in domestic variables relative to Central European countries can be explained by foreign shocks, in this case referred to the German economy (Mackowiak, 2006). Horváth and Rusnák (2009) found out for Slovakia (before it joined the EMU) that ECB policy impacted the real economy, in terms of some of the variables described so far, even more than domestic measures (Horváth & Rusnák, 2009). Finally, Feldkircher (2015), using a global VAR as econometric technique, argued that Central Europe reacts in a similar fashion both to US and euro area output shocks. On the other hand, ECB policy had a long-run effect on output in the region, although the impact was rather mild (Feldkircher, 2015). Unfortunately, empirical evidence on the cross-border effects of the unconventional approaches more recently undertaken by the ECB is practically almost non-existent. The unique suitable contribution so far is Fratzscher et al. (2014), who analysed the impact of the most important UMPs of the ECB on asset prices in the euro area and globally. The major results they detected were a positive improvement relative to global equity markets and a lowering of credit risk between banks and sovereigns in G20 countries. Unlike what happed in the US, in relation to the Fed's adoption of unconventional measures, the operations undertaken by the ECB did not lead to international portfolio rebalancing across regions and assets (Fratzscher, Lo Duca, & Straub, 2014).

Previous streams of empirical work have been studying different aspects of monetary spillovers, working through volumes of flows, prices, or institutions involved in international flows. Considering the first two out of the scope of the work, let's focus briefly on the role of banks and financial institutions, linking international spillovers with the credit channel of transmission mechanism, topic which will be the centrepiece of the following paragraphs of the chapter. This step may prove to be useful in relation to the aim of the thesis, that is to explore the dynamics of conventional and unconventional policies, and how they influence the effectiveness of the transmission mechanism. Research conducted in this theoretical field began from the sub-categories of monetary transmission traditionally analysed in the credit channel literature, the bank lending channel, the portfolio channel, and, consequently, the

risk-taking channel. While country investigations actually did find evidence for these channels, practitioners also showed that transmission channels are much more complex than expected and relevant differences exist in scale and nature depending, for example, on the country from which monetary shocks steam, or whether inward or outward transmission channels are considered in the analysis. Perhaps most critically, there is not a single balance sheet item or bank characteristic that has proved to be the only determinant of banks' response to monetary stimuli. Financial frictions, as described in the previous chapter, and bank-level characteristics, which will be the main topic of the following chapter, are therefore at the core of discussions relative to differentiated effectiveness of the transmission mechanism, including the influence of spillover phenomena. Frictions are in turn mirrored in the capital and liquidity position of individual banks, affecting their access to different types of funding, availability of collateral, or acceptance from internationally active banking networks. These frictions, relative to the country taken into consideration, have been proved to alter how monetary policy impacts bank lending activity, both domestic and cross-border. Extending such concepts to an international context, the costs of external funding in local versus foreign currency and the capability to handle foreign exchange risk through financial instruments, as opposed to manage it exclusively through balance sheet composition, can also play a decisive role. Exchange rate risks are likely to fluctuate depending on base currencies in foreign exchange regimes or with limitations on international capital flows. This focus on "frictions" captures the fact substantial heterogeneity in balance sheets and business models across credit institutions exist. Moreover, in order to gain some distinguishing insights, in times of conventional monetary measures, the liquidity composition of banks' balance sheets may be relatively more important while, during periods of unconventional monetary policy, bank capital might become the more relevant. Applying such concepts, which will be regularly repeated and updated throughout this work, to the scope of the paragraph, it can be added that there may also be indirect effects of monetary policy implementation, for instance, through interbank lending phenomenon, widely recognized as the most unstable component of bank lending internationally. The research initiatives of many practitioners have explicitly found out, over years, that spillover phenomena of policy may differ in their impacts between periods of conventional monetary policy compared with quantitative easing or unconventional periods. Accordingly, Buch et. al. (2019), more recently, debated about the complexities in measuring policy stance during these latter uncertain periods, and alternative approaches have been used in the broader econometric analyses for robustness purposes. All the outcomes, together with the procedures adopted, have repeated using standard measures of monetary

policy, with tests for differences in international spillovers across conventional and unconventional monetary policy regimes (Buch, Bussierè, Goldberg, & Hills, 2019).

To the best of the researchable theoretical knowledge, there is no study focusing specifically on the international spillovers of ECB policy operations into the real economy, so the final step of the transmission mechanism could not be analysed properly. Some of the measures ECB as unconventional actions are actually very up-to-date, while more may yet need to be potentially undertaken in the near future in case of further degeneration of the debt crisis in the euro area. In both cases described, nevertheless, they may end up with major and potentially dangerous impacts on the monetary policy decisions of neighbouring economies (Fratzscher, Lo Duca, & Straub, 2014). Definitely, a sound comprehension of the transmission of monetary policy shocks across national borders is crucial from both macroeconomic and microeconomic perspectives. From a macroeconomic standpoint, the central doubt is whether adjustments to the extent of monetary policy and the adoption of new policy instruments do transmit into the real economy through lending to the nonbank sector by commercial banks. Considering the international environment, understanding the spillovers from monetary policy into bank lending activity across economies might prove its importance for the effectiveness of monetary policy and for financial stability. From a microeconomic perspective, on the other hand, the way banks react to monetary decisions taken by the ECB depends on bank-specific characteristics and the frictions that banks face. Different frictions on the asset and on the liability side of banks' balance sheets would bind different conditions and may be particularly significant in particular categories of banks. The extent to which central bank activity affects bank lending in the international context can be clearly distinguished depending on the use of conventional and unconventional monetary policies, across banks which differ with regard to frictions on the asset and liability sides of their balance sheets.

Three main findings may be extrapolated from the combined analysis of the streams of knowledge explored so far:

- First, international spillovers of monetary policy into lending of banks are pervasive. Every country team studying inward transmission of foreign policy to domestic nonfinancial lending of resident banks found statistical significance. Outward transmission by banks through their local claims and cross-border loans is also evident. Transmission occurs both in periods of conventional and unconventional policy. During unconventional policy periods, specifications using the shadow policy rates were more likely to identify significant international policy transmission;

- Second, while bank heterogeneity clearly matters for international transmission, the pattern of heterogeneity is not straightforward and individual. Bank features that proxy the frictions that banks normally deal with, such as liquidity positions and capitalization, can clearly matter. Country-specific idiosyncratic factors also influence patterns of international spillovers into bank lending. Cross-border assets and liabilities exposures of banks are most important for capturing heterogeneous transmission across banks into private sector lending growth rates. Some lending spillovers may be moderated by banks that rely more on internal capital markets, and in banking systems that have better and cheaper access to foreign currency risk hedging;

- Third, the contribution of heterogeneity toward explaining overall cross-bank and over time variation in loan growth to nonfinancial borrowers differs greatly across countries. In general, this contribution is larger for emerging market economies and for some financial centres. The two forms of heterogeneity that matter most for inward transmission, including gross or net cross-border liabilities and intragroup funding (in conventional periods), can be associated with large differences across banks in the magnitude of international policy spillovers into credit extended to nonfinancial borrowers. International spillovers into lending can be large for some banks, even when the average international spillovers of policies into nonbank lending generally are not large (Buch, Bussierè, Goldberg, & Hills, 2019).

Kept in mind the relevant connection, just highlighted, between the international spillover phenomenon and the individual countries' banking systems, it can be stated that the effectiveness of the transmission mechanism of monetary policy, by means of the credit channel, may partly depend on international dynamics, other than structural features of both the economy and economic agents. The potency of such spillover effects has been demonstrated to be, as mentioned in the first chapter, a differential factor when comparing conventional and unconventional policies. Most euro area members benefit from these measures but with substantial heterogeneity, whose extent has been evolving over time and peaked with the sovereign debt crisis. Cross-country spillovers account for a sizable share of such dispersion, and substantially amplify its effects. Variance which seems to have been alleviated with the adoption of the most recent measures in response to financial turmoil (Burriel & Galesi, 2018). Burriel & Galesi (2018), in their relevant study of the spillover phenomenon, plotted the median peak responses of output and prices to a one-standard-

deviation UMP shock, decomposed into direct effects and spillovers. They presented two main results:

1. Spillover effects dramatically amplify the effects of UMP shocks;

2. A substantial part of the heterogeneity in effects is due to spillovers.

Definitely, it is crucial to account for cross-country interdependencies and spillovers when assessing the transmission of monetary policy across euro area countries. Neglecting cross-country interactions would substantially underestimate the effects of UMP shocks.

Figure 3: Direct and spillover effects of UMP shocks.
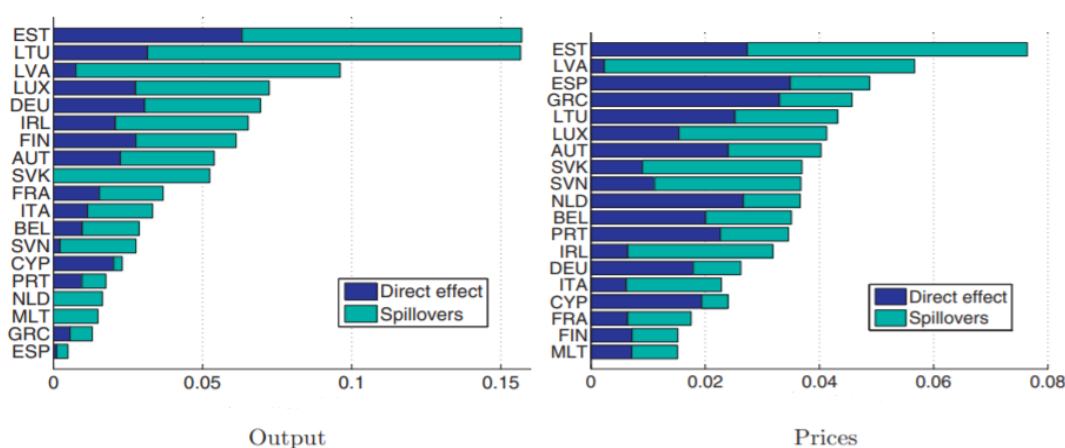
Source: (Burriel & Galesi, 2018).

Further econometric studies are suggested on the topic, evaluating the exact relevance of the spillover phenomenon for the effectiveness of the transmission mechanism relative to non-standard measures. Let's now delve into the details of the credit channel, considering its subsequent stages, justifying its relevance relative to the scope of the overall work.

2.4. The relevance of the credit channel for the transmission mechanism heterogeneity

A great number of motives and dynamics of heterogeneity, from purely structural to international, from those relative to a single economic agent, passing through those related to an individual economy, to those involving a connection among countries, have been described throughout this chapter, in order to shed more light on what researchers and practitioners have worked on for years. From such general overview, let's know focus on just one channel of the transmission mechanism of monetary policy, the credit channel, with its components and steps, in order to check whether and how some elements may undermine the unambiguous effectiveness of the policy implemented by the ECB.

Before exploring the international literature on the topic, let's briefly review the mechanism underlying the credit channel and its constituents, which have been described throughout the first chapter of this work. When the central authority tightens monetary policy by means of a squeeze in bank reserves, a correspondent cutback in the supply of bank loans might be generated. A bank can prevent this from happening following two alternative paths:

- By altering the structural composition of its liabilities by issuing instruments not subject to a reserve requirement (such as CD's or interbank loans);
- Otherwise, it can decide to sell bonds to shield itself from the exogenous reduction in bank reserves. If neither of these alternative scenarios is realized, and the supply of loans is actually cut, the monetary shock will impact the real economy, unless firms are allowed to replace loans with bonds and commercial paper for no additional cost.

This effect, widely known as "credit" channel of transmission mechanism, works, as just seen, on the supply side, complementing the more traditional "money" channel, that is the demand effect of a monetary shock, which influences new marginal expense by altering 3 borrowing conditions and by affecting asset prices, and thus the market value of wealth (Bernanke & Gertler, 1995). In a nutshell, in contrast with the traditional theory, highlighting the centrality of households' decisions between money and other less liquid assets, the updated assumptions of monetary policy assert the crucial role of the banking sector for the transmission of monetary policy to the real economy. Specifically, two key variables draw the way in which monetary policy works according to the more recent literature:

1. The extent to which banks rely on reservable deposit financing and adjust their loan supply schedules following changes in bank reserves;

2. The extent to which certain borrowers are bank-dependent and cannot easily offset these shifts in bank loan supply (Kashyap & Stein, 1997).

Lending standards are, therefore, a critical factor to be considered when evaluating the extent of economic activity and welfare of an economy. This consequence is particularly true in the euro area since both small and large non-financial corporations finance their operations largely through financial intermediaries. If firms were financially constrained, impairments of lending activities would affect hiring and investment procedures and, thus, the level of aggregate activity. Lending conditions, as a result, are also a concern for monetary policy authority: an ineffective, or better heterogeneously effective, pass-through of policy rate changes makes it much complex for a central bank to regulate the dynamics of aggregate demand (Altavilla, Canova, & Ciccarelli, 2016).

