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## Implications of higher inflation and interest rates for macroprudential policy stance

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# Abstract

In recent years, monetary policy and inflation considerations have been playing an increasingly important role for macroprudential authorities in their policy setting. This paper aims to assess the implications of high inflation and rising interest rates for macroprudential policy stance. The conceptual discussions and model-based analyses included in this paper reflect on the appropriate direction and impact of macroprudential policies at the different stages of financial and business cycles, given cross-country and banking system heterogeneities. In this context, a key objective of the paper is to assess to what extent the interaction between macroprudential and monetary policies differs, given the heterogeneity across euro area countries exposed to a homogenous monetary policy. While both policies are to a large extent complementary, monetary policy may generate relevant spillovers due to its impact on the financial cycle and, potentially, on financial stability. The paper argues that the recent focus of macroprudential policy on resilience, when banking sector conditions ensure no unwarranted procyclical effects of macroprudential tightening, suggests an expansion of the notion of “complementarity” with monetary policy. Specifically, with the build-up of resilience, macroprudential policy acts de facto countercyclically, supporting monetary policy in its pursuit of price stability. In this regard, the paper stresses that the source of the inflationary shock (supply versus demand side) and the monetary environment primarily affect the intensity, speed and extent of buffer build-up or release within each stage of the financial cycle while affecting borrower-based measures in their bindingness.

**Keywords:** Financial stability, banks, macroprudential policy, monetary policy, capital buffers, borrower-based measures

**JEL codes:** E52, G21, G28

# Non-technical summary

**This paper aims to assess the implications of high inflation and rising interest rates for the macroprudential policy stance.** Monetary policy and inflation considerations have played an increasingly important role for macroprudential authorities in their policy setting since 2022, as indicated in notifications to the European Systemic Risk Board (ESRB) and the European Central Bank (ECB). Against this background, the analyses reflect on the appropriate direction and on the impact that macroprudential policies have throughout the different phases of financial and business cycles. This requires an examination of the impact that macroprudential policies have on the mitigation of risks posed by monetary policy tightening/loosening, considering also cross-country and banking system heterogeneities.

**De-synchronised business and financial cycles and inflationary supply shocks in the context of the pandemic and geopolitical tensions have posed a challenge to the classical notion of "complementarity" between macroprudential and monetary policies.** For synchronised financial and business cycles, as observed in the most recent quarters, where both cycles have started to contract in most euro area countries, complementary macroprudential and monetary policies may largely move in the same tightening or loosening direction. By contrast, de-synchronised cycles, as observed in the context of the pandemic and the inflationary supply shocks, have complicated the interaction between macroprudential and monetary policies.

**Macroprudential policy builds up resilience and, in its interaction with monetary policy, both policies are to a large extent complementary, although there may be trade-offs in the short run.** By increasing the loss absorption capacity (via capital-based measures) and safeguarding the lending standards of borrowers (via borrower-based measures, or BBMs), macroprudential policy builds up resilience among banks and borrowers, thus helping to support and stabilise the flow of credit in a downturn. However, monetary policy may generate relevant spillovers given its impact on the financial cycle and, potentially, on financial stability.

**Macroprudential authorities have recently focused on resilience, which might suggest an expansion of the notion of "complementarity" with monetary policy.** By focusing on the (pre-emptive) build-up of resilience and macroprudential space, when banking sector conditions ensure this action has no unwarranted procyclical effects, macroprudential policy acts de facto countercyclically, supporting monetary policy in its pursuit of price stability. Thus, macroprudential policy provides space for monetary policy to pursue its targets more effectively, without risking unintended side effects on financial stability. This may result in a synchronous direction of both policies despite a diversion in business and financial cycles. Overall, sufficient loss-absorbing capacity in the financial system allows for the two key policy objectives (financial stability for macroprudential policy and price stability for monetary policy) (largely) not to be in conflict. More precisely, both policies primarily

focus on their own objectives and macroprudential policy acts as the first line of defence to address financial stability risks. However, this does not imply that macroprudential policy should not respond to monetary policy stance: if strong shifts in the latter, irrespective of direction, create additional financial stability risks, macroprudential policy might have to build up resilience against such vulnerabilities.

**This complementary role played by macroprudential policy becomes even more relevant in the case of a monetary union with a single monetary policy across member states.** With its granular and targeted instruments, macroprudential policy is able to mitigate potentially systemic, asymmetric financial developments or shocks at the country, sector or financial institution level. It is therefore an essential complement to monetary union, by easing the burden of monetary policy to fulfil its price stability mandate by limiting potential unintended side effects of union-wide monetary policy measures.

**The direction (build-up or release) of capital-based measures primarily reacts to the build-up of, and/or still existing unaddressed financial vulnerabilities or materialisation of, risks to banks' capital and profitability conditions and to the stage of the financial cycle in conjunction with the business cycle, while the inflationary and monetary environment affects the timing, extent and speed of this.** When the financial cycle turns negative, macroprudential policy should focus on strengthening bank resilience, regardless of the monetary policy stance. The marginal gains of increasing buffers are larger for countries that do not have them yet. In the initial risk materialisation phase, authorities may decide to (partially) release cyclical buffers, while in the disorderly risk materialisation phase it will likely prove necessary to release cyclical buffers, acting in the same direction as monetary policy. In the early build-up/neutral phase of the financial cycle, buffers could be built up pre-emptively, whereas in the exuberance stage, macroprudential and monetary policies are likely to move in tandem in a tightening direction. The direction of capital-based measures will also depend on prevailing and expected bank capital and profitability conditions and on any signs of binding capital-related supply constraints. In this regard, the inflationary and monetary environment will affect the intensity, speed and extent of the build-up or release of capital buffers within each stage of the financial cycle.

**BBMs have become one of the key instruments in the macroprudential toolkit over the last ten years when it comes to building resilience.** Their primary goal is to build resilience among households by reducing the risk of over-indebtedness, promoting the adoption of prudent lending standards and making household financing more sustainable, thus improving the quality of bank loan books and making the financial system more resilient. The effectiveness of BBMs and their costs for the economy depend on the fraction of borrowers whose debt decision is ultimately constrained by the measures. In countries where they have been activated so far, BBMs are largely perceived as structural measures and are not meant to substantially change across the financial cycle. While their use has become widespread over the last ten years, it still remains heterogeneous across European countries, also in terms of their specific design at national level.

**The nature of inflationary shocks (supply versus demand side) and the prevailing monetary policy stance affect the bindingness of BBMs.** Inflationary pressures related to supply-side shocks (demand-side shocks), as well as monetary policy tightening (loosening) tend to make income-based BBMs more (less) binding. At the same time, monetary policy tightening has a less direct and more ambiguous effect on LTV limits.

**The current macro-financial environment increases the benefits associated with BBMs, especially for countries where floating rate mortgages dominate.** Following a substantial monetary tightening, such as the one we have witnessed over the past two years or so, the benefits associated with BBMs increase, particularly for countries with predominantly floating rate mortgages. However, to reduce potential excessive bindingness and possible undesired procyclical effects, macroprudential authorities might change exemption quotas and maturity limits to adjust the bindingness of the measures.

# 1 Introduction

## 1.1 Context

**This paper aims to assess the implications of high inflation and rising interest rates for macroprudential policy stance.** Our analysis addresses the appropriate direction and impact of macroprudential policies at the different stages of financial and business cycles, given cross-country and banking system heterogeneities. One of the goals of our analysis is to assess the extent to which the interaction between macroprudential and monetary policies differs, given the degree of heterogeneity across euro area countries exposed to a homogenous monetary policy. Relevant dimensions of such heterogeneities include the prevalence of fixed or floating rate mortgages, the stage at which each country finds itself in the financial cycle and levels of inflation, or the relative importance of non-bank financial intermediaries.

**Monetary policy and inflation considerations have played an increasing role for macroprudential authorities in their policy setting since 2022,** as indicated in notifications to the ESRB/ECB (**Box A**). The notifications suggest that higher interest rates and inflation were assessed to have contributed to an increase in risks, uncertainty and/or probability of risk materialisation. This led most euro area/European Union (EU) countries to rebuild or even increase their macroprudential buffers in the following the pandemic.

**As monetary and macroprudential policies both operate to a large extent through the banking system, their interaction can result in complementarities and trade-offs to each other's effectiveness.** The optimal mix of monetary and macroprudential policy depends on the different stages in the financial and business cycle, on the level of inflation, on the capital position and profitability of the banking system, on the nature and magnitude of shocks and existing vulnerabilities, and on the specific type of policies implemented (Section 2).

**The direction (build-up or release) of capital-based measures primarily reacts to the build-up or existence of unaddressed financial vulnerabilities, to the materialisation of risks, to banks' capital and profitability conditions and to the stage of the financial cycle in conjunction with the business cycle**. Beyond the relevant underlying interdependencies between the financial cycle and monetary policy, the source of inflationary shocks (supply versus demand side) and the prevailing monetary regime will affect the intensity, speed and extent of macroprudential policy setting within each stage of the financial cycle (Section 3).

**Structural models allow to assess how monetary policy can influence macroprudential policy by affecting the course of the financial cycle and the costs and benefits of phasing in or releasing macroprudential measures.** In this report, model simulations using different versions of a structural model (the so-called "3D model") highlight these policy interactions in various analytical boxes. The 3D model is a macro-financial structural model showing how macroprudential policy can affect bank resilience and how the financial sector interacts with the rest of the

economy (Clerc et al., 2015, and Mendicino et al., 2020). To study the interaction between macroprudential policy and monetary policy, the versions used in the boxes also include monetary policy shocks (Espic et al., 2024, Mendicino et al., 2024, and Herrera et al., 2024).[1] Box B shows that monetary policy, by affecting the course of the financial cycle, can have indirect implications for the speed of the countercyclical capital buffer (CCyB) build-up, should the macroprudential authority follow a rule-based approach. The simulations in Box C suggest that the release of capital buffers can act positively on credit and GDP by creating macroprudential space for banks (lending channel). However, ex post less capitalised banks would increase the overall risk in the economy (risk channel), partially offsetting the positive effects of the release. In an inflationary environment, should the monetary policy response be more aggressive, the effect of the ex post risk channel would be greater, making the release more detrimental in case of initially low bank capitalisation. As shown inSection4, monetary policy can also affect the bindingness of BBMs and, therefore, the costs of phasing-in. Box D estimates how the bindingness of BBMs has evolved across the recent monetary policy tightening cycle using empirical microsimulations. The structural model simulations in Box E show how changes in bank profitability and in the bindingness of BBMs can affect the phase-in costs of capital requirements and of BBMs respectively. A second set of simulations in this box indicates that, in case of disorderly risk materialisation, previously phased-in macroprudential measures can help reduce the negative effects of risk materialisation following monetary policy tightening periods. Therefore, the design of BBMs should include elements of flexibility, via exemption clauses, so that adjustments can be made in response to the nature of the economic or inflationary shocks that take place and to the prevailing monetary policy stance.

## 1.2 Macroprudential policy in an evolving macro-financial landscape

**Challenges and uncertainties arise from the current economic environment, with inflation persistently above target, having triggered a more intense and lasting monetary policy tightening.** This environment is still characterised by uncertainty regarding the evolution of inflation, future monetary policy stance and financial market reactions. The financial cycle has turned negative in most EU countries, with real estate prices and valuations reflecting downward pressure and credit growth slowing.

**The business and financial cycles have become de-synchronised and inflationary supply shocks in the context of the pandemic and geopolitical tensions in the euro area have posed a challenge to the classical notion of "complementarity" between macroprudential and monetary policies going**

[1] Espic et al. (2024) and Mendicino et al. (2024) feature three layers of default (banks, firms and households). Espic et al. (2024) is used to study how capital requirements affected monetary policy transmission in 2021-23. Mendicino et al. (2024) is used to assess the role of the release in the economy and its interactions with monetary policy. Finally, Herrera et al. (2024) is used to assess how monetary policy can affect the costs and the benefits of BBMs and capital requirements, via changes in bank profitability, BBM bindingness and financial vulnerability among agents.

**forward.** Measures relating to the euro area's business and financial cycles suggest an increasing divergence between both policies, both in real and in nominal terms over the extended COVID-19 period. While for synchronised financial and business cycles, complementary macroprudential and monetary policies may largely move in the same tightening or loosening direction, de-synchronised cycles and inflationary supply shocks complicate the interaction between macroprudential and monetary policies.

**The level of accumulated risks and vulnerabilities has remained significant.** Most national authorities have considered monetary policy concerns for macroprudential measures taken in 2022 and beyond, suggesting that the higher interest rates and high levels of inflation have contributed to the increase in short-term risks, uncertainty and/or probability of risk materialisation relevant for their decisions. Especially in countries with a high proportion of floating rate mortgages, rising interest rates may become a significant burden for highly indebted households, apart from slowing down demand for credit and house purchases (Box A).

**Since the pandemic, the build-up of capital-based measures has focused on preserving banking sector resilience.**[2] Most euro area/EU countries have rebuilt or even increased their macroprudential buffers (for both countercyclical (CCyB) and (sectoral) systemic risk buffers (s)SyRB)) following the pandemic.[3] They aimed to further tighten the policy stance or at least to keep the level of capital buffers in place to ensure banking sector resilience against the backdrop of built-up vulnerabilities. This re-focus on resilience took place amid the substantial cumulated cyclical and structural vulnerabilities and the likely deterioration in asset quality along the entire monetary policy tightening cycle that would consume bank capital over the medium term. So far, there have been no signs of change to this momentum in the form of releases or lowering of capital requirements.

**BBMs have become one of the key instruments in the macroprudential toolkit over the last ten years.**[4] BBMs encompass primarily collateral-based and income-based credit limits and are predominantly applied to mortgages.[5] Collateral-based BBMs apply a credit limit based on the borrower's collateral value (loan-to-value (LTV) or loan-to-collateral (LTC)). Income-based BBMs restrict the amount of credit or debt in relation to the borrower's disposable income (D/LTI) or debt service capacity, which cannot exceed a specified fraction of their disposable income (debt/loan service-to-income ratio, or D/LSTI). In addition, some macroprudential authorities apply maturity limits to the extension of mortgages or amortisation requirements.[6]

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[2] See also ECB (2023a), Chapter 5, and Behn and Lang (2023), Section 2.

[3] Individual countries have maintained their capital buffers throughout the pandemic (e.g., LU maintained the CCyB and most countries, except for EE, FI, NL and PL, maintained the SyRB).

[4] For an overview of different BBMs implemented in euro area and other EU countries, see Lagaria (2023).

[5] However, in some cases, income-based BBMs are applied to all debts of the borrower. Therefore, they also restrict other types of loans, such as consumer loans.

[6] Some countries have also imposed specific requirements concerning the amortisation schedule of loans. For example, in Slovakia, new credit agreements should be granted with regular payments of interest and capital. In Sweden, mortgagors with large loans relative to their income must amortise a certain percentage of their debt every year.

**Across countries where they have been activated so far, BBMs are largely perceived as structural measures and are not meant to substantially change across the financial cycle**. While their use has become widespread over the last ten years, heterogeneity persists across European countries, also in terms of their specific design at the national level. For some countries, BBMs have been in place for a long time (CY, NL, IE, PT and SI), while other countries have adopted them more recently (FR, LU, BE, LV and AT). A large number of countries have activated a combination of constraints (L/DTI, L/DSTI and LTV),[7] whereas others have focused on implementing a unique limit (FR for DSTI).

**Even though policy decisions on BBMs have been quite scarce so far, there were a few policy changes of a loosening nature among European Economic Area (EEA) countries in 2023.** The high interest rate and high inflation environment renders income-related BBMs, such as limits on D/LSTI and D/LTI ratios, more binding, because debt service is increasing and disposable income is decreasing in real terms.

