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Money supply and inflation in Europe: is there still a connection?

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Content

Summary

Since the outbreak of the European financial and economic crisis in 2008, the monetary policy of the European Central Bank (ECB) has been in crisis mode. The central bankers are attempting to get a grasp on the current low inflation rates and inflation expectations by, among other things, introducing a policy of extreme quantitative easing. The expansion of the Eurosystem's balance sheet was problem-free on this occasion, and the ECB also managed to eventually increase the money supply again. However, ensuring that the growth in the money supply transmutes into higher inflation or inflation expectations has been much more difficult.

Results of the empirical assessment

1. The formulation of an appropriate monetary policy for the heterogeneous country groups of the euro area remains a challenge.
2. Controlling the money supply is now the last option remaining out of three monetary policy instruments.
3. Monetary developments have become disconnected from inflation developments. At present a structural break exists for the various euro area countries.
4. The ECB's asset purchase programme and the accompanying shift from long-term to short-term assets on banks' balance sheets is partly responsible for this development.
5. In the current regime of extremely low interest rates, there is a strong connection between the liabilities and lending of commercial banks and inflation for individual countries.
6. Two problems stand in the way of a universally effective monetary policy in the euro area: real economy divergence and the different ways in which financial intermediation works in the different countries.

Recommendations

1. Monetary policy must focus on boosting private demand through increased lending in order to achieve the inflation target.
2. On the demand side, a reduction in the general and political uncertainty is necessary, while on the supply side, critical reflection on the regulatory guidelines is required.
3. In order for monetary policy to once again be effective in all euro area countries, the banks must be able to fulfil their roles properly. A clean-up of banks' balance sheets and the write-off of non-performing loans are desperately needed.
4. Recommendations 2 and 3 cannot be resolved through monetary policy. The governments of the respective Member States must take action. These must raise the employment intensity of growth and push ahead with the regulatory and supervisory clean-up of banks' balance sheets.

1. Initial position

In accordance with Article 127 of the Treaty on the Functioning of the European Union, the ECB's main aim is to maintain price stability over the medium term (European Union, 2009). Price stability is defined here as an increase in the Harmonised Index of Consumer Prices (HICP) of below, but close to, two percent (ECB, 2003). This aim should be achieved by ensuring similarly stable inflation expectations, among other things. Since the foundation of the ECB this target has been met for the most part. In the period from 1999 (introduction of the euro as 'book money') to 2012, the average annual inflation rate in the euro area was just below two percent – with a variation margin of three percentage points. This level of inflation has, however, been impossible to achieve in the euro area since the beginning of 2013. In 2015, the inflation rate even fell in the interim to a level of zero (see Figure 1). Since then the annual increase in prices has remained at a very low level and has thus been substantially lower than the stipulated target for some time. In part this can be traced back to declining prices for raw materials and crude oil during this period, but even without energy prices taken into account the same finding can be made. In recent years, the core inflation rate has also been substantially lower than the previous level.

