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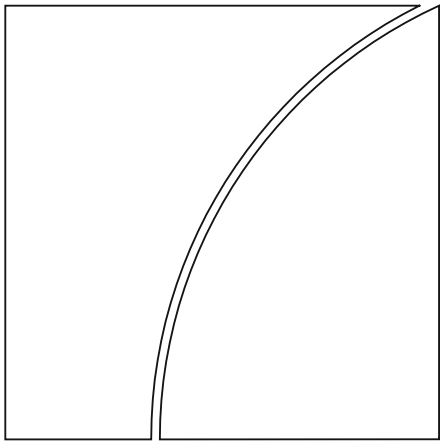

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# Macroprudential policies to mitigate housing market risks

Country case study: the Netherlands

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# Macroprudential policies to mitigate housing market risks Case study – the Netherlands

Author: Lu Zhang (De Nederlandsche Bank)

## Summary

Macroprudential policy plays a key role in containing financial stability risks stemming from the housing market. This article provides a case study on the macroprudential framework targeting housing risks in the Netherlands. I discuss the borrower-based and capital-based measures that are currently in place and reflect on the lessons learned.

## 1. Housing as a source of risk

The Dutch housing market is cooling down. As a result of sharply increased mortgage interest rates (200 basis points in one year, Graph 1), Dutch house prices are falling. This marks the end of a long period of sustained growth since 2013, a boom that was particularly pronounced during the pandemic. In the period June 2013 to July 2022, nominal house prices nearly doubled. Prices (mom) fell in the second half of 2022 and are expected to fall by 5.1% in 2023 and 3.8% in 2024 (yoy; DNB (2023a)). Furthermore, we observe a slump in market activity. The number of transactions decreased by 15% in 2022 compared to 2021. The share of transactions involving overbidding fell from 82% in the second quarter of 2022 to 31% in the first quarter of 2023 (Graph 2).

House price movements demonstrate strong cyclical characteristics and are amplified by structural factors. The Dutch housing market is prone to boom-bust cycles. House prices depend mainly on the borrowing capacity of home buyers (Eijsink and van Dijk (2023)), which could in turn be explained by: i) existing regulations, such as the loan-to-value (LTV) and debt service-to-income (DSTI) limits; ii) financial conditions, particularly mortgage interest rates; and iii) macroeconomic developments, including wage growth and unemployment. This has been amplified by a persistent scarcity of supply, owing in part to limited building locations and a time lag in construction as a result of zoning and environmental restrictions, and in part to demographic changes, such as the changing composition of households and declining residential mobility. Another important factor is the small liberalised rental sector, which does not constitute a good alternative to buying. Only 7% of all existing homes are private rental homes. About 33% is social rent housing, about 60% for owner-occupiers.

Dutch households are highly indebted. They have remarkable balance sheets compared to households in other countries, in particular their high levels of pension entitlements (due to mandatory pension contributions) and mortgage debt. Sixty per cent of the Dutch have a mortgage, the highest percentage in Europe (DNB). Household debt to GDP, which comprises mostly mortgages, is the highest in the euro area (94% of GDP in 2022; CBS). High debt levels are mainly driven by a combination of three factors: i) a generous fiscal subsidy in the form of mortgage interest rate deductibility (MID); ii) a high LTV ratio: with a maximum LTV ratio of 100%, home buyers can currently still finance their entire house purchase with a mortgage, making the Netherlands an outlier in Europe; and iii) a large share of interest-only (IO)

loans. To date, IO loans still constitute 45% of the total outstanding mortgage loans in Q1 2022, although the share of IO loans in new production (including refinancing) has declined from 58% in Q4 2013 to 44% in Q1 2022.

Banks are the biggest players in the Dutch mortgage market and are systemically relevant. Their resilience is especially important from a macroprudential perspective. Dutch banks are highly exposed to the Dutch housing market, as 23% of their assets, on average, are domestic mortgage loans. At the end of 2022, they accounted for EUR 550 billion, or 69% of total outstanding mortgage loans (Graph 3). Bank mortgage lending increased sharply from the 1990s until the Great Financial Crisis (GFC) and has remained weak afterwards. Institutional investors – pension funds, insurers and investment funds – have been gaining market share. They account for 87% of the total increase in outstanding mortgage loans to Dutch households over the period from 2014 to mid-2022 (DNB).[1] Since 2016, DNB has been collecting loan-level data to monitor the developments and risks associated with mortgages issued by major non-bank lenders.

