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A Case Study from Austria

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Abstract

In August 2022, the Austrian Financial Market Authority activated the Regulation on Measures to Limit Systemic Risks from Real Estate Financing by Credit Institutions (KIM-V), imposing binding caps on loan-to-value (90%), debt service-to-income (40%), and loan maturity (35 years) for new housing loans to private households. The measure had been decided in December 2021, when Austrian mortgage rates stood at a record low of about 1.2%. It entered into force five days after the European Central Bank's first rate hike took effect and remained in force through the steepest tightening cycle in two decades. The coincidence of the two shocks is both the central identification problem and part of our analysis, because the two policies clearly interact. We estimate the effect of the KIM-V on monthly new housing lending per capita with a synthetic control built from twelve EU comparison countries and show that this counterfactual also tracks the Austrian mortgage rate through the tightening cycle, so that the residual gap can be read net of the rate channel. By January 2024, new lending in Austria is about 104 EUR per capita, or 46%, below the counterfactual. Of the total decline in new lending during the first year of the regulation, roughly two thirds are attributable to the rate shock and one third to the KIM-V. We draw lessons for the coordination of monetary and macroprudential policy.

JEL: E58, G21, G28, R31

Keywords: Macroprudential policy, borrower-based measures, debt service-to-income cap, KIM-V, synthetic control, housing credit, monetary policy coordination, Austria

1 Introduction

On 1 August 2022, the Austrian Financial Market Authority (FMA) activated, for the first time, legally binding borrower-based limits on new housing loans to private households through the Regulation on Measures to Limit Systemic Risks from Real Estate Financing by Credit Institutions (KIM-V): a loan-to-value cap of 90%, a debt service-to-income cap of 40%, and a maximum loan maturity of 35 years. The regulation was the end point of a process that had started a year earlier. In September 2021 the Austrian Financial Market Stability Board (FMSG, after its German name) asked the central bank to prepare the analytical basis for binding measures, and in December 2021, eleven days after the European Systemic Risk Board (ESRB) had issued a recommendation to Austria (ESRB, 2021), the FMSG decided to recommend legally binding limits that should take effect by mid-2022. The formal recommendation followed on 1 March 2022 (FMSG, 2022), and the FMA's regulation was published in the Federal Law Gazette on 17 June 2022 (FMA, 2022).

The decision and the activation of the KIM-V fell into two very different worlds. When the FMSG took its decision in December 2021, the ECB's main refinancing rate had stood at zero for almost six years and Austrian mortgage rates were close to their record low of about 1.2%; the FMSG itself noted the record-low cost of credit as a driver of the risks it wanted to contain. When the regulation took effect in August 2022, the ECB's first rate hike in eleven years had taken effect five days earlier, and the ECB went on to lift the main refinancing rate from 0.00% to 4.50% within 15 months. Austrian mortgage rates more than tripled, to above 4% in late 2023. New lending to private households in Austria subsequently fell to an extent without historical precedent. The natural question is: how much of this decline is attributable to the KIM-V, and how much to the rate shock?

A simple before-after comparison of new lending cannot answer this question, because both shocks, the activation of borrower-based measures and the increase in policy rates, act simultaneously and in the same direction. We therefore apply the synthetic control method (Abadie et al., 2010; Abadie et al., 2015) and construct a synthetic Austria as a convex combination of twelve EU comparison countries that replicates Austria's pre-treatment new lending per capita. Three features of the design address the rate shock. First, we show that the resulting donor mix, dominated by Germany, Portugal, and the Netherlands, also tracks the Austrian mortgage rate through the tightening cycle, to within about 14 basis points on average from August 2022, so that the rate channel is absorbed by the comparison benchmark. Second, we exploit the expiry of the KIM-V at the end of June 2025 as a within-country test. Third, we use the Bank Lending Survey to document the supply-side fingerprint of the measure.

The results are clear. Synthetic Austria replicates the pre-treatment period to within 1 EUR per capita in lending, or 0.3% of the pre-treatment mean, and 4 basis points in the mortgage rate. After the KIM-V took effect, a marked gap opens up. In January 2024, the eighteenth month of the regulation, monthly new lending in Austria lies about 104 EUR per capita, or roughly 46% of the pre-treatment mean, below the synthetic counterfactual; averaged over the three years in which the regulation was in force, the gap is 84 EUR per capita, or 37% of the pre-treatment

mean. In a placebo application of the same method, no comparison country shows an equally large average decline relative to its own synthetic counterpart. After the KIM-V expired, the gap narrows relative to the counterfactual but does not close within twelve months, which is consistent with the FMA retaining the same limits as non-binding guidance. The Bank Lending Survey documents a contemporaneous jump in reports of tightened credit standards and in loan rejection rates around the activation date, evidence of a supply-side effect of the measure beyond a pure demand response.

The paper makes three contributions. First, it provides a causal ex-post evaluation of the KIM-V over its full life cycle, from activation to expiry, and thus an empirical basis for the further use of borrower-based instruments. Second, it documents a case in which a borrower-based measure was calibrated under near-zero interest rates and activated into the steepest monetary tightening in two decades. We show that this is not only an identification problem but also part of the policy take-away: a debt service-to-income cap is implicitly rate-contingent, and the limits that the FMSG calibrated in 2021 cut the loan a given income could service by more than a third once rates peaked, without any change in the rule. The estimated effect is therefore the effect of the KIM-V as activated into the rate shock. Third, we place the findings within the literature on the interaction of monetary and macroprudential policy and draw lessons on the lag between decision and implementation, on fixed sunset clauses, and on the calibration of debt service-to-income caps.

2 Related Literature

2.1 Borrower-based measures: channels and evidence

Borrower-based measures aim to contain household indebtedness and dampen housing-credit growth without raising banks' funding costs (CGFS, 2023). They operate through three channels. A size channel caps the maximum loan amount per borrower and therefore depresses average new-loan volumes. A selection channel pushes income- and wealth-constrained households out of the market more than others, altering the risk composition of the credit portfolio. An expectations channel leads to anticipatory adjustments in credit conditions even before the rule formally binds. The individual instruments[1] differ empirically in their bite and in their demographic incidence; for example, LTV restrictions disproportionately affect younger and less wealthy households (Nissen et al., 2022). The DSTI cap has a further property that is central to this paper: because the monthly annuity on a loan of given size rises with the interest rate, a DSTI limit becomes mechanically more binding as rates increase (CGFS, 2023; Berret et al., 2023).

Ex-post evaluations of individual national activations of borrower-based measures remain scarce, although cross-country panel evidence is available (e.g. Cerutti et al., 2017). Alongside the Danish micro-simulation of Nissen et al. (2022), the ex-post assessment for France by Berret et al. (2023) shows that the DSTI cap improved lending standards without impairing access to credit. The Irish ex-post evaluation by Acharya et al. (2022) documents that the joint LTV/LTI

[1]The most frequent types are caps on the loan-to-value ratio (LTV), the debt service-to-income ratio (DSTI), the loan-to-income ratio (LTI), the debt-to-income ratio (DTI), and an upper limit on the maturity of a loan.

rule meaningfully altered the volume and composition of mortgage lending in Ireland. DeFusco et al. (2020) similarly estimate the effects of the US Ability-to-Repay/Qualified Mortgage rules, finding sizeable reductions in mortgage origination among borrowers with high debt-to-income ratios. Cross-country panel evidence by Kuttner and Shim (2016) finds that DSTI limits robustly dampen housing-credit growth, by 4 to 6 percentage points over the following four quarters, whereas the effect of LTV limits is not robust across estimators. Galati and Moessner (2018) survey the broader macroprudential literature and emphasise the still-thin evidence base for borrower-based instruments.

2.2 Monetary and macroprudential policy interaction

As the financial cycle usually deviates from the business cycle, and given the pivotal role of credit growth in the accumulation of financial imbalances (Schularick and Taylor, 2012), macroprudential authorities may successfully operate autonomously from monetary policy (Svensson, 2018). Furthermore, in a common currency area, prudential instruments enable localised interventions and provide an instrument to counterbalance the common monetary policy through local tightening or easing of regulatory requirements (Quint and Rabanal, 2014). The implementation of macroprudential instruments is, nevertheless, closely linked to the stance of monetary policy, because financing costs, credit volumes, and housing prices are affected by the activities of the central bank. Borio and Shim (2007) were early to point to the mutually reinforcing relationship between prudential and monetary policy and concluded that there are potential gains from cooperation between monetary and supervisory authorities.

The literature on the interaction between monetary and prudential policy is based on dynamic stochastic general equilibrium models including a banking sector which operates under monopolistic competition. In a few papers, banks are subject to a restriction that limits capital accumulation to a gradual build-up through retained earnings (Angelini et al., 2012; Van der Ghote, 2021); De Paoli and Paustian (2017) impose a borrowing constraint on firms, but most papers do not model bank capital.

Angelini et al. (2012) propose two modes of interaction between the monetary and prudential authorities. In the cooperative case, the central bank and the macroprudential authority are assumed to act as a single entity, optimising a joint objective function and implementing instruments simultaneously. In the non-cooperative case, each authority optimises its own objective function, taking the other authority's policy choice as given. In this set-up a Nash equilibrium arises.

