Institutions and Economies
Vol. 18, No. 3, July 2026, pp. 111-141 https://doi.org/10.22452/IJIE.vol18no3.5

The Interaction Between Macroprudential Policy, Monetary Policy, and The Macroeconomy in Vietnam

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Abstract: *This paper investigates the interaction between macroprudential policy, monetary policy, and the macroeconomy in Vietnam from 2012 to 2021. We focus on comparing the effect of macroprudential policy with those of monetary policy in Vietnam. A Bayesian VAR model is employed to analyse the interaction between macroprudential policy, monetary policy, and several other macroeconomic variables. This paper confirms some known results on the interaction between macroprudential policy, monetary policy, and the macroeconomy. Firstly, macroprudential policy has a substantial positive effect on the consumer price index. Additionally, it has a slight positive effect on industrial production, similar to the effect of monetary policy but in the opposite direction. Conversely, macroprudential policy is also affected by the impacts of shocks to outstanding credit to the economy and industrial production. Secondly, this paper shows little interaction between these two policies. Lastly, we offer recommendations for the application of macroprudential and monetary policies to stabilise the macroeconomy in Vietnam.*

Keywords: Macroprudential policy; Macroeconomic variables; Monetary policy; Global financial crisis; Financial stability
JEL Classification: G28, E32, E52

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1. Introduction

1.1 The interaction between macroprudential policy and monetary policy in the context of global integration is a critical issue that warrants thoughtful consideration

The global financial crisis demonstrated the critical importance of financial stability for maintaining overall macroeconomic stability. In response, central banks and other policy authorities have increasingly relied on macroprudential measures to address systemic risks. However, the empirical impacts and practical implementation of macroprudential policies remain insufficiently understood due to their relatively recent adoption, particularly after the 2008 global economic crisis (Belkhir et al., 2023).

While the role of macroprudential policy is increasingly recognised, monetary policy has long been central to managing a nation's economy. As the primary tool of central banks, it regulates money supply and interest rates to control inflation, stabilise exchange rates, and support growth. Understanding their interaction when implemented together is therefore essential. In a globalised economy, maintaining monetary policy stability and independence is increasingly challenging, heightening the need for macroprudential measures to ensure financial stability and mitigate risks amid rising interconnectedness and uncertainty. Thus, studying the interplay between macroprudential policy, monetary policy, and the broader economy is more critical than ever.

1.2 Research gap leading to the selection of the review topic

In recent years, the study of macroprudential and monetary policies, along with their interplay with the macroeconomy, has gained momentum. Richter et al. (2019) highlight the growing reliance of central banks on macroprudential tools to manage financial cycles. While their findings involve some degree of uncertainty, they suggest that reducing maximum loan-to-value ratios dampens output, producing economic effects similar to a policy rate hike in emerging markets. Notably, tightening loan-to-value ratios caps exerts a stronger economic impact than easing them, significantly influencing credit growth and housing price dynamics. Jeon et al. (2024) provide compelling evidence that heightened economic uncertainty increases

bank risk while underscoring the mitigating role of macroprudential measures.

Kim et al. (2023) reveal that macroprudential policy significantly influences financial variables, such as credit and housing prices, and macroeconomic indicators, such as output and inflation, which resemble the effects of monetary policy in China during the period from 1998 to 2018. Their research further demonstrates that China employs macroprudential tightening to stabilize credit in response to shocks, preferring it over monetary policy adjustments. On a global scale, the exploration of this issue remains limited, with notable exceptions such as Kim and Mehrotra (2022).

In Vietnam, "macroprudential policy" has recently become a prominent topic. While a few tools are being utilised to mitigate macroeconomic risks to the financial system, research on this policy remains limited. Thach et al. (2019) found that fiscal policy negatively impacts financial stability, whereas macroprudential policy plays a positive role. Their study highlights an inverse relationship between fiscal and macroprudential policies, recommending greater focus on their coordination to enhance financial stability. Anh (2019) demonstrated the effectiveness of Vietnam's macroprudential framework, measured by the MaPP index. Nguyen et al. (2021) emphasised the importance of maintaining a stable macroeconomic environment for financial stability. Thach et al. (2022) analysed the influence of monetary and macroprudential regulations on bank stability, noting that factors such as the M2 money supply, capital adequacy ratio, and interbank interest rates significantly improve stability, while the effects of liquidity and loan-to-deposit ratios are less pronounced. Existing studies in Vietnam focus on: (i) fiscal and monetary policy coordination, (ii) the effectiveness of fiscal and macroprudential policies for financial stability, and (iii) the interaction between monetary and macroprudential policies during economic instability. However, little research examines their response to financial instability, particularly credit shocks. Notably, no study has applied the BVAR model with 2012–2021 data to analyse their interaction with the macroeconomy. BVAR improves forecasting, reduces overfitting, and incorporates expert knowledge, making it ideal for data-constrained macroeconomic research. The 2012–2021 period, with economic fluctuations, policy shifts, and deeper global integration, is an optimal context. Vietnam's adaptive policy framework, credited with maintaining stability during the 2008 global crisis

and the COVID-19 slowdown, further underscores the relevance of this timeframe.