## Box A. Overview of monetary policy concerns in macroprudential notifications[8]

*Notifications regarding capital-based measures*

**Monetary policy and inflation considerations were present in the notifications of capital-based measures during both low and high inflation periods throughout 2015-23 but have become more prominent since 2022** Chart A.1, left panel).The analysis of keywords related to inflation and monetary policy[9] suggests that monetary policy concerns were increasingly cited among the underlying reasons for national authorities' notifications over the 2016-19 period (Chart A.1, middle panel). The share then decreased throughout 2020 and 2021 amid the COVID-19 pandemic, as pandemic-related economic and financial stability issues moved into focus. In 2022 and 2023, when inflation increased and monetary policy tightened, monetary policy concerns became more prominent in national notifications (more than 60% of all notifications). During these two years, monetary policy concerns were also cited by a higher number of countries (Chart A.1, right panel).

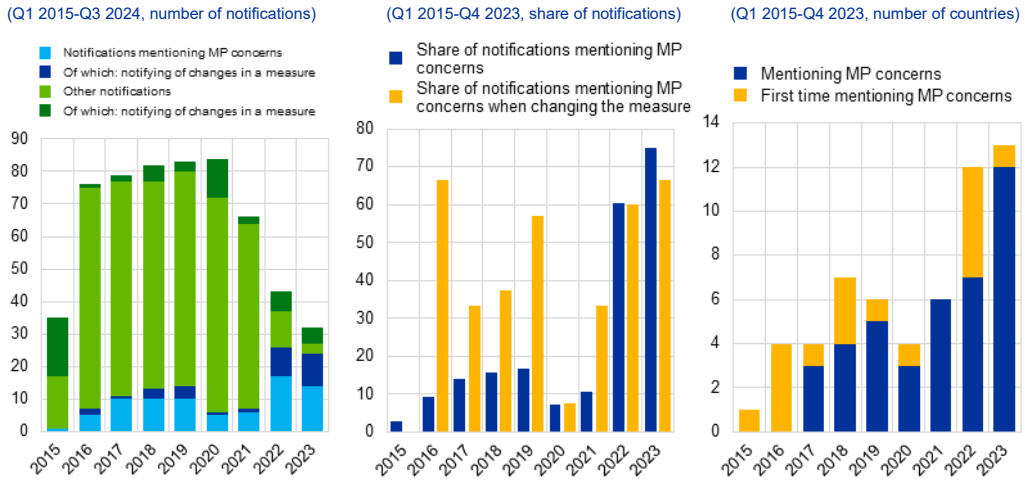
[7] Several euro area countries with an LTV limit in place have also imposed a D/LSTI or a D/LTI limit, with a combination of LTV and DSTI limits being particularly common. In addition, DSTI and LTV caps are often accompanied by a limit on loan maturity.

[8] Prepared by S. Kärkkäinen and P. Steikūnė with the support of M.A. Rocchi.

[9] "Monetary policy", "inflation", "interest rates" and "interest rate risk".

**Chart A.1**

National notifications and number of notifying countries by presence of monetary policy concerns



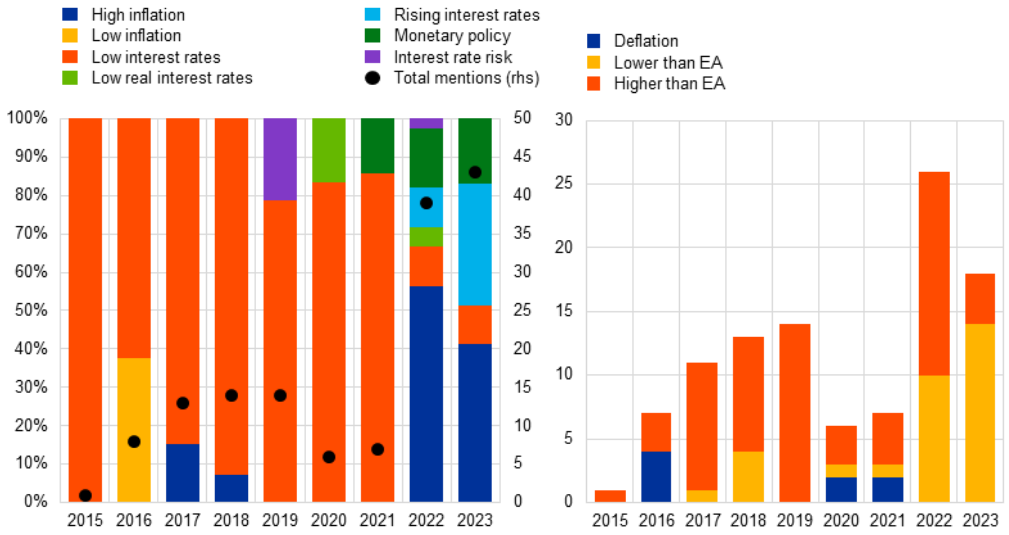

Sources: ECB and authors' calculations.
Notes: MP – monetary policy concerns. The number of notifications has declined since 2021 due to fewer CCyB notifications, as most authorities opted to notify the ECB only when changing the CCyB. Only five countries (BG, ES, FI, LU and SI) still notify the ECB about their CCyB decisions every quarter.

**During 2016-19, a period of low inflation, low interest rates were cited most often in the notifications mentioning monetary policy concerns** (Chart A.2, left panel). In addition, these concerns came from countries that tended to have inflation that was higher than the euro area average (Chart A.2, right panel), suggesting that imbalances related to the low interest rate environment, such as excessive credit and real estate price growth, were becoming more present in these countries. The importance of monetary policy concerns for macroprudential policy decisions is also illustrated by the fact that monetary policy concerns were mentioned more often when notifying changes in macroprudential measures compared to notifications that merely confirmed existing measures (Chart A.1, middle panel ).

**In 2022, high inflation replaced the low interest rate environment as the most commonly cited monetary policy concern in national notifications.** As monetary policy tightening continued, more notifications mentioned rising interest rates, which was the second most mentioned concern after high inflation in 2023. Anticipating that interest rates might rise in the future, one authority indicated interest rate risk in its notifications as early as 2019, while monetary policy has been mentioned explicitly in notifications since 2021.

**Chart A.2**

National notifications by monetary policy concern and inflation environment

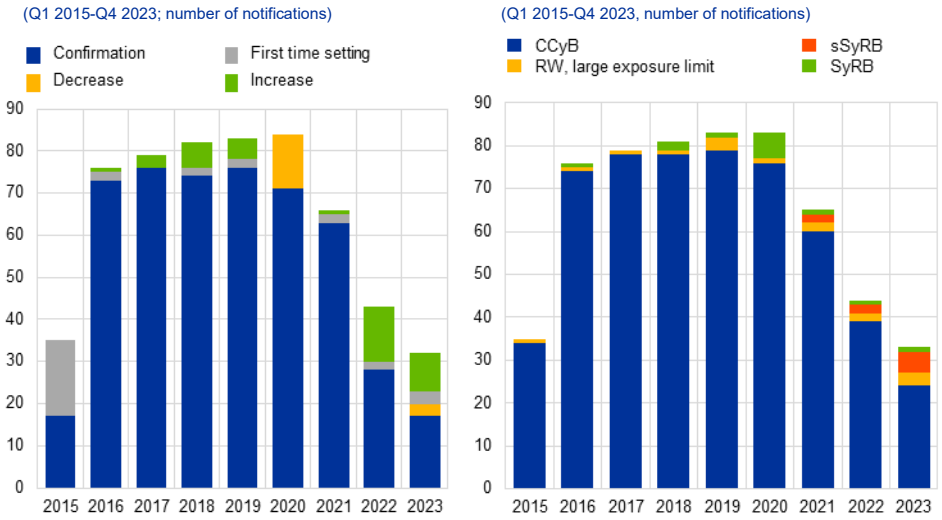



Sources: ECB, ESRB and authors' calculations.

**Most notifications referencing monetary policy concerns from 2022 still suggested that higher interest rates and inflation contributed to an increase in risks, uncertainty and/or probability of risk materialisation.** They either announced tightening measures or the decision to maintain existing macroprudential measures (Chart A.3, left panel). The notifications indicated that the goal of the measures was resilience, although some authorities still targeted the build-up of cyclical imbalances (Chart A.3, right panel ). In addition, several notifications mentioned the positive impact of rising interest rates on bank profits when implementing macroprudential measures.

**Chart A.3**

Notifications by type of action and macroprudential measure




Sources: ECB, ESRB and authors' calculations.
Notes: The number of notifications has declined since 2021 due to fewer CCyB notifications, as most authorities opted to notify the ECB only when changing the CCyB. Only five countries (BG, ES, FI, LU and SI) continue to notify the ECB about their CCyB decisions every quarter.

*Notifications regarding BBMs*

**While high/low inflation has not been mentioned directly in the notifications,[10] monetary policy concerns seem to have influenced BBM decisions to some extent.** In 2020 and 2021, low interest rates were a common reason for adjusting BBMs. Some policy actions undertaken in 2020 took the form of temporary relaxations due to the COVID-19 pandemic. In 2021, policy decisions relating to BBMs tightened across the board and, in many cases, rapidly rising house prices and growth in household debt were cited as reasons for tightening the BBM stance. To the extent that these factors were at least partly influenced by the low interest rate environment, monetary policy can be judged to have also influenced BBM decisions indirectly in this regard. In 2022, however, rising interest rates replaced low interest rates as the most common concern relating to monetary policy. There were also a few mentions of the BBM stance being tightened in a bid to make households less vulnerable in the event of a sharp increase in interest rates.

**From 2023, the BBM policy decisions made in EEA countries have been fairly scarce and of a loosening nature.** Norway relaxed the level of stressed interest rates used when assessing the debt servicing ability of a borrower. In the same vein, Banco de Portugal revised downward the interest rate shock considered in the stressed DSTI ratio. The Czech Republic abolished the upper DSTI limit, while the LTV and DTI limits were left unchanged. The DSTI limit was seen as unnecessary when interest rates were high, while keeping the LTV and DTI limits intact was seen as necessary to curb the persisting overvaluation of residential property prices. In Hungary, the income thresholds that allow higher DSTI application and the de minimis limits were increased to account for inflation and nominal wage growth.

[10] As with capital-based measures, keywords related to interest rates and inflation were searched for among the notifications. Three of these policy decisions were made by the same country and were classified as tightening, concerning the details of a DSTI limit. The two other policy actions involved technical adjustments to loan maturity and DSTI limit and could not be classified as either tightening or loosening.

# 2 Macroprudential policy given different monetary policy stances and inflationary dynamics

## 2.1 Systemic risk at the current juncture

**In most EU countries, the financial cycle has turned negative amid substantial cross-country heterogeneity, although the reversal has been orderly so far.**[11] The downward correction has largely been smooth so far. Energy and commodity prices increased substantially between 2022 and 2023, amid disruptions on the supply side, coupled with geopolitical conflicts. These cost shocks, combined with a post-Covid recovery in consumption, translated into broad-based price pressures. The increase in inflation was followed by a series of unprecedented monetary policy tightening. These supply-side shocks and the monetary policy tightening reduced disposable income and contributed to an increase in volatility in an already uncertain environment. However, household fundamentals have remained broadly resilient, on the back of still low unemployment and strong (nominal) wage growth. In addition, fixed rate loan contracts have helped to contain financial distress in many countries, despite the unprecedented interest rate hikes. The balance sheets of non-financial corporations have been healthier than in previous periods of monetary policy tightening, supported by initial strong profit performance, albeit with stronger economic headwinds taking their toll in the form of increasing insolvencies. In this context, high uncertainty and notable heterogeneity across non-financial corporations persists, depending, among other factors, on their financial structure and sector. The banking sector has also remained resilient. Profitability has increased in most countries, due to lower loan loss provisions and, in particular, the steep increase in lending rates against a slower increase in deposit rates. This rise in bank profitability has been especially pronounced in countries with a high share of floating rate loans in total loans, whereas the impact in countries where fixed rate loans predominate has been somewhat less favourable. Downward corrections in asset prices caused by the interest rate hikes have remained orderly for the most part.

**Inflationary shocks and monetary tightening have also contributed to an increase in short-term systemic risk.** As lending conditions have tightened substantially, sharper adjustments could materialise. In the current environment, households face a high risk of becoming financially distressed. The normalisation of monetary policy has resulted in a strong pick-up in bank lending rates, which, in turn, has curbed the demand for credit and house purchases. Particularly in countries with floating rate mortgages, indebted households face higher debt servicing costs, which increases the likelihood of financial distress among more indebted households. Moreover, the past erosion of real household disposable income on account of

[11] See ECB (2023c) and Behn and Lang (2023), Section 1, for a discussion on the stage of the financial cycle.

persistently high inflation may affect households' debt servicing capacity. By the same token, the increase in borrowing costs has also affected non-financial corporations, especially those that are more leveraged. While EU banks had reported a significant recovery in profitability and interest margins, they might face a notable increase in credit risk. At the same time, the monetary tightening has curbed demand for residential real estate and commercial real estate , increasing the risk of a further disorderly correction of residential and commercial real estate prices.

**Overall, in the short term, monetary policy tightening increases the probability of a crisis – especially after a longer loosening period, while it can reduce financial vulnerabilities in the medium term.**[12] Overall, monetary policy generates an intertemporal trade-off between short-term and medium-term effects on financial stability (Boissay et al., 2021, and Chavleishvili et al., 2023). Jiménez et al. (2022) find that U-shaped monetary policy increases systemic risk, by analysing 170 countries over 150 years. This higher systemic risk can be explained in light of the expansion in credit and asset prices following a loosening of monetary policy. In a low interest rate environment, banks tend also to increase risk-taking (Abbate and Thaler, 2019, and Albertazzi et al., 2020).[13] Boissay et al. (2023b) find that monetary tightening in a supply-led inflationary environment increases financial stress, while in a demand-led inflationary environment it decreases financial stress. When monetary policy is tightened, systemic risk materialises through three channels: (i) interest rate risk channel, (ii) credit risk channel, and (iii) liquidity channel. The combination of these effects leads to a higher probability of systemic risk materialising when interest rates rise (see, for example, Jiménez et al., 2022, and Boissay et al., 2023a).[14] Since monetary tightening discourages indebtedness, via an increase in lending rates, it can lead to a reduction in financial vulnerabilities and in systemic risks in the medium term.[15]

**Macroprudential policies can reduce such risk if activated before or during monetary policy tightening.** As found by Boissay et al. (2023a), the increase in systemic risk is smaller when macroprudential policies have been activated before or during the monetary tightening. Espic et al. (2024) find that higher capital requirements acted as automatic stabilisers during the 2021-23 monetary tightening, by limiting the volatility of banks' probability of default. To this extent,

[12] For an in-depth discussion on the side effects of monetary policy on financial stability, see *Work stream on macroprudential policy, monetary policy and financial stability* (2021), Section 3.

[13] Accommodative monetary policy generally induces more risk-taking in financial markets (see Albertazzi, et al., 2020 for a review of the evidence for the euro area). The effect is stronger for unconventional monetary policy instruments, such as asset purchases and negative interest rates, especially among banks that rely more heavily on deposit funding (see, for instance, Ampudia and Van den Heuvel, 2018, Bubeck, Maddaloni and Peydró, 2020, Heider, Saidi and Schepens, 2019, and Heider and Leonello, 2021).

[14] Also, Mendicino et al. (2024) find that under inflationary supply-side shocks, a more aggressive monetary policy attempting to strictly stabilise inflation can increase financial stability risks, as the higher interest rates reduce asset prices and increase bank default probability in the short run.