Figure 1: Inflation rates in the euro area
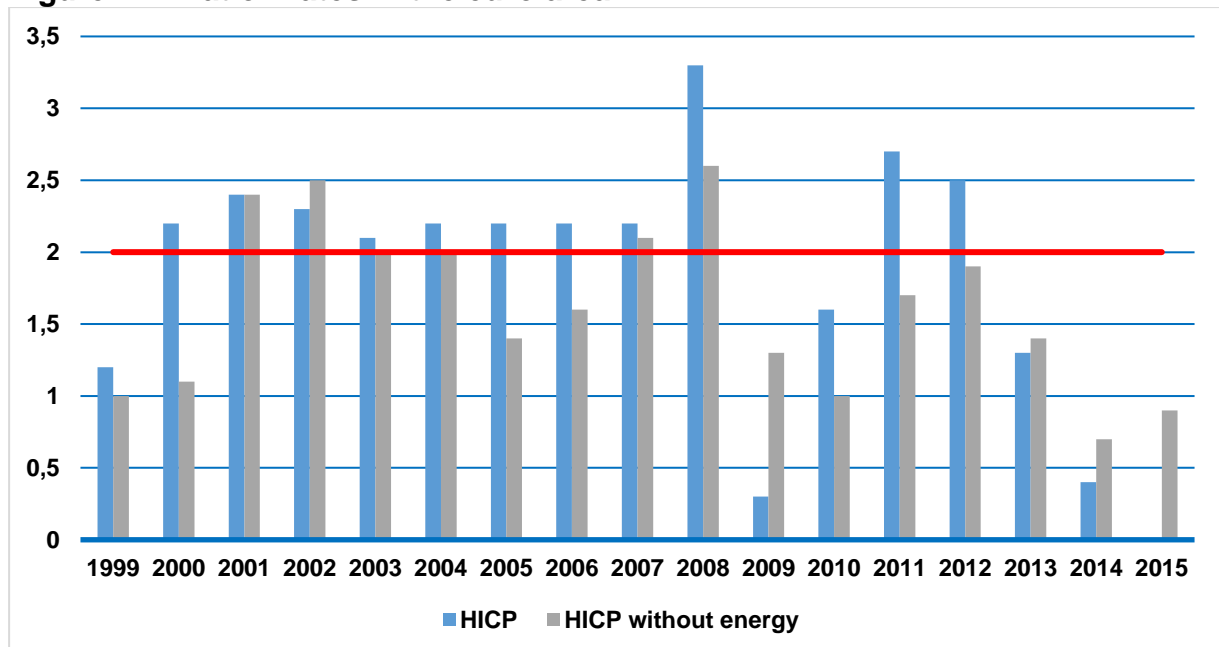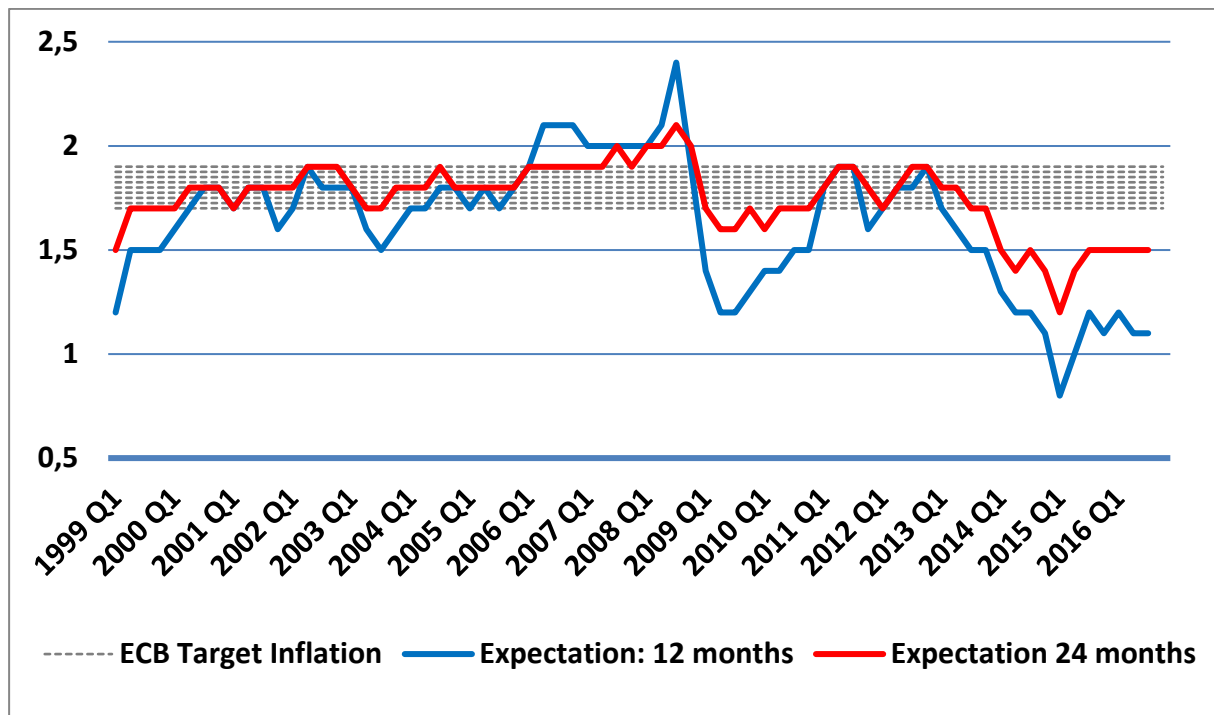

Source: ECB

In order to achieve the target level set for price stability once again, the ECB essentially has three monetary policy instruments at its disposal:

- interest rate setting
- controlling the money supply and
- influencing inflation expectations through its communications.

The remaining potential of these three instruments currently looks like this. Since March 2016, the ECB's base rate has been at 0.00 percent. Irrespective of the debate surrounding which interest rates can be dropped further, even into negative territory, the following is true: a reduction in the ECB's base rate to low but still positive rates is no longer causing interest rates in all countries of the currency union to fall (Demary and Hüther, 2015a). The transmission mechanism seems to be disturbed in the low interest environment, or at least in comparison with normal times it seems to follow different rules (zero lower bound problem; McCallum, 2000). As such, this instrument has practically reached its limit in terms of being able to stimulate inflation. A current indicator for the lack of effectiveness of a further broadening of the expansive monetary policy is the Wu-Xia shadow rate (Wu and Xia, 2015). This interest rate approximates the non-observed interest rate under the zero-rate level, which is valid for the wider economy. In the case of Europe, the Wu-Xia shadow rate was already in negative territory in 2015 and has been falling ever since, up until the present day – without stimulating inflation or providing a lasting boost to inflation expectations.

