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RESEARCH ARTICLE

Housing Credit, the Cost of Housing and the Canadian Business Cycle, 1979–2023: Evidence from a Macro-Financial VAR, Local Projections and Historical Episodes

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Keywords: housing credit; house prices; household debt; cost of housing; business cycle; monetary transmission; local projections; Canada; mortgage renewals

Abstract

This paper asks whether the cost and availability of housing credit drive Canadian business cycles or mainly reflect them. A quarterly five-variable VAR in real GDP, consumer prices, the policy rate, real house prices and household debt relative to disposable income, estimated for 1991Q2–2023Q4, is complemented by local projections, state-dependent projections, sign restrictions, a Bayesian VAR, rolling estimates, break tests, a historical decomposition, an out-of-sample forecasting experiment and a 1979–2023 episode history.

House prices and household leverage reinforce each other. A one-standard-deviation house-price shock (2.1%) raises the debt-to-income ratio by about 0.9 percentage points after one year, significant at 90%; a household-credit shock raises real house prices by up to 0.8% within three quarters. Monetary tightening transmits strongly to housing: a 100-basis-point policy shock lowers real house prices by about 2.1% after one year (90% band −3.5% to −0.3%), and prices fall in 89% of sign-restricted models.

The link from housing and credit to output is weak on average. House-price and credit shocks explain about 8% of the five-year forecast-error variance of real GDP (2–15% across specifications), no GDP response is robustly significant, and adding housing and credit does not improve GDP forecasts. A payment-to-income measure of the cost of housing is somewhat more informative, but it moves with output, behaving as a demand indicator rather than an affordability drag.

Two qualifications matter. The mechanism is unstable: in 15-year windows ending 2011–2021, housing and credit shocks explain 16–41% of GDP variance. And state-dependent projections suggest that housing and credit expansions are followed by lower GDP three to four years later when household debt is above trend, but by higher GDP otherwise. The evidence supports housing credit as a conditional amplifier, most relevant when leverage is high, rather than a dominant independent source of Canadian business cycles. Identification is recursive or set-based and the credit variable is a leverage ratio, so causal statements are limited accordingly.

1 Introduction

Canadian households carry one of the highest debt burdens among advanced economies. Household credit-market debt stood at about 177% of disposable income at the end of 2025, below its 2022 peak of

188% but roughly double its 1990 level (Figure 1). Mortgage debt is more than 70% of household financial liabilities (Pugh, Wang & Webley, 2026). The Bank of Canada's 2026 *Financial Stability Report* identifies elevated household debt, mortgage renewals at higher rates and falling house prices as continuing vulnerabilities, while judging that households have so far proven resilient (Bank of Canada, 2026).

These facts invite a simple story: cheap credit inflates house prices, higher collateral values support more borrowing and spending, and when rates rise the process reverses and amplifies the downturn. The story is plausible but not established. Canada's largest post-1990 recessions (2008–09 and 2020) were not preceded by Canadian housing busts, and Canada avoided the mortgage-default crisis that struck the United States despite similar monetary policy before 2008 (Federal Reserve Bank of Cleveland, 2009). Earlier Canadian evidence is also mixed: Muellbauer, St-Amant and Williams (2015) find that easier credit conditions raise house prices, debt and consumption, but that the US-style housing-collateral effect on consumption is absent in Canada.

This paper therefore does not assume that housing credit drives Canadian business cycles. It tests three competing hypotheses:

The contribution is modest and empirical. Rather than studying house prices, credit or monetary policy in isolation, the paper estimates them jointly and asks how much of the variation in Canadian output they account for, whether that share has changed over time, and whether it depends on the level of household leverage. It combines a vector autoregression with local projections, state-dependent projections, rolling-window estimates, known-date break tests, a historical decomposition, a recursive forecasting experiment and scenario simulations, and it reads the results against the Bank of Canada's recent micro-level evidence on stress tests, mortgage renewals and arrears.

The main findings are that house prices and household leverage reinforce each other, that monetary policy moves house prices strongly, and that the link from housing and credit to aggregate output is weak on average but larger in some periods and in high-debt states.

2 Research questions and contribution

The central question is: *to what extent does the cost and availability of housing credit influence house prices, household balance sheets and ultimately the Canadian business cycle, and do downturns feed back into credit and housing?* It is operationalised through five testable questions:

1. Do house-price and household-credit shocks move real GDP, and by how much relative to other shocks?
2. Is the house-price–credit relationship one-way or two-way?
3. How strongly does monetary policy transmit to house prices and leverage?
4. Is the transmission stable over time, including around 2008, 2016–18, 2020 and 2022?
5. Does it depend on the level of household debt?

Relation to the literature. Bank of Canada staff have studied pieces of this system with richer micro data: the effect of the 2016 and 2018 mortgage stress tests on credit and house prices (Hartley & Paixão, 2024), payment changes at renewal (Godbout, Su & Xu, 2025) and the macroeconomic drivers of arrears (Pugh, Wang & Webley, 2026). Structural work has estimated housing-collateral DSGE models for Canada (Christensen et al., 2009) and compared monetary, fiscal and macroprudential responses to household debt (Alpanda & Zubairy, 2017). The gap this paper addresses is narrower: a single,

transparent, public-data framework that quantifies the aggregate business-cycle importance of housing and credit shocks, tests its stability and state dependence, and is fully reproducible. It does not claim a new identification strategy; its causal claims are correspondingly limited (Section 11).

3 The Canadian housing and credit market

Canada's mortgage market has three features that matter for transmission. First, most mortgages combine a long amortisation (typically 25 years) with a shorter contract term, most often five years, so rate changes reach many borrowers only at renewal. About 60% of outstanding mortgages were expected to renew in 2025 or 2026 (Godbout, Su & Xu, 2025). Second, lending is concentrated in large banks that historically held much of their mortgage book on balance sheet, and high-ratio mortgages must carry government-backed default insurance. Third, underwriting has been tightened through stress tests: from October 2016 for insured mortgages and from January 2018 (OSFI Guideline B-20) for uninsured mortgages, with the minimum qualifying rate set from June 2021 at the higher of 5.25% or the contract rate plus 200 basis points (Hartley & Paixão, 2024).

Recent conditions are summarised in the Bank of Canada's 2026 assessment. The typical home price has fallen about 20% from its 2022 peak. Arrears of 60 days or more remain low overall (0.32% of mortgage holders in March 2026 against a 2018–19 average of 0.29%) but have risen among borrowers with loan-to-income ratios above 450% (0.64%) and especially among Toronto high-loan-to-income borrowers who originated in 2022–23 (1.33%), a group holding about 2% of outstanding balances (Bank of Canada, 2026).

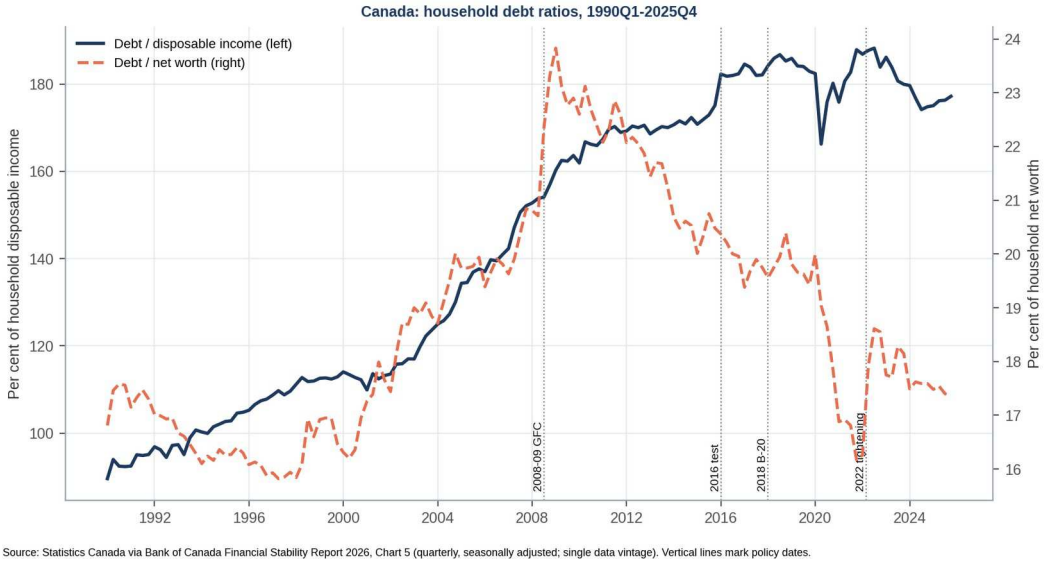


Figure 1. Canadian household debt ratios, 1990Q1–2025Q4. Source: Statistics Canada via Bank of Canada Financial Stability Report 2026, Chart 5.

What this figure tells us. Canadian households have steadily taken on more debt relative to their income: from about 90% of disposable income in 1990 to a peak of about 188% in 2022, easing to about 177% by 2025. Debt relative to net worth has moved less, because house prices rose too. For policymakers, Canadian households are among the most indebted in the advanced world, which makes them sensitive to higher interest rates and job losses, even though house-price falls have not so far caused recessions.

4 Historical Canadian housing and credit cycles

This section combines sourced narrative with statistics computed directly from the data (Table 1; Figure 2 plots the full 1979–2023 history). The payment-to-income index (MPI) is described in Section 8;

because its income measure is aggregate rather than per-capita, its levels are comparable only within a decade or two, not across the whole period.