[15] More broadly, by pursuing price stability, monetary policy also contributes to financial stability as price stability is a precondition for financial stability (see ECB (2021b)). For a more in-depth discussion of monetary policy more actively pursuing financial stability objectives by "leaning against the wind", see *Work stream on macroprudential policy, monetary policy and financial stability* (2021).

macroprudential policy provides more headroom for monetary policy to fight inflation.[16]

## 2.2 Effectiveness of macroprudential policy

**Macroprudential policy aims to preserve financial stability by strengthening the resilience of the financial system and limiting the build-up of vulnerabilities.** The build-up of resilience allows the financial system to better absorb unexpected shocks over time and to mitigate systemic risk to ensure the ongoing effective provision of financial services to the real economy, especially in a risk materialisation phase. In this manner, macroprudential policy is smoothing the financial cycle.[17] However, depending on banks' capital headroom, these objectives might not be achieved without side effects, such as a deceleration of economic activity related to a short-term slowdown in credit. Overall, the benefits of activating macroprudential policy generally outweigh the costs, particularly in a high-risk environment with low levels of releasable buffers.

**Capital-based measures require banks to hold additional capital, thus having an immediate impact on increasing the resilience of the affected institutions.**[18] These measures directly increase financial sector resilience and contribute to a reduction in the probability of crisis (see, for instance, Birn et al., 2020). Additionally, the benefits tend to be larger when the initial banking capitalisation is low (Clerc et al., 2015, and Mendicino et al., 2020).[19]

**The primary goal of BBMs is to build up household resilience by reducing their risk of over-indebtedness, thus promoting the adoption of prudent lending standards, enhancing the sustainability of household financing and improving the quality of banks' portfolios and the resilience of the financial system.** Households with higher debt burdens have a higher probability of enduring financial distress down the line, due to a sudden increase in living expenses or debt servicing costs, among other factors. BBMs act directly on household leverage and financial health (Herrera et al., 2024, and Tereanu et al. 2022), ultimately improving financial sector resilience. BBMs also help to ensure that new borrowers do not take up excessive debt with respect to their repayment capacity (Abreu et al., 2024). By improving the quality of bank loan books, BBMs have also a positive effect on bank

[16] Faria-e-Castro (2021) shows that building up resilience when risks increase and releasing buffers during the downturn substantially helps to avoid crisis episodes like the global financial crisis.

[17] See also the ECB's Macroprudential policy strategy and ECB (2016), p. 5. Lima et al. (2023) suggest that an increase in capital requirements, regardless of their structural or cyclical nature, makes the banking sector more resilient to adverse shocks and also helps counter some of the pro-cyclicality within the financial system by smoothing the crunch in credit flows.

[18] See Lo Duca et al. (2023) for further details.

[19] For the euro area, Clerc et al. (2015) and Mendicino et al. (2020) show that the benefits of capitalisation are higher when initial bank capitalisation is low. In this situation, an increase in capital requirements substantially decreases expected probability of default among banks, thus helping to reduce their funding costs. By contrast, when initial bank capitalisation is high, the marginal benefits of an increase in capital requirements decrease because the initial expected probabilities of default are also lower.

resilience.[20] The effect of BBMs on bank resilience is relatively slower, as they act on new lending, and their role in increasing the resilience of the targeted credit segment increases gradually as restrictions to risky new mortgage flows feed into the stock of credit over time. The structural model simulations described in Box E show that a mix of capital requirements and BBMs can help to substantially reduce financial amplifications and the economic downturn in case of risk materialisation. BBMs are relatively more beneficial in containing risk amplifications from the household sector, whereas capital requirements limit financial amplification related to the materialisation of bank vulnerabilities.

**Empirical evidence suggests that the costs of macroprudential policy are small in terms of deceleration in real economic growth.** Macroprudential policy can have a small statistically significant negative impact on economic activity in the near term (Araujo et al., 2020). The average effect appears small across the different tools, supporting the notion of macroprudential policies as an efficient "surgical" tool. Birn et al. (2020) find that the costs of activating capital requirements are small.[21] Similarly, the effects of LTV caps also appear to be moderate (Richter et al., 2019),[22] and macroprudential tightening can be rather effective in reducing excessive credit and asset price growth. This points to a favourable trade-off between desired effects and the costs in terms of economic growth. The negative effects on economic activity of macroprudential policy tightening due to a slowdown in credit growth materialise in the short term, whereas the positive effects (i.e. greater resilience) materialise in the medium term (Araujo et al, 2020, and Mendicino et al., 2020).

**The costs of macroprudential policy depend on the lending standards of the banking sector, banks' capital headroom, the bindingness of the measures and the transition period considered.** The cost of macroprudential measures in terms of deceleration in real economic growth is heavily dependent on the lending standards of the banking sector at the time the measures are activated. Some macroprudential policies simply act as a backstop in case of excessive risk-taking in the future. These activations do not carry a substantial cost for the economy, as credit growth is not decelerated by their activation. By contrast, more binding restrictions also tend to be more effective in curbing credit creation. Another key dimension affecting the costs of activation is how measures are phased in: a slow phase-in allows for building up resilience over a longer time while keeping costs relatively low (Mendicino et al., 2020). In the same vein, Buratta et al. (2023) conclude that transition periods for the replenishment of capital buffers should be carefully considered, since shorter transition periods may be more effective at reinforcing banks' resilience, while longer transitions may be more suited to ensuring that lending flows smoothly to the economy. Lastly, when constraints on lenders are not binding and equity is less costly, capital buffer activation becomes less costly

[20] Neugebauer et al. (2021) tested the effectiveness of BBMs consisting of limits to LTV, DSTI and maturity and concluded that those limits led to a reduction in the loss rate among households, caused by both a decrease in households' probability of default and loss given default and an increase in the capital ratio of the banking system, compared with a scenario where these limits are not in place.

[21] Ranging between 2 and 16 bp for an increase of 100 bp in capital requirements expressed in terms ofCET1 ratio.

[22] Richter et al. (2019) run an empirical analysis on the levels and changes of LTV caps over time and find that a tightening of the LTV ratio cap by 1 percentage point yields a decline in output of around 0.1% after four years.

than in times of crisis (Lang and Menno, 2023), as also highlighted in Section 3. A similar mechanism holds for BBMs, which are more costly and curb credit in the areas where the real estate market is more constrained, as shown in Section 4. Box E shows how the costs of capital requirements and the phase-in of BBMs can change, depending on the prevailing conditions in the financial sector (bank profitability, bindingness of the measures, etc.).

**A set of macroprudential tools can be released or loosened when sources of systemic cyclical risk materialise to counteract a potential excessive reduction credit supply.** In times of crisis, the higher resilience and potential countercyclical macroprudential policy action can help to sustain the credit supply and prevent a downturn in the business cycle from being exacerbated. Macroprudential tools are classified into cyclical and structural instruments (ESRB handbook). Generally, only cyclical instruments are available for release. Aside from the CCyB, the (s)SyRB might be used in a cyclical manner to address specific risks which could materialise in an environment of high inflation and tightened monetary policy. This relates in particular to the credit risk channel (see Section 2.1), with higher PDs and LGDs. As soon as those credit risks materialise, macroprudential authorities might consider releasing (partially or fully) these instruments. Other macroprudential measures, especially OSII/GSII and capital conservation buffers (though also BBMs, which are structural in nature and address persistent vulnerabilities present in the financial system), are potentially crucial in safeguarding the financial system in an environment of high inflation and tightened monetary policy and are not to be released**.**

## 2.3 Interactions with different monetary policy stances[23]

**Looking at the interaction between macroprudential policy and monetary policy, both are to a large extent complementary, although monetary policy may generate relevant spillovers due to its impact on the financial cycle.** Both policies have a clear mandate: monetary policy primarily aims to safeguard price stability, while the main aim of macroprudential policy is to support financial stability. However, given that both policies operate through common transmission mechanisms and can affect each other's final objectives, there may be some unintended side effects. As these policies interact with each other, they largely enhance each other's effectiveness (Gambacorta and Murcia, 2017, Kim and Mehrotra, 2018 and 2022, and Biljanovska et al, 2023), but might also diminish it in the short term (Rubio and Carrasco-Gallego, 2016, Fahr and Fell, 2017, Acharya et al., 2020, Eickmeier et al., 2020, and Imbierowicz et al., 2020). By moving policy rates or affecting the yield curve with unconventional measures, monetary policy can have a strong impact on the course of the financial cycle and, potentially, on financial

[23] For an in-depth discussion on the interactions between monetary policy and macroprudential policy, see *Work stream on macroprudential policy, monetary policy and financial stability* (2021), Section 2.

stability.[24] Hence, there might be trade-offs and spillovers that monetary and macroprudential authorities face when deciding on their policy interventions (Laeven et al., 2022, Boissay et al., 2021, Van der Ghote, 2021, and Revelo and Levieuge, 2022). From a macroprudential policy perspective, this implies that monetary policy stance matters in the design, timing and calibration of macroprudential policies. From a monetary policy perspective, the 2021 ECB Strategy Review clearly recognised that financial stability is a precondition for price stability, and vice versa, thus making the case for taking financial stability considerations into account in future monetary policy deliberations.[25]

**By pursuing its key objectives of strengthening resilience and limiting the build-up of vulnerabilities, macroprudential policy largely complements monetary policy.** Such complementarity is seen as prevalent for synchronised financial and business cycles and understood as both policies moving in the same tightening or loosening direction (thus reinforcing each other). When inflation is above target and, at the same time, risks are building up (financial cycle expansion), the increased resilience achieved through higher cyclical capital buffers would complement the rise in interest rates from monetary policy and would lead to a reduction in risk-taking behaviour and to the adoption of more prudent lending standards. By contrast, when there are deviations in both cycles – such as where a financial contraction coincides with high inflation (as under supply driven inflationary shocks) – both policies are typically seen as being in conflict.[26] This relates especially to the more traditional focus of macroprudential policy on prima facie countercyclical action aimed at smoothening credit cyclicality as such. Therefore, de-synchronised business and financial cycles and inflationary supply shocks have posed a challenge to the classical "complementarity" between macroprudential and monetary policies and may do so for some time ahead.

**The more recent focus of macroprudential policy on resilience suggests an expansion of the notion of complementarity with monetary policy.** This emphasis on strengthening (pre-emptively) the resilience of the financial system, when conditions in the banking sector ensure no unwarranted pro-cyclicality, may result, on the one hand, in a synchronous direction of both policies despite a diversion in the business and financial cycles or a synchronous contraction of the financial and business cycles (e.g. in the case of inflationary supply shocks). For instance, this could occur were a cost-push shock to trigger stagflationary pressures with declining economic growth without (yet) observing a financial cycle contraction. In this case, monetary tightening would aim to contain inflationary pressures while a pre-emptive buffer build-up could strengthen banks resilience against a potentially abrupt and disorderly materialisation of risks. On the other hand, it may coincide with an expansion of the notion of complementarity, where the build-up of resilience provides space for monetary policy to pursue its objectives more effectively without

[24] In this vein, results by Kim and Mehrotra (2018 and 2022) show, for the countries covered, that macroprudential policy is endogenously loosened over time as a response to contractionary monetary policy shocks. Smets (2018) and *Work stream on macroprudential policy, monetary policy and financial stability* (2021) indicate that financial stability considerations are also taken into account when conducting monetary policy.

[25] See ECB (2021).

[26] See *Work stream on macroprudential policy, monetary policy and financial stability* (2021), p. 23.

risking unintended side effects on financial stability, i.e. by increasing the probability of a financial crisis or disruptions to financial intermediation when a crisis occurs. In other words, macroprudential policy will still complement or support monetary policy, even when heading in the opposite direction. This scenario could, for example, arise during a phase of prolonged monetary loosening (low-for-long) to address deflationary pressures. In this situation, the measured and targeted build-up of capital buffers and the application of BBMs to safeguard lending standards would mitigate the progressive cumulation of financial vulnerabilities induced by the expansionary monetary policy. The tightening of macroprudential measures would therefore allow monetary policy to focus on its price stability objective by limiting (future) unintended side effects.

**When macroprudential and monetary policies primarily focus on their own objectives, macroprudential policy is the first line of defence in addressing financial stability risks.** To the degree that both policies are not constrained, the optimal combination of policies would allow each policy to focus primarily on its own primary objectives, i.e. financial stability for macroprudential policies and price stability for monetary policies, taking one another as given parameters. Such an approach would be broadly in line with the Tinbergen rule, whereby one policy instrument should be used for each objective.[27] In addition, model evidence suggests that, in that case, the gains obtained from policy coordination are limited. By contrast, if policies are constrained, as for instance monetary policy in the case of the effective lower bound, pre-emptive macroprudential policies limiting the build-up of vulnerabilities and strengthening the resilience of the financial system become integral parts of optimal policy coordination. Moreover, if strong shifts in monetary policy, irrespective of direction, create additional financial stability risks, macroprudential policy might have to build up resilience against such vulnerabilities. Likewise, macroprudential policies might encounter limitations in the aftermath of crises and may require the support of unconventional monetary policies to help shore up banks and financial intermediaries.

**Key for the direction of macroprudential policies are the build-up or existence of unaddressed financial vulnerabilities, the materialisation of risks and demand or supply shocks affecting the economy** (**Table 2.1**). Monetary policy plays an important and multifaceted role in affecting the build-up of vulnerabilities and their possible materialisation. In the case of unaddressed vulnerabilities, depending on their type, i.e. a built-up stock or a building-up flow of vulnerabilities, authorities would decide on either capital buffers or BBMs respectively, or a combination thereof (Table 2.1, first row). This holds in particular in the presence of positive demand or supply shocks (first row, two middle fields). While independent of the monetary policy stance, in the case of a negative demand or supply shock (first row, two outer fields), BBMs would typically remain stable. However, in these latter cases, if there were concerns over procyclicality for the tightening of capital buffers, or if BBMs would become overly binding, the stance for the respective instruments could be moderated (see Table 2.1, first row, outer fields). Furthermore, capital buffers would typically be released following (disorderly) risk materialisations (Table

[27] While the Tinbergen rule assumes the independence of instruments, this only partially holds for macroprudential and monetary policy instruments, given their shared transmission via bank credit.

2.1, second row),, while after orderly risk materialisations, there may be a successive decrease of buffers over time. BBMs are expected to remain broadly stable due to their more structural nature, but might be partially relaxed if they become too binding following negative demand or supply shocks in the economy (second row, outer fields).

**Table 2.1**

Schematic overview of macroprudential policy given inflationary environment and monetary policy stance across stages of vulnerabilities

| | **Monetary policy tightening** in times of inflation above target due to | | **Monetary policy loosening** in times of inflation on/below target with | |
|---|---|---|---|---|
| | **Negative supply shock** | **Positive demand shock** | **Positive supply shock** | **Negative demand shock** |
| **Vulnerabilities** present or building up and **not** yet sufficiently **addressed by macroprudential measures** | **- Buffer increase** (under favourable capital conditions)* **- BBMs stable** (allowing for flexibility, e.g. via exemption clauses) | **- Buffer increase** and/or **BBMs tighten** | **- Buffer increase** and/or **BBMs tighten** | **- Buffer increase** (under favourable capital conditions)* **- BBMs stable** (allowing for flexibility, e.g. via exemption clauses) |
| **(Disorderly) risk materialisation** | **- Buffer release** (in orderly case depending on adverse conditions)** **- BBMs stable** (allowing for flexibility, e.g. via exemption clauses) | **- Buffer release** **- BBMs stable** | **- Buffer release** **- BBMs stable** | **- Buffer release** (in orderly case depending on adverse conditions)** **- BBMs stable** (allowing for flexibility, e.g. via exemption clauses) |

* **Favourable bank capital conditions** comprise moderate/ample capital headroom and/or bank profitability/net interest income, contained cost of equity, and no binding capital-related supply constraints implying potential unwarranted procyclicalities.
** Indications supporting **potential buffer release (fully/partial)** for targeted cyclical risk materialising or pre-emptively: asset quality deterioration, binding capital-related loan supply constraints and significant deterioration of macroeconomic indicators and outlook.
Notes: **Timing, speed and extent of buffer build-ups/releases** depend in particular on the build-up of vulnerabilities, prevailing and expected bank capital conditions, and the probability of risk materialisation in the short term, also affected by the **monetary policy stance**.