While the central bank minimises the deviation from inflation and output growth targets (Taylor rule), the supervisory authority minimises instability in the financial sector. Several objective functions are suggested for the macroprudential authority. It may target the variance of the loan-to-output ratio and of output (Angelini et al., 2012), the rate of change in credit volume (Kannan et al., 2012; Quint and Rabanal, 2014; Rubio and Carrasco-Gallego, 2014; Bailliu et al., 2015), or the variance of output together with the credit spread (De Paoli and Paustian, 2017). Alternatively, it may minimise a set of pecuniary externalities, as in Van der Ghote (2021).

The key finding in this body of work is that cooperation between the authorities increases welfare in most cases; Van der Ghote (2021) finds that cooperation improves welfare. Other studies find welfare-enhancing effects conditional on the type of shock hitting the economy. These studies share a common feature: they combine credit-financed property purchases by households with mortgage loans secured against the property. In this set-up, prudential policy brings no stabilisation gain if productivity shocks drive the cycle (e.g. Kannan et al., 2012). For example, if monetary policy responds to a positive productivity shock by raising the interest rates, house prices will fall, which will reduce the collateral value and the borrowing capacity of households. Tighter macroprudential policy will restrict borrowing further, while households' repayment capacity has improved through higher incomes, creating welfare losses. Under risk or financial shocks, however, macroprudential policy provides unequivocal benefits. If a negative financial shock weakens credit supply and lowers the collateral value of housing simultaneously, easing macroprudential requirements can help reduce output and loan-to-value ratio volatility, consequently improving welfare. De Paoli and Paustian (2017) find a particular environment in which non-cooperation slightly dominates cooperation: if the supervisory agency acts as a leader when setting its instrument, social welfare will be higher. Such an environment, however, is highly unlikely within the euro area because many national supervisory authorities are subject to a single central bank that decides on the use of monetary policy instruments for the entire area.

To summarise, the growing literature on the interplay between monetary and macroprudential policy suggests that the interactions are substantial and that a coordinated approach is welfare enhancing. The Austrian setting, where both policies were shocked simultaneously, therefore serves as an ideal empirical case study for such concerns.

3 The Austrian Context

3.1 From recommendation to regulation: the KIM-V chronology

Between 2010 and 2022, the Austrian residential real estate market recorded one of the strongest price increases in the euro area. Nominal house prices more than doubled over this period, and the price-to-income and price-to-rent ratios at the end of the sample lay well above their long-run averages. In parallel, the growth of new housing loans to private households accelerated; annual growth rates reached double digits between 2019 and 2021, and a considerable share of new loans carried high loan-to-value ratios, long maturities, and variable interest rates (OeNB, 2022). The ESRB had warned Austria about medium-term vulnerabilities in its residential real estate sector as early as 2016 (ESRB, 2016), and the FMSG had responded in September 2018 with non-binding guidelines on sustainable lending standards.[2]

The switch from the recommendation to binding rules is shown in Figure 1, which places the milestones of the regulation against the ECB main refinancing rate and the Austrian cost of borrowing for house purchase. On 15 September 2021 the FMSG noted the continued combination

[2]Press release of the FMSG on its 17th meeting, 21 September 2018: a down payment below 20% of the purchase price was to be regarded as critical, debt service should not exceed 30 to 40% of net income, and maturities above 35 years should remain the exception; `https://www.fmsg.at/publikationen/presseaussendungen/2018/17te-sitzunge.html`.

of high house price and credit growth, low lending rates, and high debt-service burdens, and asked the Oesterreichische Nationalbank (OeNB) to prepare a comprehensive analysis of systemic risks as the basis for a possible recommendation to the FMA.[3] On 2 December 2021, the ESRB issued a recommendation to Austria on medium-term vulnerabilities in the residential real estate sector (ESRB, 2021). Only shortly after, on 13 December 2021, the FMSG concluded that the build-up of systemic risks had continued, judged borrower-based instruments to be the appropriate response, and asked the central bank to draft a concrete recommendation with the intention that legally binding measures should take effect by mid-2022.[4] The same press release observed that lending rates remained at a record low. The Austrian cost of borrowing for house purchase stood at 1.22% in that month.

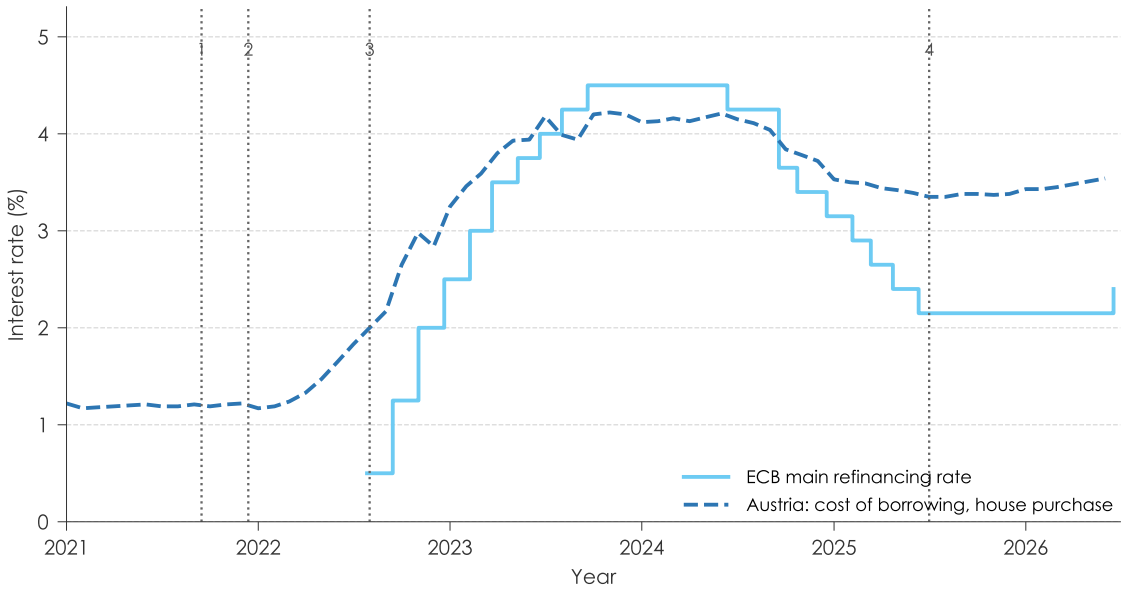
On 1 March 2022, the FMSG adopted Recommendation FMSG/2/2022, which specified the limits later written into the regulation: a loan-to-value ratio of at most 90%, a debt service-to-income ratio of at most 40%, a maximum maturity of 35 years, and an exemption quota of 20% of new lending (FMSG, 2022). The KIM-V was published in the Federal Law Gazette on 17 June 2022 (FMA, 2022), with entry into force on 1 August 2022. In addition to the binding limits, the regulation contained a de minimis threshold of 50,000 EUR, exemption categories, and institution-specific exemption quotas of up to 20% of half-yearly new business (differentiated by limit: 20% for the LTV cap, 10% for the DSTI cap, 5% for the maturity cap) that permitted limited deviations. The regulation carried a fixed sunset clause (§ 11 KIM-V): it was not extended beyond 30 June 2025, and since 1 July 2025 the same limits apply only as non-binding guidance in an FMA circular (FMA, 2025).

A key piece to understand the effect of the regulation is that between the FMSG decision and the entry into force, the monetary environment changed completely. As markets had come to expect shortly after Russia's full-scale invasion of Ukraine in February 2022, the ECB raised its policy rates for the first time in eleven years. The first hike took effect only five days before the KIM-V came into force, and the tightening continued over the following 15 months: the main refinancing rate rose in several steps from 0.00% to 4.50%. Austrian mortgage rates had already started to move in the spring of 2022 as markets anticipated the turnaround: the cost of borrowing for house purchase rose from 1.22% in December 2021 to 1.65% in June 2022 and 2.00% in August 2022, and peaked at 4.22% in November 2023. By the time the regulation expired in June 2025, the rate had eased to 3.39%, still almost three times its level at the time of the decision. The eight months between decision and activation thus spanned the turning point of the monetary cycle, and the fixed three-year duration of the regulation meant that the limits calibrated in 2021 remained in force unchanged throughout the tightening cycle.

[3] Press release of the FMSG on its 29th meeting, 15 September 2021, `https://www.fmsg.at/publikationen/presseaussendungen/2021/29te-sitzung-fmsg.html`.

[4] Press release of the FMSG on its 30th meeting, 13 December 2021, `https://www.fmsg.at/publikationen/presseaussendungen/2021/30te-sitzung.html`.

Figure 1. ECB main refinancing rate and Austrian cost of borrowing for house purchase, with the milestones of the KIM-V.



