JUDIT SÁGI
BALÁZS FERKELT

Monetary policy and transmission in the eurozone and in Hungary before and after the 2008-2009 crisis

APOSZTRÓF

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INTRODUCTION

The third stage of Economic and Monetary Union, as well as the common supranational monetary policy of the euro area inaugurated on 1 January 1999. In the first decade, the currency area expanded steadily, but the European Central Bank faced serious challenges as a result of the global financial and economic crisis of 2008-2009. The effective and efficient functioning of the common monetary policy has been further hampered by the sovereign debt crisis in some eurozone member states, which has caused a recession throughout the European Union. The 19-member euro area is about to expand further, and all EU member states, with the exception of Denmark with an opt-out, have an obligation under the EU acquis to join the Economic and Monetary Union and to strive to meet the conditions for adopting the euro.

The aim of our book is to assess and analyze the monetary policy of the euro area, in particular the functioning of the monetary transmission mechanism and their changes as a result of the global financial and economic crisis of 2008-2009. We place special emphasis on the use of non-conventional monetary policy instruments, which have been used by more and more central banks around the world since the crisis. It is not the purpose and subject of this volume, but in some chapters we discuss the effects of the COVID-19 pandemic and the tools introduced as a result. In a separate chapter we deal with the monetary policy of the Magyar Nemzeti Bank (the Central Bank of Hungary), focusing on the operation of the monetary transmission mechanism. Research material and data collection was closed in August 2020.

1. MONETARY POLICY INTERVENTIONS AND TRANSMISSION FROM A THEORETICAL POINT OF VIEW

1.1. EFFECTIVENESS OF MONETARY POLICY INTERVENTIONS

„Uncertainty is not only a specific but also a fundamental feature of the monetary policy area." (Greenspan, 2003) Despite all its cautious considerations, the monetary authority is not able to assess the full impact of its interventions on the economy and does not even have a complete picture of the initial state of the economy.

The assumptions about the effects of central bank interventions necessarily move within the framework of some theoretical paradigm system. The controlled flow of the result of monetary policy interventions, the so-called monetary transmission, cannot be interpreted without taking into consideration the actual course of the economic policy or the structural-institutional state of the economy.

Monetary policy, according to the classical monetarist approach, has little effect on real output in the long run, given that the latter is influenced by real economic factors such as the skills of the labour force or the level of technology. According to the cited principle of monetary neutrality, in the long run, monetary policy can only change the evolution of the price level (Masuch *et al*, 2003).

The above principle of monetary neutrality seems to contradict the fact that inflation volatility may affect certain real economic variables, even in the long run. Experience has shown that unexpected and large fluctuations in inflation rates, employment levels and output levels cause significant additional economic and social costs and dampen long-term economic growth (Kiss and Kwesi Ampah, 2018; Kwesi Ampah and Kiss, 2019). Conversely, price stability contributes to the long-term planning of the private and public sectors and to improving the return on capital invested in the development of tangible and human resources. (Veress, 2001)

We can talk about price stability when economic agents do not have to bother with a shift in the price level when making their economic decisions. Monetary policies are defining some kind of medium- or long-term inflation target (or target band). It can be stated that an inflation target is not an absolute value, which is irrelevant to the state of the economy and growth prospects: in theory, both high and near-zero inflation rates can cause welfare losses.

Welfare losses attributed to high inflation are (Briault, 1995):

- Given that in income taxes the tax base is the nominal wage, a higher inflation rate will lead to higher tax burdens, even if the country's economic performance remains the same.
- The information content of accounting reports and financial statements is distorted as a result of high (and variable) price indices.
- The higher nominal interest rate level resulting from a higher expected inflation rate increases the interest burden within loan repayments and increases the interest rate sensitivity of investments.

A higher inflation rate can also mean a more uncertain inflation environment. According to Briault (1995), the costs of inflation rate uncertainty are as follows:

- High level of inflation tends to distort the information content of market prices: it is not possible to determine whether the increase in the prices of given products/services was caused by changes in market demand and supply conditions or an increase in inflation.
- High inflation has an unintended effect of redistribution of incomes as the structure of prices and wages changes: the different inflationary expectations of certain market agents differ in each sector of the economy, which might result in differing price and wage levels.
- Inflationary uncertainty makes long-term financial planning unrealistic and long-term financial investment irrational.

- Alongside with high inflation, foreign investors expect a higher risk premium thus increasing the financing burden on domestic debtors.

A near-zero inflation rate could cause welfare losses mainly because, in the event of a negative demand shock in the economy, as prices can no longer fall, businesses will reduce production and employment levels. Thus a low but positive inflation rate in times of recession may be less conducive to lower economic output and employment levels – provided, of course, that prices and wages are not inelastic downward.

In any economy a zero inflation rate can easily turn into deflation. The welfare losses attributed to deflation are as follows:

- The general decrease in the price level reduces the value of the collateral behind the loans, i.e. it worsens the creditworthiness of the debtors. This is particularly dangerous for listed companies, as it can coincide with falling stock prices, making it even more difficult for companies to raise external funds.
- Households, in anticipation of further declines in the prices of goods and services, may choose to postpone consumption which may result in a decline in aggregate demand. However, this effect can be mitigated by public policy measures (see for example Lentner *et al*, 2017a, 2017b); Ságі *et al*, 2017, 2018).
- In an environment of low nominal interest rates, the possibility of monetary policy intervention is limited: with interest rate policy, there is no possibility for monetary expansion. This is the so-called liquidity trap phenomenon.

The above justifies that monetary authorities set a low, positive inflation target band. It is no coincidence that the Governing Council of the European Central Bank set the medium-term inflation target for the euro area at 2% in 1998; nor did the fact that they specified this in May 2003 mean that the inflation rate should be close to 2%. However, it cannot be ruled out that the ECB's monetary policy is asymmetric, i.e. it intervenes sooner if the inflation rate increases than when it decreases (around 2%). Its quantitative definition is

that "Price stability is defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%." The Hungarian National Bank set its target at 3% (±1 p.p. tolerance band), from 2007 till now.

In the short to medium term, monetary policy may indirectly affect the level of real output, assuming that nominal price and wage levels are inelastic in the short run. The latter condition is usually met (for example, due to wage agreements or due to the narrow range of cost-indexed products), with differences in scope and duration at most, leaving room for monetary policy intervention.

In the long run, real income (real GDP) in the economy increases as a result of supply-side factors (technical development, capital accumulation, skilled labor, etc.). While fiscal policy can have some influence on these supply-side factors, monetary policy (in the long run) cannot change the growth trajectory of the economy. (Moreno, 2003)

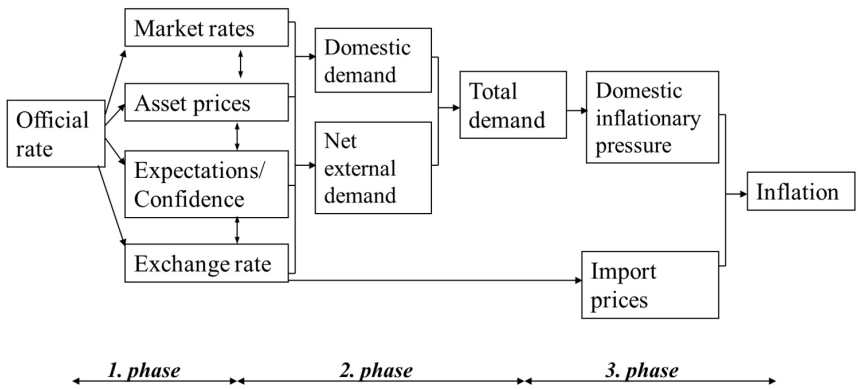
Assuming the effectiveness of central bank interventions in terms of the growth rate of the real economy (while maintaining that the strength of the effects induced by the interventions depends on the length of the period under review), it is still debatable how the interventions work. There is no consensus on the impact of monetary policy interventions on the certain segments of the economy, or rather on their intensity. (HM Treasury, 2003)

1.2. MONETARY TRANSMISSION, THE EFFECTS OF CENTRAL BANK INTERVENTION - GENERAL MACROECONOMIC MODEL

Leading monetary authorities across the world, in particular the European Central Bank, the Bank of England or the Federal Reserve System, use different assumptions (models) regarding the likely effects of monetary policy interventions on the real economy (King, 2002). Highlighting the differences, it can be said that in contrast

to the Fed's deliberately active economic stimulus policy, the ECB typically refrains from influencing the real sector; while the Bank of England, mentioned third, is mostly having an intermediate position. In the latter case, the decisions of the Monetary Policy Committee (consisting of representatives of commercial banks) are intended to influence monetary variables primarily, but it does not disregard the effects of its decisions on the real economy. A further feature of the Bank of England model is that it assumes an open national economy, which is why it treats the exchange rate as a key variable. Due to the above the model prepared by the Bank of England's Committee fits the theoretical grounding of the monetary transmission mechanism. (Figure 1)

Figure 1: The traditional monetary transmission model of the Bank of England



Source: Bank of England (1999)

According to this model, decisions about the official interest rate affect economic activity and inflation through several channels:

- First, official interest rate decisions affect market interest rates (such as mortgage rates and bank deposit rates), to varying degrees;
- Second, these changes in turn affect the spending, saving and investment behaviour of individuals and firms in the economy;
- Third, the level of demand relative to domestic supply capacity – in the labour market and elsewhere – is a key influence on domestic inflationary pressure. (Bank of England, 1999)

In the first phase of monetary transmission a change in the central bank base rate has an impact on money market interest rates (i.e., interest rates on bank deposits and mortgages), asset prices, and the exchange rate. At the same time, the central bank's announcement influences the expectations of financial market agents regarding the future development of the economy and their assumption on the credibility of the economic policy course. The second phase illustrates that the former changes have an impact on private sector spending, savings, and investment decisions. The change in aggregate demand, in terms of its value relative to domestic aggregate supply, plays a crucial role in the formation of domestic inflationary pressures. Finally, although often with significant delays, in the third phase, changes in the foreign exchange rates directly affect domestic prices of imported goods and services and indirectly affect the prices of domestic substitutes, and ultimately the rate of inflation. (Bank of England, 1999)

1.2.1. PHASES OF MONETARY TRANSMISSION

1.2.1.1. The 1st Phase

The main instrument of central bank monetary policy intervention is the central bank's base rate, which results from the fact that the central bank creates the monetary base (M0, i.e., high-powered money). An important aspect is that the central bank is able to set the interest rate at which it is willing to finance the commercial banks who belong to compulsory reserving. What kind of instruments (a two-week repo or other instrument suitable for refinancing) are used in doing so is of secondary importance to this topic.

The strength of the effects generated by a change in the central bank's base rate depends primarily on the extent to which financial markets expected the interest rate change, the extent to which they incorporated the new interest rate level into their previous decisions, and their expectations for the near future. Theories describing the transmission mechanism (see also Crespo-Cuaresma et al, 2003) usually assume that financial markets do not expect either a change in the base rate next after a previous base rate decision or other monetary intervention. This assumption can be maintained in a stable economic policy environment with a credible and accepted monetary authority.

Changes in the central bank's base rate have an immediate effect on changes in money market interest rates, including interest rates on interbank deposits and other central bank instruments. The consequence is that commercial banks will re-price their loans, depending on the interest period of the loans, first overdrafts and then mortgages. Banks adjust their offered deposit rates to the changed interest rate level, with the presumed intention of maintaining a near-constant interest margin. (Gaspar et al, 2002)

Unlike money market interest rates, the long-term interest rates may even turn in the opposite direction to changes in the central bank

base rate. This is because the long-term interest rate level is the average of spot and expected short-term interest rates, and consequently depends on the interest rate expectations of the financial markets accompanying the change in the base rate. For example, if an increase in the central bank's base rate predicts a decline in future interest rates for financial market participants, a fall in long-term interest rates should be expected. (Reinhart and Sack, 2002)

Changes in the central bank base rate affect the *price of securities* (bonds, shares). Bond prices react inversely to changes in the long-term interest rates, so if the central bank base rate is increased, the price of fixed-rate bonds is expected to fall. Assuming all other factors remain unchanged, the same is true for stock price developments: after a central bank interest rate hike, the cash flow expected by investors should be discounted at a higher interest rate, therefore the present value of the estimated cash flow will be lower.

The monetary authority's decision upon the base rate – within certain limits (and here, of course, excluding fixed exchange rate regimes) – can affect the exchange rate of the domestic currency. The exchange rate is, by definition, the relative price of the domestic and the foreign currency, and therefore depends on both domestic and foreign monetary policy rates. The exact impact of changes in the central bank's key interest rate on foreign exchange rates cannot be determined given that the development of foreign exchange rates depends on the expectations of the financial markets regarding the domestic and the foreign interest rate and price levels; where the latter (i.e., expectations) may themselves be associated with central bank interventions. Consequently, assuming all other factors remain unchanged, the unexpected increase in the central bank base rate in foreign exchange markets leads to an immediate appreciation of domestic currency due to the fact that the widening relative interest rate differential makes the domestic investment more attractive to foreign investors. However, the strengthening of the exchange rate may reach a level where foreign investors calculate that the weakening

of the forward exchange rate makes it indifferent to choose between holding foreign or domestic financial instruments. (Upper and Worms, 2003)

The central bank's base rate, as a key monetary policy instrument, has an impact on the financial markets' expectations about the future course of the real economy, as well as on how stable their expectations are. The expectations of financial market participants are determining the private sector as a whole, influencing the anticipated changes in wages, price levels and profits for the future. However, expectations are characterized by the fact that their directions and effects are difficult to predict (Ságі and Lentner, 2019). For example, a rise in central bank interest rate can be interpreted by financial markets as an indicator that the central bank considers economic growth to be faster than expected, leading to a further strengthening of the general optimism. Or, conversely, they may interpret the central bank's intervention as a moderation necessitated by overheated economic growth and the achievability of the inflation target, which makes financial markets perceive the sustainability of the economy's past growth rate as uncertain. Consequently, financial market expectations bring an element of uncertainty into the mechanism of action of monetary policy interventions that makes credibility and transparency an integral part of central bank policy, at least as required preconditions to any intervention. (Kákosy *et al*, 2003)

1.2.1.2. The 2nd Phase

The central bank's decision to change the key interest rate has therefore changed the level of money market interest rates, the market price of financial instruments, and foreign exchange rates through the reactions of the financial market agents. In the second phase, the level and structure of private sector expenditures will change. In examining this, it is reasonable to assume at start that expectations are

stable and that monetary policy intervention has not had an impact on the current fiscal policy stance.

Households are affected by the central bank intervention for several reasons. (Sági, 2002) On the one hand, as a result of changes in deposit and loan interest rates, the disposable income of households and the ratio of savings to consumption change. Rising retail lending rates, with unchanged nominal income, reduce household income that can be going to consumer spending. Consumption levels before raising interest rates can only be maintained through higher indebtedness or a reduction in savings, which makes it likely that consumption expenditures will decline. On the other hand, rising retail deposit rates provide an incentive for households to increase their bank savings, i.e., to defer their consumption. Changes in the base rate and money market rates clearly do not worsen (e.g. through rising bank lending rates) or improve (due to rising deposit rates) the *income situation of households* in the same way, but rather have a redistributive effect: for example, favours net savers.

As a result, changes in the market price of financial assets affect household wealth. An increase in forward interest rates leads to a fall in the market price of financial market instruments, i.e. securities, and therefore reduces the financial wealth of households. Declining demand on the real estate market as a result of higher lending rates is holding back the real estate prices, worsening the future value of the real estate assets of the households and making it more difficult for households to borrow against real estate.

Finally, the adjustment of foreign exchange rates to changes in interest rates has an impact on the relative price level of goods and services in domestic and foreign currency thereby influencing the expenditure structure of households. In addition, the assets of households held in foreign assets are revalued (although this is not significant for most households).

Taking into consideration the impact of monetary policy on household expectations, if the assumed aim of central bank policy is to

stimulate the economy, then expectations of rising employment and income levels will stimulate household consumption expenditures. (Ságí, 2004)

The change in the central bank's key interest rate – through the adjustment of the money market interest rates – directly affects the cost of borrowing by enterprises. Rising financing costs worsen the return on investments for businesses and increase the cost of holding inventories. The effect of the interest rate hike does not affect companies in the same way here either: while the interest burden of companies generally increases, companies with a high stock of liquid assets realize higher interest rates on their bank deposits. Theoretically it is also possible that by matching the maturity of their assets and liabilities enterprises are able to minimize the impact of changes in interest rates. (Only in theory because the adjustment of deposit and lending rates usually differs in time and extent and because firms are exposed to the volatility of money and capital markets at the same time. Moreover, the impact of monetary policy interventions on bond and equity prices is only indirect due to a process that is difficult to estimate for issuing companies.) (Horváth *et al*, 2005)

Changes in asset prices – the price of securities and real estate – affect the ability of businesses to raise funding, in part through the change in the net asset value of companies, be it any form of borrowing, banking or capital market (see e.g. Molnár and Hegedűs, 2018). Generally, low interest rates increase the value of assets pledged as collateral for bank loans and appreciate the asset prices of listed companies.

Changes in foreign exchange rates directly affect the profitability of most companies (noting that this effect is only partly attributable to monetary policy interventions). The appreciation of the domestic currency generally worsens the competitiveness of domestic exporters and/or companies exposed to import competition and conclusively the profit margin of export sales. The most exposed companies to foreign exchange rate effects are the ones that export and those

that produce goods and services that replace imports on the domestic market; especially if a significant portion of their costs are incurred in domestic currency.

One of the most significant effects of central bank intervention can be examined in the context of economic expectations and, above all, expectations in relation to corporate investments. Depending on whether managers (and owners) are optimistic or pessimistic about the future state of the economy and the expansion of consumer demand, they decide to start or postpone investments in tangible assets. The importance of their decisions is indicated by the fact that the investments that have already started cannot be stopped later, or only at significant losses. As a result, the outcome of the effects induced by central bank intervention is not known in advance, but it is crucial for investment demand. (Kátay and Wolf, 2004)

Due to the above effects the central bank's decision to change the base rate influences the total expenditures of the private sector. Domestic income – by definition, according to the expenditure approach – can be described as the sum of consumption, private investment, government expenditure, to which net exports are added, and the final aggregate is the category of gross domestic product (GDP).

1.2.1.3. The 3rd Phase

Through the effects of the first and second phases of monetary transmission described above, changes in the central bank's base rate are directly or indirectly influence nearly all actors in the economy. Undertakings whose operations are not directly affected by changes in interest rates, securities prices and foreign exchange rates are indirectly affected in the third phase of transmission through changes in *consumer and producer demand*. Moreover, this indirect effect is amplified by the expectations of economic actors. In part, this explains the cyclical nature of the economy, in which busines-

ses are optimistic about investment in good times; or conversely, they restrain their investment spending during a sustained downturn. This also means that central bank intervention will ultimately not have its full effect on households and businesses whom have been directly affected by interest rate changes. Similarly, the extent of the effect may not necessarily be measurable through gains/losses generated by changes in interest and foreign exchange rates. (Valentinyi, 2005)

Any change in the central bank's key interest rate will take full effect after a certain period of time (this phenomenon is called as "time lag" and is persistent in all phases of monetary transmission). Money markets are adapting quickly, but interest rates on retail deposits or retail mortgages, for example, react late to changes in central bank interest rates; as a result, the impact on consumer demand is to be delayed in time. Companies are perceived to adjust the level of their retail stocks and, indirectly, their producer stocks to the anticipated changes in consumer demand. The level of production activity influences the investment and employer decisions of enterprises, where the latter has an impact on consumption expenditures through wage outflows. This adaptation process is time consuming. (Olsen *et al*, 2003)

The experience of the monetary authorities reflects that, on average, monetary policy intervention has an impact on private sector demand and output levels over a period of one year; and another year is needed for its full impact on inflation to materialize. The uncertainty of the estimate cannot be ignored, however, especially given that the change in the base rate has the effect of changing several other factors, most of which are not measurable. These factors include the confidence index of enterprises and households, their inflation expectations, the current state of the economic cycle, or a world economic event, all of which are outside the direct scope of monetary policy. The delayed and uncertain adjustment process is reflected by the consumption and the investment demands, as well as prices and wages.

There is a sound theoretical framework for estimating inflationary pressure in economics. (Skořepa and Kotlán, 2003) If the difference between the current GDP and the potential GDP, the so-called "output gap" is positive, it indicates that the over-demand in the economy has raised aggregate supply above its long-term sustainable (potential) level, while the utilization of production capacities has exceeded the normal value. The latter presumably increased the unit cost of production, which, in an attempt to compensate, is to be mitigated by businesses as an attempt to increase their unit sales prices. Excess demand encourages enterprises to raise the level of employment, which, through the growing outflow of wages, will increase consumer demand and result in further growth in wage and price levels. The overshooting in demand may also be accompanied by a current account deficit. Consequently, a positive "output gap" is likely to lead to an increase in the inflation rate. Conversely, a process in the opposite direction accompanies the negative "output gap" with an expected slowdown in the rate of inflation.

If we accept the thesis that in the economy there is a so-called potential level, this designates an income level at which firms make full use of their capacity but are not forced to raise prices above the inflation rate. If the current GDP can correspond to the potential income level, then – in theory – there is no inflationary pressure in the consumer goods market and the labour market is also in balance.

In practice, the difficulty is caused by the fact that it is difficult to measure the "output gap", for example, because structural changes in labour supply and production can shift the maximum of the production levels. Different sectors of the economy may face different capacity constraints in the event of a boom and may decide to lay off workers at different levels of production in the event of a downturn. Moreover, no two economic cycles are alike, and similarly, one sector is not like the other. Consequently, the theoretical framework of the "output gap" is not suitable for making a meaningful contribution to measuring inflationary pressures in the economy. Rather, it is

important, for the controllability of the inflation as well, that there may be a (potential) level of output at which aggregate demand and aggregate supply are close to balance. (Lippi, 2003)

Apart from the existence of external shocks, the inflation target could only be achieved if the real GDP close to potential output was consistent with the rate of inflation expected by economic agents and considered desirable by monetary policy. Inflation expectations of economic agents are reflected, among other things, in wage negotiations and, through rising labour costs due to excessive labour market demand and high inflation expectations, in the prices of goods and services. The level at which the inflation rate stabilizes as a result of all these effects is the result of monetary policy interventions and the credibility of the inflation target. (Lohmann, 1992)

Finally, changes in exchange rates, in addition to changes in the value of net exports, also have a direct effect on the rate of domestic inflation. Changes in the foreign exchange rate affect the domestic prices of imported goods both for goods and services consumed and for goods and services used for domestic production. The effect of changes in the exchange rate on domestic inflation can take several months, and it is not only working one direction: the difference in the rates of domestic and foreign relative inflation rates affects the foreign exchange rate adjustment through the relative purchasing power parity relationship. (Naszódi, 2004)

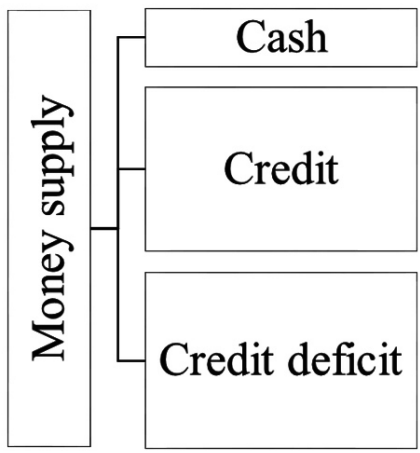
1.3. THE NEW MACROECONOMIC MODEL WITH QUANTITATIVE EASING

Quantitative easing is a tool that central banks can use to inject money directly into the economy. The aim of QE is simple: by creating this 'new' money, the monetary authority aims to boost spending and investment in the economy. When the global recession took hold in late 2008 the Bank of England quickly lowered base rate from 5%

to 0.5% to support the UK's economic recovery. With lower interest rates it is cheaper for households and businesses to borrow money – which encourages them to spend and invest. However, there is a limit to how low interest rates can go. Therefore, when the monetary authority needed to act to boost the economy, it turned to another method of doing so: it introduced quantitative easing.