Based on these findings, we recognise that the interaction between macroprudential policy, monetary policy, and key macroeconomic variables in Vietnam from 2012 to 2021 can be effectively analysed by addressing the following three questions:

First, are there significant relationships between each pair of the three factors: macroprudential policy, monetary policy, and macroeconomic variables?

Second, how do macroeconomic variables evolve over time in response to endogenous and exogenous shocks, considering their short- and long-term impacts on the macroeconomy?

Third, what is the optimal coordination mechanism between macroprudential policy and monetary policy to enhance macroeconomic management efficiency?

Our findings highlight the significant impact of macroprudential policy on macroeconomic variables, especially the consumer price index (CPI). While both macroprudential policies (MaPP) and monetary policies (MP) have modest effects on industrial production, their influences are opposite in direction. Besides, macroprudential policy can also be adjusted to respond to the shocks to outstanding credit to the economy. Furthermore, the interaction between these two policies is relatively limited. This study contributes to the literature by exploring the relationship between macroprudential and monetary policies, and their effects on financial stability and macroeconomic fluctuations. Notably, macroprudential policy strongly affects CPI and adapts effectively to shocks in industrial production and credit, supporting the findings of Kim et al. (2023) and Sinclair & Sun (2021). Our results reinforce the stabilising role of contractionary macroprudential policy in managing credit shocks, offering valuable insights for integrating these policies and advancing empirical research.

The paper is organised as follows: Section 2 reviews the literature and develops hypotheses; Section 3 describes the methodology and data; Section 4 presents results and discussion; and Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 A comprehensive overview of macroprudential policy and monetary policy within Vietnam's macroeconomy

By the end of the 20th century, capital control liberalisation in emerging economies facilitated freer global capital flows. However, economic crises have triggered widespread contagion, leading countries to prioritise financial stability. In response, macroprudential policies have gained prominence in emerging markets such as Korea, Brazil, Indonesia, Russia, and Thailand, particularly after the 2008 Global Financial Crisis (Pasricha et al., 2018). ASEAN countries have become more proactive in attracting FDI after reopening by implementing specific policies, especially in the post-COVID-19 period to support economic recovery (Hakim & Budi, 2024).

Since the mid-1980s, Vietnam has made strong progress despite financial distress and slower growth. WTO accession in 2007 exposed challenges in maintaining monetary and exchange rate stability, stressing the need for stronger macroprudential policies (Mania et al., 2022). Financial sector weaknesses, driven by institutional issues and macroeconomic volatility, led to instability. Three "stop-and-go" episodes followed: stimulus in 2009, tightening in 2011 ("Resolution 11"), and easing in 2012. During COVID-19, despite repeated interest rate cuts, credit growth stayed sluggish due to balance sheet pressures, deleveraging, and weak liquidity management. As a result, banks have increasingly relied on non-interest income from non-traditional activities since the 2000s to mitigate credit risk and sustain revenues. However, Dang (2021) has pointed out that this shift may elevate standalone risk and systemic risk due to the inherently volatile nature of non-interest income, posing significant challenges to long-term financial stability. As a result, a unified body is essential to assess systemic risks and implement robust macroprudential policies (Anh, 2019).

In Vietnam, while macroprudential policy tools are not officially established, several instruments are used for monetary policy and banking supervision. Figure 1 (a) in Section 4 illustrates recent trends in macroprudential policy. The State Bank of Vietnam has adopted a dynamic and adaptive monetary policy, utilising both traditional and unconventional tools to ensure macroeconomic stability, control inflation, and foster growth. Key instruments include interest rates, open market operations (OMO),

exchange rates, reserve requirements, and refinancing. Interest rates, in particular, are a powerful tool for influencing the economy quickly, though their effectiveness is influenced by factors such as economic structure, financial market development, and overall macroeconomic conditions. Figure 1 (b) in Section 4 further depicts recent trends in monetary policy.

Between 2012 and 2021, Vietnam and China underwent significant economic transformations with both similarities and differences in macroeconomic, macroprudential, and monetary policies. China shifted to a consumption- and service-led economy, while Vietnam pursued sustainable growth through digital transformation. During COVID-19, Vietnam adjusted monetary policy flexibly, while China cut rates and injected 995 billion yuan to boost liquidity. Both maintained GDP growth and controlled inflation, yet Vietnam prioritised financial stability via reserve requirements and bank supervision, whereas China focused on credit control and financial oversight. These differences highlight the need for comparative research on Vietnam's policies, drawing on Kim et al. (2023), to develop strategies for stability and growth amid global integration.