**Specifically, with the build-up of resilience, when banking sector conditions ensure there are no unwarranted procyclical effects, macroprudential policy acts de facto countercyclically, supporting monetary policy in its pursuit of price stability.** By pre-emptively increasing the loss-absorbing capacity of the financial sector (via adequate capital buffers) and by promoting the financial soundness of borrowers (via BBMs), macroprudential policy can build up the necessary resilience to absorb unexpected monetary policy shocks and the side effects of strong monetary policy tightening and loosening phases. It thereby acts effectively, albeit countercyclically, even if the build-up is largely irrespective of the direction of monetary policy (see Table 2.1, first row). This holds as long as the banking sector has sufficient capital headroom and/or profitability, as the build-up of resilience smooths the financial and business cycles in the event of risk materialisation (Table 2.1, second row) and becomes particularly relevant for strong and/or lasting monetary policy changes. This support from macroprudential policy becomes particularly relevant following an extended period of monetary loosening ("low-for-long") and the parallel build-up of financial vulnerabilities, as well as U-shaped monetary policy changes with the related rise in systemic risk (see, for example, Jiménez et al., 2022, and Boissay et al., 2023).[28] Structural simulations with a macroeconomic model show that a mix of capital requirements and BBMs can help to contain financial amplifications should risks materialise (Box E). Sufficient

[28] See also Section 2.1.

loss-absorbing capacity in the financial system (together with other policy tools to ensure sufficient liquidity provision if needed) largely prevents allows for the two key objectives of macroprudential and monetary policies, namely financial stability and price stability, from being in conflict.[29]

**The complementary role of macroprudential policy becomes even more relevant in the case of a single monetary policy with shared responsibility for macroprudential policy among national authorities and the ECB.** This shared responsibility reflects the fact that financial imbalances often build up along national borders. They are a result of (i) national regulations; (ii) persistent fragmentation of the European banking sector and/or specific financial/asset markets (e.g. residential real estate); (iii) different structural characteristics of the financial sector, which may impair the transmission channels of monetary policy; and (iv) de-synchronised cycles across euro area countries. With its granular and targeted instruments, macroprudential policy is the most appropriate tool for mitigating potentially systemic, asymmetric financial developments or shocks in specific areas, be it at the country, sector or financial institution level. Macroprudential policy is an essential complement to monetary union, by easing the burden of monetary policy and letting it fulfil its price stability mandate (ECB, 2021).

[29] See also Lagarde (2023), who remarked that “there is no trade-off between price stability and financial stability”.

# 3 Capital-based measures under different inflation and monetary policy regimes

**Since the pandemic, the build-up of capital-based measures has focused on preserving banking sector resilience.** The ongoing overall trend within macroprudential policy has been to further tighten the policy stance or to, at least, keep the level of capital buffers in place to ensure banking sector resilience against the backdrop of built-up vulnerabilities.

**Going forward, the further development of cyclical capital buffers will also depend on the nature of the shocks that may affect EU economies and the course of monetary policy.** As shown in Box B, through the lens of a structural macroeconomic model with a rule-based setting of the CCyB, the course taken by monetary policy can have diverse implications when it comes to calibrating the CCyB. In the model, the mix of inflationary shocks considered (a fiscal expansionary shock and a recessionary productivity shock) causes GDP to decline by more than credit, triggering an increase in cyclical risks and a temporary increase in banks' profitability. Under these circumstances, a CCyB rule-based on the trend in the credit-to-GDP gap would call for a gradual increase in capital buffers. At the same time, tightening monetary policy can have a relatively stronger impact on credit than on GDP, causing a deceleration in the accumulation of cyclical risks. In this case, the CCyB's rule-based setting would call for a slower build-up of the buffer. Conversely, a loosening of monetary policy boosts credit and hence the cyclical systemic risks in the economy, calling for an acceleration in the build-up of capital.

**Macroprudential policy faces contracting financial conditions paired with a policy of high interest rates and abating inflationary pressures and notable uncertainties.** While a further decline in inflation (bringing it closer to target) accompanied by some loosening of the monetary policy stance is expected, further cyclical and macro-financial developments remain uncertain. This includes the degree of future risk materialisations and potential additional cost-push shocks emanating from geopolitical tensions as well as substantial heterogeneities across countries.

**Table 3.1 provides a schematic overview of the application of macroprudential buffers in the current and upcoming macro-financial environment, treating the monetary policy stance and the inflationary environment as exogenous.** The combination of current macro-financial factors calls for a rethinking of traditional paradigms of countercyclical capital buffer setting. The large heterogeneity of macro-financial conditions across individual euro area/EU countries further complicates the assessment. Against this backdrop and to accommodate the different cyclical stages at the current juncture and uncertainties going forward, Table 3.1 below distinguishes between various cyclical stages (left columns). The accompanying inflationary environment and monetary policy stance are taken as exogenous and

aim to reflect the expected return of inflation (close) to target and the related monetary policy loosening going forward (Table 3.1, right columns).

**Table 3.1**

Schematic overview of the application of macroprudential buffers* under alternative inflation and monetary policy regimes in the current and upcoming macro-financial environment

<table>
<tr><th colspan="2"></th><th>Inflation above target & monetary policy tightening</th><th>Inflation on/close to target & monetary policy loosening</th></tr>
<tr><td rowspan="6">Financial cycle contraction</td><td rowspan="2">Turning financial cycle / early contraction phase</td><td colspan="2">Macroprudential policy (MAP) could still move in same direction as monetary policy</td><td>MAP could move in opposite direction to monetary policy</td></tr>
<tr><td colspan="2">Indications supporting potential buffer build-up/phase-in:<br>• Past build-up of vulnerabilities<br>• Favourable bank capital conditions**<br>• Build-up of macroprudential space (positive neutral CCyB, targeted sSyRB, other cyclical buffers)<br>• Still moderate economic activity; only moderate asset quality deterioration</td></tr>
<tr><td rowspan="2">Initial/orderly risk materialisation</td><td>MAP may act in opposite direction to monetary policy</td><td>MAP may move in same direction as monetary policy</td></tr>
<tr><td colspan="2">Indications supporting potential buffer release (fully/partial) for targeted cyclical risks materialising or pre-emptively:<br>• Asset quality deterioration<br>• Binding capital-related loan supply constraints<br>• Significant deterioration of macroeconomic indicators and outlook</td></tr>
<tr><td rowspan="2">Disorderly risk materialisation</td><td rowspan="2"></td><td>MAP moves in same direction as monetary policy</td></tr>
<tr><td>Indications supporting buffer release:<br>• Materialisation of systemic risk and expectations of widespread bank losses<br>• Material asset quality deterioration<br>• Credit crunch depressing economic activity with real financial feedback loops</td></tr>
<tr><td rowspan="4">Financial cycle build-up</td><td rowspan="2">Early build-up/ neutral</td><td>MAP could move in same direction as monetary policy</td><td>MAP may move in opposite direction to monetary policy</td></tr>
<tr><td colspan="2">Indications supporting pre-emptive buffer build-up/phase-in:<br>• Early signs of build-up of vulnerabilities<br>• Favourable bank capital conditions**<br>• Build-up of macroprudential space (positive neutral CCyB, targeted sSyRB, other cyclical buffers)<br>• Growing economic activity</td></tr>
<tr><td rowspan="2">Exuberance</td><td>MAP moves in same direction as monetary policy</td><td>MAP moves in opposite direction to monetary policy</td></tr>
<tr><td colspan="2">Indications supporting buffer build-up/phase-in:<br>• Past and ongoing build-up of vulnerabilities<br>• Resilient or strong economic activity<br>• Safeguarding future banking system resilience</td></tr>
</table>

* **CCyB, targeted sSyRB.**
** "**Favourable bank capital conditions**" comprise moderate/ample capital headroom and/or bank profitability/net interest income, contained cost of equity, and no binding capital-related supply constraints.
Notes: **Timing, speed and extent of buffer build-ups/releases** depend in particular on the build-up of vulnerabilities, prevailing and expected bank capital conditions, and the probability of risk materialisation in the short term, also affected by the **monetary policy stance**.

**The direction of capital buffers (build-up or release) mainly reacts to the build-up or existence of unaddressed vulnerabilities, the materialisation of risks and banks' capital conditions.** As can be seen from the schematic overview provided in Table 3.1, the setting of capital-based measures will be largely determined by the stage of the financial cycle, the accumulation or existence of unaddressed financial vulnerabilities, the materialisation of risks and the banking system's capital conditions. Hence, in terms of direction (build-up or release of capital buffers), they may be set to run alongside, or in the opposite direction to, monetary policy (same direction and opposite direction shown in green and red respectively in Table 3.1).

However, by treating the monetary policy stance as exogenous, this simplified, schematic table abstracts from the relevant impact of inflation and monetary policy on the course of the financial cycle, the build-up of financial vulnerabilities, banks' capital conditions and the probability of risk materialisation and vice versa. These underlying interactions render the different cyclical stages (table rows) and monetary regimes (table columns) in this table largely interdependent. However, the application of macroprudential buffers as such is never independent of the inflationary and monetary regime, given their interactions with the financial cycle.[30]

**The inflationary and monetary policy environment affects the intensity, speed and extent with which macroprudential buffers may be built up or released within a given stage in the cycle.** Beyond the relevant underlying interdependencies between the financial cycle and monetary policy mentioned earlier, the prevailing monetary regime will affect how macroprudential policy is calibrated and applied during each stage in the cycle. Given its repercussions for future financing conditions, bank profitability, the build-up of vulnerabilities and the probability of short-term risk materialisation, the monetary policy regime will affect the speed, timing and extent of buffer build-ups or releases. As shown in Box E, monetary policy can also influence phasing-in costs, to the extent that it affects banks' capacity to generate capital by triggering changes in their profitability.[31] However, the composition of these repercussions may vary substantially with cyclical and structural cross-country heterogeneities.[32]

**When the financial cycle turns negative, macroprudential authorities may still find good reasons to strengthen bank resilience, when banking sector conditions ensure no unwarranted procyclical effects, independent of the direction of monetary policy** (Table 3.1, top row).[33] Even though monetary policy tightening can increase the bindingness of macroprudential policy, for countries still in a turning phase of the financial cycle and with subdued chances of risk materialisation, a further build-up of capital buffers may still be considered. This is particularly true if there has been a significant accumulation of vulnerabilities in the past, or if there is ample bank capital headroom and strong bank profitability. Coulier et al. (2023) show that the recent monetary tightening had positive effects overall on banks' profitability in the euro area.[34] When inflation is above target and monetary policy is tightened, constraints on lenders and borrowers tend to become more binding. In this situation, close monitoring of financial conditions and of capital headroom, profitability and lending standards among banks helps to ensure that

[30] Box B shows, with a structural macroeconomic model, that by affecting the course of the financial cycle, monetary policy can have indirect implications for the speed of the CCyB build-up, should the macroprudential authority follow a rule-based approach.

[31] Borio et al. (2017) and Coulier et al. (2023) find that increases in short-term policy rates and in the slope of the yield curve increase bank profitability overall, given the key role played by the interest rate margin. Meanwhile, Altavilla et al. (2018) highlight that accommodative monetary policy can have positive effects on bank profitability via a reduction in loan loss provisions and non-interest income.

[32] Such structural heterogeneities comprise the structure of the banking system, including its capitalisation, business models, prevailing interest rate fixations and the sectoral composition of the economy, among others.

[33] See also Behn and Lang (2023), Section 2, for a detailed reflection on the implications for capital measures as the financial cycle turns.

[34] The response of bank profitability in the euro area has been heterogeneous, largely depending on the business model characteristics of banks and on interest rate fixation conventions (Coulier et al., 2023).

activated macroprudential policies do not become procyclical and excessively binding. At the same time, ample capital headroom and strong bank profitability ensure that capital increases can be accommodated without the need to raise capital externally or reduce lending. Hence, the risk of inducing exacerbating procyclicality is low.[35] Under these conditions, countries targeting a positive neutral rate or with small or non-existing buffers could shield themselves against the potential materialisation of cyclical risk as the cyclical contraction progresses.[36] The simulations provided in Box E show that, to the extent that monetary policy tightening increases bank profitability, macroprudential authorities might want to use such favourable conditions to increase buffers.

**The marginal gains of increasing releasable buffers are larger for countries that do not have them yet.** Countries with low capital buffers can benefit from available capital headroom and profitability to build up resilience at a low cost to the economy.[37] For countries where the financial cycle turns negative, the risks of a destabilising procyclical impact on credit supply are likely still low. The literature documents that increasing capital buffers when bank profits and shareholder funds are available may have small (but temporary) contractionary effects on credit supply without adversely affecting firm financing and economic performance (Jiménez et al., 2017). This is also found to be the case in Box B, where the CCyB rule suggests a faster increase in capital buffers should the shocks fostering credit creation prevail. Box E shows how different profitability levels can affect the cost of building up capital buffers. Lang and Menno (2023) also find that when the cost of capital is low, activations carry minor costs for the economy.

**Substantial medium-term gains can be achieved from releasing available capital buffers once adverse conditions materialise – especially for well-capitalised banking systems**.[38] Faria-e-Castro (2021) shows that releasing buffers during risk materialisation allows banks to keep supporting lending to the economy during times of crisis, thus reducing the size of the economic downturn. Hence, the gains from enhancing resilience are larger when countries do not yet have buffers, which, all else equal, tilts the trade-off towards buffer build-up for these countries. Box C shows that the level of resilience of the banking system also influences the effectiveness of the release, in that releases are more beneficial when banks are well capitalised. After the release, in case of low capitalisation, banks are ex post riskier and the increases in financial risks and potential defaults can even offset the positive countercyclical effects of the release on lending. Moreover, should the

[35] Additionally, building capital buffers over longer horizons entails lower transition costs than doing it over shorter horizons, as slower phase-in periods allow banks to adjust smoothly (Mendicino et al., 2020). A smoother activation allows banks to accumulate new capital via retained earnings rather than by deleveraging. Moreover, raising capital requirements affects a bank's funding costs in two partially opposite ways (Mendicino et al., 2024, and Bahaj and Malherbe, 2020): first, it increases the weighted average cost of funds and causes lending to contract; and second, higher capital requirements lower probability of default among banks, reducing the overall costs of default in the economy and lessening the contractionary effect of tighter regulation. This second positive effect on lending becomes more important when systemic risk is high.

[36] Mendicino et al. (2020) show that raising capital requirements makes banks safer and generates welfare gains in the long run, even after factoring in the short-term transition costs of rising capital requirements without accommodative monetary policy.

[37] Lang and Meno (2023) stress that credit supply is less sensitive to increases in capital requirements in periods when bank profitability is high, as banks can accumulate equity through retained earnings.

[38] When adverse conditions materialise, banks with higher capital buffers, stemming from the policy, expand credit supply relatively more than other banks (Jiménez et al., 2017).

release happen in an inflationary environment and with a strongly aggressive monetary policy, the negative effects related to the increase in financial stability risks would even be larger. This set of considerations justifies the notion that countries with low buffers could consider buffer build-up, while those with larger buffers could take no additional action in an environment in which the two types of countries exhibit similar dynamics in the credit cycle.