Controlling inflation through inflation expectations is also proving to be increasingly difficult (see Figure 2). For a long time inflation expectations were fixed at a level of close to two percent, yet this anchor disappeared thanks to the persistently low inflation. The ECB is obviously not able to keep inflation expectations in line with its inflation target over the long term in an environment of low inflation rates. After Mario Draghi's "Whatever it takes" speech in July 2012, the expectations slipped even further downwards out of the ECB's target range. It is not only Europe that is failing to anchor inflation expectations, rather this has been experienced across the globe (Afrouzi et al., 2015). For the ECB this means that it cannot use what is known as "forward guidance", that is to say either the announcement of future interest rate movements or the announcement of expansive monetary policy measures, to anchor inflation expectations within the original target range again. As such the communication instrument also seems to have more or less lost its influence, at least over inflation expectations. Nevertheless, through the announcement of its unconventional measures, the ECB has managed to once again anchor two-year inflation expectations at 1.5 percent.

Figure 2: Inflation and inflation expectations in Europe

Since the two monetary policy measures mentioned are therefore not really able to guide inflation back within the prescribed target range, the only remaining instrument that the ECB has is that of controlling the money supply. A glance at monetary policy history shows how important controlling the money supply is for central banks. After the collapse of the Bretton-Woods System and the transfer to a flexible exchange rate regime, it was possible for the first time to control the money supply in accordance with national criteria ("Objektivierung der Geldmengensteuerung" – Objectivisation of the control of money supply, according to the German Council of Economic Experts, 1974/75). When demand for money is stable, a control of money supply that is focused on potential is effective and the Deutsche Bundesbank made use of this after 1973 to combat the inflationary consequences of the first oil price shock. In contrast with the situation today, the new concept at that time was expected to limit the high growth in the money supply – and with it the sharp increase in prices. The M3 target rates fluctuated between 8 percent in 1975 and 3 to 5 percent in 1985 and 1991 (Deutsche Bundesbank, 1995). The long-lasting focus on controlling the money supply is ultimately a reflection of the realisation that inflation is a monetary phenomenon. This insight is also shared by the European Central Bank's Governing Council, which has set a reference value for M3 growth of 4.5 percent. With an inflation target of just under 2 percent, this reference value is based upon the following assumptions: a downward trend in the velocity of circulation of M3 money of 0.5 to 1.0 percent a year, as well as a potential production growth of 2.0 to 2.5 percent a year (ECB, 1998; ECB 2002). Various assessments made by the ECB's

Governing Council have proven that the reference value for the growth of money supply can still be derived from macroeconomic conditions. In contrast with the Bundesbank's regular revisions, which are a result of the difficult economic conditions, the ECB has left the reference value at 4.5 percent (ECB, 2002; ECB, 2011) and has placed the focus of its monetary policy on interest rate setting.

In the long term, the empirical evidence supports the importance of controlling the money supply for influencing the level of inflation, and the theoretical basis of this is derived from the quantity theory. Table 1 shows the evidence for a historical consideration of global economies. Irrespective of the differentiation in the money supply and the countries selected, there is a very high correlation between the growth of money supply and inflation in the period observed. The underlying theory of stable demand for money cannot therefore be dismissed for this period.

Table 1: International comparison of the correlation between money supply and inflation, 1960-90

	M0	M1	M2
110 countries	0.925	0.958	0.950
21 OECD countries	0.894	0.940	0.958
14 Latin American countries	0.973	0.992	0.993

Source: McCandless and Weber

Even when this analysis is updated with the OECD countries and for the period from 1990 up to the present day, there is a high correlation, at 0.88, between the change in the money supply aggregate and inflation.

## 2. Analysis of the current situation in Europe

There is something peculiar about Europe when it comes to the monetary policy instrument of money supply control. The growth in money supply at the present time is at least in part a result of the bond purchases undertaken by the central banking system through its "asset purchase programme". The effect on inflation resulting from the bond purchases is unclear (Bundesbank, 2016). The growth in M3 from the bond purchases is, over the long term, subject to the self-prescribed limit ("issuer limit") of the bonds held by the ECB (Claeys and Leandro, 2016). In the case of a debt instrument issued by a country this limit is 33 percent of the value of the overall debt (ECB, 2015a) – which does not mean that this value cannot in principle be increased. The question of the extent to which the Eurosystem can continue expanding its balance sheet by purchasing bonds on the basis of this limit remains unanswered.

If the historical perspective is still held, contrary to the current debate surrounding the effectiveness of the ECB's bond purchases, however, there is hope for the ECB that it could, via a high growth rate for the money supply, generate positive momentum for an increase in inflation. In fact, over the last 12 months the ECB has managed to increase the growth rate of money supply back to a level of around five percent. Nevertheless, it was clear that at the same time inflation was falling further or remains at a very low level. As a result the correlation between money growth and inflation rates in the euro area since the outbreak of the euro crisis no longer exists – obviously there was a structural break here. The statistics substantiate this change. Table 2 shows the correlations before and after a structural break. Figure 3 depicts the connection between M3 and inflation for the whole of the euro area and in certain member countries. The moment that the structural break happened in each country is defined separately through an econometric approach using a "Supremum Wald" test for structural breaks with an unknown date for the Eurozone aggregate and for the individual countries of the currency union. The timing of the structural break in each country that has been defined in this way is entered in the table. The different timings of the structural breaks can be explained in part by the extreme differences in the financial and economic systems of the Eurozone member states.