When an economic crisis occurs, banks reduce the amount of loans for a variety of reasons. At this time the bank will hold more cash than the statutory reserve forming an „excess reserve". The money multiplier decreases, and the money supply decreases. At this point, the need for the central bank's intervention arises, because of the shortage in the money supply across the economic sectors. (Figure 2)

Figure 2: The need for quantitative easing – the shortage in the money supply



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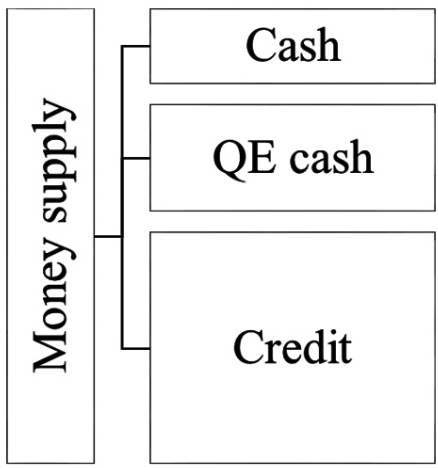
The financial crisis has therefore resulted in a reduction of money supply. As a response, the monetary authority hopes to restore the money supply in order to prevent the adverse effects of deflation. There are two ways to do this: increase the currency multiplier and increase the monetary base. During the economic crisis, monetary authorities first adopted the method of lowering interest rates, making loans cheaper, and thus stimulating the accessibility of loans.

Since bank loans have not been recovered and money supply has continued to decline, as a result the monetary authority decided to use the second method to increase the base currency and inject cash into the banking system. Injecting cash like this is called 'quantitative easing (QE).' It does not increase the total amount of money, only changes the structure of the money supply. (Figure 3)

Figure 3: The need for quantitative easing – the access cash



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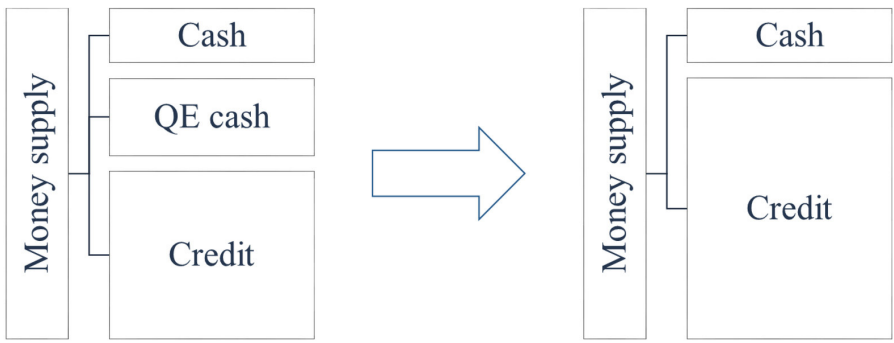
By injecting cash through quantitative easing, the monetary authority hopes that banks can take the initiative to find opportunities to make money, lend out this part of the cash, and eventually restore the money multiplier. The first situation is, when quantitative easing successfully stimulates the loan (Figure 4). After the loan resumes, the monetary authority withdraws the funds injected before, and finally the size and composition of the money supply recovers to its previous level.

Figure 4: The quantitative easing – if the intervention was successful



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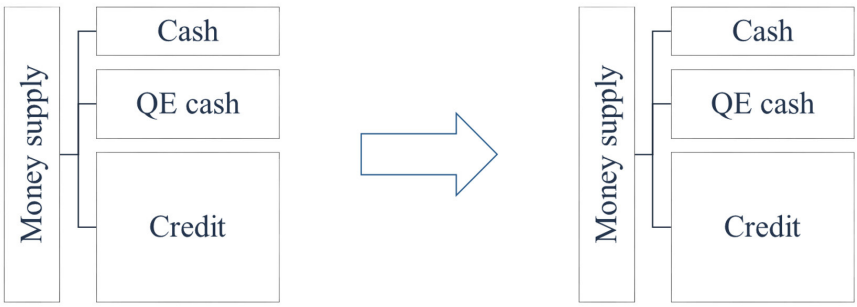
The second case is, when quantitative easing does not stimulate lending in the economy. Commercial banks keep the injected funds in excess reserves and do not release loans. The currency multiplier remains unchanged. Under such circumstances, the economy remains in a state of quantitative easing for a long time until the economy recovers. (Figure 5)

Figure 5: The quantitative easing – if the intervention failed



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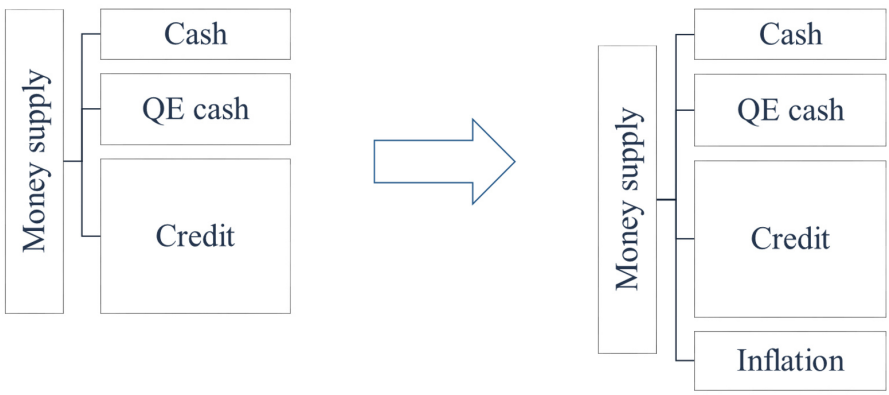
However, there is a third case, when commercial bank loans resume, still the monetary authority does not withdraw the quantitative easing cash for political, fiscal, economic or other reasons. (Figure 6) In this case, the recovery currency multiplier acts on the larger monetary base, and the money supply grows greatly, resulting in higher inflationary pressure and an increased rate of inflation.

Figure 6: The quantitative easing – if mistakenly not withdrawn on time



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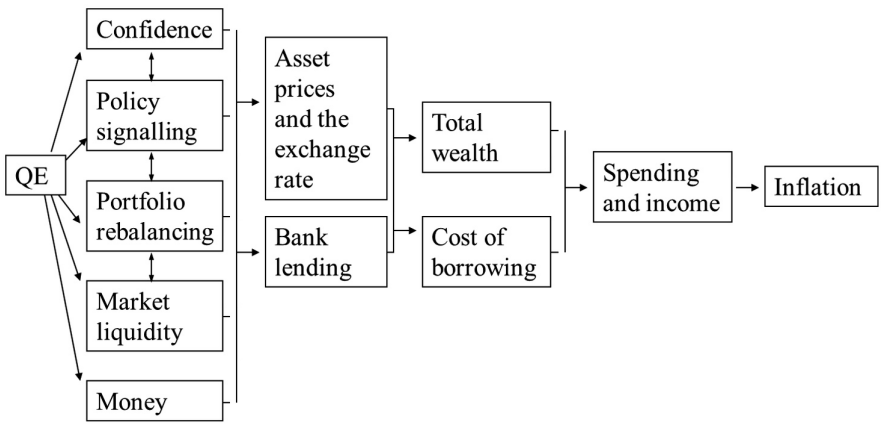
In response to the deepening of the financial crisis in late 2008 the Bank of England, alike other central banks, loosened monetary policy using both conventional and unconventional policy measures (Kiss and Balog, 2018). The principal element of these unconventional measures was the policy of asset purchases financed by central bank money, the so-called quantitative easing (QE). Over the period March 2009 to January 2010, £200 billion of assets (mostly government securities) were purchased, representing around 14% of annual GDP of the United Kingdom. (Bank of England, 2012)

In Europe after the financial crisis it is still difficult to start the economy with loan interest close to a zero percent interest rate level. QE applies to a long-term policy, which has a reference level of zero or below zero. It cannot stimulate the economy by further lowering the benchmark interest rate. Instead, it must switch to large and medium-term bonds to reduce long-term interest rates.

As a result of the above the theoretical model of monetary transmission has also been aligned as quantitative easing was incorporated instead of the central bank's base rate. (Figure 7)

Figure 7: The New monetary transmission model of the Bank of England (with quantitative easing)



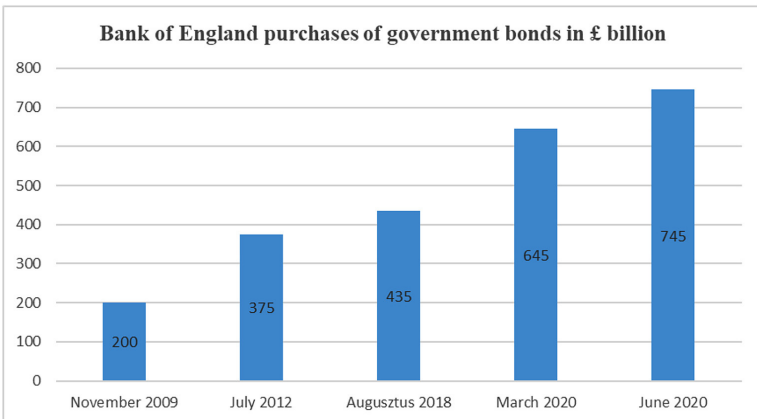
Source: own from the Bank of England (2020)

In the above model large-scale purchases of government bonds lower the yields on those bonds. This pushes down on the interest rates offered on loans (e.g. mortgages or business loans) because rates on government bonds tend to affect other interest rates in the economy. As a result QE works by making it cheaper for households and businesses to borrow money – encouraging spending.

In addition, QE can stimulate the economy by boosting a wide range of financial asset prices. Suppose we buy £1 million of government bonds from a pension fund. In place of the bonds, the pension fund now has £1 million in money. Rather than holding on to this money, it might invest it in financial assets, such as shares that give it a higher return. When demand for financial assets is high, with more people wanting to buy them, the value of these assets increases. This makes businesses and households holding shares wealthier – making them more likely to spend more, boosting economic activity.

In case of the Bank of England, rounds of QE have been announced in response to the economic conditions in the following dates: at the beginning and then in the later course of the financial crisis, after the EU referendum, and finally during the Covid 19 pandemic. Figure 8 shows how bond purchases have built up over the years:

Figure 8: Increasing amount of quantitative easing



Source: own from the Bank of England (2020)

Harrison (2017) found that through quantitative easing the monetary authority may influence long-term interest rates and that its use has welfare costs. Reducing long-term rates can increase aggregate demand when the economy is in a downturn cycle in which the short-term policy rate is constrained by the zero bound. In such cases the welfare costs of portfolio distortion may be outweighed by the benefits of increased aggregate demand. In this case, relative to the case in which the only policy instrument is the short-term policy rate, use of QE reduces the welfare costs of fluctuations by around 50%. Entry into QE regimes (a period during which the central bank holds a positive stock of long-term bonds) can be rapid, with asset purchases commencing as soon as the short-term policy rate hits the zero bound. Exit from QE is slower. Both of these findings are consistent with some aspects of real-world QE policies.

2. PECULIARITIES OF THE CREATION OF THE EURO AREA

The eurozone, the voluntary integration of (in 2020) 19 independent countries, is a unique undertaking in economic history.

It is worth highlighting several circumstances of its existence that still influence the functioning and effectiveness of the supranational monetary policy. The start of the third phase of the Economic and Monetary Union (EMU), the introduction of the euro (in the form of scriptural money) in 1999, was the result of a political decision. Although the idea of the monetary integration appeared as early as 1969, in the Declaration of Hague and later in the 1970 Werner Report, the current economic and monetary union had been realizing practically within 9-10 years, between 1989 and 1999. Political decision has been taken on the date of introduction, the conditions for implementation, the convergence criteria, and the number of participating countries. The reunification of Germany and the German-French-cooperation played a significant role in the introduction of the euro in 1999 (see, for example, the letter of 18 April 1990 of Francois Miterrand and Helmut Kohl to Charles Haughey, Prime Minister of Ireland, President-in-Office of the European) (Szemlér, 2000). Regarding the implementation of EMU, two main economic theories evolved: According to one theory, economic union must first be created, which includes the perfect implementation of the single (internal) market, the reduction of economic disparities, and the integration of fiscal policy („federalists"). This theory was mainly represented by the Germans. In contrast, according to the theory supported by the French ("neofunctionalists"), the introduction of monetary union in itself leads to the gradual realization of economic union. The EMU roadmap clearly shows that the second theory has been overcome. (The two positions clashed as early as 1970, when the Werner Report was born. (Stahl, 1974)

The Maastricht Treaty, as set out in the Delors Plan, as well. provided practically the foundations for an asymmetric integration form. While monetary policy is fully implemented with a supranational, independent, autonomous institutional system, other areas of economic policy (economic union) are characterized by a level of coordination with both mandatory (e. g. avoiding excessive government deficits) and non-mandatory elements.

There were significant socio-economic disparities between the member states of the European integration (potential, future members of the euro area) in the early 1990s (and nowadays, as well). By including the convergence criteria in the Maastricht Treaty, integration decision-makers have practically acknowledged the need to strengthen convergence before the introduction of the euro, not primarily on the level of economic development, but rather on monetary policy and related inflation and interest rates. For the sake of completeness and accuracy only, we list the economic convergence criteria in the strict sense, which are as follows: 1. The (actual or planned) general government deficit should not exceed 3% of GDP. 2. Gross government debt must not exceed 60% of GDP. (The first two criteria are the so-called budgetary (fiscal) criteria. If these are exceeded by member states, an "excessive deficit procedure" (EDP) could be initiated against them.) 3. The increase in the consumer price level may not exceed the simple arithmetic average of the inflation values of the three lowest inflation countries by 1.5 percentage points (stability, inflation criterion). 4. The nominal interest rate on long-term government bonds may not exceed the simple arithmetic average of the long-term interest rates of the three lowest-inflation countries by up to 2 percentage points (interest rate criterion). 5. The currency of the member state must be a member of the European Exchange Rate Mechanism (ERM) for at least two years without devaluation and major tensions (exchange rate criterion). In addition to the above, a wide range of macro indicators can be assessed, and the independence of each national central bank is an important legal criterion.

The convergence criteria have been the subject of several critics. On the one hand, the conditions do not examine the process of strengthening convergence, but its existence at a specific point in time (one year before the decision). Practically all indicators, except for the exchange rate criterion, only need to be met in a given year, and the Treaty provides for the examination of time series in the case of budgetary criteria, but it is also there as a facilitator. If gross government debt declines significantly and permanently, approaching the reference value satisfactorily, the criterion is considered to be fulfilled. This clause allows for a rather subjective assessment and may have reduced the confidence in EMU and the success of the convergence process. Moreover, the criteria do not address real economic convergence, and real convergence is at least as important for the success of EMU. It would have been necessary to include additional indicators in the system of criteria, such as the unemployment rate, which illustrates the macroeconomic imbalance, or the GDP per employee characteristic of productivity, or the unit labour cost.

The decision in May 1998 about the countries which could adopt the euro in 1999 was based not primarily on the fulfilment of the convergence criteria, or more precisely, the budgetary criteria were interpreted rather broadly. In the case of government deficit and debt level, it was not the excess over the reference values set out in the protocols to the Treaty that were taken into account but they were based on the fact whether the country was in an excessive deficit procedure or not. The Council decides by a qualified majority on a proposal from the Commission, about the excessive deficit procedure. This means that it is a result of a political decision. Only Greece was subject to the excessive deficit procedure in May 1998 (following the Council Decision of 26 September 1994). Table 1 shows the fulfilment of the economic convergence criteria.

Table 1: Fulfilment of the convergence criteria

Country	Year	Inflation**	Interest rate***	Budget****	Gros Debt****	ERM-membership
Austria	1997	1,2	5,7	-2,5	62,0	Yes
	1998*	**1,1**	**5,6**	-2,2	60,0	Yes
Belgium	1997	1,5	5,8	-2,1	122,2	Yes
	1998*	**1,4**	**5,7**	-1,7	118,1	Yes
Denmark	1997	1,9	6,3	0,7	65,1	Yes
	1998*	**1,9**	**6,2**	1,1	59,5	Yes
United Kingdom	1997	1,8	7,1	-1,9	53,4	No
	1998*	**1,8**	**7,0**	-0,6	52,3	No
Finland	1997	1,2	6,0	-0,9	55,8	Yes
	1998*	**1,3**	**5,9**	0,3	53,6	Yes
France	1997	1,3	5,6	-3,0	58,0	Yes
	1998*	**1,2**	**5,5**	-2,9	58,1	Yes
Greece	1997	5,4	9,9	-4,0	108,7	No
	1998*	**5,2**	**9,8**	-2,2	107,7	No
Netherlands	1997	1,9	5,6	-1,4	72,1	Yes
	1998*	**1,8**	**5,5**	-1,6	70,0	Yes
Ireland	1997	1,2	6,3	0,9	66,3	Yes
	1998*	**1,2**	**6,2**	1,1	59,5	Yes
Luxemburg	1997	1,4	5,6	1,7	6,7	Yes
	1998*	**1,4**	**5,6**	1,0	7,1	Yes
Germany	1997	1,5	5,6	-2,7	61,3	Yes
	1998*	**1,4**	**5,6**	-2,5	61,2	Yes
Italy	1997	1,9	6,9	-2,7	121,6	Yes
	1998*	**1,8**	**6,7**	-2,5	118,1	Yes
Portugal	1997	1,9	6,4	-2,5	62,0	Yes
	1998*	**1,8**	**6,2**	-2,2	60,0	Yes
Spain	1997	1,9	6,4	-2,6	68,8	Yes
	1998*	**1,8**	**6,3**	-2,2	67,4	Yes
Sweden	1997	1,8	6,6	-0,8	76,6	No
	1998*	**1,9**	**6,5**	0,5	74,1	No

*Note: * for inflation and interest rates, the twelve-month data at the end of January 1998; ** annual percentage change; *** - %; **** - as a percentage of GDP;*

Source: EMI, 1998

As it can be seen from the table, several Member States have significantly exceeded the government debt reference value, e. g. Belgium or Italy, both founding members of the European integration. (Although Belgium reduced its debt by 20 percentage points between 1994 and 1997, but still reached twice the reference value during the examined period. In Italy, on the other hand, the debt stock increased by 20 percentage points between 1991 and 1997). In addition, several member states have approached or reached the reference value for budget deficit of 3% of GDP, despite one-off budgetary measures (Italy until 1996 continuously, Germany between 1993 and 1996, France between 1992 and 1996 significantly exceeded the reference value). Italy, for example, wanted to achieve spending cuts by cutting interest rates by 1 percentage point and a one-off European tax due to its large general government deficit and debt. France transferred an amount of 11 billion DEM from the state-owned Télécom to the budget, in return for which the budget undertook the future pension requirements of the group to be privatized.

In Germany, the country's gold reserves have been revalued to increase the budget by 40 billion DEM. (However, the central bank opposed the government, so the surplus from the gold revaluation could only affect the budget balance in 1998. The method of revaluation of gold reserves is also regularly used by other countries, the German attempt has become suspicious due to the timing.) (Ferkelt, 2000).

It is also clear that the fulfilment of the criteria does not depend on the level of economic development of the countries. (Sávai and Kiss, 2016, 2017)

According to the decision of the European Council eleven Member States could enter the 3rd phase Stage Three of EMU. Greece did not fulfil any of the convergence criteria, so the introduction of the euro was out of the question at all. (In the case of the United Kingdom and Denmark, the so-called opt-out regulation was in force according to the Treaty, i.e. these countries can decide for themselves when they want to enter the third stage, of course in that case they have to fulfil the criteria.) The decision of May 1998 supports the finding that even nominal convergence between euro area countries has not been fully achieved and a political decision has been taken on by range of participating countries.

The introduction of the euro in the form of scriptural currency on 1 January 1999 has been the subject of other critics too, namely that the range of participating countries cannot be considered an optimal currency area in many respects. The debate over optimal currency areas was initiated by Robert A. Mundell's study, "The Theory of Optimum Currency Areas," published in the American Economic Review, in 1961. (Mundell, 1961) According to Mundell, the most important condition for the optimality of a currency area is a high degree of factor flow, factor mobility within the area. (Incidentally, the study originally sought solutions to balance of payments crises.) Indeed, in the case of a demand shock, easing with a common monetary policy instrument for achieving full employment is subject to very strong inflationary pressures in a currency area. The common central bank of the currency area takes global balance into account and seeks to restore it, but it cannot realize so alone. A high degree of factor flow (mobility within the zone, and immobility towards the world outside the zone) plays a central role in restoring the balance. (In a study published in 1958 by Tibor Scitovsky, examining the economic theoretical context of European integration, he concluded, among other things, that the introduction of the single currency promotes a high degree of capital mobility and labour mobility, but measures such as supranational employment policy are necessarily. (Scitovsky, 1958)

Based on Mundell's concept, the following conclusion can be drawn regarding the examined topic: if the countries participating in the currency area have different levels of development and there is no adequate factor flow between them, it carries significant risks in terms of the chances of the formation of an equilibrium situation, i. e. in terms of the functioning and efficiency of the whole integration. For all these reasons, factor flows must be allowed and encouraged, and fiscal transfer mechanisms must be applied. However, labour flows are still relatively low in the European Union as a whole. According to an analysis published by the European Commission in January 2020, a total of 4.1% of workers of the EU member states worked permanently in another member state in 2018, the proportion of cross-border commuting workers achieved 0.7% (European Commission, 2020a), meaning that overall labour mobility did not reach 5%. Labour mobility within the EU is increasing year by year, its rate was much lower before the introduction of the euro. In addition, these values apply to the European Union of 28, but three of the five largest sending countries (Romania, Bulgaria and Poland) are not members of the euro area, one of the two largest recipient countries, the United Kingdom is no longer a member of the European Union. For the euro area, therefore, labour mobility is significantly lower than for the whole European Union.

The euro area fulfilled and fulfils most of the conditions of the other optimal currency area theories born in the 1960s and 70s given that we can speak of open economies (McKinnon, 1963), most countries have a diversified export product structure (Kenen, 1969), they have a developed capital market (Ingram, 1969), the convergence criteria ensured the convergence of inflation rates (Haberler, 1970, Fleming 1971) and more or less a stable real exchange rate (Vaubel, 1976; 1978), however, political (fiscal) integration (Haberler, 1970; Ingram, 1969; Tower; Willet, 1970) is not implemented. New criteria for the optimality of a currency area also emerged in the 1990s. De Grauwe (2000), for example, points out, in connection among others

with Mundell, that different labour market characteristics can make participation in economic and monetary union quite costly, however, unemployment and employment rates vary significantly within the euro area.

The potential effects of monetary integration on regional disparities have been addressed in the literature since the 1970s. Among the first to be mentioned is Heinz-Michael Stahl's book "Regionalpolitische Implikationen einer EWG-Währungsunion" (Stahl, 1974). The author examines the possible effects of monetary integration on the spatial economic structure in his work. Vanhove and Klaassen (1983) deal, in a monograph, with detailing the theoretical and practical context of regional policy with the effects of monetary union. Paul Krugman, one of the leading figures in mainstream economics, also analyses the issue in his volume co-published with Guillermo de la Dehesa (De la Dehesa - Krugman 1992), similar to Hitiris (1995). In addition to the above authors, general coherence and impact assessment are central to several of Martin Hallet's studies. (Hallet-Matthes 1997, Hallet 1997, Hallet 2002).

Considering the most important findings in the literature and the connections of convergence, divergence, and U-theory, we can conclude that if factors of production are sufficiently mobile (balancing mechanisms work effectively), so if the single (internal) market is perfectly realized, the reduction of trade costs (related to the development of economic integration, such as the implementation of monetary integration) can help reduce territorial disparities. However, if the initial differences between individual countries and regions are large and the cost reduction is not adequate, inequalities are expected to increase (especially in the initial period). If we look at the indicators of real economic convergence, we can see significant inequalities among these member states before the introduction of the euro. As an example, the values of GDP per capita and GDP per employee (a productivity indicator) are shown in Table 2.