**Should countries reach the initial risk materialisation phase, macroprudential authorities may decide to (partially) release cyclical buffers. The monetary policy stance affects the timing, speed and extent of such potential releases** (Table 3.1, second main row). Until losses materialise on a broad-base scale and notable capital-induced constraints in loans supply become evident, it will not be necessary to release countercyclical capital buffers or other cyclical buffers. Nonetheless, if monetary policy is tightened and its lagged effects take hold, the likelihood of risks to financial stability materialising will increase, which may, in some cases, justify the partial or full release of cyclical buffers to ensure a smoother contraction of credit. Conversely, if monetary policy is already loosening and inflation is on/close to target, authorities may release cyclical buffers in a more gradual way, to the extent releases are deemed required. Close monitoring of these indications is necessary to prevent macroprudential policy action from becoming procyclical and, thus, to avoid further attempts to enhance loss-absorbing capacity from exacerbating the ongoing credit contraction and triggering losses that banks then cannot easily absorb.[39] Clear communication on the objective of the policies and on why they are not assessed to pose a risk of exacerbating procyclicality is key in this environment, as is the clear commitment by authorities to stand ready to release those buffers if needed to absorb losses and avoid credit supply constraints.

**In the event of disorderly risk materialisation, macroprudential authorities will likely need to release cyclical buffers, acting in the same direction as monetary policy** (Table 3.1, third main row).[40] Should a severe, disorderly risk materialisation unfold, complementary supportive action by monetary policy can be expected. Under such circumstances, it is important to consider the timing and size of the release. Releasing too much capital too early may deplete much-needed resilience; hence, authorities may choose to preserve resilience by allowing for absorption of unexpected shocks going forward. However, if a crisis situation emerges, there might be benefits in rapidly releasing cyclical capital buffers completely to help credit institutions absorb losses while continuing to lend to the real economy (ESRB, 2014). Box E further below shows the benefits of having previously built up capital buffers in the event of a crisis. When banks are more capitalised, financial shocks become less amplified because banks are better able to cope with defaults within the economy. This outcome is also found in standard works studying the role of bank capitalisation in shielding the banking sector (Clerc et al., 2015, Mendicino et al., 2020, and Faria-e-Castro, 2021).

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[39] Box C finds that, in an inflationary environment, releases can help to support lending when banks are well capitalised. In the event of low capitalisation, an aggressive monetary policy can make the release even more recessionary.

[40] For General considerations on conditions that could inform potential buffer releases in the future, see also Box 1 in the July 2023 ECB Macroprudential Bulletin.

**When countries are in the early build-up/neutral phase of the financial cycle, macroprudential policy could be tightened pre-emptively, particularly when inflation is below target and monetary policy is loosening** (Table 3.1, fourth main row). In the early build-up/neutral phase of the financial cycle, the extent of macroprudential tightening will be influenced by the monetary policy stance: in a monetary loosening or low interest rate environment, banks will have incentives to engage in more risk-taking behaviour, ultimately leading to the build-up of systemic risk and potential asset price misalignments (Abbate and Thaler, 2023), justifying a more restrictive build-up of buffers. At the same time, a declining or low level of interest rates could – via declining net interest margins – weigh on banks' profitability and ability to generate capital internally, thereby affecting the speed at which cyclical capital buffers can be built up. This is in part counterbalanced by a positive impact on the economic outlook and ultimately lower default risk, which might result in lower provisioning costs for banks and higher lending activity.[41] All in all, macroprudential authorities may consider activating cyclical capital buffers sufficiently early in a build-up of cyclical imbalances to grant banks the necessary time to build up the buffers ahead of turning points or financial stress.

**Should the financial cycle reach the stage of exuberance, macroprudential and monetary policies are likely to move in tandem in a tightening direction** (Table 3.1, last main row). If the financial cycle matures to such a degree that it reaches the stage of exuberance, marked by persistently strong credit developments and house price dynamics, the ongoing and increasing build-up of financial vulnerabilities will call for a further increase in cyclical buffers. Such buffer increases would aim to limit the further build-up of financial vulnerabilities and safeguard the resilience of the banking system going forward. As economic activity picks up, monetary policy will most likely be highly vigilant to contain any inflationary pressures that might push inflation off target. In this case (Table 3.1, last main row, left column), macroprudential and monetary policies would reinforce each other in containing cyclical dynamics. In addition, with the further build-up of cyclical buffers, macroprudential policy would provide additional space for monetary policy to act by containing risks of future credit supply constraints via higher releasable capital buffers. For the somewhat less standard macro-financial constellation of financial exuberance despite inflation remaining below target (Table 3.1, last main row, right column), macroprudential policy would counteract looser monetary policy by building up capital buffers and thus partially weighing on credit dynamics. In this case, authorities may choose to increase buffers more resolutely as overall financing conditions would be less affected by their measures and the build-up of vulnerabilities would likely be more dynamic. However, in this case macroprudential policy would also provide further space for monetary policy to act by increasing

[41] Box E shows that, under favourable bank capital conditions, the cost of building up buffers is relatively lower as banks are more able to generate new capital. The overall net impact on bank profitability will depend on the characteristics of the banking system and on the duration of the spell of low interest rates induced by monetary policy. In this scenario, it becomes especially hard to gauge the right time to tighten macroprudential policy. First, a delayed realisation that financial imbalances are mounting could increase the probability of a financial crisis unfolding later on. Second, the build-up of cyclical buffers too early could negatively affect the level of credit in the economy and, thus, the stimulation of economic activity that monetary policy aims to achieve by keeping interest rates low.

banking system resilience amid rising risk-taking behaviours in a monetary loosening environment.[42]

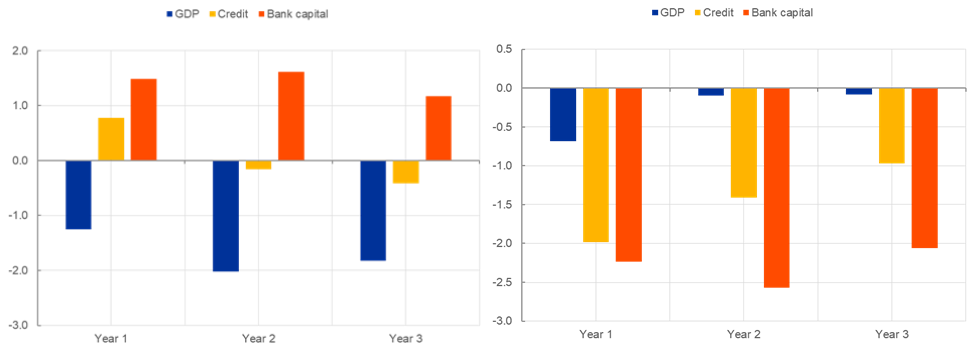
## Box B. Inflation, monetary policy and rule-based countercyclical buffer[43]

**This box investigates the impact of monetary policy and inflation when setting the countercyclical buffer (CCyB) in a dynamic stochastic general equilibrium (DSGE) model.** The model, developed by the financial stability directorate of the Banque de France, is based on a standard 3D model (Clerc et al., 2015), featuring default for households, firms and banks, and augmented with nominal rigidities.[44] In addition, a monetary authority sets the policy rate following a Taylor rule, and the macroprudential authority sets the CCyB rate following an automatic credit-to-GDP rule. In this regard, whenever the credit-to-GDP ratio is above its long-term trend, the macroprudential authority raises the CCyB rate, with some implementation lag. By featuring a credit-to-GDP rule, the model is able to assess how inflationary shocks and monetary policy stance affect the CCyB setting. Such assessment will therefore depend on the type of rule considered and does not intend to prescribe an optimal macroprudential policy.[45]

**Chart B.1**

Impact of inflationary shocks (left panel) and monetary policy shocks (right panel) on GDP, credit and bank capital

(percentage deviation from the steady state)




Source: Banque de France.
Note: The supply and fiscal shock (left panel) and the monetary policy shock (right panel) are calibrated to trigger a 100 bps increase in the monetary policy rate (pp deviation from steady state).

**Scenarios combining real inflationary shocks and monetary policy shocks are generated to assess the implications for bank conditions and for the countercyclical buffer.** In a first step, the model is run to assess the implications of different shocks for bank conditions and cyclical risks. The analysis starts by considering a mix of real inflationary shocks (recessionary productivity and expansionary fiscal shocks), before turning to an exogenous monetary policy shock. In a second step, three types of scenarios are designed by considering different combinations of real shocks

[42] The simulations provided in Box B suggest that a more substantial monetary policy loosening fosters credit growth, thus calling for a faster build-up of countercyclical capital buffers or other cyclical buffers.

[43] Prepared by A. Espic and V. Scalone.

[44] For more details, see Espic et al. (2024).

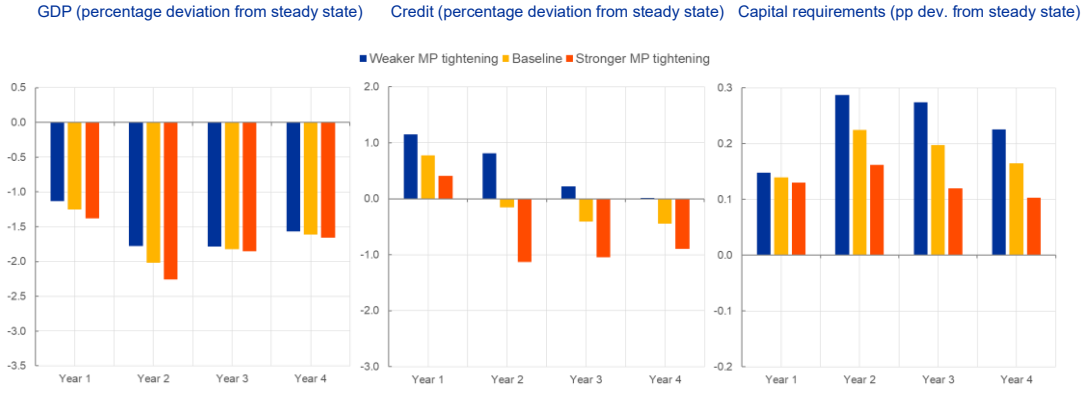
[45] If anything, the experience in recent years (e.g. CCyB releases across euro area countries during the pandemic despite an overall increase in credit-to-GDP ratios) has shown that a credit-to-GDP rule can better model countercyclical macroprudential policy action in positive economic growth periods rather than during recessions, when the increase in the credit-to-GDP ratio is mainly determined by a fall in GDP.

and monetary policy shock. In the baseline scenario, the mix of real shocks hits the economy and the central bank reacts endogenously, following a pre-set Taylor rule. In the stronger monetary policy tightening scenario, the monetary authority tightens its stance in year two, generating a further increase in the policy rate by 50 basis points with respect to its endogenous response to the real shocks. Meanwhile, in the weaker monetary policy tightening scenario, the central bank softens its stance in year two and cuts its policy rate by 50 basis points with respect to its endogenous response to the real shocks.

**The real shocks and the monetary policy shocks have opposite effects on the setting of the CCyB.** First, a mix of a negative supply shock combined with a positive government spending shock is considered (Chart B.1, left panel). Shocks are calibrated such that the policy rate endogenously rises by 100 bps, countering the increase in inflation. In the model, in deviation from their respective trends and one year after the onset of the arrival, GDP decreases by 1.3% whereas credit remains relatively stable (0.8%). Despite the endogenous increase in the policy interest rate, banks' net worth increases, as credit remains resilient. As a result, the credit-to-GDP ratio increases and so does the rule-based CCyB rate, thus contributing to build up resilience. Meanwhile, the effects of a monetary policy shock are reported in Chart B.1 (right panel), with the shock increasing the policy rate by 100 bps on impact. One year after the tightening, GDP, credit and banks' net worth decrease by 0.7%, 2.0% and 2.2% respectively. Since the negative effect on credit is larger than the impact on output, the overall effect on the ratio is negative, thus pushing down the CCyB rate driven by the rule.

**Chart B.2**

GDP, credit and capital requirements under three different monetary tightening scenarios




Source: Banque de France.
Notes: GDP (left panel), credit (middle panel) and capital requirements (right panel) are reported for three different scenarios. The three scenarios feature inflationary fiscal and supply-side shocks triggering an endogenous increase in the policy rate of 100 bps. In the stronger monetary policy tightening scenario, a further monetary policy tightening in year two triggers an additional 50 bps increase in the policy rate. In the baseline scenario, no further monetary policy tightening takes place. In the weaker monetary policy tightening scenario, the monetary authority loosens its policy stance and cuts its policy rate by 50 bps with respect to its endogenous response to the real shocks.

**Monetary policy can affect the course of credit and cyclical systemic risks, influencing the speed at which the CCyB is built up.** In particular, loosening (tightening) monetary policy accelerates (decelerates) credit growth and the build-up of cyclical systemic risks, implying a faster (slower) CCyB build-up, should macroprudential policy follow a CCyB rule. In the second step of this analysis, three scenarios are built to study how the CCyB evolves according to the strength of the monetary tightening. Given the counteracting effect of the different shocks on the rule, the evolution of the rule-based CCyB rate depends on how real shocks and monetary policy shocks balance each other. In the baseline scenario, the real shock triggers an increase of 100 bps in the

policy rate. Chart B.2 below depicts the evolution of capital requirements over a four-year horizon. In the baseline scenario (yellow bars), the CCyB rate increases by less than 25 bps over the projection horizon and quickly reverts to its initial level. As banks' net worth improves in the early phase of the cycle, some countries may use this window to reach their CCyB target more quickly and at a lower cost. This build-up becomes more substantial when the monetary policy tightening is less severe than in the baseline scenario (50 bps increase in the policy rate, blue bars). Conversely, should the monetary tightening be stronger (150 bps increase in the policy rate, orange bars), the rule would call for a more moderate increase in the buffer with respect to the initial level. This exercise shows how monetary policy can affect the course of credit growth and cyclical systemic risks and, hence, the speed at which the CCyB is built up, should the macroprudential authority follow a rule-based approach for the CCyB. By reducing credit growth, monetary policy tightening slows the financial cycle and hence the CCyB rule-based level. Conversely, monetary policy loosening can boost credit growth, calling for a faster build-up of the CCyB, according to the CCyB rule of the model.

## Box C. Buffer release: how monetary policy and initial bank capitalisation influence its effectiveness[46]

**The release of capital buffers can support bank lending to the economy in the negative phase of the financial cycle but increases financial stability risks going forward due to lower ex post bank capitalisation**. A macro-financial structural model (the 3D model; see Mendicino et al., 2024) is used to assess the effects of capital release during the negative phase of the financial cycle and shows how monetary policy stance influences the effectiveness of this release. The model features three layers of defaults (households, firms and banks) and two policy authorities. First, a monetary policy authority sets the policy rate in response to inflation and GDP deviations from the steady-state level. Second, a macroprudential authority sets capital requirements following a countercyclical rule, where the capital requirement endogenously increases (decreases) when credit is above (below) its equilibrium level. In terms of economic activity, when the capital requirement is released, two opposing forces come into play. First, the capital release increases credit capacity among banks and helps them to continue lending and, therefore, supporting economic activity. Second, less capitalised banks ex post have a higher probability of default, thus generating higher losses for the economy. In order to mimic an orderly downturn in the financial cycle, in the current exercise, an inflationary supply-side shock is simulated, generating a decline in GDP of 1.5% and an increase in inflation of 0.3 pp (peak effects) with respect to the starting point. In the baseline scenario, the monetary policy authority increases the policy rate by 0.3 pp to bring inflation back to target.

**If banks are sufficiently capitalised, a buffer release can act as a countercyclical stabiliser.** However, for low levels of bank capitalisation, the release can increase financial stability risks by imposing higher costs on the economy owing to an increase in financial risks. Upon buffer release, two counteracting channels are activated. First, banks can reduce their capital ratios, thus lowering spreads and supporting credit (lending channel).[47] Second, given their higher leverage, ex post less

[46] Prepared by L. Herrera and V. Scalone.