2.2 The interaction between macroprudential policy and monetary policy

Krugman (1979) introduced the "Impossible Trinity" (Trilemma), asserting that no country can simultaneously achieve fixed exchange rates, financial integration, and monetary policy independence, requiring trade-offs in a globalised economy. Aizenman et al. (2008; 2013) expanded this concept by developing the Quadrilemma, which includes foreign exchange reserves (IR) as a buffer to address trade-offs and adds financial stability as a fourth objective to manage global capital flows. Keynes (1936) emphasised the government's role in correcting market failures and ensuring stability, known as the "Visible Hand." These theories highlight the synergy between macroprudential and monetary policies: macroprudential measures manage systemic risks, easing pressure on monetary policy during booms, while loosening them in downturns supports liquidity, allowing monetary policy to control inflation and stimulate demand. Their coordination enhances stability, supports growth, and mitigates risks from global integration. However, differing objectives and contexts lead to varying interactions, making it hard to draw definitive conclusions about their relationship.

Martinez-Miera and Repullo (2019) analysed the role of monetary and macroprudential policies in mitigating financial system risks. Monetary tightening is achieved through open market operations, such as selling government bonds, while macroprudential tightening involves raising capital requirements. While both policies contribute to financial stability, macroprudential policy is more effective in enhancing stability and improving social welfare. These results support the hypothesis that macroprudential policy may be more beneficial than monetary policy, suggesting a slightly negative correlation between the two policies. Bussière et al. (2021) provide evidence that macroprudential policies in peripheral economies can mitigate the spillover effects from monetary policies in centre economies. By adjusting macroprudential measures, a peripheral economy can counteract the impacts of monetary actions from center economies, thereby reducing the need to significantly adjust its own monetary policy. This suggests that macroprudential and monetary policies in peripheral economies, such as Vietnam, may not be strongly correlated. Anwar et al. (2024) found that both the central bank rate and macroprudential policy independently improve the bank Z-Score. When combined, their joint effect further enhances this positive impact. These findings support the hypothesis that the interaction between macroprudential and monetary policies is more effective when used together, suggesting a strong positive relationship between the two.

Based on the various hypotheses mentioned above, we propose a specific hypothesis:

H_1 Macroprudential policy and monetary policy (policy rate) do not have a significant interaction.

2.3 The interaction between macroprudential policy and macroeconomy

The relationship between macroprudential policy and the macroeconomy focuses on maintaining financial stability and mitigating systemic risks that could disrupt economic performance. Tools like capital buffers, leverage ratios, and loan-to-value (LTV) limits prevent asset bubbles, excessive credit growth, and imbalances. These measures influence credit growth, investment, and consumption. By regulating credit, macroprudential policies ensure sustainable lending, avoiding economic overheating. For example, tightening

capital requirements during booms curbs speculative lending, directing credit to productive sectors. During downturns, loosening measures stimulate lending, sustaining production. Macroprudential tools also manage inflation by controlling aggregate demand, stabilising consumer spending and prices during expansions and supporting price stability in slowdowns. In essence, macroprudential policy stabilises credit growth, supports industrial output, and moderates inflation, fostering a resilient macroeconomic environment.

In a recent study, Kim et al. (2023) found that macroprudential policy significantly impacts financial variables like credit and house prices, as well as macro variables such as output and inflation. The study also revealed that in response to a credit shock, China tightened its macroprudential policy to stabilise credit. Similarly, Sinclair and Sun (2021) argue that macroprudential policy can address shocks in industrial production or CPI. These findings support the hypothesis that macroprudential policy positively interacts with the macroeconomy, playing a crucial role in stabilising macroeconomic conditions. While many studies confirm the benefits of macroprudential policy in enhancing financial stability, it is essential to weigh the trade-offs between stability and other outcomes. Aldasoro et al. (2017) find that while liquidity requirements reduce systemic risk, they also lower efficiency, highlighting a trade-off between stability and efficiency. In contrast, equity requirements improve stability without significantly affecting investment levels. Additionally, Suh (2012) argues that while macroprudential policy stabilises credit, measures targeting specific credit market segments can lead to regulatory arbitrage, redirecting credit to less regulated areas. These findings support a slightly negative hypothesis about the relationship between macroprudential policy and the macroeconomy, in contrast to earlier hypotheses.