An orderly correction of house prices is unlikely to result in financial stability concerns. Mortgage losses for financial institutions have remained low due to government guarantees (see Appendix for more details), high payment morale and a strong legal position of creditors in the event of defaults. Furthermore, we see that mortgage lending growth – especially compared to house price growth – has remained relatively limited in recent years, in contrast to the run-up to the 2007–08 crisis (Graph 3). Also, higher mortgage rates will only gradually affect households' monthly expenses. Almost 60% of mortgages originated in 2022 still had interest rates fixed for longer than 10 years, compared to only 5% in 2013 (DNB (2023b)). Perhaps more importantly, banks are better capitalised now compared to the GFC period and households are in better financial positions and are more resilient to negative shocks. Mortgage debt is lower relative to disposable income (OECD) and households have more savings. In addition, the labour market remains tight, with a historically low unemployment rate and considerable wage growth.

Downside risks could arise from indirect effects on household consumption and from deteriorating consumer sentiment. High leverage makes the Dutch economy more cyclical to house price developments. House prices directly affect consumer confidence, spending and investment. Any (expected) fall in house prices could lower both consumption and growth, potentially threatening the debt service capacity of both households and firms, which could have repercussions for financial institutions. When house prices fell by more than 20% during the GFC, many Dutch households were in negative equity and had to cut back consumption to repay their debt. This further amplified the economic downturn (Zhang (2019)).

# 2. Governance and objectives

## 2.1 Governance

The establishment of the Financial Stability Committee (FSC) has strengthened institutional arrangements for macroprudential policy setting in the Netherlands, but further measures are recommended. The FSC was formed in 2012, to act as a forum for discussions and coordination on Dutch macroprudential policy. Its task is to identify risks to financial stability and to issue non-binding recommendations to address these risks. The FSC meets at least twice a year and is chaired by the president of DNB. Two other institutions are also represented, namely the Dutch Authority for the Financial Markets (AFM) and the Ministry of Finance

[1] Other financial institutions (OFIs), which largely consist of finance companies and securitisation vehicles, have seen a downward trend. The decline is related to banks securitising fewer mortgages on the one hand, and stricter accounting rules on the other, which increasingly require banks to leave securitised residential mortgage loans on their own balance sheets.

(MoF). The Netherlands Bureau for Economic Policy Analysis (CPB) participates in an advisory role. The FSC does not decide on macroprudential policy measures itself. To enhance its effectiveness, the European Systemic Risk Board (ESRB) and IMF have recommended that the FSC be established in primary legislation with powers to issue macroprudential policy recommendations on a "comply or explain" basis to both DNB and the MoF.

Conducting macroprudential policy is a shared competency between various national authorities and European agencies. DNB conducts macro- and microprudential policies for banks according to the Capital Requirements Directive IV (CRD IV) and Capital Requirements Regulation (CRR). The European Central Bank (ECB) can apply more stringent measures, including higher capital buffers (the so-called "topping-up power"). The MoF sets limits on LTV and DSTI ratios in collaboration with the Ministry of the Interior and Kingdom Relations based on inputs from the National Institute for Family Finance Information (NIBUD). The ESRB can issue recommendations on a "comply or explain" basis. The AFM, as the market conduct supervisor, is responsible for supervising any deviation of the LTV and DSTI limits as there is a "comply or explain" option outlined in the MoF's legislation. DNB monitors developments and conducts impact analyses based on loan-level data collected from banks to support the FSC's role.

## 2.2 Objectives

The ultimate objective of macroprudential policy is to safeguard financial stability. This includes strengthening the resilience of the financial system as a whole and limiting the build-up of systemic risks, thereby ensuring the sustainable and effective provision of financial services to the real economy.

Real estate is at the core of macroprudential policy. It is not only the largest component of household wealth; it is also primarily financed by banks. Given high leverage and procyclical characteristics, the real estate sector is a crucial element in financial stability policy. In the Dutch context, borrower-based and capital-based macroprudential measures (BBMs and CBMs) are currently being used to target real estate-related risks. There is a strong focus on enhancing the resilience of borrowers and lenders against housing shocks and less on actively managing the housing cycle. This focus reflects a common limitation of macroprudential policy. As Borio (2014) put it, "macroprudential policy *must* be part of the answer but it *cannot* be the *whole* answer". Other policies also need to play their part, not least monetary policy and structural housing policies.

BBMs strengthen the resilience of borrowers and, consequently, of lenders against the potential build-up of vulnerabilities stemming from the real estate market. BBMs such as the LTV and DSTI limits directly impose limits on the terms and conditions of lending related to the riskiness of mortgage loans. They make debt more sustainable, thereby reducing the probability of default (PD) of individual borrowers in the event of adverse shocks as well as limiting amplification effects on consumption and economic growth. Additionally, BBMs improve the quality of banks' mortgage loan portfolios through more prudent lending standards which gradually temper risk. In addition to these two objectives, BBMs tend to limit excessive credit growth during the upward phase of the credit cycle and, to some extent, curb real estate price growth. Therefore, they are preferred measures in early phases of cycles to limit the build-up of systemic risks.

