From the monetary pillar to the monetary and financial analysis

In the summer of 2021, the Governing Council of the ECB, in the latest review of its monetary policy strategy, made it clear that the content of the existing "monetary analysis" had become increasingly broader since its last review in 2003. Against this background, the present article traces the development of the monetary analysis from the beginning of monetary union to the present.

At the beginning of monetary union, the two-pillar strategy enabled the ECB Governing Council to look at all information relevant to the monetary policy decision-making process in a structured manner. In this context, the "monetary pillar" initially focused on the money supply. However, the deviation of money growth from its reference value played a prominent role only at the start of monetary union. This was due, amongst other things, to the weakening of the relationship between money growth and inflation and to changes in the macroeconomic environment that confronted monetary policy with new challenges.

Following the global financial crisis, studies of the transmission of monetary policy measures via the financial system gained in importance, particularly the deployment and design of the new non-standard monetary policy measures introduced in the low-inflation environment. In addition, the monetary analysis has made valuable contributions to the identification of financial shocks and their impact on the real economy. As a consequence, since the recent strategy review, the ECB Governing Council now uses the term "monetary and financial analysis". This analysis is also tasked with taking greater account of financial stability aspects than it had before.

With the pandemic, the energy crisis and high inflation, the issues to be addressed by the monetary and financial analysis have shifted once again. One such issue that arises, for instance, is the extent to which the high money growth in 2020 could have caused the rise in inflation in 2021-22. Our analyses suggest that the strong money growth in the first phase was driven by the build-up of liquidity buffers, which, in and of itself, is not inflationary. Subsequently, money growth and inflation were supported by aggregate demand shocks, which are likely to be attributable to fiscal support measures taken during the COVID-19 pandemic, as well as by an accommodative monetary policy.

Against the backdrop of the currently very high inflation rates, the monetary and financial analysis now needs to assess how the monetary policy tightening that began at the end of 2021 is affecting the financing conditions of banks, firms and households. Available data and models suggest that the transmission process is intact and that monetary policy tightening is being transmitted to the real economy as expected. The current monetary policy stance is also confirmed to be appropriate when taking into account the attendant risks to financial stability. Given the stable situation of the euro area banking system at present, it is currently unlikely that the tightening of monetary policy envisaged by the ECB Governing Council will lead to any major negative feedback loops between the financial system and the real economy.

Monetary and financial analysis in transition

2021 strategy review clarified content of the monetary and financial analysis …

In July 2021, the ECB Governing Council unveiled the results of its review of the Eurosystem's monetary policy strategy and, at the same time, adopted its new strategy.[1] This strategy is designed to address the challenges to monetary policy that have arisen since the last strategy review in 2003. With regard to the monetary analysis, the Eurosystem used the strategy review to bridge the gap between public perception and its own analytical practice: the ECB Governing Council clarified that the content of the monetary analysis had become increasingly broader since 2003 and that it would now cover financial markets and the financial situation of banks, firms and households. In this respect, it was only logical to rebrand the "monetary analysis" as the "monetary and financial analysis".[2]

… integrated monetary and financial analysis more closely with economic analysis …

The Eurosystem's strategy review also reflected the lessons for monetary policy learned from the global financial crisis. One key lesson was that there are close links between the real economy and the financial system, which must be taken into account when making monetary policy decisions. Against this background, the ECB Governing Council replaced the previous two-pillar structure, which was characterised by the coexistence of the monetary analysis and the economic analysis, with an integrated analytical framework in which monetary and financial analysis is an integral part. Within this framework, the "economic analysis" and the "monetary and financial analysis" no longer represent two separate perspectives on inflation. Instead, the interrelationships between economic developments and monetary and financial developments are now explicitly taken into account in the assessment of inflation risks and in the orientation of monetary policy. The contents of the analysis are therefore more closely interlinked.

… and explicitly incorporated financial stability considerations into the monetary and financial analysis

The ECB Governing Council also decided to give more weight to financial stability aspects in the monetary policy debate and assigned this topic to the monetary and financial analysis.[3] Although financial stability is not an independent monetary policy objective, it is a key prerequisite for price stability and is also necessary for effective monetary policy transmission.[4] This poses great analytical challenges because the interrelationships between monetary policy, financial stability and macroprudential policy, and their interaction in various phases of economic and financial cycles, are complex and have not yet been comprehensively researched.[5]

Structure of this article

Against this background, the present article will begin by tracing the development of the monetary analysis from the beginning of monetary union to the 2021 strategy review. It will then discuss the specific issues addressed by the monetary and financial analysis in the current environment of monetary policy tightening.

1 For a comprehensive presentation of the results, see Deutsche Bundesbank (2021a).
2 At the same time, the ECB Governing Council made it clear that the monetary and financial analysis in its new form would no longer be confined to the medium term alone. It would also increasingly look at shorter-term developments, for example as part of its analyses of the transmission of monetary policy impulses through the financial sector.
3 Financial stability aspects were not alien to the monetary analysis even before the strategy review, especially since bank loans are the main source of trend money growth. However, the strategy review expanded and gave structure to the relevant analytical mandate.
4 See Deutsche Bundesbank (2015a).
5 For more on the methodological challenges of a joint analysis of business cycles and medium-term financial cycles, see, for example, WGEM Team on Real and Financial Cycles (2018). The topic is also discussed in Boyarchenko et al. (2022) and Ajello et al. (2022).

Looking back: The evolution of the monetary analysis from the start of monetary union to the second strategy review

Diminishing importance of the money growth-inflation relationship

The Eurosystem's original two-pillar strategy, in which the money supply played a prominent role

From the outset, a key element of the Eurosystem's monetary policy strategy was to structure the assessment of risks to price stability on the basis of two analytical perspectives (two-pillar strategy). The monetary pillar encompassed the assessment of risks to price stability using monetary indicators, while the economic pillar comprised a broadly based analytical approach with a focus on real economic developments and cost dynamics.[6] Within the monetary pillar, the money supply initially played a prominent role, which was embodied in the formulation of a reference value for the growth of the broad monetary aggregate M3 and its annual review by the ECB Governing Council.[7] In an environment of high uncertainty resulting from the introduction of the single currency, the ECB Governing Council sought to ensure that the relationship between money growth and inflation was sufficiently incorporated into the assessment of risks to price stability. Moreover, as a young institution with no track record of its own, the Eurosystem was concerned with building on the Bundesbank's culture of stability.[8]

After 2003: Focus on analysing underlying money growth and the information it provides on the trend rate of inflation

However, even in the early years of monetary union, the information content of money growth for future inflation developments already proved to be limited in the short term. One reason for this was the impact on monetary developments of the non-bank sector's portfolio shifts, which were unrelated to the aggregate demand for goods and thus to potential risks to price stability.[9] Subsequently, the reference value for money growth receded into the background and its annual review was discontinued with the 2003 strategy review. The monetary pillar evolved into the monetary analysis that – complementing the economic analysis – was intended to flag medium-term to long-term risks to price stability.[10] This took place due to the empirically documented relationship between the trend components of money growth and inflation. By contrast, corresponding analyses failed to identify a stable relationship between the short-term to medium-term changes in the two time series. The identification of the relevant long-term component of money growth – the "underlying money growth" – was based both on statistical methods and on a comprehensive analysis of the determinants of changes in the money supply, its components and counterparts, including at the sectoral level.[11] An important reason for this comprehensive analysis was the challenge of identifying underlying money growth for the monetary policy decision-making process in real time.[12]

Empirical evidence shows a weakening of the long-term relationship between money growth and inflation, too

However, studies published since the mid-2000s show that the long-term relationship between money growth and inflation has also changed over time and weakened in an environment of low and stable inflation rates (see the box on pp. 18 ff.). This evidence suggests that, in such an environment, the long-term component of money growth likewise has only limited information content for monetary policy.

6 See, for example, European Central Bank (2011), p. 69.
7 The reference value for the annual growth rate of the monetary aggregate M3 was 4.5%.
8 See Issing (2006) and European Central Bank (2000).
9 See Holm-Hadulla et al. (2021a), p. 30 f.
10 The contribution of the economic analysis focused on short-term to medium-term price stability risks.
11 See, for example, Drudi et al. (2010), p. 83 f.
12 See, for example, Drudi et al. (2010), pp. 77 ff. and 96 f. Identifying the long-term trend component of money growth using statistical methods in real time is fraught with great uncertainty. A key reason for this is that, owing to the absence of data on future money growth, two-sided filters cannot be used at the current end. However, one-sided filters, which only consider current data and past observations, are less accurate.

Empirical evidence concerning the long-term relationship between money growth and inflation

The quantity theory of money predicts a stable, long-term 1:1 relationship between money growth and the growth rate of the price level, i.e. the inflation rate.[1] However, empirical studies published over the past 15-20 years suggest that the long-term relationship between money growth and inflation is subject to change over time.

The first set of analyses includes cross-sectional studies of the relationship between average money growth and inflation rates across different economies over long periods of time.[2] De Grauwe and Polan (2005) take this approach in their examination of the long-term empirical relationship between the growth rates of the monetary aggregates M1 and M2 and of inflation in a sample of more than 100 countries. They show that, in regressions of the inflation rate on the money growth rate, the coefficient of money growth varies with the level of money growth. For average money growth rates below 10%, the regression coefficient is not significantly different from zero.[3]

Teles et al. (2016) use a similar approach to investigate the relationship between M1 growth and the inflation rate of countries where average inflation was below 12% in the sample period. The theoretically expected 1:1 relationship can only be seen if money growth is corrected for the other factors contained in the quantity equation – real GDP growth and changes in the velocity of circulation caused by changes in the opportunity cost of holding money. However, for one subset of countries, whose central banks pursued an implicit or explicit strategy of direct inflation targeting, there was still no evidence of a quantity theory relationship even in this case, i.e. there appears to be no discernible link between money growth and inflation. These countries still show cross-sectional dispersion of (corrected) money growth. However, central banks' stability-oriented monetary policy goes hand in hand with a very low dispersion of inflation, with the result that the correlation between money growth and inflation tends toward zero.

The second set of approaches encompasses time series analyses of the relationship between money growth and inflation in individual economies. Benati (2009) examines the relationship between the trends in the growth rates of various monetary aggregates and inflation and how it changes over time in a number of countries using frequency domain techniques. His results show that, although the trends in money growth and inflation exhibit common fluctuations, the change in the inflation trend associated with a given change in the money growth trend can nevertheless be very small over long periods. Benati explains the results using simulations of a model in which the drivers of money growth and inflation change over time. If unexpected changes in the velocity of money in circulation – i.e. money demand shocks – dominate, a given change in the trend growth of money has only a weak effect on inflation. Periods in which the central bank does not – or, due to external influences, cannot – pursue a stability-oriented monetary policy lead to a sustained increase in inflation and

1 See Lucas (1996), p. 665.
2 A well-known example of this analytical approach can be found in McCandless and Weber (1995).
3 This result is supported by further analyses using panel regressions, see De Grauwe and Polan (2005).

money growth and to the correlation between the changes in the two variables rising towards one.[4]

Sargent and Surico (2011) show that, for the United States, the coefficient of a regression of the inflation trend on the M2 growth trend is also significantly lower than one over longer periods.[5] They develop a quantitative model in which the disappearance of the 1:1 relationship between the long-term trends of money growth and inflation can be explained by changes in the monetary policy reaction function. In their simulations, a credible stability-oriented monetary policy causes the relationship between money growth and the inflation that was previously visible in the data to become weaker or disappear.[6]

Gao et al. (2021) review developments in inflation rates and money growth rates (M1) for a large group of countries, adjusted for short-term fluctuations. They correct money growth for changes in real GDP growth and the opportunity cost of holding money. The graphical comparison shows common fluctuations in the two variables for some of the economies under review. For other countries, including Germany, however, the correlation appears to be weak.[7] The authors attribute these differences to monetary policy regime changes and support this hypothesis with simulations based on a New Keynesian macroeconomic model. In this model framework, the assumption of a time-varying inflation target subject to persistent fluctuations leads to the quantity theory relationship between money growth and inflation becoming visible in the data, while the correlation is weak given a constant inflation target.

The model-based explanations proposed by Benati (2009), Sargent and Surico (2011) and Gao et al. (2021) indicate that the empirical relationship between money growth and inflation is strongly influenced by monetary policy and that the transition to a stability-oriented monetary policy has weakened the relationship that was previously visible between the two variables.