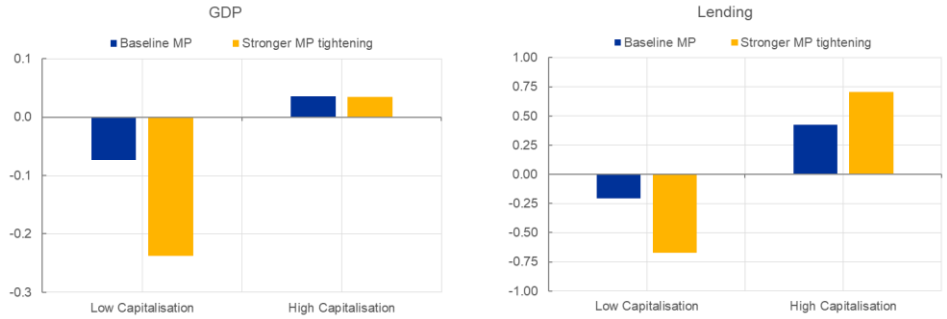
[47] In the 3D model, capital requirements are always binding. This implies that in this simulation, the release is assumed to be fully effective and that banks will fully adapt to the new capital requirement level. In reality, banks can decide not to use all the released space, thus limiting the effect of the release.

capitalised banks are more prone to default, increasing the costs of default for the economy (risk channel). Under standard monetary policy, Chart C.1 (blue bars) shows that when bank capitalisation is at its baseline calibration level, in line with the historical average CET1 ratio for the period 2011 to 2019, the release has overall positive effects on economic activity (0.03 pp, peak effect) and on lending (0.42 pp, peak effect). When banks are less capitalised (-2 pp with respect to the baseline calibration), the release renders banks more vulnerable, substantially increasing their probability of default.[48] In this case, the risk channel dominates the countercyclical scenario: the net effects on GDP and lending are negative (respectively, -0.07 pp and -0.20 pp, peak effects).

**Chart C.1**

Effects of releasing capital on GDP and lending in the case of high and low bank capitalisation

(percentage level deviations)




Sources: ECB and ECB calculations.
Notes: Blue bars show the peak effects deriving from the release of capital under standard monetary policy. Yellow bars show the peak effects in the case of a stronger monetary policy tightening fully stabilising inflation.

**Financial stability risks increase under stronger monetary policy tightening , making the risks channel of the release more detrimental for the economy.** In a second simulation, as depicted in Chart C.1 (yellow bars), the central bank reacts more aggressively to inflation, achieving full stabilisation. To succeed in this task, the increase in the interest rate is three times higher than under the standard monetary policy reaction function. As a result, the higher rates substantially compress asset prices and reduce the net worth of banks, increasing their probability of default. Under an initially low bank capitalisation and a stronger monetary policy tightening, the risk channel of a buffer release becomes even more amplified than in the case of baseline monetary policy. The stronger reduction in asset prices amplifies the negative effects related to the loss of resilience of ex post less capitalised banks. In this case, the effect of the release is negative on both GDP (-0.24 pp, peak effect) and lending (-0.67 pp, peak effect). Conversely, in the case of high capitalisation, a stronger monetary policy tightening makes the release overall more beneficial, in terms of both GDP and lending (+0.03 pp and +0.7 pp, peak effects).

[48] In the model, capital requirements are always binding, implying that in case of a release, banks fully use the released capital buffer.

# 4 BBMs under various inflation and monetary policy regimes

## 4.1 BBMs in the euro area/EU

**The primary goal of BBMs is to build up household resilience and to improve banks' portfolio quality and the resilience of the financial system.** Their costs for the economy will depend on the fraction of borrowers whose debt decision is limited by the measures. The higher the fraction of new borrowers limited by BBMs, the higher the costs for the economy will be in terms of reduced lending and consumption. In some cases, the costs can be mitigated, as BBM activations are not necessarily conceived to be binding as they may act more as a signal to banks, in order to discourage them from excessively allocating their funds to risky lending.

**The cost of BBMs in terms of GDP growth depends, among other factors, on the monetary policy stance and the inflationary environment.** Box E applies a structural macroeconomic model to assess the phasing-in costs of BBMs considering different levels of bindingness. The results suggest that under the recent high interest rate environment, the increase in costs for the economy was not substantial, given the current estimated increase in bindingness. Should bindingness decrease, the cost would marginally decrease in the event of monetary policy normalisation, and would drop even further were monetary policy to be loosened. Overall, as BBMs act on flows, thus affecting only a small fraction of total borrowers, the cost for the economy is moderate in all the cases considered. Notably, recent empirical work focusing on BBM activation in Ireland has found that credit limits move credit creation from areas where the BBMs are more binding to areas where the constraints are less binding. Overall, the effect on aggregate credit, and hence on the economy, is muted (Acharya et al., 2022).[49]

**The benefits associated with BBM activation are higher following substantial increases in interest rates and in inflation, as observed particularly in 2023**. In Box E, a second simulation shows how a mix of macroprudential instruments, capital requirements and BBMs can reduce the negative effects of cyclical risk materialisation. The recession scenario considered assumes that, after a substantial monetary policy tightening, cyclical risks for banks and households materialise, triggering a financial crisis. In this exercise, the benefits of BBMs (and of capital requirements) are estimated in terms of smaller losses in GDP if cyclical risks materialise. The presence of BBMs can make households more resilient and, therefore, less vulnerable to the materialisation of cyclical risks (e.g. income reduction, asset depreciation and increase in borrowing costs), thus lowering the probability of distress in the future and preventing amplification mechanisms as

[49] In this study, the authors also find that when the measure is binding, the effect on aggregate total debt is small. This is due to the fact that new credit is relatively more concentrated in areas where the constraint is less binding and the mortgage market is less tight.

households become more financially vulnerable. Furthermore, it substantially reduces the severity of the economic downturn and the fall in asset prices. Should cyclical risks materialise before the newly applied BBMs are able to take full effect, the benefits associated with BBMs will be smaller. Giannoulakis et al. (2023) assess the ex ante effectiveness of BBMs on the economy through a micro-macro simulations model. They find that BBMs improve household resilience, particularly for households located at the lower end of the income distribution.

**BBMs are largely conceived as structural measures in euro area countries and their effectiveness is not meant to substantially change across the financial cycle**. If macroeconomic conditions change over time and drastically affect the desired effectiveness of the BBMs, macroprudential authorities might want to adjust limit exemptions and maturity limits to restore bindingness as they see fit so as to continue building household resilience over time without causing an excessive slowdown in mortgage creation and in the housing sector. Jensen et al. (2018) show that the effectiveness of BBMs can vary substantially within the economy, depending on whether or not the measures are binding for borrowers. In their model, a certain degree of countercyclicality in the BBMs rule can help to reduce the excessive bindingness of the measure and possible undesired procyclical effects. In this regard, the definition of exemptions and of the maturity limits in many countries that activated the BBMs seems to be aimed at avoiding excessive bindingness in this new financial cycle phase.

## 4.2 Bindingness of BBMs given macro-financial conditions and monetary policy stance

**Table 4.1 presents a schematic overview of the impact channels that different inflation environments and monetary policy stances have on the bindingness of BBMs.** The level of bindingness will be affected by the nature of the inflationary shock (supply versus demand side) and by the monetary policy stance. Table 4.1 outlines the channels that affect the bindingness of BBMs not only in the current environment (marked by inflationary pressures, monetary policy tightening and subdued (real) wage growth), but also in the environments that may potentially follow: inflation returning to (or below) target and monetary policy loosening. Therefore, the design of BBMs should include some degree of flexibility, via exemption clauses, that should be adjusted according to the nature of the economic and inflationary shocks and the monetary policy stance.

*High inflation and monetary policy tightening*

**Inflationary supply-side shocks tend to make D/LSTI and D/LTI limits more binding.** Between 2022 and 2023, inflationary supply-side shocks related to supply bottlenecks and geopolitical tensions affected the economies of Europe and pushed up the cost of energy and commodities (“Cost channel”; see Table 4.1, first row). These shocks had a negative impact on both output growth and disposable income

("General equilibrium effect").[50] Furthermore, the impact on lower-income households, which are often relatively more indebted with respect to the rest of the population (Adhikari, 2022, and Albacete et al., 2022), tends to be disproportionate.[51]

**Inflationary demand-side shocks tend to make D/LSTI and D/LTI limits less binding.** An inflationary demand-side shock that leads to a positive increase in GDP may also increase spending, thus expanding global demand, raising disposable income and ultimately making the D/LSTI and D/LTI limits less binding ("General equilibrium effect").

**A tighter monetary policy stance in response to rising inflation makes D/LSTI and D/LTI limits more binding.** First, higher interest rates directly affect debt service costs by increasing the numerator of the D/LSTI ratio ("Interest rate channel").[52,53] Second, for those households that already have a floating rate mortgage, the higher interest rates directly reduce their de facto disposable income that could be used to arrange an additional mortgage.[54] Third, the monetary policy tightening slows nominal demand and, ultimately, output and income growth among households ("General equilibrium effect"). Through these channels, monetary policy contributes to a reduction in the debt servicing capacity of households and in their de facto disposable income, thus making the constraints more binding overall. However, in the event of an inflationary demand-side shock, the net effect on income would depend on the magnitude of the inflationary shock vis-à-vis the monetary policy tightening.

**Monetary policy tightening has a less direct and more ambiguous effect on LTV limits.** As shown in the fourth column of Table 4.1 (upper part), house price depreciation resulting from an interest rate hike can, via the collateral channel, make borrowing conditions tighter for existing homeowners who would like to refinance their debt[55] or arrange new mortgages by using their house equity as collateral (since house price depreciation lowers the collateral value of housing).

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[50] Guerrieri and Iacoviello (2017) show that expansionary demand shocks can make borrower constraints less binding. In their model, when constraints are less binding, the amplification of demand is smaller, since the financial accelerator implied by the borrower constraint is less active and spending decisions among borrowers are less dependent on the evolution of the constraint limits.

[51] Euro area countries feature significant heterogeneity in terms of nominal wage rigidities.

[52] See, for instance, Jarmulska et al. (2022); "Evolution of mortgage lending standards at the turn of the housing market cycle", *Macroprudential Bulletin*, Issue 22, ECB, July 2023; and related results from microsimulations in Box D.

[53] Note that increases in maturity can curb the increase in the debt service ratio.

[54] See note to Table 4.1 for further details.

[55] Practices are fairly heterogeneous among EU countries. For instance, in Germany, BBMs for housing loans would apply only to new housing loans taken out to finance the construction or purchase of RRE property, and not to simple refinancings of the outstanding volume on an old loan once its fixed interest rate period has ended. In Portugal, all refinancing loans are treated as a new loan and are subject to the BBMs in place (except for credit agreements intended to prevent or address delinquency situations).

**Table 4.1**

Schematic overview of the impact channels of inflation and interest rates on the bindingness of BBMs

<table>
<tr><th></th><th></th><th>D/LSTI limit</th><th>D/LTI limit</th><th>LTV limit</th></tr>
<tr><td rowspan="3">Inflation above target and monetary policy tightening</td><td>Inflationary pressures</td><td colspan="2">Disposable income:<br>Supply-driven inflation (with negative GDP pressures)<br>– Cost channel: geopolitical tensions, commodity shocks, energy shocks reducing disposable income[1]: more binding<br>– General equilibrium effect: recessionary supply-side shocks slow down economic activity, reducing household income, including the wage stickiness channel: more binding<br>Demand-driven inflation (with positive GDP pressures)<br>– General equilibrium effect: spending increase, global demand expansion raises disposable income: less binding</td><td></td></tr>
<tr><td rowspan="2">Monetary policy tightening</td><td colspan="2">Debt service (only on DSTI/LSTI):<br>– Interest rate channel: rising debt servicing costs: more binding<br>Disposable income:<br>– General equilibrium effect: interest rate hikes slow down economic activity, reducing household income: more binding</td><td>Collateral channel: interest rate hikes slow the growth of house prices, lowering collateral values: more binding for loans to be refinanced</td></tr>
<tr><td colspan="3">Property price channel: interest rate-induced decline in house prices that also reduces amount of mortgage needed for financing: less binding</td></tr>
<tr><td rowspan="2">Inflation below target (or returning to target) and monetary policy loosening</td><td>Inflation below target (or declining to target)</td><td colspan="2">Disposable income:<br>Supply-driven (dis)inflation (with positive GDP pressures)<br>– Cost channel: absorption of the supply-side shock, recovery in disposable income: less binding<br>– Wage channel: nominal wages recover their lagged adjustment to inflation: less binding<br>Demand-driven (dis)inflation (with negative GDP pressures) – including recessions and ~~crisis~~<br>– General equilibrium effect: reduction in aggregate demand reducing disposable income: more binding</td><td></td></tr>
<tr><td>Monetary policy loosening/normalisation</td><td colspan="2">Debt service (only on DSTI/LSTI):<br>– Interest rate channel: interest rate slowly adjusting, debt service decreases: less binding<br>Disposable income:<br>– General equilibrium effect: interest rate decreases, enhancing economic activity, increasing household income: less binding</td><td>Collateral channel: interest rate decrease boosts the growth of house prices, increasing collateral values: less binding for loans to be refinanced</td></tr>
<tr><td colspan="3">Property price channel: Interest rate-induced boom in house prices increases the amount of mortgage needed for financing: more binding</td></tr>
</table>

[1] This channel is operational if macroprudential authorities consider a minimum subsistence amount in the denominator when calculating the D/LSTI and D/LTI ratios. Particularly for low-income households, the increase in minimum subsistence amount induced by higher costs of energy and commodities may be greater, in absolute terms, than the increase in nominal net income, making the limits more binding. For instance, Slovakia considers a measure of disposable income defined as net income less the minimum subsistence amount.

**Lower house prices also reduce the size of the mortgage required to buy a new house, thus making borrowing constraints less binding.** As shown in the fourth row of the upper part, through the "Property price channel", house price depreciation can ease borrowing conditions. Assuming that the amount of the down payment remains the same, a household could purchase the same home it would have purchased before the drop in house prices, but now taking out a smaller mortgage.[56] This channel contributes to making the three constraints analysed in the table (D/LSTI, D/LTI and LTV) less binding.

**Microsimulations based on the Household Finance and Consumption Survey (HFCS) estimate that, under the new environment, measures are slightly more binding.** Box D shows the results of microsimulations using survey data on the financial position of households. In the current environment, the rise in interest rate increases the outstanding DSTI ratio, especially for countries with a high share of floating rate mortgages. In the simulations, the increase in bindingness related to higher DSTI is partially offset by a decrease in housing demand. Overall, the constraints are only slightly more binding and the results are fairly heterogeneous across countries. Exemption clauses in BBMs provide a degree of countercyclical "breathing space" to avoid overly constraining policy stance. Box E shows the impact on costs and benefits of BBMs when the measures are more binding and finds that under the high interest rate environment, costs and benefits are slightly more substantial, especially in countries with a larger proportion of floating rate mortgages.

*Inflation returning to (or below) target and monetary policy loosening*

**Disinflationary pressures resulting from the absorption of recent supply-side shocks could reduce the bindingness of BBMs.** Table 4.1 (bottom part) shows the effects of declining inflation on the various BBM limits. First, the effects of the recent supply-side shocks can be seen to fade, thus facilitating disinflation and exerting upward pressure on GDP. The absorption of the supply-side shocks is expected to support a recovery in disposable income ("Cost channel"). At the same time, nominal wages are expected to recover their lagged adjustment with respect to inflation ("Wage channel"). These two factors will tend to make DSTI and LTI limits less binding because of the increase in disposable income.