It seems that in all countries, with the exception of Ireland, Italy and the Netherlands, the positive correlations that existed before the respective structural breaks have disappeared, or have switched to strong negative correlations. From a monetary policy perspective the Netherlands is an exception because the structural break was identified as happening very early (January 2003). The missing connection between inflation and the growth of the money supply at the current time is also true for the Netherlands – with money supply growth of up to 15 percent and inflation around 0.5 percent. It is only covered by the long time period after the country-specific structural breaks. In Ireland, neither before nor after the structural break, has there been an empirical correlation between money supply growth and inflation. A positive correlation after the structural break could be seen in Italy, but even here a divergence of the two variables has been observed since 2015. Overall, the majority of euro countries show a homogeneous picture of the relationship at the current time: the situation is characterised by low inflation rates at the same time as increasing money supply.

Figure 3: National growth in money supply and national inflation from 2002
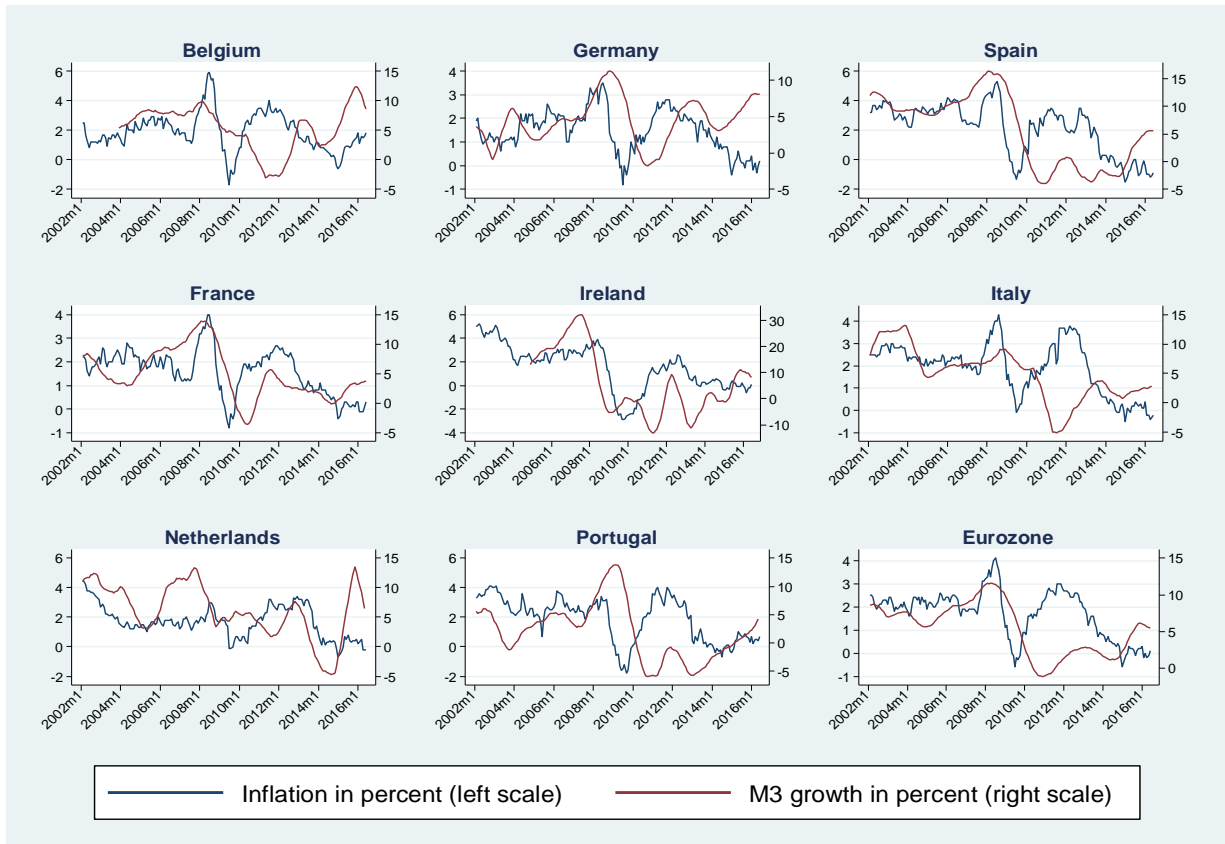
Source: own calculations, Bloomberg, ECB

Table 2: Correlation between money supply growth and inflation in the euro area

| Country	Before the structural break	After the structural break
Belgium (2010m3)	0.70	-0.64
Germany (2008m11)	0.54	-0.43
Spain (2009m1)	0.32	-0.55
France (2013m4)	0.27	-0.20
Ireland (2008m12)	0.00	-0.04
Italy (2013m4)	-0.16	0.61
The Netherlands (2003m1)	-0.78	0.19
Portugal (2008m11)	0.35	-0.53
Eurozone (2009m3)	0.41	-0.65