During the 1990s a consistent stream of research has been devoted to test for the existence and effectiveness of the bank lending channel. The majority of them analysed the context of US, focusing on the systematic reaction of bank loan, other asset and deposit categories to changes in monetary policy stance, aggregate which has been proxied by changes in the federal funds rate (Altunbas, Fazylov, & Molyneux, 2002). In addition, these scholars also explored through their works whether monetary policy had an asymmetric impact on banks depending on: different asset size (Kashyap & Stein, 1995); asset size and liquidity (Kashyap & Stein, 1997a); asset size and capital strength (Kishan & Opiela, 2000). The totality of these inquiries stated the existence of a bank lending channel, mainly operating through small banks, which can be considered the main responsible for monetary transmission. The bank lending channel has also resulted to be intensified when such small banks are either relatively illiquid or undercapitalised. That is, the empirical evidence strongly pointed out the presence of a bank lending channel for small balance sheet constrained banks. A subsequent, and more recent, stream of research has been pushed by the European monetary integration, which in turn stimulated curiosity in the analysis of divergencies between financial systems among EU countries and their consequences for the relative monetary transmission mechanism (Dornbusch, Favero, & Giavazzi F., 1998). In the spirit of (Bernanke & Blinder, 1988), variety in the structural composition of financial intermediation and in the degree and structure of firms' and households' debt could imply differences in the effectiveness of the credit channel or, now, the bank lending channel of monetary policy in the euro area (Borio E. , 1996) (Kashyap & Stein, 1997) (Guiso, Kashyap, Panetta, & Terlizzese, 1999). Empirical studies seemed to validate the significance of these asymmetries for various of the countries constituting the monetary and financial union at the time. For example, the credit channel has been found to be existing in Italy (Buttiglione & Ferri, 1994) (Angeloni, Buttiglione, Ferri, & Gaiotti, 1995) (Bagliano & Favero, 1995) (Fanelli & Paruolo, 1999) (Chiades & Gambacorta, 2000), but not, or to a lesser extent, in France (Bellando & Pollin, 1996), Germany (Barran, Coudert, & Mojon, 1995) or the Netherlands (Garretsen & Swank, 1998). The research could have also been extended to other UE countries, such as the United Kingdom, where there is evidence of a significant credit channel, but with some evidence of a particular behaviour which is proper of Anglo-Saxon economies (Dale & Haldane, 1995). Apart from their different conclusions, these econometric studies point out the substantial information content of the spread between bank and bond market rates in explaining loan market disturbances and their impact on real output (Gambacorta, 2002).

A sound understanding the transmission mechanism is crucial for monetary policy, which would exploit it for improving its measures' distributional effectiveness. In this respect, for

reaching this purpose, the particular function of banking institutions in this mechanism has been studied extensively both at a theoretical and empirical level. The existing evidence has demonstrated the voluntary alteration of bank attitudes, in specific ways, following a change in monetary policy. But does this response imply only adjustments to lending behaviour, as studied in the bulk of the literature? And do all banks in the market respond homogeneously to monetary policy changes, or is there some individualized and unique impulse for each bank? The effectiveness of monetary policy decisions steam from a number of bank features, namely liquidity, capitalization and market power (Brissimis & Delis, 2010). Other structured methodologies adopted over years by scholars, involving additional proxies for banking activity, will be treated more deeply in the following chapter, from an operative point of view. Here, the dissertation will be limited to various theoretical contributions to the concept of heterogeneity related to credit institutions. The aims of this paragraph are related to a long tradition in the literature of the transmission mechanism that accords banks a special role. In particular, (Bernanke & Blinder, 1988) among other proponents of the so-called bank lending channel, suggest that the effect of monetary policy on aggregate real variables through interest rates may be boosted by financial market imperfections and the existence of imperfect substitutability between loans and securities in bank portfolios and also as a means of borrowing for firms. The asymmetric behaviour of banks, both intra-nationally and internationally, evolves from their different balance sheet components. Theory on the bank lending channel detected a number of stimulating mechanisms that operate through the capital structure of banks, their liquidity levels and/or their size and argued that these structural elements may play a decisive part in modifying bank lending when a monetary policy shock is registered (Bolton & Freixas, 2006) (Diamond & Rajan, 2006). A schematic representation is given, in figure n. 4, of how the bank-lending channel works and how it may contribute to generate cross-country or regional heterogeneity depending on the characteristics taken into consideration.

Figure 4: Transmission of monetary policy through banks.
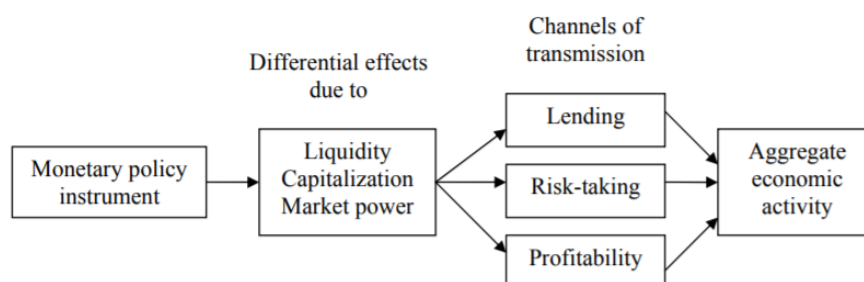
Source: (Brissimis & Delis, 2010).

In detail, a variation in monetary policy directly impacts lending, risk-taking and profitability of banks in a heterogeneous fashion because of differential bank characteristics such as liquidity, capitalization and market power. This will have, of course, immediate implications for the real economy, touching the aggregate economic activity in terms of spending, investment and consumption. Probably, the simplest and more at-hand aggregate empirical consequence of such bank-centric standpoint of monetary transmission is that bank loans should be tightly connected with benchmark measures of economic activity. What has been demonstrated is that, subsequent to changes in monetary policy, there is a strong correlation between bank loans and unemployment, GNP, and other key macroeconomic variables. However, such correlations may be detected even if the bank lending channel is not operative in that country. Moreover, the above-mentioned correspondence may be driven by the demand-side relative to bank loans rather than their supply. For example, bank loans and inventories might be moving together because credit institutions always keep their willingness to lend and firms fund their desired adjustments to inventory levels with bank loans (Kashyap & Stein, 1997)

This heterogeneity, which arises from differential bank balance sheet characteristics, such as liquidity, capitalization and size, has been examined by a number of theoretical and empirical studies mainly in the conceptual framework of the bank lending channel. What will be explored below related to the main implications of bank structural diversity for the reaction of banks in terms of lending, risk-taking and ultimately profitability to monetary policy impulses (Brissimis & Delis, 2010). As seen earlier on, some of the bank characteristics exploited for matters of empirical analyses were those of liquidity, capitalization and size (Gambacorta, 2005). Many researchers diverged from adopting size as the third bank balance sheet feature affecting banks' reaction to monetary policy shocks. The main argument for selecting size as a variable has to be researched in the prediction that largest banks may have an easier time raising uninsured funding, which would make them and their activity less reliant on monetary policy shocks regardless of other bank characteristics (Kashyap & Stein, 2000). Nevertheless, this mechanism implicitly shows that certain banks may possess market power in raising uninsured finance, something that may or may not be the result of size. This feature naturally is carried over to the asset side of bank balance sheets generating forms of divergence from perfectly competitive behaviour (Brimmis & Delis, 2010). It is also remarkable that Lensink & Sterken (2002), in editing a special issue of the Journal of Banking and Finance, provided some suggestion for future research: in particular they recommended to investigate on whether and how bank competition plays a role in the monetary transmission mechanism. Market power of banks therefore has proved to be a key element to be evaluated alongside

liquidity and capitalization to estimate the potency of monetary pass-through. In the context of the bank lending channel, Kashyap & Stein (2000) among others, suggest that the influence of monetary policy on lending behaviour is more intense for banks with less liquid balance sheets (Kashyap & Stein, 2000). In a recent theoretical study, Diamond & Rajan (2006) defended a different mechanism through which the bank lending channel may be operating. In particular, they logically advocate that an expansionary open market operation improves the level of financial liquidity, thereby mitigating the real liquidity pressures on banks, which in turn eases them to finance longer-term projects and with a beneficial effect on aggregate economic activity. This implies that the aftermath of monetary policy is further magnified when credit institutions keep a higher value of liquid assets, especially in the context a low interest rate environment, because banks would then tend to spend the extra liquidity in their portfolios to make new loans. As a result, expectation about lending and profitability of these banks are likely to boost above average (Diamond & Rajan, 2006). Turning to the effect that enhanced liquidity may exert on the relationship between policy rates and bank risk-taking, one could expect banks with higher levels of liquid assets, condition that reflects high risk aversion, to be less incentivized to take on more credit risk after an expansionary monetary policy. To the extent that this holds, the impact of monetary policy on bank risk is weakened. Also, if banks with relatively illiquid portfolios face higher risks, due for example to a prolonged period of low interest rates, then these banks may be less able to use part of their liquidity in less risky activities and mitigate credit risk accordingly. However, it may also be the case that excess liquidity of banks in a low interest rate environment provides stimuli for enhanced risk-taking when credit institutions feel particularly safe (situation that represents a moral hazard problem). These circumstances, although not reflecting a typical bank attitude, can lead to a deterioration of the quality of its assets and a sharp increase in the degree of undertaken risk (Brissimis & Delis, 2010). Following again the methodology of Brimmis & Delis (2010), three relevant hypothesis could be formulated: it can reasonably be expected the impact of a monetary policy change on bank lending, risk-taking and profitability to decrease (increase) with higher (lower) levels, respectively, of bank liquidity, equity capital and market power (or, more generally, size). In order to gain some helpful insights on these dynamics from which heterogeneity in the transmission mechanism steams, many econometric techniques have been used, based on the behaviour of individual banks. These methodologies will be described in the following chapter, through a more on-the-field perspective, exploring pro and cons relative to each one of them.

Let's now properly explain the significance of the bank-lending channel, centrepiece of this paragraph, in relation to the scope of the overall work, related to a presumed shift in the

effectiveness of the transmission mechanism of monetary policy, corresponding to the passage from conventional to unconventional measures adopted by the ECB. The latter helped to normalise lending conditions, reducing the cross-sectional dispersion of lending rates and producing a more homogeneous pass-through in the medium run. Better lending conditions for non-financial corporations materialised because of the improvement of the instantaneous pass-through and because of dynamic funding cost relief, together with the rise of signalling effects. Banks with a high level of non-performing loans and a low capital share were the most responsive to the measures and banks with higher uptakes in the credit easing operations reduced lending rates more than banks not participating in the program. Non-standard measures also played a major role in regularizing the dynamics of lending rates to households. It is well known that the pass-through of standard policy measures to household lending rates is generally lower than that to non-financial corporations, and that non-competitive pricing features explain this difference. Even though the effect is smaller, lending rates to households fell substantially in response to non-standard measures and banks with a high level of non-performing loans and a low level of capital responded most (Altavilla, Canova, & Ciccarelli, 2016). Non-standard measures compressed banks' lending margins significantly. When pricing frictions are present, monetary policy may alter lending margins (Gambacorta, 2008) (Alessandri & Nelson, 2015). It has been ascertained that the compression of lending margins is more pronounced for banks with a low level of capital, a higher exposure to sovereign debt, and a higher share of non-performing loans. Thus, while non-standard measures decreased funding costs for a class of banks, they hampered a component of their profitability, potentially making the banking system more vulnerable to shocks (Altavilla, Canova, & Ciccarelli, 2016).

Before concluding the chapter, a brief literature review about the theorical attempt of designing an optimal monetary policy, one that takes into account that cross-country heterogeneity which has been described so far, will be provided. Such overview will be aimed at providing a theoretical background on the main properties and effects of an optimal solution in terms of policy making. Moreover, the exploration of those methodologies might serve as baseline for future streams of empirical research which, drawing on the approaches which have been adopted so far, evaluating pro and cons and combining them, would aim at maximizing the results of monetary central authorities.

