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How Does Monetary Policy Affect the New Zealand Housing Market Through the Credit Channel?

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Key Findings

- We analyse the effect of a monetary policy shock on household credit and real house prices in New Zealand through one of the channels of transmission, the credit channel.
- We confirm that monetary policy stimulus triggers moderate house price movements in New Zealand.
- We find out that an unanticipated increase in policy rate reduces real house prices by up to -1.6% and the growth rate of residential loans by -0.6% after 2.5 years.

Introduction

House prices are driven by both cyclical and structural factors, and the Reserve Bank of New Zealand can affect house prices and affordability through the impact of monetary and prudential policies.

As Mishkin (2007) discussed, there are six different channels through which the monetary policy can affect house prices: through direct effects of interest rates on (1) the user cost of capital, (2) expectations of future house-price movements, and (3) housing supply; and indirectly through (4) standard wealth effects from house prices, (5) balance sheet, credit-channel effects on consumer spending, and (6) balance sheet, credit channel effects on housing demand.[1] The analysis of this paper focuses on the sixth channel—the credit channel.

Many studies have explored the impact of tight monetary policy on dampening housing loan demand and consequently the demand for housing. Bernanke and Gertler (1995) state that tighter monetary policy affects borrowers by reducing their current cash flows and likewise affects banks by draining deposits and the liability side of their balance sheet. Subsequently, credit supply falls and puts downward pressure on demand for housing. In this study, we focus on the balance sheet of borrowers and the effect of this on housing demand. The credit channel works through effects on housing demand when credit-constrained households are affected by current cash flows, i.e., the difference between their income and expenses. More specifically, a rise in the policy rate will increase short-term rates on a variable-rate mortgage, and households will have higher interest rate payments and reduced cash flow. Assuming that the household income does not increase to compensate for the reduced cash flow, the size of the mortgage that the households will be able to afford or qualify for will be reduced. If the share of variable-rate mortgages is high in total mortgages, an increase in policy rates can significantly affect housing demand.

In this paper, we aim to test the credit channel of monetary policy transmission through bank lending on housing demand, focusing on house prices in New Zealand.[2] By doing so, we try to assess the extent a positive monetary policy shock (1% increase in the policy rate) reduces house prices and the growth rate of home loans.

There are few studies of the credit channel of monetary policy in the New Zealand housing market. In our literature review, we find only one study by Claus (2011) that focuses on the credit channel in New Zealand relative to the interest and exchange rate channels. In her study, Claus

1 See Mishkin (2007) for a detailed explanation of each channel.
2 In our model, we use real house prices. We want to inform the reader that when we present and discuss our results, the quantities are in real terms.

(2011) uses a dynamic general equilibrium model and concludes that all three channels affect business dynamics in New Zealand; however, the interest rate channel has the most significant effect on the transmission of shocks to the economy.[3]

This Note is part of a wider body of research initiated at the Bank to better understand the sustainability of house prices in New Zealand. Brunton (2021a) defines the Bank's conceptual framework around assessing house price sustainability. Since land and houses contribute more than half of all household wealth in New Zealand, Aguiar Carvalho, Baker and Farquharson (2022) investigate if the share of housing in the national portfolio is oversized from a risk-return perspective. Fitchett and Jacob (2022) study the New Zealand housing market against the backdrop of housing markets in 12 other developed countries over the past three decades. Similar to this Note, Chadwick, Dasgupta and Jacob (2022) present empirical evidence that confirms that monetary policy has a short-run impact on house prices over the New Zealand business cycle. However, they use territorial-level data and find that monetary policy tightening induces stronger declines in house prices those regions in New Zealand where housing supply is less responsive. Brunton and Jacob (2022) emphasise that the longer-term upward trend in New Zealand house prices is mainly driven by the decline in longer-term interest rates, more influenced by global factors rather than by domestic cyclical factors such as monetary policy.

Explaining Our Data

We present the complete list of data we use in Table 1. We collect our monthly and quarterly data for 2000Q2-2021Q1 and 2000M07-2021M02. The sample selection is determined by data availability for monetary policy surprises.