Table 1. Canadian housing and credit episodes computed from the data (house-price windows as shown; policy rate is the quarterly-average Bank Rate)

Episode	Window	Real GDP (%)	Real house prices (%)	Max policy-rate proxy (%)	Debt/income change (pp)
1980–82 recession	1981Q2 – 1982Q4	−5.3	−19.4	20.2	n.a.
Late-1980s boom	1985Q1 – 1989Q1	+14.5	+66.3	12.5	n.a.
1990–92 recession	1990Q1 – 1991Q1 (GDP); 1989Q1 – 1996Q4 (prices)	−3.4	−19.3	13.9	+7.6 (1990–92)
Late-1990s recovery	1996Q1 – 2000Q4	+22.3	+1.6	6.0	+7.0
2000–07 expansion	2001Q1 – 2008Q1	+18.0	+66.7	5.6	+42.8
2010–14 expansion	2010Q1 – 2014Q4	+13.0	+11.6	1.25	+10.4

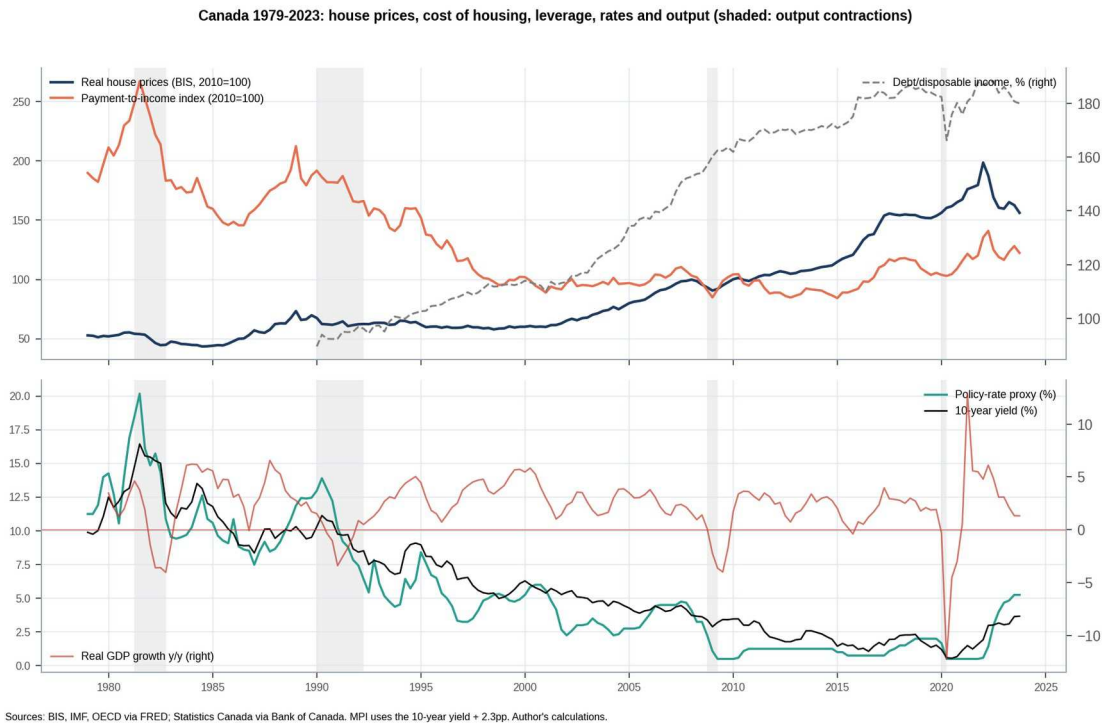


Figure 2. Canada 1979–2023: real house prices, payment-to-income, household leverage, interest rates and output growth.

What this figure tells us. The top panel shows three big house-price booms, in the late 1980s, 2001–2008 and 2015–2022, and one real bust in the early 1990s, when high interest rates ended the late-1980s boom. The bottom panel shows interest rates falling for four decades until 2022. The deepest recessions, in 1981–82, 2008–09 and 2020, came from interest-rate, global and pandemic shocks rather than from housing. For policymakers, Canadian booms have usually ended in slower growth, not in crashes.

1980–82 recession. The deepest pre-pandemic contraction in the sample was a monetary one. The Bank Rate averaged 20.2% in 1981Q3 (21.0% in August 1981) and the 10-year yield reached 16.4%. Real GDP fell 5.3% between 1981Q2 and 1982Q4 and real house prices fell 19.4% between 1981Q1 and 1982Q3. The payment-to-income index peaked in 1981Q3 at more than double its 2022 value. Even allowing for the upward bias in early levels, this was the most severe payment shock for new buyers in the sample, and it came from interest rates rather than from prices.

Late-1980s boom. Real house prices rose 66% between 1985Q1 and 1989Q1 (from 44.1 to 73.3 on the BIS index), while the policy-rate proxy climbed back to 12.5%.

1990–92 recession and housing bust. Canada's recession ran from March 1990 to May 1992, following monetary tightening against high inflation and fiscal restraint; in Ontario, output and employment fell about 6% peak to trough. Toronto average resale prices fell 23.2% between 1989 and 1995 and did not regain their 1989 level until 2002 (Globe and Mail, 2022, citing CREA; TD Economics). The BIS real house-price index in our data falls from 73.3 in 1989Q1 to 59.2 by 1996Q4. This is the one post-1980 episode in which a housing bust and a deep recession coincided, and it is also the episode in which housing collateral effects appear strongest in structural estimates (Christensen et al., 2009).

Late-1990s recovery. Output grew 22% between 1996 and 2000 while real house prices rose less than 2% and leverage rose 7 points of income: a strong expansion with no housing boom, which is a reminder that Canadian cycles do not require housing to drive them.

2000–07 expansion. Real house prices rose 67% between 2001Q1 and 2008Q1, matching the late-1980s boom in size, and household debt rose from 110% to 153% of disposable income, by far the

largest leverage build-up in the data. Yet the payment-to-income index barely moved (averaging 98, 2010 = 100), because falling long-term yields offset rising prices. The two largest price booms therefore differ sharply: the first was financed at high and rising rates and ended in a bust and recession; the second was financed at falling rates, left payment burdens stable and saw real prices fall only 9% during the 2008–09 crisis before recovering.

2008–09 global financial crisis. Canada avoided a US-style housing crash and needed no bank bail-outs. Because Canadian and US monetary policy moved similarly from 2000 to 2008 while house prices diverged, the Cleveland Fed attributes the US bust mainly to lax subprime lending rather than low interest rates (Federal Reserve Bank of Cleveland, 2009). Industry estimates put non-prime lending near 7% of Canadian mortgages against roughly one-third of US originations before the crash.

2014–16 oil shock. A regional income shock under a common national policy rate: Alberta's economy contracted by almost 2% in 2015 and its house prices fell about 4% from their late-2014 peak, while Toronto and Vancouver continued to boom (IMF, 2016). Alberta foreclosure filings rose from about 1,800 in 2014 to 2,166 in 2015.

2010–14 expansion. With the policy rate at or below 1.25% throughout, real house prices rose 12% and debt-to-income a further 10 points, while the payment-to-income index averaged 92, the lowest cost of housing for new buyers in the sample. The rolling estimates in Section 10 show that the share of output variation linked to housing and credit shocks was largest in windows covering this low-rate period.

2016–18 stress tests. Using local exposure to each rule in a difference-in-differences design, Hartley and Paixão (2024) find that the 2016 test improved borrower quality without slowing credit or house prices, while the 2018 test lowered mortgage credit and local house-price growth, and that areas more exposed to the 2016 test saw smaller increases in delinquencies during the 2022–23 tightening.

2020 COVID shock. House prices rose through a deep recession: national year-over-year growth reached 17% in February 2021, reflecting income losses concentrated below the incomes of typical buyers, record-low rates and large income support (Bank of Canada Staff Analytical Note 2021-4). The measured debt-to-income ratio fell from 182.4% to 166.2% in 2020Q2 because transfers raised income, not because households deleveraged.

2021–22 boom and 2022–23 tightening. Investors' share of mortgaged purchases rose to just over a fifth in 2021 while first-time buyers' share hit a low (Bank of Canada Staff Analytical Note 2022-1). The policy rate then rose from 0.25% to 5.0% between March 2022 and July 2023 (Hartley & Paixão, 2024). Real house prices in our data fell from 198.6 (2022Q1) to 160.6 (2022Q4), a 19% decline in three quarters.

2024–26 renewal cycle. About 60% of renewers in 2025–26 were expected to face higher payments, with five-year fixed-rate holders facing increases of about 15–20% (Godbout, Su & Xu, 2025). More than 90% of recent renewers renewed below their stress-test qualifying rate, and many extended amortisation (Bank of Canada, 2026).

5 The 2000–2006 property boom: why Canada avoided a bust

Between 2001Q1 and 2008Q1 real Canadian house prices rose 67%, almost exactly the rise in the late-1980s boom and similar to the US boom of 2000–2006. Household debt rose from 110% to 153% of disposable income, by far the largest leverage build-up in the Canadian data. Yet the payment-to-income index for new buyers barely moved, because falling long-term interest rates offset rising prices, and when the global crisis came real prices fell only about 9% before recovering.

The contrast with the United States is instructive. Monetary policy in the two countries was similar, so interest rates alone cannot explain why one market collapsed and the other did not (Federal Reserve Bank of Cleveland, 2009). The difference lay in credit quality. Industry estimates put non-prime lending

near 7% of Canadian mortgages against roughly one-third of US originations before the crash; Canadian lending was concentrated in regulated banks that kept most loans on their balance sheets; high-ratio mortgages required government-backed insurance; and borrowers remained personally liable for their debts. Credit therefore expanded mainly to households able to repay.

This paper's estimates support that reading. House-price and credit shocks reinforce each other in Canada, but their average effect on output is small, and they become damaging mainly when household debt is above its trend. The 2000–2006 boom raised leverage without triggering that damage, because it was not followed by a collapse in prices or a wave of defaults.