2.5 The attempt of designing an optimal monetary policy which takes into account cross-country asymmetries

The mandate of the European Central Bank, as defined in the Maastricht Treaty, states, through article 105 (1), that the primary objective of monetary policy shall be those of maintaining price stability over the medium term in the euro area. While avoiding acting to the detriment of such objective, the ECB shall, moreover, support the general economic policies in the Community, including sustainable and non-inflationary growth. The focus of the ECB is therefore on price stability in the euro area as a whole, adopting an aggregate perspective. Concerns about the performance of individual countries belonging to the union are not normally considered in policy decision-making process (ECB, 2005). Despite the fact that the ECB may potentially use a wide set of economic markers, comprehensive of country-specific ones, in order to fulfil this primary objective, it normally takes initiative according to Euro-level aggregates, while national idiosyncrasies are left to the attention and action of single national governments. The results of such a limitation on the effectiveness of monetary policy in the euro area are obviously related to the extent and the nature of heterogeneity among economies within the area. Since the centralized choices have to be defined on the basis of aggregate developments only, theorists and practitioners may be arguing that, given the fact that targets are thought in cumulative terms, an area-wide model (AWM) would be enough for explaining most of the features of the euro-area whole economy. As opposite, a multi-country model (MCM) may prove to be helpful in capturing the variety of reaction within single countries, therefore offering precious insights about the conditions of the entire economy, facilitating, consequently, the planning and implementation of a more suitable monetary policy rule. As a result, it is not clear a priori what type of predicting model (multi-country or area-wide) should be preferred for programming the execution of an optimal monetary policy (Jondeau & Sahuc, 2008)

In order to explore the role and significance of country-specific information affecting the decision process with regard to the Eurosystem, the standard approach to policy appraisal can be followed: the optimal policy rule, upon which decisions are taken, is established so as to minimize the expected value of an intertemporal loss function, under the constraint provided by a low-dimensional multi-country model of the euro area (Taylor, 1999). Supposing, as just said, that the monetary central authority is exclusively targeting area-wide objectives, it is possible to compare the performance of two optimal reaction functions based on an MCM and an AWM, respectively. Such operative procedure has already been tested by a number of researchers, whose contributions will be mentioned below, disclosing that the cost associated

with ignoring country-specific information might be significant. Nevertheless, in these studies, the underlying macroeconomic models are not envisioned in an optimization-based framework. As a result, the optimal monetary policy rule extrapolated from such models is subordinated to the Lucas critique, as it may be accused to be based on a reduced form, rather than on structural features and parameters. This may represent a concerning restriction when the target of the analysis consists in the appraisal of the welfare resulting from an optimal policy rule (Jondeau & Sahuc, 2008).

Research on the topic of ECB monetary policy strategy formulation and implementation has expanded in recent years. Most scholars focused their attention on the definition of the adequate monetary policy rule and the subsequent welfare optimization that can be achieved through the usage of this rule. Little consideration, however, has been directed toward the concern of data aggregation and the relevance of national asymmetries for the success of the common monetary policy. Although the fragmentation of economic aggregates across member countries is deemed to be a standard feature of any monetary union related to the convergence process, in the European monetary union it can also be, at least up to a certain degree, ascribed to diverging national policies and long-lasting structural inefficiencies, such as nominal and real rigidities in product and factor markets. Kept in mind the prospect of a widening of the European monetary union, national divergencies are expected to become even more significant, creating potential dramatic costs in terms of the union's whole economic performance. Therefore, it may be insightful, for practical purposes, to analyse the benefits for the effectiveness of monetary policy in the euro area, arising from the integration of national information into interest rate decisions, as opposed to the inclusion of only aggregate union-wide variables (Brissimis & Skotida, 2008).

The importance of incorporating national information when the central bank of the European monetary union decides on monetary policies to be implemented has been studied empirically by De Grauwe (2000), De Grauwe & Piskorski (2001), Angelini, Del Giovane, Siviero, & Terlizzese (2002) and Monteforte & Siviero (2002). In particular, the authors evaluated, using the framework proposed by Rudebusch & Svensson (1999), the performance (relative loss) of rules targeting national variables as opposed to union-wide variables for calibrated aggregate demand and supply equations. All of them, except De Grauwe & Piskorski (2001), discovered that the first type of rule may generate large welfare gains. Further research by Angelini, Siviero, & Terlizzese (2006) demonstrated the potential capability ECB to align national economic cycles by integrating the inflation dispersion across member states into the decision-making process, but at the cost of a larger variance of union-wide inflation. In a

recent study, Jondeau & Sahuc (2008) estimated, using Bayesian techniques, a multi-country model for three core euro area countries, comparing their performance on various dimensions and found that using an area-wide model may entails relatively significant losses. Finally, Benigno (2004) and Lombardo (2006), using two-country optimizing models, explored the topic of optimal monetary policy applied to a currency area, like the European monetary union, traditionally characterized by asymmetric shocks across countries. According to the former, an optimal inflation targeting policy shall assign a greater value to the inflation of the country with the major extent of nominal rigidity. The logic underlying this mechanism shall be that differences in price flexibility affect relative prices across members of a currency union, inducing output fragmentation and endangering the welfare of the currency area. Similar results have been achieved by Lombardo (2006) on the basis of the degree of market competition. Jondeau and Sahuc (2008), finally, focused their efforts towards the modes and functioning of cross-country heterogeneity and the ways it shall impact the draft of an optimal monetary policy within the euro area. Technically, they took two alternative modelling approaches into consideration for the analysis. In both of them, the central bank establishes its priorities and its loss function at the area-wide level, and the reaction function is designed in terms of aggregate variables only. In the first approach, the MCM, estimated using country-specific information, is exploited for figuring out the loss function, while in the second approach, the AWM, estimated using aggregated data, is adopted. The optimal monetary policy that maximizes the aggregate welfare, both under the AWM and the MCM, is then computed, and, finally, a measure of the welfare cost of using the AWM (suboptimal) forecasting model is provided. The results of the analysis points towards the moderate significance, both statistically and economically, of the welfare cost. Moreover, it seems to be correlated mainly to nominal rigidities rather than to real rigidities (Jondeau & Sahuc, 2008).

The paper by Brissimmis & Skotida (2008) contributed relevantly to the literature on the optimal design of monetary policy in the European monetary union in the presence of structural asymmetries across union member countries by analysing the reliance of the coefficients of the interest rate rule on the parameters of the structural model of each economy, the central bank's predilections for inflation and output stabilization, as shown in its loss function, and the relative size of each country. As a complement of the other existing literature, they allowed for additional types of asymmetry, considering the existence of more than one category of divergencies, better reflecting the concrete context of the transmission mechanism. They evaluated the optimal weight that each country's economic variables should be attached by the central bank in its interest rate reaction function using the parameters of the multi-country structural model. After that, an assessment of the potential welfare

improvement that would be achieved through the execution of such a decision compared to a rule that focuses only on union-wide variables. The outcomes achieved indicated that an optimal monetary policy decision making rule should take into consideration not only the relative size of the countries as at present (relative output or population), but also the structural characteristics of the economies, which are some of the determinants causing dispersion in the effectiveness of the transmission mechanism (Brissimis & Skotida, 2008)

A number of recent theoretical studies have explored the consequences of cross-country heterogeneity on the outlining of an optimal monetary policy, demonstrating in particular that the existence of asymmetries in the transmission channel might be a stimulus for taking account of "national information" and not only "average information". More specifically, in the attempt of stabilizing only average inflation rate and output-gap, the common central bank touches a lower level of social welfare than that which would have been achieved if the same was only worried of the consolidation of national inflation rates and output-gaps. Therefore, importantly, the incorporation of national information into the decision-making process for a common monetary policy allows the central authority to more effectively deal with the heterogeneity issues stimulated by the structural asymmetries. Nonetheless, a crucial concern still involves the modes for taking national information into account. Two responses to this question may be envisaged:

1. An institutional response, inspired from the recent results in the literature;

2. A contractual response, inspired from the literature on the agency problem in a principal-agent relationship framework, optimally solved if the principal imposes the "good" contract to the agent (Semenescu, Gregoriadis, & Villieu, 2008).

Analysing the former, De Grauwe & Senegas (2004) proposed that the function of the common central bank should be the one minimizing a loss function, envisaged as a weighted average of national loss functions. In the context of the EMU, such an institutional solution would require the central bank to alter the traditional way monetary policy is designed and implemented, because nowadays, as stated in the Treaty, each member country "is therefore well aware that he or she is not a representative of a country, but shall act in deciding the appropriate conduct of monetary policy for the euro area as a whole". Furthermore, the negotiation phase necessary to agree on a common hypothesis could potentially give birth to inflation biases or conflicts conducting to noncooperative solutions in the Union, so that the cure might become worse than the disease (De Grauwe & Senegas, 2004). Semenescu et. al. (2008) presented an alternative practise for monetary policy to gain national insights, to be incorporated into the decision-making process, namely a contractual solution in which the

Union (acting as the "principal") would agree to delegate monetary policy to an "agent" who is the common central bank. With such a contractual agreement, monetary policymaking remains responsibility of the common central bank, who operates as an independent agent, but, as in the traditional agency theory, the "principal" has to grant the adequate stimuli to the "agent". As a result, what researchers have been looking for was an optimal form of this kind of arrangement, namely an optimal contract for the common central bank, and it can be showed that such an optimal contractual solution exists in nature. This type of agreement takes into account national information for the purpose of monetary policy decision-making process if penalties are imposed to the central bank in function of the weighted standard deviations of inflation and unemployment in the Union. Clearly established values for these penalties can help enforcing the optimal solution for monetary policy, allowing the optimization of Union-wide social welfare (Semenescu, Gregoriadis, & Villieu, 2008).

The quality of EMU performance with regard to the planning stage of such an optimal monetary policy will depend on the way it fits the notion of an optimal currency area (OCA). Specifically, economic theorists have long assented on the following four criteria to be met for a region to be considered an optimal currency area:

1. Countries should be exposed to similar sources of disturbances (common shocks);

2. The relative importance of such common shocks should be similar (symmetric shocks);

3. Countries should have similar responses to common shocks (symmetric responses);

4. If countries were affected by country-specific sources of disturbance (idiosyncratic shocks), they would need to be able to adapt rapidly to the context.

The basic idea is that economies meeting these requirements are said to behave similarly with respect to their business cycles, so a common monetary policy reaction would be optimal. Many economists are still are critical and skeptical about the long-run survival of the EMU. Euro-zone members have renounced to their freedom to establish their own interest rates and to the possibility of altering their exchange rates against each other. The widespread view is that this loss of flexibility may involve significant costs (in the form of persistent high unemployment and low output growth) if countries are not able to act as a common one or cannot easily adjust in other ways. The definitive apprehension is represented by the possibility that some countries, concerned about the prediction of such macroeconomic costs balancing out the microeconomic benefits of unification, would decide to abandon the EMU. How distant the euro area is from an OCA is an open question and main direction for future

research, asking whether an apparent potential deviation from the OCA concept would be sufficient to threat the long-run viability of the EMU. On an empirical ground, the outcomes obtained appear to foster the skeptics' conviction that the EMU is not an OCA, for at least two reasons. First, European economies have tested recurrent and often dramatic idiosyncratic shocks over recent years. Second, consistent severe unemployment levels across Europe may proxy the fact that EMU economies (especially their labour markets) are sluggish to adjust subsequently to all economic turmoils that might occur (Kouparitsas, 1999).

To conclude, the cost of ignoring the above described theoretical issues of cross-country variance within the euro area when designing and planning the execution of the presumed optimal monetary policy has been assessed again by Jondeau and Sahuc (2008). It may be argued that the cost of developing, estimating, and applying an MCM is rather severe, envisaging that the AWM would be less costly to implement. However, estimated measurements of the difference between the AWM and the MCM in terms of welfare are relevant. It is likely that including additional economies in the estimation, while normally just the few of them which are deemed to be in line with the purpose of the analysis are embedded, would even enlarge the inconsistencies between the two models. Using more complex frameworks incorporating different fiscal policies and labour market characteristic, adding therefore some degrees of sophistication, shall also tend toward higher welfare losses (Jondeau & Sahuc, 2008).

The chapter which is just to be concluded aimed at theoretically exploring, following the direction of various streams of international literature, the motives of the transmission mechanism of monetary policy, taking into consideration the variability of its effectiveness. The literature review on such heterogeneity has been divided and described according to two main flows, with the advent of the EMU as a crucial point for research. An exploration of the structural features affecting the potency and geographical distribution of monetary policies' effects has been provided, with a particular focus on the relevance, both for the literature and for the scope of the thesis of the bank-lending channel as a particular declination of the transmission mechanism. A reduction of cross-country heterogeneity in the bank lending channel, corresponding to the passage from conventional to unconventional measures of monetary policy has been detected in the field of spillover phenomena, especially relevant at the Union level. Finally, the attempt of many researchers to establish some rules for optimal monetary policy definition, in a context characterized by changing effectiveness of the transmission mechanism, has been explored, highlighting its cost and benefits, with a forward look for the future of the EU. The following and final chapter is intended to present such shift

in the effectiveness of the transmission mechanism, parallelly to the gradual passage from conventional to unconventional monetary policies, through a more operative lens, in order to provide some insights for further in-depth research.