**When aggregate demand decreases, due to a demand-driven disinflationary shock, the reduction in disposable income makes BBMs more binding.** A recessionary demand shock can slow economic activity, pushing down prices. If the size of the shock is substantial, this may trigger a recession. In such cases, the reduction in aggregate demand would foster a decline in inflation to target (Table 4.1). This in turn would reduce disposable income, making the D/LSTI and D/LTI constraints more binding ("General equilibrium effect"). Standard macro-financial models (see Guerrieri and Iacoviello, 2017, and Chen et al., 2023) feature dynamics whereby recessionary shocks make borrower constraints more binding,

[56] The cost of BBMs might also be affected by how monetary policy endogenously reacts to the effects of BBMs on the economy. Chen, Finocchiaro, Lindé and Walentin (2023) find that when monetary policy endogenously reacts to the recessionary effects of BBMs, the costs of phasing-in are smaller than when monetary policy does not try to offset such deceleration, as in the case of constrained monetary policy (i.e. zero lower bound).

thus reducing the collateral or income available to borrowers. When the constraint binds, shocks are amplified and trigger a further negative reduction of asset prices and income, exacerbating the initial negative fluctuation.

**Monetary policy loosening (including the expected monetary policy normalisation) reduces debt service and sustains economic activity, making BBMs less binding overall.** When inflation is (close to or) below target, monetary policy is likely to be loosened in order to support aggregate demand via lower interest rates, thus stabilising prices. Table 4.1 (second row of the bottom part) shows the effects on BBMs of looser monetary policy. As interest rates fall, debt service is reduced and so the D/LSTI limits become less binding ("Interest rate channel"). The monetary policy loosening has also a positive effect on household disposable income by supporting economic activity via smaller costs of lending for the wider economy ("General equilibrium effect"). Importantly, these mechanisms apply also to the monetary policy normalisation that is expected to happen in the short term, given the absorption of the recent supply-side shocks and the current decline to target of inflation.

**Monetary policy loosening would sustain asset price valuations, making BBMs more binding.** Falling interest rates would support demand, thus pushing up housing prices, increasing the cost of housing ("Property price channel") and making BBMs more binding overall. Concerning the LTV, this increase in bindingness would be countered by an increase in the value of collateral (growth of house prices), also making the LTV less binding for those loans that need to be refinanced ("Collateral channel").

**Overall, recessionary shocks and expansionary monetary policy have opposite effects on the bindingness of BBMs: the net effect would depend on the capacity of monetary policy to offset the negative shocks.** Recessionary demand shocks tend to push down house prices, whereas monetary policy would counter this effect, sustaining house prices. The net change in house prices will depend on the relative importance of these two opposite effects. Table 4.1 (third row of the bottom part) shows the consequences of this dynamic in terms of BBMs. Notably, the decrease in house prices triggered by recessionary demand shocks would result in smaller housing good costs (making the constraint less binding). Meanwhile, when it comes to LTV, falling house prices would lead to a lower collateral value if the loan must be refinanced ("Collateral channel"), thus making the constraint more binding. The expansionary action of loosening monetary policy would instead have the opposite effects on BBMs.

*Focus on BBMs in countries with predominantly floating rate mortgages*

**The benefits of BBMs become even more apparent in countries with a predominance of mortgages arranged at floating interest rates.** As discussed in Box D, the increase in DSTI becomes more sizeable in countries with a higher proportion of mortgages arranged at floating interest rates. For these countries, an increase in the policy rate directly transmits to the debt service payments of the borrowers. The higher level of indebtedness overall makes the economy more vulnerable to upcoming financial shocks. As discussed in Box E, building resilience

through BBMs in this context can be more beneficial given the higher risks associated with households that pay floating rates on their mortgages. Moreover, in countries with a high share of floating rate mortgages, national macroprudential authorities might require banks to conduct a sensitivity interest rate assessment at origination to assess whether the borrower would be able to cope with higher interest rates or apply differentiated limits according to the interest rate fixation period.

**The new environment of high interest rates illustrates the importance of considering the structural features of the mortgage market when designing BBMs.** At origination, the increase in bindingness is homogeneous across countries with both floating and fixed interest rates. However, when calibrating the measure in countries with a high share of floating rates, authorities need to consider how the effective lending rate would evolve over time in the event of further interest rate hikes. This consideration becomes even more important within the current environment, where interest rate volatility is substantially higher than the level observed over the previous ten years, which featured low interest rates. As long as interest rates are higher than where they were when most BBMs were conceived, some macroprudential authorities might want to reduce the interest rate shock used in assessing household compliance with credit limits.

## Box D. Bindingness of BBMs among euro area households in the current environment – microsimulations on granular household survey data[57]

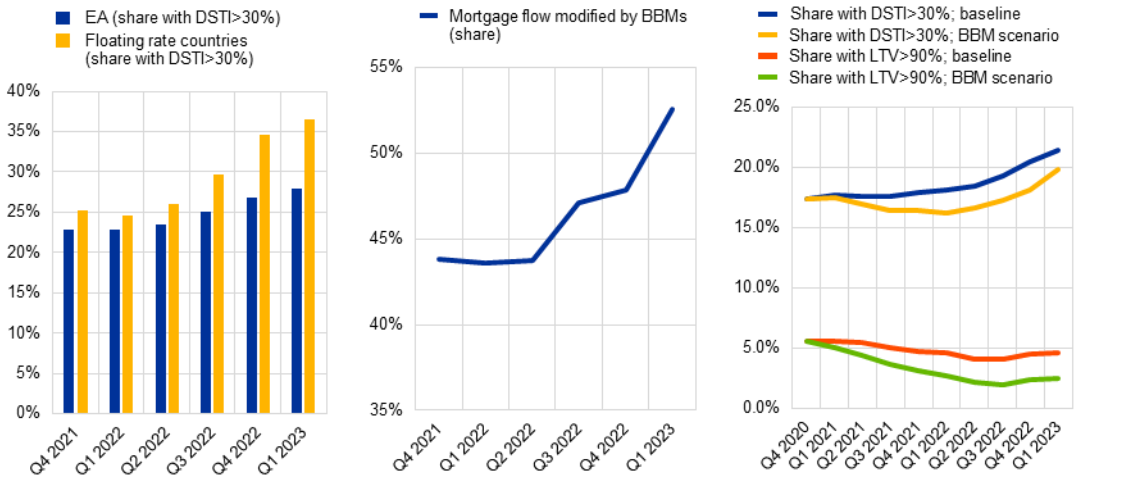
**The recent tightening of monetary policy is linked to higher D/LSTI ratios for households across the euro area, especially for countries with a high share of floating rate mortgages** (Chart D.1, left panel). We conducted dynamic microsimulations of survey data that cover the balance sheets and income sources of households in 17 countries of the euro area. The simulations are conditional on country-level macroeconomic developments since the survey was conducted (2017-18) and on the repayment features of existing mortgages and the generation of new mortgages. We find that the share of households that have DSTI ratios above 30% has increased by 4 percentage points to reach 27% of euro area borrowers. This is driven primarily by the stock of mortgages arranged at floating rates and, to a lesser extent, by the increased cost of new borrowing in recent quarters.[58]

[57] Prepared by S. Palligkinis.

[58] The framework builds on Palligkinis (2024).

**Chart D.1**

BBM bindingness in recent quarters




Sources: HFCS, OECD, ECB and authors' calculations.
Notes: Left panel: Euro area (EA) results based on 17 EA countries. Floating rate countries are Estonia, Latvia, Netherlands and Portugal. Middle panel: only countries with DSTI limits included in the sample. Right panel: results for EA countries of the sample that have no BBMs in place, i.e. Germany, Spain, Greece and Italy.

**As interest rates increase, the constraining impact of DSTI limits on simulated credit flows becomes more prominent** (Chart D.1, middle panel). In this framework, new mortgages are first issued with an original set of terms (notably amount and LTV) and then the BBMs are used to modify these original terms with the purpose of capping excessive borrowing. The share of such simulated modified loans has increased by 9 percentage points since the second quarter of 2022t.

Introducing BBMs in those countries that do not already have such measures in place would gradually improve household financial resilience. Chart D.1, right panel, shows the results of a counterfactual exercise whereby a DSTI limit of 30% and an LTV threshold of 90% are introduced to new mortgages granted in countries that hitherto had no BBMs in place. Key assumptions are that (a) the measures were introduced in the first quarter of 2021; and (b) in response to these measures, credit growth was 0.5% lower than the baseline in 2021 and 1% lower than the baseline thereafter.[59] The combination of these BBMs helps to build the financial resilience of households over time compared to the baseline of no BBMs being introduced, and helps households cope with the repercussions of the recently hiked interest rates.

[59] Although BBMs are associated with decreased credit growth, calibration is still an open issue. Our choices fall within the range of estimates found in the literature (see, for example, Poghosyan, 2020).

## Box E. Costs and benefits of macroprudential policy: the role of monetary policy and of the structural features of the mortgage sector[60]

**Monetary policy can affect the cost of BBMs by influencing their bindingness and of capital-based measures by making it harder for banks to generate capital internally.** In the first part of the box, model simulations are used to show how the cost of the instruments changes with respect to financial sector conditions (bank profitability, bindingness of BBMs), highlighting the role of monetary policy in this context. As highlighted in Section 3, on capital headroom, monetary policy can make it harder for banks to generate capital internally, thus affecting the cost of activating capital-based measures in the economy. The cost of activating BBMs in terms of credit and economic activity depends on their degree of bindingness. In other words, monetary policy can, by affecting bindingness, affect the cost of BBMs.

**Monetary policy can have heterogeneous effects on the vulnerability of banks and households, depending on the structural features of the mortgage sector.** Considering this dimension is essential when assessing the benefits of BBMs and capital-based measures. In the short term, a higher interest rate environment and tighter monetary policy can also increase the probability of stress (Boissay et al., 2023a). In countries with a predominance of floating rate mortgages (), higher interest rates will immediately increase the debt burden of households, thus making them more financially vulnerable. Conversely, in those countries with a predominance of fixed rate mortgages (), higher rates will make banks more vulnerable. In the second part of this box, structural model simulations show how BBMs and capital-based measures can reduce financial risks and the size of the crisis, taking into account the heterogeneous increase in vulnerability found between floating rates and fixed rates countries.

**Tighter monetary policy can render BBMs slightly more costly, but may reduce the costs of activation for capital-based measures.** Monetary policy can have different effects on the costs of activating macroprudential policies, depending on the type of instrument considered. It predominantly affects BBMs by increasing their bindingness across households when arranging new loans. As discussed in Section 4, a tightening (loosening) of monetary policy will make D/LSTI limits more (less) binding. Conversely, as highlighted in Section 3, the costs of capital-based measures are broadly affected by the capacity of banks to generate new capital. In this respect, and to the extent that monetary policy tightening increases bank profitability, new activations of capital-based measures will become less costly. On this point, Borio et al. (2017) and Coulier et al. (2023) find a positive relationship in the short term between the level and the slope of the yield curve and bank profitability, thus illustrating the importance of the interest rate margin.[61] Altavilla et al. (2018) find that accommodative monetary policy has positive effects on bank profitability by reducing loan loss provisions and non-interest income.[62] The activation costs of both types of macroprudential policies are also significantly affected by how gradually they are activated: a more gradual activation of capital-based measures allows banks to comply with the new requirement through retained earnings, rather than by reducing credit supply. It also allows for a smoother reduction in new credit flows, thus reducing the impact on aggregate demand.

[60] Prepared by L. Herrera and V. Scalone.

[61] The importance of the net interest margin and its relationship with monetary policy is also highlighted by Deutsche Bundesbank in “The importance of bank profitability and bank capital for monetary policy”, *Monthly Report* 70.1 (2018), pp. 27-52.

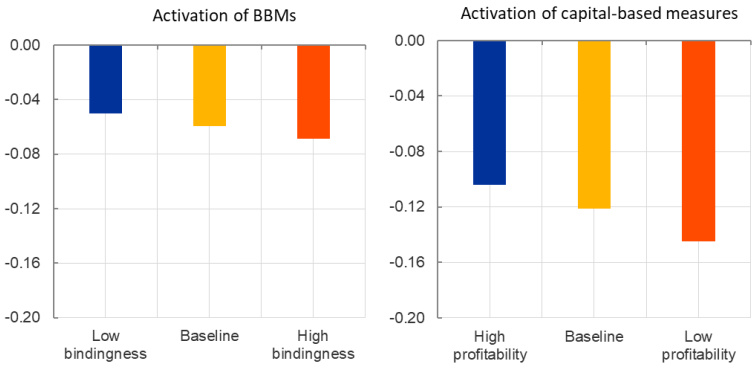
[62] Mendicino et al. (2020) and Chen et al. (2023) show that when monetary policy is constrained at the zero lower bound, macroprudential activations can be more costly since monetary policy fails to partially offset the deceleration in demand resulting from the activations.

**BBMs are more binding in a high interest rate and inflation environment, while the economic cost of phasing them in increases only moderately; by contrast, a decrease in interest rates would render them less binding and the phase-in costs would decrease slightly.** To assess the costs of phasing in BBMs and capital-based measures, a structural general equilibrium model featuring two layers of default for banks and households (known as the 2DH; see Herrera et al., 2024) is used. The model also features a macroprudential authority that is able to set BBMs and capital-based measures.[63] In assessing the costs of activation, the BBMs are assumed to be phased in smoothly (resulting in a stable decline in annual credit growth of 2%, in line with the micro model estimates reached by Giannoulakis et al., 2023). According to the results shown in Box D, following a monetary policy tightening such as the one observed in 2023, a larger fraction of borrowers would become subject to a credit limit, when compared with a low interest rate environment. Given the slow phase-in of the BBMs, the effect on GDP is low (around -0.06% with respect to the initial level, yellow bar) in the baseline case (Chart E.1, left panel). In the high interest rate environment with higher bindingness, the cost in terms of GDP increases marginally in absolute terms but remains at around -0.07% (red bar). Meanwhile, should monetary policy return to a low interest rate environment, the cost in terms of GDP would be slightly less in absolute terms (-0.05%; see Chart E.1, left panel, blue bar).[64]

**Chart E.1**

Cost of BBMs under different levels of bindingness and cost of capital-based measures under different bank profitability conditions

(percentage level deviations)




Sources: ECB and ECB calculations.
Notes: Bars show the response of the economy to the phasing-in of BBMs within the EA triggering a stable 2% decline in credit. Blue (yellow) bars show the benchmark (more binding) scenario.

**To the extent that monetary tightening has positive effects on bank profitability, the activation costs for capital-based measures are lower as banks are better able to generate capital.** Tightening monetary policy can have positive effects overall on bank profitability via the net interest income channel, as suggested by Borio et al. (2017). Altavilla et al. (2018) find that the effects of accommodative monetary policy on non-interest income and on loss provisions can

[63] More precisely, the targeted credit limit of the model is reduced over ten years, to take into account that the model features just one debt period. In this way, one can consider that BBMs act on credit flows. The larger the duration in the economy, the longer the period for the BBMs to be fully phased in. The BBMs are activated so as to target a stable 2% reduction in credit.

[64] Should the monetary tightening last for too long or household conditions deteriorate, the credit limits would become binding for a larger fraction of households and the costs of the phase in would be larger.

substantially counter the effect on the interest rate margin, supporting bank profitability. When bank profitability is high, as in the baseline, the peak in the cost of increasing capital-based measures by 1% would lead to a drop of 0.12% in GDP (see Chart E.1, right-hand side, yellow bar). In the case of even higher profitability, activation costs would drop slightly in absolute terms (-0.1%, blue bar), whereas such costs would increase in absolute terms under lower profitability (-0.15%). Under the high profitability scenario, banks are able to comply with the new capital-based measures by increasing capital using retained earnings, rather than by deleveraging.