Based on the hypotheses mentioned above, we propose the following hypothesis:

H_2 Macroprudential policy and several macroeconomic variables (outstanding credit to the economy, industrial production, and CPI) have a significant interaction.

2.4 The interaction between monetary policy and macroeconomy

Monetary policy is closely linked to macroeconomic variables, influencing

inflation, economic growth, financial stability, and labour markets. Through tools such as interest rates, money supply, and open market operations, it directly affects aggregate demand, investment, consumption, and capital flows. Lower interest rates reduce borrowing costs, increase credit and stimulate industrial production. However, this can also raise consumption and investment, putting upward pressure on inflation. In contrast, tightening monetary policy by raising interest rates reduces credit, limits production, and curbs inflation. Thus, monetary policy plays a crucial role in regulating credit, industrial output, and consumer prices, ensuring economic stability and sustainable development.

Kim et al. (2023) found that monetary policy significantly influences financial variables like credit and house prices, as well as macroeconomic factors such as output and inflation in China. Similarly, Baglioni (2024) showed that central banks use traditional tools, such as controlling the money supply and interest rates, to impact the economy. These findings support the hypothesis that monetary policy plays a crucial role in the macroeconomy, helping to stabilise it when macroeconomic conditions fluctuate.

Based on the hypotheses mentioned above, we propose a hypothesis:

H_3 Monetary policy and several macroeconomic variables (outstanding credit to the economy, industrial production, and CPI) have a significant interaction.

3. DATA AND METHODS

3.1 Data

Our model includes five endogenous variables (mapp, rate, credit, ip, cpi) and two exogenous variables (us_ip, us_cpi). Due to the lack of monthly house price data in Vietnam, this factor is excluded. Us_ip and us_cpi significantly impact Vietnam's economy through trade and financial channels. U.S. industrial production (us_ip) influences supply chains and exports, while U.S. inflation (us_cpi) raises import prices and exchange rates. Higher U.S. inflation can tighten monetary policy, triggering capital outflows and destabilising Vietnam's financial system. These dynamics necessitate adjustments in Vietnam's macroprudential and monetary policies. Thus, us_ip and us_cpi are appropriate exogenous variables, reflecting their substantial economic influence.

We use the composite macroprudential index to assess macroprudential policy effects. Various methods exist for its computation. This study adopts a new index by Alam et al. (2019), sourced from the IMF's iMaPP Database. The dataset includes multiple macroprudential instruments, where each takes +1 for tightening, -1 for loosening, and 0 for no change per month. Monthly values are summed up and accumulated over time to construct mapp.

Central banks use both traditional and unconventional tools to implement monetary policy based on economic conditions. Traditional tools, with a long history, adjust short-term interest rates and money supply to influence economic activity through credit and consumption channels (Moschella, 2024). Unconventional tools are employed in crises or when traditional methods lose effectiveness. In this study, we use the rediscount rate, a key monetary policy instrument, to construct the variable rate for analysis. Data is sourced from the "Decision on the rediscount rate" by the State Bank of Vietnam over the years.

Table 1: Description of endogenous variables

Variable	Description	Source
mapp	macroprudential policy index	IMF
rate	rediscount rate	The State Bank of Vietnam
credit	outstanding credit to the economy	The State Bank of Vietnam
ip	industrial production	IMF
cpi	consumer price index	IMF
us_ip	industrial production of the US	IMF
us_cpi	The Federal Funds Rate	IMF

Our data consists of monthly observations. Due to missing credit data before April 2012 and MaPP data after 2021, our model includes 117 observations (April 2012 – December 2021). However, we use data from 2010–2021 for the chart in Section 4.1 and policy analysis in Section 4.3. Monthly data provides greater flexibility in contemporaneous structural parameters and increases degrees of freedom. Compared to quarterly or annual data, it more effectively captures the timing of policy actions and their impacts.

3.2 Model

Based on the analysis in Section 2, macroprudential policy, monetary policy, and other macroeconomic variables are likely to interact. To investigate this, we use a VAR model, which captures the relationships between multiple variables over time. Specifically, we construct VAR models to examine the interaction between macroprudential policy, monetary policy, and the macroeconomy in Vietnam from 2012 to 2021. We opt for the BVAR model, which incorporates Bayesian methods to enhance reliability by leveraging expert information. This approach will be further discussed in the next subsection. Additionally, using monthly data, as suggested by Kim et al. (2023), helps relax restrictions on contemporaneous structural parameters and increases degrees of freedom, distinguishing this study from previous research that typically used quarterly or annual data.