CBMs primarily enhance the resilience of lenders. As necessary complements to BBMs, CBMs, explicitly prescribed in the CRD IV and CRR, aim to improve the resilience of banks. For example, by imposing higher risk weights applicable to exposures secured by mortgages on residential property, major Dutch banks are forced to hold more capital for their mortgage portfolios. This creates an added loss-absorbing capacity against housing downturns.

# 3. Macroprudential instruments in practice

## 3.1 Borrower-based measures

To contain the build-up of potential vulnerabilities from new mortgage loans, the statutory LTV limit has been in place since 2013. The limit is applicable to all mortgages provided by financial institutions in the Netherlands. It was reduced by 1 percentage point per year from 106% in 2013 to 100% by 2018. It has been kept at 100% since then. Financing up to 106% is allowed in cases where 6% is put towards energy saving measures. Despite the reduction, the LTV limit is still high in international comparison. In May 2015, the FSC recommended further reduction of the LTV limit to 90% after 2018, by keeping up at least the pace of 1 percentage point decrease per year. The MoF did not follow up on the advice due to a reluctance to constrain first-time buyers' access to the housing market.

The DSTI limits have been legally binding since 2013. The regulation applies to all borrowers who want to obtain a mortgage from any financial institution. A DSTI limit establishes the maximum percentage of annual disposable income that can be spent on mortgage payments (interest and amortisation). The maximum percentage is determined annually by the ministries based on recommendations of the NIBUD. The NIBUD first derives the annual disposable income by taking the annual gross income and subtracting taxes, pension premiums and non-housing expenses. Subsequently, it calculates the maximum percentage of serviceable mortgage debt, which varies by income and mortgage rates. Additionally, different limits apply to borrowers above the statutory retirement age given different treatments of taxes and pension premium changes after retiremewwnt. Lastly, mortgage lenders are required to apply a "stressed" interest rate, currently set at 5% by the AFM, when calculating DSTI ratios for mortgages with interest rates fixed for less than 10 years.

Fiscal reforms contribute to the reduction of housing-related risks. Generous tax relief has contributed to a high level of household debt and incentivised the uptake of IO mortgages. Since January 2013, new mortgage loans are only eligible for mortgage interest deductibility (MID) if they are amortised within 30 years. Newly originated IO mortgages are no longer eligible for MID. Furthermore, with the introduction of the Code of Conduct for Mortgage Financing of the Dutch Banking Association and the Dutch Association of Insurers, the IO proportion in new mortgages was capped at a maximum of 50% of the home value – this has subsequently led to a reduction in the issuance of IO mortgages. In addition, plans were made to reduce the MID rate by 0.5 percentage points per year from 52% to 38% in 2042. The phase-out of the MID has now been accelerated to 37% in 2023; this was announced in the Dutch coalition agreement in January 2020. Ultimately, these reforms offer strong fiscal incentives to reduce household indebtedness and lower credit risks for financial institutions.

## 3.2 Capital-based measures

DNB introduced a floor for risk weighting on residential mortgage loans (the so-called 458 measure) on 1 January 2022. This measure, based on Article 458(2)(d)(iv) of the CRR, requires banks to apply minimum average risk weights to exposures to natural persons secured by mortgages on residential property located in the Netherlands, excluding loans wholly or partially covered by the National Mortgage Guarantee (NHG) scheme (see details in the Appendix). The loans covered by the scheme will be safer when systemic risks materialise. The floor is applicable to six banks using the internal ratings-based (IRB) approach to calculate regulatory capital requirements, including major Dutch banks, such as ING Group NV, ABN AMRO Bank NV and Rabobank, which account for nearly 90% of the total mortgage exposure of the banking sector.

The measure is intended to increase the average risk weights of IRB banks' domestic loan portfolios. Dutch banks are particularly vulnerable to a house price correction given their traditionally light covers on residential mortgages due to historically low default rates. Risk weights assigned to Dutch mortgages are among the lowest in the European Union. The average risk weights of domestic mortgage loans of IRB banks have steadily decreased from 13.2% in the first quarter of 2014, to 9.7% in the third quarter of 2019 and 7.3% in the first quarter of 2021. In contrast, banks that follow the standardised approach applied an average risk weight for domestic mortgage loans of 38% in the third quarter of 2019 – more than four times higher than that of IRB banks. Because of the decrease in the average risk weights, the macroprudential risk weight floor measure applied to IRB banks requires them to hold more capital to ensure that they are sufficiently resilient if housing risks materialise.