Analyses of the long-term relationship between money growth and inflation in the euro area are complicated by the limited length of the sample period. Mandler and Scharnagl (2023) examine the relationship between growth in the monetary aggregate M3 and the Harmonised Index of Consumer Prices (HICP) inflation rate in the euro area using a dataset ranging from 1970 to 2022.[8] The wavelet analysis-based tools used for this purpose allow the relationship between the time series to be examined for

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4 In the model, these shocks are presented as trend inflation shocks, see Ascari and Ropele (2009).
5 Their analysis includes regressions with filtered inflation and money growth rates based on Lucas (1980), and a calculation of the cross-spectral gain for frequency zero using an estimated time-varying vector autoregressive model. Benati (2021) conducts a similar study for 17 countries. He interprets the results of his analyses using a time-varying vector autoregressive model as evidence of a 1:1 relationship between money growth and inflation rate trends. His regression analysis of the low-frequency components of money growth and inflation using the Müller and Watson (2018) approach provides evidence of a weakening of the relationship between money growth and inflation after 1985. However, the estimation uncertainty is very high.
6 The model assumes a 1:1 relationship between money growth and inflation in the money demand function, i.e. a quantity theory relationship is included in the model via money demand. In the case of an aggressive anti-inflationary monetary policy response, however, this relationship is not reflected in regressions of the trend components, as the central bank prevents the emergence of persistent movements in money growth.
7 Gao et al. (2021) use the Hodrick-Prescott (HP) filter to remove short-term fluctuations from the time series. However, the properties of the HP filter can create artificial correlations between the two filtered time series; see, for example, Hamilton (2018).
8 This is an update of the analysis of Mandler and Scharnagl (2014) based on an extended data set reaching as far back as possible. Another difference is a modified bootstrap algorithm for the significance tests which takes account of possible heteroscedasticity. See Mandler and Scharnagl (2023).

possible changes over time and across fluctuations of different lengths.[9]

The authors find evidence of a strong, stable correlation between long-term fluctuations in the growth rate of M3 (corrected for real GDP growth) and the inflation rate with a fluctuation period of 24 to 40 years.[10] For these long-term fluctuations, the relationship between changes in money growth and inflation is close to the 1:1 relationship expected on the basis of quantity theory. Fluctuations in both time series are contemporaneous, i.e. there is no evidence of money growth leading inflation. The lack of a lead of money growth and the problems associated with estimating the relevant long-term fluctuations in money growth at the current end mean that the long-term relationship identified provides very little information on the future inflation rate that could be utilised for monetary policy purposes.

The results described above are valid for a period between around 1990 and the early 2000s. This is because the estimation of the relationship between the variables using the wavelet approach requires many data points before and after the time period under observation. This approach does not allow a sufficiently accurate assessment of whether the relationship has changed in the period thereafter.

9 For more information on wavelet analysis, see the annex in Deutsche Bundesbank (2019b).
10 The maximum length of the fluctuations that can be analysed using this procedure and this specific dataset length is 40 years.

Growing importance of analysing the monetary policy transmission process

Monetary analysis provides information on monetary policy transmission mechanism …

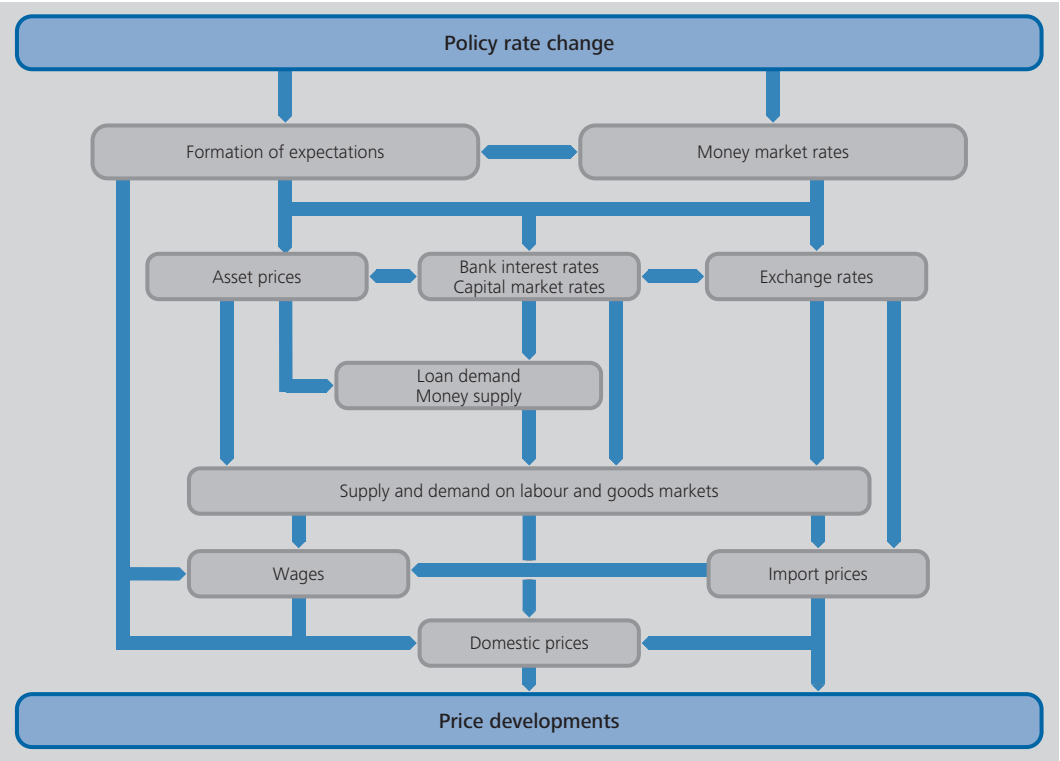
Despite the change in the assessment of the information content of monetary developments, the monetary analysis has remained a source of important information for the monetary policy decision-making process. The monetary policy transmission process now forms a new focal point of the monetary analysis. This concerns the mechanisms through which changes in monetary policy instruments feed through to economic activity and inflation. With the global financial crisis, potential changes or disruptions to the transmission process and the use of novel monetary policy instruments took centre stage in the monetary policy debate. The monetary analysis has proven to be well suited to providing analyses of the monetary policy transmission process for monetary policy decision-making.[13]

… as the monetary and financial data it studies capture the early stages of the transmission process

The chart on p. 21 shows a stylised depiction of the transmission of policy rate changes. At the early stages of many of the monetary policy transmission mechanisms, monetary policy instruments affect financial variables.[14] The impact of monetary policy on banks' funding costs and loan supply, i.e. on lending rates and other lending conditions, is of particular importance for the euro area as a bank-based financial system. These are variables that had already featured prominently in the monetary analysis. First, in the balance sheet context, bank lending is the most important determinant of monetary developments. Second, data on banks' lending and deposit rates, as well as information on the loan market from the Bank

13 For an overview of studies on monetary policy transmission from the monetary analysis, see also Holm-Hadulla et al. (2021a).
14 For an explanation of the transmission channels to developments in loans and the money supply, see Deutsche Bundesbank (2017a). More detailed explanations of the monetary policy transmission mechanisms can be found, for example, in Mishkin (2019), Chapter 26.

Transmission of policy rate changes



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Lending Survey (BLS), have already been used by the monetary analysis to assess the determinants of monetary developments.

Heterogeneous developments in the euro area have required, amongst other things, the country-specific macroeconomic environment to be taken into account

In response to the global financial crisis, the Eurosystem cut policy rates sharply. Even after the onset of the sovereign debt crisis, the risk of excessively low inflation required that policy rates be kept low. The observed differences between euro area countries in the pass-through of lower monetary policy rates to lending rates and the weak dynamics of lending raised the question of whether the monetary policy transmission mechanism might be disrupted in certain countries, for example owing to loan supply restrictions. The monetary analysis was thus expanded to include the country-specific macroeconomic environment, developments in sovereign bond markets, the debt situation of the private non-financial sector and bank-specific factors.[15]

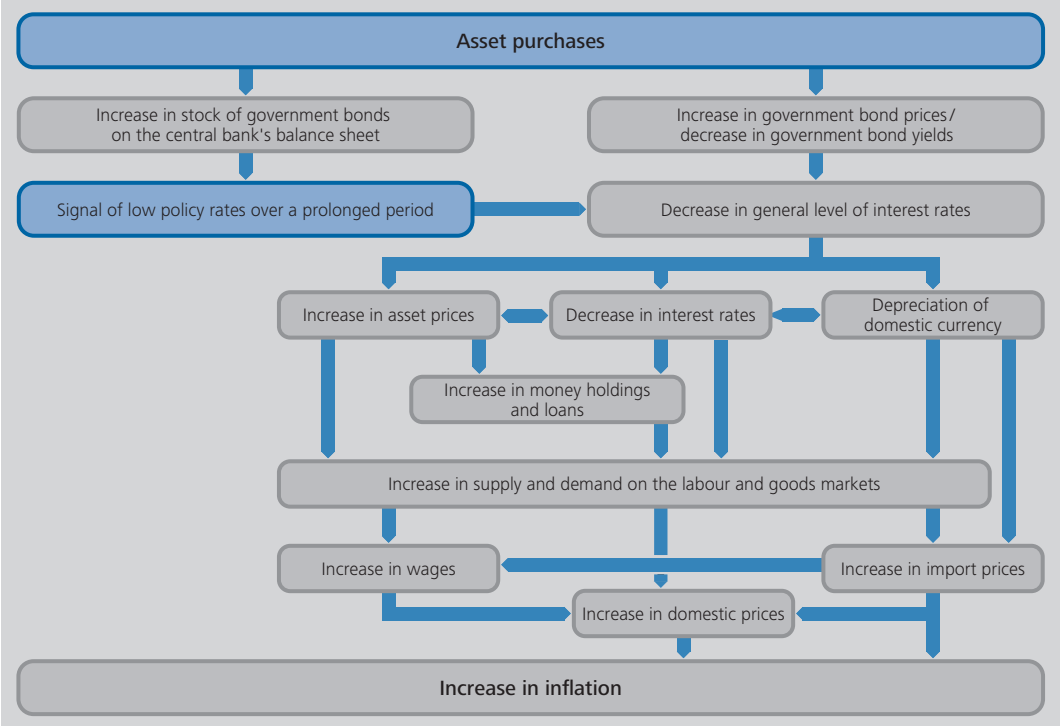
Analysis of the transmission of non-standard monetary policy instruments

With the scope for further monetary policy easing via policy rate cuts largely exhausted as it approached the lower bound, the Eurosystem implemented a series of non-standard monetary policy measures, such as asset purchase programmes (APPs) or targeted longer-term refinancing operations (TLTROs). The stylised depiction of the transmission process of an asset purchase programme on p. 22 illustrates how key transmission mechanisms function via the banking system.[16] Other non-standard measures, such as the TLTROs, were aimed directly at influencing banks' loan supply. With its ana-

15 Examples of such analyses of interest rate pass-through include Darracq Paries et al. (2014) and Altavilla et al. (2020). For an analysis of the heterogeneity of loan developments in the euro area, see, for example, Deutsche Bundesbank (2015b). For an analysis of the debt situation in the euro area, see, for example, Deutsche Bundesbank (2014, 2017c).

16 For more information on the impact of asset purchases for monetary policy purposes on the banking sector, see Deutsche Bundesbank (2017b), p. 27. For more information on the transmission mechanisms of asset purchase programmes, see Deutsche Bundesbank (2016).

Transmission of a monetary policy asset purchase programme*



* The blue fields denote active intervention in the transmission process by the central bank. For reasons of clarity, the chart does not take into account any feedback effects.

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lyses of the transmission process, the monetary analysis made a valuable contribution to the decisions on the deployment, design and (re)calibration of these novel monetary policy instruments.[17]

Monetary policy transmission in the low interest rate environment

As the period of low interest rates persisted, interest grew in whether there were characteristics of monetary policy transmission that were specific to the low interest rate environment, such as the transmission of negative policy rates to banks' lending and deposit rates.[18] Other topics included the possible adverse effects of very low or negative policy rates and a very flat yield curve on the loan supply.[19]

Extensions of the dataset and of the modelling approaches

For the studies on transmission, the dataset and the models used by the monetary analysis were refined, improved and expanded. The extensions to the model approaches included, amongst other things, approaches using micro data – primarily bank-specific data – and the use of multi-country models to capture possible differences in monetary policy transmission within the euro area.[20] The use of micro data has enabled researchers to drill deeper into the determinants of lending, examples of which include the relevance of the characteris-

17 For analyses of the transmission of the TLTROs, see, for example, Barbiero et al. (2021), Barbiero and Burlon (2020) and European Central Bank (2017c). Deutsche Bundesbank (2020a) contains findings on the transmission of the TLTROs and the APP. For more information on the impact of non-standard monetary policy measures on lending rates, see, for example, Altavilla et al. (2020) and European Central Bank (2017a).

18 See, for example, Altavilla et al. (2022) and Heider et al. (2019).

19 The focus here was on the effects of the low and negative interest rate policy on bank profitability (see, for example, Altavilla et al. (2018), Altavilla et al. (2022) and European Central Bank (2017a)) and the discussion about the "reversal rate", below which further interest rate cuts restrict the loan supply rather than expand it; see, for example, Deutsche Bundesbank (2022a). For a study on the transmission of the negative interest rate policy via financial markets and the banking sector as well as its impact on the corporate sector, see, for example, Boucinha and Burlon (2021).