For policymakers, the lesson is that a long housing boom is not in itself a crisis. What converts a boom into a bust is the quality of the credit that finances it. Canada's experience argues for keeping lending standards, mortgage insurance and borrower stress tests firm during booms, when the temptation to relax them is greatest, while recognising that the leverage accumulated then leaves households more exposed to later rate increases.

6 Literature review

This section places the paper in six strands of research. In-text citations follow APA (7th edition) style.

Credit conditions, house prices and consumption in Canada. Muellbauer et al. (2015) estimate a system of equations for Canadian consumption, house prices and debt and find strong effects of credit conditions, but not the large housing-collateral effect on consumption found in the United States. Kartashova and Tomlin (2017) show with household data that part of the link between house prices and spending runs through non-mortgage borrowing such as home-equity lines of credit. Christensen et al. (2009) estimate a small open-economy model in which borrowing is limited by housing values; collateral constraints improve the model's fit and account for a large share of consumption growth during the late-1980s boom and bust.

Regional markets. Allen et al. (2009) document that Canadian city housing markets are segmented, so national averages conceal large regional differences, a point that matters for interpreting national estimates such as those in this paper.

Macroprudential policy. Alpanda and Zubairy (2017) compare monetary, fiscal and macroprudential instruments for addressing household indebtedness in a structural model. Hartley and Paixão (2024) provide the most credible Canadian causal evidence: the 2016 stress test for insured mortgages improved borrower quality without slowing credit or house prices, while the 2018 extension to uninsured mortgages reduced credit and house-price growth in exposed areas and left borrowers better able to absorb the 2022–23 rate increases. International evidence points the same way: loan-to-income limits in the United Kingdom slowed credit and prices in exposed areas (Peydró et al., 2024), and Irish limits reallocated credit toward higher-income borrowers (Acharya et al., 2022).

Monetary policy identification. Champagne and Sekkel (2018) construct narrative monetary-policy shocks for Canada and find that a 100-basis-point shock lowers real GDP by about 1% at its peak once the 1991 adoption of inflation targeting is accounted for, a useful benchmark for the recursive estimates reported here.

Household stress and mortgage renewals. Godbout et al. (2025) estimate that about 60% of outstanding mortgages renew in 2025–26 and that many five-year fixed-rate borrowers face payment increases of 15–20%. Pugh et al. (2026) find that the labour market, not interest rates, is the main driver of mortgage arrears: a 1-point rise in unemployment raises arrears by about 0.1 point, whereas a 100-basis-point rise in rates raises them by only 3–5 basis points. The Bank of Canada (2026) documents that arrears remain low overall but higher among borrowers with high loan-to-income ratios.

International evidence. Iacoviello (2005) provides the collateral-constraint model used in Section 7; Mian and Sufi (2011) show how home-equity borrowing amplified the US boom and bust; Mian et al. (2017) find across countries that rising household debt predicts weaker growth; and Jordà et al. (2016) show that mortgage-credit booms are followed by deeper recessions. The Federal Reserve Bank of Cleveland (2009) attributes Canada's escape from a US-style bust to stronger lending standards.

Gap addressed. Canadian studies either estimate structural models or examine particular policies. This paper provides a transparent, public-data estimate of how much housing and credit shocks contribute to Canadian business cycles, with the same specification applied to eight other economies.

7 Theoretical framework

A representative borrowing household chooses consumption , housing and labour to maximise

subject to the budget constraint and a collateral constraint,

where is mortgage debt, the mortgage rate and the maximum loan-to-value ratio (a macroprudential parameter). With multiplier on the collateral constraint, the Euler equation for debt is

and the housing demand condition is

When the constraint binds (), house prices enter borrowing capacity directly: a rise in relaxes the constraint, raises and , and a fall does the reverse. This is the collateral channel. A separate cash-flow channel operates through : higher rates at renewal reduce resources for consumption even when the constraint is slack. The model implies testable predictions that the empirical work examines: (i) house-price shocks raise leverage; (ii) credit shocks raise house prices; (iii) the effect of housing on consumption and output should be larger when more households are constrained, that is, when leverage is high; (iv) monetary tightening lowers house prices and borrowing.

8 Data and variables

The estimation panel covers 1990Q1–2023Q4 (136 quarters); after differencing and four lags the effective sample is 1991Q2–2023Q4 (131 quarters), which conveniently lies entirely within the inflation-targeting regime whose importance Champagne and Sekkel (2018) emphasise. The start is set by the household-debt series, the end by the availability of the policy-rate and CPI series in the source used. Table 2 defines the variables; the complete data dictionary with codes and provenance is in the replication package.

Table 2. Variable definitions

Symbol	Variable	Source (code)	Notes
	Real GDP, 100×ln	IMF IFS via FRED (NGDPRSAXDCCAQ)	Quarterly, seasonally adjusted
	Consumer price	OECD MEI via	Monthly NSA,

Symbol	Variable	Source (code)	Notes
	index, 100×ln	FRED (CPALCY01CAM661N)	quarterly mean
	Policy-rate proxy, %	OECD MEI via FRED (IRSTCB01CAM156N)	Bank Rate; quarterly mean
	Real residential property prices, 100×ln	BIS via FRED (QCAR628BIS)	NSA, CPI-deflated
	Household debt / disposable income, %	Statistics Canada via Bank of Canada (FSR_2026_C5)	SA, single 2026 vintage

Data discussion. Real GDP, consumer prices, the policy-rate proxy, real house prices and the 10-year yield were retrieved from FRED, the database of the Federal Reserve Bank of St. Louis; household debt and mortgage arrears come directly from the Bank of Canada's Valet service, which publishes the data behind its *Financial Stability Report*. All series were retrieved on 28 September 2026 and transcribed with length and spot checks; provenance is documented in the replication package.

Three measurement choices need attention. First, the policy-rate proxy is the Bank Rate, which since 1996 has been set 25 basis points above the target for the overnight rate, so it tracks the policy stance closely; monthly values are averaged to quarters. Second, the household-debt ratio is a single 2026 data vintage. Earlier Bank of Canada releases report different historical levels because Statistics Canada revises income and debt, so the level of the ratio should be read with care, although its movements are robust. Third, the BIS real house-price index is not seasonally adjusted and is deflated by the consumer price index; seasonal dummies are included in all models.

The sample begins in 1990, so that estimation (from 1991Q2 after differencing and lags) covers the inflation-targeting regime adopted in 1991. It ends in 2023Q4, the last quarter common to all series. All models include seasonal dummies, pandemic dummies for 2020Q2 and 2020Q3, and a dummy for the 1991 introduction of the goods and services tax where it falls in the sample. The payment-to-income index uses the 10-year Government of Canada yield plus a spread calibrated from posted five-year mortgage rates, which exceed rates actually paid; its levels are indicative, but its movements over time are informative.

Cost-of-housing indices. Two affordability measures are constructed. The price-to-income ratio is , where is the nominal house-price index (the BIS real index multiplied by the CPI, since BIS deflates by the CPI) and is annual nominal income, measured as the four-quarter sum of nominal GDP (IMF IFS via FRED, NGDPNSAXDCCAQ). The payment-to-income index for a new buyer with a constant loan-to-value ratio and 25-year amortisation is

which applies Canada's semi-annual compounding convention. The mortgage rate is proxied by the 10-year Government of Canada yield (OECD, IRLTLT01CAQ156N) plus a spread of 2.3 points, the mean gap between the CMHC posted five-year conventional mortgage rate and the yield over the 16 quarters (2022Q3–2026Q2) for which both were retrieved (range 1.65–2.79). Spreads of 1 and 3 points are used as robustness checks. Two limitations matter: posted rates exceed rates actually paid, and nominal GDP rather than per-capita disposable income is the income measure, so the level of the ratios drifts down

with population growth. Only changes in the indices are used in estimation; comparisons of levels across decades are not reliable.

Table 3. Descriptive statistics, 1991Q1–2023Q4 (132 quarters)

Variable	Mean	S.D.	Min	Median	Max
Real GDP growth, y/y %	2.21	2.55	−13.06	2.51	12.13
CPI inflation, y/y %	2.05	1.65	−1.80	1.69	7.85
Policy-rate proxy, %	3.24	2.26	0.50	3.00	10.27
Real house-price growth, y/y %	2.82	5.88	−21.79	2.78	17.01
Household debt/disposable income, %	143.70	32.82	92.45	148.89	188.22
Change in debt/income, y/y pp	2.74	4.25	−17.90	2.63	14.43

9 Econometric methodology

9.1 Model selection

Unit-root tests (Table 9) indicate that all five variables are integrated of order one: augmented Dickey–Fuller tests do not reject a unit root in levels (p-values 0.25–0.97), KPSS tests reject stationarity in levels for four of the five, and all first differences are stationary. The Johansen trace test rejects no cointegration (73.24 against a 5% critical value of 69.82) but not a rank of one or less (37.70 against 47.85), so there is at most one cointegrating relation and the evidence for it is marginal.

A VAR in levels is the natural first choice because it remains consistent under unknown cointegration (Sims, Stock & Watson, 1990). In these data, however, it fails its diagnostics: at every lag length from one to four the companion matrix has a root outside the unit circle (maximum modulus 1.016–1.048) and residuals are serially correlated. The baseline is therefore a stationary VAR in growth rates,

with the seasonal and event dummies. Impulse responses of the differenced variables are cumulated to give level responses. Information criteria disagree (BIC and HQ select one lag, AIC eight); four lags are used because they span a year of quarterly dynamics and give the cleanest single-equation residuals. The resulting VAR is stable (largest root modulus 0.957). Ljung–Box tests do not reject serial independence in the GDP, inflation, house-price and credit equations ($p = 0.51, 0.62, 0.18, 0.99$) but do in the policy-rate equation ($p = 0.035$), and the system portmanteau test rejects ($p = 0.003$); residuals are non-normal, reflecting a few large shocks. Inference therefore uses a residual bootstrap (500 replications) rather than asymptotic normality.