Table 2: GDP per capita and GDP per employee in EU member states in 1998

Member state	GDP per capita (ECU)		GDP per employee (ECU)	
	current prices	PPP	current prices	PPP
Austria	23300	22200	48200	45920
Belgium	21900	22600	56530	58340
Finland	22300	20200	53080	48090
France	21500	20400	56700	53780
Netherlands	22300	21900	45420	44600
Ireland	20500	21200	51800	53560
Luxembourg	38200	36400	70790	67450
Germany	23400	21800	51900	48310
Italy	18400	20400	47620	52790
Portugal	9800	14600	21490	32000
Spain	13200	16400	35750	44400
EUR-11	**20000**	**20300**	**47240**	**48840**
Greece	10300	13700	27660	36790
Denmark	29400	24000	56680	46250
UK	21100	20200	44720	42800
Sweden	23700	20100	54240	46000
EU-15	**20100**	**20100**	**48170**	**48070**

Source: Own calculations based on Eurostat (2005a), European Commission (2004), Stapel-Pasanen-Reinecke (2004) and Barcellan (2000)

The table clearly shows that the development of Portugal, Greece and Spain, as well as the productivity of Portugal and Greece, are significantly below the average of the euro area and of the European Union, as well.

In summary, we can conclude, that the timing of the third phase of economic and monetary union, the selection of eurozone members were primarily the result of a political decision. By deciding on the range of participating countries the nominal convergence criteria in the Maastricht Treaty have not been rigorously examined, as a result, a rather heterogeneous currency area with significant socio-economic disparities has emerged.

The monetary integration realized in the European Union is an asymmetric integration form, in addition to supranational monetary policy, there has been no close coordination in the fiscal policy. However, low labour mobility posed additional risks to the success of the euro area.

3. THE MONETARY POLICY OF THE EUROPEAN CENTRAL BANK IN PRACTICE

3.1. THE MONETARY POLICY STRATEGY OF ECB

In November 1998, the single, supranational monetary policy for the euro area was adopted. The aim of monetary policy has already been clearly defined in Article 105 of the Maastricht Treaty: „The primary objective of the ESCB shall be to maintain price stability." The ECB quantified the objective of price stability already in 1998: according to this, we can talk about price stability in EMU if the growth of the harmonized index of consumer prices (HICP) does not exceed 2% compared to the previous year. The single monetary policy strategy, declared to be medium-term oriented, included the objective of price stability and consisted of three elements: (ECB 1999):

- a quantitative definition of the primary objective of the single monetary policy, namely price stability (2%),
- a prominent role for money, as signalled by the announcement of a reference value for the growth of a broad monetary aggregate (M3),
- a broadly based assessment of the outlook for future price developments and the risks to price stability in the euro area as a whole.

The two pillars of the strategy are elements 2 and 3, which help to achieve the primary goal. In practice, supranational monetary policy included the main elements of both strategies: inflation targeting and money supply control („Geldmengensteuerung"). The combined application of the essential elements of these two strategies has resulted a policy mix and decision-making that is difficult to review and predict. The monetary policy of the euro area was not transparent even when the monetary union came into force, thus significantly reduced the credibility of the policy.

The role and legitimacy of money supply control in the system is highly questionable, especially as the money supply, not as an intermediate target but as a benchmark, is an indicative quantity in the monetary policy strategy. This pillar has been included in the strategy on the model of the Bundesbank. However, the strategy of the money supply control was not always successful in Germany either, in the 23-year time interval from 1975 to 1997, the actual increase in money supply remained only 12 times in the projected range.

Table 3: The result of money supply control in Germany (% of central bank money, 1975-1987), resp. of M3 monetary aggregate)

YEAR	Target	RESULT	YEAR	TARGET	RESULT
1975	approx. 8	10	1987	3-6	8
1976	8	9	1988	3-6	7
1977	8	9	1989	approx. 5	5
1978	8	11	1990	4-6	6
1979	6-9	6	1991	3-5	5
1980	5-8	5	1992	3,5-5,5	9
1981	4-7	4	1993	4,5-6,5	7
1982	4-7	6	1994	4-6	6
1983	4-7	7	1995	4-6	2
1984	4-6	5	1996	4-7	8,1
1985	3-5	5	1997	3,5-6,5	4,7
1986	3,5-5,5	8			

Source: Bockelmann (1997), EMI (1998)

The state and harmonization of statistical systems in the euro area did not really allow for accurate data on monetary aggregates. The reference value of 4.5% set by the ECB for the growth of the monetary aggregate M3 is not considered as well-founded. The value was determined based on a 2-2.5% increase in real GDP, less than 2% increase in harmonized consumer price index and a decrease in the velocity of money of 0.5-1%. The latter value could not be based on accurate calculations, considering that concrete correlations and harmonized data on the euro area money demand function were not available. In addition, the first two values (including the primary objective of price stability) were established in 1998, when the European Union, and the core countries in particular, were in recession.

The mere fact that the ECB would have decided otherwise in some strategic way would have increased the credibility of the policy. Even in the case of a strategy following a pure direct inflation target, the development of the monetary aggregate as an indicator could have been taken into account. I am not claiming that inflation targeting would have been squarely successfully in terms of the external and internal stability of the euro, but it would have had a positive effect on the start of monetary policy, the establishment and credibility of adequate communication.

The second pillar of the strategy is also rather vague and overly general: assessment of future changes in the price level, assessment of risks related to price stability by involving a wide range of economic indicators. According to the ECB's report, these economic indicators are the various business cycle barometers, which take into account, for example, wages, exchange rate developments, certain indicators of fiscal policy, price and cost indices, but also are based on various questionnaire surveys of economic actors and consumers.

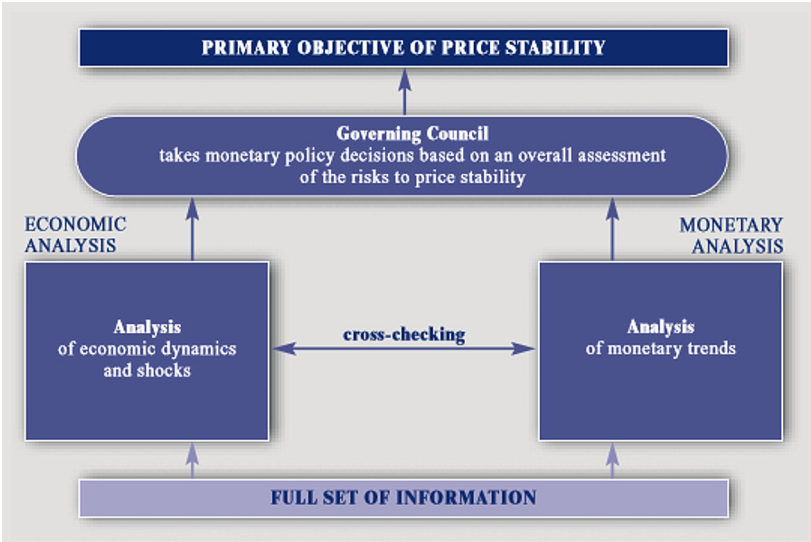
The kind of „policy mix" of monetary policy strategy defined by the ECB was therefore, on the whole, ill-suited to pursuing a predictable, transparent and credible monetary policy, which, as a

new institution, had to gain the confidence of economic actors. This is due, on the one hand, to real economic developments (significant differences among Member States in terms of economic growth and inflation, accelerating economic growth and money demand), and, on the other hand, to problems with statistics and the definition of each pillar of the strategy. However, certain constraints, such as the lack of fiscal coordination, also played a role in shaping the strategy. If the ECB had undertaken to pursue a pure inflation target, due to inadequate fiscal coordination, it would be difficult to establish in the case of a possible miss of goals that it was due to the ECB's error or to the uncoordinated and undisciplined level of the fiscal level. In this interpretation, this strategy would have had disadvantages for the ECB. The pure strategy of money supply control would have been unpredictable due to the statistical problems outlined above, at the same time, the application of this strategy could not have been in the interest of the fiscal policy either, as too high inflation by the pre-determined increase of money aggregates allows us to infer the error and responsibility of fiscal policy.

The first substantive review of the above monetary policy strategy took place in 2003. As a result, a decision was taken in May 2003 to amend the strategy. The inflation target has been refined to achieve a harmonized consumer price index of between 0 and 2%, close to 2%, over the medium term. However, the increase in the money supply, the fulfilment of the previously set reference value, was no longer monitored year by year.

The entire strategy of the monetary policy is based on two analytical methods, so called "two pillars" that evaluate potential price stability risks. The two-pillar framework is the core of internal analysis, on which the ECB bases its decisions. These pillars are economic and monetary analyses. (Figure 9)

Figure 9: The stability-oriented monetary policy strategy of the ECB



Source: European Central Bank (2004)

Economic analysis is focused on detection of risks to price stability in the short and medium term. It is based on the fact, that price development in short and medium term is influenced by mutual interaction of demand and supply in the market of goods and services. Economic analysis seeks to identify economic shocks affecting the price level and production growth, especially in terms of the analysis of the economic cycle. Meanwhile, it monitors various economic activities and indicators not only at the level of the euro area but also at the level of individual countries and economic sectors. Using all these observed factors, economic analysis evaluates dynamics of the economy and furthermore, prepares regular macroeconomic prognoses of the main parameters in the euro area that support summarizing large amount of economic data from various sources. Such predictions help the Governing Council to understand comprehensively the economic situation and consequently to be able to take measures ensuring the price stability.

The objective of the monetary analysis is to identify risks to price stability in the medium and long term. This analysis is based on the fact that changes in the money supply and price inflation are closely linked in the medium and long term. On the basis of monetary dynamics, it is possible to predict the evolution of inflation. Monetary analysis is in fact analysing the broad monetary aggregate M3, which the central bank must consider while reacting to the economic growth so that the main goal is met.

The two-pillar system increases the responsibility of the ECB's monetary policy and ensures consideration of all the essential information for assessing risks to price stability. Comparing the results of the monetary and economic analysis ensures the completeness of the assessment since short, medium and also long term information are taken into account. Thus the monetary policy does not calculate just with one indicator but the two comprehensive analyses that reduce the risk of errors. The amendment has therefore resulted in a more transparent strategy than before, especially as the rate of monetary growth regularly exceeded the reference value between 1999 and 2003.

3.2. ASSESSMENT OF MONETARY POLICY IN THE EURO AREA

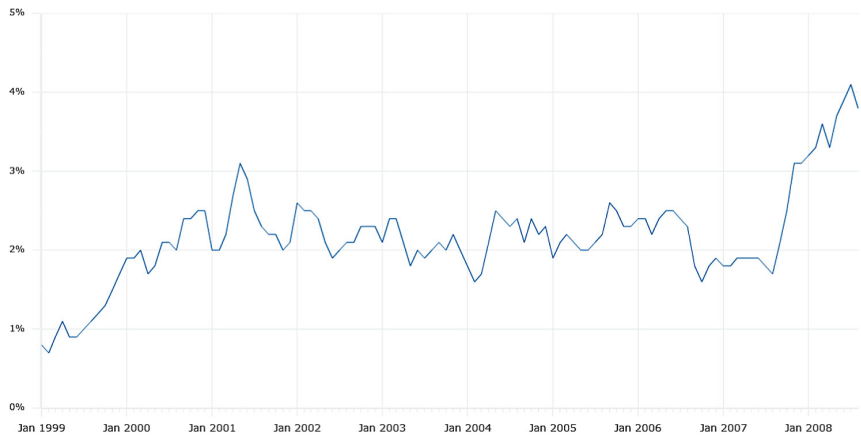
The monetary policy of the first 21 years of the euro area is assessed over two periods (January 1999-August 2008; September 2008-July 2020) in particular, the global financial and economic crisis and the ensuing sovereign debt crisis have posed unprecedented challenges to monetary policy. A different structure can be observed in the literature, for example Hartmann and Smets (2018) distinguish four periods between 1999 and 2018: End of technology cycle (1999-2003), Economic upturn and build-up of imbalances (2003-2007), Financial and sovereign debt crises (2007-2013) and Low-inflation recovery (2013-2018).

3.2.1. Monetary policy in the euro area (January 1999 - August 2008)

3.2.1.1. Meeting the inflation target

Between January 1999 and August 2020, price stability in the euro area was broadly realized (average 1.7%). Between January 1999 and August 2008, the inflation rate was higher (average 2.2%) (Figure 10). In the analysed period we can see outstanding values in 2008, when the world market price of crude oil broke records.

Figure 10: Overall HICP inflation rate in the Eurozone (01. 01. 1999 – 31. 08. 2008) (%)



Source: European Central Bank (2020a)

Inflation rates, by the way, show quite large differences between countries, and only very slow convergence between price levels can be detected.

Table 4: All-items HICP (1999-2008)
(Annual average rate of change)

GEO/TIME	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Euro area	1,1	2,1	2,3	2,3	2,1	2,1	2,2	2,2	2,1	3,3
Belgium	1,1	2,7	2,4	1,5	1,5	1,9	2,5	2,3	1,8	4,5
Germany	0,6	1,4	1,9	1,3	1,1	1,8	1,9	1,8	2,3	2,8
Ireland	2,4	5,3	4,0	4,7	4,0	2,3	2,2	2,7	2,9	3,1
Greece			3,6	3,9	3,4	3,0	3,5	3,3	3,0	4,2
Spain	2,2	3,5	2,8	3,6	3,1	3,1	3,4	3,6	2,8	4,1
France	0,6	1,8	1,8	1,9	2,2	2,3	1,9	1,9	1,6	3,2
Italy	1,6	2,6	2,3	2,6	2,8	2,3	2,2	2,2	2,0	3,5
Cyprus										4,4
Luxembourg	1,0	3,8	2,4	2,1	2,5	3,2	3,8	3,0	2,7	4,1
Malta										4,7
Netherlands	2,0	2,3	5,1	3,9	2,2	1,4	1,5	1,6	1,6	2,2
Austria	0,5	2,0	2,3	1,7	1,3	2,0	2,1	1,7	2,2	3,2
Portugal	2,2	2,8	4,4	3,7	3,2	2,5	2,1	3,0	2,4	2,7
Slovenia									3,8	5,5
Finland	1,3	3,0	2,7	2,0	1,3	0,1	0,8	1,3	1,6	3,9

Source: Eurostat (2020a)

We can see particularly large differences in the year of high economic growth, 2000, when inflation rates ranged from 1.4% (Germany) to 5.3%. Ireland, Greece and Spain showed higher inflation rates than the euro area average each year.

3.2.1.2. Interest rate policy

In setting the single base (interest) rate, the base rate for countries with significant economic weight and the inflation target were taken into account. Table 5 shows the base rates in each country before the introduction of the euro. Significant short-term interest rate cuts can be observed in two countries, Ireland and Spain.

Table 5: Base (interest) rate in the countries of the euro area (End of the period)

	B/L	D	E	F	IRL	I	NL	A	P	FIN
1995	3,75	3,75	9,00	4,45	6,50	10,50	3,40	3,90	8,50	4,25
1996	3,00	3,00	6,25	3,15	6,25	7,05	2,50	3,00	6,70	3,00
1997	3,30	3,30	4,75	3,30	6,75	6,16	3,30	3,20	5,31	3,25
1998	3,00	3,00	3,00	3,00	4,00	2,40	3,00	3,00	3,00	3,00
98/9.	3,30	3,30	4,25	3,30	6,75	5,03	3,30	3,20	4,51	3,40
98/10.	3,30	3,30	3,75	3,30	5,75	4,82	3,30	3,20	4,00	3,40
98/11.	3,30	3,30	3,50	3,30	4,50	3,70	3,30	3,20	3,76	3,40
98/12.	3,00	3,00	3,00	3,00	4,00	2,40	3,00	3,00	3,00	3,00
99/1.	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00

Source: ECB (2000)

Different starting interest rates and significant differences in economic development and growth between countries have posed a difficult task for the new central bank.

The European Central Bank has set three interest rates for the euro area:

- The interest rate on the main refinancing operations (MRO), which provide the bulk of liquidity to the banking system.

- The rate on the deposit facility which banks may use to make overnight deposits with the Euro system.
- The rate on the marginal lending facility, which offers overnight credit to banks from the Euro system.

Table 6 shows the European Central Bank's interest rate adjustment decisions from the introduction of supranational monetary policy to August 2008.

Table 6: Decisions of the European Central Bank on interest rate changes between January 1999 and August 2008

Date	Deposit facility	Main refinancing operations	Marginal lending facility
01.01.1999	2,00	3,00	4,50
04.01.1999	2,75 (+0,75)	3,00	3,25 (-1,25)
22.01.1999	2,00 (-0,75)	3,00	4,50 (+1,25)
09.04.1999	1,50 (-0,50)	2,50 (-0,50)	3,50 (-1,00)
05.11.1999	2,00 (+0,50)	3,00 (+0,50)	4,00 (+0,50)
04.02.2000	2,25 (+0,25)	3,25 (+0,25)	4,25 (+0,25)
17.03.2000	2,50 (+0,25)	3,50 (+0,25)	4,50 (+0,25)
28.04.2000	2,75 (+0,25)	3,75 (+0,25)	4,75 (+0,25)
09.06.2000	3,25 (+0,50)	4,25 (+0,50)	5,25 (+0,50)
01.09.2000	3,50 (+0,25)	4,50 (+0,25)	5,50 (+0,25)
06.10.2000	3,75 (+0,25)	4,75 (+0,25)	5,75 (+0,25)
11.05.2001	3,50 (-0,25)	4,50 (-0,25)	5,50 (-0,25)
31.08.2001	3,25 (-0,25)	4,25 (-0,25)	5,25 (-0,25)
18.09.2001	2,75 (-0,50)	3,75 (-0,50)	4,75 (-0,50)
09.11.2001	2,25 (-0,50)	3,25 (-0,50)	4,25 (-0,50)
06.12.2002	1,75 (-0,50)	2,75 (-0,50)	3,75 (-0,50)

Date	Deposit facility	Main refinancing operations	Marginal lending facility
07.03.2003	1,50 (-0,25)	2,50 (-0,25)	3,50 (-0,25)
06.06.2003	1,00 (-0,50)	2,00 (-0,50)	3,00 (-0,50)
06.12.2005	1,25 (+0,25)	2,25 (+0,25)	3,25 (+0,25)
08.03.2006	1,50 (+0,25)	2,50 (+0,25)	3,50 (+0,25)
15.06.2006	1,75 (+0,25)	2,75 (+0,25)	3,75 (+0,25)
09.08.2006	2,00 (+0,25)	3,00 (+0,25)	4,00 (+0,25)
11.10.2006	2,25 (+0,25)	3,25 (+0,25)	4,25 (+0,25)
13.12.2006	2,50 (+0,25)	3,50 (+0,25)	4,50 (+0,25)
14.03.2007	2,75 (+0,25)	3,75 (+0,25)	4,75 (+0,25)
13.06.2007	3,00 (+0,25)	4,00 (+0,25)	5,00 (+0,25)
09.07.2008	3,25 (+0,25)	4,25 (+0,25)	5,25 (+0,25)

Source: European Central Bank (2020b)

The first interest rate adjustment took place as early as April, the measures in January 1999 were only introduced as announced and on a temporary basis in order to facilitate the transition of market participants to the new interest rate regime.

The 50 basis point cut in interest rates in April 1999 (which also changed the interest rate corridor) has been widely criticized. Confidence in the European Central Bank was, moreover, eroded before the bank became operational due to the debate over the appointment of its President (the French wanted a French president and then behind closed doors there was a disturbing agreement on the mandate of the first president, Wim Duisenberg, who announced at the beginning of his eight-year term that he would not fill the term).

Another problem was that German Finance Minister Oskar Lafontaine wanted to force the ECB to cut interest rates in early 1999 in order to stimulate the economies of the core countries,

especially Germany. The ECB, led by Wim Duisenberg, resisted the request of the Social Democrat politician. Lafontaine's resignation also had a positive effect on the perception of the euro area and the exchange rate of the euro, however, the interest rate cut in April a few weeks later suggested to the markets that the ECB still obeyed the Social Democrat politician. Inadequate communication by the ECB to economic agents and the public was a problem. The professional criticism of the April 1999 interest rate cut was that, despite an increase in the money supply above the reference value, the interest rate was cut, and in November, after a 50 basis point increase, the key interest rate was again 3%. The aim of the interest rate cut was clearly to stimulate the economy, primarily to stimulate the slow growth of the "core countries". Apparently, all conditions were in place for the interest rate cut, although the growth rate of M3 was already above the reference value.

The high economic growth of 2000 and, in part, the associated higher inflationary pressures resulted in six steps to raise interest rate, resulting in a relatively high interest rate (4.75%). This interest rate policy can be considered practically appropriate due to the rising inflation, although the market did not find the 25 basis point increases sufficient. The IMF warned the ECB against raising base rate in early April 2000, markets were dissatisfied with the 25 basis point increase at the end of April, followed by a sharp rise in base (interest) rate in June. On 8 June 2000, the ECB announced that starting from the operation on 28 June 2000, the main refinancing operations of the Euro system would be conducted as variable rate tenders. The minimum bid rate refers to the minimum interest rate at which counterparties may place their bids. The decisions of 31 August and 5 October 2000 were, in my view, essentially intended to protect the exchange rate of the euro. (The interest rate raising in October, which did not enjoy the support of all seventeen board members, hit the market unexpectedly, but both the financial world and economists later welcomed the decision.)

The interest rate cut on 10 May 2001 surprised both the market and analysts, as the ECB had refused to make another change at the IMF meeting two weeks earlier. Of the monetary conditions, only the growth rate of adjusted M3 was acceptable (but not eligible for base (interest) rate cuts), and inflation rate achieved 2.6% in February and March. Following the economic stagnation in the United States in 2001 (real GDP growth of 0.8%), the Fed embarked on a cycle of interest rate cuts in early 2001, followed by the ECB in May 2001, although the EU had to face a recession in 2002.

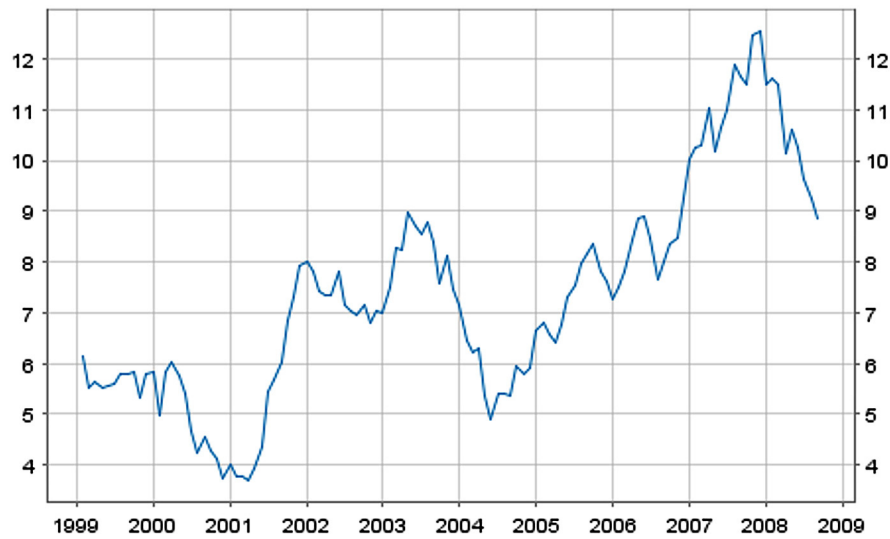
The interest rate cut periode lasted until June 2003 on both sides of the ocean, the lowest rate achieved in the U.S. was 1%, in the eurozone 2%. In general, the ECB pursued a less active interest rate policy and reacted more slowly to interest rate cuts, but this is clear from the different mandates of the ECB and the Fed but may have been due to inadequate statistical harmonization and slow availability of statistics. Between 1999 and 2008, with the exception of the January transitional measures, the ECB worked with an interest rate corridor of 2 percentage points.

Another methodological change was that in 2001 the ECB revised the methodology for calculating monetary aggregate M3. The new, adjusted value did not include various (mainly longer-term) money market securities sold to non-euro area buyers. Based on these calculations, M3 money growth achieved 4.8 % in the fourth quarter of 2000, 4.5 % in the first quarter of 2001 and 4.7 % in April compared with the same period of the previous year. With values calculated under the new method, the ECB has demonstrated that the May 2001 interest rate cut is allowed by monetary conditions. However, all this led to the querying of the credibility of the Central Bank much more. The need for the adjustment should have been recognized by the ECB as early as 1999, and not published two and a half years later, before an interest rate cut. On the other hand, if M3 growth achieves 4.5%, it does not yet include the possibility of an interest rate cut, it simply means that the current interest rate level is appropriate, as the

expansion of liquidity will allow for a stable growth in the medium term. (Bofinger 2001)

The evolution of the money supply M3 can be studied in Figure 11. There it can be seen that the value of money supply did not exceed 4.5% for about a year during the period under review, otherwise it was significantly higher. All this calls into question the accuracy and credibility of the preliminary calculations and the target value, but at the same time justifies the existence of the 2003 amendment to the monetary policy strategy.