Source: own calculations, Bloomberg, ECB

This raises the question of what economic variable shows a connection with inflation in the current low interest rate environment, if this is no longer money supply. Here it is worth looking at the loans supplied by commercial banks. In the programme countries in particular, a strong decline in lending has been observed in recent years, whereas in Germany and Belgium the respective credit institutions have reduced the size of their balance sheets (Figure 4). A quick glance at lending and M3 supply shows that in practically all countries these two variables proceeded along similar trajectories before the structural break (the country-specific structural breaks are shown as vertical bars in Figure 4). Nevertheless, this correlation also broke down after the respective structural breaks. With the exception of France and the Netherlands, there is either less or even no further lending to non-financial companies in all the countries observed at the end point, although the money supply is strongly increasing in a few countries. There are two basic reasons for this.

1. The increases in bond purchasing by the Eurosystem do not lead to more lending (Demary and Hüther, 2015b) – in particular when the Eurosystem buys bonds from shadow banks, which in turn park the proceeds via sight

deposits in the respective commercial banks. The bond purchases are recorded (at least in part) in the M3 aggregate, but they do not pertain to the loans given by commercial banks. Even when the central bank buys high-risk securities, it is possible that, as a result of the Wallace neutrality, no real economy effects emerge. This is the case when private entities expect an increased tax burden in the future as a result of the assumption of risk by a government (Wallace, 1981; Bundesbank, 2016).

2. A change in the maturity towards more short-term lending and increased purchases of long-term securities (ECB, 2015b; Bundesbank and BaFin, 2015). This pure asset shift has no effect on the overall level of lending by the commercial banks, but increases the supply of M3.

Figure 4: National total liabilities and national money supply
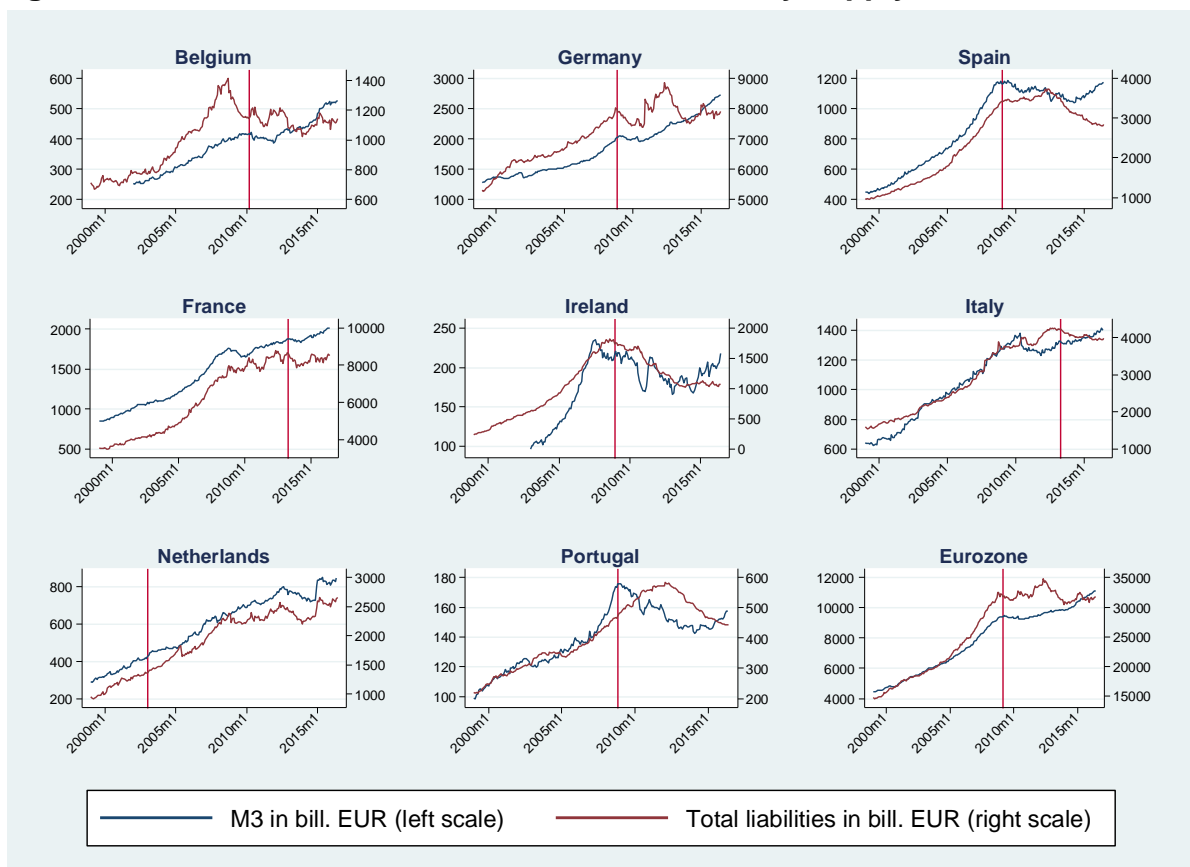
Source: own calculations, Bloomberg, ECB

Figure 5 demonstrates this result in the form of the composition of the M3 supply in the euro area. It seems that the overall M3 growth in recent years in the euro area is based on an increase in the M1 aggregate. The database for the individual euro area countries is unfortunately not complete at this point. The phenomenon that can be seen in the aggregate is, however, astoundingly homogeneous in all of the countries for which the M1-M3 differentiation is available. A broad restructuring from long-term to short-term lending has taken place.