9.2 Identification

Structural shocks are identified recursively (Cholesky) in the order GDP, prices, policy rate, house prices, household leverage. The assumptions are that output and prices respond to monetary, housing and credit shocks only with a lag; that the policy rate reacts within the quarter to output and inflation but not to house prices or credit; that house prices respond immediately to rates; and that leverage responds immediately to everything. Three alternative orderings are reported as robustness checks. This is the weakest part of the design. The candidate external instrument, the Champagne–Sekkel narrative shock series, ends in 2015 and has not been incorporated, and the 2016/2018 stress-test variation has already been exploited at the local level by Hartley and Paixão (2024) and would require their loan-level data to replicate.

9.3 Local projections

As a check that does not impose the VAR's dynamic restrictions, the paper estimates Jordà (2005) local projections with the same recursive information set:

where is the shock variable, the variables ordered before it and inference uses Newey–West errors with lags. The state-dependent version replaces with , where if the debt-to-income ratio was above its one-sided Hodrick–Prescott trend () in the previous quarter. High-debt states cover 45% of the sample.

10 Results

10.1 What does the VAR say in simple language?

A VAR is a set of equations in which each variable is explained by the recent past of all the variables. An *impulse response* traces what happens to each variable after one surprise, for example an unexpected rise in interest rates, holding everything else to its normal behaviour. A *variance decomposition* asks: of all the unpredictable movements in GDP over the next five years, what share came from each kind of surprise?

10.2 Housing and credit reinforce each other

Figure 3 (the full numerical summary is in replication file table09_10_irf_summary.csv) report the baseline level responses. A one-standard-deviation house-price shock raises real house prices by 2.1% on impact and 2.7% after three quarters, and raises the debt-to-income ratio by about 0.9 percentage points after four quarters; that response is significant at the 90% level from quarter 4 through quarter 20. Conversely, a household-credit shock (1.7 points of income) raises real house prices by 0.6% after one year and 0.8% at the peak in quarter 3, significant in quarters 1–3, after which the effect fades. Granger-causality tests point the same way but weakly: credit growth helps predict house-price growth ($p = 0.088$) and house-price growth helps predict credit growth ($p = 0.059$). The data therefore favour H3, a two-way house-price–leverage feedback, with the price-to-credit direction the more persistent.

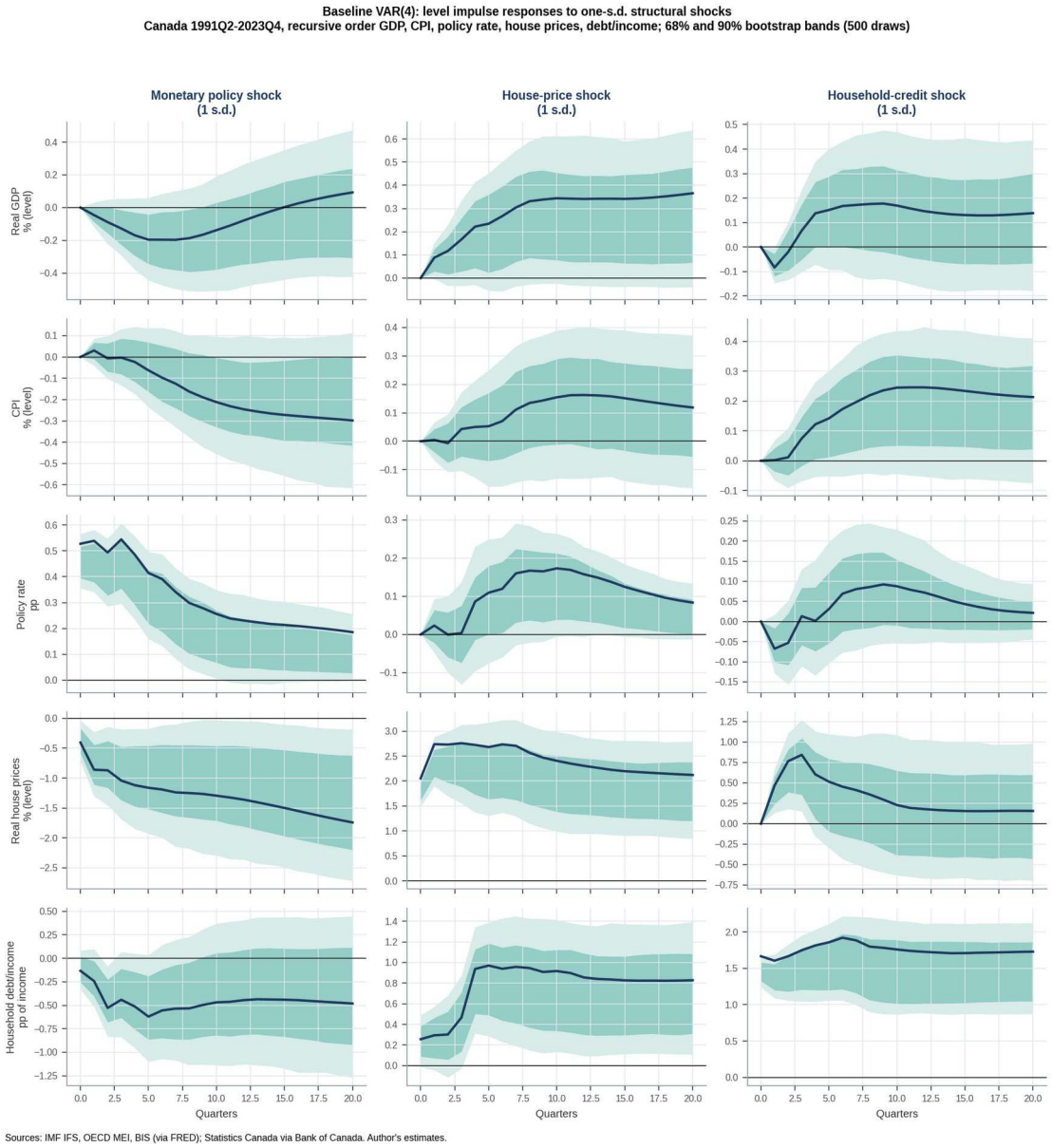


Figure 3. Baseline VAR(4) level impulse responses to one-standard-deviation monetary, house-price and household-credit shocks, with 68% and 90% bootstrap bands.

What this figure tells us. Each small chart shows what happens over five years after one surprise. House prices and household debt push each other up: a rise in prices leads to more borrowing, and more borrowing to higher prices. A rise in interest rates lowers house prices within a year. But the shaded bands for GDP include zero throughout, so on average neither housing nor credit surprises measurably move Canadian output. For policymakers, housing and credit form a self-reinforcing loop that monetary policy can cool.

10.3 Monetary policy transmits strongly to house prices

A monetary tightening that raises the policy rate by 100 basis points lowers real house prices by about 2.1% after four quarters (90% band −3.5% to −0.3%), 2.4% after eight and 2.6% after twelve, and lowers debt-to-income by about 1 point after a year (band −1.8 to +0.1). Local projections give a similar picture: −1.9% after four quarters (s.e. 0.99) and −4.0% after sixteen (s.e. 1.43). The GDP response is negative, about −0.3% after one to two years, but imprecise (band −0.97 to +0.22 at eight quarters). The weak output response is itself informative: the aggregate effect of policy is estimated less precisely than its housing-market effect in this model, and recursive identification in a small VAR is known to

understate monetary effects relative to narrative identification (Champagne and Sekkel, 2018, report a 1% peak fall in GDP per 100 basis points).

10.4 The link from housing and credit to output is weak on average

Table 4 is the paper's central result. At a five-year horizon, house-price shocks account for 6.9% and household-credit shocks for 1.5% of the forecast-error variance of real GDP; own output shocks account for 83%. The GDP responses to both shocks are positive (about +0.3% after two years for a house-price shock, +0.18% at peak for a credit shock) but their 90% bands include zero at all horizons except a small, short-lived negative credit response in quarter 1. Local projections agree except for one horizon range: a one-point credit shock is followed by GDP about 0.32% higher after twelve quarters (s.e. 0.15).

Table 4. Forecast-error variance decomposition of levels (%), baseline VAR

Shock	GDP h=4	GDP h=20	House prices h=20	Debt/ income h=20
Output	96.8	82.8	16.4	12.4
Price level	0.2	7.6	8.4	2.7
Monetary policy	0.9	1.1	16.3	4.7
House prices	1.7	6.9	57.5	14.0
Household credit	0.4	1.5	1.5	66.2

The historical decomposition (Figure 4) confirms that housing and credit shocks were minor contributors to the major output swings in the sample. Between 2008Q2 and 2009Q2, identified house-price and credit shocks subtracted about 0.4 and 0.1 percentage points from the GDP level, against 5.7 points from output shocks. During the 2022–23 tightening, monetary shocks subtracted about 0.5 points and house-price shocks 0.1 points.