20 See, for example, Mandler and Scharnagl (2020b) and Mandler et al. (2022).

tics of banks and borrowers.[21] Given the importance of financial markets for the transmission of non-standard monetary policy measures, such as the asset purchase programmes, and their impact on banks' funding costs and portfolio decisions, financial market prices and yields have likewise become increasingly important for monetary analysis.[22]

Comprehensive assessment of financing conditions and indebtedness of firms and households

With the non-standard measures, the monetary analysis perspective was expanded beyond bank loans and lending rates to a comprehensive assessment of financing conditions of the corporate sector. Both financial market data and information from the financial accounts play a key role in assessing the overall picture of firms' financing conditions. These allow account to be taken of other forms of external financing, such as the issuance of bonds and equity, as well as of firms' internal financing, which can substitute bank loans.[23] In addition, the financial accounting data enable the debt situation of the private non-financial sector, which can also have an impact on the transmission of monetary policy impulses, to be incorporated into the analysis.[24]

Analysis of the effects of financial shocks

Identifying financial shocks and assessing their effects on the financial sector and the real economy

The monetary analysis also continued to contribute to the assessment of risks to price stability by using the information contained in financial variables such as loans, lending rates and financial market yields to examine the impact of financial shocks on the financial sector, the real economy and inflation.[25] The financial system is not just a mechanism that transmits and amplifies economic shocks originating in the real economy.[26] As the global financial crisis, above all, has shown, shocks can also originate in the financial system, spill over from there to the real economy, and have a quantitatively significant impact on economic activity and inflation.[27] Moreover, due to the links and interactions between the real economy and the financial system, financial shocks can also have negative feedback effects on the financial system through their real economic effects.[28]

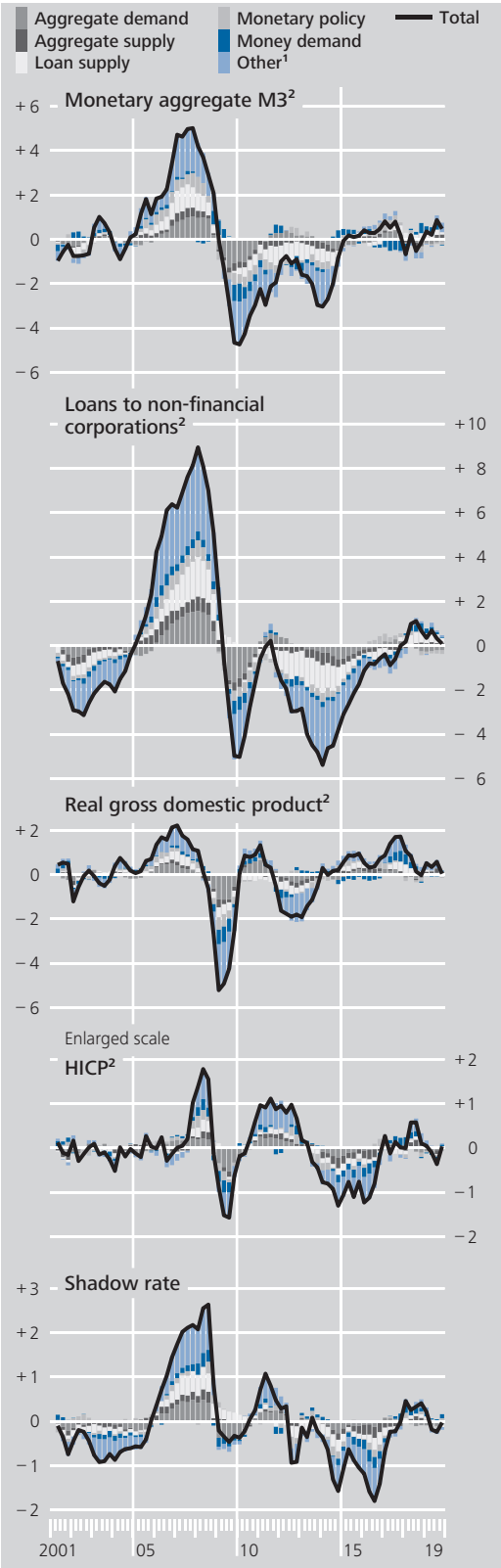
Examples of the importance of loan supply and money demand shocks

However, such shocks are not directly observable – yet they can be indirectly inferred from unexpected changes in economic time series. This requires suitable economic models. Using financial variables and appropriate models, the monetary analysis can identify financial shocks and assess their impact on the financial sector, economic activity and inflation. An example of such an analysis for the euro area is shown in the chart on p. 24. The underlying econometric model combines monetary and financial data (bank loans to non-financial corporations, the monetary aggregate M3, the lending rate, the yield on government bonds, and the difference

21 See, for example, Albertazzi et al. (2021), Altavilla et al. (2021) and Arce et al. (2021).
22 See, for example, European Central Bank (2017b) and the analysis of the portfolio rebalancing channel in Albertazzi et al. (2021).
23 For information on the substitution relationship between loans and corporate bonds, see, for example, Altavilla et al. (2019) and Arce et al. (2021). For an analysis of the complementarity and substitution relationships between various forms of external financing, see Mandler and Scharnagl (2020a).
24 See, for example, Deutsche Bundesbank (2021b) and, on the impact of firms' funding structure on monetary policy transmission, Holm-Hadulla et al. (2022) and Holm-Hadulla and Thürwächter (2021).
25 The prevailing paradigm in macroeconomics assumes that an economy converges towards a long-term "steady state", deviations from which are caused by shocks, i.e. exogenous impulses affecting the economy.
26 These mechanisms are based, for example, on asymmetric information, incomplete contracts and incentive problems. These frictions lead, amongst other things, to an external finance premium, i.e. a premium on external financing compared with internal financing and credit rationing. The external financing premium and the availability of loans depend, amongst other things, on the borrower's capital. A decline in equity as a result of a slowing economy can lead to a deterioration in firms' financing conditions, which in turn adversely affects the real economy. These mechanisms are discussed in, for example, Bernanke et al. (1999), Gertler and Gilchrist (2018) and Niepelt (2019), Chapter 8.3.
27 See, for example, Christiano et al. (2010) and Prieto et al. (2016).
28 For an overview, see, for example, Claessens and Kose (2018). One example is a shock-induced deterioration in the real economy's financing conditions that causes economic activity to contract. The increased insolvency risk that could ensue may require banks to increase their loan loss provisions, impair their loan supply, and thus further worsen financing conditions in the economy. Feedback effects are also possible in the case of real economic shocks, whose effects on the financial system can, in turn, spill over to the real economy.

Shock decomposition of key variables using a VAR model, 2001–19*

%, quarterly data



* Deviations from an unconditional forecast. See the box on pp. 25 ff. **1** Sum of the contributions of the unidentified shocks. **2** Deviations of the annual growth rate.

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between the yields on corporate bonds and government bonds (excess bond premium)) with real economic data, real gross domestic product (GDP), and the Harmonised Index of Consumer Prices (HICP). It thus allows selected financial shocks and their impact on the real economy to be identified.[29] A shadow rate is used as an indicator of monetary policy (see the box on pp. 25 ff.). Two financial shocks are identified – a loan supply shock and a money demand shock. The loan supply shock represents a change in banks' lending behaviour for given economic fundamentals captured by the other variables.[30] The money demand shock leads to a change in money holdings and to portfolio shifts between riskier assets and money for given economic conditions. It can also be interpreted as an uncertainty shock in which heightened uncertainty in the economy in general or in the financial markets specifically triggers a build-up of liquidity buffers and shifts into safe assets.

Loan supply shocks important during the credit boom and sovereign debt crisis, money demand shocks during the financial crisis

The adjacent chart shows the effects of the two financial shocks and other macroeconomic shocks on selected variables up to the end of 2019. The black lines represent the deviations of the annual growth rates of the monetary aggregate M3, loans to non-financial corporations, real GDP, and HICP and of the shadow rate level from a hypothetical simulated model scenario in which no economic shocks hit the euro area. These deviations are decomposed into the contributions of the various shocks. The chart shows that positive and negative loan supply shocks during the credit boom in the second half of the 2000s and during the European sovereign debt crisis had a quantitatively relevant impact on loan and money growth, respectively. Similar effects on GDP

29 In addition, real economic shocks are also identified. See the box on pp. 25 ff.

30 In the model used here, a (negative) loan supply shock can represent a number of underlying changes, such as a loss of capital, higher capital requirements, elevated risk assessments, increased risk aversion, etc.

BVAR model for estimating the effects of macroeconomic shocks on growth in gross domestic product, loans and the money supply and on the inflation rate

The chart on p. 24 shows the results of a Bayesian vector autoregressive (BVAR) model estimated for the euro area.[1] The model contains nine variables: real gross domestic product (GDP), the Harmonised Index of Consumer Prices (HICP), loans to non-financial corporations, the lending rate, the euro area shadow rate of Geiger and Schupp (2018), the average yield on five-year euro area government bonds, the monetary aggregate M3, the difference between the yield on corporate bonds and a risk-free interest rate with the same maturity (excess bond premium),[2] and the yield on five-year US Treasuries. The shadow rate is used as a composite indicator of the Eurosystem's standard and non-standard monetary policy.[3] The US Treasury yield is used to control for possible influences from the US or global capital markets.

The model is estimated using quarterly data covering the period from the second quarter of 2000 to the fourth quarter of 2019.[4] With the exception of the interest rates and the interest rate spread, all of the variables are entered into the estimation as log levels. The estimation is carried out using the approach in Giannone et al. (2015).

The residuals of the model contain the economically interpretable "structural shocks", which are responsible for the fluctuations of the variables around the model's long-term equilibrium, in the form of linear combinations. In order to estimate the impact of the shocks on the model variables, the shocks need to be identified on the basis of assumptions. In the analysis presented here, shocks are identified through the use of sign restrictions, i.e. assumptions about the direction in which a shock moves the model variables.

Five economic shocks are identified. The sign restrictions for each of the shocks are shown in the table on p. 26. The aggregate demand shock comprises exogenous changes in the demand for goods due to changes in consumer preferences or government spending. For the monetary variables, it is assumed that the demand shock leads to greater demand for loans, and thus to a rise in both the volume of loans and the lending rate, as well as to an increase in the money supply (additional money creation through loans, increased nominal money demand due to a higher price level and higher real income). The aggregate supply shock comprises, amongst other things, shocks that affect firms' production technologies or mark-ups, and also energy price shocks. The loan supply shock repre-

1 This model is an extended and modified version of that in Mandler and Scharnagl (2020a) and Deutsche Bundesbank (2020b). The extension to include the money demand shock originates from Mandler (2021).
2 This indicator was devised by Gilchrist and Zakrajšek (2012) and is constructed so as to avoid possible distortions caused by duration mismatches. Gilchrist and Mojon (2018) calculate corresponding indicators for the euro area countries; see https://publications.banque-france.fr/en/economic-and-financial-publications-working-papers/credit-risk-euro-area.
3 The shadow rate is calculated using a term structure model. It is the hypothetical short-term interest rate absent the zero lower bound. The shadow rate is influenced by monetary policy measures that affect the yield curve, even if these measures do not affect the actual market short-term interest rate due to the zero lower bound; see Deutsche Bundesbank (2017d).
4 Ending the estimation before the COVID-19 pandemic is intended to avoid potential distortions caused by the pandemic; see Lenza and Primiceri (2022). Nevertheless, the shock decomposition includes the period from the first quarter of 2000 until the third quarter of 2022, i.e. the analysis assumes that the relationships estimated for the preceding period continue to hold true from 2020 onwards.

Sign restrictions*

Variable	Shock				
	Aggregate demand	Aggregate supply	Loan supply	Monetary policy	Money demand
GDP	+	–	+	–	–
HICP	+	+	.	–	–
Loans	+	.	+	–	.
Lending rate	+	.	–	+	.
Euro area government bond yield	.	.	.	.	+
Shadow rate	+	+	+	+	–
Money supply	+	.	+	–	+
Excess bond premium	.	.	–	+	+
US Treasury yield	.	.	.	.	.

* The restrictions apply to the period in which the shock occurs. Points indicate that no assumption has been made for that variable regarding the direction of the effect of the shock described in the corresponding column.

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sents exogenous changes in banks' supply of loans. An increase in the loan supply leads, amongst other things, to a decline in the lending rate and an increase in real GDP, the volume of loans, and the money supply.[5] The negative response of the excess bond premium to the loan supply shock assumes that firms respond to an expansion in the loan supply by substituting credit financing for bond financing. Therefore, the supply of corporate bonds declines and the yield on corporate bonds falls relative to the yield on government bonds. The monetary policy shock is a deviation of the monetary policy indicator – in this case, the shadow rate – from the monetary policy reaction function estimated in the model, i.e. from the systematic relationship between the policy indicator and the other variables in the model. In the case of a restrictive (positive) monetary policy shock, monetary policy is thus more restrictive than the model would predict given the other variables and other shocks. Alongside the sign restrictions typically used to identify a monetary policy shock, the table shows that the excess bond premium is also assumed to rise following a restrictive monetary policy shock.[6]

In addition to the sign restrictions shown in the table, it is assumed that the coefficients of contemporaneous GDP and the price level in the equation for the shadow rate are positive, which causes the central bank to respond immediately to an increase in output or prices by tightening monetary policy.[7] A money demand shock is identified as the fifth structural shock. This leads to a rise in money holdings, the government bond yield, and the excess bond premium. Money holders sell off non-monetary assets in order to increase their money balances. The positive effect on the excess bond premium assumes that there is a relatively larger reduction in demand for risky assets compared with low-risk and risk-free assets, such as government bonds. In addition to portfolio reallocation, it is assumed that money holders will also increase their money holdings by making fewer purchases, thereby reducing output and the price level. Monetary policy responds to the

5 For more information on the identification assumptions for the loan supply shock, see Mandler and Scharnagl (2020a).
6 See Gertler and Karadi (2015).
7 See Arias et al. (2019).

deflationary effect of the money demand shock through easing, i.e. by accommodating the increased demand for money. Alongside this interpretation of the money demand shock, which is based on money demand theory, there is another alternative interpretation whereby economic agents respond to an exogenous rise in macroeconomic uncertainty: this leads to a reduction in the demand for goods and services, a build-up of precautionary funds, and a shift from risky and less liquid assets to money.