Figure 5: Composition of M3 money supply in the euro area. Pure M3 = M3-M2; pure M2 = M2-M1
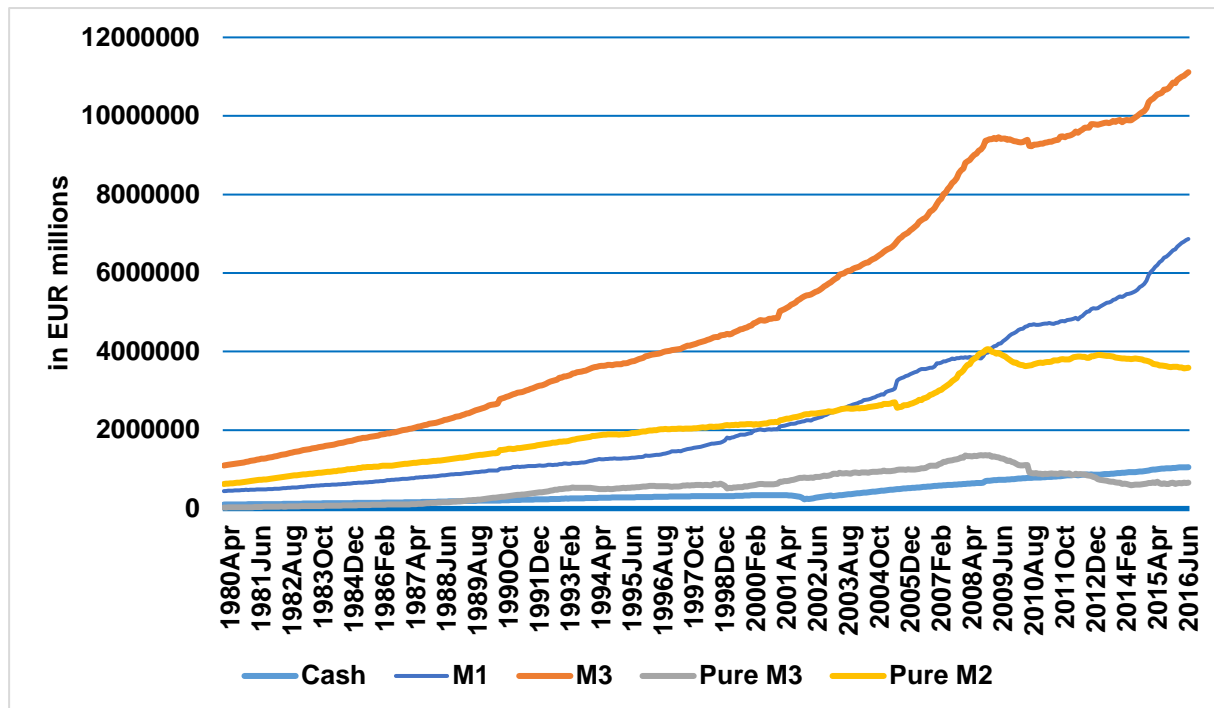

Source: ECB

A look at the lending done by the commercial banks and the national inflation rates after the regime change offers an interesting perspective (Figure 6): the balance sheets of commercial banks and inflation are generally strongly correlated after the respective structural breaks (Table 3). For Belgium, Spain, Italy, Portugal and the Eurozone aggregate, the strength of the positive correlation has increased. For Germany, a strong positive correlation exists both before and after the structural break. Exceptions to this pattern are Ireland, France and the Netherlands. In the Netherlands this is once again a result of the early identification of the structural break. In Ireland, inflation has no correlation, either before or after the structural break, with the growth of money supply, but it has a negative correlation with the size of the banks' balance sheets. A similar picture can be seen for France. It is notable that in France and the Netherlands, the two countries that had no positive correlation between balance sheet size and inflation rates, lending increased after the structural break. An increase in lending therefore does not necessarily lead to inflationary impulses. Only when lending has an effect on the demand-side does it reveal its inflationary effect. For a majority of countries in the Eurozone, it is true that the commercial banks' balance sheets after the regime change show a much stronger correlation with inflation rates than before the structural break. Despite the heterogeneity between the countries, the Eurozone aggregate shows a stronger positive correlation after the structural break.