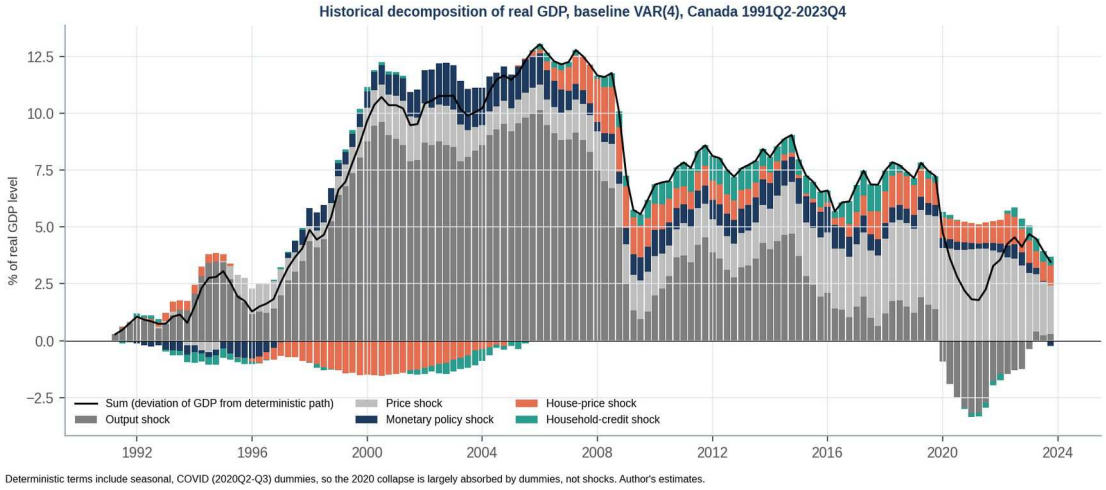


Figure 4. Historical decomposition of real GDP, baseline VAR.

What this figure tells us. This chart splits the ups and downs of Canadian GDP into the parts caused by different kinds of surprise. In every major downturn, 2008–09, the 2014–16 oil shock and 2020, general economic shocks dominate, and the house-price and credit components are small. For policymakers, Canadian recessions have been imported through trade, commodity prices and global shocks, not generated by the housing market, although housing can amplify them when debt is high.

The forecasting experiment points the same way. In recursive one-quarter-ahead forecasts over 2005Q1–2023Q4, adding house prices and credit to a VAR does not improve on an AR(4) benchmark for GDP growth (RMSE ratio 1.10, Diebold–Mariano p = 0.11) or for real house-price growth (ratio 1.13, p = 0.13). Excluding 2020Q1–2021Q2, the full VAR is significantly worse than the benchmark for GDP (ratio 1.45, p = 0.04). Housing and credit variables carry little short-run predictive content for aggregate output in these data.

10.5 The cost of housing versus house prices

Figure 5 plots the indices. The payment-to-income index rose about 30% between 2020Q1 and 2022Q1 as prices surged, eased as prices fell, and rose again in 2023 as higher rates offset lower prices, ending 2023 near 122 (2010 = 100).

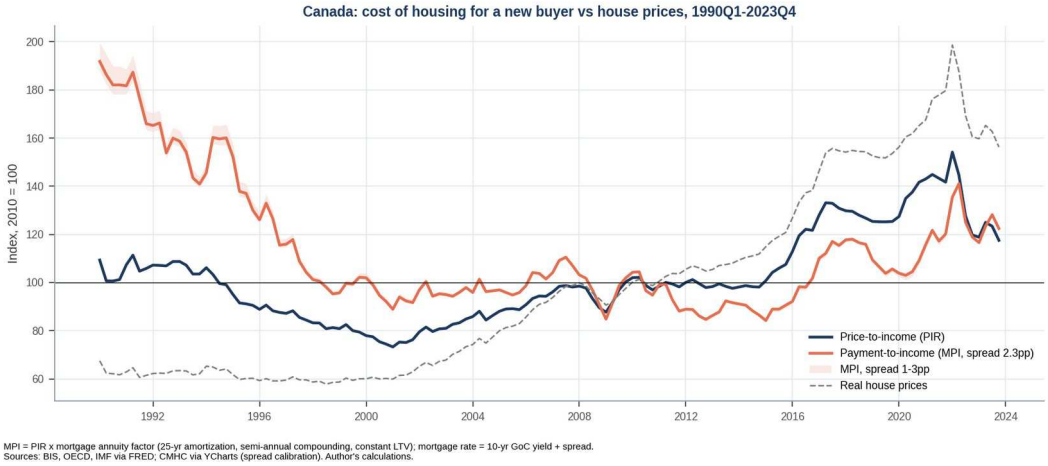


Figure 5. Cost of housing for a new buyer versus house prices, 1990Q1–2023Q4.

What this figure tells us. The orange line estimates how much of their income a new buyer would spend on mortgage payments, and the blue line house prices relative to income. The payment measure depends heavily on interest rates: it was very high in 1990 and fell for two decades as rates declined, even while prices rose. It rises when the economy is strong, so it signals demand rather than predicting a slowdown. For policymakers, affordability for new buyers depends as much on interest rates as on prices.

Replacing real house prices in the VAR with the cost-of-housing measures (Table 5) raises the share of five-year GDP variance attributed to the housing variable from 6.9% to 11.1% for price-to-income and 8.5% for payment-to-income, and the housing measure's predictive content for GDP rises (Granger p-value 0.38 for real prices, 0.27 for price-to-income, 0.11 for payment-to-income). The GDP response to an unexpected rise in payment-to-income is positive and significant at the 90% level at most horizons (about +0.36% after eight quarters for a 3.6% shock; band +0.03% to +0.56%). That sign rules out reading the index as an exogenous affordability shock: payment-to-income rises when house prices and long-term yields rise together, which happens when demand and expected growth are strong. Unlike a price shock, a payment-to-income shock does not raise leverage (Granger p = 0.45), consistent with rate-driven cost increases restraining borrowing.

Table 5. House prices versus cost-of-housing measures in the baseline VAR

Housing measure in VAR	GDP h=8 (1 s.d.)	Debt/ income h=8	FEVD GDP h=20 (%)	Granger to GDP, p
Real house prices (baseline)	0.33	0.95	6.9	0.38
Price-to-income	0.41	0.75	11.1	0.27

Housing measure in VAR	GDP h=8 (1 s.d.)	Debt/ income h=8	FEVD GDP h=20 (%)	Granger to GDP, p
Payment-to-income (spread 2.3pp)	0.36	0.26	8.5	0.12
Payment-to-income (spread 1pp)	0.35	0.24	8.3	0.12
Payment-to-income (spread 3pp)	0.36	0.28	8.6	0.11

In recursive forecasts of GDP growth, adding lagged payment-to-income growth to an AR(4) lowers the RMSE by about 5% outside the pandemic quarters (0.640 against 0.677), but the gain is not statistically significant (Diebold–Mariano p = 0.15); adding real house prices lowers it by 2% (p = 0.70). The answer to Question 2 is therefore qualified: the cost of housing is somewhat more informative about output than house prices alone, but as a signal of demand, not as a measured drag on it.

10.6 Nonlinearity: leverage makes the difference

The average masks state dependence (Figure 6). When household debt is below trend, a 1% house-price shock is followed by GDP about 0.30% higher after twelve quarters; when it is above trend, GDP is about 0.38% *lower* (difference p = 0.001), and the pattern persists at sixteen quarters (p = 0.002). A household-credit shock raises GDP by about 0.3–0.6% in low-debt states but has no positive effect, and a negative point estimate at eight quarters, in high-debt states (differences p = 0.05 at h=8, 0.011 at h=12). Credit shocks are also much more persistent in high-debt states: the debt ratio is 2.5 points higher after twelve quarters against 0.8 points in low-debt states (p = 0.005). Monetary tightening lowers GDP more in high-debt states at eight quarters (−0.45% against +0.08%, p = 0.084).

This is the pattern the collateral model predicts: when leverage is high, housing and credit booms build fragility that later subtracts from output. Two cautions apply. Many horizon-by-shock comparisons were run, so a few small p-values would arise by chance; and the state indicator is based on a single leverage measure and trend filter.

A two-regime Markov-switching regression of GDP growth on the previous year's house-price and credit growth offers a check. On the full sample it separates a normal regime (mean quarterly growth 0.60%, expected duration 63 quarters) from a short low-growth regime (mean −2.7%, about 3 quarters) that covers only 2008Q4–2009Q2 and 2020. In that regime, faster prior house-price and credit growth predicts deeper contractions, both coefficients significant. The result is not robust: excluding 2020, the model degenerates into a near-zero-variance regime that picks off isolated quarters. The Markov-switching evidence therefore adds little beyond the state-dependent projections.

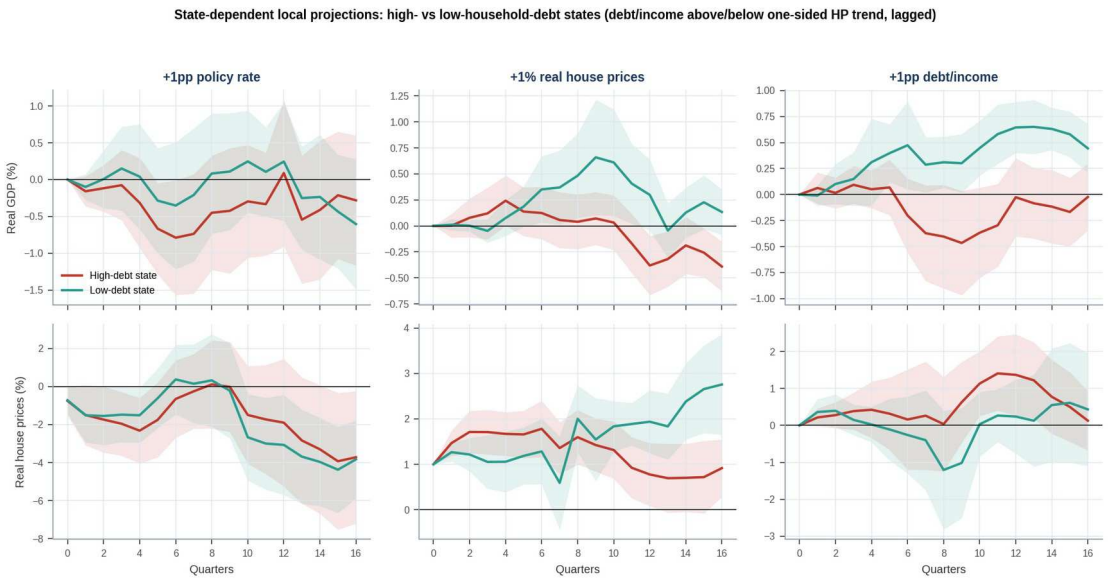


Figure 6. State-dependent local projections: high- vs low-household-debt states.