In contrast to the model described on pp. 41 ff., an independent loan demand shock is not identified. As shown on p. 42, a loan demand shock results in changes in the volume of loans and the lending rate, both in the same direction. In the model presented here, this condition is fulfilled by the aggregate demand shock. The aggregate supply shock and the money demand shock may also fundamentally be considered to be components of a loan demand shock, as their identification assumptions do not exclude the possibility of loan volumes and lending rates moving in the same direction. Another difference from the model on pp. 41 ff. is that the loan supply shock defined therein also encompasses the monetary policy shock defined in the model described here, as it leads to the loan volume and lending rate moving in opposite directions.

Economic shocks move the variables out of the long-term equilibrium to which the model converges. The effects of a shock may persist beyond the period in which it occurs, as the changes in the variables caused directly by the shock are transmitted to subsequent periods via the model dynamics (shock propagation). In each period, the deviation of the actual observed variables from their hypothetical paths if the shocks had not occurred thus incorporates the effects of the current shocks as well as the persisting effects of previous shocks and can be assigned to the categories of shocks described above. The chart on p. 24 shows the decomposition of the deviations of the observed variables from a hypothetical scenario in which the shocks do not occur into the contributions of the various economically interpretable shocks. As the model contains nine variables but identifies only five shocks, four additional unidentified and thus uninterpretable shocks affect the variables.

The Bayesian estimation produces a probability distribution of the shock contributions. However, the charts show only the stacked medians of the contributions of the various shocks and do not provide any information on their statistical distribution. In order to assert that a particular shock played an important role in the development of a particular variable at specific points in time, the estimation uncertainty in the distribution of the shock contributions must also be taken into account. If the distribution of a shock contribution is very wide, it is not possible to make any definitive assertions regarding its direction, even if the median is relatively large. As in Mandler and Scharnagl (2019), this analysis uses percentiles of the distribution of the shock contributions and the ratio of the posterior probabilities of a positive versus negative contribution (or vice versa) of a shock at a given point in time for the assessment. The main article discusses results that can be considered sufficiently reliable on the basis of these analytical tools. One example in which the high degree of estimation uncertainty prevents conclusions from being derived with confidence is the effect of the loan supply shock on loan growth since 2020 in the chart on p. 29. Although, at first glance, the median contribution suggests that the loan supply shock had a quantita-

tively significant impact, the uncertainty surrounding its contribution is so great that the model ultimately does not provide any reliable evidence that loan supply shocks played a significant role during this period.[8]

8 While the other results described in the main text prove to be qualitatively robust for different variations of the model (use of the monetary aggregate M1 instead of M3, extension to include an equity price index, use of another shadow rate), this is not the case for the contribution of the loan supply shock in the recent past. For example, the model does not indicate any relevant median effect of loan supply shocks from 2020 onwards if, instead of the shadow rate of Geiger and Schupp (2018), that of Wu and Xia (2016) is used.

growth and inflation are also evident.[31] In addition, the analysis shows that positive (uncertainty-related) money demand shocks occurred during the initial phase of the global financial crisis, which were clearly reflected in GDP growth and inflation.[32] These are valuable insights that helped decision-makers to assess both the risks to price stability and the transmission process.

Questions of monetary and financial analysis in the current environment

High M3 growth at the outbreak of the COVID-19 pandemic

Illustrative analysis of money growth and inflation since 2020 …

The macro models used to identify financial shocks are also contributing to the interpretation of economic developments in the current environment. Upon the onset of the COVID-19 pandemic in 2020, the annual growth rate of the monetary aggregate M3 increased to more than 12% before receding over the course of 2021 and 2022. The inflation rate rose steadily over the same period. This raises the question of a possible relationship between the increase in the M3 growth rate and the increase in the inflation rate.

… by means of shock decomposition

This question can be analysed in the empirical macro model presented on pp. 23 ff. and in the box on pp. 25 ff. The monetary aggregate M3 and the price level are endogenous variables, i.e. they are explained within the model. Their

31 Further studies on the impact of loan supply shocks in the euro area or in the individual Member States include Bijsterbosch and Falagiarda (2015), Gambetti and Musso (2017), Hristov et al. (2012) and Mandler and Scharnagl (2020a).

32 Qualitatively similar results can be obtained if the analysis is carried out using the monetary aggregate M1 instead of M3. However, the money demand shocks and their impact tend to be stronger for M1. This is likely because uncertainty-related portfolio shifts are particularly reflected in the most liquid components of the monetary aggregate.

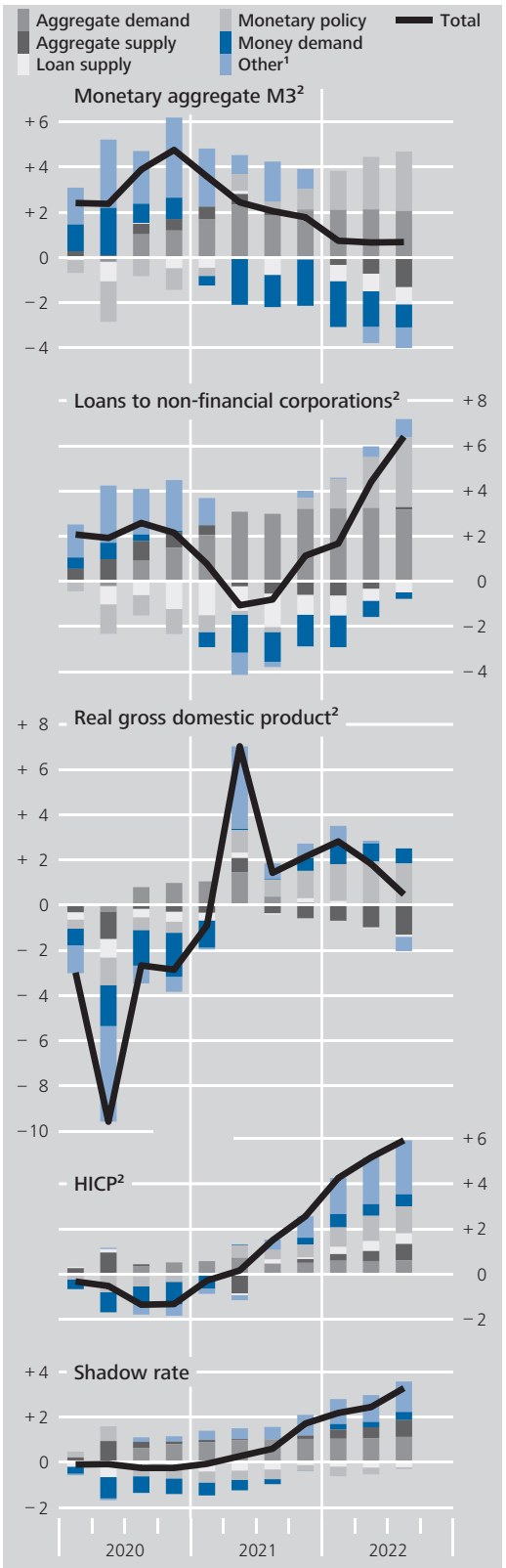
dynamics, in conjunction with the other endogenous variables, thus result from the economy's responses to macroeconomic shocks. How the two variables react, and thus their observed correlation, depends on the nature of the shock. A good way to obtain an understanding of money growth and the inflation rate in recent years is therefore to decompose, as described above, the deviations of the variables from a baseline scenario into the contributions of different macroeconomic shocks. The adjacent chart continues the shock decomposition on p. 23 from the first quarter of 2020 to the third quarter of 2022. In addition to the two financial shocks described above (loan supply shock and money demand shock), it also shows the estimated contributions of aggregate demand shocks and aggregate supply shocks as well as monetary policy shocks (which are discussed on pp. 25 ff.). The effects of the shocks are interpreted individually below.

Money growth accelerated at the outbreak of the pandemic due to money demand shocks, which had a negative impact on inflation, however

According to the model, money demand shocks made a marked contribution to the acceleration of money growth in 2020. These are likely to reflect, in particular, the heightened uncertainty and the build-up of liquidity reserves at the outbreak of the COVID-19 pandemic. The increased demand for liquidity was accommodated by monetary policy, as assumed in the model. This is represented by the negative contributions of the money demand shocks to the shadow rate. These liquidity buffers were later reduced again, which is reflected in the fact that the contributions of the money demand shock to money growth decline and eventually enter into negative territory. The effect of the money demand shocks on the inflation rate is negative at first, as implied by the identification assumptions, but turns positive as from the end of 2021.[33] At the outbreak of the pandemic, money growth rises

Shock decomposition of key variables using a VAR model, 2020–22*

%, quarterly data



* Deviations from an unconditional forecast. See the box on pp. 25 ff. **1** Sum of the contributions of the unidentified shocks. **2** Deviations of the annual growth rate.

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33 The model is estimated in the levels of the variables. The positive contribution of the money demand shock to inflation towards from the end of 2021 onward largely reflects a base effect resulting from the, in the short term, negative (but only temporary) impact of a money demand shock on the price level.

above the baseline while inflation falls below the baseline of the model. Towards the end of the period under review, money growth declines as inflation rises. These dynamics illustrate the fundamentally countervailing effects of the money demand shock on inflation and the monetary aggregate.

Expansionary monetary policy raised money growth and inflation …

In the short run, money growth and inflation are assumed to be affected in the same direction by monetary policy shocks. Monetary policy shocks are deviations of the shadow rate, which is used as a monetary policy indicator, from its "normal" estimated response to the other variables.[34] According to the estimations, monetary policy has been particularly accommodative compared with the model since mid-2020. This has raised both money growth and the inflation rate since mid-2021. At this stage, however, the overall money growth rate had already begun to decline again. The expansionary monetary policy shocks from mid-2020 are reflected in the chart showing the shadow rate.[35] Although the model does not indicate expansionary monetary policy at the end of the period under review, the monetary policy shocks that occurred up to that point may continue to have a positive impact on money growth and inflation for some time to come.

… and positive aggregate demand shocks

Unusually strong growth in aggregate demand (positive demand shocks) was a further common driver of money growth and inflation. The shock decomposition of real GDP growth shows that these positive demand shocks occurred between mid-2020 and mid-2021. This suggests that these shocks could reflect fiscal support measures during the COVID-19 pandemic. The impact of these demand shocks on money growth and inflation persists up to the current end. Supply-side disruptions, i.e. aggregate supply shocks, were also increasingly playing a role in the rise in inflation in 2022, impacting positively on the inflation rate, but, at the same time, according to the estimations, tending to adversely affect money growth at the current end.

Interpretation of monetary dynamics depends on underlying shocks

These results illustrate that the correlation between money growth and inflation at a given point in time depends on which economic shocks are particularly important for the dynamics of the two variables. The increase in money growth in 2020 was initially driven mainly by money demand shocks, which, however, impacted negatively on the price level. It was only in the subsequent phase that aggregate demand shocks and monetary policy shocks became more important for money growth; taken in isolation, they caused both money growth and inflation to rise.[36] However, information on the underlying shocks can be obtained only if monetary developments are analysed holistically along with real economic and financial variables. Focusing on a money growth-inflation relationship that assumes a stable positive correlation between the two variables can therefore lead to misjudgements.