Our primary goal is to analyse how shocks to macroprudential and monetary policies affect financial variables (e.g., credit) and macroeconomic variables (e.g., industrial production, CPI). We also examine how macroeconomic and financial shocks influence these policies and their interaction. Kim and Mehrotra (2018; 2022) noted that macroprudential policy can affect macroeconomic variables targeted by monetary policy. Expanding on this, Kim et al. (2023) analysed both policies in China, showing positive effects on financial and economic stability. Using IMF and State Bank of Vietnam data (2011–2021), we develop a model to examine their interaction in Vietnam. We estimate the following VAR model:

$$y_t = B(L)y_{t-1} + D(L)x_t + u_t,$$

where $B(L)$ and $D(L)$ are matrix polynomials in the lag operator L, y_t is a $m \times 1$ vector of m endogenous variables, x_t is a $k \times 1$ vector of exogenous variables, and ut denotes $am \times 1$ vector of disturbances. In our model, vector y consists of 5 endogenous variables and vector x consists of 2 exogenous variables listed in Table 1.

3.2 Bayesian method

Many studies have relied on p-values despite their limitations. In response, the Bayesian framework, which uses Bayes factors and incorporates prior distributions of regression coefficients, has emerged as a more reliable

alternative, offering more accurate and contextually informed conclusions. Our research adopts the Bayesian Vector Autoregressive (BVAR) model to analyse the interactions between macroprudential policy, monetary policy, and key macroeconomic variables. Unlike traditional VAR models, BVAR treats model parameters as random variables with prior distributions and uses shrinkage priors to prevent overfitting, making it more reliable for complex macroeconomic analysis.

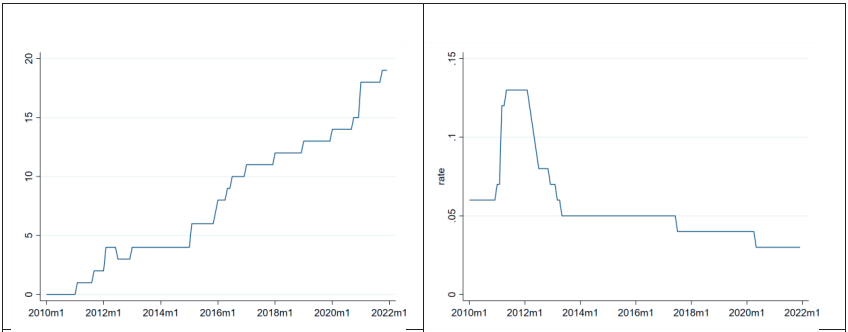
Given the small sample size and many parameters in our study, the BVAR model, particularly with the "Minnesota prior" (Litterman, 1981; Doan et al., 1984; Sims, 1993), is ideal. This prior structure incorporates prior information to regularise the model, mitigating overfitting and ensuring that the estimates remain economically plausible, making it a robust approach for high-dimensional macroeconomic analysis (Giannone et al., 2015). Since no other research has exploited the Bayesian method on similar data, we use the well-known conjugate Minnesota prior, an improved version of the original Minnesota prior introduced by Litterman. We adopt this Minnesota prior setting with a self-variable tightness parameter of 0.1, a lag decay of 1, and an exogenous variable tightness parameter of 100.

4. Results and Discussion

4.1 Unit root test and descriptive statistics

The iMaPP database has collected data for Vietnam's index since 2010. Figure 1 (a) depicts the upward trend in the Macroprudential Index (MaPP), confirming the State Bank of Vietnam's increasing focus on macroprudential policy. Figure 1 (b) shows that monetary policy has generally been loose since 2012, except for tightening in 2010–2011, indicating an overall easing stance (easy money).

Figure 1: Trend in Macroprudential Index and Monetary Policy of Vietnam



(a) Trend in Macroprudential Index of Vietnam

(b) Trend in Monetary Policy of Vietnam

The formal tests show that the series mapp, credit, cpi, and us_cpi are nonstationary, but their first differences (dmapp, dcredit, dcpi, and dus_cpi) are stationary (see Table 2). The series rate, ip, and us_ip are stationary and used in our BVAR model. However, we use drate instead of rate to focus on interest rate fluctuations. The descriptive statistics for all variables are in Table 3.

Table 2: Dickey–Fuller test for unit root

Variable	p-value for Z(t)	difference of variable	p-value for Z(t)
mapp	0.1918	d.mapp	0.0000
credit	0.9410	d.credit	0.0000
rate	0.0000	d.rate	0.0000
ip	0.0032		
cpi	0.3779	d.cpi	0.0000
us_ip	0.0068		
us_cpi	1.0000	d.us_cpi	0.0000

Source: Author's calculations.