Figure 11: Growth of M3 in the Euro Area
(%, January 1999 – August 2008)



Source: European Central Bank (2020c)

For the conduct of open market operations, the ECB used a fixed rate (volume) tender between 1 January 1999 and 28 June 2000, but after 28 June 2000 switched to the US-style procedure for variable rate (interest) tenders. The application of the variable rate (interest) tender, which several experts have suggested to the bank before the introduction of the single monetary policy, can be considered positive, as it can improve communication between the bank and the market and reduce short-term volatility in market expectations.

Between 2006 and 2008, the ECB did make every effort to curb inflation with the available instruments, but this led to a high base (interest) rate in international comparison (4.25%), which had negative effect on investments. The worldwide financial and economic crisis of 2008-2009 swept into a high-inflation, high-interest-rate eurozone.

3.2.1.3. Interventions

The European Central Bank „officially" intervened four times between 1999 and 2009 (22 September, 3 November, 6 and 9 September 2000). I deliberately used the term "officially" because the monetary policy measure of 14 September 2000, when, according to the ECB, the conversion of interest income took place immediately after the base rate increase on 1st of September, could, in practice, be practically qualified as an intervention for supporting the exchange rate of the euro. The monetary policy strategy of the euro area has no exchange rate target, but between January 1999 and September 2000 the exchange rate of the euro against the US dollar and the nominal effective exchange rate weakened drastically, by about 18.6% to a low on 26 October 2000. (Figure 12)

Figure 12: Daily nominal effective exchange rate of the Euro (01. 01. 1999-31. 08. 2008, 1999 Q1 = 100)

Source: European Central Bank (2020d)

On 22 September 2000, the ECB, the Fed, the Bank of England and the Bank of Japan intervened in a coordinated manner (leaning with the wind). (As intervention fell overnight in Japanese time, the central banks of France, Germany and Italy bought euros on the foreign exchange markets on behalf of the Bank of Japan.) The intervention took place the day before the IMF and World Bank meeting. The ECB also did not accept the recommendations of the G-7, thus proving its independence. The euro rose from 0.87035 USD to 0.8942 USD on the day of the intervention but began to fall the following day. The ECB did not disclose the extent of the intervention, President Wim Duisenberg only confirmed to the press that the value of the intervention ranged from 1.5 billion to 20 billion USD. (Ex-post estimates put the total value of interventions

in 2001 at around 9.7 billion USD.) (The Governing Council of the ECB has only in September 2019 decided to publish additional data on the ECB's foreign exchange interventions.) These interventions can be described as virtually unsuccessful. The ECB intervened with the interventions and the two base rate increases (31 August and 5 October) to strengthen the euro, without success. The strengthening of the euro in December 2000 was due more to downward-adjusted US growth data than to the above monetary policy measures.

3.2.2. Impact of the 2008-2009 worldwide financial and economic crisis and the sovereign debt crisis on the euro area

The carry-over of the 2008 financial and economic crisis from the United States and the 2010 European sovereign debt crisis resulted in the worst economic recession in the history of European integration. In 2009, the rate of decline in real GDP in the euro area achieved 4.4 % (Table 7). During the crisis years, three countries (Estonia, Greece, and Latvia) suffered a decline in GDP of more than 20 percent.

In 2009, the GDP of Germany, the largest economy in the euro area, also fell by 5.7%. As a result of another recession in some countries caused by the sovereign debt crisis that hit individual countries, the rate of decline in the euro area was 0.9 % in 2012 and 0.3 % in 2013. In addition to the countries suffering from the sovereign debt crisis, the GDP of the Netherlands, Luxembourg, Slovenia, and Finland also shrank.

Table 7: Real GDP growth in the euro area (2007-2019)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EUR	0,4	-4,4	2,1	1,7	-0,9	-0,3	1,4	2,1	1,9	2,6	1,9	1,3
BE	0,4	-2,0	2,9	1,7	0,7	0,5	1,6	2,0	1,5	1,9	1,5	1,4
DE	1,0	-5,7	4,2	3,9	0,4	0,4	2,2	1,5	2,2	2,6	1,3	0,6
EE	-5,1	-14	2,7	7,4	3,1	1,3	3,0	1,8	2,6	5,7	4,8	4,3
IE	-4,4	-5,1	1,8	0,6	0,1	1,2	8,6	25,2	2,0	9,1	8,5	5,6
EL	-0,3	-4,3	-5,5	-9,1	-7,3	-3,2	0,7	-0,4	-0,2	1,5	1,9	1,9
ES	0,9	-3,8	0,2	-0,8	-3,0	-1,4	1,4	3,8	3,0	2,9	2,4	2,0
FR	0,3	-2,9	1,9	2,2	0,3	0,6	1,0	1,1	1,1	2,3	1,8	1,5
IT	-1,0	-5,3	1,7	0,7	-3,0	-1,8	0,0	0,8	1,3	1,7	0,8	0,3
CY	3,6	-2,0	2,0	0,4	-3,4	-6,6	-1,9	3,4	6,7	4,4	4,1	3,2
LV	-3,3	-14	-4,5	6,3	4,1	2,3	1,9	3,3	1,8	3,8	4,3	2,2
LT	2,6	-15	1,5	6,0	3,8	3,6	3,5	2,0	2,6	4,2	3,6	3,9
LU	-1,3	-4,4	4,9	2,5	-0,4	3,7	4,3	4,3	4,6	1,8	3,1	2,3
MT	3,3	-2,5	3,5	1,4	2,8	4,9	9,0	10,9	5,8	6,5	7,3	4,7
NL	2,2	-3,7	1,3	1,6	-1,0	-0,1	1,4	2,0	2,2	2,9	2,4	1,7
AT	1,5	-3,8	1,8	2,9	0,7	0,0	0,7	1,0	2,1	2,5	2,4	1,6
PT	0,3	-3,1	1,7	-1,7	-4,1	-0,9	0,8	1,8	2,0	3,5	2,6	2,2
SI	3,5	-7,5	1,3	0,9	-2,6	-1,0	2,8	2,2	3,1	4,8	4,1	2,4
SK	5,6	-5,5	5,7	2,9	1,9	0,7	2,8	4,8	2,1	3,0	3,9	2,4
FI	0,8	-8,1	3,2	2,5	-1,4	-0,9	-0,4	0,5	2,8	3,3	1,5	1,1

Source: Eurostat (2020b)

The response to the crisis that erupted in 2008 was hampered by a number of factors: the slow response time of the EU institutions and Member States, inadequate coordination and communication, limited availability of EU funds, protectionist views erupting during crises, and differences of interest of Member States.

The crisis also shook the confidence in the mainstream economic policy trend, allowing crisis management to begin with Neo-Keynesian means. (Moldicz, 2012) A significant part of the fiscal package of more than 400 billion euro to prevent the deepening of the real economic crisis was covered by Member States' budgets, whereas this amount exceeds the total expenditure of the EU budget for more than three years and there is no reserve in the multiannual EU budget for similar purposes at all. The European institutions have been active mainly in the field of regulation and more flexible management of rules, such as authorizing bank rescue packages, state aid to the car industry, increasing advances on cohesion aid and managing the regulation of the Stability and Growth Pact flexibly. In addition, a decision was taken to establish a European System of Financial Supervision (ESFS): European Systemic Risk Board (ESRB), European Banking Authority (EBA), European Insurance and Occupational Pensions Authority (EIOPA) and European Securities and Markets Authority (ESMA). Stricter rules for alternative investment fund managers have been achieved with the adoption of Directive 2011/61 /EU (AIFM Directive). (Kecskés, 2018)

The outbreak of the sovereign debt crisis in May 2010 sparked events and the EU was already taking crisis management measures with a significantly shorter response time. Sovereign debt crises can also be seen as a consequence of asymmetric shocks caused in part by country-specific problems, not to mention the crisis in the euro area as a whole. The construction of the euro area, the political decision taken by the Council on the participation in the third stage of economic and monetary union, and the accession of the countries to the euro area also played a role in the development of the sovereign

debt crisis. e. g. due to the declining base (and borrowing) rate and the growing confidence associated with membership, more favourable debt financing opportunities. The gross government debt of the euro area member states has increased significantly.

Shortly after the outbreak of the sovereign debt crisis, two transitional crisis management funds were set up, the European Financial Stability Mechanism (EFSM) available to all EU Member States and the European Financial Stability Facility (EFSF) available to euro area countries. The amendment of the Lisbon Treaty and an intergovernmental agreement have resulted in the creation of a permanent crisis management instrument, the European Stability Mechanism (ESM).

For the first time in the euro area, Greece requested and received a rescue package in May 2010 (followed by two additional rescue packages worth a total of € 288.7 billion), followed by Ireland in November 2010 (67.5 billion EUR), Portugal in May 2011 (78 billion EUR), Cyprus (7.3 billion EUR). In 2012 and 2013, Spain used the ESM's 41.33 billion EUR loan package to restructure its banking system. (ESM, 2019) The IMF also co-financed the Greek, Irish, Portuguese and Cypriot packages. We note that the lending activity of the ESM has also reduced the divergence in bond market yields, thereby increasing the effectiveness of the single monetary policy. (Kiss et al, 2019)

At the same time, the strengthening of economic policy coordination and the laying of the foundations of economic governance began. The European Semester, launched in 2011, has created a cycle for the coordination of fiscal and economic policies in the EU. On December 13, 2011, the so-called Six Pack entered into force, which simultaneously amended the Stability and Growth Pact, strengthened the surveillance of Member States' fiscal policies, introduced regular surveillance of macroeconomic imbalances (including monitoring current account surpluses and deficits) and introduced measures to prevent and sanction "manipulation" of statistics. All this sought to

alleviate the asymmetric nature of economic and monetary union, which means supranational monetary policy, but essentially the economic policies of member states, including fiscal policies.

The Euro Plus Pact, adopted in 2011 under the Hungarian Presidency of the Council of the European Union, aimed to increase competitiveness and convergence, but relied essentially on the voluntary commitments of the Member States. Like the ESM, the Fiscal Pact, which further tightened the rules on the general government deficit, given that the concept of a balanced budget means a structural deficit of less than 0.5 % of GDP. The so-called Two Pack entered into force in all euro area member states on 30 May 2013, on the one hand tightening up the budget planning process and schedule of member states, and on the other hand clarifying and simplifying enhanced economic policy and budgetary surveillance of member states experiencing or threatened by severe financial stability difficulties. The Compact for Growth and Jobs in the context of the Europe 2020 strategy, has focused primarily on increasing competitiveness.

In November 2014, the European Banking Authority published the results of the stress tests performed on 123 banks, which is an important element of a banking union based on three pillars (single rule book, single supervisory mechanism, single resolution mechanism). The European Central Bank has taken over the tasks of banking supervision at the European level, and the Single Bank Resolution Board was established on 1 January 2015, while the replenishment of the Single Bank Resolution Fund started in 2016 and is planned to reach the planned amount by 2023 (2018 a total of 3315 institutions were required to contribute 7.5 billion EUR to the Fund (Single Resolution Board, 2019). At the same time, the development of a capital market union began, which included the goal of diverting financial intermediation towards capital markets and removing barriers to cross-border investment. The implementation of the Banking and Capital Markets Union is still ongoing in 2020, the

Council adopted on 14 May 2019 a comprehensive legislative package aimed at reducing risks in the banking sector and further enhancing banks' resilience to potential economic shocks (amending Regulation (EU) No 575/2013, Directive 2013/36 / EU, Directive 2014/59 / EU and Regulation (EU) No 806/2014).

The measures taken as a result of the crisis, new sources of law and the implementation of economic governance have on the one hand, deepened cooperation within the euro area and, on the other, made the euro area and the European Union more resilient in the case of a similar type of crisis.

3.2.3. Monetary policy in the euro area (September 2008 - July 2020)

3.2.3.1. Meeting the inflation target

At the outbreak of the crisis in 2008-2009, a particularly high inflation environment was observed in the euro area, the inflation rate reached in 2008 3.3%. As a result of the crisis, declining economic performance and demand led to deflation, the inflation rate in 2009 achieved only 0.3%. 2011 and 2012 again resulted an inflation rate well above 2%, the pace of price increases slowed again as a result of the recession in 2012 and 2013, and even a deflationary period followed in 2015 and 2016. It is important to note that the high inflation in 2011 is due, among other things, to the high world oil prices resulting from the Arab Spring. Overall, the ECB's medium-term inflation target was met between September 2008 and July 2020. (Figure 13)

Figure 13: Overall HICP inflation rate in the Eurozone (01. 09. 2008 – 31. 07. 2020) (%)

Source: European Central Bank (2020a)

Between 2009 and 2019, inflation rates in the euro area Member States varied slightly, but the countries hardest hit by the crisis typically deflated for several years, including Ireland, Greece, Portugal, and Spain.

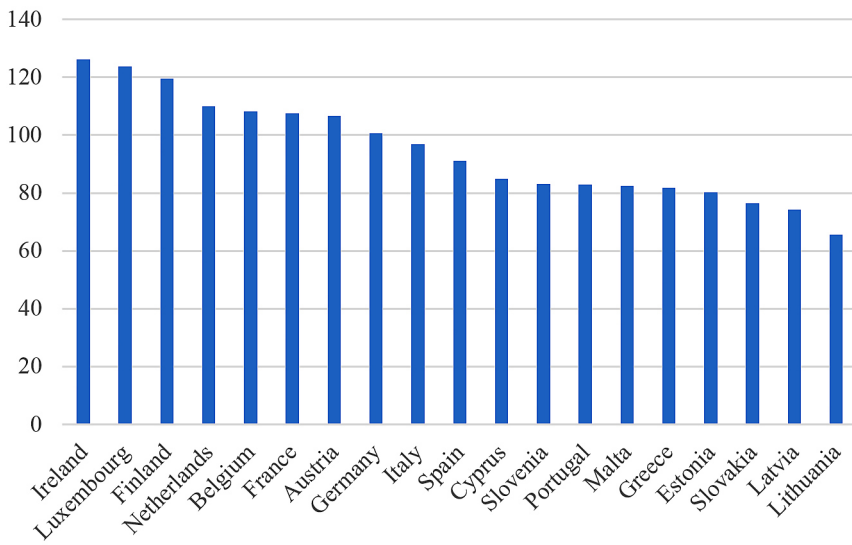
Table 8: All-items HICP (2009-2019)
(Annual average rate of change, %)

GEO/TIME	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Euro area	0,3	1,6	2,7	2,5	1,4	0,4	0,2	0,2	1,5	1,8	1,2
Belgium	0,0	2,3	3,4	2,6	1,2	0,5	0,6	1,8	2,2	2,3	1,2
Germany	0,2	1,1	2,5	2,2	1,6	0,8	0,7	0,4	1,7	1,9	1,4
Estonia			5,1	4,2	3,2	0,5	0,1	0,8	3,7	3,4	2,3
Ireland	-1,7	-1,6	1,2	1,9	0,5	0,3	0,0	-0,2	0,3	0,7	0,9
Greece	1,3	4,7	3,1	1,0	-0,9	-1,4	-1,1	0,0	1,1	0,8	0,5
Spain	-0,2	2,0	3,0	2,4	1,5	-0,2	-0,6	-0,3	2,0	1,7	0,8
France	0,1	1,7	2,3	2,2	1,0	0,6	0,1	0,3	1,2	2,1	1,3
Italy	0,8	1,6	2,9	3,3	1,2	0,2	0,1	-0,1	1,3	1,2	0,6
Cyprus	0,2	2,6	3,5	3,1	0,4	-0,3	-1,5	-1,2	0,7	0,8	0,5
Latvia						0,7	0,2	0,1	2,9	2,6	2,7
Lithuania							-0,7	0,7	3,7	2,5	2,2
Luxemb.	0,0	2,8	3,7	2,9	1,7	0,7	0,1	0,0	2,1	2,0	1,6
Malta	1,8	2,0	2,5	3,2	1,0	0,8	1,2	0,9	1,3	1,7	1,5
Netherlands	1,0	0,9	2,5	2,8	2,6	0,3	0,2	0,1	1,3	1,6	2,7
Austria	0,4	1,7	3,6	2,6	2,1	1,5	0,8	1,0	2,2	2,1	1,5
Portugal	-0,9	1,4	3,6	2,8	0,4	-0,2	0,5	0,6	1,6	1,2	0,3
Slovenia	0,8	2,1	2,1	2,8	1,9	0,4	-0,8	-0,2	1,6	1,9	1,7
Slovakia	0,9	0,7	4,1	3,7	1,5	-0,1	-0,3	-0,5	1,4	2,5	2,8
Finland	1,6	1,7	3,3	3,2	2,2	1,2	-0,2	0,4	0,8	1,2	1,1

Source: Eurostat (2020a)

Different inflation rates in the Member states make the decision-making and effectiveness of the single monetary policy significantly more difficult. The differences can be attributed, among other things, to the Balassa-Samuelson effect and to the different economic development and price levels in each country. Figure 14 shows the significant differences in the average price level between the euro area member states even in 2019.

Figure 14: Comparative price levels of final consumption by private households including indirect taxes (2019, EUR19 = 100)



Source: own calculation based on Eurostat (2020c)

As shown in Figure 14 above, the price level of 11 of the 19 countries in the euro area will not reach the average even in 2019. Ireland, with the highest price level, is 92% higher than the Lithuanian indicator. The convergence of price levels in the Eastern and Central European member states will continue for many years to come, which may lead to consistently higher inflation in these countries.

3.2.3.2. Interest rate policy

As seen above, the ECB decided to raise interest rate in July 2008. At that time, the Fed was virtually in the final stages of the interest rate cut cycle, which began in September 2007, moving from 5.25% in June 2006 to 2.00% in April 2008 and 0.00-0.25% in December 2008. As shown in Table 9, the ECB only started the interest rate cut cycle in October 2008.

There were several changes in the ECB's monetary policy at the beginning of October. As of 9 October 2008, the ECB reduced the standing facilities corridor from 200 basis points to 100 basis points around the interest rate on the main refinancing operations.

On 8 October 2008 the ECB announced that, starting from 15 October, the weekly main refinancing operations would be carried out through a fixed-rate tender procedure with full allotment at the interest rate on the main refinancing operations. This change overrode the previous decision (made on the same day) to cut by 50 basis points the minimum bid rate on the main refinancing operations conducted as variable rate tenders.

The reason why the ECB started cutting interest rates much later is, on the one hand, that in the euro area, after real GDP growth of 2.9% in 2006, there was an expansion of 2.7% even in 2007, while even in autumn 2008, the European Commission forecast a growth of 1.2% for 2008 and 0.1% for 2009 (European Commission, 2008). Another issue is that actual growth was 0.4% in 2008 and -4.4% in 2009. (Eurostat 2020b) On the other hand, inflation in the euro area was markedly high in 2008 (the highest in the history of the euro area in July 2008, at 4.1%), and the achievement of the primary objective of monetary policy was in danger.

Table 9: Decisions of the European Central Bank on interest rate changes between October 2008 and August 2020

Date	Deposit Facility	Main Refinancing Operations	Marginal Lending Facility
08.10.2008	2,75 (-0,50)	4,25	4,75 (-0,50)
09.10.2008	3,25 (+0,50)	4,25	4,25 (-0,50)
15.10.2008	3,25	3,75 (-0,50)	4,25
12.11.2008	2,75 (-0,50)	3,25 (-0,50)	3,75 (-0,50)
10.12.2008	2,00 (-0,75)	2,50 (-0,75)	3,00 (-0,75)
21.01.2009	1,00 (-1,00)	2,00 (-0,50)	3,00
11.03.2009	0,50 (-0,50)	1,50 (-0,50)	2,50 (-0,50)
08.04.2009	0,25 (-0,25)	1,25 (-0,25)	2,25 (-0,25)
13.05.2009	0,25	1,00 (-0,25)	1,75 (-0,50)
13.04.2011	0,50 (+0,25)	1,25 (+0,25)	2,00 (+0,25)
13.07.2011	0,75 (+0,25)	1,50 (+0,25)	2,25 (+0,25)
09.11.2011	0,50 (-0,25)	1,25 (-0,25)	2,00 (-0,25)
14.12.2011	0,25 (-0,25)	1,00 (-0,25)	1,75 (-0,25)
11.07.2012	0,00 (-0,25)	0,75 (-0,25)	1,50 (-0,25)
08.05.2013	0,00	0,50 (-0,25)	1,00 (-0,50)
13.11.2013	0,00	0,25 (-0,25)	0,75 (-0,25)
11.06.2014	-0,10 (+0,25)	0,15 (-0,10)	0,40 (-0,35)
10.09.2014	-0,20 (-0,10)	0,05 (-0,10)	0,30 (-0,10)
09.12.2015	-0,30 (-0,10)	0,05	0,30
16.03.2016	-0,40 (-0,10)	0,00 (-0,05)	0,25 (-0,05)
18.09.2019	-0,50 (-0,10)	0,00	0,25

Source: European Central Bank (2020b)

The European Central Bank therefore began a multi-step rate cut in October 2008, resulting in a 325 basis point cut in the base rate (from 4.25% to 1.00) between October and May. The two-step rate hike in 2011 was driven by rising inflationary pressures (Inflation again exceeded 2% in December 2010, reaching 2.7% in May 2011. However, another wave of interest rate cuts began in November 2011 (inflation was 3% this month), the European Commission's forecast for the euro area, published a few days before the Governing Council's interest rate decision meeting, projected growth of only 0.5% for 2012 after 1.5% in 2011. (European Commission, 2011) The euro area entered recession again in 2012 and 2013, mainly due to the sovereign debt crisis of several member states, real GDP fell by 0.9% (2012) and 0.3% (2013), and the inflation rate was again below 2% from February 2013, which allowed for further interest rate cuts. This is how the key interest rate of 0% was formed in March 2016, and the negative deposit rate by June 2014, with which the ECB wants to stimulate the euro area banking system to lend and finance investments.

It is also worth examining the evolution of M3 money aggregate over this period, which, although not an independent pillar of monetary policy strategy since 2003, remains an indicator to be taken into account in monetary policy decisions, among many other indicators.

As Figure 15 shows, the crisis has led to a significant slowdown in growth and even negative values in 2010, but from 2015 onwards it typically exceeded the reference value applied between 1999 and 2003. The exceptionally high monthly money growth in the first half of 2020 is related to the COVID-19 pandemic, the reasons are: a liquidity needs of firms, a preference for holding liquidity in a period pf great uncertainty and the need among institutional investors for liquidity buffers. (ECB 2020f)

Figure 15: Growth of M3 in the euro area
(%, September 2008 – July 2020)

Source: European Central Bank (2020c)

3.2.3.3. Interventions

As mentioned earlier, the supranational monetary policy has no exchange rate target. As Figure 16 shows, the nominal effective exchange rate of the euro was significantly weaker in 2012 and 2015 than in 2010, but did not reach its October 2000 low, and in 2015 it occurred in a deflationary environment. The exchange rate of the euro also weakened during this period due to a decline in confidence in the euro area caused by the sovereign debt crisis. As a result, the ECB did not intervene to protect the euro exchange rate.

Figure 16: Daily nominal effective exchange rate of the euro (01. 09. 2008-31. 07. 2020, 1999 Q1 = 100)

Source: European Central Bank (2020d)

In 2011 the Euro system undertook one intervention in the foreign exchange markets. In response to the movements in the exchange rate of the yen associated with the natural disaster in Japan, and at the request of the Japanese authorities, the ECB together with the authorities of the United States, the United Kingdom and Canada, joined Japan, in March, in a concerted intervention in foreign exchange markets.

3.3. MONETARY TRANSMISSION IN THE EUROZONE

3.3.1. Originally Set Instruments of the Monetary Policy

Interaction between the central banks and commercial banks is possible due to interconnectedness of their balances. Access to balance items in banking is specific. It requires defining access to assets and liabilities of the central bank and also commercial banks. Balances of banks are mutually connected by the system of reserves of the bank structure. All monetary policy instruments of the central bank have an impact on change of resources in the bank structure.