The floor is calibrated to be risk-sensitive. A risk weighting floor of 12% is imposed on mortgages with LTV ratios of up to 55%. Any loans or parts of loans with an LTV above that threshold are assigned to a risk weighting floor of 45%. This implies that risk weights of individual loans increase with their LTV ratios: from 12% for loans with an LTV ratio up to 55% to 26.85% for loans with an LTV ratio of 100%; see Graph 4. An LTV-dependent floor means the capital impact is larger for more risky (higher LTV) loan portfolios. This should reduce the attractiveness of these loans for IRB banks.

DNB has conducted two analyses to inform the calibration of the measure (see the DNB 458 notification template). First, it ran a top-down stress test on the basis of the adverse scenario that was also used in the EU-wide stress test conducted by the European Banking Authority (EBA) in 2018. In this scenario, Dutch house prices were around 25% lower after three years compared with the baseline scenario. While the EBA stress test is based on constrained bottom-up calculations from banks' own models, the top-down model is designed to provide conservative estimates by using a uniform approach to calculate expected losses for all banks. This approach is more macroprudential in nature, in that it explicitly takes into account observed losses at the national level and ensures that the results for individual banks are consistent at the macro level. The top-down stress test shows that the average risk weight for mortgage loans could increase by as much as 8–11 percentage points in an adverse scenario, which was larger than the increase in average risk weights found in the 2018 EBA stress test based on constrained bottom-up calculations. The results suggest that part of the potential increase in the average risk weights (approximately 3–4 percentage points) found in the top-down analyses is not reflected in the current capital requirements of banks.

Second, DNB projected potential credit losses in a stress scenario for the housing market. It performed a sensitivity analysis where PDs and LGDs increase over a three-year period in line with the maximum increases that were observed during the previous housing market correction. We found that banks would incur sizeable losses on their mortgage portfolios in such a scenario. These estimates indicate that banks would need to increase their capital by around EUR 3 billion over a three-year period to maintain their current capital levels. Based on these analyses, the calibration informed how much risk weights would need to change to ensure that banks would be sufficiently resilient in case of a materialisation of systemic risk in the housing market.

The pandemic has affected timing of activation. DNB first announced its intention to introduce the measure on 15 October 2019. Following public consultation and the notification of the relevant European institutions, DNB intended to take the final decision in March 2020 and the measure was due to take effect in autumn 2020. However, on 17 March 2020 DNB decided to postpone the introduction of the measure in light of the coronavirus outbreak and its potential impact on the Dutch economy and the financial sector. In October 2020 DNB announced that the measure would not come into force before the end of 2021. On 21 June 2021 DNB decided not to further postpone its introduction and announced that the measure would come into force as of 1 January 2022. In October 2022 DNB announced that the measure would be extended for another two years. The measure will be in effect at least until 1 December 2024.

# 4. Effectiveness

## 4.1 Measuring success

BBMs have improved borrower resilience. While it is difficult to pinpoint the impact of LTV and DSTI limits separate from broad housing reforms (through lower fiscal subsidies) since 2013, Dutch homeowners have become less vulnerable to housing risks. Household debt as a percentage of net disposable income fell from 282% in 2010 to 222% in 2021 (OECD), although the level is still high. Moreover, a steep rise in house prices and an economy-wide shift to full amortisation of mortgage loans have led to a sharp decline in the average LTV ratios. As a result, homeowners are less likely to go into negative equity (or "under water") in the event of falling house prices compared to the previous crisis (CBS). A scenario analysis shows that a house price fall of 20% would cause 8% of homeowners to go into negative equity.[2] These would include particularly recent home buyers, who have not yet built sufficient home equity though benefiting from house price increases and/or voluntary and regular repayments.

BBMs have boosted lender resilience. They are efficient in mitigating losses stemming from the mortgage loan portfolio by decreasing the PD as well as the LGD. Using loan-level data on mortgage loans originated by Dutch banks from 1996 to 2015, De Haan and Mastrogiacomo (2020) show that the originating LTV ratio and the DSTI ratio are significantly positively associated with the probability of non-performance.