Table 3: Descriptive statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
d.mapp	116	.1293103	.4477999	-1	3
d.credit	116	65598.05	59000.42	-121452	307747
d.rate	116	-.0007328	.0023778	-.01	0
ip	117	89.61222	13.58323	57	124.73
d.cpi	116	.3793966	.7297567	-2.61	2.83
us_ip	117	108.9602	3.518518	90.1	115.66
d.us_cpi	116	.1925862	.3642338	-.79	1.15

Source: Author's calculations.

4.2 Correlation coefficients and model selection

In a VAR (Vector Autoregressive) model, moderate correlation between variables is ideal for capturing the economic and dynamic relationships the model reflects. Table 4 shows that the variables can form a stable and reliable model.

Table 4: Correlation coefficient matrix

Variables	d.mapp	d.credit	d.rate	ip	d.cpi
d.mapp	1.0000				
d.credit	-0.0929	1.0000			
d.rate	0.1306	0.1116	1.0000		
ip	-0.0173	0.2684	-0.1893	1.0000	
d.cpi	0.0279	-0.1597	0.2202	-0.0160	1.0000

Source: Author's calculations.

We fit a BVAR model with up to six lags. Based on log-likelihood and a priori probability, we select six lags (see Table 5). Marginal likelihood (ML) is computed using the Laplace–Metropolis approximation.

The selected lag is appropriate and aligns with Kim et al. (2023) and Kim and Mehrotra (2018, 2022). A short lag (e.g., 1 – 3 months) may miss long-term policy effects, while an excessively long one (e.g., 12 months) risks overfitting by consuming too many degrees of freedom and reducing estimation efficiency. Economic policies take time to influence the macroeconomy, requiring intermediate targets to assess effectiveness and

allow timely adjustments. Macroeconomic variables are typically reported semiannually, providing a structured policy evaluation framework. Based on these assessments, governments refine policies to align with economic conditions. Thus, a six-month lag reasonably reflects the interaction between economic policies and macroeconomic variables.

Table 5: Model selection

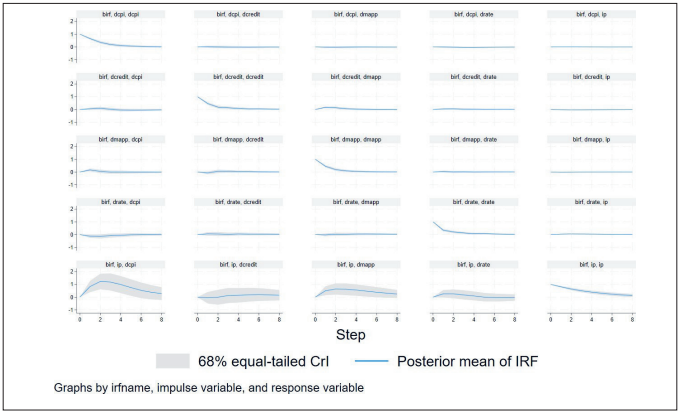
	Log of marginal likelihood	Prior probability	Posterior probability
lag1	-1.66e+03	0.1667	0.0000
lag2	-1.65e+03	0.1667	0.0000
lag3	-1.64e+03	0.1667	0.0000
lag4	-1.63e+03	0.1667	0.0000
lag5	-1.62e+03	0.1667	0.1198
lag6	-1.62e+03	0.1667	0.8802

Source: Author's calculations.

Since all series in the model are stationary, it is expected to be stable. Checking the eigenvalue stability condition confirms this, with a 0.9971 probability of eigenvalues lying inside the unit circle. Thus, the model meets the stability condition.

Next, we rescale variables for clear IRF visualisation, replacing drate, dcredit, ip, and us_ip with 100 × drate, dcredit/100000, ip/100, and us_ip/100, respectively. Figure 2 illustrates the impact of shocks on endogenous variables.