Table 1 –Summary table of variables we use in our model

Data	Descriptions
QSBO domestic trading activity	Frequency: Quarterly - source : NZIER
Inflation – Core factor model	Frequency: Quarterly - source : RBNZ
New Zealand Official Cash Rate (OCR)	Frequency: Monthly - source : RBNZ
Housing price index (real, sa*)	Frequency: Monthly - source : REINZ
5yr banks mortgage rate	Frequency: Monthly - source : RBNZ
5yr NZ government bond yield	Frequency: Monthly - source : RBNZ
Non-banks housing loans (real)	Frequency: Monthly - source : RBNZ
Banks housing loans (real)	Frequency: Monthly - source : RBNZ
Banks total loans (real)	Frequency: Monthly - source : RBNZ
Monetary policy surprises	Frequency: Monthly - source : RBNZ

Note: The real variables are deflated by the CPI inflation. sa* means seasonally adjusted

3 Dynamic stochastic general equilibrium (DSGE) models use modern macroeconomic theory to explain and predict comovements of aggregate time series over the business cycle and to perform policy analysis.

Nearly all of our data is monthly except inflation and economic activity measures, which are quarterly. Using an extended sample is vital for the application of time series methods; therefore, we use the temporal disaggregation *à la* Quilis (2018) to convert quarterly time series to monthly time series.[4]

Methodology

Monetary policy decisions are thought to affect economic activity and inflation through several channels, collectively known as the transmission mechanism of monetary policy. In this and the next section, we define our methodology and report our empirical results about the effects of monetary policy shocks on house price inflation and housing loans. We provide evidence compatible with the credit channel discussed in the literature.

Studying the effects of monetary policy is difficult. Variations in monetary aggregates are largely attributable to the response of monetary policy to economic conditions and not to the random disturbances to the central bank's reaction function. To identify the causal effects of monetary policy, it is necessary: first, to isolate unexpected exogenous shifts to monetary policy tools that are not due to the systematic response of policy, and second, to generate responses of macroeconomic and financial variables over time using an econometric model that can summarise the dynamic interaction among such variables.[5] Correct inference of the dynamic effects of monetary policy shocks hinges on the interaction between the identification strategy and the modelling choice. The empirical practice has typically relied on several identification schemes, all justified by models of full-information rational expectations, in conjunction with linear econometric specifications, such as vector autoregressions (VARs) and local projections (LPs, Jorda, 2005).[6]

To isolate exogenous shifts to monetary policy that are not due to the systematic response of policy, we rely on estimates of monetary policy surprises as presented in Bernhard and Leong (2022). The authors extract high-frequency monetary policy surprises from daily changes in financial market variables, including 1-month and 3-month Bank Bills and 3-month Bank Bill futures (two to four quarters ahead). They cover all monetary policy announcements in Monetary Policy Statements, OCR Reviews (Monetary Policy Reviews as of 2020), and unscheduled decisions from 1999 to 2021.

VARs produce impulse response functions (IRFs) by iterating the coefficients of a one-step-ahead model to the relevant horizon. Hence, if the one-step-ahead VAR is misspecified, the resulting errors are compounded at each horizon in the estimated IRFs. Conversely, the local projection method of Jorda (2005) estimates impulse response functions from the coefficients of direct projections of variables onto their lags at the relevant horizon, and it makes local projections (LP) more robust to several model misspecifications and thus a theoretically preferable choice. In practice, however, the theoretical appeal of LPs has to be balanced against the significant estimation uncertainty that surrounds the coefficients' estimates. From a classical perspective, one faces a sharp bias-variance trade-off when selecting VARs and LPs. Miranda-Agrippino and Ricco (2021), in their paper, review the two methods and propose a Bayesian approach to Local

4 Temporal disaggregation methods are used to disaggregate low-frequency time series to higher frequency series, where the sum, the average, the first or the last value of the resulting high-frequency series is consistent with the low-frequency series. Temporal disaggregation can be performed with or without one or more high-frequency indicator series. For our purpose, we did not use any indicator series. We use a Matlab extension for this purpose, and the details can be accessed at Quilis (2018).

5 See Sims (1992).

6 We use the models in Miranda-Agrippino and Ricco (2021) in order to measure the effects of monetary policy changes on house prices. We also use the codes shared by the authors of this paper. For interested readers, their codes are open to public.

Projections (BLPs) as an efficient way to bridge between the two by employing informative priors, and that is the model that we use to present our result for the remaining part of the text.

Accordingly, we use high-frequency monetary policy surprises as robust instruments in a Bayesian Vector Autoregression – Instrumental Variable (BLP) model to assess the presence of credit channel, using monetary policy surprises as our instrument for the OCR. For robustness, we compare our impulse responses from BLP with impulse responses we get via a standard Bayesian VAR (BVAR) and local projections (LP) of Jorda (2005).