Chapter 3

Comparative overview of conventional and unconventional policies: differing effectiveness in the relative transmission mechanisms

3.1 Research question explanation: is the effectiveness of the transmission mechanism altered through the implementation of unconventional policies?

The conclusive chapter, which is just to begin, aims at combining the previous ones in terms of integrating the theoretical concepts presented, that are central to them, through an operative perspective, exploring methodologies and relative systematic difficulties, in order to provide future researchers, willing to commit to the empirical investigation of such question, with an helpful framework to provide more structured and complete answers.

The basic idea underlying the design of such work is that of analysing the implications of the transition from conventional to unconventional measures of monetary policy, prompted by the unleash and spread of the financial crisis, on the effectiveness of the transmission mechanism, connected to the issues of cross-country heterogeneity described across chapter number two. As observed, thanks to an in-depth literature exploration, the most frequent cause of such geographic dispersion in the effectiveness of ECB's interventions is represented by the behaviour of credit institutions, differing along various characteristics that alter their reaction to monetary policy decisions undertaken by the central bank. What has been showed throughout the course of this disquisition about unconventional policies compared to traditional approaches is that, in particular, a policy measure aimed at raising the monetary base or the extent of the central bank balance sheet for a given policy rate, has a reversed U-shaped impact on real activity and persistent consequences on prices felt by consumers. If compared to a traditional interest rate adjustment, the pass-through has proved to be more slow-moving. Moreover, the functioning of the transmission process for both types of policy instruments turned out to be slightly different. While an alteration in the balance sheet of the European Central Bank is conveyed to bank lending activity via a decay in interest rate spreads of banks, the same spreads have been shown to boost significantly after a fall in the policy rate, which stands for a traditional monetary shock. Moreover, the so-called credit multiplier deteriorates remarkably subsequent to a balance sheet shock. Conversely, the surge in the volume of lending activity after the implementation of a conventional measure is mainly generated by an improved multiplier. A potential reason underlying such asymmetry might be researched in a stronger risk-taking channel for an interest rate innovation, a feature which might be worthwhile to concentrate on for future researchers wishing to widen the knowledge on such concerning field (Peersman, 2011).

It may be useful to also analyse the extent and modes through which the various euro area countries are affected by the balance sheet shocks. This might be performed by having a look at the statistics provided by Boeckx et. al. (2017), based on the implementation of a SVAR

model to dynamically investigate the impact of unconventional monetary policies, which might turn to be a helpful insight for the purpose of this work. The aftermaths on real activity proved to be slightly dissimilar if compared with interest rate adjustments. These outcomes were relatively wide in Germany, Finland, Estonia, Ireland, Slovenia, Slovak Republic and Luxemburg, while they were detected to be much more subdued in France, Italy, Austria and Belgium. The same measures were ascertained to be almost insignificant in Spain, the Netherlands, Portugal and Cyprus. For Greece, they even found a confusing negative response of output to a balance sheet expansion. On the other hand, as shown in the following figure, the effects on consumer prices are much more similar across countries. Hence, there is little evidence that in countries where output reacts more (less), also inflation reacts more (less).

Figure 5: Impact of balance sheet shocks on output *(first row)* and prices *(second row)*. Comparative overview for four major euro countries.
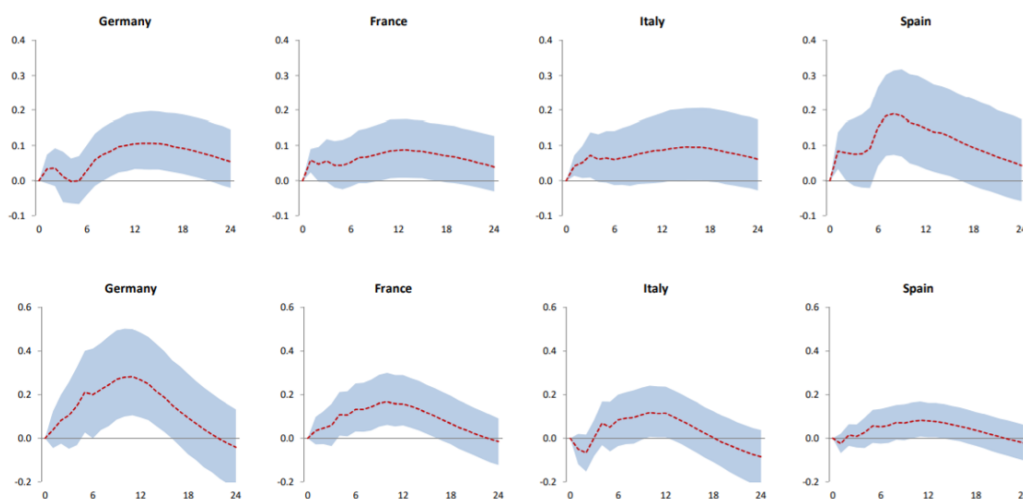

Source: (Boeckx, Dossche, & Peersman, 2017).

Since the peripheral countries of the euro area were more frequently targeted by the ECB with its nonstandard measures of monetary policy, the outcome of a much more vigorous impact of expansionary (and restrictive) balance sheet shocks in countries that are generally less susceptible to the financial crisis turned out to be quite impressive. A potential interpretation of this phenomenon relates to the fact that the majority of credit institutions in those peripheral countries have not been able to translate the extra liquidity they received into more credit to the private sector because of their financial precariousness and low capitalization.

With respect to the applicative divergencies between conventional and unconventional shocks, Burriel & Galesi (2018) compared the euro area implications of UMP shocks against those emerging from conventional interest rate innovations through the implementation of a

global VAR model involving all the member states belonging to the monetary union. The multi-country structure of the methodology was specifically designed to account for national macroeconomic trends as well as cross-country interconnections (that is, the spillover phenomenon which has been demonstrated, in chapter number two, to be hampered in relation to unconventional shocks). At the individual country-level, most of the euro area members profited from the employment of unconventional policies, but with a substantial degree of heterogeneity, whose stance has been evolving over time and reached its maximum with the sovereign debt crisis. Spillover phenomena constitute a substantial share of such fragmentation, magnifying the real consequences of UMP shocks. Countries with more vulnerable banking systems tend to get the minimum benefit from unconventional monetary policies application, particularly in terms of output growth. Definitely, what generates concern is the fact that this heterogeneity has dramatic consequences for the conveyance of unconventional measures at the euro level, as it substantially restrains the desired impact on the real activity of the whole currency union. In this respect, the authors also furnished a proof of how the real implications of unconventional monetary shocks are significantly weaker and less enduring than those related to conventional interest rate adjustments (Burriel & Galesi, 2018). The disquisition about which types of variables are more suitable for such kind of analysis, whether macro or micro data (related to the balance sheet of credit institutions as main responsible of cross-country asymmetries) will be more precisely tackled in the following paragraphs. Figure n. 3 presents Euro area countries' responses to UMP (left-hand side) and CMP (right-hand side) adjustments, in terms of one-standard-deviation shocks. Solid red lines stand for the median approximations and blue regions designate the 16th and 84th percentiles of the selected distribution.

Figure 6: Euro area responses to unconventional and conventional monetary policy shocks
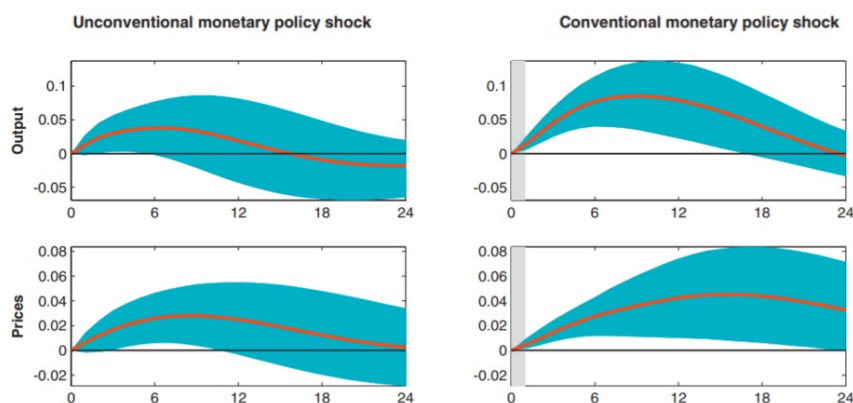
Source (Burriel & Galesi, 2018).

The research question which will be investigated across this third chapter of the research shall then be clear, thanks also to examples from the international literature which have just been provided. The idea is the one of demonstrating, through an in-depth literature analysis, which allows a comparative overview of such an unexplored field of research, accompanied with a number of official ECB statistics, the existence of divergencies in the effectiveness of the transmission mechanism of monetary policy, depending in particular on the nature of the action approached by the ECB. Drawing on the conclusions of many researchers about the issue of cross-country heterogeneity, a final overview of which features, and to which extent, contribute to influence the effectiveness of the transmission mechanism of monetary policy, will be presented. Moreover, some predictions about the potential evolution of the influence that such elements may exert in case of implementation of an unconventional policy will be discussed. The relevance of the result shall therefore be twofold: providing a conceptual starting point for future empirical research together with the suggestion of many methodological approaches that might be undertaken, specifying pro and cons for each of them. In particular, the more formal procedures involve the design and approximation of econometric models changing starting points, to check different ways of implementing them, and techniques. The starting point is generally rooted in a number of basic hypothesis about how the economy works, which are frequently limited by data availability in terms of both scope and length. Some other formal methods commit to the avoidance of such robust theoretical constraints on the data, employing a vector autoregressive model in order to infer about the potential consequences of monetary policy. Leaving those types of approaches to future researchers, for a number of reasons that will be detailed further on in the inquiry, the one chosen for this work is that of conducting a less formal, descriptive, graphic and comparative exploration, which copes with inspections and comparisons of variables related to monetary transmission, aimed at making inferences boiling down to recommendations for stylized facts about monetary transmission (Ganev, Molnar, Rybiñski, & Wozniak, 2002). The ratio behind the comparative analysis of conventional and unconventional approaches of monetary policy is that the latter, aimed at altering the extent of the central bank balance sheet and, consequently, the liquidity position of credit institutions, may trigger a different response of economic agents in the two different stages of transmission and, therefore, imply, in line with the main objective of these kind of measures, a major degree of cross-country homogeneity.

Given the key role that the credit channel and credit institutions play in relation to the scope of this work, a brief review of those potential sources which could counteract the transmission mechanism of the bank lending channel in its first and second stages is provided, before

concluding the paragraph and moving to the exploration of the procedural approaches which have been attempted in the field, together the limits and barriers encountered.

Table 4: Trojan Horses Affecting the Credit Channel

Factors Interfering with the First Stage of the Bank Lending Channel	**Factors Interfering with the Second Stage of the Bank Lending Channel**
Multibank holding networks are propitious to the development of internal capital markets from which affiliated banks can profit even when external financing resources have dried up. Especially relevant for small banks, which would so manage to shield their lending activity from shocks (Ashcraft, 2001).	A potential mitigation might occur if firms would be capable of protecting themselves from short-term shocks in bank or external borrowing via adjustments of capacity utilization, if financial restrictions were foreseen in advance (Wang, 2001).
A banking system which is well capitalized overall may limit the efficiency of the bank capital channel. Other features of the banking system like relationship lending and the maturity structure of loans actually positively affect the magnitude of the pass-through.	Weak agreement on which characteristics of credit institutions (size, liquidity, capitalization) matter the most. The second stage of the bank lending channel seems to be even more debated, as a number of researchers stressed the existence of a broad lending channel instead of a bank lending channel.
A highly dense concentration in the banking sector would imply the lack of small banks. As large banks would then have an easier time accessing to alternative external funding, they may insulate their loan supply from monetary policy shocks (Adams & Amel, 2005).	If small firms' contribution to output is insignificant, or if only a minor share of (small) firms relies on bank lending, the aggregate impact of the bank lending channel will be minimal and therefore negligible.
There is relevant interconnection between different channel of the transmission	If the dissemination of small firms is asymmetric across sectors, consequently, the aftermath of monetary policy operating via the credit channel may be

mechanism, namely the credit channel and the interest rate pass-through.	heterogeneous across sectors (Tornell & Westermann, 2002).
The government's strict engagement in the banking sector either as an owner or via public guarantees can partially counterbalance the effects of monetary policy on lending activity of banks (Ehrmann, Gambacorta, Pagès, Sevestre, & Worms, 2001).	Government involvement may also imply mitigated budget restrictions for firms. Especially important for the case of transition economies (Kornai, Maskin, & Roland, 2003).

Source: (Ganev, Molnar, Rybiñski, & Wozniak, 2002).