**Strong monetary policy tightening exposes households to interest rate risk and related vulnerabilities, particularly in countries with a predominance of floating rate mortgages, whereas banks become more vulnerable in countries with a predominance of FRMs.** A second simulation shows the implications of a high interest rate environment in the event of risk materialisation.[65] The distress scenario features an increase in the risk to which households are exposed (an exogenous increase in household asset volatility mimicking a deterioration in their capacity to repay their debt) and a banking risk shock (an exogenous increase in bank asset volatility mimicking an increase in their funding cost). The simulations consider the differences in vulnerability faced by floating rate countries and by fixed rate countries. The shocks capturing risk materialisation are calibrated consistently with the probabilities of default resulting from Giannoulakis et al. (2023) disaggregated by countries with a predominance of floating rate mortgages and fixed rate mortages. Probabilities of default three times larger than those estimated by Giannoulakis et al. (2023) are assumed in order to resemble a distress scenario (Chart E.2).[66] The materialisation of those risks triggers a drop of 2.8% and 2.4% in GDP for floating rate and fixed rate countries respectively (Chart E.2, top charts, blue lines).

**BBMs and capital-based measures can help substantially in reducing financial amplifications: BBMs (capital-based measures) are relatively more beneficial for floating rate (fixed rate) countries.** To assess the benefits of the macroprudential measures in place, the same simulation is run when BBMs and capital-based measures are activated. BBMs limit borrower indebtedness, primarily at the tail of the distribution, thus reducing their probability of becoming financially distressed, while capital-based measures increase bank resilience and reduce the probability of banks becoming distressed. Where BBMs are in place, in the distress scenario the reduction in GDP would be 2.1 percentage points less among floating rate countries and 1.3 percentage points less among FRM countries (Chart E.2, top charts, yellow lines). Where BBMs are present, most of the financial amplification related to a materialisation of credit risk affecting households would not come into play. House prices would fall by 3.6 percentage points (2 percentage points) less among floating rate (fixed rate) countries, whereas the increase in household probability of default would be 2.5 percentage points (1.6 percentage points) smaller among floating rate (fixed rate) countries. Meanwhile, bank probability of default amid the presence of BBMs is 0.6 percentage points (0.4 percentage points) lower among floating rate (fixed rate) countries, in line with the findings of Lo Duca et al. (2023). Should BBMs be released before the stress materialises, or should the shocks materialise before the BBMs are fully phased in, the beneficial effects of a reduction in the financial accelerator would be smaller. By contrast, capital-based measures would reduce the amplification of the stress scenario by 0.4 percentage points in terms of GDP for FRM countries and by 0.2 percentage points among floating rate countries (Chart

[65] Boissay et al. (2023a) show that crisis probabilities are higher after monetary policy tightening.

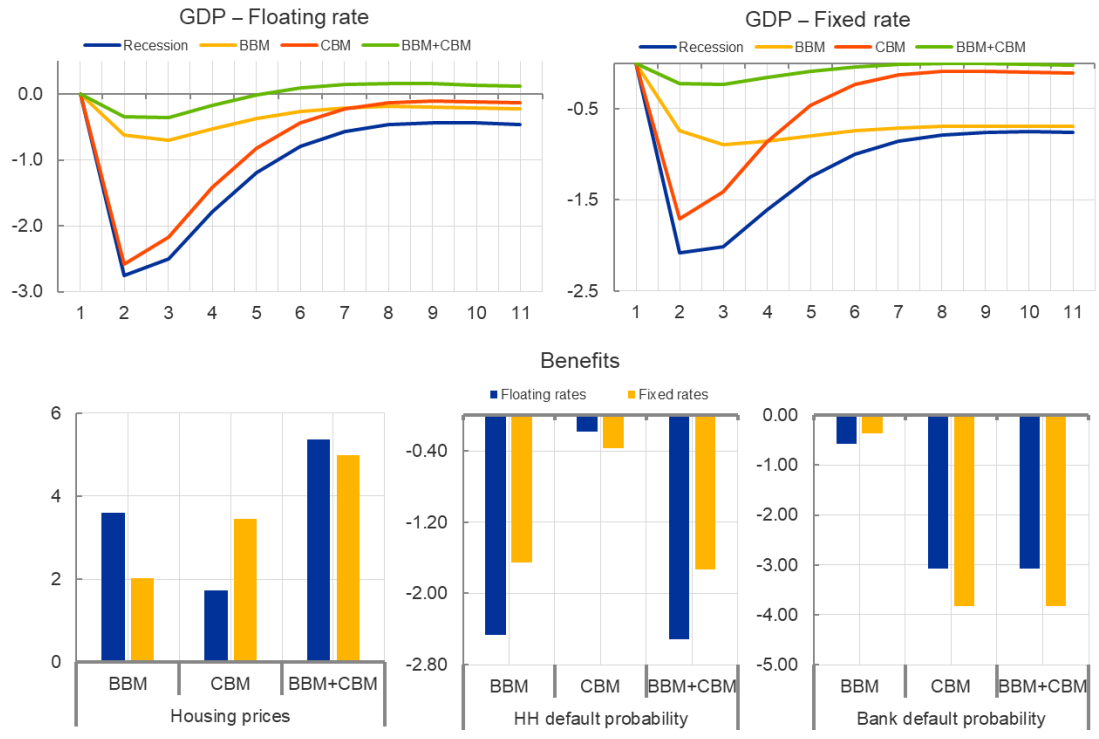
[66] Default probabilities are higher in floating rate countries due to the greater pass-through of monetary policy to lending rates. The opposite elasticity is assumed to calibrate the default probability of banks where banks in fixed rate countries bear the costs of the monetary policy tightening to a larger extent.

E.2, top charts, red lines). As shown in the bottom-left panel of Chart E.2 below, the fall in house prices in the presence of capital-based measures would be 3.5 percentage points (1.7 percentage points) smaller among fixed rate (floating rate) countries. Capital-based measures would also help to limit the increase in the probability of distress for banks (3.8 percentage points in fixed rate countries and 3.1 percentage points in floating rate countries) and would marginally contain the probability of households encountering distress. BBMs and capital-based measures contribute to reducing macroeconomic volatility via different channels: BBMs make households more resilient, while capital-based measures reduce bank volatility with respect to risk shocks (see Lo Duca et al., 2023). The benefits of capital-based measures would be greater for FRM countries as the build-up of risks would be greater within the banking sector than in the household sector. Meanwhile, BBMs would be relatively more beneficial in floating rate countries, since the consequences of risk materialisation due to higher household vulnerability would be higher. This exercise also shows that a combination of capital-based measures and BBMs can notably increase the resilience of the financial sector to different types of stress and reduce the volatility of the economy under the adverse scenario (in line with the findings of Lo Duca et al., 2023).

**Chart E.2**

Benefits of BBMs and capital-based measures in countries with a majority of floating rate mortgages versus fixed rate mortgages

(percentage level deviations)




Sources: ECB and ECB calculations.
Notes: In the upper panels, the lines show the response of the economy to the materialisation of cyclical risks, determined by a mix of household and bank financial shock for floating rate countries(left panel) and fixed rate countries (right panel). The blue solid line depicts the baseline scenario. The yellow line depicts the scenario where BBMs are phased in and the red line shows the scenario where capital-based measures (CBMs) are activated. The green line shows the scenario where both macroprudential instruments are activated. In the lower panels, the bars show the benefits in terms of reduced amplification following the introduction of macroprudential measures (BBMs, CBMs and both instruments) for Housing prices, HH probability of default and Bank probability of default. The blue (yellow) bar depicts the benefits for floating rate (fixed rate) countries, where BBMs have been activated and shield the economy from the recessionary effect of the financial accelerator.

# 5 Conclusions

**In recent times, monetary policy and inflation considerations have been playing an increasingly important role for macroprudential authorities in their policy setting, as indicated in national notifications to the ESRB/ECB.** While monetary policy and inflation considerations were cited in notifications of capital-based measures during both low and high inflation periods between 2015 and 2023, they have become more prominent since 2022, as shown in Box A. For BBMs, evidence gathered from notifications sent to the ESRB and from national authorities' own websites also suggests that monetary policy-related concerns have influenced their decisions to some extent.

**Macroprudential policy builds resilience and limits the accumulation of vulnerabilities.** Capital-based measures build resilience by increasing the loss-absorbing capacity of banks and therefore help to support the flow of credit in a downturn, while BBMs safeguard the lending standards of borrowers. As discussed in Section 2, empirical evidence shows the effectiveness of macroprudential policies in increasing resilience, by contributing to reduce the probability of a crisis materialising and containing the build-up of vulnerabilities. Various empirical studies also suggest that macroprudential policy has a relatively small impact on real economic activity in the short term. However, the costs of macroprudential policy depend on the prevailing conditions within the financial sector, on the bindingness of the measures and on the transition period considered.

**Looking at the interaction between macroprudential and monetary policies, both are largely complementary, although monetary policy may generate relevant spillovers due to its impact on the financial cycle and, potentially, on financial stability.** In the long term, both policies complement each other to a large extent, as price stability is a precondition for financial stability and vice versa. However, in the short term, there may be trade-offs related to the unintended side effects of monetary policy. As both policies operate through common transmission mechanisms, they can affect each other's final objectives. In addition, monetary policy can generate relevant spillovers due to its impact on the financial cycle. From a macroprudential policy perspective, this implies that monetary policy stance matters when it comes to the design, timing and calibration of macroprudential policy.

**The complementary role of macroprudential policy becomes even more relevant in the case of a single monetary policy with shared responsibilities for macroprudential policy among national authorities and the ECB.** This shared responsibility reflects the fact that financial imbalances often build up along national borders. With its granular and targeted instruments, macroprudential policy is the most appropriate tool for mitigating potentially systemic, asymmetric financial developments or shocks in specific areas, be it at the country, sector or financial institution level.

**De-synchronised business and financial cycles and inflationary supply shocks amid the pandemic and geopolitical tensions have posed a challenge to the classical notion of "complementarity" between macroprudential and monetary policies**. Measures for the euro area's business and financial cycles suggest increasing divergence, in both real and nominal terms, over the extended COVID-19 period. While for synchronised financial and business cycles, complementary macroprudential and monetary policies may largely move in the same tightening or loosening direction, de-synchronised cycles and inflationary supply shocks complicate the interaction between the two sets of policies.

**However, the recent focus of macroprudential policy on resilience suggests an expansion of the notion of complementarity with monetary policy.** With the build-up of resilience, macroprudential policy acts de facto countercyclically, smoothing the financial and business cycle in the event of risk materialisation. Therefore, macroprudential policy provides space for monetary policy to pursue its objectives more effectively without risking unintended side effects on financial stability. This may result in both policies heading in the same direction, despite divergence in the business and financial cycles, or even in a parallel tightening of both polices despite a synchronous contraction of the financial and business cycles (e.g. in the event of inflationary supply shocks), insofar as banking sector conditions ensure no unwarranted procyclical effects of macroprudential tightening.

**Specifically, with the build-up of resilience, macroprudential policy acts de facto countercyclically, supporting monetary policy in its pursuit of price stability.** A key concern for the direction of optimal macroprudential policy is not so much the direction of monetary policy per se, but more whether there is a build-up of financial vulnerabilities and/or whether such vulnerabilities still persist, or whether risks are materialising. If there are negative demand or negative supply shocks prevailing in the economy, the risk of procyclicality of macroprudential policy must also be taken into account. In that case, prevailing and expected conditions in terms of bank capital and profitability and the existence of binding capital-related supply constraints need to be monitored. By pre-emptively increasing the loss-absorbing capacity of the financial sector (via adequate capital buffers) and by promoting the financial soundness of borrowers (via BBMs), macroprudential policy can build up the necessary resilience to absorb unexpected monetary policy shocks and the side effects of strong monetary policy tightening and loosening phases. Therefore, it still acts effectively and countercyclically even if the build-up is largely irrespective of the direction of monetary policy. This holds as the built-up resilience smooths the financial and business cycles in the event of risk materialisation and it becomes particularly relevant for strong and/or lasting monetary policy changes.

**Sufficient loss-absorbing capacity in the financial system allows for the two key policy objectives (financial stability for macroprudential policy and price stability for monetary policy) (largely) not to be in conflict.** When macroprudential and monetary policies primarily focus on their own objectives, macroprudential policy is the first line of defence in addressing financial stability risks, although that does not imply that macroprudential policy should not respond to monetary policy stance: if strong shifts in this stance, irrespective of direction, create

additional financial stability risks, macroprudential policy might have to build up resilience against such vulnerabilities.

**Since the pandemic, the build-up of capital-based measures has focused on preserving banking sector resilience, in both the euro area and the EU.** The further development of cyclical capital buffers will also depend on the nature of the shocks that may affect economies, on the course of monetary policy, on its effects on financial conditions, and on the existing vulnerabilities and on the capital position of the banking system (Section 3). Box B illustrates how monetary policy tightening can affect credit growth and cyclical risks, potentially influencing the build up speed of capital requirements.

**Going forward, when the financial cycle turns negative, macroprudential authorities may still find good reasons to strengthen bank resilience, provided that conditions within the banking sector ensure no unwarranted procyclical effects, independently of monetary policy, although there may also be a case for a (partial) buffer release**. The marginal gains of building up releasable buffers are larger for countries that do not have them yet. However, should countries reach the initial risk materialisation phase, macroprudential authorities may decide to (partially) release cyclical buffers. There are substantial medium-term gains from releasing available capital buffers once adverse conditions materialise, to the extent that banks are able and willing to use them. In the event of a disorderly risk materialisation, macroprudential authorities will likely need to release cyclical buffers, acting in the same direction as monetary policy. Looking ahead, when countries are in the early build-up/neutral phase of the financial cycle, macroprudential policy could be tightened pre-emptively, particularly when inflation is below target and monetary policy has been loosened. Should the financial cycle build-up reach the stage of exuberance, macroprudential and monetary policies are likely to move in tandem in a tightening direction.

**BBMs have become one of the key instruments in the macroprudential toolkit over the last ten years when it comes to building resilience.** Their primary goal is to build resilience among households by reducing the risk of over-indebtedness, promoting the adoption of prudent lending standards and making household financing more sustainable, thus improving the quality of bank loan books and making the financial system more resilient. The effectiveness of BBMs and their costs for the economy depend on the fraction of borrowers whose debt decision is ultimately constrained by the measures. In countries where they have been activated so far, BBMs are largely perceived as structural measures and are not meant to change substantially across the financial cycle. While their use has become widespread over the last ten years, it still remains heterogeneous across European countries, also in their specific design at national level.

**The source of inflationary shocks (supply versus demand side) and the prevailing monetary environment affect the intensity, speed and extent of buffer build-up or release within each stage of the financial cycle while also affecting the bindingness of BBMs**, as discussed in Section 3. Inflationary pressures related to supply-side shocks, as well as monetary policy tightening, tend

to make income-based BBMs more binding. At the same time, monetary policy tightening has a less direct and more ambiguous effect on LTV limits (see Section 4).

**A high interest rate and high inflation environment increases the benefits associated with BBMs, especially for countries with predominantly floating interest rate mortgages.** In this new environment, the economic costs of applying these measures still remain limited on aggregate and are outweighed by the benefits stemming from their activation (Box E). The benefits deriving from BBMs will be even larger for countries with a predominance of floating rate mortgages.

**The new environment of high interest rates highlights the importance of considering the structural features of mortgage markets when designing BBMs, while allowing for some flexibility via exemption clauses.** BBMs are mainly designed as backstops to safeguard lending standards and are therefore not to be used in a cyclical manner. However, their design should include a degree of flexibility, via exemption clauses or other features, allowing them to be adjusted accordingly in response to any economic or inflationary shocks and to the monetary policy stance. Hence, depending on the specific design of the existing BBMs, the risks concerning a potential disorderly correction of real estate prices and an amplified slowdown in credit growth may justify loosening the BBMs applied in some countries where there are no exemption clauses already built in.

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