The result could reflect the interplay between asset purchases for monetary policy purposes and expansionary fiscal policy

The results of the model can be related to the consolidated balance sheet of the euro area MFI sector. One of the main reasons for the high money growth during the pandemic was the strong expansion in securities held for monetary policy purposes by the Eurosystem in the context of the low inflation environment; the other was the increased new issuance of government

34 The "normal" monetary policy response also includes the response of the shadow rate to the other macroeconomic shocks.
35 The chart for the shadow rate shows a pronounced restrictive monetary policy shock in the second quarter of 2020, i.e. a more restrictive monetary policy than the normal monetary policy response to the other variables. The fall in output in the second quarter of 2020 was an extreme event compared with the history of GDP movements over the estimation period. The estimated monetary policy reaction function implicitly contained in the model predicts a stronger easing of monetary policy, i.e. a greater decline in the shadow rate than actually occurred, in response to this sharp decline in output. The zero lower bound and limits for possible monetary policy asset purchase programmes would probably not have allowed for monetary policy easing to the extent predicted by the model. In addition, the chart shows that, as early as in the following quarter, the Eurosystem provided an accommodative impulse above and beyond the monetary policy response predicted by the model.
36 As the expiring money demand shocks and a number of other shocks overcompensated for the impact of the aggregate demand and monetary policy shocks on the deviation of money growth from the baseline, the deviation in the period of rising inflation is largely declining in the chart.

bonds to raise funding for fiscal support measures during the pandemic. The interplay between expansionary fiscal and monetary policy is reflected in the model results, on the one hand, in the positive aggregate demand shocks and their impact on GDP growth and inflation.[37] On the other, it is also part of the expansionary monetary policy shocks and their effects.[38]

Money creation through lending to the private sector is not reflected in specific shocks

Bank loans to the private sector were the second major counterpart to the changes in the monetary aggregate M3 since 2020. The positive relationship between loan growth and money growth reflects the money creation process and can, in principle, be caused by any of the shocks contained in the model.[39] In the chart on p. 24, the close relationship between loans and the monetary aggregate over the period up until 2020 is reflected in the fact that the contributions of the various shocks to the growth of loans to non-financial corporations and to M3 growth are often of similar relative importance and tend to point in the same direction for both variables.

Model can only partly explain rise in inflation

Overall, the model shows that monetary policy shocks and aggregate demand shocks have played an important role in joint developments in money growth and inflation, while money demand shocks tended to cause countervailing developments of both variables. However, the model is unable to assign a significant part of the upward deviation in the current inflation rate to any of the identified shocks. This is because, amongst other things, the model does not use a broad range of determinants of the inflation process as a basis (for example, it does not include energy prices), but instead focuses on financial variables, consistent with the focus of the monetary and financial analysis.

Transmission of monetary policy tightening

Overview

Monetary policy addresses high inflation with increased monetary policy tightening

As described above, one of the main tasks of the monetary and financial analysis in its current form is to assess the progress and degree of monetary policy transmission in the early stages of the monetary policy transmission process described on p. 21. Whilst a large number of the above-mentioned transmission analyses were conducted in an environment of very low inflation rates, economic conditions have now changed and, as a result, so too has the monetary policy stance. The economic downturn in 2020 and the rise in inflation in 2021 were shaped by the COVID-19 pandemic. In 2022, macroeconomic developments were also increasingly driven by the outbreak of the war in Ukraine and its economic repercussions. Sharp rises in energy and food prices, continuing disruption to global supply chains and the post-pandemic recovery in demand led to inflation reaching new highs over the course of the year. Strong inflationary pressures, which are expected to persist over the medium term, forced

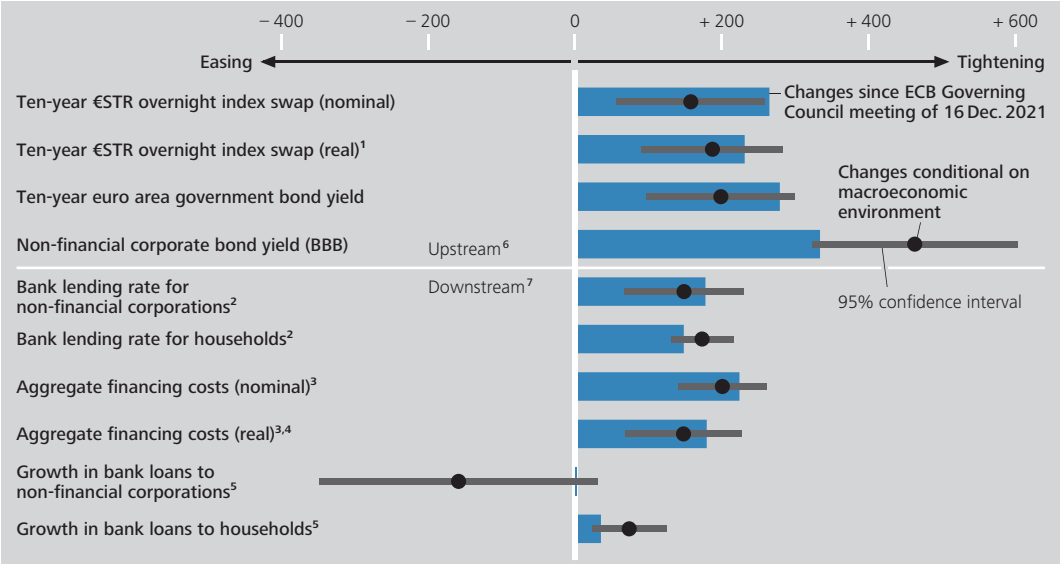
37 A demand shock caused by an expansionary fiscal policy impulse leads ceteris paribus to an increase in GDP and in the price level compared with the baseline, to which the central bank responds by tightening monetary policy. In the model, however, this tightening is not strong enough to prevent an increase in the money supply, which means that the fiscal policy shock is temporarily and partially accommodated by monetary policy. The monetary policy accommodation of a demand shock is thus also reflected in the contributions of the demand shock to the decomposition of money growth.

38 If the central bank responds to an expansionary fiscal policy impulse by tightening its monetary policy to a lesser extent than it would according to its estimated reaction function, GDP and the price level rise relative to the baseline, while the shadow rate falls relative to it. This is depicted in the model as an expansionary monetary policy impulse. Since the model does not contain any fiscal policy variables, fiscal policy impulses cannot be isolated from the monetary policy and aggregate demand shocks. For information on identifying fiscal policy shocks, see, for example, Ramey (2016).

39 For more information on the money creation process, see Deutsche Bundesbank (2017b). The assumptions made in order to estimate the aggregate demand shock and the monetary policy shock assume a positive correlation between money growth and loan growth, while the assumptions regarding the other shocks do not rule out a positive correlation.

Financing Conditions Dashboard for the euro area: Actual changes in the financing conditions of the non-financial sector as well as predictions of these changes conditional on the macroeconomic environment*

Basis points, latest observation: 9 Jan. 2023



Sources: Bloomberg, ECB, and Bundesbank calculations. * Conditional on the growth and inflation gap. Based on the most recent data available in each case. The non-financial sector encompasses non-financial corporations, households and general government. **1** Ten-year €STR overnight index swap less ten-year inflation-linked swap. **2** Volume-weighted average interest rate according to the MFI interest rate statistics. **3** Aggregate index of volume-weighted financing costs of the non-financial sector (AIFC). **4** AIFC less 5y-5y inflation-linked swap. **5** Three-month growth rate of MFI loans according to the BSI statistics with the sign reversed. **6** Refers to indicators at upstream stages of transmission that are directly linked to the financing conditions on the money and capital market. **7** Encompasses downstream indicators that primarily reflect the financing conditions in banks' lending business.

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a rapid tightening of the monetary policy stance in the euro area. In the first half of 2022, the ECB Governing Council discontinued net asset purchases; in July, it reversed its interest rates. Since then, key interest rates have risen by a total of 250 basis points.

Monetary and financial analysis provides information on regular assessment of monetary policy stance

In this environment, the monetary and financial analysis must address three core issues. First, it must assess whether banks pass on the monetary policy-induced rise in market interest rates to borrowers to the necessary extent. Second, it must evaluate whether the tightening of financing conditions has the intended dampening effect on the demand for loans among households and firms. And third, the monetary and financial analysis must also keep a close eye on the loan supply side. This is because very loose lending policies among banks could weaken the impact of monetary policy tightening, whilst excessively restrictive lending could lead to undesirable feedback loops between the financial system and the real economy. By analysing these issues, it is possible to adjust the monetary policy stance to a changing environment in good time, where necessary.

Tightening of monetary policy feeds through to financing conditions for private non-financial sector

The dashboard shown above provides an initial condensed overview of the assessment of transmission, outlining how financing conditions for the private non-financial sector develop across the monetary policy transmission process. For this purpose, it contains upstream indicators that directly address financing conditions for the money and capital markets, as well as downstream indicators that capture the subsequent stages of monetary policy transmission and mainly reflect financing conditions for banks' lending business. The dashboard shows increases in almost all indicators for 2022, with the tightening observed since December 2021 being more pronounced for upstream indicators than for downstream indicators. This is due to the fact that upstream indicators respond quickly to monetary policy impulses, whereas the corresponding changes in downstream indicators

typically occur with a time lag. This is illustrated particularly clearly by the growth in bank loans to non-financial corporations, which remained virtually unchanged over the course of 2022.

Developments in financing conditions thus far in line with macroeconomic environment

In addition to the summarised depiction of financing conditions, the dashboard shows the results of an empirical analysis in which changes in the indicators are conditioned to the development of the macroeconomic environment. [40] Specifically, this means that changes in the individual indicators are regressed on current and past values of the output and inflation gaps.[41] These estimation models can be used to assess the degree to which changes in the indicators are consistent with macroeconomic developments.[42] It is clear that, taking into account an area of uncertainty (grey lines), the tightening of financing conditions observed since December 2021 is broadly in line with the developments in the macroeconomic environment. This is due, in particular, to the high inflation dynamics. Looking at the point forecasts, the actual tightening shown by the upstream indicators close to the financial market is, in some cases, slightly more pronounced than predicted by the models. This is likely to be attributable, in particular, to markets' reappraisal of the anticipated monetary policy response to the macroeconomic environment. In the case of the downstream indicators, which mainly reflect banking conditions, the increases have thus far been largely in line with expectations.

Pass-through of higher interest rates in banks' lending business

Banks' funding costs have risen significantly since the beginning of 2022

In a bank-based economy such as the euro area, the banking sector's responses to adjustments in the monetary policy stance have a crucial influence on developments in financing conditions for the private non-financial sector. Banks pass on rising financial market interest rates in their lending business to cover their own higher funding costs. As the upper chart on p. 34 shows, banks' funding costs, which had been extremely low for a long time, have risen significantly since the beginning of 2022. This upward movement was mainly due to the sharp rise in yields on bank debt securities, which, in turn, followed the general trend of money market and capital market interest rates.

Banks' interest rate pass-through thus far in line with historical patterns

Higher interest rates in the financial markets led banks to significantly raise interest rates, which had been close to all-time lows up until that point, on loans to non-financial corporations and loans to households for house purchase. This occurred with a time lag. Empirical models based on historical interrelationships show that, for loans to non-financial corporations and loans to households for house purchase in the euro area, interest rates are generally passed through almost entirely and that this process is largely concluded after one year. In the case of loans to non-financial corporations, developments in market interest rates are mostly passed on within the first few months,

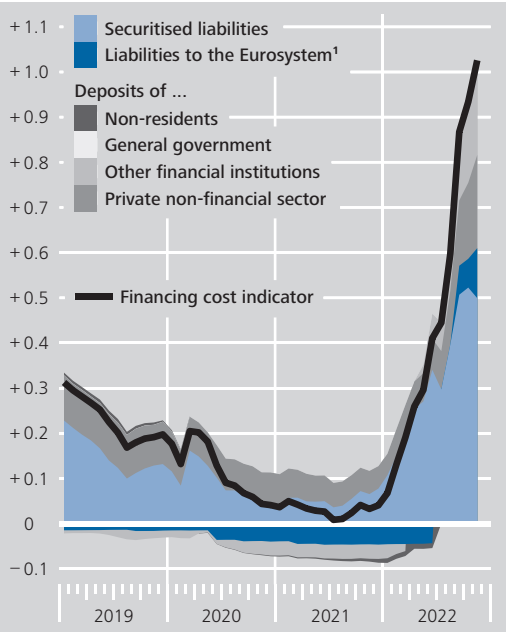
40 It is assumed that market participants form their expectations about future monetary policy using simple rules, such as the Orphanides rule; see Hartmann and Smets (2018), pp. 21f. and Orphanides (2003). If the expected output gap and/or the expected inflation gap are positive, market participants expect rising interest rates and vice versa.

41 The estimates are based on autoregressive distributed lag (ARDL) models of orders p and q. Specifically, this means that the dependent variable (change in the indicator compared with the previous period) is regressed on p of its own lags as well as on contemporaneous values and q lags of additional explanatory variables. Within the scope of this analysis, the expected output gap (deviation of expected annualised GDP growth at time t from potential growth approximated using expected growth in six to ten years) and the expected inflation gap (expected inflation in one year minus the inflation target) serve as explanatory variables and describe the macroeconomic environment. Expected values are measured using monthly consensus forecasts, which, using the method developed by Knüppel and Vladu (2016), are converted into annual rates at times t and $t+12$. The lag lengths are selected on the basis of the Schwarz-Bayes information criterion.

42 As the upstream indicators are entered into the estimation at a weekly frequency, the time dimension of the monthly data from the macroeconomic indicators is transformed accordingly. For the weekly figures on the upstream indicators, this means that only lagged values of the macroeconomic indicators are entered into the regression and these values are kept constant over every week of a given month. This approach is consistent with the fact that the information and data on economic conditions are only available with a certain lag, which means that, using this estimation procedure, the forward-looking financial market variables in a given week are ultimately responding to macroeconomic data from the previous month. For information on a similar approach, see Brave and Kelley (2017).