The following paragraph analyses a number of theoretical contributions that may prove to be helpful in relation to the objective of the work. Given the relevance of the credit channel and the pivotal role of banks in generating effectiveness asymmetries in the pass-through of monetary policy, the exploration will be centred on methods exploiting data at the micro level, which are generally said to be more suitable to capture bank-lending heterogeneity. The main problem associated with formal approaches built on macro, aggregate data, benefiting from small structural macroeconomic models with at most several equations, involving estimations of several equations, reaction functions, and doing simulations, is that they fail to consider the country-specific dimension of the individual bank, which actually appears to be one of the main conductors of monetary policy. The study of such entities, with their cross-country differing characteristics, will be leading, throughout a number of paragraphs, to the final conclusion.

3.2 Methodological approaches and related limits encountered by researchers on the topic

Before delving into the detailed description of the empirical techniques which have been adopted by researchers and practitioners over years, revolving around the theoretical field of the transmission mechanism of monetary policy and its effectiveness, let's briefly mention the reasons behind the choice of adopting a methodology centred on micro-data, coming from the balance sheets of credit institutions, which are, as described in the previous paragraph, at the core of the transmission mechanism via the credit channel.

The use of micro data by a stream of literature, even if not comparable with the extent of research adopting methods based on aggregate data, aimed at studying the transmission of monetary policy from the central monetary authority to individual credit institutions is motivated by the widespread conviction that macroeconomic time-series are not adequate to distinguish a credit channel from the more traditional money channel. Such belief is rooted in the assumption that the money channel functions through banks' liabilities, and the credit channel operates through their assets. But assets' and liabilities' items are tightly interrelated by accounting identities, thus modelling a concerning identification problem. For this reason, the evidence provided by macroeconomic research which look at output and price aggregates' fluctuations in response to adjustments in the amounts of loans and deposits is rarely decisive. On the other hand, microeconomic data allow the more precision detection of the existence of a credit channel by testing the specific empirical implication of the credit view, namely the one of asymmetric banks' (and firms') reactions to a shift in monetary policy, according to their structural features. Small banks, for instance, face more complexities in sheltering their loans' structure from a squeeze in central bank liquidity because they typically cannot replace CD's and interbank loans for deposits without costs. Other reasons for stating the weak adequacy of aggregate techniques for the scope of this works have to be researched in the following matters:

1. The standard errors are often substantial, so that the hypothesis of symmetry can be easily rejected, even if the point estimates are very different across countries;

2. The approximations obtained are not robust to the "Lucas critique" since they are normally based on samples from a pre-EMU monetary regime, inspired to previous studies, and one of the main consequences of the monetary union is exactly that of altering the way European monetary policy is conducted. The same may be valid for the emergence of unconventional measures;

3. More significantly, the empirical evidence derived from such approaches on asymmetries in monetary transmission is silent to the question of which are the sources of the observed divergencies, thus furnishing no instructions for authorities who commit to their reduction, (Favero, Giavazzi, & Flabbi, 1999).

Let's now turn to the exploration of that stream of international research that moves from banks' balance sheets, whose items may be considered as proxies for some structural characteristics generating asymmetries across credit institutions, to analyse the efficacy of the transmission mechanism of monetary policy across Euro countries. The first and probably most relevant paper analysed is the one from Favero et al. (1999), because of its logical

procedure in the identification of a monetary shock (which will be deepened further on in the dissertation) and the extreme simplification of the methodology just running a basic linear regression. Their empirical strategy was articulated in two steps:

1. Recognition of an episode of synchronised shift in monetary policy. As an indicator of the extent of monetary policy they opted for a measure of bank liquidity: cash plus reserves. Looking at this variable, they managed to certificate an important shift in the supply of banks' liquidity during 1992;

2. Identification of the impact of the squeeze in liquidity on the supply of loans by individual banks: they managed to perform such an action by testing whether the observed asymmetries across banks are consistent with their structural features, namely size and strength of their balance sheet.

Following this second step, just in 1992 the cause of a movement in reserves could be assigned to monetary policy: during that year opposite shifts in interest rates and reserves were detected, and output gaps did not show any relevant variation in the cycle. The authors decided not to exploit the panel dimension of the dataset, just to focus on a cross-section for the single year. They computed the strength of a bank balance sheet as *(cash + securities + reserves)/ total assets*, explicitly reflecting the concept that a balance sheet is strong when it is liquid, so allowing an individual bank to shield the supply of loans from fluctuations in the stance of monetary policy, leaving it untouched. On the other hand, size variables can include elements of the lending view that are not connected to the strength of the balance sheet: larger banks might have an easier time issuing a wide variety of market instruments (such as certificates of deposit) which can also function as protection for their lending activity from adjustments to monetary policy. Their use of reserves as variable, intended as a proxy for monetary policy shocks, will be detailed further on. Their results, commented country-by-country, pointed at a weakly-significant heterogeneity among the four major countries chosen, namely Italy, France, Germany and Spain (Favero, Giavazzi, & Flabbi, 1999).

Kashyap & Stein (1997) adopted a different strategy, only relying on a descriptive analysis, without running regressions, provide an insightful starting point for future empirical research. They inferred the degree of bank dependence in different countries by looking at the size distribution of firms and the availability of nonbank finance, so, differently from Favero et al. (1999) they focus on both stages of the credit channel, parallelly accounting for banks' and firms' reaction to monetary policy shocks. To assess loan supply effects, they studied the size distribution of the banking industry and the health of banks. They conducted such comparative overview for the following countries belonging to the European Union: Belgium,

Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and the UK. Such size distribution index for the supply side is represented by the three-firm concentration ratio for commercial banks (that is, the share of total commercial bank assets controlled by the three largest commercial banks in the country). In Belgium, Netherlands, and the UK, the large banks appeared to hold a dominant position. Conversely, Italy, Germany, and Luxembourg were emphasized as countries in which the smaller banks tend to control a significant share of total assets. In addition to the information on bank size, they employed a number of measures of bank profitability and capital. The rationale behind such adoption is that well-capitalized (or highly rated) banks should be facing less difficulties going to securities markets to raise funds as a consequence of a deposit shock. Accordingly, monetary policy shall have a weaker impact when banks are well capitalized. Their benchmark measure of creditworthiness came from Thomson BankWatch rating software complemented with another measure of bank health (OECD stylized income statement for banks). Turning to the demand side of loans, bank dependence indexes for borrowers are based on unemployment and on the structure of capital markets across Europe (an ideal measure of the switching costs firms would suffer in case they lost their bank financing). To summarize the results of such descriptive analysis, they attributed each country a letter grade (from A to C) for each of our four factors. A grade of "A" indicates the minimum responsiveness to monetary policy. A mark has been assigned to all these features and then a final rate has been provided for each country based on subjective weighting of the following standards (Kashyap & Stein, 1997):

- Relevance of small banks;

- Bank health condition;

- Importance of small firms;

- Availability of non-bank finance.

Linking to above-explained descriptive analysis, de Bondt (1998) employed the external finance premium as a proxy (that is, the cost spread between external and self-finance) for banks' lending activity. The author ran a basic interactive regression with bank loans as a dependent variable (*100 * net loans/total assets*) and short-term interests rate, liquidity (*100 * liquid assets/deposits and money market funding*), size (*ln of total assets*) and real GDP growth expressed in percentage as explanatory variables. Data were taken from the BankScope database, with unbalanced observation for six European countries (Italy, Germany, UK, France, Netherlands and Belgium). Evidence has been provided of the

existence of credit channels, both considering lending channels and balance sheet channels, with different intensity across countries (de Bondt, 1998). Among various papers mentioned by the latter while describing the potency of credit channels across various European countries, Angeloni et al. (1995) demonstrated that Italy has traditionally been characterized by one of the strongest, for a number of reasons: the weak degree of progress of the stock and private bond markets; the virtual non-existence of commercial paper; the high fragmentation and structural asymmetry among credit institutions; the low extent of international credit market integration, mainly caused by the high fiscal and reserve burdens imposed on domestic banks; the high interest elasticity of money demand, which implies that monetary policy exerts a vigorous influence on the size of banks' balance sheets. The empirical approach was based on clusters of credit institutions, according to many relevant features:

- Large vs. small banks, depending on the total size of their loan portfolio;

- Large vs. small average loan banks, according to the average volume of their loans.

Information on the characteristics of the firms borrowing from the bank groups were derived from "Centrale dei Bilanci". In order to assess the dynamic response of bank interest rates, and thus of their lending activity, in a more systematic way, they approximated a VAR model on monthly data, separately for the two groups. Large banks, and particularly "large average loan" banks, responded more rapidly to monetary policy stimuli than counterparts. Their findings resulted to be contradictory with respect to standard results because of the positive reaction of rate differentials to monetary, inconsistently with the traditional assumption of the credit view that smaller banks face difficulties in isolating themselves from monetary policy shocks through asset and liability management. This asymmetry was demonstrated to be connected to two structural characteristics of the credit market namely customer relationships and monopoly power in local markets (Angeloni, Buttiglione, Ferri, & Gaiotti, 1995).

Again De Bondt (1999), in another relevant work, adopted two credit supply factors to test the relative importance of the two stages of the credit channel, respectively banks' holdings of securities for bank lending channel and net wealth of households and firms for the balance sheet channel. Loan demand effects were assumed to be proxied by real gross domestic product (GDP). Its main empirical findings might be summarized as follows: credit to households is more reactive to a squeeze in monetary policy than credit to firms; the response was demonstrated to be wider in Germany and Italy, thus furnishing strong evidence for the existence of credit channels of monetary policy. The statistical technique implemented was once more that of VECM, a vector autoregressive model (VAR) (De Bondt , 1999). The traditional three bank characteristics influencing the effectiveness of the credit channel of

transmission mechanism has also been adopted as explanatory variables in the work by Chatelain et al. (2003). They measured size as the logarithm of total assets. Liquidity was estimated as the ratio of liquid assets (cash, interbank lending and securities) to total assets, and capitalization was approximated by the ratio of capital and reserves to total assets. The empirical technique was computed with each of the bank features in turn, as well as once with all three characteristics simultaneously. The results might be summarized with the finding that restrictive monetary policy reduces bank lending of the average bank. The responsiveness of credit institutions varies across countries, size does not appear to be a helpful indicator for the distributional effects of monetary policy. Furthermore, even capitalization variables do not play a major role in distinguishing banks' reactions. Only liquidity resembles to be significant: more liquid banks reduce loans to a lesser extent in response to a restrictive monetary policy than less liquid banks tend to do (Chatelain, et al., 2003). Brimmis & Delis (2010), on the other hand, opted for the employment of market power as internal factor influencing banks' reaction in terms of lending and risk-taking to monetary policy impulses instead of considering a measure of size, and the reasons have already been presented throughout the course of chapter number two. They employed a smoothing technique, and in particular the Local GMM (LGMM) method, using a micro-dataset from BankScope (Brimmis & Delis, 2010).

Kishan & Opiela (2000) furnished proof of the existence of both a credit channel and a bank lending channel of monetary policy in the United States from 1980 to 1995. They tested for bank loan supply shifts by clustering banks depending on asset size and capital leverage ratio (Kishan & Opiela, 2000). Adapting the same methodology to Europe, Altubas et al. (2002) ranked banks according to asset size and capital strength to test whether these factors exerted a significant impact on the lending channel. Using a panel data approach, they discovered that, across the EMU system, undercapitalised banks (of any size) tend to react more to modifications in policy. When checking the individual country approximations for France, Germany, Italy and Spain, evidence of a bank lending channel exists only with regard to the last two countries. By logic consequence, it may appear that the bank lending channel prevails for undercapitalised banks operating in the other smaller EMU members. Exploiting individual bank level data, the growth in bank loans is regressed on the current period and lagged values of changes in the relevant countries short-term money market rate, current and lagged growth in bank securities holdings, current and lagged growth in interbank deposits, current and lagged growth in GDP and lagged change in bank lending. As a representative of monetary policy stance, they opted for short-term money market rates. Their empirical strategy might be outlined as follows:

1. They first tested the reaction of total loans, securities, total deposits and interbank borrowings to changes in the short-term money market using the full pooled sample;

2. Then they examined the bank lending channel using the bundled approximations depending on the six asset size categories;

3. Afterwards, they checked the modalities through which the funding characteristics of different sizes of banks reacted to policy shocks;

4. Finally, they analysed the estimations of the lending channel according to bank size and capital strength (here the number of asset size categories was reduced to 3 because of missing data).

Among the chosen asset categories which can be enumerated there were: total assets, total loans, total securities, total deposits, total interbank deposits (Altunbas, Fazylov, & Molyneux, 2002). Definitely, they provided stronger evidence of the existence of a bank lending channel in Europe than Favero et al. (1999), but poorer than De Bondt (1999).