The instruments used by the monetary authority of the Euro system to achieve its main goal were threefold: open market operations, standing facilities and minimum reserving. (Table 10)

Table 10: Traditional monetary policy instruments of the ECB

Monetary policy operations	Type of Transaction		Maturity	Frequency	Procedure
	Liquidity providing	Liquidity absorbing			
Open Market operations					
Main refinancing operations	Reverse transactions	-	One week	Weekly	Standard tenders
Long-term refinancing operations	Reverse transactions	-	Three months	Monthly	Standard tenders
Fine-tuning operations	Reverse transactions Foreign exchange swaps	Reverse transactions Collection of fixed-term deposits Foreign exchange swaps	Non-standardized	Non-regular	Quick tenders Bilateral procedures

Monetary policy operations	Type of Transaction		Maturity	Frequency	Procedure
	Liquidity providing	Liquidity absorbing			
Structural operations	Reverse transactions Outright purchases	Issuance of debt certificates Outright sales	Standardized/ non-standardized -	Regular and non-regular Non-regular	Standard tenders Bilateral procedures
Standing facilities					
Marginal lending facility	Reverse transaction	-	Overnight	Access at the discretion of counterparties	
Deposit facility	-	Deposits	Overnight	Access at the discretion of counterparties	
Compulsory reserving					

Source: own from European Central Bank (2020e)

3.3.1.1. Open Market Operations

Open market operations are one of the most applied and the most important tools used for liquidity controlling, interest rates regulation and indication of monetary policy intentions. The ECB initiates open market operations, decides on the tool to be used and the conditions of its use. Operations may be conducted under conditions of standard tenders, quick tenders or bilateral procedures.

Open market operations – in terms of its objectives, regularity and procedures – may be divided into following categories: main refinancing operations, longer-term refinancing operations, fine-tuning operations and structural operations.

Open market operations are carried out within either reverse or outright transactions, the issuance of debt certificates, foreign

exchange swaps or the collection of fixed-term deposits. These methods are described as follows.

Reverse transactions are operations when the European Central Bank buys or sells eligible assets under repurchase agreements or conducts credit operations ensured by underlying assets. Mostly they are used for main refinancing operations, long-term refinancing operations but may also be used for fine-tuning and structural operations. Central banks perform reverse transactions in the form of collateralized loan when the ownership right is temporarily transferred to the creditor or in form of repurchase agreements when the owner remains debtor over time.

Outright transactions: Throughout outright transactions, the Euro system buys or sells eligible assets directly on the market. In case of outright sale, it is a liquidity-absorbing operation and in case of outright purchase, liquidity-providing operation. These transactions are carried out in a decentralized manner by the National Central Bank through bilateral procedures.

Issuance of debt certificates: The ECB may issue debt certificates in order to reduce liquidity in the financial market. Such certificates represent the European Central Bank's commitment to the holder within a one-year maturity. They are issued and stored in a book form in security depositories and represent transferable securities.

Foreign exchange swaps: Foreign exchange swaps are transactions that consist of two parallel transactions in euro against foreign currency. In the first part of the operation, the Euro system sells (or buys) euro for the foreign currency and simultaneously buys (or sells) back in a forward operation in the agreed term. The Euro system usually conducts foreign exchange swaps only with currencies that are normally traded. The purpose of these transactions is regulation of interest rates in the market.

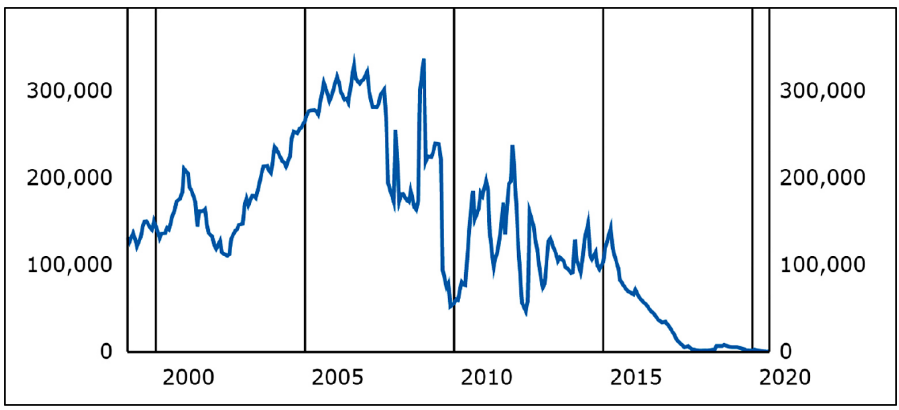
Collection of fixed-term deposits: Fixed-term deposit collection is executed in order to absorb liquidity from the market. To this

step, the Euro system may invite counterparties that have to store interest-bearing fixed-term deposits in the national central bank of the Member State in which they reside.

3.3.1.1.1. The Main Refinancing Operations

The main refinancing operations are the most important instruments of monetary policy as they have a key role in steering interest rates and managing the market liquidity. They are reverse transactions providing liquidity, conducted by national central banks in a decentralized manner, regularly every week. the Maturity of these transactions is usually one week, executed on the basis of standard tenders. (Actual volumes are seen on Figure 17 below.)

Figure 17: Volumes of the main refinancing operation – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

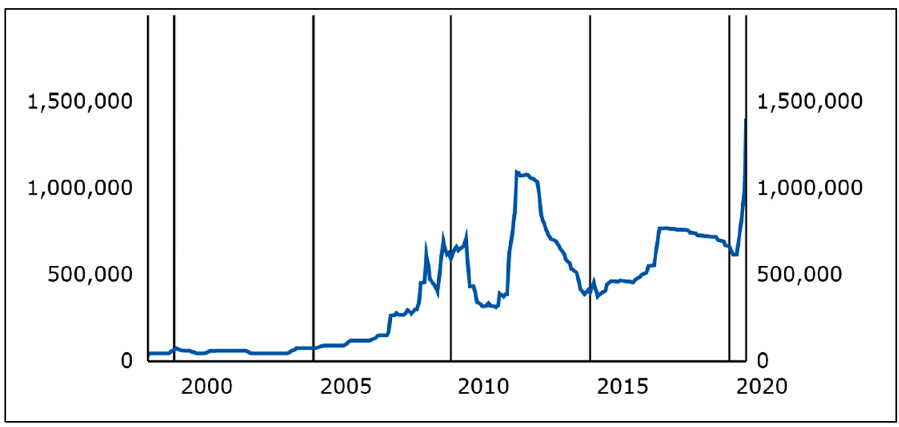
The above chart clearly indicates the acceleration of the central bank funding from the time when the Eurozone had been established.

In late 2008, the funding through the main refinancing operation peaked, then during the next year period dropped to a temporary minimum level. Since then, this structural funding has partially been replaced by other forms of funding.

3.3.1.1.2. The Longer-Term Refinancing Operations

The longer-term refinancing operations are reverse transactions that provide liquidity, executed once per month with a three-month maturity. The aim of these operations is to provide long-term refinancing to the financial sector. These operations are conducted based on tenders with variable interest rates and only in exceptional cases based on tenders with fixed interest rates. The procedure used with the longer-term refinancing operations also applies to irregular longer-term refinancing operations with longer maturities (i.e. to the targeted ones).

Figure 18: Volumes of longer-term refinancing operation – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

In accordance with its purpose to provide funding when there is a structural need for liquidity across the banking sector, longer-term refinancing operations have been mainly used by the European Central Bank from the awakening of the financial crisis. (Figure 18)

3.3.1.1.3. Fine-Tuning Operations

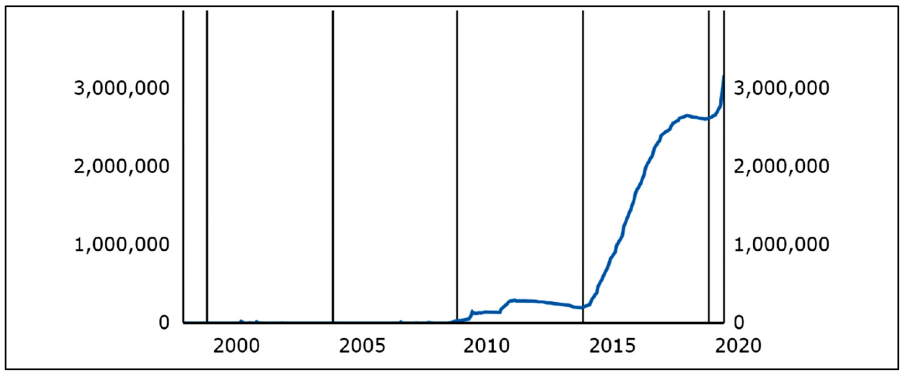
The fine-tuning operations can be conducted as reverse transactions, aiming to manage liquidity, interest rates and particularly the impact of unexpected liquidity fluctuations on interest rates. Such operations can be used to offset liquidity imbalances that arose by allocation of resources in the last refinancing operation during the last day of reserve maintenance period. Fine-tuning operations with unstandardized maturity are irregular.

Fine-tuning operations may take form of refinancing operations that are serving liquidity or sterilization operations that conversely are absorbing liquidity in the market. Refinancing operations are normally executed by quick tenders and sterilization operations through bilateral procedures.

3.3.1.1.4. Structural Operations

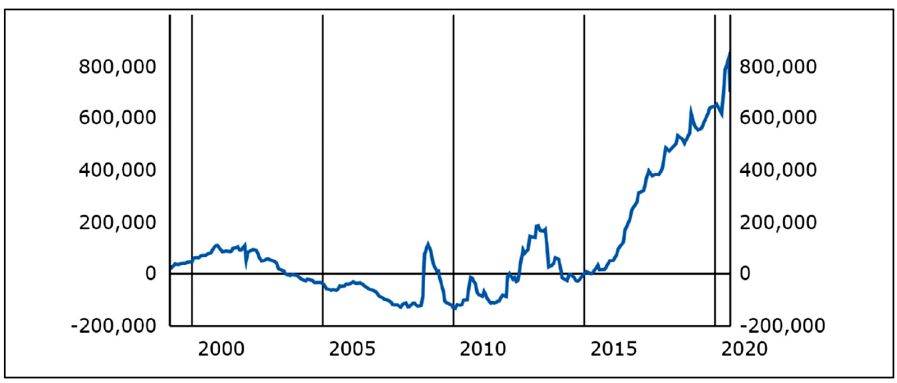
Structural reverse transactions are used by decentralized national central banks through standard tenders to adjust structural position of the Euro system. These liquidity-providing operations may be repeated regularly or applied irregularly. The maturity of such operations may not be determined in advance. From 1999 until now, structural operations have not been used. Figures 19 and 20 show the fine-tuning of liquidity providing or liquidity absorbing operations.

Figure 19: Volumes of other liquidity providing operations – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

Figure 20: Volumes of other liquidity-absorbing factors (net) – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

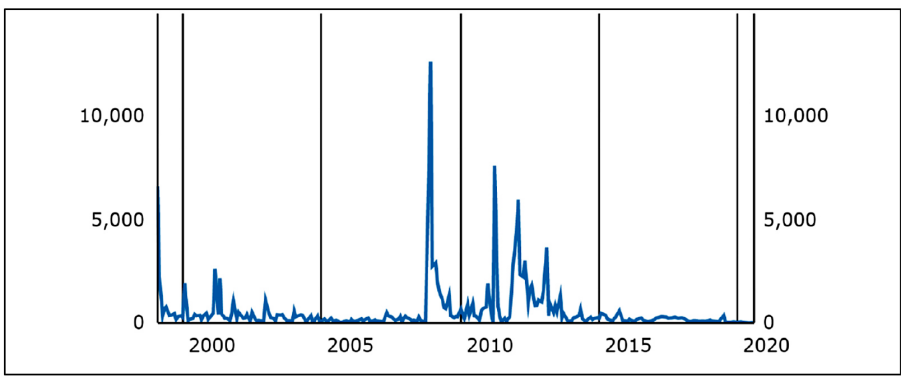
As it is reflected by the above figures, fine-tuning operations have been implemented on a larger scale since 2015, due to the mitigating efforts as responses to the financial crisis.

3.3.1.2. Standing Facilities

Central bank liquidity management refers to the practices of the European Central Bank as a monetary authority supplying the amount of liquidity to the market consistent with a desired level of short-term interest rates. Among these, standing facilities are used for providing and absorbing the overnight liquidity, signalizing aims of the monetary policy and formation of the zone for overnight rates of the money market. The Euro system offers two standing facilities, i.e. the marginal lending facilities and the deposit facilities.

Marginal lending facilities enable counterparties (note: banks, financial institutions) to obtain overnight liquidity from national central banks against collateral in the form of eligible assets. The interest rate on marginal lending facilities usually creates the upper limit of the overnight rate in the money market. (Figure 21)

Figure 21: Volumes of the marginal lending facility utilisation – Euro system (in millions of EUR)

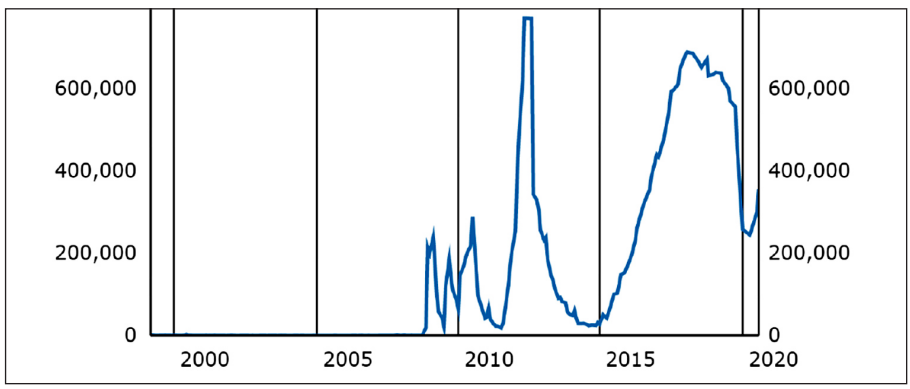


Source: European Central Bank (2020g)

The above figure marks the occasions when there was an urgent need for liquidity in the banking sector across the Eurozone (in November 2008, February and December 2011 by most).

Deposit facilities allow counterparties the overnight storage of an excess liquidity in national central banks. The interest rate on deposit facilities forms the lower limit of the overnight rate in the money market. Data indicate that there were peaks in deposits during the periods from March till July 2012, and early 2017 till October 2019. (Figure 22)

Figure 22: Volumes of the deposit facility utilisation – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

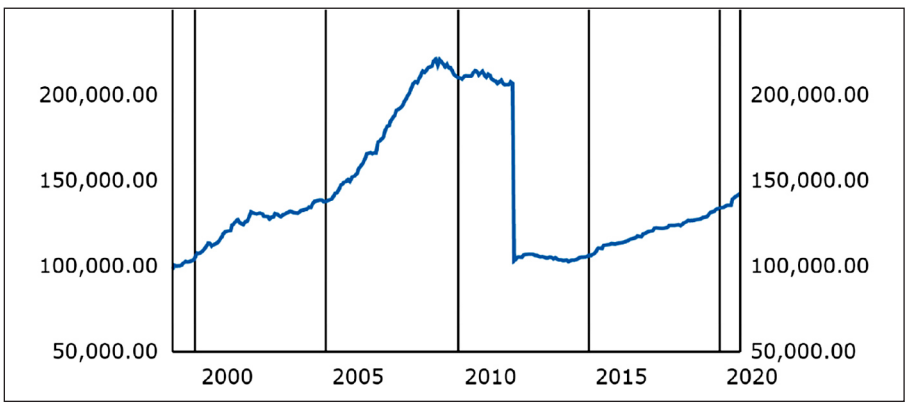
3.3.1.3. Minimum Reserving

Minimum reserves must be held by credit institutions on accounts in national central banks. The aim of the minimum reserve system is to stabilize interest rates in the money market and manipulate the structural liquidity. (Figure 23-25) To ensure interest rate stability, the system of minimum reserves allows averaging the Euro system

(completing of mandatory minimum reserves is set as the average of daily balances on the minimum reserve account during the compliance period). If the credit institution fails to meet any of the obligations related to minimum reserves, the ECB may apply sanctions.

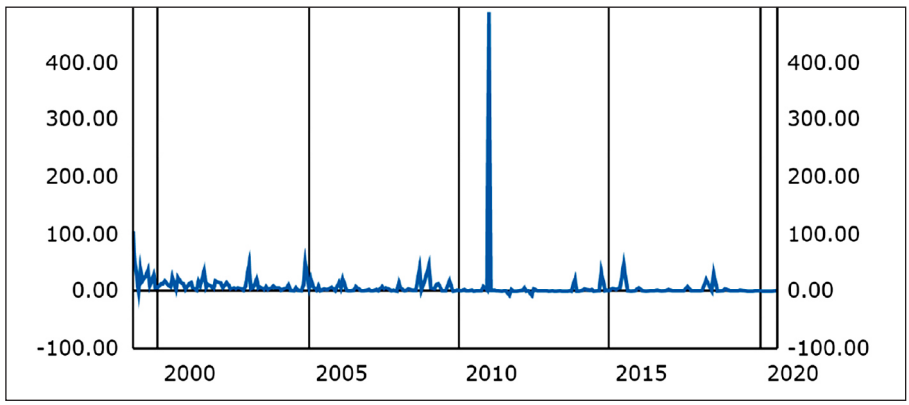
The reserve rate on the overnight deposits, deposits with agreed maturity or period of notice up to 2 years, debt securities issued with maturity up to 2 years and money market papers was 2% since 1999 and has been reduced to 1% since 18th of January 2012. There is a 0% coefficient on the deposits with agreed maturity or period of notice over 2 years, repos, and debt securities issued with maturity over 2 years. Credit institutions shall apply a standardised deduction to the debt securities issued with maturity up to 2 years and to money market papers as well; in 10% since January 1, 1999, in 30% since January 24, 2000, and in 15% since December 14, 2016. (European Central Bank, 2020h)

Figure 23: Total required reserves of credit institutions subject to minimum reserve requirements – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

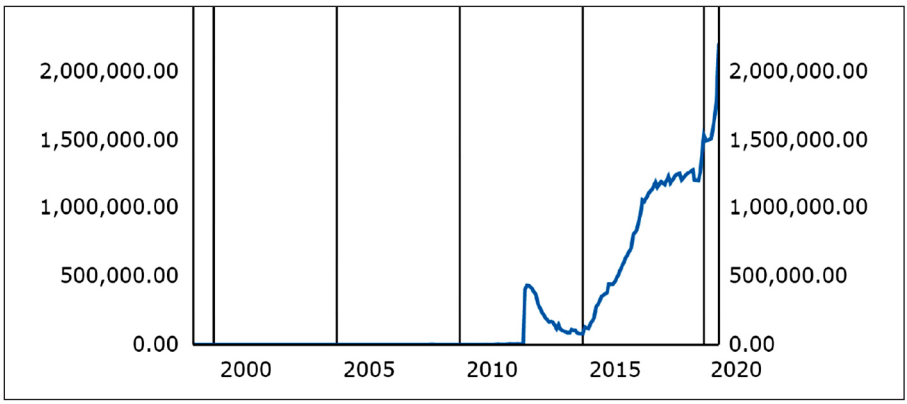
Figure 24: Total deficiencies of credit institutions subject to minimum reserve requirements – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

Deficiencies peaked in December 2010 with EUR 488 million, since then euro area credit institutions have been able to perform their reserve requirements. What is more, excess amounts of reserves have accumulated throughout the past couple of months across the Eurozone (Figure 25).

Figure 25: Total excess reserves of credit institutions subject to minimum reserve requirements – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

3.3.2. Unconventional Monetary Policy Operations

The European economies have fallen into recession in the aftermath of the global financial crisis and amongst the European debt crisis (Kiss and Mészáros, 2020). Their economic recovery was not supported significantly with the improvement in 2013, and there was an increased risk of uncertainty for the Eurozone economies in 2014.

The geopolitical situation, the declining oil prices and the long-term threat to the common currency required an adjustment in monetary policy to resolve the crisis. In April 2014, President Mario Draghi of the European Central Bank announced that the euro area might face emergencies and must therefore prepare for them.

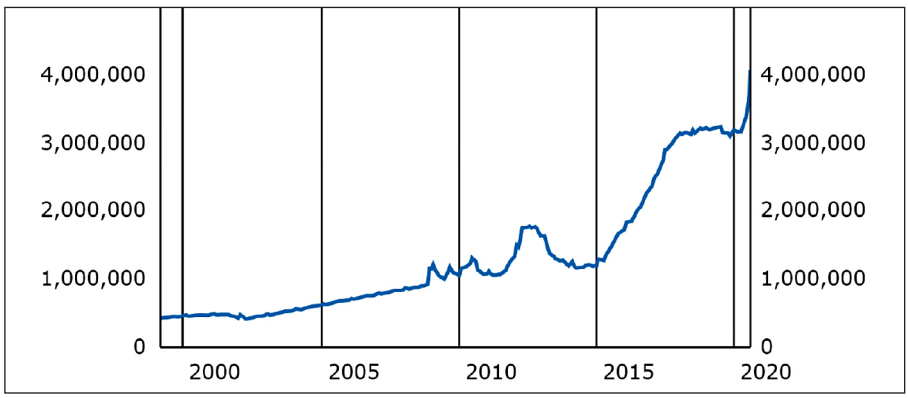
First, the European Central Bank must respond to routine monetary policy interventions (such as interest reduction) as countries outside the euro area tighten monetary policy, and as it results in higher bond rates or the appreciation of the euro.

Secondly, the European Central Bank will pursue quantitative easing policies to provide the commercial banks with permanent damage to bank loans or buy asset-backed securities. Under these conditions, the euro area should adopt an asset purchase strategy (i.e. quantitative easing).

These hypotheses fit the subsequent development of the economic situation. In June 2014, the European Central Bank took the necessary steps to address the situation, when the FED proposed withdrawing from quantitative easing. The ECB's Asset Purchase Programme was initiated in mid-2014 to support the monetary policy transmission mechanism and provide the amount of policy accommodation needed to ensure price stability. It consists of (i) the corporate sector purchase programme, (ii) the public sector purchase programme, (iii) the asset-backed securities purchase programme, and (iv) the third covered bond purchase programme.

The unconventional measures (i.e. the Asset Purchase Programme including the targeted long-term refinancing operations) contributed to the substantial increase of the monetary base in the Eurozone (Figure 26).

Figure 26: Volumes of the monetary base – Euro system (in millions of EUR)



Source: European Central Bank (2020g)

The European Central Bank announced in June 2014 a quantitative easing withdrawal, which brought its principal refinancing interest rate to an active and low level, introduced forward-looking directions and allowed deposits to maximize the impact of the policy in the yield curve in the name of negative rates.

Nevertheless, changes in the yield curve have not played a major role in improving liquidity in the euro area and the general public, so the conventional monetary policy of the European Central Bank has failed to achieve the expected results. Since then, the European Central Bank has decided to extend its long-term refinancing market operations. (Caballero and Schwaab, 2019)

3.3.2.1. Targeted Longer-Term Refinancing Operations

The implemented targeted long-term refinancing operations (TLTROs) are operations in the Euro system that provide financial institutions with excess funding. They preserve favourable borrowing conditions for banks by offering long-term financing to banks at attractive conditions and stimulate bank lending to corporations and individuals.

Accordingly, the TLTROs reinforce the current accommodative monetary policy position of the ECB and reinforce monetary policy transmission by further encouraging bank loans to entities. On 5 June 2014, the first TLTRO series was announced, the second (TLTRO II) series on 10 March 2016 and the third (TLTRO III) series on 7 March 2019.

The TLTROs are targeted activities, since the amount that banks can borrow is connected to non-financial companies and households with their loans. The interest rate to be applied in TLTRO III, similar to TLTRO II, is related to the borrowing trends of the participating banks. The more loans are issued by participating banks to non-financial corporations and households (with the exception of

household loans for home purchases), the more attractive the interest rate on their TLTRO III loans becomes.