Financing cost indicator for euro area banks and contributions by funding sources

%



Sources: MFI interest rate statistics, BSI statistics, ECB, European Money Markets Institute, Centralised Securities Database and Bundesbank calculations. **1** Priced at the main refinancing rate.

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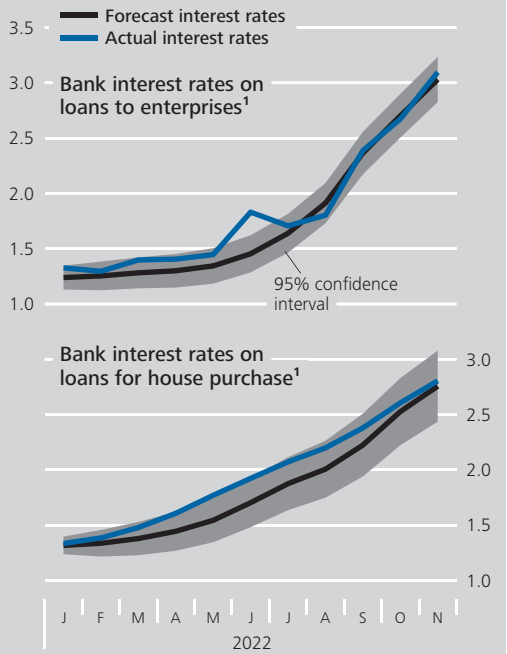
Interest rate pass-through in the euro area: forecast and actual interest rate developments

Annual percentages



1 New business according to the harmonised MFI interest rate statistics.

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while these take longer to pass through to loans to households for house purchase.[43] In 2022, lending rates in the euro area as a whole developed essentially in line with the historical patterns indicated by the models (see the lower adjacent chart). With a few exceptions, this also applies to the interest rate pass-through in the four largest Member States.

Models suggest further rise in lending rates

The models suggest that lending rates will rise further in the coming months. First, it is likely that part of the increase in financial market interest rates over the past few months is not yet reflected in lending rates, but will have a delayed impact. Second, a further hike in lending rates can be expected if market interest rates continue to rise. With regard to lending rates, the models do not yet provide any reason to expect increasing heterogeneity among the euro area countries.

Development of financing needs of firms and households

Rising financing costs coincide with high financing needs

Experience shows that the decline in demand for loans among non-financial corporations and households as a result of higher financing costs requires more time. For instance, some borrowers frontload their borrowing activity in anticipation of rising interest rates. In addition, in a weakening economy, firms' internal financing options diminish, which initially increases their needs for external financing and thus also their demand for bank loans.[44] Furthermore, in the current environment, the increasingly broad-based, massive rise in prices, aggregate supply bottlenecks and acute liquidity shortages among some firms in the energy sector have led to dynamic loan demand despite higher financing costs in the wake of monetary policy tightening. Financing volumes thus remained high for a time or even grew further. A weakening was not observed until the final quarter of 2022, meaning that the tightening of the monetary policy stance is likely to grad-

43 See Deutsche Bundesbank (2019a).
44 See European Central Bank (2013).

ually achieve its intended impact. In the current environment, it is difficult to say whether these developments in lending are in line with historical patterns or should be regarded as exceptional. This is because the euro area data available for such analyses do not contain periods with similarly high inflation rates. According to the estimation results presented in the dashboard, the developments in lending can be regarded as unremarkable taking into account the broad area of uncertainty in 2022.

Slowdown in loans to households already clearly identifiable

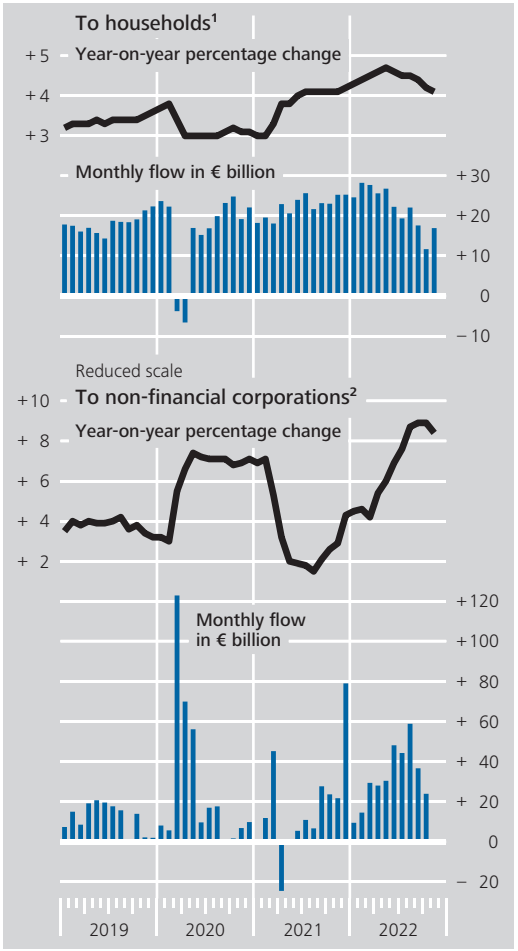
With regard to loans to households, signs of a slowdown were already emerging as early as in the middle of the year. Net lending decreased significantly from June 2022 (see the adjacent chart). The corresponding year-on-year growth rate has declined moderately since mid-2022. There was a particular drop in the previously buoyant demand for loans for house purchase, which is the most significant sub-item of loans to households. In this case, the rise in lending rates led to a significantly higher interest burden for newly issued and renegotiated loans. From the second quarter of 2022, the banks surveyed by the BLS identify the rise in the interest rate level as a factor dragging on demand. Furthermore, they cite both the decline in consumer confidence as well as the significant deterioration in the housing market outlook as perceived by borrowers as reasons for the dampened demand (see the chart on p. 39). Indeed, in the euro area, there are mounting signs of a turnaround in the housing market, which boomed during the low interest rate period.

Shift in non-financial corporations' external financing from market to bank financing …

The picture is more complex for non-financial corporations, as they generally have access to multiple forms of external financing. Against the backdrop of the tightening of monetary policy in the euro area from the beginning of 2022, there was an increasing shift within external financing from market financing to bank financing (see the upper adjacent chart). The associated reduction in financing by debt securities, which had played an increasingly important role in corporate financing in the wake of

MFI loans to the private non-financial sector in the euro area*

Month-end data, seasonally adjusted



Source: ECB. * Adjusted for loan sales and securitisation as well as for positions arising from notional cash pooling services provided by MFIs. **1** Including non-profit institutions serving households. **2** Non-financial corporations and quasi-corporations.

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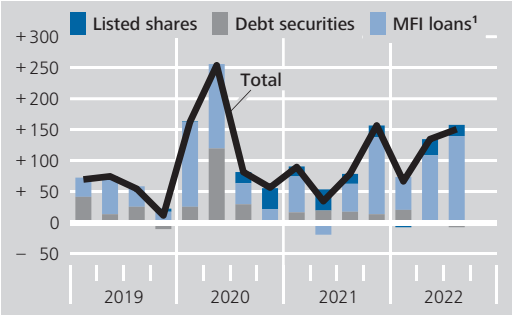
the global financial crisis, was particularly pronounced (see the box on pp. 37 f.). This was mainly due to the divergence in financing costs. Interest rates on debt securities have risen sharply since the turn of 2021-22 owing to the close linkages between interest rates in the financial markets. Bank lending rates, however, in line with the historical patterns outlined in the above-mentioned interest rate pass-through models, responded with a certain time lag (see the lower adjacent chart). As a result, obtaining financing via debt securities became increasingly unattractive. Overall, both the nominal and the real costs of debt financing for

Contributions to narrow external financing of non-financial corporations in the euro area

€ billion, quarterly data



Source: ECB and Bundesbank calculations. **1** Adjusted for seasonal variations as well as for loan sales, securitisation and positions arising from notional cash pooling services provided by MFIs.

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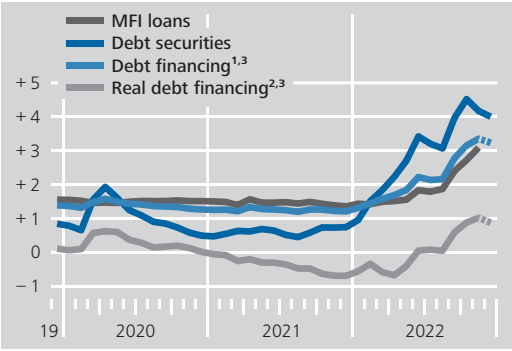
Financing costs for non-financial corporations in the euro area

%, monthly data



Sources: Bloomberg, ECB, iBoxx, and Bundesbank calculations. **1** Volume-weighted average of loans and debt securities. **2** Less 5y-5y inflation-linked swap. **3** Interest on loans for December 2022 taken as constant on the month.

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non-financial corporations increased clearly over the course of 2022.

… while firms' financing needs were high

Another key factor that sustained demand for bank loans despite rising interest rates was the decline in internal financing, i.e. financing from internally generated payment surpluses within firms. The main driver of this development was higher dividend payments by firms, which reduced the available cash flow. The euro area firms participating in the Survey on the Access to Finance (SAFE) also indicated a stronger increase in production costs despite higher sales, which resulted in mounting reports of declining profits. At the same time, financing needs for working capital and inventories were relatively high and investment activity also remained comparatively robust in nominal terms. A gap therefore opened up between the need for financing and internally generated funds, which was closed by taking out bank loans.

Demand for loans to firms dynamic at first, with initial signs of weakening recently

Against this backdrop, banks' aggregate lending to non-financial corporations remained high into the summer. Alongside the aforementioned reasons, government-sponsored large-volume loans to firms in the energy sector also played a role.[45] However, a slowdown in non-financial corporations' demand for loans can also be observed at the current end. Net lending has been in decline since September, and came to a standstill in November (see the chart on p. 35). As a result, the annual growth rate went down moderately in November from a high level. The banks participating in the BLS expected a decline in loan demand in the final quarter of 2022 (see the adjacent chart above). A drop in firms' financing needs for fixed investment was cited as the main factor dampening demand, in line with the deteriorating economic and geopolitical environment. On top of this, there is the rising lending rate, which makes some investments no longer seem lucrative. In the third quarter of 2022, for example, BLS banks for the first time cited higher financing costs as a dampening factor in corporate demand for loans. Furthermore, it is also possible that the now easing supply bottlenecks will lead to lower financing needs for working capital and inventories.

Developments in banks' loan supply

Considerable tightening in loan supply policy according to BLS

It is crucial that the monetary and financial analysis also keeps a close eye on developments in the loan supply, as changes in banks' lending policies can accelerate or weaken the impact of monetary policy tightening. The BLS provides

45 In Germany, in particular, these loans were granted via state-owned banks, such as KfW Group, in order to counter the higher energy costs and the resulting increased margin requirements for futures transactions at energy exchanges.

Shift in the debt financing structure of non-financial corporations from bank loans to debt securities

The expanded monetary and financial analysis takes into account, amongst other things, that the importance of alternative debt financing relative to bank loans[1] for non-financial corporations (NFCs) in the euro area has been growing for some time now.[2] Debt securities have traditionally been the main alternative to bank loans for financing investments in non-financial assets.[3] The role of debt securities has increased markedly since the start of the millennium. However, this development has taken place with temporary fluctuations and a certain degree of heterogeneity at the country level (see the chart on p. 38).

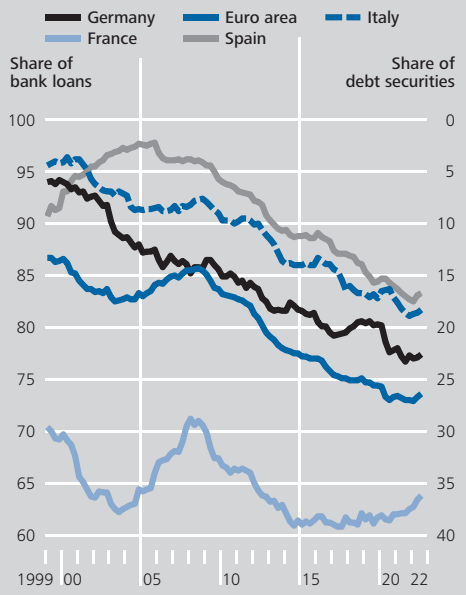
The share of debt securities in non-financial corporate debt in Germany and Italy rose almost continuously from only around 5% in 1999 to just over 23% and 19%, respectively, at the beginning of 2022. In Germany, this was due, in particular, to a relatively strong issuance of debt securities. In Italy, by contrast, the decline in bank loans in the wake of the European debt crisis was the main driving factor. In the case of NFCs in Spain, the share of debt securities initially fell during the bank credit boom at the beginning of the millennium to just 2% at the end of 2005. Since then, however, the share of debt securities has grown steadily, amounting to just over 18% at the beginning of 2022. Both the strong issuance of debt securities and the significant decline in bank loans following the global financial crisis contributed to this. In France, the almost 30% share at the beginning of 1999 was already very high compared with other countries. Debt securities initially became increasingly important up to 2004 on the back of strong issuance. Net issuance then came more or less to a standstill by the end of 2008. This, combined with strong borrowing from banks, resulted in a declining debt securities share. From 2009 onwards, however, financing through debt securities rebounded significantly, thus appreciably pushing up its share once more. Stronger demand for bank loans caused a sideways movement from the end of 2013. Given these country-specific developments, the share of debt securities in the euro area as a whole increased almost continuously, with the exception of the period of the strong bank credit boom between 2003 and 2008.