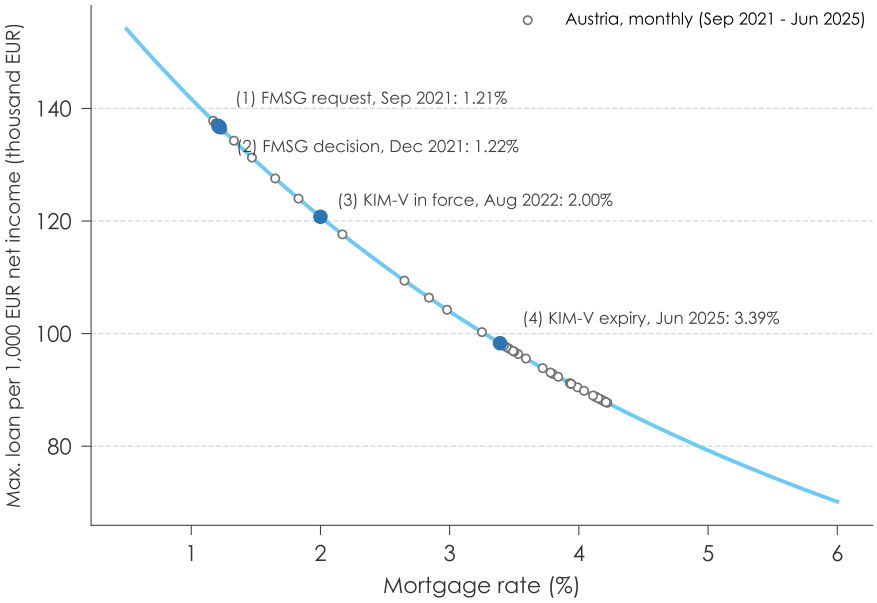
Source: ECB (main refinancing rate; MFI interest rate statistics, cost of borrowing for households for house purchase), FMSG press releases. Notes: The main refinancing rate is drawn as a step function. Milestones: (1) FMSG asks the OeNB for a systemic-risk analysis, 15 September 2021; (2) FMSG decides to recommend legally binding measures, 13 December 2021; (3) entry into force, 1 August 2022; (4) expiry, 30 June 2025.

3.2 The coincident rate shock and the bite of the DSTI cap

The coincidence of the KIM-V with the monetary tightening of the Eurosystem is the central identification problem of this study. The rise in policy rates directly raised banks' funding costs and thus mortgage rates, which, independently of the KIM-V, reduced demand for housing finance as well as the average affordable loan size. A simple before-after comparison for Austria cannot separate the KIM-V effect from the rate channel, because the two shocks act simultaneously and in the same direction.

The rate shock is, however, more than a nuisance for identification. It changed what the regulation meant for borrowers, because the DSTI cap is implicitly rate-contingent. Under a 40% DSTI limit and an annuity loan with a maturity of T years, the maximum loan a household with monthly net income y can take is $0.4 \cdot y \cdot a(r)$, where $a(r) = \big(1 - (1 + r/12)^{-12T}\big)/(r/12)$ is the annuity factor at the annual mortgage rate r. For the 35-year maximum maturity of the KIM-V, $a(r)$ falls from about 342 at the 1.22% rate of December 2021 to 302 at the 2.00% rate of August 2022 and to 219 at the 4.22% peak of November 2023. Holding income constant, the largest DSTI-compliant loan therefore shrank by 12% between the FMSG decision and the entry into force, and by 36% at the rate peak, without any change in the rule (Figure 2). For a household with a net monthly income of 4,000 EUR, the ceiling fell from about 547,000 EUR at the 1.22% rate to about 483,000 EUR at 2.00% and 351,000 EUR at 4.22%. When the regulation expired in June 2025, the rate of 3.39% still implied a ceiling about 28% below its December 2021 level.

Figure 2. The DSTI cap bites harder as rates rise.



Source: ECB (MFI interest rate statistics), own calculations. Notes: Maximum loan per 1,000 EUR of monthly net income under a 40% DSTI cap and a 35-year annuity, as a function of the mortgage rate. Small dots show the actual Austrian cost of borrowing for house purchase in each month from September 2021 to June 2025; the numbered markers are the milestones of Figure 1.

The combined bite of the DSTI limit and the maturity cap was thus far stronger at the rates of 2023 than at the rates under which the limits had been calibrated. Two implications follow for the interpretation of our estimates. First, the effect we measure is the effect of the KIM-V as activated into the rate shock; the same limits under 2021 rates would have bound far less. Second, the regulation and the rate shock were complements rather than merely coincident: the rate shock raised the share of loan applications that the rule excluded, which is one reason why the measured effect is large.

4 Data

The empirical analysis draws on three publicly available data sources. New lending volumes and credit interest rates come from the ECB's MFI Interest Rate Statistics (MIR), specifically the monthly series 'Bank business volumes – loans to households for house purchase (pure new loans)' and 'Cost of borrowing for households for house purchase'.[5] Population data are taken from Eurostat and interpolated to monthly frequency; the latest available year (2025) is carried forward for 2026. The headline outcome variable, new lending per capita, is the average monthly volume of new housing loans in EUR per inhabitant. We use nominal lending in EUR per capita because it is the most directly interpretable measure of how much new credit private households

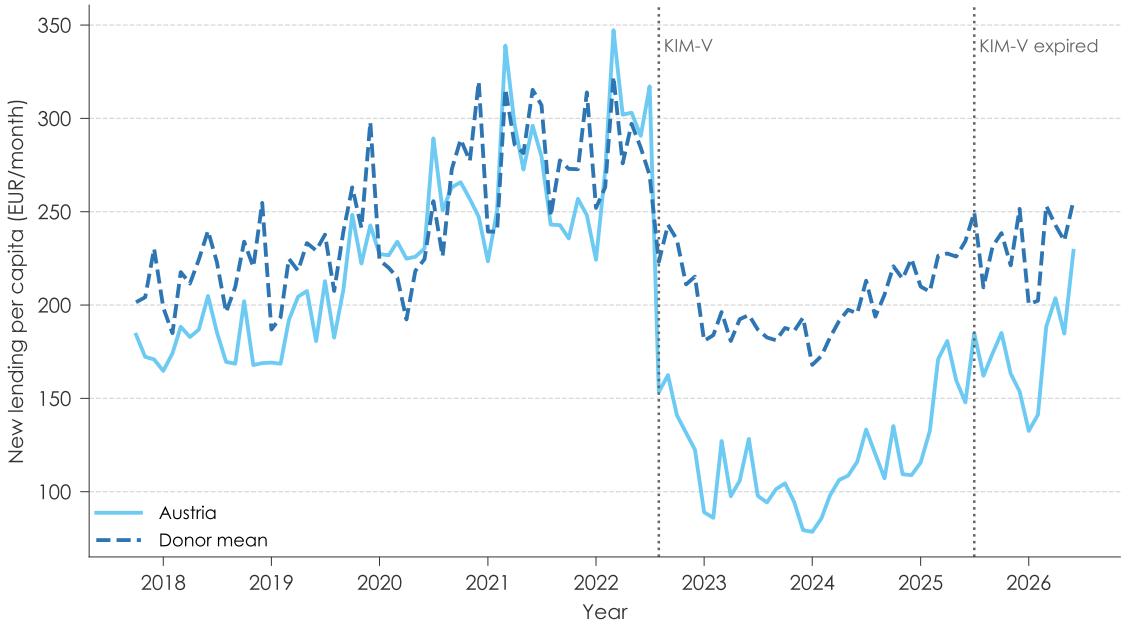
[5]Both series are not seasonally adjusted, since the seasonal component is similar in the cross-section of comparison countries and is largely absorbed by the synthetic control. The ECB volume series for France is incomplete and is replaced by the Banque de France series up to January 2025; thereafter the ECB series is used, adjusted to the Banque de France level over the preceding twelve months. Luxembourg's volumes are confidential in 41 of the 105 months in the sample and are linearly interpolated.

actually take on in a given month, and because it is the cleanest combination of the two ECB-MIR primitives without further deflation or normalisation steps that themselves introduce noise from auxiliary data; Section 7.3 shows that the results are not sensitive to this choice. From the ECB Bank Lending Survey (BLS), we use the quarterly net balances for credit standards, credit demand, and the share of rejected applications for housing loans to private households.

The observation window covers the months from October 2017 to June 2026 (105 months) and ends with the latest month for which all thirteen countries report. It thus spans almost three years during which the KIM-V was binding and the first twelve months after its expiry on 30 June 2025. The first treated month for Austria is August 2022, the month in which the regulation entered into force; the pre-treatment window on which the synthetic control is fitted ends in July 2022. Because the regulation was published on 17 June 2022 and its limits had been publicly known since the FMSG decision of December 2021, anticipatory reactions before August 2022 are plausible; Section 7.4 tests earlier treatment dates. The comparison group comprises twelve further EU member states with near-complete MIR coverage (see footnote 5): Belgium, Finland, France, Germany, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Portugal, Slovakia, and Spain.