After the outbreak of the euro crisis, many commercial banks reduced their balance sheets predominantly by removing high-risk loans. As a consequence of stronger regulation in the banking sector, such as the introduction of counter-cyclical capital buffers, lending institutions are forced to prioritise very liquid assets, such as AAA-rated bonds or even demand deposits, ahead of other assets (Demary, 2015). At the same time, commercial banks in the euro area limited the volume of loans made to new customers. The muted demand for goods that happened as a result went, unsurprisingly, hand in hand with low inflation.

Figure 6: National total liabilities and national inflation after the country-specific structural breaks
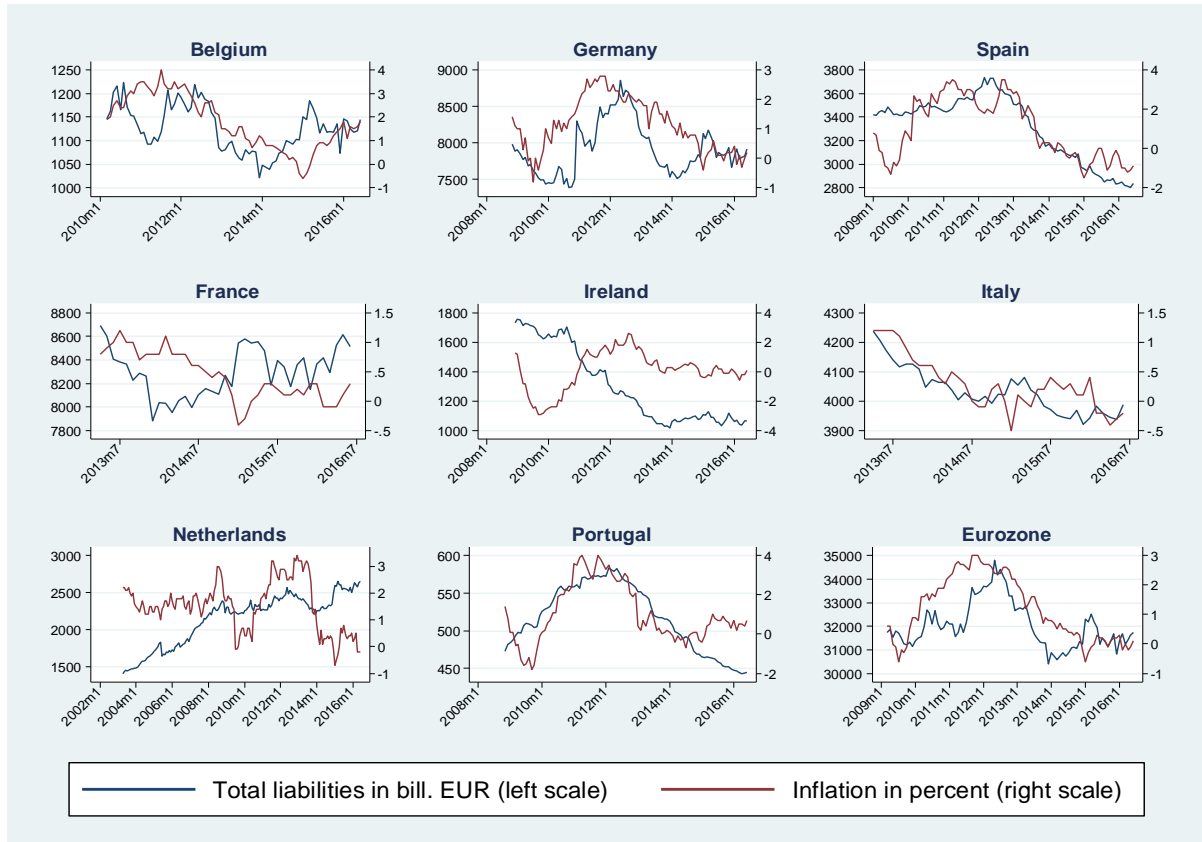
Source: own calculations, ECB

Table 3: Correlation between total liabilities and inflation in the euro area

Country	Before the structural break	After the structural break
Belgium (2010m3)	0.22	0.45
Germany (2008m11)	0.76	0.56
Spain (2009m1)	0.34	0.76
France (2013m4)	0.09	-0.41
Ireland (2008m12)	-0.37	-0.49
Italy (2013m4)	0.07	0.73
The Netherlands (2003m1)	0.75	-0.16
Portugal (2008m11)	-0.10	0.68
Eurozone (2009m3)	0.48	0.69

Source: own calculations, ECB

The fact that in many countries after the structural break overall lending by banks displaced money supply as a determinant of the level of inflation is shown through an analysis of the Granger causality. The analysis is conducted using VAR model-based Granger causalities during the relevant time frames after the structural breaks. The optimal lag length of the respective model is determined using the median of the following information criteria: final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC). Granger causalities in essence test whether the forecast quality of a model is improved if not only dependent but also independent variables from the past are referred to. Statistically significant Granger causalities do not point to a causality in its own right, but instead to more of a statistically significant connection between a variable in the past and another variable in the present.