The shift from bank loans to debt securities can impact the transmission of monetary policy. The interest rate channel is the focus of theories on monetary policy transmission, with findings suggesting that a tightening of monetary policy increases interest rates on borrowed capital. This, in turn, leads to lower demand for credit and weaker investment. As a result of financial constraints, the financial sector can amplify this channel. Through the banking channel of monetary policy transmission, a tightening of monetary policy restricts banks' credit supply. This leads, amongst other things, to a rise in bank lending rates. If NFCs only make limited use of alternative financing, the interest they pay on borrowed capital will thus increase disproportionately sharply. Against this backdrop, it would be expected

1 In this box, the term "bank loans" is used synonymously for "MFI loans".
2 For a detailed analysis of the shifts in corporate financing see Deutsche Bundesbank (2012, 2018a).
3 In terms of safeguarding liquidity, trade credits and advances are the main alternative to bank loans. Their importance has likewise increased in recent years. However, as they are less relevant for monetary policy transmission, their role is not examined in detail here.

Relative importance of bank loans and debt securities for the financing of non-financial corporations*

As a percentage of total financing, quarterly



Sources: ECB and Bundesbank calculations. * In order to eliminate any influence from price fluctuations, calculations are made by adding cumulated transactions to initial stocks.

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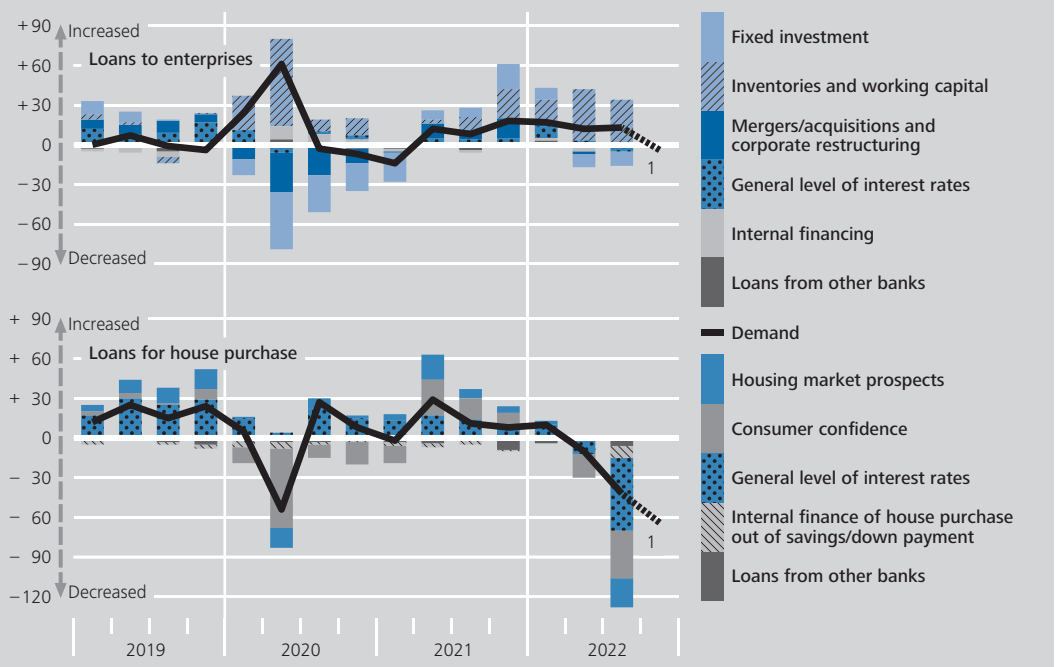
that a high share of debt securities in NFC financing weakens monetary policy impulses via this channel. A recent study by a Eurosystem working group confirms this assumption, showing that conventional monetary policy shocks lead to a smaller decline in GDP in euro area countries that have a high share of debt securities in NFC financing than in those with a small share.[4] However, this result only applies to conventional monetary policy shocks that are reflected in changes in short-term interest rates. The effect is reversed in the case of unconventional monetary policy shocks that affect the long end of the yield curve, with monetary policy thereby having a stronger impact in euro area countries with a high share of debt securities. One reason for this could be the fact that debt securities are often held by non-bank financial intermediaries. These tend to make comparatively strong adjustments to their balance sheets in response to changes in long-term interest rates. Taken together, a shift in NFC financing from bank loans to debt securities could thus change the relative importance of individual monetary policy transmission channels. However, this should not fundamentally weaken the transmission of monetary policy. The research area briefly outlined here, which is still largely in its infancy, will undoubtedly provide further insights in this regard over the next few years.

4 For more in-depth information, see Work stream on non-bank financial intermediation (2021). Its findings on monetary policy transmission are based on the work of Holm-Hadulla and Thürwächter (2021). Similar results are found at the firm level for the United States as well. For more information see Crouzet (2021).

Changes in credit demand* in the euro area and selected explanatory factors**

As a percentage of responses given (net)



Source: Bank Lending Survey. * Difference between the sum of the percentages of banks responding "increased considerably" and "increased somewhat" and the sum of the percentages of banks responding "decreased somewhat" and "decreased considerably". ** Difference between the sum of the percentages "contributed considerably to higher demand" and "contributed somewhat to higher demand" and the sum of the percentages of banks responding "contributed somewhat to lower demand" and "contributed considerably to lower demand". **1** Expectations for Q4 2022.

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information about the orientation of loan supply policies. BLS banks reported that they had repeatedly tightened their credit standards for loans to non-financial corporations and households in the first three quarters of 2022 (latest data, see the chart above). They justified the stricter standards on the grounds of a perceived heightening of credit risk. For the corporate lending segment, a deterioration in the general economic situation and the economic outlook, as well as industry-specific and firm-specific factors, were cited as the most significant reasons. In the case of loans to households for house purchase, the key issues were not only the deterioration in the general economic situation but also the decline in borrowers' creditworthiness. In addition, there was a decrease in risk tolerance among the BLS banks. The non-standard monetary policy measures also gradually expired in 2022 and, according to BLS data, therefore no longer had an expansionary effect on banks' financing options and lending policies.[46]

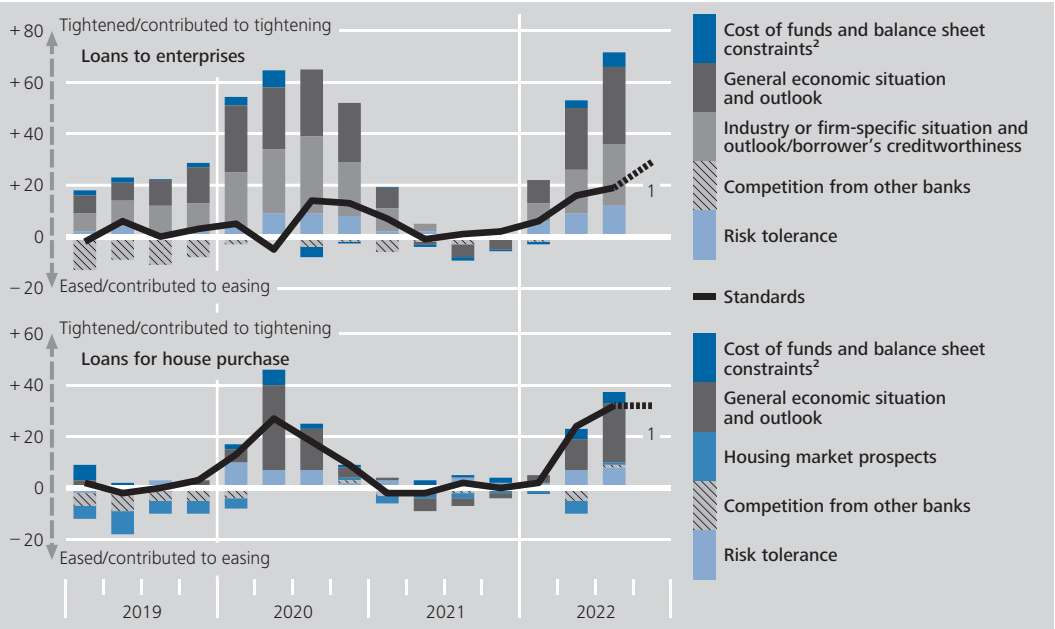
No indications of greater loan supply restrictions thus far

Given these indications of a significant tightening of credit standards, the question arises as to whether current restrictive effects on lending caused by loan supply policy exceed the desired degree of monetary policy transmission. For a comprehensive assessment, it is necessary to incorporate the BLS results into a broader context and to evaluate them against the backdrop of the macroeconomic environment. A vector autoregressive model is presented on pp. 41 ff. that combines data on the growth and lending rate of loans to non-financial corporations in the euro area with the corresponding BLS data on changes in credit standards and loan demand, conditioning results on GDP growth. While the model registered pronounced restrictive loan supply shocks in the years of the financial and sovereign debt crises as well as in 2021, during the COVID-19 pandemic, there are not yet any signs of an additional restrictive impact through banks for

46 See Deutsche Bundesbank (2022b).

Changes in credit standards* in the euro area and selected explanatory factors**

As a percentage of responses given (net)



Source: Bank Lending Survey. * Difference between the sum of the percentages of banks responding "tightened considerably" and "tightened somewhat" and the sum of the percentages of banks responding "eased somewhat" and "eased considerably". ** Difference between the sum of the percentages "contributed considerably to tightening of credit standards" and "contributed somewhat to tightening of credit standards" and the sum of the percentages of banks responding "contributed somewhat to easing of credit standards" and "contributed considerably to easing of credit standards". **1** Expectations for Q4 2022. **2** Average of the following factors: costs related to a bank's capital position, access to market financing, and liquidity position. Since Q1 2022, the factor "Cost of funds and balance sheet constraints" has been subdivided into the aforementioned separate factors for loans to households.

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2022. The analysis therefore shows that the reported adjustments to credit standards have not had an overly restrictive effect on lending to date. In addition, as shown in the chart on p. 29, the model outlined on pp. 25 ff. indicates that the contributions of the loan supply shocks in the recent past have a negative median. However, as explained in the box on pp. 25 ff., this finding is sensitive to specification choices and the uncertainty surrounding the estimates of these contributions is high. There are therefore doubts regarding the reliability of this result. Overall, model evidence therefore does not point to loan supply shocks having a greater relevance at present.

So far no indication of major financing bottlenecks in business surveys either

Surveys of businesses likewise provide no indication of any significant financing restrictions and thus support the model-based estimate. Firms surveyed by SAFE continue to regard access to financing as the least of their worries. The shortage of skilled labour, in particular, currently poses the biggest problem for firms. Surveys conducted by the European Commission also do not indicate any fundamental deterioration in enterprises' financing conditions to date, although there were reports that financing bottlenecks had become more relevant over the course of the year. Firms did not regard them as one of their most pressing concerns, however.

Banking sector was well positioned at onset of interest rate reversal

The assessment that supply-side financing constraints are not currently a major factor is also consistent with the available information on the banking sector's capital resources and profitability in the euro area. The indicators available for significant banks directly supervised by the ECB under the Single Supervisory Mechanism (SSM) suggest that the banking sector was well positioned when interest rates began to reverse. Although the Common Equity Tier 1 (CET1) ratio of these banks recently fell slightly, it still tended to be somewhat higher in the first three quarters of 2022 than it had been in the period prior to the start of the pandemic. Earn-

Identifying loan supply and loan demand using the Bank Lending Survey

An important task of the monetary and financial analysis is to draw conclusions about changes in loan supply and loan demand based on developments in loan growth and the lending rate. Monetary policymakers are particularly interested in whether and, if so, to what extent developments in lending are hindered by supply-side constraints. Restrictive loan supply shocks could prevent the desired monetary policy impulses from being transmitted from the key interest rates to the real economy in the intended way. If this were the case, policymakers would have to take this factor into account when further tightening monetary policy.

However, a multitude of variables have an impact on the loan market, which means that loan supply and loan demand cannot simply be inferred from the statistical data on loan growth and the lending rate. This box outlines an analytical tool that serves this purpose with regard to loans to non-financial corporations in the euro area. To this end, the information on lending volumes from the MFI balance sheet statistics is supplemented by figures from the MFI interest rate statistics on the average rates for (newly issued) loans as well as data from the Bank Lending Survey (BLS). In the BLS, the Eurosystem surveys a sample of 153 banks domiciled in the euro area about credit developments on a quarterly basis. The banks' responses are categorised, amongst other things, into information on changes in their credit standards on the one hand and their assessments of changes in loan demand on the other. From an economic perspective, however, the responses to both of these questions cannot always be attributed definitively to either the loan demand side or the loan supply side.[1] Furthermore, banks provide their responses to the BLS by selecting one of five multiple-choice options[2] – as a result, the aggregate observations are averages or net shares of a qualitative variable. For these reasons, it is not possible to quantitatively decompose loan growth and the lending rate into supply-side and demand-side components directly from the survey responses. Instead, these can only be obtained in conjunction with statistical data.