The interest rate of TLTRO will be set for each operation's duration. In addition, the Eurozone's key refinancing operating level (the Eurozone reference interest rate, now 0.15%) plus 10 basis points spread during the activity. The counterparty may choose to repay the loan to the central bank beginning 24 months after each TLTRO. The European Central Bank will lay down a number of operational terms to ensure that funds are used to support the euro area's real economy. (European Central Bank, 2020i)

3.3.2.2. The Newly Introduced Pandemic Emergency Purchase Programme (PEPP)

Although the pandemic emergency purchase programme – by its purpose, procedures and volumes – belongs to the unconventional monetary policy instruments, but has been initiated lately, in March, 2020, to counter the outlook for the euro area posed by the coronavirus (COVID-19) outbreak. (European Central Bank, 2020j)

According to the official announcement on 18/March/2020, a maximum of €750 billion facility has been set for asset purchases until the end of 2020. (European Central Bank, 2020k) On 4/June/2020, the Governing Council decided to increase the €750 billion facility for the PEPP by €600 billion to a total of €1,350 billion.

The new temporary asset purchase programme covers private and public sector securities as eligible instruments for purchase. The purpose of the programme is to mitigate the serious risks to the monetary policy transmission mechanism and to improve the outlook for the euro area posed by the outbreak and escalating diffusion of the coronavirus, COVID-19.

The European Central Bank decided to accept several different kinds of assets in this programme. According to this, when the central

bank is buying bonds directly from banks, it serves the purpose of making more funds available that they can lend to households or businesses. The central bank under this programme can also buy companies' bonds, giving them an additional source of credit. Both kinds of purchases help boost spending and investment with the aim of supporting economic growth. (European Central Bank, 2020l)

3.3.2.3. Pandemic Emergency Longer-Term Refinancing Operations

In addition to the pandemic emergency purchase programme, the European Central Bank on 30 April 2020, launched a series of new pandemic emergency longer-term refinancing operations, as well. Their purpose is similar, i.e. to ensure sufficient liquidity and smooth money market conditions during the pandemic period. Operations allotted on a near monthly basis maturing in the third quarter of 2021, at highly accommodative terms. (European Central Bank, 2020m)

The overall response of the European Central Bank as a monetary authority to the pandemic crisis is fairly summarised by a blog of its president, Christine Lagarde (attached in Appendix I).

3.3.3. The Classical Monetary Transmission Model for the Eurozone

Transmission mechanism of monetary policy of the Euro system has been a process of changing interest rates of the ECB that in turn sets in motion several mechanisms until the desired change of economic indicators is reached. The complex mechanism is illustrated by Figure 27.

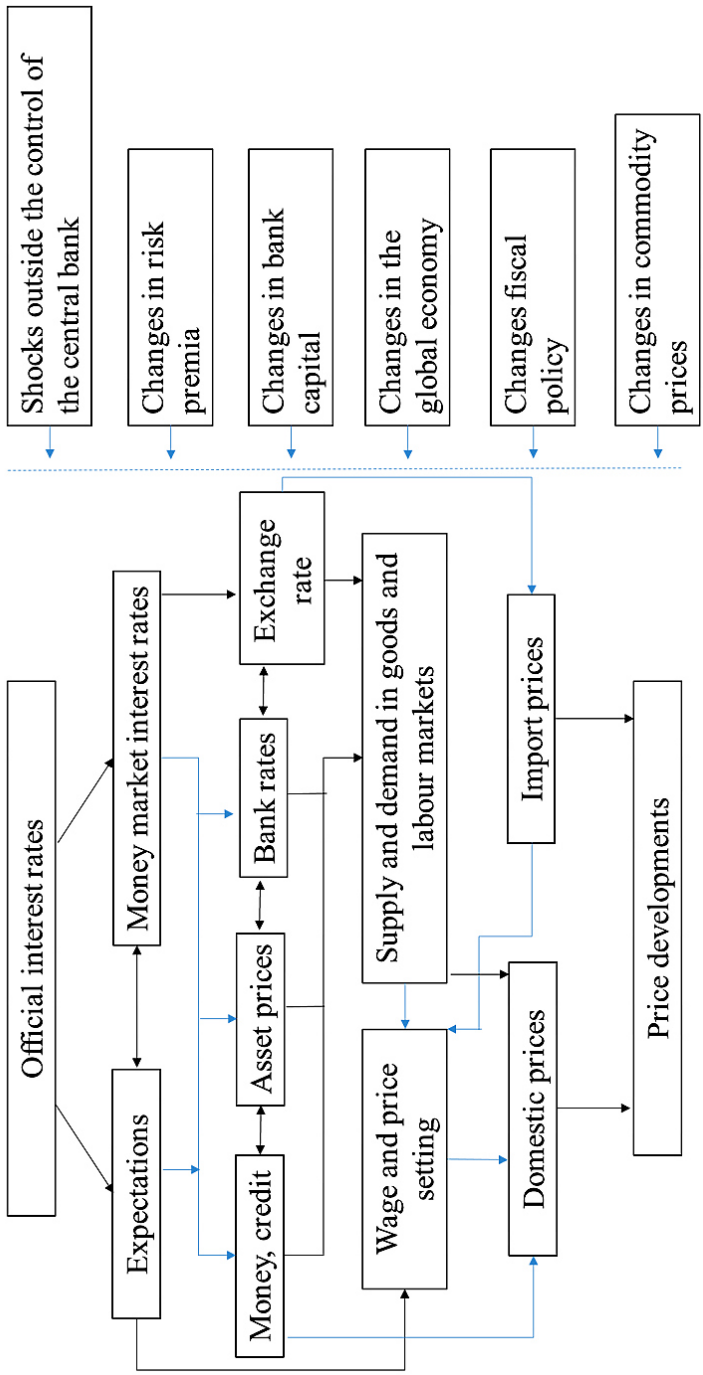


Figure 27: Transmission mechanism of the ECB

Source: European Central Bank (2020n)

In this classical model, the monetary authority provides funds to the banking system and charges interest. Given its monopoly power over the issuing of money, the central bank is able to determine this key interest rate, called as base rate. The whole mechanism starts with changing of short-term money market interest rates, which may lead to changing the interest rates of instruments with longer maturities. These rates are, however, highly dependent on long-term evolution of economic growth and inflation developments in the economy.

Monetary policy of the Euro system is also able to change other variables as asset prices (e.g. stock market prices) and exchange rates due to its impact on financing and shaping market expectations. Expectations of the market agents about the formation of official interest rates affect medium and long-term interest rates. In particular, longer-term interest rates highly depend on market expectations about the future course of short-term rates.

The monetary authority – assuming that it is credible to market agents – is able to guide economic agents' expectations of future inflation and thus it can influence price developments, as well. A central bank with a high degree of credibility firmly anchors expectations of price stability. In this case, economic agents do not have to increase their prices for fear of higher inflation or reduce them for fear of deflation. (Ságі and Maizl, 2004)

Changes in the foreign exchange rate can affect inflation directly, due to the fact that in open market economies the imported goods are directly used in consumption, but they may also work through other channels.

Changes in interest rates influence the saving and investment decisions of households and companies. Higher interest rates discourage market agents to take out loans for financing consumption or investment. In addition to the above, consumption and investment are also affected by increasing or decreasing asset prices via wealth effects and effects on the value of collateral. For example, as equity prices rise, share-owning households become wealthier and may

choose to increase their consumption. Conversely, when equity prices fall, households may reduce consumption.

Asset prices can also have an impact on aggregate demand via the value of collateral that allows borrowers to apply for more loans in line with the improvement of their creditworthiness. However, the actual amount of loan disbursements will depend on the banks' credit supply. In the circumstances of higher probabilities of default on loans, commercial banks may cut back on the amount of funds they lend to households and firms. This, in turn, may reduce the consumption and investment by households and firms.

In addition to the traditional bank lending channel, which focuses on the quantity of loans supplied, a risk-taking channel may exist. (De Santis and Surico, 2013) This happens when risk related decisions of commercial banks are affected, since this may lead to changing the provisioning on loans. The risk-taking channel is supposed to exercise its full effects mainly via two routes. First, low interest rates improve asset and collateral values. This, in connection with the expectations that the growth in asset values is sustainable, leads both borrowers and banks to accommodate with higher risk levels. Second, low interest rates make riskier assets more attractive to market agents, as they are in search for higher yields. In the case of commercial banks, these two effects usually translate into a loosening of credit standards, which can then lead to an excessive increase in loan supply.

The last step of the transmission mechanism is the impact of all targets on the primary goal of the ECB which is price stability. Inflation is influenced by many factors in the economy and therefore its adaptation to the executed monetary policy is carried out with a certain time lag.

In the final phase of the transmission, the interest rate decision of the monetary authority leads to changes in aggregate demand. As a result of the adjustments in consumption and investments of market agents, the level of domestic demand for goods and services relative to domestic supply is going to be altered. An upward price pressure is

likely to occur in the case when demand exceeds supply. In addition, changes in aggregate demand may translate into tighter or looser conditions in labour and intermediate product markets, which, in turn, may influence price and wage setting in the respective markets.

3.3.4. Monetary Transmission Model Embedding Quantitative Easing in the Eurozone

In line with the classical model, the transmission of standard monetary policy decisions exercise their effects via adjustments of market agents to changes in the official interest rates, and have their final on economic activity and price developments (Beyer et al, 2017). However, monetary policy transmission channels, like expectations and money market interest rates, are closely linked to financial stability considerations (such as bank capital, bank funding cost, credit standards and bank deposit and lending rates). In this regard, macro-prudential and micro-prudential policies aim to ensure the resilience and the sound working of the financial system.

The purpose of introducing non-standard monetary policy measures to the ECB's monetary policy was to safeguard specific channels of the transmission scheme, and to ease the monetary policy stance beyond the standard transmission of the policy rate as well (Figure 28).

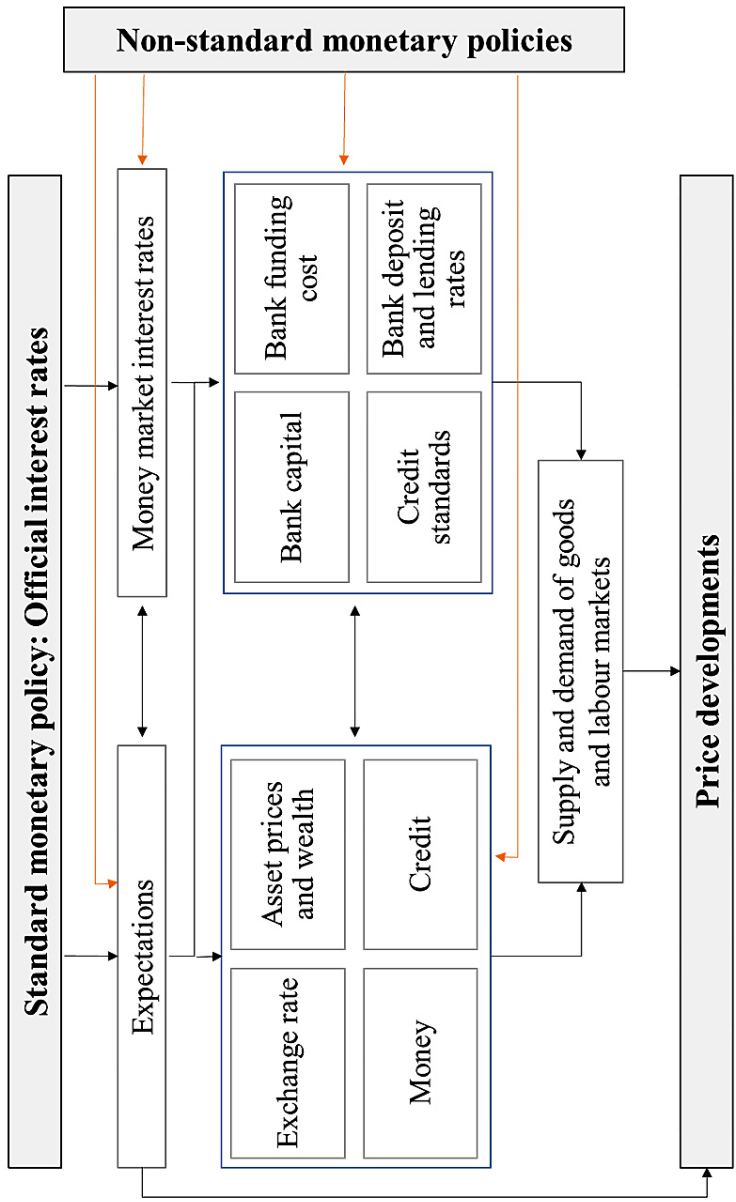


Figure 28: Transmission mechanism of the ECB (with QE)

Source: Beyer et al, 2017

The following main transmission channels of monetary policy can be distinguished in the practice of the European Central Bank:

- Interest rate (impact on money market rates, bank funding costs and saving and borrowing costs),
- Money (as changes in money supply affect liquidity conditions in the banking sector, further affecting consumer spending),
- Exchange rate (influencing import prices and competitiveness)
- Asset price and wealth (asset prices – i.e. the prices of housing type real estate and also of debt and ownership-type securities – react to policy changes with implications for wealth through market valuation),
- Balance sheet and profitability (initiating changes in the private sector balance sheets, net worth and collateral value)
- Bank funding and lending (the adjustment of commercial banks' lending supply and demand),
- Bank capital (implications for bank capital and profitability)
- Risk-taking (yield and lending behaviour),
- Expectations (influencing the private sector long-term expectations including ways whereby signalling the future policy course).

The macro-prudential policy, which is complementing the monetary policy, is aimed at strengthening the stability of the financial system, and thus safeguarding the financial system against the build-up of systemic risk. Its purpose is twofold: first, keeping the financial cycles within acceptable bounds in terms of levels and rates of change ('smoothen the financial cycle'), and second, building resilience in the financial system so as to allow it to absorb downturns in the financial cycle without major disruptions ('increase resilience'). With the usage of micro-prudential policy, the monetary authority's objective is to contribute to the safety and soundness of private individuals and enterprises, and thus to support the stability of the economy as a whole.

In the following paragraphs, three types of micro- and macro-prudential instruments (MPIs) are assessed: capital-based, liquidity-based and asset-based instruments (Figure 29, 30 and 31). Within the range of these instruments, capital-based MPIs going to exercise their effects through:

- the interest rate channel as, for example, requirements based on risk-weighted assets and the leverage ratio increase the cost of certain money market transactions, which indicate changes in the short-term market interest rates;
- the balance sheet and profitability channel, since raising capital is costly and discourages commercial banks in balance sheet expansion through the provision of loans or asset purchases;
- the bank capital channel, since the degree of capital constraints and provisioning requirements impacts on the supply of loans;
- the risk-taking channel, as capital-based MPIs encourage banks to invest in less risky assets with relatively lower yields; and
- the expectations channel, which impacts commercial banks in their capital planning, risk management and lending decisions.

The asset-based micro- and macro-prudential instruments – alike strict credit standards – impose quantitative restrictions on credit supply, and (according to Beyer *et al*, 2017) influence the monetary transmission through:

- the interest rate channel, because credit exposure limits lower the capabilities of commercial banks to raise funding, which is likely to be reflected in money market rates;
- the wealth channel: rising asset prices partially raise the value of the available collaterals (to the amount of caps on loan-to-value ratios);
- the risk-taking channel of potential borrowers; and
- the balance sheet and profitability channel through their impact on the net worth of borrowers and the collateral available to borrow against.

Liquidity-based MPIs (according to Beyer *et al*, 2017) are expected to impact on monetary policy transmission through the following channels:

- the interest rate channel,
- the balance sheet and profitability channel,
- the bank funding and lending channel,
- the bank capital channel and
- the formation of expectations.

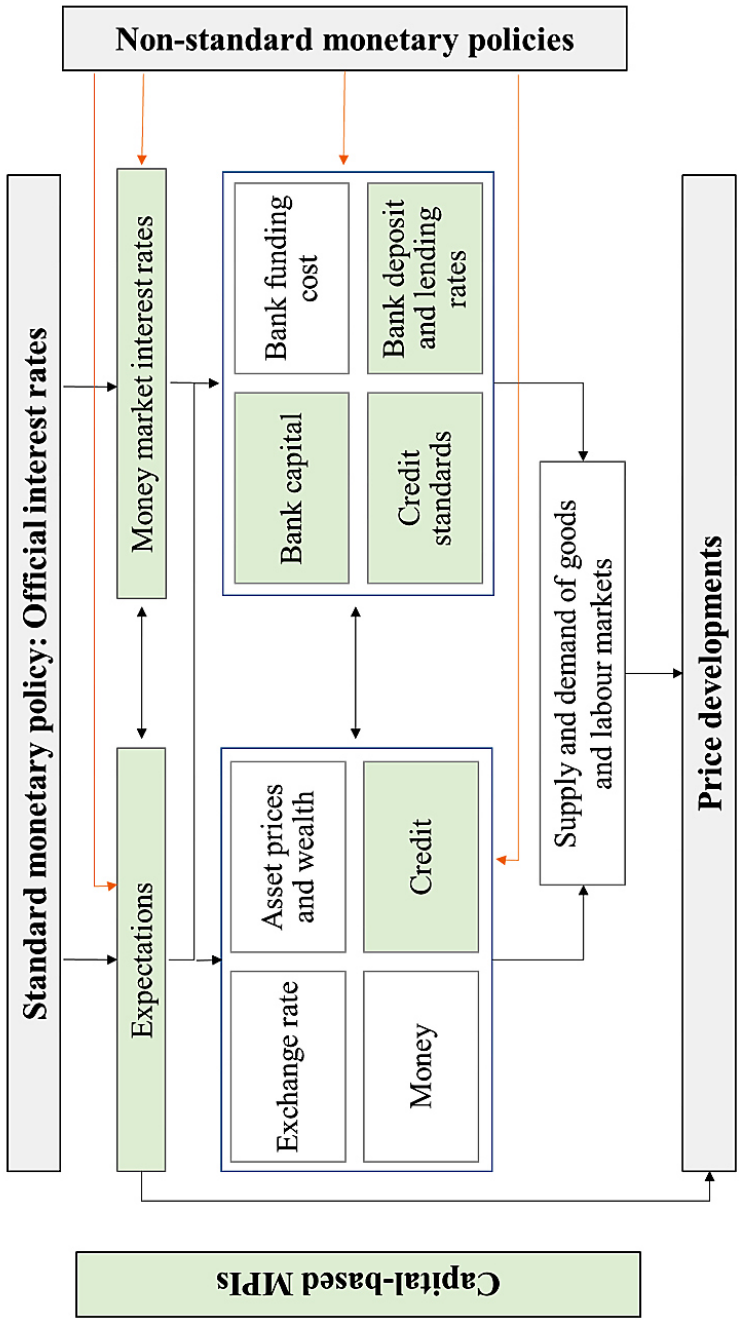
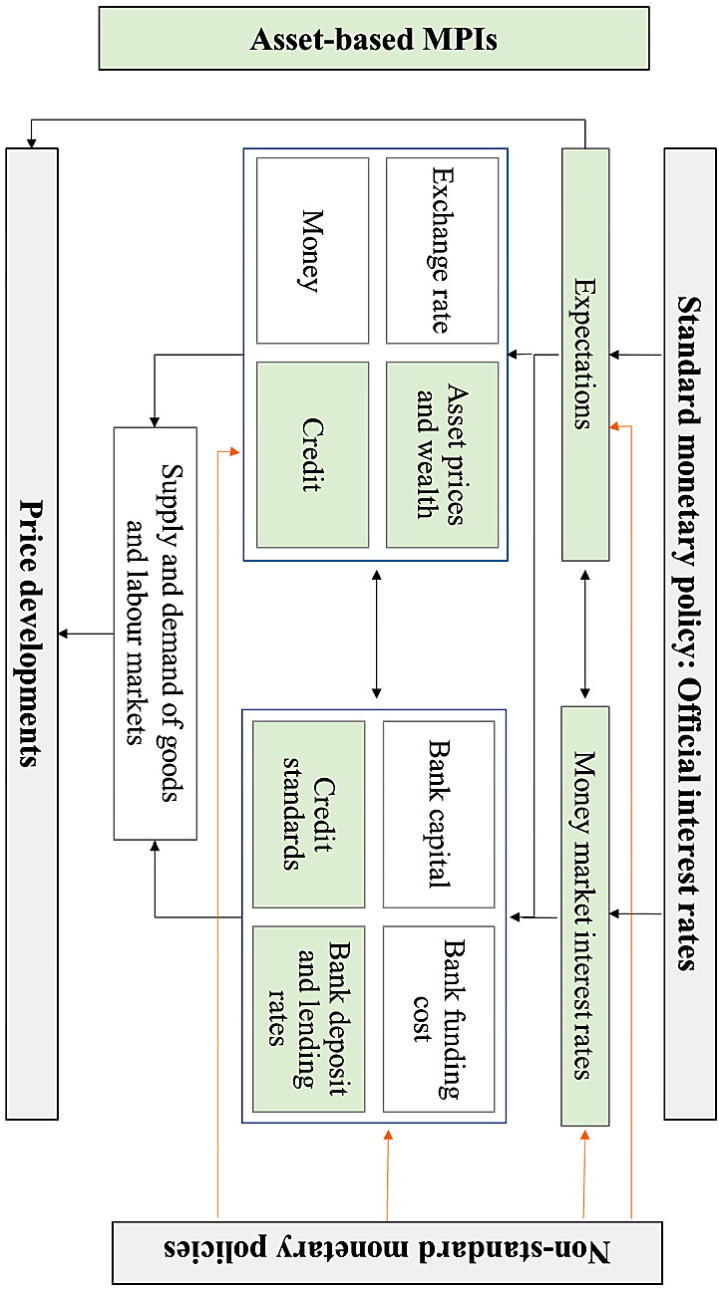


Figure 29: Impact of capital-based MPIs on the transmission mechanism

Source: Beyer et al, 2017

Figure 30: Impact of asset-based MPIs on the transmission mechanism



Source: Beyer et al, 2017

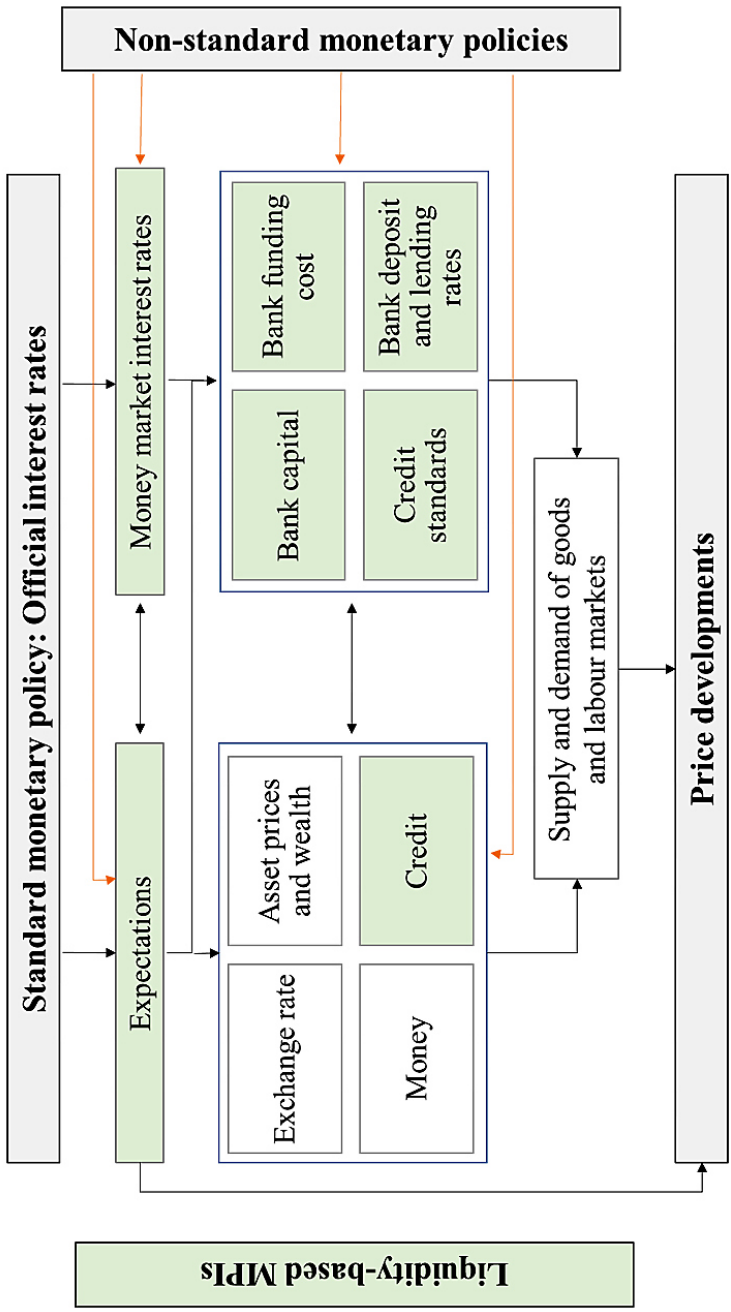


Figure 31: Impact of liquidity-based MPIs on the transmission mechanism

Source: Beyer et al, 2017

4. MONETARY TRANSMISSION IN CONJUNCTION WITH THE HUNGARIAN NATIONAL BANK'S STRATEGY

Being a non-Eurozone country, Hungary is carrying out an independent monetary policy. The transmission mechanism resulting from the monetary policy interventions is described with the model of a small, open-market economy, like that of the Bank of England During the examined period starting as of 1999, the base rate was functioning as a main policy instrument, effecting the economy through the money market interest rate channel, as well as the channels of the asset prices, the expectations and the foreign exchange rate.