Figure 2: Impact of a shock in one variable on endogenous variables



4.3 The interaction between macroprudential policy, monetary policy and the macroeconomy

4.3.1 The interaction between macroprudential policy and monetary policy

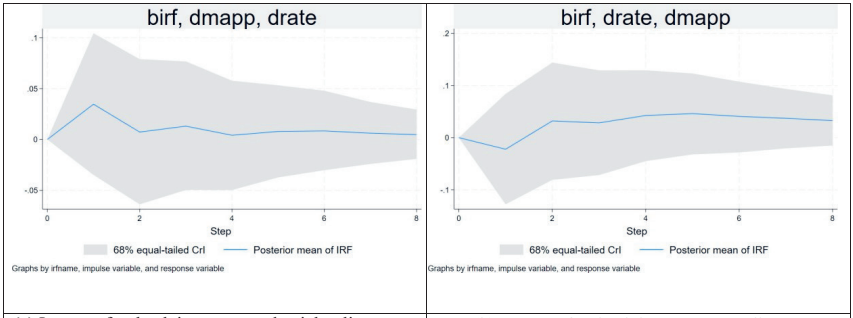
Figure 3 reveals an interaction between macroprudential policy volatility and monetary policy volatility, though these effects are not statistically significant. This aligns with the hypothesis in section 2.2 and highlights the complexity of economic and financial factors. The relationship between these policies is context-dependent and shaped by their differing objectives: macroprudential policy targets systemic risks in specific sectors, while monetary policy addresses broader economic stability. The interaction between these policies can be complementary or conflicting, depending on the economic environment. Effective coordination is essential to balance financial stability with macroeconomic goals like inflation control and sustainable growth. For instance, during rapid economic expansion, the central bank raises interest rates to curb inflation, while macroprudential policy tightens capital requirements and reduces loan-to-value (LTV) ratios to prevent asset bubbles. In contrast, economic downturns often see conflicts as monetary policy lowers rates to stimulate growth, but macroprudential measures restrict credit to manage risks.

Research data shows that in 2010 – 2011, high interest rates controlled inflation, while minimal macroprudential policy reflected low financial risks. From 2012 onward, macroprudential policy tightened to address risks, while monetary policy eased, lowering interest rates. This coordination supported economic growth without increasing financial instability. During COVID-19, interest rates dropped to stimulate demand, while macroprudential policy strengthened to manage asset bubbles and credit expansion, ensuring financial stability despite aggressive monetary easing. These flexible adjustments to prevailing conditions may explain why the relationship between these policies is not statistically significant.

These preliminary findings do not diminish expectations for effective coordination between macroprudential and monetary policies, as this may be influenced by the specific economic context of each country. According to Klingelhöfer and Sun (2019), these policies in China complement each other in maintaining financial stability. In China, macroprudential and monetary policies work together to mitigate financial risks without hindering growth.

Macroprudential policy immediately constrains credit, while monetary policy has a slower but more sustained impact. This coordination ensures both financial and macroeconomic stability. Monetary policy affects credit with a lag of approximately two quarters, whereas macroprudential measures take effect immediately but for a shorter duration.

Figure 3: The interaction between macroprudential policy and monetary policy



(a) Impact of a shock in macroprudential policy on monetary policy

(b) Impact of a shock in monetary policy on macroprudential policy

4.3.2 The interaction between macroprudential policy and macroeconomy

Figure 4 illustrates that a shock to macroprudential policy volatility induces changes in CPI volatility, with effects lasting approximately three periods. In contrast, its impact on industrial production volatility remains minor and short-lived, while its influence on credit volatility is statistically insignificant. These findings are consistent with the research on China's case by Klingelhöfer and Sun (2019), which concluded that macroprudential policies have negligible effects on output, further supporting their observations.

Specifically, CPI volatility rises significantly within the first month after a shock, gradually diminishes over the next two months, and stabilises thereafter. This can be explained by examining capital costs and aggregate demand. Tightening macroprudential policy increases borrowing costs for businesses, raising production costs. If businesses pass these costs onto consumers, CPI may rise. However, reduced aggregate demand often limits the extent to which higher costs are reflected in prices, leading to moderate CPI increases that stabilize over time. Macroprudential policy in Vietnam has been significantly tightened since the early 2010s and was further

strengthened during the economic challenges of the COVID-19 pandemic. Although during the COVID-19 period, Vietnam primarily implemented monetary and fiscal policy easing to support economic growth, ensure liquidity, and mitigate the negative impacts of the pandemic – leading to temporary inflation spikes following economic shocks – overall, inflation remained stable in the long term, reflecting effective management of price stability.

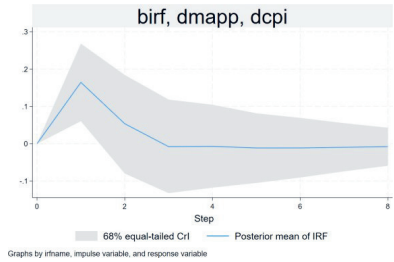
Vietnam's CPI is more sensitive to macroprudential policy than China's due to structural differences. As an open economy (trade openness >150% of GDP), Vietnam's prices react strongly to both domestic policies and global market fluctuations. Macroprudential tightening raises borrowing costs and restricts credit access, hindering SMEs' operations and investment expansion, thereby amplifying CPI volatility. Vietnam's SME-dominated economy, with limited credit access, further intensifies the impact of borrowing costs on CPI. In contrast, China's transition to a consumption-driven economy with a large domestic market (trade openness <50% of GDP) helps stabilise CPI. China manages financial risks through macroprudential tools like reserve requirements and credit controls, but strict price regulations limit their direct impact on CPI. While state-controlled banking slows policy transmission, Vietnam's flexible financial system and high consumer credit exposure make its CPI more responsive. Overall, Vietnam's high trade openness, SME-driven economy, and flexible pricing heighten CPI sensitivity to macroprudential policy, whereas China's centralized structure and strict price controls ensure greater stability.