CBMs have further strengthened bank resilience. In contrast to BBMs targeting new mortgages, CBMs apply to the stock of outstanding mortgages. The 458 measure turned out be binding for five out of six IRB banks. It was expected to increase the average risk weights by 3–4 percentage points (from 11% to 14–15%, roughly the level in 2015). Based on Q4 2021 data, the measure is expected to result in an aggregate increase in the total capital requirement for the IRB banks of EUR 4.5 billion (EUR 3 billion calibrated in 2019), of which more than EUR 3 billion (EUR 2 billion in 2019) is CET1 capital. The amount of additional capital is sufficient to cover projected credit losses calibrated using loss data from the previous housing crisis. While the activation of the countercyclical capital buffer (CCyB; DNB announced the activation "from 0% to 1%" in May 2022 and subsequently increased it to "from 1% to 2%" in May 2023) does not specifically target housing risks, it nevertheless further increases banks' capital buffers and their overall resilience by building buffers in upturn periods, which can be subsequently released if (cyclical) risks start to materialise.

The evidence on how BBMs affect the riskiness of new mortgages is mixed. BBMs only apply to newly originated loans. There is evidence that the average LTV ratio of new mortgages is on average declining. It remains high, however, particularly among buyers aged below 36 (average LTV = 85%). Fifty-four per cent of buyers aged below 36 and 25% of over-35s were still borrowing more than 90% of the value of their home in Q3 2021.[3] Risky borrowing behaviour became more prevalent during the recent boom period. In Q1 2022, 54% of buyers aged below 36 and 44% of over-35s borrowed more than 90% of the maximum amount indicated by the LTI norms, compared to 46% and 31% at the end of 2018, respectively.[4] Moreover, since the beginning of 2021, the share of IO mortgages has been increasing among

[2] See FSR Autumn 2022, Figure 20.

[3] See FSR Autumn 2022, Figure 10.

[4] See FSR Autumn 2022, Figure 11.

all age groups.[5] Going forward, the sharp rise in mortgage interest rates is likely to make IO mortgages unattractive because households do not qualify for MID.

### 4.2. Interaction between macroprudential measures

Interaction among measures needs to be considered. BBMs and CBMs are complements in enhancing borrower and lender resilience. Given that BBMs are not under the remit of DNB, CBMs are primarily used to enhance lender resilience. Moreover, the 458 measure was taken because housing risks are not sufficiently addressed by other generic measures, such as the O-SII buffer and the CCyB. Considering BBMs, the LTV and LTI limits are complementary in enhancing the quality of mortgage loans. Their interaction can, however, be more subtle. LTV limits tend to be more binding for first-time buyers who lack existing home equity to finance house purchases, whereas DSTI/LTI limits are more binding for low-income buyers. Caloia (2022) shows that LTV limits are more binding than LTI limits in the Netherlands: the progressive 6% reduction in the LTV limit during the period 2012–18 impacted up to 45% of highly leveraged borrowers. This is because increasing house prices act as additional binding constraints.

### 4.3 Leakages

Careful ex ante policy design could limit leakages. The effectiveness of macroprudential policies may be limited by circumvention, particularly through policy leakages to non-banks and across borders. Macroprudential measures have been partly circumvented by non-banks when they are subject to less stringent regulation. This is not the case for BBMs in the Netherlands as they are applicable to all financial institutions. While non-banks' mortgages have some different characteristics compared to bank mortgages, for example a longer interest rate fixed period and a larger proportion with the NHG (DNB (2016)), we find no evidence that non-bank mortgages are riskier than those issued by banks. Additionally, mandatory reciprocation (eg for the 458 measure) helps avoid cross-border leakages and ensure a level playing field. Foreign banks have a limited presence in the Dutch mortgage market. Cross-border leakages do not appear to be a major concern.

## 5. Cost, benefits and unintended consequences

BBMs may involve policy trade-offs in the short run. They affect borrowing capacity and could reduce or delay demand for housing, thereby dampening credit, house prices and aggregate demand in the near term. A large number of cross-country studies support macroprudential policy's role in containing vulnerabilities ex ante, particularly in slowing growth in credit and real estate prices (see a comprehensive review in Patnam et al (2020)). While policy trade-offs may arise between financial stability benefit and macroeconomic costs in the short run, in the long run, a robust and resilient financial system enhances banks' lending capacity and monetary policy transmission and has positive effects on economic growth.

BBMs have non-trivial macroeconomic impacts in the Netherlands. Everett et al (2020) show that mortgage credit growth of Dutch banks is strongly influenced by monetary policy shocks, while there is no evidence for the significant impact of (macro)prudential policies on mortgage lending. The authors argue that even though prudential regulation in the Netherlands has become stricter, it may still be the case that it is not yet binding enough for it to have a clear impact on the financial cycle. Moreover, most of the

[5] See FSR Spring 2022, Figure 7.

prudential measures, in particular the lender-based macroprudential ones, have been primarily directed at building up resilience. De Jong and de Veirman (2019) find that the tightening of LTV limits in the Netherlands has considerable effects on real house prices and real GDP: a decrease in real GDP by 1.50% 10 years after the initial shock and a decline of 3.52% in real house prices.