All the variables we use in our modelling are in log levels, except for the QSBO variable, interest rates, and spreads. Table 2 illustrates the details of the variables in our models. The shock is identified over the sample common to our external instrument, and the VAR innovations are normalized to raise the policy rate (OCR) by 1%. Our baseline model BLP and BVAR are estimated with Bayesian techniques and standard Normal Inverse Wishart (NIW) priors.[7] All the models defined below are estimated with 4 lags for all variables suggested by the Schwarz information criterion (SIC).

As shown in Table 2 we run 3 different Bayesian local projection VARs (BLP) with different variables. We use the period between 2000M07 and 2009M01 as pre-sample to calibrate the prior.

Table 2 –Overview of our models

BLP-VAR	Variables	IV
Model 1	QSBO (level), CPI (log), HP (log), HL (log), BL (log)	Monetary policy surprises used as instrument for OCR
Model 2	QSBO (level), CPI (log), HP (log), HL (log) , Spread (level)	Monetary policy surprises used as instrument for OCR
Model 3	QSBO (level), CPI (log), HP (log), HL (log), Mix (level)	Monetary policy surprises used as instrument for OCR

Definition of variables: QSBO (Quarterly survey of business opinion - Domestic trading activity), CPI (RBNZ Inflation core factor model), HP (real house prices), HL (real housing loans from banks), BL (real total loans from banks), Spread (5yr mortgage rate minus 5yr government bond yield), and Mix (ratio of housing loans from non-banks to total housing loans).

Model 1

The first BLP model includes QSBO trading activity, core inflation, real house prices, banks' housing loans, total loans, and the policy rate. We include QSBO trading activity as a proxy for domestic economic activity for two reasons. First, QSBO trading activity is an excellent proxy for GDP in New Zealand, and second, our IRFs are less volatile when we use QSBO trading activity instead of GDP. We also use core inflation from the RBNZ core inflation factor model instead of CPI inflation as it is less volatile.[8] Monetary policy decisions affect economic activity and inflation through several channels, commonly known as the transmission mechanism. QSBO trading activity and core inflation are the variables related to the transmission mechanism. We add the real house prices variable to our model as our analysis is a quest for what may happen to house prices through the credit channel.

[7] The tightness of the prior is set as in Giannone, Lenza and Primiceri (2015).
[8] We estimate our models using GDP and headline inflation for robustness. The results are qualitatively similar, yet our IRFs are very volatile.

Model 2

Our second model differs from the first model by one variable, i.e., we replace the real total bank loans with the spread between the 5-year mortgage rate and the 5-year government bond yield (a benchmark interest rate). The spread can capture the risk premium associated with a credit channel. The unavailability of detailed data for the 2-year mortgage rate and the 3-year government bond yield prevents us from using the spread for shorter terms.

Model 3

Our third model differs from the first model by one variable, i.e., we replace the real total bank loans with the ratio of housing loans from non-banks to total housing loans (Mix). Lower bank deposits should lead to a contraction in banks' housing loans and an increase in the Mix if households try to source home loans from non-bank institutions. However, a negative Mix ratio response shows that non-bank housing loans are an imperfect substitute to bank loans, and a reduction in bank housing loans will affect housing demand.

The analysis of the Mix ratio also has been used by Oliner and Rudebush (1996) and Iacoviello and Minnetti (2008). They explain that the increase in the Mix ratio after a positive monetary policy shock is a 'flight to quality' from risky households to households with better financial positions. Additionally, a negative Mix ratio might confirm lower demand for housing loans.

Results

Our results point to a significant credit channel in the New Zealand housing market. Figure 2 lists the impulse response functions of **Model 1.** It illustrates the response of house prices, housing loans, and bank loans to a 1% increase in policy rate (OCR) using monthly data from 2000M07 to 2021M02. We find that a positive monetary policy shock (1% increase in the policy rate) will reduce real house prices by -1.6% and the growth rate of residential loans by -0.6% after 2.5 years. After a positive monetary policy shock, total bank loans stay broadly unchanged for 12 months. We take this as a piece of evidence that total bank loans may contain a countercyclical component in New Zealand. Indeed, this might mean that firms and individuals might borrow more to make up for shortfalls in income after a rise in official interest rates, e.g., reducing principal repayments when interest payments rise, or some aspects of credit demand may be relatively insensitive to interest rate rises, e.g., investment demand from businesses if the economy is booming.