What this figure tells us. This chart compares what happens after the same surprise when household debt is above its usual trend and when it is below. When debt is high, a rise in house prices is followed three years later by lower GDP, and credit booms do more harm; when debt is low, the same shocks are harmless or helpful. For policymakers, the risk from housing depends on how much households already owe. On this measure, Canadian debt has been below its trend since 2022.

10.7 Structural change

Transmission is not stable. Known-date tests on the house-price equation reject stability at 2008Q3 (Chow F = 2.23, p = 0.004) and predictive tests reject at each later candidate date (2016Q4, 2018Q1, 2020Q1, 2022Q1, all p < 0.001), largely because the 2016–17 surge and the 2022 collapse are large relative to the equation's fit. The GDP equation also shows instability around 2008 (p = 0.011). A CUSUM test of the full-sample residuals does not reject for any equation (p = 0.54–0.71), so the evidence is of episodic large shocks and shifting coefficients rather than a single clean break.

Rolling 15-year VARs (Figure 7) show how much the mechanism moves. The eight-quarter house-price response to a 100-basis-point policy shock is negative in windows ending 2005–2010 (about −1% to −3%), turns positive in windows ending 2010–2019, when rates were low and prices rising together, and becomes strongly negative once 2020–23 enters. The share of three-year GDP variance due to housing and credit shocks rises from about 8–14% in windows ending 2005–2011 to 16–41% in windows ending 2011–2021, before falling to 7% in the window ending 2022Q4. With only 60 quarters per window these estimates are imprecise, but they suggest that housing and credit mattered more for output in the low-rate 2000s–2010s than in the full-sample average.

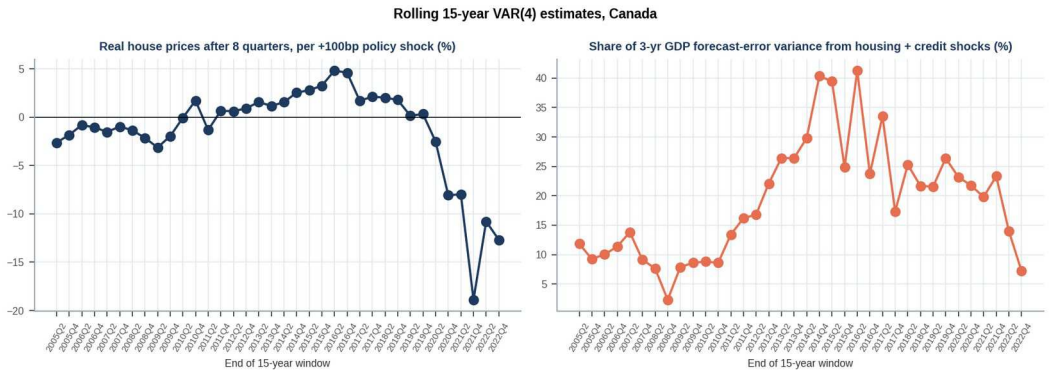


Figure 7. Rolling 15-year VAR estimates.

What this figure tells us. Here the model is re-estimated on moving 15-year windows. The importance of housing and credit for GDP was much larger in windows ending 2011–2021, reaching about 16–41%, than in the full sample, and fell to about 7% by 2022. For policymakers, the role of housing in the Canadian economy is not fixed: it grew during the long period of low rates and rising debt, which is when monitoring matters most.

10.8 Robustness

Table 6 reports the main statistics under alternative identification, lag length, sample and dummy choices. The qualitative conclusions survive: house-price shocks raise leverage in every specification (0.3–1.3 points after eight quarters); monetary tightening lowers real house prices in every specification (−1.2% to −2.9% per 100 basis points after eight quarters); and housing plus credit shocks explain between 2% and 15% of five-year GDP variance, the upper figure arising only when housing and credit are ordered first and so allowed to affect GDP within the quarter. The positive GDP response to credit shocks is not robust: it turns negative when the sample ends in 2019 or when COVID dummies are dropped.

Sign restrictions. As an alternative to recursive ordering, two shocks are set-identified with the Rubio-Ramírez–Waggoner–Zha rotation method, leaving GDP unrestricted: a monetary tightening raises the policy rate and does not raise the CPI or house prices on impact and after one quarter; a housing-demand shock raises house prices and does not lower debt-to-income or the policy rate. Across admissible models (which reflect identification uncertainty only), a 100-basis-point tightening lowers real house prices by a median 4.5% after eight quarters, and they fall in 89% of models; the GDP response is negative in only 59% of models. A housing-demand shock raises debt-to-income in 90% of models and GDP in 72%, with a median of +0.37% after eight quarters per 1% of house prices. Its share of five-year GDP variance has a median of 15% but ranges from 2% to 49% (16th–84th percentiles). The data alone cannot pin down how important housing demand is for output; the recursive estimate of about 7% lies inside that range.

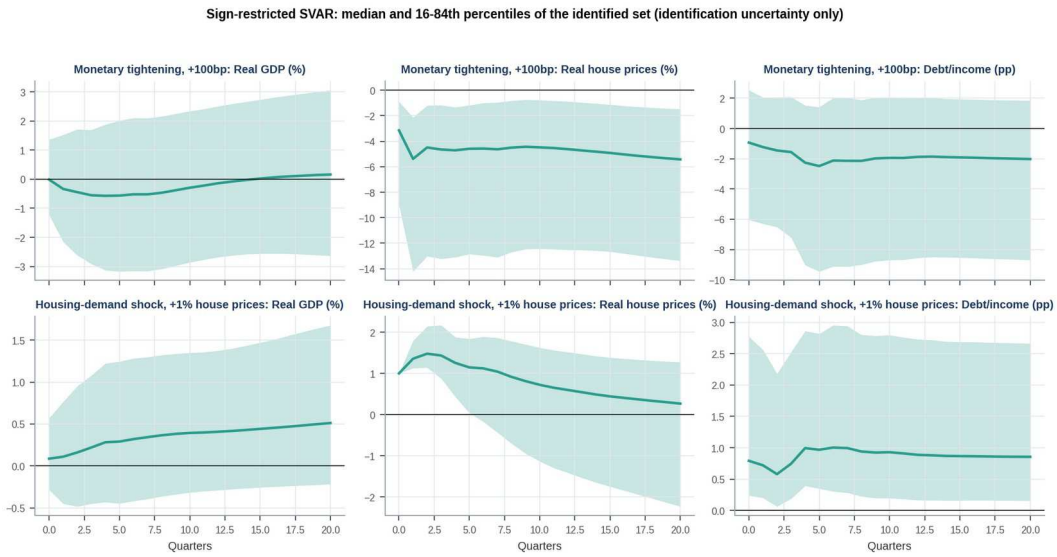


Figure 8. Sign-restricted SVAR: identified-set medians and 16–84th percentiles.

What this figure tells us. This alternative method identifies shocks using only basic economic logic. It confirms that tighter monetary policy lowers house prices, in 89% of admissible models, and that housing-demand surprises raise household debt. How much housing matters for GDP is uncertain: between 2% and 49% of output variation depending on the model. For policymakers, the direction of the effects is reliable even where their size is not.

Bayesian VAR. A Minnesota prior (tightness 0.2, cross-variable weight 0.5, harmonic lag decay) shrinks the dynamics toward independent random walks in levels. The policy-rate effect on house prices survives (−2.8% after eight quarters per 100 basis points), while the housing and credit share of five-year GDP variance falls to 2.2%. The BVAR forecasts GDP growth better than the AR benchmark over 2005–2023 (RMSE 2.41 against 3.02), but the difference is not significant (p = 0.22) and disappears outside the pandemic quarters.

Table 6. Robustness (point estimates)

Specification	GDP h=8 to house-price shock	HP h=8 per +100bp	FEVD GDP h=20, housing+credit (%)
Baseline VAR(4)	0.33	−2.37	8.4
Credit before house prices	0.30	−2.37	8.4
Housing, credit before policy rate	0.36	−1.38	8.8
Housing, credit ordered first	0.49	−1.38	15.0
2 lags	0.26	−2.95	5.7
6 lags	0.03	−2.43	2.1
Sample ends 2019Q4	0.25	−1.16	6.9
No COVID dummies	0.29	−2.76	9.9

11 Scenario analysis

The scenarios below scale the baseline impulse responses linearly. They are model simulations under a linear, symmetric model estimated on average behaviour, not forecasts, and they understate risk if the high-debt nonlinearity documented above is operative.

Table 7. Scenario simulations (% or percentage points)

Scenario (model simulation)	GDP h=4	GDP h=8	Real HP h=8	Debt/ income h=8
S2 Housing correction: house-price shock sized to a 12.5% peak real price fall	−1.0	−1.5	−11.6	−4.3
S3 Severe: 25% price fall plus a 3-point credit tightening	−2.3	−3.3	−23.9	−11.8
S4 Rate shock: +200 bp on impact	−0.6	−0.7	−4.7	−2.0

Uncertainty is large: the 90% band for GDP after eight quarters in S2 is −2.7% to +0.1%, and in S4 −1.9% to +0.4%. A “soft landing” (S1) corresponds to the absence of new shocks and so returns the baseline path.

12 The mortgage-renewal payment shock

For a $400,000 loan at 2.0% with a 25-year amortisation, the monthly payment is about $1,694 and the balance after five years about $335,000. Renewing at 4.5% over the remaining 20 years raises the payment by about 25%; re-extending to 25 years cuts the increase to about 10%. These round-number illustrations sit close to the Bank of Canada’s RESL2-based estimate of 15–20% increases for five-year fixed renewers. The aggregate estimates in this paper suggest why the renewal wave has not produced a recession on its own: the direct cash-flow effect on output is small unless combined with job losses and low equity, which is where Pugh, Wang and Webley (2026) locate the arrears risk and where our state-dependent results locate the output risk.