BBMs tend to be associated with some negative welfare and redistribution effects. Elbourne et al (2020) show that while limiting LTV and LTI ratios reduces excessive debt for those households affected by the restrictions, it also reduces welfare for this group because tightening borrowing space limits intertemporal consumption smoothing. Moreover, the measures may be accompanied by redistribution effects. Households that are financially constrained can borrow less, so demand for housing falls. The resulting lower house prices benefit households that are not financially constrained. Another potential side effect is to make the housing market less accessible, particularly for first-time buyers. Biesenbeek et al (2022) analyse this issue in the Dutch context. The effect of the LTV limit on the transition to first-time homeowner is quite small, approximately 6%. Other developments, notably rapidly increasing housing prices, have put much larger constraints on home ownership.

## 6. Relevant policy considerations

Recent experiences with different policy tools in the Netherlands provide several lessons for an effective macroprudential framework for the housing market (Hilbers and van Hengel (2019)).

Macroprudential policy has a key role to play in containing financial stability risks stemming from the housing market. The combination of BBMs and CBMs enhances borrower and lender resilience and limits the build-up of system risks. However, macroprudential policy has its limits. It operates in a wider housing market and cannot address structural imbalances affecting house prices. These imbalances are better tackled by fiscal measures and housing policies. One can only reduce housing market vulnerabilities effectively if the full set of policy instruments works consistently in the same direction: lowering fiscal subsidies, lowering supply constraints, tightening lending standards and increasing the resilience of households and banks.

Governance poses a challenge to the effectiveness of macroprudential policy. In the current framework, BBMs are ultimately decided by the ministries. They have broader socioeconomic objectives concerning housing beyond financial stability considerations. Any policy changes related to housing will yield wider economic, social and political consequences. This gives rise to the inaction bias, which hinders the adoption of BBMs as macroprudential tools to effectively mitigate risks from a forward-looking perspective. Furthermore, the bias is likely to be asymmetrical. Political opposition towards tighter policy is often stronger than that for a more accommodative stance. For capital-based measures primarily targeting resilience, the bias tends to go in the other direction; easing buffers tends to be more difficult than building them up in the first place. To alleviate inaction bias, the ESRB's proposal of amending the CRD to empower national authorities to make use of a minimum set of BBMs would be a good starting point (ESRB (2022)). Furthermore, the governance of macroprudential policy in the EU is complex, creating inefficiencies and strengthening the inaction bias (Houben et al (2014)). For example, activating the 458 measure requires a lengthy consultation process and approvals of the ECB, EBA, ESRB and EC.

More evidence is needed to better support policymakers in their use of macroprudential tools for the housing market. These areas include identifying and monitoring housing risks, and especially defining and measuring the macroprudential stance, the ex post effectiveness of macroprudential tools and their interaction with other policy areas. More country-based studies are necessary to gauge the heterogeneity

of transmission channels. Any macroprudential solution should include a cost-benefit analysis, but there are many challenges in quantifying (unintended) policy impacts. More focus could be given to the ex ante design and calibration. The timing, size and strategy of policy intervention matter a lot for its benefits and costs. Lastly, continued efforts in collecting granular data, enhancing data quality and exploring new methods are key to assess policy effectiveness and to better design and calibrate macroprudential measures.

## References


Biesenbeek, C, M Mastrogiacomo, R Alessie and J De Haan (2022): "The effect of introducing a loan-to-value limit on homeownership", *SUERF Policy Briefs*, no 333, May.

Borio, C (2014): "Macroprudential frameworks: (too) great expectations", contribution to the 25th anniversary edition of *Central Banking Journal*, 5 August.

Caloia, F (2022): "Borrower-based measures, house prices and household debt", *DNB Working Papers*, no 738, February.

De Haan, L and M Mastrogiacomo (2020): "Loan to value caps and government-backed mortgage insurance: loan-level evidence from Dutch residential mortgages", *De Economist*, no 168, pp 453–73.

De Jong, J and E de Veirman (2019): "Heterogeneity and asymmetric macroeconomic effects of changes in loan-to-value limits", *DNB Working Papers*, no 635, May.

DNB (2016): *Credit markets in motion* (Kredietmarkten in beweging), November.

——— (2022a): *Financial Stability Report*, Spring.

——— (2022b): *Financial Stability Report*, Autumn.

——— (2023a): *Economic developments and outlook*, June.

——— (2023b): *Financial Stability Report*, Spring.