Figure 3 shows new lending per capita in Austria against the unweighted mean of the remaining countries. Until mid-2022, Austria tracks the donor-mean dynamic closely. From summer 2022 onwards a marked gap opens up: Austria stays at a lower level while the donor mean recovers from 2024 onwards. In the pre-treatment averages, Austria lies below the simple donor mean both in new lending and in the credit rate (see Table 2), so a more carefully matched comparison is required.

Figure 3. Monthly new lending per capita: Austria versus twelve EU comparison countries.



Source: ECB (MFI interest rate statistics), Banque de France, Eurostat, own calculations. Notes: New lending per capita in EUR per month; Austria versus the unweighted mean of the twelve comparison countries. Vertical lines: entry into force of the KIM-V on 1 August 2022 and its expiry on 30 June 2025.

5 Empirical Strategy

5.1 Synthetic control

The core empirical difficulty of the research question is not the absence of a comparison unit, but the simultaneous occurrence of two shocks: the KIM-V and the monetary tightening of the Eurosystem from July 2022 onwards. Because both shocks affect new lending in the same direction, a naive before-after comparison or a simple difference estimator against an unadjusted cross-country average cannot separate the macroprudential from the monetary policy effect.

The synthetic control method (Abadie and Gardeazabal, 2003; Abadie et al., 2010; Abadie et al., 2015) offers a remedy. It constructs an artificial comparison unit, the synthetic counterfactual, as a weighted combination of potential donor countries, where the weights are chosen so that this combination reproduces pre-treatment Austria as closely as possible. The weights are non-negative and sum to one, so that synthetic Austria remains interpretable as a plausible mixture of actually observed economies. Concretely, the predictor vector stacks the pre-treatment monthly series of new lending per capita and of the mortgage rate, and we minimise the root mean squared distance between Austria and the weighted donor combination over this stacked vector, solved by the Sequential Least Squares Programming (SLSQP) algorithm. Because the lending series is measured in EUR per capita and the rate in percent, the volume block dominates the unstandardised loss function by roughly two orders of magnitude, so the rate block is numerically non-binding: matching on lending alone yields identical donor weights and an identical effect (Section 6.3). We therefore do not claim that the optimisation filters out the rate shock by construction. Instead, the agreement between the observed and the synthetic Austrian mortgage rate after treatment is treated as a testable diagnostic of whether the donor mix absorbs the rate channel. Appendix A reports a variant in which both predictor blocks are standardised so that the rate genuinely enters the matching.

5.2 Identification: rate-path tracking and compositional effects

The validity of this approach for separating the prudential policy effect from the policy rate shock rests on a testable implication: synthetic Austria must track Austria's interest rate path not only in the pre-treatment window but also from August 2022 onwards. We document this explicitly in Section 6.3 by plotting observed against synthetic Austrian mortgage rates over the full sample. If the two series move together, the residual gap in lending volumes can be read as the prudential policy effect net of the policy rate channel. We acknowledge a corresponding limitation: the KIM-V itself may shift the quoted mortgage rate through portfolio-composition effects. If the regulation pushes riskier borrowers out of the new-business pool, the average quoted rate may fall mechanically. Any such compositional rate effect would tend to bias the volume estimate downwards in absolute terms, so the estimates reported below are, if anything, conservative.

The results of the quarterly Bank Lending Survey carried out by the OeNB suggest that this compositional effect is small. The OeNB asks banks in Austria whether they have adjusted their interest margin on housing loans to private households with an average risk profile compared with the previous quarter. The balance of negative (widened margin) and positive (narrowed

margin) answers remained at zero on impact and fluctuated between plus and minus one until mid-2023. The OeNB asks the same question for private households with a high risk profile; for this group, there are even fewer signs of a compositional adjustment.

5.3 Donor pool and borrower-based measures elsewhere

Several countries in the donor pool had their own borrower-based measures (BBMs) active during the treatment window: Portugal (LTV/DSTI/maturity caps active since 2018, recalibrated in 2022), the Netherlands (long-standing LTV/LTI rules), Luxembourg (LTV cap activated January 2021), Slovakia (DSTI/DTI rules since 2018), and France (legally binding measures of the Haut Conseil de stabilité financière, HCSF, from January 2022). If these measures depressed new lending in the donor countries as well, synthetic Austria's post-treatment counterfactual is biased downwards, and the measured Austrian effect is correspondingly biased towards zero. We address this concern through the leave-one-donor jackknife in Section 7.2, which removes each donor in turn, including Portugal and the Netherlands individually as the two donors with the most material own-BBM dynamics, and shows that the estimate is essentially unchanged.

5.4 Inference

Classical standard errors are not defined in the synthetic control design. Inference proceeds via a cross-sectional placebo distribution (Abadie et al., 2010): for each donor country, the same optimisation is repeated with identical predictors and an identical treatment date, as if that country were Austria. If the Austrian effect lies in the tail of this placebo distribution, it can be regarded as unusually large. We report two rank-based statistics across all thirteen units. The first ranks the average post-treatment gap; since the KIM-V is expected to reduce lending, it is a one-sided criterion. The second is the ratio of post- to pre-treatment root mean squared prediction error (RMSPE) proposed by Abadie et al. (2010), which discounts placebos with poor pre-treatment fit but is sign-blind, so a donor that deviates strongly *upwards* after 2022 ranks above Austria. We therefore report it both in its two-sided form and in a one-sided form that only counts placebos with a negative post-treatment gap. As a further, design-based piece of evidence, we exploit the expiry of the KIM-V on 30 June 2025: if the gap reflects the regulation, it should narrow once the binding limits are lifted. The leave-one-donor jackknife, alternative transformations of the outcome, and shifted treatment dates are reported in Section 7; standardised predictors and an unconstrained regression are documented in Appendix A.

5.5 Bank Lending Survey as supply-side evidence

In addition, the Bank Lending Survey is used to characterise the supply-side response to the KIM-V. The quarterly net balances for credit standards, loan rejections, and perceived demand react with little delay to regulatory interventions and provide a fingerprint of the measure that cannot be explained by interest rate changes alone: a pure rate shock would primarily lower demand, whereas a binding lending rule should show up as tightened standards and rejected applications.

6 Results

6.1 Donor weights and pre-treatment fit

The pre-treatment optimisation yields the weighting scheme in Table 1. Roughly three quarters of synthetic Austria is made up of Germany and Portugal, and about one fifth of the Netherlands, with marginal contributions from Luxembourg, Finland, and Spain. The pre-treatment fit is very close: synthetic and observed Austria differ by 0.7 EUR per capita, or 0.3% of the pre-treatment mean, in lending and by 4 basis points in the mortgage rate (Table 2). An unweighted donor mean, by contrast, differs from Austria both in lending (+17 EUR per capita) and in the rate (+19 basis points).

Table 1. Synthetic control: donor weights (baseline specification).

Country	Weight (%)
Germany	38.9
Portugal	34.9
Netherlands	19.0
Luxembourg	4.4
Finland	1.8
Spain	1.1
Belgium	0.0
France	0.0
Ireland	0.0
Italy	0.0
Lithuania	0.0
Slovakia	0.0

Source: Own calculations. Notes: Weights of the baseline specification, matched on pre-treatment new lending per capita and the mortgage rate (October 2017 to July 2022); donors with zero weight are listed for completeness.

Table 2. Pre-treatment averages for Austria, synthetic Austria, and the simple donor mean.

Variable	Austria	Synthetic Austria	Simple donor mean
New lending per capita (EUR/month)	229.5	230.2	246.4
Mortgage rate (%)	1.49	1.53	1.68

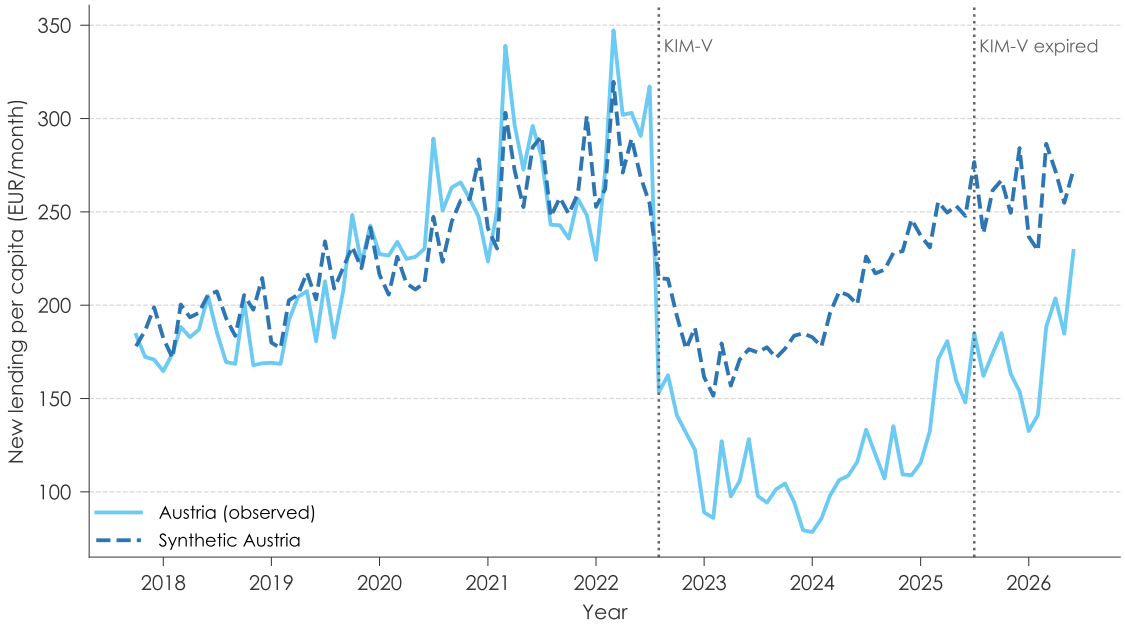
Source: Own calculations. Notes: Averages over the pre-treatment window October 2017 to July 2022; new lending in EUR per capita per month, mortgage rate in percent.