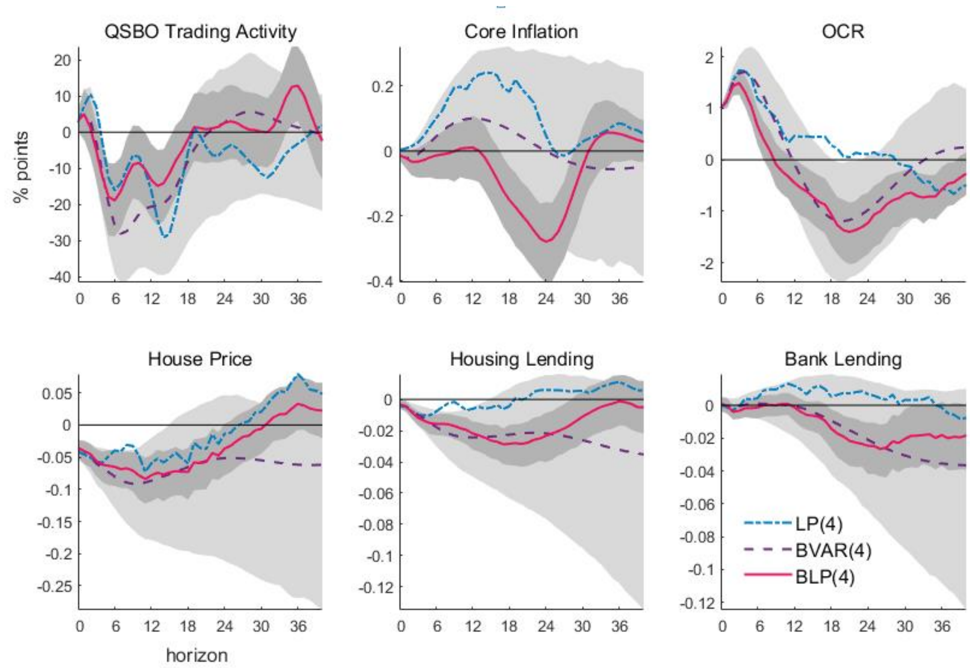
The response of house prices to a positive monetary policy shock (a fall in real house prices of 1.6%) does not fully explain the rise in house prices in NZ while policy rates kept falling over the last decade. This is because monetary policy surprises are only a small part of the dynamics of house prices in New Zealand. House prices are driven by both cyclical and structural factors, which are influenced by a range of governmental and non-governmental institutions. The Reserve Bank's monetary and prudential policies can affect house prices and affordability through the impact it has on the cyclical drivers of interest rates, and this impact is more significant in supply-insensitive environments.[9] However, existing literature has identified supply-side considerations as being the most significant determinant of house prices in New Zealand.[10] These structural constraints, together with other longer-term drivers of house prices, cannot be meaningfully altered with the use of the monetary policy. Additionally, our results are very similar to comparable international studies. For example, Iacoviello and Minetti (2008) using a very similar model and set of variables,

9 See Chadwick, Dasgupta, and Jacob (2022).
10 For example, see the Productivity Commission's 2012 Inquiry into housing affordability in New Zealand and Nunns et al (2022).

find that the response of house prices to a positive monetary policy shock is between -0.7% to -1.4% for Finland, -0.5% to -0.75% for Germany, -1% to -1.5% for the UK and about -1% in Norway.

We estimate two other models beside BLP for robustness. Further examination of Figure 1 shows that we have a price puzzle with the alternative models we use for robustness. After a rise in monetary policy interest rates, we expect bank lending to decline, and using a simple local projection (LP) we cannot capture this effect.

Figure 1 – Response of QSBO, inflation, OCR, housing price inflation, housing loans and total banks loans to 1% increase in the monetary policy rate