The three additional empirical contributions that are to be mentioned below belongs to the aftermath of the financial turmoil and may, therefore, contain precious insights related to the scope of this work, that is to check the presumed improved homogeneity of the transmission mechanism subsequent to the implementation of balance sheet policies, aimed precisely at altering the liquidity position of credit institutions, which in turn may modify their response to the monetary shocks. Holton & Rodriguez D'Acri (2015) contributed to the identification of those balance sheet characteristics that played a major role in the fragmentation of the transmission of monetary policy after the financial crisis. Their analysis drew on a dataset gathered by the European Central Bank (ECB) composed individual balance sheet items from a sample of monetary and financial institutions (MFIs), relative to a five-years period (from mid-2007 to mid-2012). As econometric technique, they employed single equation generalised error correction model (ECM), considering the interest rates on new loans with a short fixation period (up to 1 year), as dependent variables. As explanatory variables, on the other hand, they opted for money market rates, which are picked by policymakers as objectives and typically influence banks' cost of funds (EONIA). The relevant bank characteristics for the analysis were, as normally assumed in literature: bank size, liquidity and capital. The size variable was designed as the ratio of main assets of a bank over the total assets of the respective country; bank liquidity was described and computed as the addition of the most liquid assets over main assets. Their work provided demonstration that SMEs suffered more than large firms from the deterioration in banks' balance sheets following the

financial turmoil, possibly because they have fewer external financing alternative options and so are obliged to bear higher interest rates (Holton & Rodriguez D'Acri, 2015). Altavilla et al. (2016) proved that bank balance sheet items such as the capital ratio and the exposure to sovereign debt are the major responsible for the heterogeneity in the transmission of conventional monetary policies, whereas the location of a bank is insignificant. The main role of non-standard measures was related to the normalization of the capacity of banks to grant loans, which in turn leads to a significant reduction of lending rates. The dataset they drew on Individual Monetary and Financial Institution Interest Rates or IMIR (composed of information on individual deposits and lending rates charged by banks for different maturities and for different loan sizes) and Individual Balance Sheet Indicators, or IBSI, (reporting the main asset and liability items of over 260 banks resident in the euro area from July 2007 to December 2015). Their econometric approach was based on cross-sectional Vector Autoregressive (VAR) model, executed in two steps: in the first they exploited the time series dimension of the data, bank by bank, to approximate the dynamic response of lending rates to policy stimuli. In a second step, they classified the distribution of pass-throughs estimated according to bank-specific characteristics and computed the average gap between the upper and lower quartiles of the distribution. The bank characteristics which have been accounted for were (Altavilla, Canova, & Ciccarelli, 2016):

1. The exposure to domestic sovereign bonds;

2. The capital ratio;

3. The degree of stability of the funding structure, as proxied by the ratio between total loans and total deposits;

4. The share of non-performing loans as a percentage of risk-weighted assets.

Finally, concluding the series of works which have been deemed to be worthwhile mentioning, Ciccarelli et al. (2013) contributed a significant evidence theorizing that the effectiveness of the bank lending channel has been partly soften, particularly during the 2010-2011 period, by means of the policy actions. With the provision of heightened liquidity through the full allotment policy and the Longer-Term Refinancing Operations (LTROs), the central bank managed to diminish the costs arising to banks from the limitations to private liquidity funding, through the induction of a softening in lending conditions. Their empirical approach was not centred on the use of micro-data, however the result could be interesting for the purpose, as they argued that the bank balance sheet problems might have been partly alleviated (and the bank-lending channel partly neutralized) by the ECB involvement, which

have targeted almost exclusively banks' liquidity, while the non-financial borrower balance sheet channel maintained its significance, especially in the context of financially distressed countries. Moreover, thanks to the macro-analysis they performed, they highlighted how the transmission mechanism of monetary policy has changed with the crisis, with a strong amplification effect of the credit channel in countries experiencing sovereign stress (Ciccarelli, Maddaloni, & Peydrò, 2013).

Focusing now on the methodology chosen for the purpose of investigating the research question, namely to test whether a shift in the effectiveness of the transmission mechanism of monetary policy, through the intermediation of banks as main actors in the chain, has occurred in the last decade, characterized by the outbreak and spread of unconventional monetary approaches in response to the financial turmoil, which has counteracted the efficiency of traditional measures. For a number of reasons detailed before, credit institutions have been chosen as the main subject to be studied, for the crucial role they play in altering the effectiveness of monetary policy's impact across countries, depending on the extent of their structural characteristics. For this cause, the optimal methodology would have been to perform a linear empirical analysis based on panel-data from banks' balance sheet coming from a number of Euro members, in order to assess the cross-country dimension of their response to both types of monetary shocks, checking whether and to what extent some divergencies occurred. The main advantages of using micro-approaches, instead of methodologies accounting for aggregate macro-data, have been outlined so far. Nevertheless, these benefits do not come without costs, in particular this type of technique, studying banks' behaviour, only allows to concentrate on the first step of transmission of the credit channel, ignoring the response of firms and individual consumers, which constitute the second and more debated stage of the mechanism. These insights will be taken into account for the concluding paragraph, intend to provide a direction for future research on the topic.

Unfortunately many complexities arose in how to find the suitable data set, including balance sheet items from banks homogeneously distributed over a relevant number of Euro-area members, for a significant span of time (that is, one containing the period of financial crisis, assuming, for example, a year as discontinuity point between conventional and unconventional measures). As a result, a second-best solution has been looked for. The idea would have been that of applying the same intended linear regression to Italy, with the aim of theoretically extending the results to the Euro-area as a whole. Again, some complications occurred with regard to the dataset. The available database for the selected country, Aida, contains financial, commercial and personal information about more than 200.000 firms,

banks and other financial institutions operating in Italy. A potential dataset composed of 633 banks across all the Italian regions has been imported from the database. In order to carry out such an empirical analysis, the necessary data were those on loan quantities per year (as explanatory variable) and on liquidity, capital and size measure as explanatory variables, following the approaches implemented by international researchers on the topic. No official statistics were available for a significant span of time (years which were intended to be considered ranged from 2009 to 2018, assuming 2014 as stepping-stone for the adoption of unconventional policies). Moreover, most of the measures which could have represented a proxy for size, like total revenues or the number of employees, were not available on a time-series dimensions, whereas data on total assets were accessible only for the 2013-2018 time span, even with many missing data. Capitalization information were available just in the form of "Current capitalization", not much adequate, and still there were plenty of missing data. Evidence on liquidity (after having checked current assets, cash, deposits and liquidity index measures) were totally absent in the dataset, almost entirely constituted of missing data. The variable intended to be explained by the empirical analysis as dependent, namely loans, might have been proxied by the "Credits towards clients" item of the balance sheet (long-term credits), but, unfortunately, again the dataset was nearly lacking.

Given all these obstacles, the obliged choice was that of providing an in-depth literature overview on the topic, highlighting those which can be considered as suitable starting point for future research, with suggested suitable empirical methodologies. With respect to the research question, that will be explored by means of some aggregate statistics which, coupled with more systematic existing international research, may furnish a visual and intuitive answer of how banks' behaviour, and therefore the transmission mechanism of monetary policy, has evolved in recent years.

3.3 The lending channel for conventional and unconventional measures: comparative overview and stylized facts

The function of this crucial paragraph of the work is mainly instrumental to the further discussion of the key findings. Before progressing and concluding the inquiry on the topic, which has been conducted throughout the path of the research work, a descriptive comparative overview of the main points of difference between the bank lending channels of the two types of monetary measures which have been adopted in the last decades will be provided. This goal will be accomplished through a schematic and intuitive narrative representation and some stylized facts coming from the official ECB statistics.

The importance of analysing the bank-lending channel for unconventional monetary policy measures, as opposed to conventional ones, is related to different motivations, which are mainly rooted in the nature of such kind of intervention. Unconventional operations are typically embarked on in a context of serious market distress and when functioning of conventional policy mechanisms are considered seriously compromised; encouraging lending supply in banks is, in most cases, the main declared target of these policies. In this context, the traditional empirical assumptions of the bank lending channel are likely to be voided, or insignificant (Albertazzi, Nobili, & Signoretti, 2016). The principal conjecture that presumably would be reversed is the standard one, formulated by the orthodox literature on the bank lending channel, foreseeing the more powerful transmission for less capitalized banks, which are more susceptible to asymmetric information concerns (Kishan & Opiela, 2000) (Jayaratne & Morgan, 2000). However, in times of financial disorder, weakly-capitalized banks may be less effective in enlarging credit supply when reacting to an expansionary policy due, for example, to an exacerbated pressure from the markets or from regulators. Dissimilarly, in times of routine, banks that are more dependent on market funding have usually been shown to be better insulated from monetary policy shocks (Van den Heuvel, 2002) (Romer & Romer, 1990).

Table 5: Comparative overview of the bank lending channel for conventional and unconventional policies

|	**Unconventional monetary measures**	**Conventional monetary measures**
Impacts on banks' future capital position and profitability	Commonly correlated with a steepening of the yield curve and an expansion in the banks' net interest income (bank capital channel) (Albertazzi, Nobili, & Signoretti, 2016).	Associated with a flattening of the yield-curve, which erodes future profitability via net interest income reduction (reverse bank capital channel) (Albertazzi, Nobili, & Signoretti, 2016).
Implications of the holding of sovereign bonds	Wide sovereign portfolios are generally intertwined with an extremely liquid balance-sheet and thus with a weak	As a consequence of UMP, implying increases in the market value of bonds, banks with high sovereign exposure realize large capital gains enabling them to accommodate the monetary policy

	transmission via the BLC (Kashyap & Stein, 2000).	stimulus (Albertazzi, Nobili, & Signoretti, 2016).
Degree of information asymmetry between banks and investors	Monetary policy transmission is more intense for credit institutions with weak balance sheets, as are they are said to be more vulnerable to problems of unequal information (Kashyap & Stein, 1995) (Stein, 1998).	Debated question: findings according which monetary policy stimuli are conveyed to a greater extent by banks with robust capital and funding positions, pointing towards a key role of regulatory and economic constraints (Albertazzi, Nobili, & Signoretti, 2016).
Presence of capital or funding constraints (regulatory requirements or market pressure)	Contrary to the asymmetric information case, this foresees the major strength in monetary policy transmission for more capitalized banks and, potentially, for banks with more consolidated funding structures (Bernanke & Lown, 1991) (Van den Heuvel, 2002).	Disproportionate normative and supervisory pressure on the extent of allowed bank capitalization may water down the effectiveness of UMP by increasing the (concrete or presumed) barriers for of banks' ability to expand credit supply (Albertazzi, Nobili, & Signoretti, 2016).
Intensity of the risk-taking channel	The lack of substantial liquidity effects in the short period signals the existence of a well-functioning credit multiplier, which enables the grant of new loans. Stronger risk-taking channel (Peersman, 2011).	The credit multiplier results to be significantly mitigated for a rise in bank lending generated by balance sheet innovations. The evidence points towards a weaker risk-taking channel (Adrian & Shin, 2010) (Borio & Zhu, 2008).

	The implications on the real economy and consumer prices reach a peak after about one year. The increment in target variables occurs almost immediately after an interest rate shock (Peersman, 2011).	An equivalent approach takes about six months more in the eventuality of innovations to the monetary base. The unconventional bank lending channel turns out to be more sluggish (Peersman, 2011).
Length and duration of effects on the economy		

The comparative overview, provided above, which has been developed through an in-depth literature analysis, allows to check the modalities through which the differing features of conventional and unconventional measures of monetary policy impact the effectiveness of the bank lending channel. For this reason, it certainly proves to be central for the conclusive discussion of the formulate hypotheses. From what argued up to this point of the inquiry, it may be inferred that the forced shift to unconventional policies represented a cornerstone in the analysis of the transmission mechanism functioning. Through the study of banks' behaviour, it has been possible to grasp the ways in which they have been able to alter its effectiveness on each country member individually, as well as at a macro level.

Postponing a more structured and systematic discussion to the following paragraph, let's now explore some stylized facts extracted from the official statistics stored in the publicly accessible ECB database. This step will allow to provide an aggregate approximation of how credit institutions have behaved in relation to credit activity over the past two decades, from a single-state perspective in order to allow some cross-country comparisons. A series of charts will be presented, relative to four main EMU members, namely Italy (blue line), France (red line), Germany (pink line) and Spain (green line). The time span considered is a twenty-years period (the initial two decades of the 21st century), to better grasp the shift occurred almost at the half of the interval. Aggregate statistics would have been available for many other member states, as well as for the Euro area aggregately; anyway, the choice of analysing only that four regions aims at aligning with most of the international literature explored so far, which would have guided also the design and implementation of that potential empirical analysis which has been described in the previous paragraph. The first variable explored is that of total loans expressed in growth rates.