In simple language: a family paying $1,700 a month would pay about $2,100 after renewing at 4.5%, unless it stretches the loan out. Many families facing this at once will spend less, but the evidence says the bigger danger is when this coincides with lost jobs and falling home values.

13 Policy analysis

Housing is a transmission channel, not the main source of Canadian cycles. On average, house-price and credit shocks explain about 8% of five-year output variation, and in every major downturn general economic shocks dominated. Canadian recessions have been imported through commodity prices, trade and global finance. Housing matters mainly as the channel through which interest rates reach households, and as an amplifier when debt is high.

Monetary policy works strongly through housing. A 100-basis-point rise in the policy rate lowers real house prices by about 2% within a year, and tightening lowers prices in 89% of sign-restricted models. Because Canadian mortgages renew every few years, rate changes reach existing borrowers relatively quickly. With about 60% of mortgages renewing in 2025–26, many at payments 15–20% higher (Godbout et al., 2025), the lagged effects of the 2022–23 tightening are still working through household budgets.

Leverage decides the damage. House-price and credit shocks lower output mainly when household debt is above its trend. Debt relative to income is near record levels, but on the trend measure used here it has been below trend since 2022, so the amplifier is not currently active. Borrower-based tools should be kept in place through the cycle, because the next boom will begin from a high level of debt.

Keep lending standards firm. The 2000–2006 comparison with the United States and the evidence on the 2018 stress test (Hartley & Paixão, 2024) show that underwriting standards, mortgage insurance and stress tests are what keep booms from becoming busts. The 2018 extension of the stress test to uninsured mortgages reduced credit and house-price growth in exposed areas and left borrowers more resilient to the 2022–23 rate rises.

Watch the labour market. Mortgage arrears respond far more to unemployment than to interest rates (Pugh et al., 2026). The main risk to Canadian mortgage performance is therefore a recession that raises unemployment while many households face higher payments at renewal.

Table 8. Policy trade-offs (qualitative)

Policy	Affordability	Financial stability	Output (short run)	Main risk
Policy-rate increase	Worse at renewal	Better medium run	Weakly lower	Payment shock for recent borrowers
Mortgage stress test (B-20)	Worse for constrained buyers	Better (causal evidence)	Small	Credit shifting to unregulated lenders
Mortgage insurance rules	Neutral to worse	Better	Small	Concentration of risk in insurers
Housing supply expansion	Better	Better	Positive	Slow; not estimated

14 Lessons for policymakers, policy professionals and academia

14.1 Lessons for policymakers

The first lesson from Canada is that high household debt and a large house-price boom need not produce a housing bust, provided credit is extended to borrowers who can repay. Canada’s debt rose to almost twice disposable income, and real house prices rose by two-thirds in 2001–2008, yet housing did not cause a recession, largely because lending standards, mortgage insurance and stress tests kept credit quality high. Policymakers should protect these safeguards, especially in booms, when pressure to relax them is strongest. The second lesson is that interest rates work powerfully through housing in a country where mortgages renew every few years. The 2022–23 tightening is still reaching households as about 60% of mortgages renew in 2025–26, so policymakers should expect lagged effects on spending and should coordinate monetary and macroprudential decisions with that timing in mind. The third lesson is that the real danger is a combination: high debt, rising payments at renewal and rising unemployment at the same time. Because arrears respond mainly to job losses, fiscal and labour-market policies that cushion unemployment in a downturn are also, in effect, housing-stability policies.

14.2 Lessons for policy professionals

Analysts in the Bank of Canada, the Department of Finance, the Office of the Superintendent of Financial Institutions and provincial governments should draw three practical lessons. First, national averages conceal large regional differences: Toronto and Vancouver behave very differently from the rest of the country, so national estimates such as those in this paper should be complemented with regional and borrower-level analysis before policies are calibrated. Second, measurement matters. The household debt-to-income ratio is revised as Statistics Canada updates income and debt, and different vintages give different historical levels; the posted mortgage rates available in public data overstate the rates borrowers actually pay. Briefings should say which vintage and measure they use and how sensitive conclusions are to those choices. Third, the importance of housing changes over time: in 15-year windows ending 2011–2021 housing and credit explained up to 41% of output variation, against 8% in the full sample. Analysts should therefore report results across periods and use scenario analysis with realistic rate and unemployment paths rather than single-number forecasts, clearly labelling them as illustrations rather than predictions.

14.3 Lessons for academia

For academic economists, Canada offers a useful test of theories that link housing to the business cycle. Collateral-constraint models (Iacoviello, 2005) predict that house prices move consumption and output, yet the average Canadian effect is small and statistically insignificant, consistent with Muellbauer et al. (2015), who find weaker housing-collateral effects in Canada than in the United States. The state-dependent results in this paper suggest that the effect exists but is conditional on leverage, which argues for models in which the share of constrained households varies over the cycle. Second, the comparison with the United States and the evidence on stress tests (Hartley & Paixão, 2024) suggest that lending standards and mortgage design deserve a larger role in macroeconomic models, alongside interest rates. Third, identification remains the weakest link: recursive and sign-restricted estimates give a wide range for housing's importance. Future work should combine narrative monetary shocks (Champagne & Sekkel, 2018), regional panels and loan-level data to separate credit supply from demand, and should exploit the 2025–26 renewal wave as a natural experiment in monetary transmission.

15 Guidance for property businesses

Developers, builders, real-estate investors and property-management firms can draw five practical lessons from this study.

First, interest rates drive the Canadian housing market. A 1-point rise in the policy rate lowers real house prices by about 2% within a year, and tighter policy lowers prices in almost nine out of ten versions of the model. Because Canadian mortgages renew every few years, rate changes reach buyers and existing owners relatively quickly. Businesses should build project plans around the likely path of interest rates, not only around population growth or immigration, and should expect demand to weaken a year or two after rates start to rise.

Second, booms have ended in slower growth, not crashes, but not always. Real prices rose 67% in 2001–2008 and fell only about 9% in the global crisis. But the late-1980s boom ended in a real decline of about a fifth, and Toronto prices took more than a decade to recover. Balance sheets, land holdings and pre-sale commitments should be able to survive a fall of 20% or more in real prices lasting several years.

Third, house prices and credit feed each other. Rising prices lead to more borrowing, and more borrowing to higher prices. This loop supports sales in good times but works in reverse when lenders tighten. The 2018 extension of the stress test reduced credit and price growth in the most exposed areas.

Firms should monitor regulatory changes to lending rules as closely as they monitor interest rates, because a change in who can borrow can shift demand quickly.

Fourth, affordability and renewals now shape demand. About 60% of Canadian mortgages renew in 2025–26, many at payments 15–20% higher. Households facing higher payments at renewal will have less to spend and will be cautious about moving up. Builders that offer smaller, more affordable homes, rental housing for households priced out of ownership, or products suited to first-time buyers under the stress test are better positioned than those relying on high-end or investor demand.

Fifth, watch household debt and unemployment together. In the model, house-price falls damage the economy mainly when household debt is above its trend, and arrears rise mainly when unemployment rises. The most dangerous combination for property businesses is a recession that raises unemployment while many households face higher payments at renewal. Keeping leverage moderate and liquidity high is the best protection against that scenario.

Use the right indicators. The study's payment-to-income index for new buyers rises when the economy is strong, so it signals demand rather than warning of a slowdown; a high reading is not by itself a reason to expect a fall in sales. The more useful warning signs are rising interest rates, tightening lending rules, rising unemployment and household debt above its trend. In the model, a 12.5% fall in real house prices is followed by GDP about 1.5% lower after two years, a modest but uncertain effect that would weigh on sales across the economy.

Regional differences are large: Toronto and Vancouver are more exposed to rate and credit changes than smaller markets, and national results should be adapted to local conditions. In short, the most resilient property businesses in Canada combine moderate leverage, attention to interest rates and lending rules, and products that match what households can afford under the stress test.

These are general lessons from aggregate analysis, not individual business or investment advice.

16 Guidance for property lenders

Banks, credit unions, mortgage finance companies and investors in mortgage securities can draw five lessons from this study.

First, Canada's lending standards are its main defence. The comparison with the United States shows that similar interest rates produced a bust there and not here, largely because Canadian lending remained concentrated in regulated institutions, high-ratio loans required insurance, and non-prime lending was a small share of the market (Federal Reserve Bank of Cleveland, 2009). Lenders should treat these standards as a competitive strength rather than a constraint, and should resist pressure to relax them during booms.

Second, the stress test works. Hartley and Paixão (2024) show that the 2018 extension of the stress test to uninsured mortgages reduced credit and house-price growth in exposed areas and left borrowers better able to absorb the 2022–23 rate rises. Qualifying borrowers at rates well above their contract rate protects both the borrower and the lender.

Third, plan for the renewal wave. About 60% of mortgages renew in 2025–26, and many five-year fixed-rate borrowers face payments 15–20% higher (Godbout et al., 2025). About half could offset the increase by extending amortisation. Lenders should identify borrowers at risk early, offer options such as amortisation extensions or blended rates where prudent, and avoid forcing sales in a weak market, which would harm both borrower and lender.

Fourth, the labour market is the key risk. Arrears rise mainly when unemployment rises: a 1-point rise in unemployment raises arrears by about 0.1 point, while a 100-basis-point rise in rates raises them by only 3–5 basis points (Pugh et al., 2026). Arrears are low overall, 0.32% of holders in March 2026, but higher among borrowers with high loan-to-income ratios, at 0.64%, and higher still among some

recent Toronto borrowers (Bank of Canada, 2026). Portfolio stress tests should combine higher unemployment with renewal payment increases, and should pay particular attention to high loan-to-income borrowers.