To this end, a vector autoregressive (VAR) model is used to define equations for loan growth, the lending rate, the change in credit standards according to the BLS (BLS standards), and the change in loan demand according to the BLS (BLS demand). Each equation incorporates the lagged values of its own variable as well as those of each of the other variables as a linear combination. In addition, the model is conditioned on GDP growth, the current and lagged values of which are also factored into each equation. The coefficients of this equation and the residuals, i.e. the unexplained remainders, are estimated using standard statistical methods (ordinary least squares method) for the period from the first quar-

1 The questions mainly relate to developments in lending volumes (in new business). However, a decline in lending volumes, for example due to a higher lending rate, that the surveyed bank attributes to loan demand may have actually been caused by a shift in the loan supply curve to which borrowers respond by moving along their loan demand curve, which itself remains unchanged.

2 For credit standards, the multiple-choice options are "tightened considerably", "tightened somewhat", "remained basically unchanged", "eased somewhat", and "eased considerably". For loan demand, the multiple-choice options are "decreased considerably", "decreased somewhat", "remained basically unchanged", "increased somewhat", and "increased considerably".

Identifying zero and sign restrictions*

Variable	Shock	
	Loan supply	Loan demand
Loan growth	+	+
Lending rate	–	+
BLS standards	+	0
BLS demand	0	+

* The restrictions apply to the period in which the shock occurs. Conversely to how it is typically depicted, the variable "BLS standards" is defined such that an increase in the variable represents an easing of standards.

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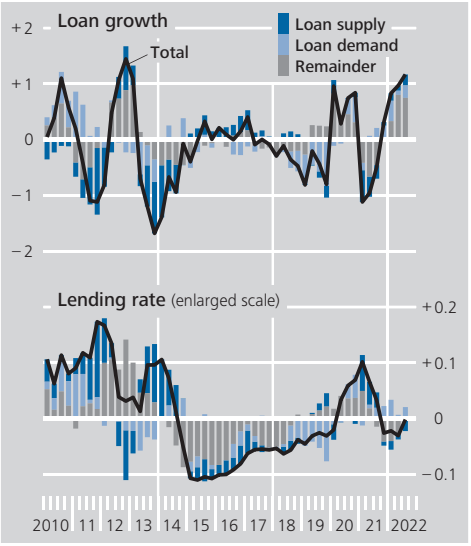
Residual decomposition of loan growth and the lending rate on loans to non-financial corporations in the euro area

Percentage points



Source: ECB and Bundesbank calculations. Four-quarter moving averages of the contributions of the identified shocks in a VAR model for the annualised change in outstanding loans over the preceding quarter (logarithmic), the lending rate, the change in BLS credit standards, and the change in BLS credit demand (with exogenous GDP growth).

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ter of 2003 to the third quarter of 2022. The residuals are then decomposed into supply and demand effects as well as into an unidentified remainder component. This is done by imposing a combination of zero and sign restrictions on the model (see the table above). These restrictions reflect the definitions of loan supply and loan demand, supplemented by the assumed responses of the variables from the BLS: an increase in loan supply increases loan growth, lowers the lending rate, and eases BLS standards, while BLS demand remains unchanged. An increase in loan demand increases loan growth, raises the lending rate, and increases BLS demand, while BLS standards remain unchanged.[3] The remainder shown in the adjacent chart therefore consists of the components of the residuals that do not correspond to this pattern.

Pronounced restrictive loan supply shocks were thus mainly recorded during the years in which the financial and sovereign debt crises occurred (2010-11 and 2013-14) and in 2021, one of the years of the COVID-19 pandemic (see the adjacent chart). Owing to the government emergency measures, 2020 was not characterised by restrictions to the loan supply. It appears that, to a certain extent, banks caught up on imposing such tightening measures following the uncertainty regarding the future course of the pandemic that was prevalent at the start of 2021. At the current end, the model indicates surprisingly strong lending. This is attributable, first, to expansionary developments in loan demand. Second, despite the recent tightening of credit standards, the loan supply side is also not having a restrictive effect, but instead a slightly expansionary impact compared with the previous year. This is the result of the relatively small rise in interest rates compared with the rise in loan growth: the identification mechanism reveals an expansionary loan demand shock, as this type of shock increases the residual values of both loan growth and the lending rate. At the same time, an expansionary loan supply shock is identified, as

3 This definition refers to the relative responses of the variables to each other and applies conversely if a reduction in loan supply or a decline in loan demand are assumed. Furthermore, not all of the variables must necessarily change; possible zero responses are also taken into account in the sign restrictions.

the rise in the lending rate is small in relation to the rise in loan growth.

The tightening measures reported in the BLS have therefore not had an impact on lending in the form of loan supply restrictions. In principle, the BLS data on changes in credit standards have a certain lead over lending,[4] so lending would be expected to decline over the coming quarters. However, the model described here shows that, as things currently stand, the tightening is unlikely to go beyond the usual (and, from a monetary policy perspective, desirable) systematic correlation.

4 For more information on the function of the BLS as a lead of lending, see Deutsche Bundesbank (2022c).

ings, as measured by the return on assets, developed positively in the first three quarters of 2022. The share of non-performing loans on the books of significant banks continued to decline during this period, despite the war in Ukraine. Taken in isolation, the relatively healthy state of the banking sector reduces the risk of additional loan supply-driven constraints, which could lead to negative feedback loops between the financial sector and the real economy.

Current financial stability issues

Monetary policy must look at interactions between monetary policy and financial stability

When assessing the current monetary policy tightening process, the expanded monetary and financial analysis also looks at interactions between monetary policy and financial stability. These are relevant to monetary policy because they can have a considerable impact on economic activity and inflation. In adverse scenarios, there are likely to be negative feedback loops between the financial system and the real economy as well as severe disruptions to the process of monetary policy transmission. In the current environment, the monetary and financial analysis gauges the risks to financial stability posed by the tighter monetary policy stance – which is a necessary response to inflation – and whether this has implications for the future path of inflation and thus for forthcoming monetary policy decisions.

Monetary policy tightening …

Monetary policy tightening has both positive and negative effects on financial stability. At present, a key question is whether this tightening may further heighten the risks to financial stability caused by the war in Ukraine.

On the one hand, the war in Ukraine and its economic repercussions led to a significant rise in financial stability risks in the euro area over

… may entail heightened financial stability risks in the short term …

the course of 2022.[47] This is because the burdens associated with the war increase the risk that the vulnerabilities built up in previous years – such as growing debt in the government sector and in parts of the corporate sector in some countries as well as the sharp rise in real estate prices – could trigger disorderly adjustments in an adverse scenario. Given the changed environment, credit risk increased for firms and households over the course of 2022, while programmes to mitigate the impact of rising energy prices reduced the fiscal leeway of euro area countries. The associated risks could be amplified by a further tightening of the monetary policy stance, as tightening leads to more stringent financing conditions and falling prices on the financial markets. Both of these factors could reduce asset quality and increase the already elevated market stress caused by the war in Ukraine, making adverse feedback loops between the financial system and the real economy more likely. In addition, increasing interest rates and rising costs of living are dampening demand for residential property, meaning that, in adverse scenarios, it would be conceivable to see falling residential real estate prices, lower collateral values for housing loans and higher future credit defaults.

… yet price stability-oriented monetary policy also has a positive impact on financial stability

On the other hand, a monetary policy oriented towards price stability lowers the risks to the financial system posed by high inflation rates and an associated weakening of economic growth. In addition, raising the policy rate, especially when starting from a low interest rate level, has a positive impact on banks' net interest income over the longer term.[48] Furthermore, the tighter monetary policy stance will reduce the build-up of existing financial vulnerabilities in the medium term. For example, it is likely to dampen excessive risk-taking and the search for yield seen on the financial markets in the low interest rate environment of recent years. At the same time, it should reduce the incentives for governments and non-financial corporations to accumulate more debt.

At present, financial system should be able to cope with side effects of tighter monetary policy …

In this environment, the monetary and financial analysis is tasked with observing the relationships between monetary policy and financial stability and determining their implications for monetary policy. Internal analyses indicate that, in its current state, the financial system will be able to cope with the effects of the changed monetary policy stance and absorb the impact of the planned further tightening. The changed macroeconomic environment and the repricing in the financial markets have, in and of themselves, increased the risk of financial amplification effects. However, as outlined in the discussion of banks' loan supply, the euro area banking system is currently in a good state, which should limit negative feedback loops between the financial system and the real economy.[49] In addition, the supervisory authorities of a number of euro area countries have activated macroprudential capital buffers in recent years. If necessary, banks can use these buffers to stabilise their loan supply.

… if monetary policy is forward-looking and its stance is clearly communicated

At the same time, however, monetary policy must ensure that it does not itself become the cause of disorderly financial market adjustments. It is therefore important for the Governing Council of the ECB to act in a forward-looking manner and communicate its monetary policy clearly and convincingly. The Transmission Protection Instrument (TPI) is also available as a means of countering any unwarranted and disorderly market dynamics that pose a serious threat to the transmission of monetary policy across the euro area. This in itself should already have a stabilising effect.

Conclusion

The topics and methods of the monetary and financial analysis have gone through many changes over the years. This is due, first, to the

47 For a broad discussion of current financial stability risks in the euro area, see European Central Bank (2022a).
48 See Deutsche Bundesbank (2018b) and Busch and Memmel (2017).
49 See European Central Bank (2022b).

Increasingly broad-based monetary and financial analysis …

fact that the changing environment has repeatedly presented monetary policy with new challenges. Second, access to additional data sources and advances in methodologies have made it possible to investigate an ever broader range of issues. Through these adjustments, the Eurosystem's monetary and financial analysis has time and again succeeded in making important contributions to the preparation of monetary policy decisions.

… time and again provides valuable input for monetary policy decision-making process

The prominent focus on monetary developments at the start of the European monetary union was a legacy of the Bundesbank's culture of stability. However, the empirical evidence of a stable money-price relationship that can be utilised for monetary policy purposes became increasingly weak in the 2000s. Against this background, and in light of the challenges posed by the global financial crisis, the focus of the monetary and financial analysis has progressively shifted towards monetary policy transmission. Work in this analytical area in particular was extensively used to prepare decisions taken during the low interest rate period on the use and design of the new non-standard monetary policy measures. In addition, it has become clear that the monetary and financial analysis can play a valuable role in identifying financial shocks and their impact on the real economy. This topic, too, gained greatly in importance in the wake of the financial and sovereign debt crisis.

Stronger money growth in 2020 and higher inflation in 2021-22 driven by different causes

The COVID-19 pandemic, the energy crisis and high inflation have caused another shift in the issues to be addressed by the monetary and financial analysis. One question that has arisen is how the large growth in the monetary aggregate M3 in 2020 might be related to the rise in inflation in 2021-22. Our analyses suggest that the strong money growth seen in the first phase was primarily due to money demand shocks associated with the uncertainty-led increase in money holdings, but that these shocks did not cause a rise in inflation. Subsequently, money growth and inflation were positively affected by aggregate demand shocks, which are probably attributable to fiscal support measures taken during the COVID-19 pandemic, and by accommodative monetary policy.

Transmission process currently considered intact; monetary policy tightening is having its intended effect

The impact of the war in Ukraine on the inflation outlook and the change in the monetary policy stance raise further questions. With regard to transmission, the monetary and financial analysis indicates that monetary policy tightening has so far been having its intended effect on the financing conditions of banks, firms and households, with financing costs having risen on a broad front. Net issuance of corporate bonds has declined significantly since the beginning of the year, even turning negative at times. Net lending to non-financial corporations and households has also weakened recently. Various model calculations suggest that the observed adjustments of financing conditions are consistent with the macroeconomic environment and historical patterns. Moreover, they do not show any indication that the loan supply side is currently generating any additional negative stimuli. It can thus be assumed that the transmission process is intact and that the tighter monetary policy stance is being transmitted to the real economy as intended.

Monetary policy tightening currently appears manageable for the financial system

Since the 2021 strategy review, the monetary and financial analysis has also explicitly looked at financial stability aspects. Viewed in isolation, a further tightening of the monetary policy stance may heighten financial stability risks, which have already been elevated by the war in Ukraine and its economic consequences. At the same time, however, a monetary policy oriented towards price stability reduces the risks posed to the financial system by high inflation rates and existing financial vulnerabilities. At the current end, the monetary and financial analysis suggests that the euro area banking system is in a good state and is able to absorb the impact of monetary policy tightening. This, too, bears out the current monetary policy stance. Major negative feedback loops between the financial system and the real economy are not expected at present.

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