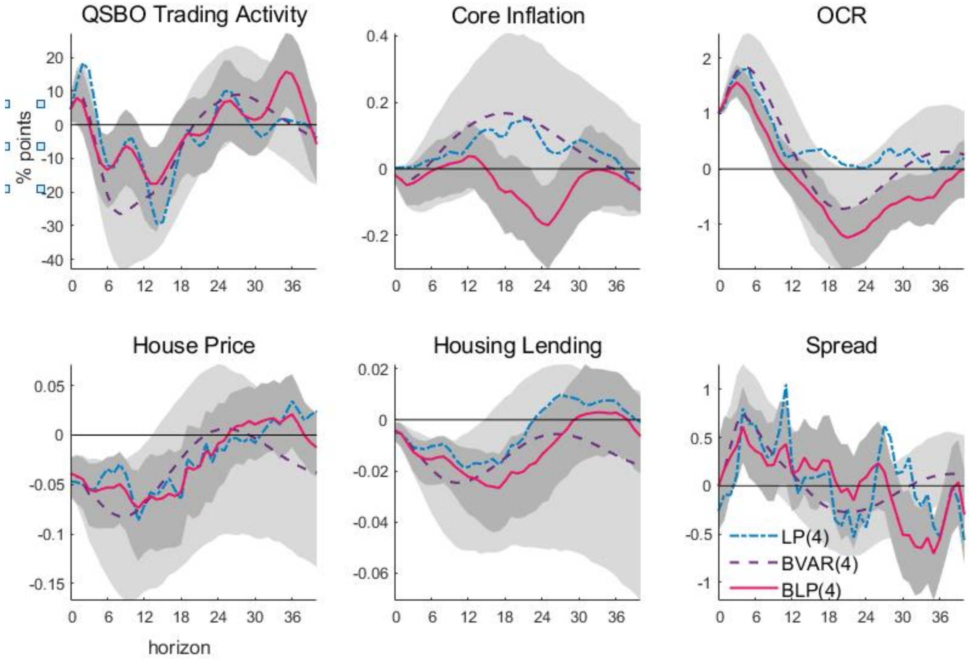


Note: We estimate our IRFs with 3 different specifications for robustness, as in Miranda-Agrippino and Ricco (2021); (1) a standard Bayesian Vector Autoregression (BVAR), (2) Standard Local Projection (LP, Jorda 2005), and (3) Bayesian Local Projection (BLP). Miranda-Agrippino and Ricco (2021) illustrates that VARs with a small set of controls are often misspecified and this may lead to compounded coefficients over horizons. IRFs from LPs are often prone to being potentially robust to misspecification and drying up degrees of freedom. Choosing between a standard VAR and LP is a trade-off between bias and estimation variance, i.e., VAR models might be more efficient but they are more prone to bias if the one-step-ahead model is misspecified. However, BLP specification not only retains the flexibility of LP and is robust to model specification, but also efficiently is dealing with estimation uncertainty. Estimation sample is from 2000M07 to 2021M02 due to data availability (monetary policy surprises). Grey areas are 90% posterior coverage bands.

Figure 2 shows the impulse response functions of **Model 2**, in which we use the spread between the 5-year mortgage rate and the 5-year government bond yield. After a contractionary monetary policy rate rise, the spread widens and stays positive for about 18 months. The increase in the spread points to the lower creditworthiness of households due to the higher risk premium (a balance-sheet channel).

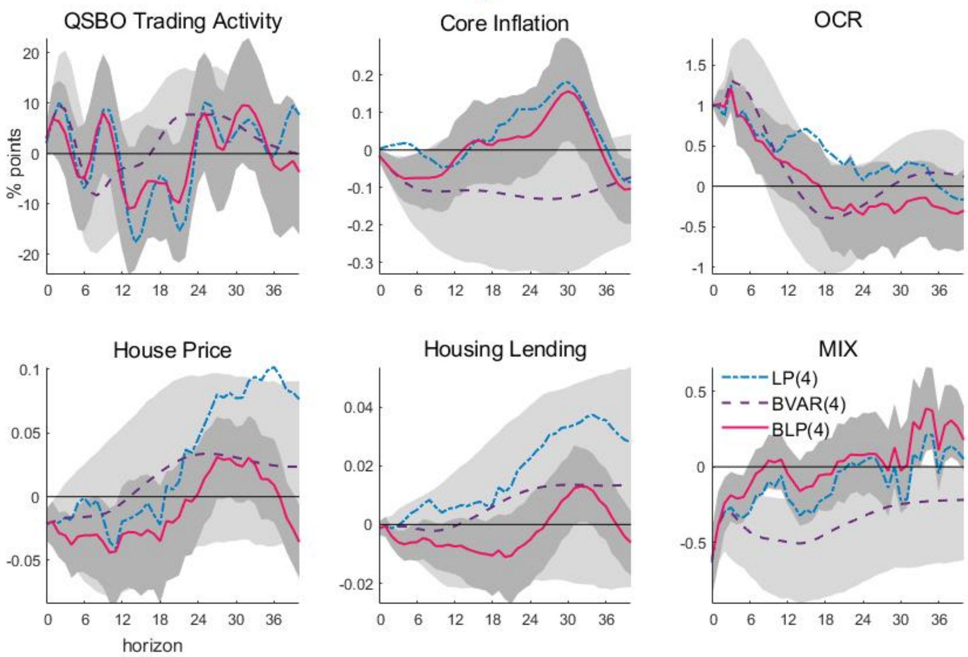
The response of Mix to the monetary policy shock presented in Figure 3 illustrates the results related to **Model 3** and confirms the existence of a bank-lending channel. The negative sign of the Mix ratio shows that a rise in the monetary policy interest rate lowers the demand for housing loans, and non-banks housing loans are not a perfect substitute because of the lower supply of bank housing loans. Also, it might suggest that non-bank institutions have no tendency to fund riskier borrowers. It is worth mentioning that our findings can be explained by the difficulty of non-bank institutions' access to wholesale funding.