Fifth, leverage decides the damage. In the model, house-price falls reduce output mainly when household debt is above its trend. Lenders should monitor aggregate household debt relative to its trend and tighten their own standards as it rises, rather than waiting for regulators. Debt relative to income is close to record levels, even though it is below trend on the measure used here, so the margin for error is small.

Sixth, watch concentration and new channels. Risk is not spread evenly. Borrowers with high loan-to-income ratios, recent buyers in expensive cities and investors holding several properties are the most exposed to renewal and unemployment shocks. Lenders should limit concentration in these groups and apply consistent standards across all origination channels, including brokers and partner lenders. As regulated lenders tighten, some demand may shift to private and less regulated lenders; banks that fund such lenders should apply the same scrutiny to their exposures as they would to their own mortgages.

In short, sound mortgage lending in Canada means qualifying borrowers at stressed rates, preparing for renewals, and planning for unemployment as the main source of losses.

These are general lessons from aggregate analysis, not individual credit or investment advice.

17 Guidance for mortgage-borrowing households

Households that own a home with a mortgage, or plan to buy one, can draw six practical lessons from this study.

First, plan for your renewal now. Canadian mortgages usually renew every few years at the rates then available. About 60% of mortgages renew in 2025–26, and many households on five-year fixed rates face payments 15–20% higher (Godbout et al., 2025). Find out when your mortgage renews, estimate the payment at current rates, and plan your budget before the renewal date rather than after.

Second, know your options at renewal. About half of borrowers facing higher payments could offset the increase by extending their amortisation. That lowers the monthly payment but increases the total interest paid over the life of the loan. Compare offers from more than one lender, and weigh a lower payment today against a larger total cost.

Third, your job matters more than the interest rate. The study's review of the evidence shows that mortgage arrears in Canada rise mainly when unemployment rises, not when rates rise (Pugh et al., 2026). The biggest risk to your home is losing your income while facing a higher payment. An emergency fund of several months' expenses, and avoiding other debts that would be hard to carry if your income fell, are the best protections.

Fourth, borrow within what the stress test allows, and ideally less. The stress test requires lenders to check that you could pay at a rate well above your contract rate. It exists because rates can rise quickly: they did in 2022–23. Treat the maximum loan you qualify for as a ceiling, not a target.

Fifth, house prices can fall and stay down. Canadian real house prices fell about a fifth after the late-1980s boom, and Toronto prices took more than a decade to recover. Prices also fell after 2022 as rates rose. A home is a place to live first and an investment second; do not borrow so much that a fall in value would leave you owing more than the home is worth, and be careful about borrowing against home equity to fund spending.

Sixth, if you are buying now, focus on affordability. Payments for new buyers depend heavily on interest rates. Buy what you can afford at today's rates, not at the rates you hope for at your first renewal; if rates fall, a lower renewal payment is a bonus, not a plan.

Seventh, be careful with home-equity borrowing. Research on Canadian households shows that part of the link between house prices and spending runs through home-equity lines of credit and other non-mortgage debt (Kartashova & Tomlin, 2017). Borrowing against a rising home value can feel safe, but these lines usually carry variable rates and can become expensive quickly when rates rise. Use them for investments in the home or genuine emergencies rather than everyday spending, and include them when you work out what share of your income goes to debt.

In short, borrow modestly relative to income, keep a cash buffer, plan for renewal well in advance, and remember that protecting your job and savings protects your home.

These are general lessons from aggregate analysis, not individual financial advice.

18 Critical discussion and limitations

The results should be read with the following weaknesses in mind.

- **Identification.** Shocks are recursive. Results for the output effects of housing and credit are sensitive to ordering, the credit shock is an innovation in leverage rather than credit supply, and no external instrument is used.
- **Measurement.** The policy rate is proxied by the Bank Rate; house prices are the BIS national index, which is noisy quarter to quarter and not seasonally adjusted; the payment-to-income index uses a bond yield plus a spread calibrated on only 16 quarters and aggregate rather than per-capita income, and no user-cost index is built because expected appreciation is not measured; there is no mortgage-rate, consumption or residential-investment variable, so the channels in H1 cannot be separated.
- **Sample.** 131 quarters for a five-variable VAR(4) leaves modest degrees of freedom; residuals in the policy-rate equation remain autocorrelated; the sample ends in 2023Q4 because of the rate and CPI sources used.
- **Coverage relative to the research design.** Not yet done: provincial panel, proxy-SVAR, threshold VAR (state-dependent projections are used instead), a full European comparison and a literature review of 50–80 studies. These are listed in Appendix B.

19 Conclusions

This paper asked whether housing credit drives Canadian business cycles or mainly reflects them. The answer is that housing and credit form a strong, self-reinforcing loop, but on average they are not a major independent source of output fluctuations. House prices and household debt push each other up, and monetary policy moves house prices strongly: a 100-basis-point rise lowers real house prices by about 2% within a year. Yet house-price and credit shocks explain only about 8% of five-year variation in GDP, no output response is statistically significant, and in every major downturn general economic shocks dominated.

Two qualifications matter. First, the effect of housing on output depends on leverage: when household debt is above its trend, house-price and credit booms are followed by lower output a few years later, whereas below trend they are harmless. Second, housing's importance changes over time: it was much larger in periods ending 2011–2021, when rates were low and debt was rising.

The 2000–2006 boom explains why Canada avoided a US-style collapse despite similar interest rates: lending standards, mortgage insurance and a small non-prime sector kept credit quality high. Consistent with international evidence (Jordà et al., 2016; Mian et al., 2017), housing becomes a macroeconomic threat mainly when large, credit-financed booms end in sudden busts.

The main risk ahead is a combination rather than a single shock: high household debt, payments rising at renewal for about 60% of mortgages in 2025–26, and a possible rise in unemployment, which is the main driver of mortgage arrears. Policymakers should keep lending standards and stress tests firm, monitor debt relative to its trend and the labour market together, and recognise that tightening continues to reach households through renewals. The results support monitoring and policy design, not precise forecasts.

20 References

Note. References follow APA (7th edition) style. Entries marked † were cited from the author's knowledge and not re-checked against the original source in this version; entries marked ‡ are cited as reported in Hartley and Paixão (2024). Unmarked entries were read at source during this project.

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21 Appendix A. Diagnostic tables

Table 9. Unit-root tests (KPSS p-values are bounded by the look-up table at 0.01 and 0.10)

Variable	Form	ADF stat	ADF p	KPSS stat	KPSS p	Decision
y	level (c, trend)	−1.973	0.616	0.406	0.010	unit root
y	first difference	−12.777	0.000	0.091	0.100	stationary
p	level	−1.554	0.810	0.087	0.100	conflicting
p	first difference	−5.101	0.000	0.207	0.100	stationary
i	level	−1.670	0.764	0.246	0.010	unit root

Variable	Form	ADF stat	ADF p	KPSS stat	KPSS p	Decision
i	first difference	−4.916	0.000	0.389	0.082	stationary
h	level	−2.670	0.249	0.327	0.010	unit root
h	first difference	−9.132	0.000	0.349	0.099	stationary
d	level	−0.771	0.968	0.231	0.010	unit root
d	first difference	−13.740	0.000	0.225	0.100	stationary

Table 10. Granger-causality tests, baseline VAR(4), F(4, 525)

Null hypothesis	F	p-value
Credit growth does not Granger-cause house-price growth	2.035	0.088
House-price growth does not Granger-cause credit growth	2.286	0.059
House-price growth does not Granger-cause GDP growth	1.051	0.380
Credit growth does not Granger-cause GDP growth	1.699	0.149
Policy rate does not Granger-cause house-price growth	1.153	0.331
GDP growth does not Granger-cause credit growth	1.967	0.098

Table 11. Recursive one-quarter-ahead forecast comparison (Diebold–Mariano with Harvey–Leybourne–Newbold correction)

Target	Model	RMSE	RMSE ratio vs AR(4)	DM p-value
GDP growth, 2005–2023	AR(4)	3.017	1.000	–
	VAR, macro only	3.047	1.010	0.429
	VAR with housing and credit	3.335	1.105	0.111
House-price growth, 2005–2023	AR(4)	2.803	1.000	–
	VAR with	3.158	1.127	0.125

Target	Model	RMSE	RMSE ratio vs AR(4)	DM p-value
	housing and credit			
GDP growth, excl. 2020Q1–2021Q2	AR(4)	0.677	1.000	–
	VAR with housing and credit	0.981	1.449	0.039

22 Appendix B. Coverage against the research design

Completed with real data: research design and model (Sections 13–14); data audit and dictionary (Section 50); unit-root, cointegration, lag-selection and VAR diagnostics (Section 51); baseline VAR with recursive identification, IRFs and FEVD (Sections 20, 28); local projections (Section 22); state-dependent nonlinearity (Section 23); known-date break tests, CUSUM and rolling estimates (Section 24); sign-restricted SVAR (Section 20); Markov-switching regression (Section 23); episode statistics for all 13 episodes and a 1979–2023 history (Section 8); Bayesian VAR (Sections 19, 37); price-to-income and payment-to-income indices and their comparison with house prices (Sections 4, 17, 56-Q2); Granger causality (Section 26); historical decomposition (Section 27); forecasting experiment (Section 29); scenario analysis (Section 31); mortgage-renewal payment arithmetic (Section 35); robustness (Section 37); policy analysis and trade-offs (Sections 32–33).

Partly done: historical episodes (all 13 covered; four of them from data and FRED series only, without narrative sources); literature review (about 20 of the 50–80 target); European comparison (two macroprudential studies only).

Not done: user-cost index; proxy-SVAR; threshold VAR; provincial panel; consumption, residential-investment and mortgage-rate variables; European comparison figures.