6.2 Effect on new lending

Figure 4 contrasts observed Austrian new lending with the synthetic counterfactual. Until July 2022 the two series move closely together; thereafter a clear gap opens up. Table 3 summarises the effect at seven horizons, counted in months of treatment with August 2022

as the first, and as averages over the in-force and post-expiry windows. The gap widens to about −104 EUR per capita by January 2024 (18 months, −46% of the pre-treatment mean), is −93 EUR (−40%) at the 24-month horizon, and reaches its trough of about −122 EUR (−53%) in January 2025. Averaged over the 35 months in which the regulation was binding, the gap is −84 EUR per capita, or −37% of the pre-treatment mean. In January 2026, six months after expiry, the gap is again as large as at the 18-month horizon, at −104 EUR, and the average over the first twelve months after expiry, −86 EUR, is practically identical to the in-force average. Section 6.4 examines the post-expiry period in more detail.

Figure 4. Observed and synthetic new lending in Austria.



Source: Own calculations. Notes: Monthly new lending in EUR per capita, observed Austria (solid) and synthetic Austria (dashed). Vertical lines: entry into force of the KIM-V on 1 August 2022 and its expiry on 30 June 2025.

Table 3. Estimated KIM-V effect on monthly new lending at selected horizons.

Treatment month (August 2022 = 1)	Effect (EUR per capita)	Effect (% of pre-treatment mean)
6 (Jan 2023)	−72.4	−31.6
12 (Jul 2023)	−76.9	−33.5
18 (Jan 2024)	−104.4	−45.5
24 (Jul 2024)	−92.8	−40.4
30 (Jan 2025)	−121.7	−53.0
36 (Jul 2025)	−91.8	−40.0
42 (Jan 2026)	−104.2	−45.4
In-force average (Aug 2022–Jun 2025)	−83.7	−36.5
Post-expiry average (Jul 2025–Jun 2026)	−85.5	−37.3

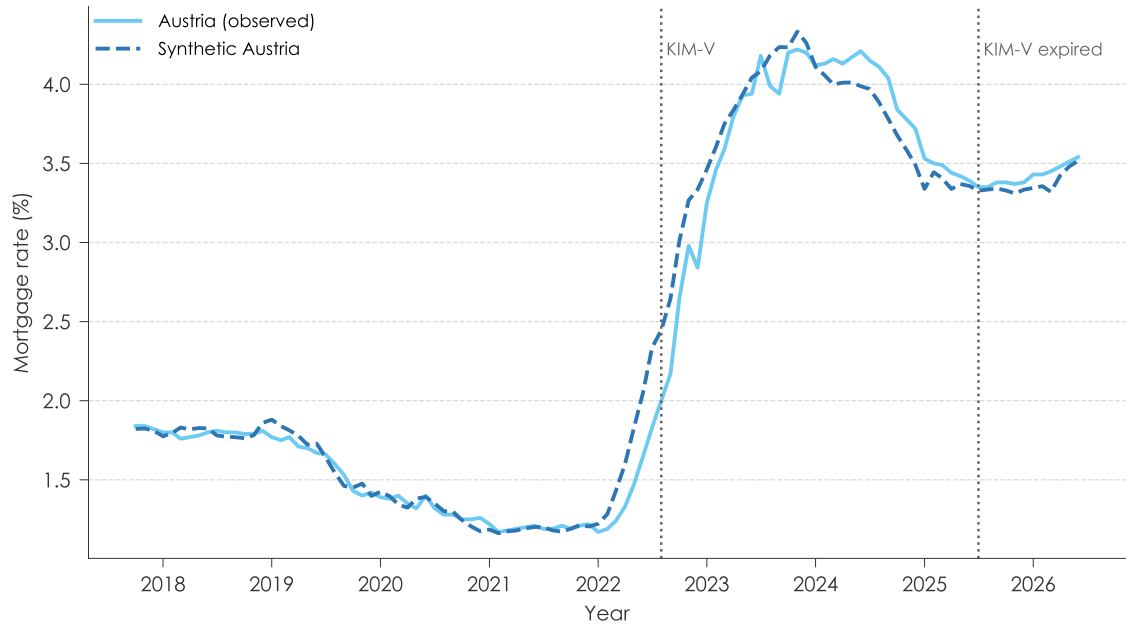
Source: Own calculations. Notes: Effect is observed minus synthetic new lending in EUR per capita per month; the horizon counts months of treatment, with August 2022 as month 1. The second column expresses the effect relative to the pre-treatment mean of Austrian new lending (Table 2).

6.3 Does synthetic Austria absorb the rate shock?

The identification argument of Section 5 requires synthetic Austria to track Austria's interest rate path after treatment. Figure 5 plots the observed Austrian mortgage rate against the synthetic counterpart over the full sample. The two series remain close throughout the post-treatment window: the mean absolute difference is 14 basis points from August 2022 onwards, 17 basis points while the KIM-V was in force, and 5 basis points after its expiry, against a rise in the Austrian rate of 300 basis points over the same period. The rate channel is thus absorbed by the donor mix, and the residual divergence in Figure 4 is interpretable as a policy effect net of monetary tightening.

As noted in Section 5, this is a property of the donor mix rather than of the matching procedure. Re-estimating the synthetic control with the mortgage rate excluded from the predictor vector yields exactly the same donor weights and the same January-2024 effect of −104.4 EUR per capita, because the volume block dominates the unstandardised loss function. Germany, Portugal, and the Netherlands, which together carry 93% of the weight, happen to share Austria's pass-through of policy rates to mortgage rates. The standardised-predictors variant in Appendix A, in which the rate block genuinely binds, shifts the weights towards France and yields a somewhat smaller but qualitatively similar effect.

Figure 5. Observed and synthetic Austrian mortgage rate.



Source: Own calculations. Notes: Cost of borrowing for households for house purchase, observed Austria (solid) and synthetic Austria (dashed), full sample. Vertical lines: entry into force of the KIM-V on 1 August 2022 and its expiry on 30 June 2025.

6.4 The expiry of the KIM-V

The expiry of the KIM-V at the end of June 2025 provides a within-country test: if the gap reflects the regulation rather than an Austria-specific shock, it should narrow once the binding

limits are lifted. Table 4 reports half-year averages of observed and synthetic lending. Measured relative to the synthetic counterfactual, the gap peaks at about −49% in the first half of 2024 and narrows steadily thereafter, to −38% in the first half of 2025, −35% in the second half of 2025, and −30% in the first half of 2026. In absolute terms the picture is less clear-cut: synthetic lending rose from about 195 to about 260 EUR per capita over the same period, so that the EUR gap receded from its trough of −108 EUR in the second half of 2024 only to −79 EUR in the first half of 2026, close to the in-force average. In June 2026, the last month in the sample, the gap is down to −44 EUR per capita, the smallest monthly value since late 2022.

Two features of this pattern are worth noting. First, the relative narrowing sets in during the first half of 2025, i.e. already before the formal expiry date, which is consistent with banks anticipating the end of the binding regime. The Bank Lending Survey points in the same direction: in the second quarter of 2025, Austrian banks reported the first decline in the share of rejected housing-loan applications since 2015 (−14) and a strong increase in demand (+57), while leaving their credit standards unchanged (Section 6.5). Second, convergence is gradual rather than abrupt and remains incomplete a year after expiry. This is what one would expect given that the FMA circular retains the same limits as non-binding guidance (FMA, 2025), that mortgage rates in 2025 and 2026 were still almost three times their level at the time of the FMSG decision, so that the DSTI guidance continued to bind far more tightly than when it was calibrated (Section 3.2), and that new lending responds to credit standards with a lag. A pure rate-channel explanation, by contrast, would not predict a narrowing gap relative to a counterfactual that already absorbs the rate path, particularly since synthetic Austria's mortgage rate tracks the observed rate within about 5 basis points on average after expiry.

Table 4. Observed and synthetic new lending in Austria, half-year averages.

Half-year	Austria	Synthetic Austria	Gap (EUR)	Gap (% of synthetic)
2022 H2[a]	142.2	197.4	−55.3	−28.0
2023 H1	105.6	166.1	−60.5	−36.4
2023 H2	95.3	178.2	−82.9	−46.5
2024 H1	98.9	194.9	−96.1	−49.3
2024 H2	119.0	227.5	−108.5	−47.7
2025 H1	151.2	245.7	−94.5	−38.4
KIM-V expired on 30 June 2025				
2025 H2	170.5	262.9	−92.3	−35.1
2026 H1	179.9	258.7	−78.7	−30.4

[a] August to December 2022.