Table 4: Granger causalities of money supply growth and balance sheet size on inflation after the structural break

Country	chi-square value for Granger causalities on the inflation rate	
	Money supply growth	Balance sheet size
Belgium (2010m3)	5.5*	12.2***
Germany (2008m11)	36.3***	15.2***
Spain (2009m1)	5.3*	3.3
France (2013m4)	1.6	2.5
Ireland (2008m12)	0.1	3.5
Italy (2013m4)	0.8	9.4***
The Netherlands (2003m1)	4.0	1.3
Portugal (2008m11)	9.3***	3.5
Eurozone (2009m3)	16.8***	7.9**

***= significant up to the 1% level

**= significant up to the 5% level

*= significant up to the 10% level

Source: own calculations, Bloomberg, ECB

In this analysis, France and Portugal represent the most persistent models with lag lengths of three months. The other countries and the Eurozone aggregate are described best by a model with two lags. The independent variable is inflation after the respective structural break. What is being tested is whether the growth of money supply or the balance sheet size can be identified as the driver of price increases. The two-stage correlation analysis already carried out and the visual examination are confirmed by the VAR model. In Belgium, Germany, Italy and the Eurozone aggregate a Granger-causal connection between balance sheet size and the inflation rate is statistically significant (see Table 4). For the other countries, this cannot be ascertained. In particular, the correlations of the balance sheet size (Table 3) identified previously for Spain and Portugal lose their significance on inflation in the

VAR model. As in the majority of analyses to date there is no Granger causality whatsoever for Ireland, France and the Netherlands, either for the money supply or for balance sheet size. In considering the Granger causality between the growth of money supply and inflation, it can be seen that in Germany in particular this is still of significance after the structural break.

Overall, the various euro area countries show a very heterogeneous picture. The disconnect between the growth of money supply and inflation is just as varied as the relatively new connection between the balance sheet sizes of commercial banks and the increase in prices.

3. Conclusion

Of the three monetary policy instruments that are available to the European Central Bank – interest rate setting, money supply control and forward guidance – money supply control is the only remaining method left. The huge expansion of the Eurosystem's balance sheet has led to another significant increase in the money in circulation and in many countries it is above the reference growth value of 4.5 percent. The increased growth in money supply, however, does not result in an increased price level. Instead, at the current time in the various euro area countries a structural break can be identified after which the growth in money supply disconnected itself from developments in inflation.

The lack of correlation between money supply growth and price increases can be traced in part back to the ECB's bond purchasing programme and the shift that accompanied it from long-term to short-term assets in the banks' balance sheets. The difficulty the ECB has had in implementing an appropriate monetary policy for such a heterogeneous group of countries is clear. For Belgium, Germany, Italy and the aggregate for the European economic and currency union, for example, it is currently possible to see a strong connection between the liabilities of the commercial banks and inflation. For some other countries during the current regime of extremely low interest rates, the lending made by commercial banks has also had some significance for inflation.

In order to bring inflation back towards the inflation target, ultimately an increase in private demand is vital. From a monetary policy perspective this can be delivered, in particular, through increased lending to the private sector. On the demand-side a reduction in general and political instability would help. On the supply-side of banks, regulatory provisions, such as the intensification of the capital ratio, should be critically scrutinised. In the long term the connection between money supply growth

and inflation holds true. In the short and medium term the regulatory measures mentioned promise a positive effect on inflation rates, if lending is expanded.

In order for monetary policy to become more effective in all euro area countries again, the banks must be able to properly fulfil their roles. At present two problems are standing in the way of a universally effective monetary policy: real economy divergence and the different ways in which financial intermediation works in the various countries.

- Real economy convergence was one of the political promises of European integration, which – in relation to per capita income – has no longer been met since the crisis of 2008. Alongside structural reforms, for example labour market regulation, relief can come in the form of regional support for growth-stimulating sectors, such as transport infrastructure. Of course, this must always be done taking into consideration the individual properties and conditions of the respective regions.

- When looking at financial intermediation, despite a common currency and monetary policy, it has not been possible to achieve harmonisation between the countries over the past one and a half decades. The financial and economic crisis has left in its wake a high proportion of bad loans, not only, but in particular, on the balance sheets of southern European banks. These must eventually be cleaned up in a consistent manner – without, however, setting off a systemic crisis. At the same time there are still institutional differences. While in some countries the credit channel is more pronounced, companies in other countries rely more on direct financing through the capital market.

Neither real economy convergence nor the differences in financial intermediation are problems, however, that can be or should be addressed by monetary policy. The governments of the respective member states must take action. This refers on the one hand to the necessary measures for strengthening competitiveness and thus the employment intensity of growth, and on the other hand to a thorough regulatory and supervisory clean-up of banks' balance sheets. In both policy areas much time has elapsed that even monetary policy cannot get back. For anyone seriously wishing to free the ECB from its dilemma, they must now call upon the governments to undertake rigorous action.

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