Figure 2 – Response of QSBO, inflation, OCR, housing price inflation, housing loans and Spread between 5yr mortgage rate and 5y government bond yield to 1% increase in the monetary policy rate



Note: We estimate our IRFs with 3 different specifications for robustness, as in Miranda-Agrippino and Ricco (2021); (1) a standard Bayesian Vector Autoregression (BVAR), (2) Standard Local Projection (LP, Jorda 2005), and (3) Bayesian Local Projection (BLP). Miranda-Agrippino and Ricco (2021) illustrates that VARs with a small set of controls are often misspecified and this may lead to compounded coefficients over horizons. IRFs from LPs are often prone to being potentially robust to misspecification and drying up degrees of freedom. Choosing between a standard VAR and LP is a trade-off between bias and estimation variance, i.e., VAR models might be more efficient but they are more prone to bias if the one-step-ahead model is misspecified. However, BLP specification not only retains the flexibility of LP and is robust to model specification, but also efficiently is dealing with estimation uncertainty. Estimation sample is from 2000M07 to 2021M02 due to data availability (monetary policy surprises). Grey areas are 90% posterior coverage bands.

Figure 3 – Response of QSBO, inflation, OCR, housing price inflation, housing loans and Mix (housing loans from non-banks over total housing loans) to 1% increase in the monetary policy rate



Note: We estimate our IRFs with 3 different specifications for robustness, as in Miranda-Agrippino and Ricco (2021); (1) a standard Bayesian Vector Autoregression (BVAR), (2) Standard Local Projection (LP, Jorda 2005), and (3) Bayesian Local Projection (BLP). Miranda-Agrippino and Ricco (2021) illustrates that VARs with a small set of controls are often misspecified and this may lead to compounded coefficients over horizons. IRFs from LPs are often prone to being potentially robust to misspecification and drying up degrees of freedom. Choosing between a standard VAR and LP is a trade-off between bias and estimation variance, i.e., VAR models might be more efficient but they are more prone to bias if the one-step-ahead model is misspecified. However, BLP specification not only retains the flexibility of LP and is robust to model specification, but also efficiently is dealing with estimation uncertainty. Estimation sample is from 2000M07 to 2021M02 due to data availability (monetary policy surprises). Grey areas are 90% posterior coverage bands.

The sign of crucial variables such as inflation depends on the shock identification, sample period, and model specification. As shown in Figure 1, the BLP response (unlike the LP and the BVAR responses) does not lead to IRFs with price puzzles. This result is in line with our expectations.

Summary

What are the effects of monetary policy on housing credit and prices in New Zealand? Using a Bayesian Local Projections VAR on monthly data (between July 2000 and February 2021), we test the presence of a credit channel in the New Zealand housing market and show the impact of a 1% increase in the policy rate on house prices and housing affordability. Our results point to a significant credit channel in the New Zealand housing market. We find that a positive monetary policy shock (1% increase in the policy rate) reduces real house prices by -1.6% and the growth rate of residential loans by -0.6% after 2.5 years. After a positive monetary policy shock, total bank loans stay broadly unchanged for 12 months. We take this as evidence that total bank loans may contain a countercyclical component in New Zealand.

A caution to our results is that the analysis in this note represents only a small part of the complexity of the full transmission mechanism. This is not a general equilibrium analysis and the results in this paper are related to the effect of monetary policy surprises on the real house prices from the perspective of households' balance sheet and household demand.

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