The turn of millennium brought a breakthrough in mortgage loans in Hungary as well, alongside with the built-up of systemic risks on commercial banking portfolios (Dobák and Sági, 2005). Foreign-owned banks were increasing the volume of foreign currency loans and till the middle of 2000s, CHF loans become one of the main products of the commercial banks. In case of foreign currency loans, the interest rate was much lower than the loans taken out in Hungarian forint. The nominal interest rate was about 3-5%, which was appealing to Western European parent banks to bring foreign currency in the country with the purpose of lending it out (Balogh, 2009). By 2008, 34% of the loans were financed by foreign sources and one third of them was for short term liabilities. The gap was mostly financed by foreign exchange swaps. (Kaponya *et al*, 2012)

In the pre-crisis period, both the Hungarian and international markets were characterized by an abundance of liquidity and increased mortgage lending. However, in Hungary in the period before 2008 foreign currency based lending became more and more popular, which also involved higher credit and liquidity risks.

The financial crunch hit the Hungarian economy hard, due to the vulnerability of the country. As an impact of the crisis, a significant drop of transactions was observed in the Hungarian interbank and government securities market. Hungary did not count as a safe

investment that is why foreign investors withdrew money from the country. The downturn of the economy had a huge impact on foreign currency denominated credits, the significant shift in HUF/CHF rate generated exchange rate risk among the CHF denominated loans. (Felcser *et al*, 2017)

4.1. TARGETED CENTRAL BANK POLICY FROM 2012

The 2008 global economic crisis triggered economic policy reforms and universal new monetary policy measures (Lentner 2018a, 2018b, Matolcsy, 2015). From 2012 several measurements have been made all over the world with the purpose of indicating economic growth. In 2012, like in other surrounding countries, the Hungarian National Bank launched its easing cycle with the purpose of promoting investing activity, reducing foreign debt and external vulnerability. The 'One goal, one tool' rule which gives importance to base rate changes at inflation stabilization, after the financial crisis was not durable anymore so unconventional measures had to be done by the central bank in order to maintain price stability and economic improvement (Magyar Nemzeti Bank 2017a, 2017b). The financial crunch, due to the external vulnerability had serious impact in Hungary, that is why one of the main goal of the central bank was to reduce external exposure. The implementation of new monetary policy instruments supported the reduction of external debt by making central bank instruments less attractive for banks. The main innovative tools have been the following ones: interest rate reduction cycle, FGS, Self-financing Programme, BUBOR reform. (Hoffmann and Kolozsi, 2017)

4.1.1. Reduction of Base Rate

Since 2012, a disinflationary period started where the Hungarian risk premium also decreased. (Felcser *et al*, 2016) These factors allowed the Hungarian National Bank to launch its first interest rate reduction cycle in the examined period, which was in line with the practice of the surrounding countries. The purpose of the interest rate reduction cycle was to lower the base rate to a historically low level, in order to support the achievement of the inflation target (3%) and to stimulate economic growth and price stability.

In the first phase of the interest rate reduction cycle, between August 2012 and July 2013, the base rate was reduced by 25 basis points in every base rate reduction meeting. The level was lowered from nearly 7% to 4% during the first cycle. In the beginning of the interest rate reduction cycle, inflation was higher than the central bank's target of 3% but a strong disinflationary period started, which allowed the base rate cut. The central bank cut its base rate by 20 basis points in each step between April 2013 and January 2014, thereby improving credit conditions.

By February 2014, the central bank lowered the base rate with 15 basis points and since then it was reduced with 10 bps at each reduction meeting. The interest rate cut was necessary due to the uncertainty of the international financial environment. Base rate remained unchanged at 2.1% until March 2015. According to the Monetary Council, during this period the disinflationary impact of the economy moderated and inflation could be kept at a moderate level.

Like in the international perspective, in Hungary there has been an enormous decline in retail and corporate lending, but the small and medium-sized enterprise sector was affected the most. Until 2013, the loan portfolio decreased by about 4-5%. Although the central bank gradually cut its base rate with the purpose of improving

credit conditions, the corporate sector had limited risk taking interest. (Due to this reason, other financial policy measures have been implemented to counterpart the central bank's policy, i.e. the preferential credit facilities and guarantee schemes for SMEs, or subsidies for households, see for example, Ságі and Lentner, 2018, 2020, Tatay *et al*, 2019). On March 2015, the central bank started the second phase of the interest rate reduction cycle. In order to meet the inflation target, it reduced the base rate with 15 bps in each meeting, to 1.35% from the previous 2.1%.

The third and last cycle of base rate decrease started in March 2016, due to the constantly low inflation rate and with the goal to meet the inflation target. The following chart represents that from March until May the central bank decreased the base rate in 3 steps. Until May 2016, the base rate was reduced by 45 base points, from 1.35% to the rate of 0.9%. From May 2016, until mid-2020 no further changes have been made in the level of the base rate. Due to the pandemic, in June 2020 the central bank lowered its base rate to 0.75%, and then in July 2020 further to 0.6%.

Contrary to the global trend, the central bank has achieved the ease of monetary conditions and the stimulation of the economy, while the central bank's balance sheet narrowed. In the short and long term government yields there has been a decline, where a 640 basis point reduction was visible in case of 3-month government bonds. Other than base rate reduction, several factors contributed to the decrease on the yield of government bonds, such as international environment and other tools implemented by the central bank (for example the Self-Financing Programme).

Easing cycles had impact on interest rates, which dropped almost with 600 basis points. Base rate cuts caused a reduction in the interest rates of central bank credit, deposit products, and indicated a decline in yield on short and long-term government securities. The easing cycle generated a major saving on interest expenditures of the central

bank and commercial banks could access cheaper credit at the central bank and deposit money at lower interest rates. (On the other hand, households' concern was to increase their consumption and avoid depositing money at banks. Low interest rate environment supported consumption and investment, thereby boosted employment.

4.1.2. Funding for Growth Scheme

The financial crisis indicated a downturn in corporate lending. Although decrease in the amount of corporate loans was a global phenomenon, the drop in Hungary was outstanding in international comparison. Prior the interest rate reduction cycle, high rates forced the corporations to restrain production and postpone investments.

4.1.2.1. FGS1

For stimulating the economy, the central bank launched the Funding for Growth Scheme (FGS) in June 2013, with the purpose of making it easier for small and medium-sized enterprises to access credit. The central bank provided a 0% interest rate refinancing loan facility to the credit institutions under the FGS program, in which the banks were able to lend to small and medium-sized enterprises with a 2.5% interest margin for a maximum of 10 years. Because of the induced competition in the market, commercial banks usually could lend out money in less than 2.5% interest rate margin. With this fixed rate loan, they were able to provide long term, exchange rate- and interest rate risk-free loans to companies.

The first phase, which lasted from June 2013 to August 2013, was aimed to stimulate competition between banks and to ease credit market barriers. FGS played an important role in the conversion

of foreign currency loans of the SME sector. With the program, nearly HUF 230 billion of foreign currency denominated loans were converted into HUF.

4.1.2.2. FGS 2

The second phase of FGS 2 ran from October 2013 until the end of 2015. During this period, the main focus was on investment loans, the proportion of which was already around 60% by this time. FGS 2 aimed to boost economic growth and increase access to credit for micro-enterprises. The goal was to indicate growth in the credit market and boost competition among commercial banks.

The Funding for Growth Scheme 2 was terminated in September 2015. During this period the value of loans given out was 1425 billion HUF. Parallel of the second phase, in March 2015, FGS + was introduced. The central bank provided liquidity to banks against eligible collateral under FGS+. Financial Institutions had to use this refinancing to expand lending to those SMEs who were creditworthy but who had higher credit risk. With the FGS+ program, the value of loans given out was almost 23 billion HUF.

4.1.2.3. FGS3

In the beginning of 2016, the Hungarian National Bank launched the Growth Supporting Programme (GSP) as part of the third phase of Funding for Growth Scheme. In this phase of FGS program, the target of the central bank was to enable forint and euro based loans for investment purposes.

As part of the GSP program in the beginning of 2016, the Market-Based Lending Scheme (MLS) was introduced. The goal of MLS was to decrease the central bank's intervention in lending to small and

medium sized enterprises and re-establish market based funding. In order to help commercial banks with the transition to market-based lending, the central bank implemented risk and liquidity management instruments. To reduce interest rate risks at fixed interest rate lending, interest rate swap on lending activity (LIRS) and preferential deposits were implemented by the central bank.

LIRS is a 3-years interest rate swap where the banks are paying fixed interest rate and in exchange the central bank pays interest on variable rate. The purpose of this act was to spur lending to SMEs with decreasing volatility of yields for commercial banks. A more predictable cost and less risky way for corporations is to take loans with fixed interest rates. Fix interest loans indicated credit risk to commercial banks when loans were lent against short-term deposits. Interest rate swaps enabled commercial banks to provide credit for the SME sector at fixed rate without any exchange rate risk. With using LIRS, the central bank collects interests from commercial banks at a fixed rate and pays a variable one. In case of a scenario when there is a rise of yields, the loss can be counterbalanced by the higher interest earned on swaps. The requirement of LIRS is that during the term of the transaction, banks have to increase their total volume of SME loans at least with an additional quarter. As a result of the implemented tenders, the volume of SME lending rose almost by five percentages.

Preferential deposit is, similarly to the overnight instrument, a one-day deposit opportunity with interest of central bank base rate. It is not part of the reserve requirement system and is managed on a separated account. The purpose of implementation was to help in the liquidity management of commercial banks. Being part of the Market Based Lending Scheme program preferential deposit was available along with an active LIRS transaction until the end of 2018 when the MLS program was terminated. Since April 2019, preferential deposit has been available to those financial institutions who are taking part of the FGS FIX program (and the Bond Funding for Growth Scheme).

The goal of this deposit instrument is that at base rate it sterilizes excess liquidity arising from FGS FIX (about the general effects of sterilizing excess liquidities arising from FX interventions, see for example Gábor *et al*, 2012).

4.1.2.4. FGS FIX

Similarly to the previous programs, the national bank provided a 0% interest rate refinancing loan to the credit institutions which the banks were able to lend to small and medium-sized enterprises with maximum 2.5% interest margin. The program started at the beginning of 2019 with a total HUF 1000 billion available for allocation. The main parameters of FGS FIX remained similar to the earlier Funding for Growth Schemes. FGS FIX can be defined as a more targeted program comparing to the previous phases, except that loan is provided for longer maturities than three years, for investment purposes. As we mentioned earlier preferential deposit is used to sterilize the excess liquidity arising from the program that is why FGS FIX can remain neutral in terms of liquidity. (Magyar Nemzeti Bank, 2018b)

Especially the first phase of FGS was crucial in the conversion of corporate foreign loans. Prior the financial crisis, the excess loan taking attitude of corporations and the private sector deepened the country's vulnerability. Funding for Growth Scheme had a huge effect on reducing the debt of SMEs. During the first period of the program, many small and medium enterprises used the FGS to convert foreign currency denominated loans into Hungarian currency. Redemption of the loans reduced the exchange rate risk and interest burden for the enterprises. In the upcoming phases, companies could focus on investments and improvements as they could obtain financing with longer maturity periods and less credit risk. Increased investment activity indicated demand and generated a general growth on wages, profit and the GDP.

4.1.3. Phase-Out of Foreign Currency Denominated Loans

As previously described, increased number of CHF denominated loans caused serious damages for households, corporations and to the overall economic conditions with the outbreak of the financial crisis. (Dancsik *et al*, 2017, Kiss and Schuszter, 2014, 2015)

In order to phase out foreign currency denominated loans several conditions had to be met, for example:

- stable legal background was needed to avoid conflicting interpretations regarding to conversion,
- lower interest rates were essential for avoiding short term rise of interest rates,
- in order to avoid pressure on FX rates during conversion, the Hungarian National Bank needed notable foreign currency reserves.

By 2014 the economic environment could allow the phase out of foreign currency loans without any considerable market risk. To ensure bank activity in reducing foreign currency denominated loans the central bank introduced two instruments. For both euro sales instruments, it announced fixed price tenders where the central bank supplied financial institutions with euro but the exchange rate risk between EUR and CHF had to be hedged by the commercial banks.

The conversion of foreign currency loans had a substantial effect on the liquidity of the banking system. During the tenders about CHF 600 million foreign currency denominated loans were converted into forint which enabled households to phase out the exchange rate risk taken with loans. Although the conversion eliminated exchange rate risk for households and indirectly from the banking sector, liquidity risk emerged for commercial banks. Within the framework of foreign currency loan conversion program, the banking sector could buy foreign currency in exchange for forint liquidity held by the central bank. In 2014 conditions of phasing out foreign currency denominated loans were met, the banking sector had adequate level

of forint liquidity required for the conversion. The banking sector had 4800 billion to 5100-billion-forint liquidity in the main policy instrument, while the required amount of forint for conversion was HUF 3000 billion.

4.1.4. Self-Financing Programme

4.1.4.1. First Phase

The program aimed to decrease the central bank's dependence on foreign sources, reduce financial risk, stimulate domestic demand for government securities and channel excess liquidity of banks into the government securities market.

The objective was to reduce foreign currency debt by increasing demand for securities acceptable as central bank collateral. The Hungarian National Bank sought to modify its instruments by making the deposit facility less attractive for commercial banks. Because of liquidity management reasons, banks opted to choose securities with longer maturities and those who were eligible as collateral.

The first phase of the Self-Financing Programme lasted from April 2014 to June 2015. In this period, significant changes have been made in the main policy instrument.

The Hungarian National Bank removed the previous two-week bond and replaced it with a two-week deposit. The two-week bond was available to domestic and foreign institutional investors, but foreign-owned bonds increased the central bank's external debt.

The two-week bond provided liquid assets to banks at low risk, unlimited amount and in short-term. This did not encourage the banking sector to purchase longer-term assets. The two-week deposit, which was introduced in August, was not marketable, so it was less liquid than the previous instrument. A two-week deposit could not serve as a collateral for central bank credit operations. Foreign

investors were not allowed to buy it, which reduced the reliance on external sources. With the modifications in the main deposit instrument, securities become better investments for commercial banks than term deposit instruments. The goal of changing main policy instrument was to channel commercial bank's liquidity with modifying the main policy instrument.

With the purpose of mitigating the interest rate risk on government security purchases, the Hungarian National Bank introduced conditional interest rate swap (IRS) in the summer of 2014. The central bank required commercial banks to increase their holding of acceptable collateral to an extent which was equivalent with the volume of IRS acquired at tenders.

In general terms, the interest rate swap is an agreement between parties and within that the central bank pays a variable rate, for what in exchange fixed interest rate is received, with the purpose to help banks reducing interest rate risks. At auctions the Hungarian National Bank determines the lowest fixed interest rate at which it is accepting bids and the maturity of swaps, with special regard to the markets of interest rate swaps as well as fixed and variable rate government bonds.

During pricing the central bank also has to take into account that the central bank interest rate swap is a conditional instrument; therefore, conditionality also needs to be reflected in the price. It means that the price of the central bank IRS is determined to be below the price of the market IRS. The difference between the two prices is the 'price of the conditionality' of the central bank instrument.

Lowering the interest rate risk by IRS caused that commercial banks got involved more in the securities market. Interest rate swap transactions are available only to those banks who are increasing the eligible collateral at the same extent as the IRS portfolio. In 2014, the central bank announced three-, five- and ten-year tenders.

4.1.4.2. Second Phase

The second phase of the self-financing program was introduced in June 2015, which indicated change in the main policy instrument. The duration of the two-week central bank deposit was increased to three months. Important difference indicated by change of maturity is that it could no longer serve as a liquid asset and could not be calculated in the liquidity coverage ratio anymore. As mentioned previously, LCR refers to the highly liquid asset (assets which mature in 30 days) held by financial institutions to ensure liquidity in short term. The change was not favourable to banks as the three-month deposit did not comply with the LCR requirements, that is why banks opted to choose more liquid Hungarian governmental securities. Government securities are counted as liquid instruments because they are marketable and can be accepted as collateral in case of O/N loans. Although two-week deposits were not terminated until the spring of 2016, it was available only in variable interest rate (usually lower than base rate) that is why commercial banks tended not to choose this option.

The self-financing program generated additional demand for liquid government securities. Increased demand for Discount Treasury Bill generated a decrease in yield. In some days, the yield of Discount Treasury Bill become lower than the O/N deposit rate. This did not support the goals of self-financing program, as in those occasions central bank deposit was a better choice than government securities. In order to remedy this problem, in September 2015 the central bank made modifications in the interest rate corridor. It did so by changing the +/- interest rate corridor around the base rate to asymmetric.

At the same time, it reduced the overnight deposit and loan rate by 25 base points. The aim was to moderate volatility of interest rates with decreasing the deviation from the base rate. Overnight deposit facility, the bottom of the corridor, provides temporary liquidity surplus and restricts the fall of interbank interest rates under this

level. O/N loan provides liquidity for banks and restricts the rise of interbank interest rate over that level.

For the banks it became more favourable to take O/N loan than to keep the capital in O/N deposit. Prior the asymmetric corridor, Hungarian Forint Overnight Index Average (HUFONIA) was mainly fluctuating in a rate lower than the base rate. Change in the corridor led to a rise in HUFONIA (temporary over the base rate) and the Discount Treasury Bill yield was no longer close to the O/N deposit rate which was consistent with the long term goal of the self-financing program.

In line with the asymmetric corridor, the central bank reduced the maturity of collateralized loans, the six-month loan to three months and the two-week loan to one week. The shortened maturity helped banks to adjust to the new liquidity environment. The new three-month deposit had weekly tenders and in order to overcome with any liquidity shortfall one-week fix rate (base rate +25 base point) collateralized loan was available. The maturity of the three-month valuable rate collateralized loan was in line with the duration of Discount Treasury Bill and the main policy instrument.

In consonance with the European Central Bank decision, in December 2015, the Hungarian National Bank modified the previous optional reserve requirement, where the required ratio was in the interval of 2-5%, to a mandatory fixed 2 percentages. The optional system allowed banks to raise the reserve ratio and keep money in a liquid form at the highest 5% reserve requirement, at almost the same interest as the base rate. This would have been in conflict with the self-financing program's goal. The introduction of the uniform reserve ratio ensured that the banks are purchasing government securities. Uniform reserve ratio prevented the flow of forint liquidity into central bank reserve.

As a result of the Self-financing Programme, the gross external debt of the national economy decreased significantly by the end of 2018. During the program, forint funds were used to refinance EUR

11 billion of foreign currency debt which indicated a drop of external debt and decreased the vulnerability of the country. A considerable decrease occurred in the proportion of foreign currency denominated debt because of the introduction of the Self-financing Programme, the domestic sector bought forint debt from external investors.

The Self-financing Programme also had considerable effects in the balance sheet of the banking system. Significant growth was realized in the government securities purchases. It indicated demand in the government securities market by the commercial banks. Due to the modifications in the instruments and the implementation of stricter rules (LCR) in line with the international standards, liquidity flowed from sterilization assets to government securities.

The announcement of monetary policy reforms resulted in a change in the attitude of commercial banks. Financial institutions were seeking other marketable investment opportunities in order to place their forint liquidity. The introduction of a 3-month deposit resulted in a change of interest from O/N deposit instrument, preferential deposit and other central bank instruments to the government securities market. As a result of the Self-financing Programme, commercial banks significantly reduced their net forint claims toward the central bank, which decreased the forint liquidity in the banking system. It was more beneficial to banks to hold government securities instead of the central bank instruments. (Magyar Nemzeti Bank, 2015; Nagy and Kolozsi, 2017)

4.1.5. Unconventional Monetary Policy Instruments Affecting the Short-Term Yields

In 2016, several unconventional modifications were made in regard to the central bank instruments. The central bank started an unconventional monetary easing in order to keep the base rate at a targeted level. The goal of the quantitative easing was to support the

Self-financing Programme, to indicate increase of loan taking attitude and to decrease market yield without making crucial modifications in the base rate. (Magyar Nemzeti Bank, 2018a)

4.1.5.1. Three-Month Deposit Facility

The most important element of the easing was the quantitative limitation of the three-month deposit. In 2015, the three-month central bank deposit become the main policy instrument. It was kept so until December 2018, when it was phased out. Prior the reforms, three-month deposits were announced weekly. In 2016 the central bank's main goal was to reduce the weekly tenders to monthly announcements. The frequency reduction of the three month deposits indicated less accessibility to the main policy instrument and generated excess liquidity in other markets.

The impact mechanism of quantitative easing showed that liquidity from the three-month deposit generated excess liquidity in the interbank and government securities market. The extra liquidity in the banking system drove down yields in the interbank and government securities market.

The most liquid instrument where banks could put their money was the reserve account. Although keeping money there is unfavourable for banks, because since October 2016 the interest rate on excess reserve was 15 base points below than the overnight deposit rate (now it's even minus).

Higher but still negative yield can be earned by banks if they put their liquidity on overnight central bank deposit account. The effect of quantitative easing is represented in the rise of O/N deposits.

Another way to manage extra liquidity is to drive money into preferential bank account, although only to a limited extent. As we mentioned above, the preferential deposit account was available up to twice their annual growth of lending toward the SME sector. In case

banks deposited more money than the limit they had to repay the interest received on preferential account.

Government securities were accepted as collateral to central bank loans and provided the means that higher yield could be gained after the money, although less liquid than the previous investment possibilities and in the long term it can generate interest rate risk. Purchasing government bonds contributed to the reduction of the country's external debt.

Apart from decreasing the frequency of tenders, MNB limited the amount of quantitative limit at 900 million HUF. Tenders for three-month deposits allocated according to the total balance sheet amount of each bank. The three-month deposit corresponds with the ratio of each bank's balance sheet total from the overall banking system. (Magyar Nemzeti Bank, 2017b)

In case commercial banks are predicting a general growth of liquidity, they are placing a large amount of their liquidity in the main policy instrument and taking a short term loan from the central bank to finance their short term obligations. In the scenario when there is lack of liquidity, decreased volume of three-month deposit is taken. In these events, the commercial banks would like to avoid those central banks instruments where the interest rate is unfavourable compared to base rate.

4.1.5.2. EUR-HUF Swap Tenders

FX swap is a variable rate tender, within its framework financial institutions can swap EUR to HUF in one-week, three-months, six months (from April 2017) and one-year (from April 2017) maturity tenders. The national bank determines the minimum swap point (minimum applied forint interest rate) and the volume of the tenders at the announcement. Depending on liquidity and the volume of submitted

bids, MNB can deviate from the announced volume upwards and downwards, as well as even announcing it to be unsuccessful.

In the Q3 of 2016, in line with the implementation of quantitative easing, short-term fine-tuning instruments were introduced by the central bank.

FX-swap market is recognized to be the biggest interbank market in Hungary, that is why using fine tuning had huge impact on interbank forint liquidity.

The objective of the fine-tuning was to modify the forint liquidity in order to achieve the inflation target. FX swap has a significant effect on market yields and contribute to the efficient monetary transmission. According to the repost of MNB, FX swap market can have effect on interbank rates.

In April 2017, the central bank announced the six-month and twelve- month FX swap maturities.