Figure 7: Growth rates of total loans to households and corporates
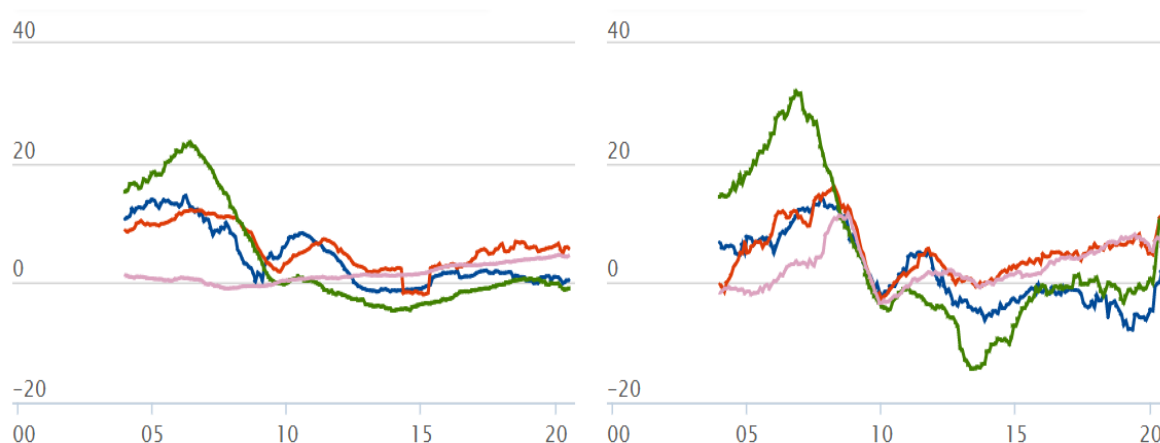
Monetary financial institution balance sheet statistics (2000-2020 time span) respectively for Italy (blue line), France (red line), Germany (pink line) and Spain (green line), growth rates of total loans to euro area households and non-financial corporations (all currencies combined, all maturities, not seasonally adjusted, annual percentage changes)

Source: (European Central Bank, 2020).

These charts show respectively, the growth of lending rates trends (2000-2020-time span) for two relevant categories of borrowers, namely euro area households and corporations (all currencies combined, all maturities, not seasonally adjusted, annual percentage changes). What can be easily noted is the flattening and the normalization of the four growth rate trends around a lower value with respect to previous years. This inferred conclusion appears to be in line with the extent of the existing literature on the bank lending channel, consistent with a slight reduction of lending rates, and with the main assumptions and hypotheses formulated in this work. Considering year 2008/2009 as the cornerstone, reference year for switch from conventional to unconventional monetary measures, it might be deducted, observing the official statistics, that more homogeneity in the distributive effectiveness of the bank lending channel, which reflects the behaviour of credit institutions, has been achieved with the intervention of monetary policy authorities.

Other insightful stylized facts refer to the loan-to-deposits variable, that might better portray the effectiveness of monetary authorities' intervention in relation to the scope of this work, as this index represents and accurate proxy for a bank's level of liquidity. In particular, if the ratio is too high, it means that the bank may not have enough liquidity to cover any unforeseen fund requirements. Conversely, if the ratio is too low, the bank may not be earning as much as it could be. It definitely shows a bank's ability to cover loan losses and withdrawals by its customers (Murphy, 2020). Of course, one could imagine the lack of liquidity characterizing the years of financial instability and link the importance of analysing

such index in relation to the explored international literature on the topic: liquidity has been deemed, by most of the researchers who has been mentioned up to now, as one of the main factors undermining the unambiguous distribution of the effects of a policy implemented by the central bank. What the chart represents is a synthesis of monetary financial institution balance sheet statistics, involving the ratio between total loans and total deposits vis-a-vis euro area non-financial corporations and households and non-euro area non-financial corporations, households and non-bank financial institutions (excluding general government, all currency combined, all maturities, not seasonally adjusted, percentage, quarterly).

Figure 8: Loan-to-deposit ratio 2000-2020 trend
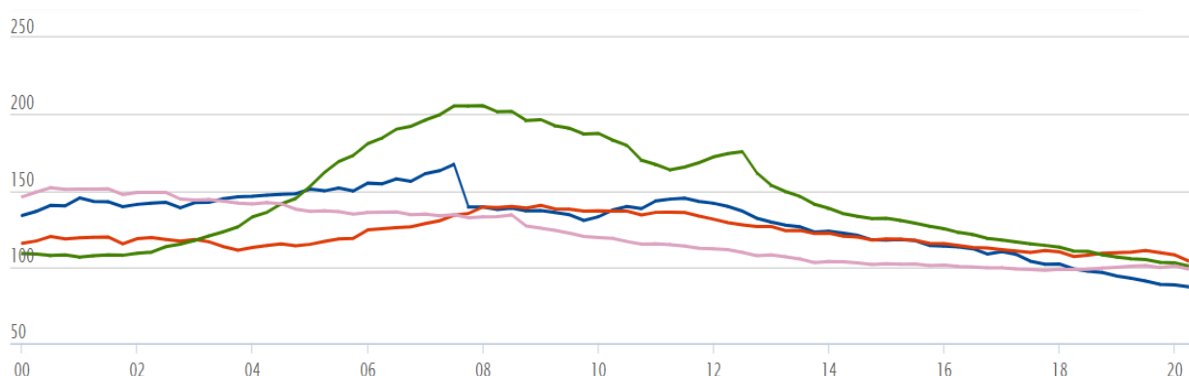
Monetary financial institution balance sheet statistics (2000-2020 time span)) respectively for Italy (blue line), France (red line), Germany (pink line) and Spain (green line), ratio between total loans and total deposits vis-a-vis euro area non-financial corporations and households and non-euro area non-financial corporations, households and non-bank financial institutions (excluding general government, all currency combined, all maturities, not seasonally adjusted, percentage, quarterly)

Source: (European Central Bank, 2020)

The main outcome that might be reasonably inferred from such graph relates that sort of convergence which have been theorized by many practitioners and researchers of lending condition across Europe. Again, considering 2008 as main point of refence for the very first adoption of unconventional policies, it appears that the employment and iterative implementation of such policies prompted a trend towards homogeneity in liquidity conditions among credit institutions, which, by hypothesis, may improve homogeneity in the transmission mechanism of monetary policy.

Before concluding the paragraph, it might be worthwhile to show, through an aggregate perspective, a schematic representation of how the European geography of bank lending activity currently works. The following map, with the attached caption, shows how the loan-to-deposit ratio is distributed across EMU countries, relatively to year 2020.

Figure 9: Loan-to-deposit ratio: an aggregate perspective

Source: (European Central Bank, 2020)

The following key paragraph of the inquiry will aim to aggregate all the evidences provided up to this point, integrating them with the comparative overview and the insights gained from the statistics observation, in order to draw some final conclusion and discuss further future potential developments.

3.4 Results discussion

A number of helpful theoretical and empirical contributions from international researchers and practitioners have been analysed so far, allowing the discussion of some results which have been derived from a detailed conceptual exploration and aggregation of the main points of interest. Postponing the recommendation of a particular direction for future research on the topic to the following and conclusive paragraph of the dissertation, the main points of the theory underlying the scope of such work will be here summarized and bundled, in order to provide some final concluding remarks.

The discussion revolved around the main macro-topic of the bank-lending, or credit, channel, and its functioning. First conceptualized by Bernanke & Gertler (1995), steaming from the

main simplifying limitation of sharp two-asset dichotomy that underlies the traditional model, it gave rise to a wide stream of literature built on the assumption that there are three important asset types: money, bonds, and bank loans (Bernanke & Gertler, 1995). Unlike the traditional theory, that stresses the relevance of households' preferences between money and other less liquid assets, the new theory of monetary policy asserts that the role of the banking sector is central to the transmission of monetary policy. Specifically, two key factors shape the way in which monetary policy works, reflecting, respectively, the first and the second stage of the bank-lending channel (Kashyap & Stein, 1997):

1. The degree to which banks rely on reservable deposit financing and adjust their loan supply schedules following changes in bank reserves;

2. The degree to which certain borrowers are bank-dependent and cannot easily offset these shifts in bank loan supply.

In the context of this work, the focus has mainly been directed towards the first stage of the channel, while the second one, involving consumer behaviours, has traditionally been more debated because of the intrinsic complexities in analysing it. The major implication of the credit channel which has been deemed to be relevant for the scope of this inquiry is that credit institutions have been demonstrated, both empirically and theoretically, to respond differently to monetary policy shocks, designed and implemented by the central bank, according to some of their structural characteristics. The main features which have been researched as distinguishing variables for the differing reaction of bank to monetary stimuli are, respectively: size and capitalization, both related to the concept of "strength" of the selected credit institution, and liquidity, based on the bank's ability to buffer from external shock using excess liquidity as a shield.

The second theoretical argument central to the logic development of the thesis is that of cross-country heterogeneity in the transmission mechanism, widely explored across chapter number two. Such an issue has been the main target of many researchers and practitioners over the last decades: the concern of monetary policy having asymmetric distributional effects on different countries has been a main concern since the period prior to the EMU establishment, to the more recent times of financial turmoil, when, from a normative point of view, knowing in advance how the effects of monetary authorities' intervention would have been distributed across the members of the monetary union could have been of great utility to policymakers. From country-specific structural characteristics to issues of international economics which can influence the geography of the distributional effects of monetary policy, the attention has then moved to investigating the relevance of that heterogeneities which are related to the

bank-lending channel mentioned above: depending on those bank's characteristics, which are also affected by countries' regulatory and legal systems, credit institutions in various member states would grant loans up to different amounts.

Turning to the main hypothesis of the thesis, the aim was that of questioning, through an in-depth literature exploration, coupled with the observation of a number of official ECB statistics, the possibility and eventual direction of a gradual shift in the effectiveness of the transmission mechanism of monetary policy, concurrently with the employment of unconventional approaches in response to the extraordinary economic conditions generated by the financial crisis. Additionally, even if not adopting empirical techniques for a number of reasons detailed earlier on, some approximation of the dynamics which distinguish conventional and unconventional shocks have been shown, in order to provide more accurate conclusions. The key link between the main topics explained up to this point is represented by the bank-lending channel, particularly by its first stage (considering also the second one would imply much more complexity). A wide array of researchers, mentioned throughout the inquiry, has investigated, at the micro-level, the various banks' balance sheet characteristics that affect the response of credit institutions to central stimuli: it seems reasonable to adopt the same methodology, that is analysis of banks' balance sheets, to assess the effectiveness of measures that explicitly targeted the levels of banks' liquidity (which is also one of the most cited features causing heterogeneous banks' reactions).

Many applicative divergencies between the two categories of approach to monetary policy have been detected through the comparative overview performed in table n.4, which detected the following points of divergency:

- Different consequences on banks' future capital position and profitability;

- Implications of the holding of sovereign bonds;

- Degree of information asymmetry between banks and investors;

- Presence of capital or funding constraints, such as regulatory requirements or market pressure;

- Potency of the risk-taking channel;

- Duration and persistence of the effects on the economy.

These factors appear to have an opposite influence on the effectiveness of conventional and unconventional measures of monetary policy. Their normative importance is, therefore,

clearly manifest, as they shall be necessarily kept in mind by policymakers wishing to positively affect the economy, in the design and implementation of monetary measures.

One of the more ambitious estimations which has been provided during the course of the work is that of improved cross-country homogeneity subsequent to the progressive configuration and roll-out of balance sheet innovations. No significant studies have been found, empirically nor theoretically investigating such concerning question. Logically reasoning, the nature itself of unconventional policies, whose aim is the harmonization of banks' behaviour targeting their level of liquidity, shall imply that, if they are to be successful, they shall improve the distributional effectiveness of the bank lending channel, pointing to enhanced equity.

Before explicitly listing the conclusion of the inquiry, it might be worthwhile to mention the results achieved by Kashyap and Stein (1997) in their descriptive research work described across this chapter. The point of major interest they reached in their conclusion is represented by an approximation of the bank-lending channel potency for a number of EMU member countries, proxied by a grade from, A to C, corresponding to progressive responsiveness of banks to monetary policy shocks. Their results were summarized in a table, reported below, which highlights how different factors, mentioned also by many other practitioners in the field, contributed to affecting the intensity of the bank-lending channel

Table 6: Summary of factors affecting the lending channel

Country	Importance of small banks	Bank Health	Importance of small firms	Availability of non-bank finance	Overall predicted potency
Belgium	A	B	B	A	A/B
Denmark	B	B	B	A	B
France	B	C	B	B	B/C
Germany	C	B	A	B	B
Greece	B	B	C	C	B/C
Ireland	B	B	B	B	B
Italy	B	C	C	C	C-
Luxembourg	C	A	A	B	B
Netherlands	A	A	C	B	A/B
Portugal	B	C	C	C	C

Spain	B	B	C	B	B
UK	A	A	A	A	A

Each country has been assigned a letter grade (from A to C) for each of the four chosen factors. A grade of "A" reflects the minimum sensitivity to monetary policy; "C" indicates high responsiveness. Finally, an aggregate grade (shown in the last column), based on a subjective weighting of the factors, has been determined.