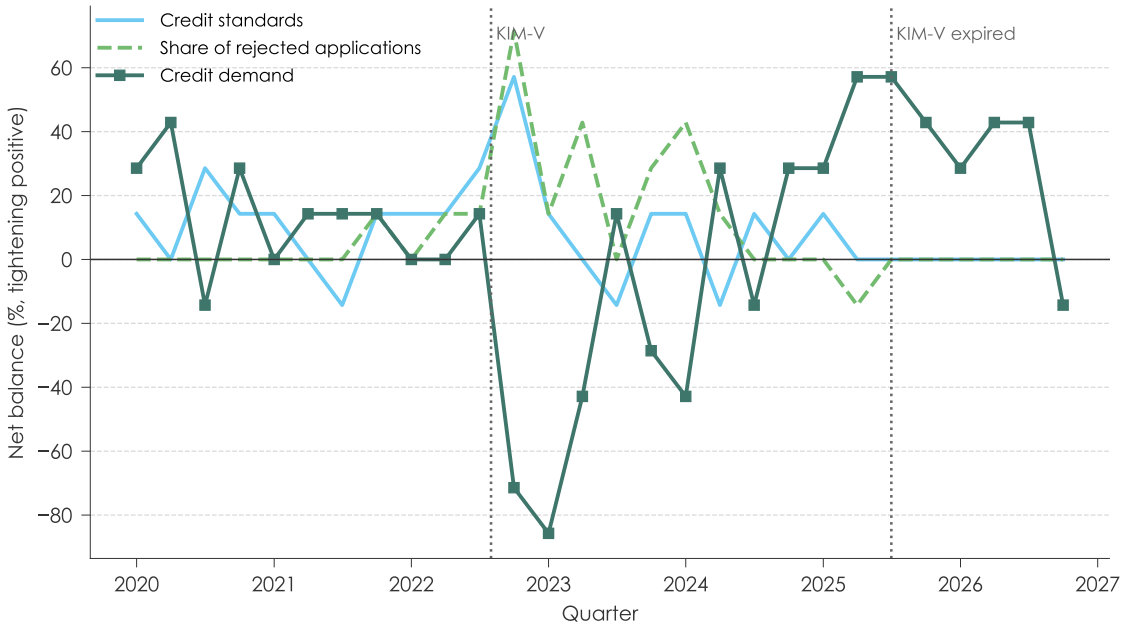
Source: Own calculations. Notes: Half-year averages of monthly new lending in EUR per capita; gap is observed minus synthetic lending, in EUR and in percent of synthetic lending.

6.5 Supply-side evidence from the Bank Lending Survey

The volume response can be cross-checked from the supply side. Figure 6 shows the quarterly BLS net balances for Austrian housing loans to private households. With the activation of the

KIM-V, the net balance for tightened credit standards rose from +14 in the second quarter of 2022 to +29 in the third and +57 in the fourth quarter, and the net balance for rejected loan applications jumped from +14 to +71 in the fourth quarter. Both are the highest values since the respective series began (2003 for credit standards, 2015 for rejections). Perceived credit demand fell sharply at the same time, to −71 in the fourth quarter of 2022 and −86 in the first quarter of 2023.[6] A pure rate shock would primarily lower demand but not generate the simultaneous sharp tightening of credit standards. The survey also brackets the end of the regime: in the second quarter of 2025, immediately before expiry, banks reported the first decline in rejection rates since 2015 and a strong recovery of demand, as noted in Section 6.4.

Figure 6. Bank Lending Survey, Austria: housing loans to private households.



Source: ECB Bank Lending Survey. Notes: Net balance (tightening minus easing) over the past three months. Tightening and rising rejection rates are coded positive; falling demand is coded negative. Vertical lines: entry into force of the KIM-V on 1 August 2022 and its expiry on 30 June 2025.

6.6 How much of the decline is the rate shock?

The synthetic-control estimate isolates the KIM-V effect from the rate channel; it is also instructive to ask how much of the early post-treatment decline would have happened anyway. We focus on the first twelve months after activation, in which secondary dynamics – interest-rate transmission lags, demand normalisation, refinancing effects – are least likely to confound the decomposition. Relative to the first half of 2022, when Austrian new lending averaged about 290 EUR per capita per month, the synthetic counterfactual, which absorbs the rate tightening together with any other shocks common to the donor pool, itself falls to roughly 180 EUR over the twelve months from August 2022 to July 2023, a decline of more than a third of the pre-treatment level. Observed Austrian lending falls further, to about 120 EUR (Table 4). The policy rate channel and shared macro shocks therefore account for roughly two thirds of the total early post-treatment drop and

[6]The Austrian BLS sample comprises seven banks, so net balances move in steps of about 14 percentage points.

the macroprudential intervention for the remaining third. Put differently, the regulation reduced Austrian housing credit by a further third relative to where rates alone would have left it. The monetary tightening was the main force behind the post-2022 decline in Austrian housing credit, but the KIM-V contributed a substantial further effect on top of it.

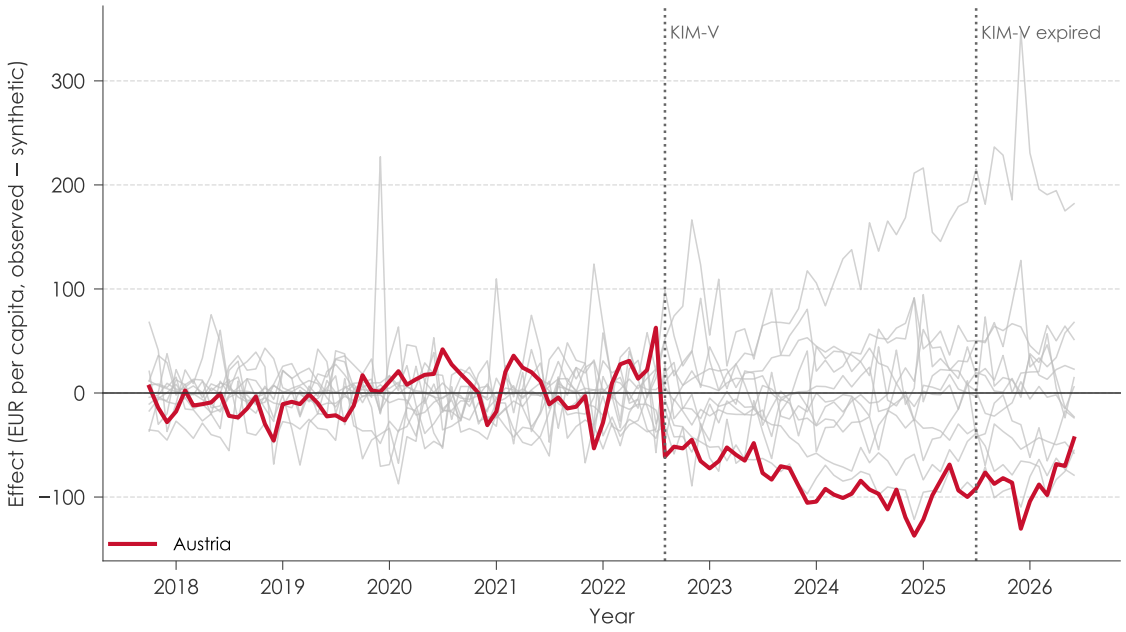
7 Robustness

The baseline estimate is now stress-tested in four directions: cross-sectional placebo inference, a leave-one-donor jackknife, alternative outcome transformations, and shifted treatment dates to allow for anticipation.

7.1 Cross-sectional placebo inference

Figure 7 shows the estimated effect over time alongside the placebo effects of the donor countries. The Austrian trajectory sits at the lower edge of the placebo distribution in the post-2022 window. Across all thirteen units, Austria's average gap over the post-treatment window from August 2022 to June 2026 (-84 EUR per capita) is the most negative, corresponding to a one-sided rank-based p-value of $1/13 \approx 0.08$. The closest case is Slovakia (-77 EUR), itself a country with binding DSTI and DTI limits. The sign-blind RMSPE ratio is less conclusive: Austria ranks fourth of thirteen ($p \approx 0.31$; third, $p \approx 0.23$, when the post-treatment window is restricted to the period in which the KIM-V was in force). Two of the three countries ranked above Austria (Portugal and the Netherlands) deviate *upwards* from their synthetic counterparts after 2022, and Portugal's high ratio mainly reflects an unusually tight pre-treatment fit. Counting only placebos with a negative post-treatment gap, Austria ranks second behind Slovakia ($p = 2/13 \approx 0.15$). The cross-sectional evidence therefore identifies the Austrian decline as the largest in the pool, but with thirteen units the attainable significance levels are coarse. The time-series evidence from the expiry of the regulation (Section 6.4) complements it.