The fine-tuning contributed to the shift of liquidity path in order to ensure the effectiveness of quantitative easing. Fine-tuning the volume of FX-swaps reached HUF 1500 billion by the end of 2017. In the upcoming years, MNB paid great attention to foreign exchange swaps. The volume of 12-month and 6-month swaps has been constantly growing. (Magyar Nemzeti Bank, 2017a)

4.1.5.3. Reduction of the Reserve Requirement

Commercial banks are required to maintain reserves against liabilities at the central bank. Financial institutions have to hold on the current account an average amount that is equal to the minimum reserve requirement. The national bank pays interest, which is equal to the base rate after the minimum reserve kept in the reserve account. Commercial banks have to pay a penalty interest rate (currently 0,6%) if they hold less or more than the required amount of reserve.

The goal of mandatory reserve is to stabilize short term market rates (O/N rates) and to avoid liquidity management difficulties.

In 2016 a modification was made concerning the reserve rate, which was decreased from 2% to 1%. The restriction supported the quantitative limitation, increased liquidity in the banking system and reduced the volatility of the money market. This act was in line with the European Central Bank's cut in reserve ratio (in 2012).

Since December 2018, after the reduction of the volume of three-month deposit to zero, reserve requirement has become the main policy instrument. Mandatory reserve has to be used by all the components in the sector, interest is linked to base rate and ties down significant amount of liquidity. In the current monetary policy framework, minimum reserve can serve as main policy instrument because of the above mentioned characteristics. Minimum reserve plays a significant role in the banks' liquidity management as it is closely linked to liquidity processes and to short term yields.

4.1.5.4. Interest Rate Corridor

In April 2016 the two-week deposit, which previously was serving as main policy instrument, was terminated. Due to the termination of two-week deposits and the decreased liquidity of the banking system, the National Bank conducted changes in the interest rate corridor.

Changes were made on the overnight deposit and loan rates. In March 2016, MNB decreased the ceiling of interest rate corridor from 2.1 to 1.45 percentage. In line with the reduction of O/N loan rate, deposit rate was changed, as well, from 0.1 to -0.05 percentage. Until the autumn of 2019 further changes were not made regarding the bottom of interest rate corridor. With the cut of base rate, MNB gradually reduced the ceiling of interest rate corridor, the rate of O/N loan, from 1.45 (March 2016) to 1.15 (May 2016).

A wide interest rate corridor can restrict the effective transmission of monetary policy and the interbank market. Change of the overnight deposit and loan rate decreased the volatility of the interbank interest rates and indicated more activity in the interbank market. The above measures had the effect of quantitative limitation on the liquidity of the banking system. At the beginning of 2016, because of the FX swap maturities related to conversion of foreign currency denominated loans and the issuance of forint government securities, the liquidity of the banking system started to decrease. The quantitative limitation indicated a flow of liquidity from the three-month deposit into other, more favourable instruments.

Liquidity outflow from the main policy instrument had a yield-reducing effect on all the relevant markets especially on the government bond market and the O/N yields.

After the announcement of modifications in the main policy instrument, interbank yields fell below central bank base rate. By the end of December 2016, 1-month and 3-month BUBOR decreased below 0.4 percentage.

Despite the cut in overnight lending rate, to the level of base rate, O/N central bank lending did not increase. This is due to that fact that, because of the modifications in the three-month deposit, there was already excess liquidity in the market. As mentioned previously, overnight interbank yields dropped significantly, that is why O/N central bank lending instrument lost from its significance.

As an effect of the limitations, significant decline occurred in the yields of the treasury market. The declined yield of long-term government securities meant that financing the public debt became cheaper for the state and long term commitment of domestic banks were secured.

4.1.6. Unconventional Instruments Affecting the Long-Term Yields

The purpose of the targeted unconventional monetary policy was to extend loose monetary conditions on the long end of the yield curve and in particular to indicate the increase in volume of fixed mortgage bonds. The act contributed to the decrease of interest rate risk at commercial banks and therefore the spread of long-term fixed rate mortgage loans.

4.1.6.1. Mortgage Bond Purchase Programme

In the January of 2018, central bank launched its Mortgage Bond Purchase Programme and monetary policy interest rate swap (MIRS). 5-year and 10-year maturities MIRS instruments were sold on tenders held very second week. Similarly to the 3-month deposit tender, allocation of MIRS among commercial banks depended on the total balance sheet volume. At the introduction, variable rate tenders were applied but those could not serve the desired goal because in case of excess demand, the national bank could not accept lower yield rates. At the end of January MNB changed the variable rate auctions into fix yield tenders which was supposed to have an effect of loose monetary conditions at the longer end of yield curve. The monetary policy interest rate swap was phased out at the end of 2018, until then the total volume of allocation reached HUF 1100 billion.

With the purpose of supporting development, increasing liquidity of the mortgage-bond market and triggering a rise in bond issues activity, in January 2018 the monetary authority introduced Mortgage-bond Purchase Programme. Within the scope of the program, the national bank purchased fix rate, forint denominated mortgage bonds from Hungarian institutions with the maturity of more than a year. To maintain transparency, the central bank set

several rules regarding how the bonds can be obtained in the market. Auctions had to be held at the platform of Budapest Stock Exchange, the issuer had to undertake to initiate a listing and a constant quotation had to be ensured. The monetary authority made purchases on the primary and secondary market, too, but with the precondition that at least ninety percent of collateral had to consist of mortgages provided by consumers, for example, household mortgages. Until the 1 October 2018, when the central bank terminated purchases in the secondary market, the national bank bought HUF 125 billion bonds in the secondary, and HUF 101 billion in the primary market. Bond purchases in the primary market lasted till the end of the year. Within the framework of the program, the central bank purchased at least 3-year maturity, fix mortgage bonds.

4.1.6.2. Bond Funding for Growth Scheme

Funding for the Growth Scheme had a huge impact on corporate lending, where the growth rate of the volume reached almost 12% in 2018. The only drawback of the FGS was, that through the lending objectives, corporates relied on the banking sector to a high degree. On the contrary, regarding the SMEs the amount of fixed long-term loans was still low which was aimed to be modified with the FGS FIX. For larger corporations, bond issuance could have been a source of fund raising, alhough due to the small size and less liquid bond market this source of financing was not realistic.

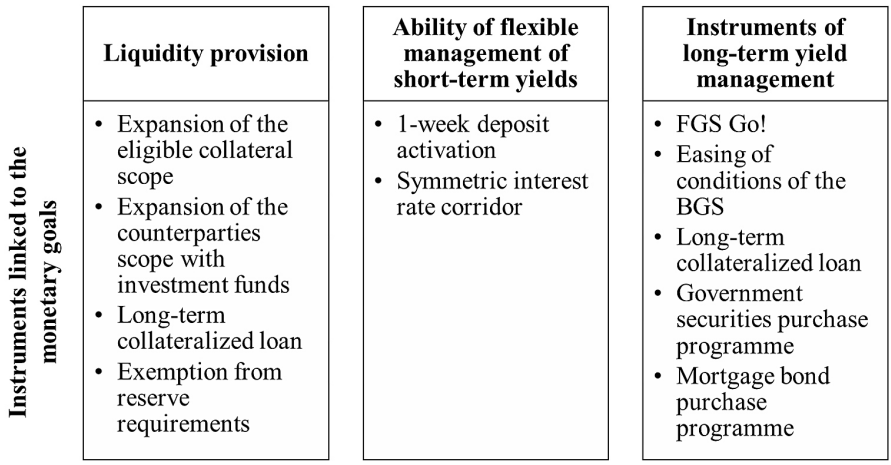
The Bond Funding for Growth Scheme was introduced on the 1 July, 2019, with the purpose of increasing liquidity in the corporate bond market and to improve the efficiency of monetary transmission. Within the framework of BGS, the central bank is buying bonds and securities from non-financial domestic corporations with good credit rating. The total amount of HUF 300 billion is allocated to the

program, with the purpose of purchasing corporate bonds with maturity of three to ten years. The central bank intends to sterilize the surplus liquidity generated in the banking system from bond purchases with the preferential deposit facility. (Magyar Nemzeti Bank, 2019)

4.1.7. Monetary Policy Instruments and their Effects during the Pandemic

Monetary policy actions took place responding to the current economic and financial crisis triggered by the coronavirus pandemic, with the purpose of providing the necessary liquidity to the markets, providing flexibility in short-term yields and influencing the long-term yields, as well. As part of the liquidity measures, the central bank complemented the scope of eligible collaterals with corporate loans, and widened the group of central bank counterparties to include investment funds. In addition to these policy tools, the Hungarian National Bank introduced the long-term central bank credit facility, and suspended the sanctions for the reserve requirement, as well. In order to improve the efficiency of its operational framework and influencing the long-term yields, the central bank has activated the one-week deposit facility and has made symmetrical the interest rate corridor. Moreover, its Funding for Growth Scheme has been expanded, the conditions of the Bond Funding for Growth Scheme and the preferential deposit facility have been modified and asset purchase programmes have been launched in excess to the above. The new measures, which are summarised in Figure 32 below, have been implemented in need of responding to the crisis of confidence. (Magyar Nemzeti Bank, 2020)

Figure 32: Monetary policy goals and associated instruments, from March 2020



Source: Magyar Nemzeti Bank, 2020

Since the outbreak of the pandemic, crisis primarily has caused liquidity shortages, monetary policy instruments have been mainly coupled with short- and long-term lending as well as asset purchases in open-market operations. The nature of the crisis and the implemented monetary policy responses have been highly concerning Central and Eastern European countries, due to the similarities of the state of their economies.

SUMMARY

The eurozone, the voluntary integration of (in 2020) 19 independent countries, is a unique undertaking in the economic history. It is worth highlighting, that political decision has been taken on the date of introduction, the conditions for implementation, the convergence criteria, and the number of participating countries. Even the convergence criteria have been the subject of several critics. The introduction of the euro in the form of scriptural currency on 1 January 1999 has been the subject of other critics too, namely that the range of participating countries cannot be considered an optimal currency area in many respects. The monetary integration realized in the European Union is an asymmetric integration form, in addition to a supranational monetary policy, there has been no close coordination in the fiscal policy. However, low labour mobility posed additional risks to the success of the euro area.

At the beginning supranational monetary policy included the main elements of two different strategies: inflation targeting and money supply control („Geldmengensteuerung"). The combined application of the essential elements of these two strategies has resulted a policy mix and decision-making that is difficult to review and predict. The monetary policy of the euro area was not transparent even when the monetary union came into force, thus significantly reduced the credibility of the policy. The first substantive review of the above monetary policy strategy took place in 2003. The inflation target has been refined to achieve a harmonized consumer price index of between 0 and 2%, close to 2%, over the medium term. However, the increase in the money supply, the fulfilment of the previously set reference value, was no longer monitored year by year. This reform could support to the increase of credibility of ECB's monetary policy.

The supranational monetary policy and its inflation target can be assessed as successful, between January 1999 and August 2020,

price stability in the euro area was broadly realized (average 1.7%). (Inflation rates show quite large differences between countries, and only very slow convergence between price levels can be detected.). ECB realized a less active interest rate policy between 1999 and 2008. The carry-over of the 2008 financial and economic crisis from the United States and the European sovereign debt crisis resulted in the worst economic recession in the history of European integration. Affected by the two crisis ECB introduced a definitely active course in the interest rate policy, since June 2014 the central bank of the Eurozone wants to stimulate the euro area banking system to lend and finance investments making use of negative deposit rate. The supranational monetary policy has no exchange rate target. The European Central Bank intervened four times between 1999 and 2020, namely in 2020, when the exchange rate of the euro against the US dollar and the nominal effective exchange rate weakened drastically, by about 18.6%.

Analysis of the primary objective of price stability has been demonstrated through the transmission mechanism of monetary policy. This analysis was conducted through the interest rate channel that describes the connection of key interest rates and interest rates for clients and thus influences the volume of loans. In case the volume of loans has a rising trend and positive outlook for the economy, it leads to growth of investments, rate of growth of GDP and also inflation. In this analysis, the functioning of the mechanism and its ability to meet the primary objective of price stability was confirmed.

As the outbreak of the financial crisis generated a downturn in the interbank market and in the loan taking attitude of the private and corporate sector, the traditional model of monetary transmission has altered. In the circumstances of the crisis the liquidity of the banking system dropped because of the foreign investors' capital withdrawal. As a result, commercial banks turned to central bank assets instead of trading with each other, which led to a significant increase in the forint liquidity of the banking system after the crisis. Therefore, the

targeted central bank policy indicated a decrease in interbank forint liquidity. The breakthrough in liquidity restriction was achieved by changing the main policy instrument in the June of 2015, when the two-week deposit was replaced by three-month deposit (it could not have been calculated into the LCR ratio which made this instrument less appealing for banks). This tool, alongside with the Self-financing Programme, contributed to the reduction of the forint liquidity in the banking system. Since the dependence on external sources was significant during the financial crisis it was crucial to rearrange the liquidity structure of the banking system by redirecting liquidity to the government securities market.

FGS programs had huge impact on the banking sector's liquidity. The Funding for Growth Scheme was introduced in 2013. In three phases, (FGS1, FGS2, FGS3) within what MNB provided refinancing loans to credit institutions which they could lend out at maximum 2.5% interest rate. As part of the third phase of FGS3, the central bank launched Growth Supporting Programme which included the Market Based Lending Scheme, LIRS and preferential deposit regulations. Funding for Growth Scheme had a crucial role in reducing the external vulnerability of the country because, in the first phase, foreign currency denominated loans were converted into Hungarian forint.

MNB's goal with the launching of the new reforms was to indicate economic growth, to stabilize the banking sector, boost consumption and investments, generate growth in GDP and avoid deflationary effects.

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APPENDIX

THE ECB BLOG

Europe's Response to the Crisis
Blog post by Christine Lagarde, President of the ECB

Robert Schuman famously argued that "Europe will not be made all at once, or according to a single plan. It will be built through concrete achievements which first create a de facto solidarity". This was as much a prediction as it was a challenge. One of the most important characteristics of any effective polity is its ability to adapt to unexpected circumstances and redefine what solidarity means. In its response to the coronavirus (COVID-19) pandemic, Europe has passed the test.

COVID-19 has delivered the largest shock to the European economy since the Second World War. Key macroeconomic indicators have plunged on a scale and at a speed previously unseen. Industrial production fell by 18% month-on-month in April. Durable goods production was down by almost 15% in the same period and new car registrations dropped by around 50%. If the ECB's baseline macroeconomic scenario for 2020 is borne out, the euro area will lose as much output in two quarters as it had gained over the previous 15 years – and growth will not recover in full until the end of 2022.

Faced with an economic collapse of this magnitude, macroeconomic policies had to respond with commensurate alacrity and force. The overriding imperative was to prevent a wave of bankruptcies and job losses that would have caused untold harm to the lives of Europeans and left deep scars on our economy. The priority for national authorities was to "freeze" the economy in order to suppress the epidemic and temporarily absorb the loss of private income triggered by the lockdown measures. In parallel, monetary policy was called on

to prevent financial markets from falling into a downward spiral and amplifying the shock.

This twin policy response was – at the outset – naturally conditioned by the design of our institutional framework, where monetary policy is a European competence and fiscal stabilisation takes place through national budgets. This differs from the United States, where the federal budget is responsible for a large share of fiscal stabilisation. In fact, it is estimated that around 50% of an unemployment shock in the euro area is absorbed through national budgets, significantly more than is absorbed by the federal budget in the United States.[1]

So it was no surprise that national governments and the ECB were the first responders in Europe. But this did not make our reaction any less powerful. With the EU's fiscal rules suspended due to the extraordinary situation, European governments have pushed through unprecedented fiscal expansions, with the aggregate fiscal balance expected to widen to around -8.5% of GDP in 2020. Monetary policy has launched new measures of extraordinary size and innovation. And, when the limits of national responses became visible, Europe adapted again: national measures have been complemented by a targeted and forceful European fiscal response.

Crucially, monetary and fiscal policies have reinforced each other. Two key features of the euro area economy – our reliance on bank-based financing and our preference to protect jobs – have become the cornerstones of our crisis response.

First, national fiscal authorities have offered massive loan guarantees and other liquidity support measures – equalling around 20% of euro area GDP – to mobilise banks and deliver liquidity to firms as fast as possible. Monetary policy has provided €1.5 trillion to fund this credit expansion at the most favourable terms we have ever offered through our new series of targeted longer-term refinancing operations. In order to ensure that lending reaches even the smallest borrowers, the ECB has started to accept loans to micro firms and sole traders as collateral in our operations. And our supervisory measures,

acting in tandem, have freed up €120 billion in bank capital for new lending.

From March to May, the increase in bank lending to euro area firms was almost €250 billion, the largest rise on record in a three-month period. Across countries, loan growth and guarantee take-up are very strongly correlated. This emergency lending has been critical in keeping viable firms liquid and encouraging employers to stem layoffs.

Second, national governments have provided unheard-of fiscal support to firms that retain jobs, helping make the surge in bank loans and corporate debt serviceable ex post. More than 25 million workers in the euro area – 15% of employment – have been enrolled in short-time work schemes during the second quarter. As a result, jobs and incomes have been protected and the connections between employers and employees have been preserved.

Monetary policy has enhanced and empowered these actions by countering the serious risks posed by the outbreak to the monetary policy transmission and the outlook for the euro area. In particular, our €1.35 trillion pandemic emergency purchase programme has prevented an undue tightening of financial conditions for both public and private sectors.

In parallel, the ECB has acted to facilitate access to euro liquidity outside the euro area by setting up a series of bilateral swap and repo lines with other central banks and launching our new Euro system repo facility, which can be accessed by a broader set of central banks. This has helped in stabilising financial markets, especially in countries where the euro is often used extensively, and in fostering the international role of the euro.

Towards a European response

The scale of fiscal support in Europe has created huge financing needs for national governments, who are expected to issue €1 trillion to €1.5 trillion in additional debt this year. At the same time, the euro area entered the crisis with debt ratios among member countries ranging from 8% to 175% of GDP, threatening an asymmetric and uneven fiscal response. Faced with a common shock, it was appropriate for Europe to deploy its collective weight through its common institutions to ensure that all members could react to the crisis adequately. The next phase of Europe's response to the crisis was about putting this into action.

The first element was to support and complement national fiscal responses mainly by strengthening existing European facilities. The European Stability Mechanism, the European Commission via its Support to mitigate Unemployment Risks in an Emergency (SURE) scheme, and the European Investment Bank made available a €540 billion safety net to help finance sovereign expenditures related to the pandemic, fund national short-time work schemes and provide credit guarantees to firms. Support largely consisted of access to very cheap loans.

As the full scale of the crisis became clearer, Europe went a step further by recognising that loans would not be sufficient for the worst-afflicted countries, since they would only increase public debt levels further. But European funds had previously been used for long-term convergence and not for recovery and stabilisation purposes. This is why the Next Generation EU (NGEU) fund – agreed in the early hours of Tuesday morning by the European Council – is such an important step forward. For the first time ever, Europe has – temporarily – put in place a European budget that complements the fiscal stabilisers at the national level.

From 2021 onwards, €750 billion in new European spending will come on line, with two unique new features: outlays will be financed

by European debt issuance and €390 billion of the spending will take the form of grants. This represents a good balance between grants and loans and will offer significant support to the countries most in need. There are two key benefits to this approach.

First, so far little fiscal support has been legislated at the national level beyond the end of this year, which could create a risk of premature fiscal tightening in Europe. Under the European Council agreement, 90% of the total NGEU envelope will be disbursed to sovereigns through the Recovery and Resilience Facility, and 70% of all funding from that facility will be committed by the end of 2022, with the remaining 30% following in 2023. This means that additional European stimulus will come on line at the right moment to complement and bolster national fiscal responses.

Second, it is already clear that the recovery phase of the crisis will be less about preserving the status quo – which was the initial priority – and more about transforming the economy to reflect the new realities of the post-COVID-19 world. But reallocation from "sunset" industries towards new sectors and technologies usually takes time.[2] Government actions will therefore be key in smoothing the transition and promoting change – and the NGEU fund can help anchor that transition.

Most importantly, 30% of spending in both the NGEU fund and the EU budget will have to be linked to the climate transition and all spending should be consistent with the Paris climate goals. This means that more than €500 billion will be spent on greening the European economy over the coming years – the biggest green stimulus of all time. Countries will only be able to receive money if they submit recovery and resilience plans that contribute to the green and digital transitions. These must be our priority areas if we are to exit this crisis modernised, reformed and strengthened. And in order to reach this goal, NGEU will need to be firmly rooted in sound structural policies conceived and implemented at the national level.

Learning the lessons of the past

Measured against realistic expectations, Europe's response to the crisis has been impressive. It has substantially exceeded the most recent benchmark – its response to the sovereign debt crisis – and broadened the boundaries of what is possible should we be struck by such dramatic shocks again. Indeed, even though NGEU is temporary, the potential to activate such tools in future crises is already a powerful change to the structure of the Union.

But this raises a final question: why has the response been better than before? Learning the lessons of the past, Europe has moved towards a new model for dealing with crises: one based around strategic autonomy, policy coordination and the Union method.

First, Europeans have realised, more than ever before, that their prospects for growth depend on each other. During the sovereign debt crisis, several countries compensated for the weakness of the monetary union by turning to the rest of the world to sell their exports. But the global nature of the COVID-19 crisis and the slow and uneven recovery have curtailed that possibility. At the same time, the euro area has only become more interconnected over time, with trade and supply chain linkages amplifying common shocks by around 20%. The upshot is that no country can recover and thrive fully unless its European partners do, too.

Second, we have seen the value of policies complementing each other rather than working against each other. A key shortcoming of the euro area during the sovereign debt crisis was its failure to consider the aggregate policy mix – that is, the negative spillovers created by uncoordinated fiscal policy tightening at a time when monetary policy was aiming to stimulate the economy. From 2013-18, fiscal policy in the euro area tightened by around 2.5 percentage points of GDP, compared with a loosening of around 0.8 percentage points in the United States.[3] This was one factor behind the euro area's weak growth and inflation dynamics during that period. Now,

policies are fully aligned in securing the fastest possible recovery, which also underpins medium-term price stability.

Third, Europeans have concluded that a coordinated response works best with the EU leading the way. The response to the sovereign debt crisis mainly took place outside the EU's institutional framework, which helped facilitate agreement but also brought a "last resort" logic to collective decisions. The decision to place NGEU within the EU budget, however, broke with these constraints and sent a different signal about solidarity. The very positive market reaction to the Franco-German and European Commission proposals in May illustrates how this shift was perceived from the outside.[4]

This new model for action did not emerge overnight. It took some haggling and internal disagreements. But Europe has adapted. We have shown that we can act quickly and adapt our institutions in the face of even the most severe challenges. Europe is a community built on interdependence, and working together is by far the best medicine to treat the economic symptoms of COVID-19. Now we must carry forward the positive momentum we have built and shape the recovery further. In doing so, we can rise to Schuman's challenge and forge a new Europe out of this crisis.

[1] See Dolls, M., Fuest, C., Kock, J., Peichl, A., Wehrhöfer, N. and Wittneben, C. (2015), "Automatic Stabilizers in the Eurozone: Analysis of their Effectiveness at the Member State and Euro Area Level and in International Comparison", Centre for European Economic Research, Mannheim.

[2] See Davis, S.J. and Haltiwanger, J. (2001), "Sectoral job creation and destruction responses to oil price changes," Journal of Monetary Economics, Vol. 48, No 3, December, pp. 465-512.

[3] Suggesting a difference in the total fiscal impulse of around 3.3 percentage points.

[4] See Buti, M. (2020), "A tale of two crises: Lessons from the financial crisis to prevent the Great Fragmentation", VoxEU. https://www.ecb.europa.eu/press/blog/date/2020/html/ecb.blog200723~c06fafabb6.en.html (Assessed on 13/08/2020)

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The scientific book "*Monetary policy and transmission in the eurozone and in Hungary before and after the 2008-2009 crisis*" – written by Judit Sági and Balázs Ferkelt – outlines the problems that have characterized the euro area since its inception, and the challenges posed to monetary policy by the global financial and economic crisis of 2008-2009, to which the world's central banks have responded differently. As a response to the crisis, the Hungarian central bank implemented substantial changes in its monetary policy regime in the 2010s, with the help of the toolkit presented in the book.

The volume is recommended reading for all researchers, academics and university students in the field of monetary policy, and the economic and monetary union, especially in the EU Member States that are about to adopt the euro.

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