——— Template for notifying intended measures to be taken under Article 458 of the Capital Requirements Regulation (CRR).

Eijsink, G and D van Dijk (2023): "Borrowing capacity and house prices", *DNB Analysis*, May.

Elbourne, A, B Soederhuizen and R Teulings (2020): "The effects of marcroprudential policy on the housing market" (De effecten van macro-prudentieel beleid op de woningmarkt), *CPB Notitie*, April.

European Systemic Risk Board (2022): *Review of the EU macroprudential framework for the banking sector*, March.

Everett, M, J de Haan, D-J Jansen, P McQuade and A Samarina (2020): "Mortgage lending, monetary policy, and prudential measures in small euro-area economies: evidence from Ireland and the Netherlands", *Review of International Economics*, vol 29, no 1, pp 117–43, October.

Hilbers, P and M van Hengel (2019): "Putting macroprudential policy to work: a case study on the Dutch housing market", *SUERF Policy Notes*, no 115, November.

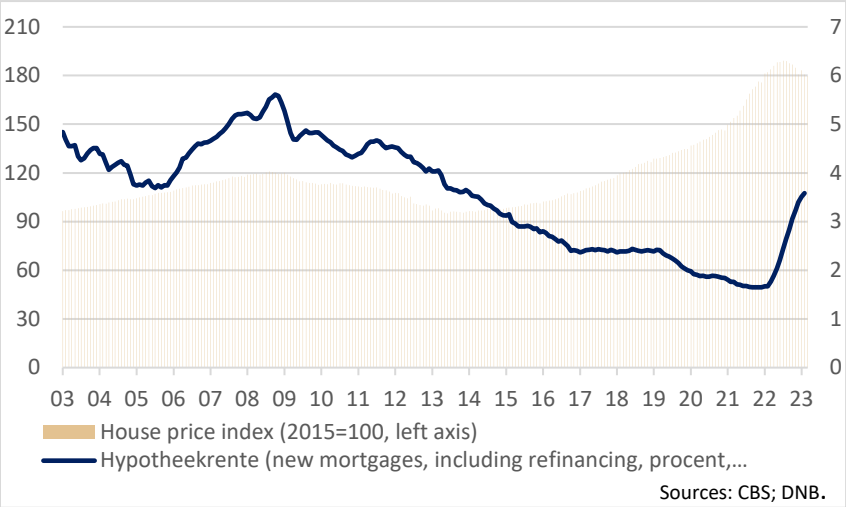
Houben, A, R Nijsken and M Teunissen (2014): "Putting macroprudential policy to work", *DNB Occasional Studies*, vol 12, no 7.

Patnam, M, A Popescu, F Velencia and W Yao (2020): "Effects of macroprudential policy: evidence from over 6000 estimates", *IMF Working Papers*, no 2020/067, May.

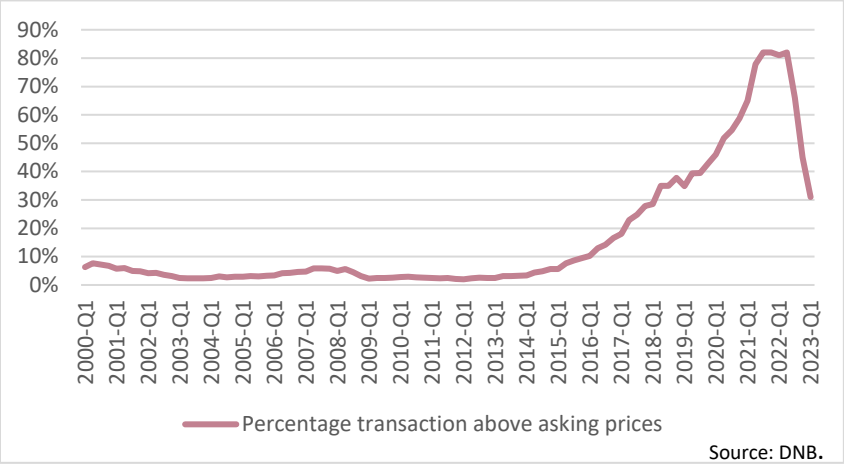
Zhang, L (2019): "Do house prices matter for household consumption?", *CPB Discussion Paper*, April.