Figure 7. Effect over time and placebo effects.

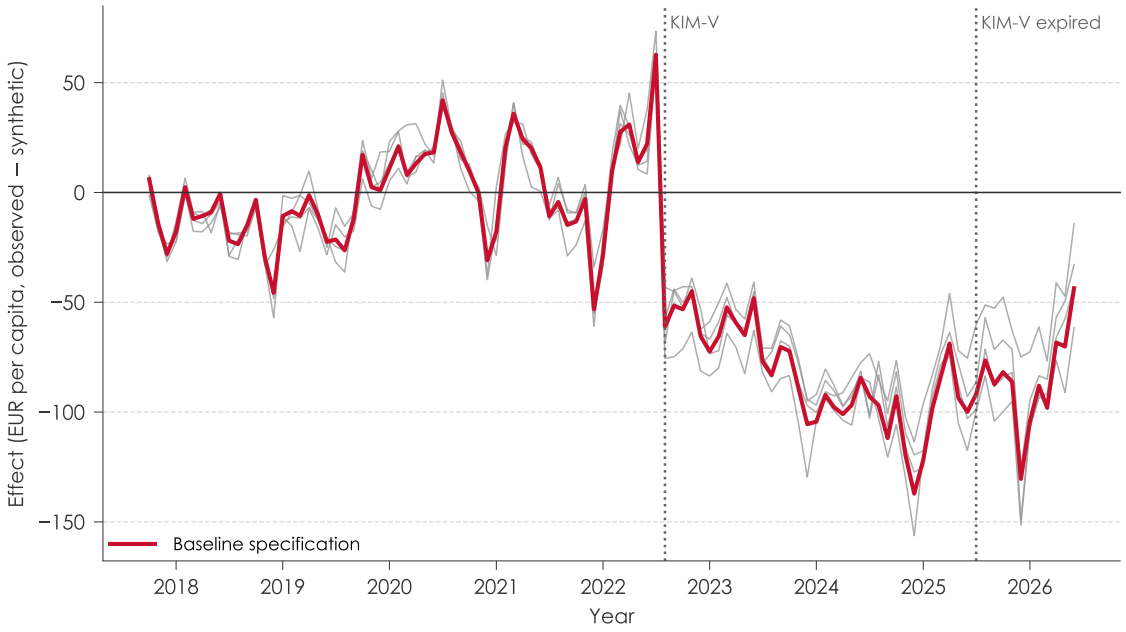


Source: Own calculations. Notes: Difference between observed and synthetic new lending in EUR per capita. Red: Austria. Grey: placebo countries whose pre-treatment RMSPE is below twice that of Austria (all donors except Luxembourg). Vertical lines: entry into force of the KIM-V on 1 August 2022 and its expiry on 30 June 2025.

7.2 Leave-one-donor jackknife

Figure 8 documents the sensitivity of the baseline specification to the donor pool. Twelve alternative specifications are estimated, in each of which one donor country is removed from the pool. The resulting effect trajectories (grey) cluster closely around the baseline specification (red); in January 2024, the effect ranges from −92 EUR (without Luxembourg) to −105 EUR per capita. No single donor drives the result on its own. Removing Germany or Portugal, the two most heavily weighted donors, leaves the estimate qualitatively unchanged because other countries substitute into the weight scheme. The estimate is also qualitatively unchanged when Portugal and the Netherlands are removed individually. These are the two donors with the most material own-BBM dynamics during the treatment window, so this result addresses the main donor-pool contamination concern raised in Section 5.

Figure 8. Leave-one-donor jackknife.



Source: Own calculations. Notes: Difference between observed and synthetic new lending in EUR per capita; twelve alternative specifications with one donor removed (grey) compared to the baseline specification (red). Vertical lines: entry into force of the KIM-V on 1 August 2022 and its expiry on 30 June 2025.

7.3 Alternative outcome transformations

The headline outcome is nominal new lending in EUR per capita. The main alternatives are real lending per capita, deflated by the Harmonised Index of Consumer Prices (HICP); lending as a share of nominal GDP; the year-on-year growth rate of new lending; and the count of new loans. Each has trade-offs: real lending and lending-to-GDP rescale by series with their own cross-country idiosyncrasies, growth rates discard level information, and loan counts are not consistently available across countries. Table 5 re-estimates the synthetic control on two of these transformations: real lending per capita (HICP-deflated, base 2015), and the year-on-year growth rate of nominal lending per capita. In both specifications the post-treatment gap remains substantively large and negative. The headline finding is therefore not an artefact of the EUR-per-capita scaling.

Table 5. Estimated KIM-V effect under alternative outcome transformations.

Outcome	Pre-mean	18m effect	% of pre-mean
Real lending per capita (HICP-deflated)	209.3	−83.0	−39.7
YoY growth of nominal lending (%)	12.4	−15.3 pp	–

Source: Own calculations. Notes: Effect in the eighteenth month of treatment (January 2024). Real lending per capita is HICP-deflated (base 2015); the effect on the year-on-year growth rate is in percentage points.

7.4 Anticipation and front-loading

In the baseline, the pre-treatment window ends in July 2022 and August 2022, the month of entry into force, is the first treated month (Section 4). Given the chronology in Section 3.1, anticipation is conceivable: the limits had been public since the FMSG decision of December 2021 and formally recommended since March 2022, and the regulation itself was published in June 2022. We therefore re-estimate the synthetic control with the pre-treatment window shortened by three and six months, to end in April 2022, shortly after the FMSG recommendation, and in January 2022, shortly after the FMSG decision, so that the optimisation is forced to match Austria to donors on a strictly shorter window. In neither shortened specification does the lending gap turn negative in the placebo window between the end of the shortened window and July 2022. On the contrary, Austria's new lending sits about +42 EUR per capita above the synthetic in the three months before entry into force, and about +40 EUR per capita above on average in the six-month run-up. This is consistent with modest front-loading of housing loans ahead of the binding rule rather than with an anticipatory contraction. The headline effect in January 2024 is essentially unchanged in absolute terms: −95 EUR (−41%) with the three-month and −88 EUR (−38%) with the six-month shortening, so the estimate is not driven by the choice of the treatment date.

8 Discussion and Conclusions

The KIM-V, which took effect on 1 August 2022, substantially dampened monthly new lending for housing purposes to private households in Austria. The synthetic control constructed here, which replicates Austrian pre-treatment lending closely and tracks the Austrian mortgage rate through the tightening cycle, indicates an effect of about −40 to −46% of the pre-treatment mean at the 18- and 24-month horizons and of −37% on average over the three years in force. A number of robustness exercises support this finding: Austria shows the largest average decline of all units in the cross-country placebo distribution, the estimate is robust to the donor-pool composition, the outcome transformation, and the treatment date, and the gap narrows relative to the counterfactual after the regulation expired in June 2025, although it remains sizeable a year later. The complementary Bank Lending Survey evidence documents a contemporaneous jump in reports of tightened credit standards and in loan rejection rates, which makes a pure demand shock implausible and is consistent with a supply-side effect of the KIM-V. Quantitatively, the monetary tightening was the main force behind the post-2022 decline in Austrian housing credit, but the regulation reduced lending by a further third relative to where rates alone would have left it, a result that is not visible from a simple before-after comparison.

The chronology of the measure matters for its interpretation. The FMSG decided on binding limits in December 2021, when the policy rate was zero and Austrian mortgage rates stood at 1.2%. The regulation took effect eight months later, five days after the first ECB rate hike took effect, and remained in force unchanged while mortgage rates rose to above 4%. Because a DSTI cap is implicitly rate-contingent, the limits – calibrated in 2021 – cut the loan a given income could service by 12% by the time they became binding and by more than a third at the rate peak (Section 3.2). The two shocks thus reinforced each other: the rate shock raised the share of loan applications that the rule excluded, and part of the measured effect originates from this

interaction rather than from either shock alone.

This reading provides clear evidence of the drawbacks associated with a lack of coordination between monetary policy and macroprudential interventions, part of which may be due to missing synchronisation between business and financial cycles. In the models reviewed in Section 2, a tightening of macroprudential policy that coincides with a monetary tightening in response to a non-financial shock reduces welfare, because borrowing is restricted twice while households' repayment capacity has not deteriorated correspondingly. The Austrian episode comes close to this configuration. On top of that, the institutional timing of prudential policy in Austria, with an eight-month lag between decision and implementation and a fixed sunset clause in the regulation itself stipulating a three-year duration for the KIM-V measures, created a potential for conflict with more flexible monetary policy instruments. The limits were not recalibrated when rates peaked, and they expired at a time when rates had only partly receded. In the case of Austria, the regulation amplified the impact of the interest rate hike to an undesirable extent and for too long.

Welfare losses from lacking coordination with monetary policy can be reduced by adding a sunset clause to the initial policy move, as in the case of Austria. A comparison across Europe – based on the overview of borrower-based measures provided by the European Systemic Risk Board[7] – shows that Austria is the only country where once implemented restrictive borrower-based measures have been lifted (Table 6 in Appendix B). Throughout Europe the average duration of borrower-based measures is 9.3 years, if the date of effective implementation is compared to the lifting date or September 2026. The maximum length occurs in Latvia, where the implementation in 2007 was followed by a further tightening in 2020. By the end of September 2026, the accumulated duration was 19.3 years. Besides Austria with a built-in duration of 2.9 years, all other countries with short implementation phases started at the beginning of 2023 or later.