Source: (Kashyap & Stein, 1997).

What can be relevant for the scope of this thesis is to highlight how the forced shift to unconventional ways of designing and implementing monetary policy may impact the overall predicted potency of the lending channel. With regard to "Bank health", item which refers to the strength of a bank's balance sheet, that is the extent to which it can use its surplus in liquidity to buffer against external shocks, it would result in a reduced level of sensitivity of the bank-lending channel. One could logically imagine that, with the gradual onset of unorthodox policies, in the eventuality they were successful, a major harmonization of lending standards would have been achieved, potentially leading to a more uniform grade "A" for many of the countries considered. The same could be valid also with respect to "Importance of small banks", whose liquidity position would have been enhanced with the major involvement of central authorities, offsetting size disadvantages that are normally predicted, allowing small banks to access valuable sources of funding. The second stage of the lending channel would need to be tackled more precisely, given the lesser extent of literature on the topic, both theoretically and empirically. Definitely, the overall potency of the lending channel shall result to be uniformly decreased across the various EMU countries, reflected in a generalized tendency towards an "A" rank, which would, anyway, lead to a more homogeneous aggregate result. Further econometric techniques would be suggested for investigating more precisely, from a micro point of view, how the different balance sheet items affect lending activity in the sample of country considered, providing a more precise spectrum of conventional versus unconventional policies' functioning.

3.5 Concluding remarks and suggestions for future research

After having discussed the dynamics behind the main findings of this work, which is just to be completed, a schematic description of the conclusion that have been reached, moving from the initial hypotheses, will be provided:

1. First of all, the more intuitive conclusion moves from the hypothesis of an effectiveness differential caused by the switch to unconventional measures of monetary policy. The answer, in this case, has easily been inferred from an in-dept literature exploration, widely documented by empirical evidence. The focus on the bank-lending channel of the transmission mechanism allowed to tighten the focus, given the perspective of further research on the topic, as well as to concentrate on banks, considered as key agents for the transmission of unconventional measures. Definitely, unconventional measures tend to favour the harmonization of lending activity across banks of various sizes and strength, as well as throughout countries, reducing its intensity and endurance, together with other factors listed in table n. 4;

2. The question of cross-country heterogeneity, with its determinants, has been tackled from many perspectives, deepened across chapter number two. Again, the topic has been largely explored from researchers applying empirical techniques and extracting helpful insights, despite the absence of a full consensus. What still lacks, in this field, is an integrated framework for studying it in relation to the types of monetary measure adopted. Focusing again on the bank lending channel, a sort of agreement, across researchers and practitioners, exists on the structural features of banks contributing to asymmetries between banks, as well as across EMU members, that are, respectively, related to banks' size, strength and liquidity, as inferred from their balance sheet items. With regard to the just-mentioned hypothesis, this study seeks to predict an improved degree of uniformity across countries in the response of the relative credit institutions to unconventional monetary shocks, compared to traditional interest rate innovations;

3. An unexplored field of research, strictly connected to the topics just described, might be represented by the study of the way banks' balance sheet items and structural characteristics, traditionally influencing the bank lending channel, have been altered by the progressive emergence of unorthodox measures of monetary policy. The predictions that have been formulated throughout this work, thanks also to the stylized facts analysed in paragraph 3.3, are limited to the emphasized reduced role of liquidity, whose harmonization has been explicitly targeted by central authorities in the design of balance sheet innovations. Definitely, the transmission mechanism of unconventional policies, via the bank-lending channel, shall result to be diminished in its potency and more homogeneous in its distributional effectiveness across countries, with regard to liquidity features of banks. A more comprehensive conclusion should

have included also banks' strength and size characteristics, as inferred from their balance sheet. Generalizing, the same findings, moving from the same rationale, might be extended also to such other items, traditionally described as factors affecting interest rate innovations.

The conclusions of this work, that is almost to be completed, are far from being exhaustive. For this reason, some suggestions, helpful for guiding future streams of research, will be provided. The natural continuation of this work would be that of empirically testing the main hypothesis and verify whether the theoretical prediction steaming therefrom were accurate in their essence. To do so, the employment of a balanced dataset of banks from a consistent number of EMU countries (or, at least, from the major ones, reducing complexity of the analysis, but loosing relevance of the results) would be necessary, in order to grasp significant cross-country implications. Alternatively, in case of lacking of suitable database, the micro-analysis might be conducted on a sample of banks from a single country (better one of the most influent EMU members, which might more likely resemble the Union as a whole) in order to extend the results to the entire Euro-area. The main advantages of adopting methodologies based on micro steaming from banks' balance sheet items, compared to approaches centred on the use of aggregate data at country-level, have been exposed throughout the course of this chapter. A crucial phase in the analysis would be that of distinguishing among conventional and non-conventional shocks, in order to draw a clear demarcation line between the two.

Connected to this concern, it might be worthwhile to mention the approach adopted by Favero et al. (1999), who focused their attention on the market for bank reserves, the one where the central bank intervenes directly. In the attempt of schematically represent its functioning, it might be said that:

- The behaviour of the demand function is settled by the way banks operate. It is negatively sloped, as the demand for reserves is dependent on the amount of bank deposits, which, in turn, are negatively in function of the opportunity cost of retaining money;

- The supply function is, instead, piecewise, as it is composed of two flat segments and a perpendicular one. The interest rates on the two standing facilities stand for a minimum and a maximum threshold to the overnight rate. Banks are allowed to store funds with the central banks at the deposit rate, i_{min}, and borrow cash from the central bank at the marginal rate, i_{max}. As a result, the overnight rate cannot be inferior than the rate at which cash can be deposited, nor can it be higher than the marginal lending

rate: actually, it varies across a defined interval. The upward sloping portion of the supply function results to be vertical, consistently with a central bank that settles the amount of bank reserves through open market operations, independently from the overnight rate.

Figure 10: The market for bank reserves in Europe
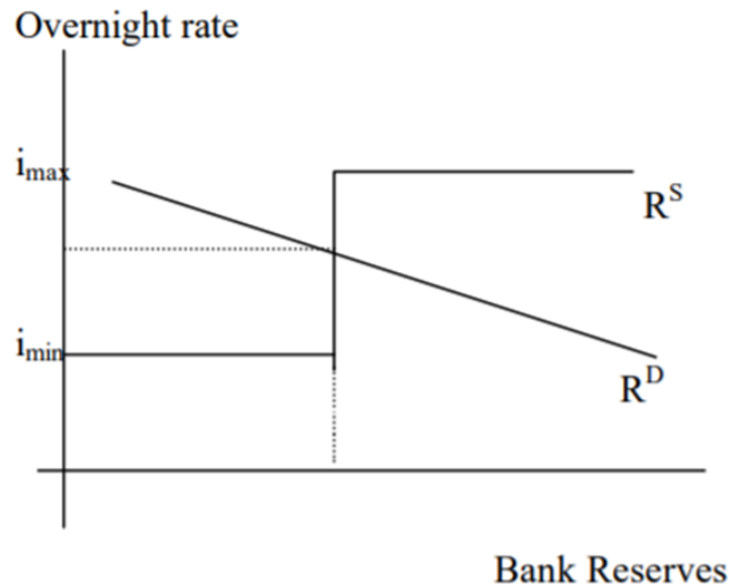
Thanks to this theoretical background, the authors managed to attribute two shifts in real interest rates to monetary policy measures just observing fluctuations in reserves and coupling them with interest rates and output gaps movements (Favero, Giavazzi, & Flabbi, 1999).

Additionally, an alternative method which can be adopted to distinguish between standard and non-standard monetary shocks is the oversimplified one of assuming one year as unique divide between the application of the two types of measures; it would be, then, easy to verify the differences among the two sub-periods. Furthermore, in order to add a degree of sophistication, it might be possible, if deemed feasible, to integrate the results from the analysis at the micro-level, based on the response of banks proxied by its balance sheet items, with some findings inferred from the implementation of more complex econometric techniques, like vector autoregressive models or macroeconomic frameworks involving several equations, which works at a country-wide level. These methodological approaches would allow to more precisely validate the findings of previous analyses and, at the same time, to check the existence and potential influence of additional factors, other than banks' features on the results. Such source of disturbance for the results might be researched in international economics phenomena, like spillover effects that can amplify cross-country

differences, or legal and bureaucratic constraints that might be visible only at the aggregate level.

In conclusion, the normative importance, from the perspective of central authorities, of gaining some insights on the functioning of the transmission mechanism of monetary policy, especially after the innovated procedural approach subsequent the period of financial turmoil, has been highlighted several times. This work aimed, using a mainly descriptive approach, at shedding some light on the theoretical issues behind such concerns and at providing a starting point for future researchers wishing to improve the effectiveness and distributional equity of the European Central Bank interventions, coupled with a substantial consciousness of the disparate implications of conventional and unconventional measures of monetary policy.

Conclusion

The path of this work, which is almost to be completed, has followed a logical approach starting the exploration of conventional and unconventional measures of monetary policy across the first chapter. Such investigation has been conducted from various perspectives, from a purely historical one, aimed at grasping the dramatic consequences of the forced shift to non-standard policies as a result of the financial crisis, to a more practical one, intended to shed more light on the applicative differences, as well as on the transmission mechanisms, of both types of measures. The concern, that has been the central topic of various streams of research over the last decades, of the potential inter-country asymmetries existing in the Euro area with regard to the effectiveness of monetary policy, has been tackled over the course of the second chapter of the inquiry. A number of researched causes for such issue have been analysed, belonging again to different historical periods of the last three decades: both structural, country-specific and international dynamics, as well as institutional and regulatory constraints, have been found to play a role in exacerbating the existing divergencies in the effectiveness of the monetary pass-through to the real economy. A particular focus has then been dedicated to the bank lending channel of the transmission mechanism, particularly relevant for explaining such effectiveness heterogeneity. The third chapter aimed at combining the preceding ones in terms of questioning whether the bank lending channel has been experiencing a shift in its effectiveness, as well as assessing the direction and intensity of such shift, parallelly to the forced passage from conventional to unconventional measures of monetary policy. The stress on the bank lending channel underscores the crucial role of credit institutions in transmitting monetary decisions on the real economy, which would be felt differently by various countries according to the extent of banks' liquidity, size and strength (as derived from some balance sheet items). The choice to rely on banks for predicting the effectiveness of the transmission mechanism was also rooted in the preferred methodology of adopting micro-dataset made of banks' balance sheet items to make inference on their lending activity, instead of employing approaches based on aggregate data, which might also reflect institutional or structural differences among states.

Three main conclusions have been achieved through the comparative overview of the bank-lending channels for conventional and unconventional monetary measures:

1. An improved degree of uniformity across countries in the response of the relative credit institutions to unconventional monetary shocks has been detected, compared to traditional interest rate innovations. This first, more intuitional, outcome steams from the natural implication of unconventional measures, namely the fact that they were

originally outlined for the alignment of lending standards across European banks. Lending activity definitely proved to be less intense in its potency and but more homogeneously distributed across credit institutions located in EMU countries. The main divergencies in the lending channels for the two categories of measure relate to: different consequences on banks' future capital position and profitability; implications of the holding of sovereign bonds; degree of information asymmetry between banks and investors; presence of capital or funding constraints; potency of the relative risk-taking channel; Duration and persistence of the effects on the economy;

2. With regard to the structural dimensions contributing to differently affect cross-country heterogeneity, a number of banks' balance sheet items have been studied. Those commonly considered, by practitioners and researchers, as the most influent ones, even if to differing extents, are those of liquidity, strength and size, which have been computed in a number of ways according to the available data. Without running regressions or empirical approaches, what can be predicted is a greater degree of uniformity in the influence such determinants have on lending activity, parallelly to the standardization of the banking sector which is one of the explicit objectives of unconventional monetary policy;

3. Further empirical research would be needed to practically sustain such theoretical assessment. The most adequate methodology would be represented by the application of econometric techniques to datasets composed of banks' balance sheet items, in order to better grasp their individual reactions, which, matched with institutional and structural country characteristics, might give an idea of the reduction of cross-country heterogeneity. A degree of complexity could then be added combining such results with an aggregate analysis on a group of Euro members in order to have a more integrated comprehension of other factors that could affect the obtained result.

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