## Appendix: Graphs and background information

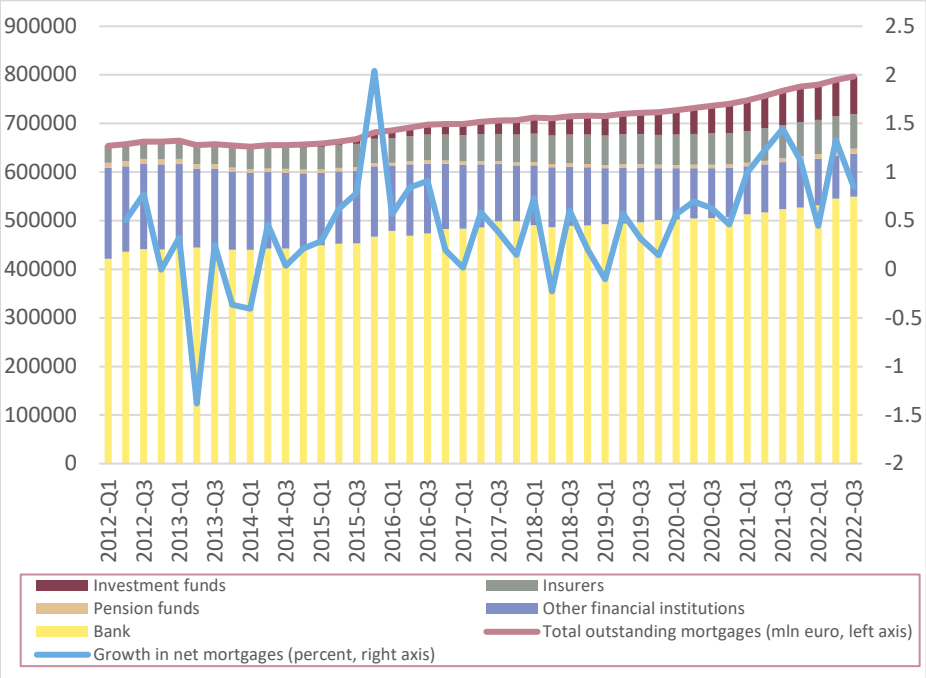
Graph 1 House price decrease and mortgage rate increase



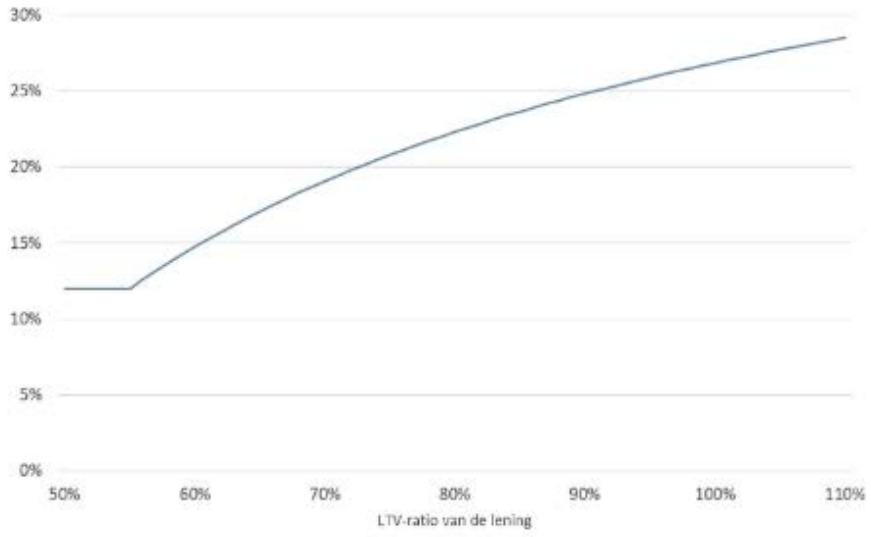

Graph 2 The decline in overbidding



Graph 3 Sector decomposition of outstanding mortgage loans




Graph 4 Calibration and the 458 measure



## Details on the Dutch National Mortgage Guarantee (NHG)

The Dutch National Mortgage Guarantee (in Dutch: Nationale Hypotheek Garantie, NHG) aims to limit financial risks of homeowners and mortgage providers. The NHG is covered by a government-backed foundation, the Homeownership Guarantee Fund (in Dutch: Waarborgfonds Eigen Woning). Home buyers pay a one-time premium of 0.6% of the total mortgage amount for the NHG in return for lower mortgage rates compared to a mortgage not backed by the NHG. The NHG provides a safety net in case homeowners have no other option but to sell their homes with negative equity in certain extraordinary circumstances due to unemployment, divorce, occupational disability or partner's death. The residential debt is waived for borrowers (the NHG covers 90%, mortgage providers co-pay 10%). In 2022, the maximum purchase price for a residential property that can be financed under the NHG is €355,000 (without energy-saving measures, 100% LTV) and €376,300 (with energy-saving measures, 106% LTV), compared to an average home price of €428,000.