Macroprudential measures that remain in place over a long period are highly likely to result in a lack of coordination with monetary policy, because business cycles are shorter than financial cycles and because macroprudential measures are intended to be introduced before the peak of the financial cycle and eased again after the peak (ESRB, 2014, Figure 4). Borio (2014) reports a length of financial cycles of 16 years and provides evidence that the length could have grown up to 20 years for cycles that peaked after 1998, while the length of business cycles is 1–8 years. Aikman et al. (2015), using spectral analysis of UK credit growth, identify a medium-term credit cycle of around 13 years, and Rünstler and Vlekke (2018) find country specific lengths for the financial cycle (credit volume) range from about 6 years (Germany) to 12 years (USA) and 19 years (Spain). Focusing on the USA and the United Kingdom, Strohsal et al. (2019) conclude that the typical length of a financial cycle in these highly developed and liquid capital markets is 15 years, while for Germany a financial cycle is less visible. A comparison of the average length of financial cycles with macroprudential policy cycles presented in Table 6 reinforces the impression that they are remarkably long. This indicates a strong preference of supervisory authorities for avoiding financial market stress, even if it means accepting welfare losses resulting from the combined effects of monetary and macroprudential policy measures.

[7] `https://www.esrb.europa.eu/national_policy/html/index.en.html`

Three policy lessons follow. First, a DSTI cap set as a fixed percentage is a very different constraint at a mortgage rate of 1% and at 4%. Calibration could take this into account explicitly, for instance by defining the cap with reference to a stressed or reference interest rate, by indexing the cap to the prevailing rate, or by giving the authority a mandate to adjust the cap within a pre-announced range as rates move. Second, the lag between decision and entry into force, and a fixed expiry date, should be short enough, or flexible enough, to allow the measure to be adjusted to a changed monetary environment. Third, in a currency union, national borrower-based measures are the principal instrument acting directly on local credit conditions at origination, which makes their timing relative to the common monetary policy the critical design parameter.

Although our headline estimate is a single bundle effect, the international evidence allows for tentative remarks on the distributional burden resulting from macroprudential interventions. Nissen et al. (2022) document that LTV-binding effects fall disproportionately on younger and lower-wealth households, and Acharya et al. (2022) find that the Irish LTV/LTI limits bound most for low-income borrowers and in hot urban housing markets.

Three limitations should be highlighted. First, the KIM-V is a bundled instrument consisting of LTV, DSTI, and maturity caps whose individual contributions cannot be separated in this study. We document the mechanical interaction between the DSTI limit and the rate shock (Section 3.2), but we cannot quantify its share of the aggregate estimate. Second, even though synthetic Austria tracks the Austrian mortgage rate closely, residual confounding with the policy rate channel cannot be entirely excluded, because market structures (variable vs. fixed share, maturity mix, funding) differ between Austria and the donor countries. Third, spillover effects from BBMs activated in parallel in donor countries cannot be ruled out. Removing these donors one at a time leaves the estimate essentially unchanged (Section 7.2), but their joint removal remains untested; the discussion in Section 5 argues that any such spillover would bias the estimate towards zero, so the headline figure can be read as a lower bound in absolute terms.

Two extensions would be natural for future work. First, a demographically stratified analysis with loan-level data would clarify the distributional consequences directly, going beyond the indirect inference from the international literature. Second, a systematic investigation of the heterogeneity of macroprudential policy effects across countries, instruments, and phases of the monetary cycle would be an important next step in assessing the external validity of the result documented here.

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A Robustness Specifications

A.1 Standardised predictors

In the baseline specification, the volume block dominates the stacked loss function by roughly two orders of magnitude, so the rate block does not bind (Section 6.3). In an alternative specification, both predictors are z-standardised before optimisation (zero mean, unit variance over the pre-treatment window) so that the volume and rate components enter the loss function with equal weight. With standardisation, the donor mix shifts to France (35%), Portugal (30%), the Netherlands (22%), Germany (5%), Italy (4%), and Luxembourg (3%). The pre-treatment fit remains very close (synthetic Austria 229.9 EUR vs. observed 229.5 EUR; mortgage rate 1.50% vs. 1.49%). The estimated 18-month effect is about −84 EUR per capita (−36% of the pre-treatment mean), somewhat smaller in absolute terms than the unstandardised baseline because the rate channel is now actively absorbed by the donor mix. The qualitative conclusion of a substantial, negative, and statistically unusual policy effect is unchanged.

A.2 Unconstrained linear regression

If the convexity constraint ($w_j \geq 0$, $\sum w_j = 1$) is dropped and the synthesis weights are obtained via simple linear regression without intercept, one or two countries dominate with weights greater than one alongside negative weights on other countries (the weights sum to 1.45). Pre-treatment fit tends to be better, but the specification is less interpretable because the synthesis can no longer be read as a convex combination of actually observed economies. The estimated 18-month effect is also clearly negative in this variant, at about −130 EUR per capita.

B Borrower-Based Measures in Europe

Table 6 compiles the implementation, tightening, relaxation and lifting of borrower-based measures in European countries from the ESRB overview of national macroprudential measures; it underlies the comparison of macroprudential and financial cycle lengths in Section 8.

Table 6. Implementation, tightening, relaxation and lifting of borrower-based measures in Europe, 2007–2026.

Country	Measures	Effective	Tightened	Relaxed	Lifted	Duration (years)	Adjust-ments	Years between adjustments
Austria	LTV, DSTI, MAT	1 Aug 2022			30 Jun 2025	2.9	2	2.9
Belgium	LTV, DSTI, DTI	1 Jan 2020				6.8	0	–
Bulgaria	LTV, DSTI, MAT	1 Oct 2024				2.0	0	–
Croatia	LTV	1 Jul 2025				1.2	0	–
Cyprus	LTV, DSTI	4 Dec 2013	2021	2016		12.8	2	4.3
Czechia	LTV, MAT	16 Jun 2015	2016, 2022, 2026	2020		11.3	4	2.3
	DSTI	1 Oct 2018	2022	2020		8.0	2	2.7
Denmark	LTV	1 Nov 2015				10.9	0	–
Estonia	LTV, DSTI, MAT	1 Mar 2015		2024		11.6	1	5.8
Finland	LTV	1 Jul 2016	2018, 2021	2020, 2023		10.3	4	2.1
	DSTI	1 Jan 2023				3.7	0	–
	MAT	1 Jul 2023				3.3	0	–
France	DSTI, MAT	1 Jan 2022		2023		4.7	1	2.4
Greece	LTV, DSTI	1 Jan 2025				1.7	0	–
Hungary	LTV, DSTI	1 Jan 2015	2018	2024, 2025		11.8	3	2.9
Iceland	LTV	20 Jul 2017	2021, 2022			9.2	2	3.1
	DSTI	1 Dec 2021	2022			4.8	1	2.4
Ireland	LTV, LTI	9 Feb 2015	2018	2017, 2023		11.6	3	2.9
Latvia	LTV	1 Jul 2007	2020			19.3	1	9.6
	DTI, DSTI, MAT	1 Jun 2020				6.3	0	–
Liechtenstein	LTV	1 Feb 2015				11.7	0	–
Lithuania	LTV, DSTI, MAT	1 Nov 2011	2015, 2017, 2022	2026		14.9	4	3.0
Luxembourg	LTV	1 Jan 2021				5.7	0	–
Malta	LTV, DSTI, MAT	1 Jul 2019				7.3	0	–
Netherlands	LTV	1 Jan 2012				14.8	0	–
Norway	LTV	1 Jul 2015	2017	2020, 2023, 2025		11.3	4	2.3
	DTI	1 Jan 2017		2020		9.8	1	4.9
Poland	LTV	1 Jan 2014				12.8	0	–
Portugal	LTV, DSTI, MAT	1 Jul 2018	2020, 2022			8.3	2	2.8
Romania	LTV, DSTI	31 Oct 2011	2019, 2022			14.9	2	5.0
Slovakia	LTV	1 Nov 2014	2017, 2018			11.9	2	4.0
	MAT	1 Mar 2015	2017, 2018			11.6	1	5.8
	DSTI	1 Mar 2017	2018, 2020			9.6	1	4.8
Slovenia	LTV, DSTI	6 Sep 2016	2022, 2023			10.1	2	3.4
Sweden	LTV	1 Oct 2010	2016, 2018			16.0	2	5.3
Mean						9.3		

Source: ESRB overview of national macroprudential measures, own compilation. Notes: DSTI: debt service-to-income, DTI: debt-to-income, LTI: loan-to-income, LTV: loan-to-value, MAT: loan maturity. Tightened and relaxed: years of adjustments. Duration runs from the effective date to the lifting date or, for measures still active, to the end of September 2026.