Regarding industrial production, macroprudential policy has minimal influence in Vietnam, as its primary focus is on addressing systemic financial risks rather than directly affecting production activities. Industrial production generally remained stable over the years, with occasional declines during periods of economic crises, such as the COVID-19 pandemic. These downturns were largely attributed to reduced market demand and supply chain disruptions, rather than the direct impact of macroprudential measures.

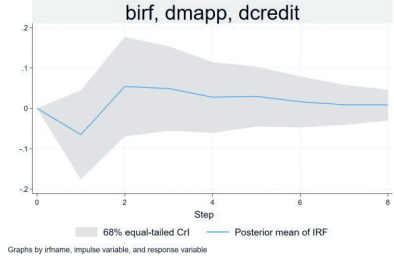
The limited impact of macroprudential policy on industrial production can be attributed to its focus on the financial sector, while most SMEs in Vietnam rely on informal financial channels. Additionally, industrial production in Vietnam is supported by fiscal policies, such as public investment and export promotion, and key export sectors like textiles and electronics often receive funding from foreign sources, reducing their

dependence on domestic credit. Compared to China, where industrial production is heavily reliant on credit, Vietnam's diverse economic structure and the resilience of its manufacturing enterprises mitigate the effects of macroprudential policy on output. These findings align with Klingelhöfer and Sun (2019), confirming that while macroprudential policy significantly impacts credit, it has no statistically significant effect on real GDP growth. This suggests it can ensure financial stability without causing substantial economic downturns.

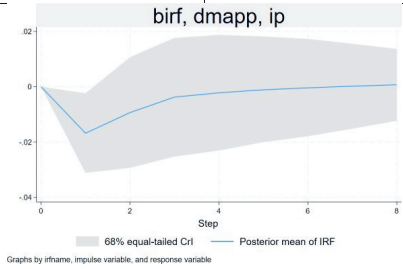
Figure 4: Impact of shocks in macroprudential policy on macroeconomy



(a) Impact of a shock in macroprudential policy on CPI



(b) Impact of a shock in macroprudential policy on outstanding credit to the economy



(c) Impact of a shock in macro- prudential policy on industrial production

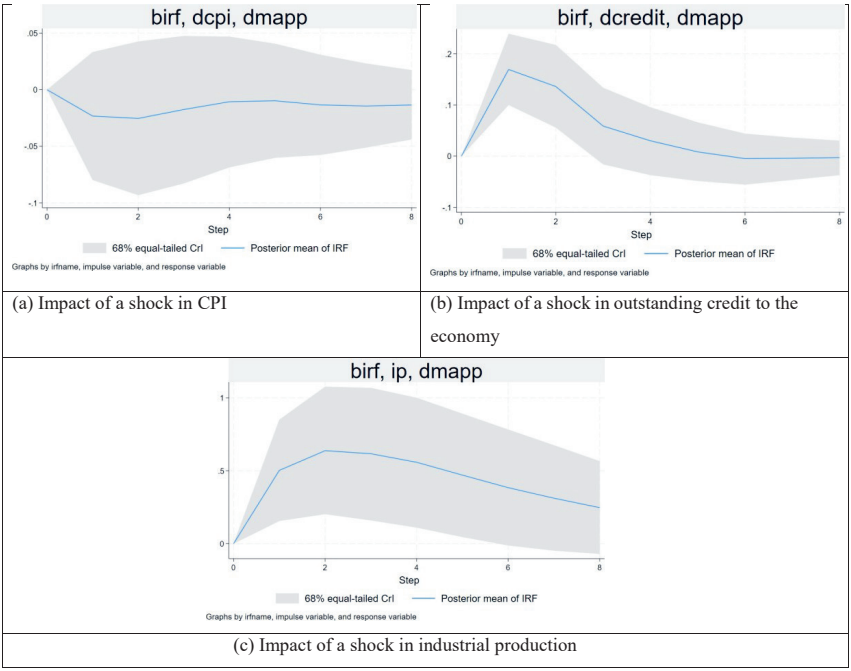
Figure 5 shows that the impacts of a shock in credit volatility on macroprudential policies volatility are statistically significant and the effect last for about six periods. In fact, macroprudential policies are used to deal with credit shocks. Macroprudential policies are regulatory measures aimed at ensuring the stability of the financial system as a whole by addressing systemic risks. When a shock in credit volatility occurs, such as a sudden tightening of credit conditions or a surge in credit defaults,

these policies help mitigate the impact by strengthening the resilience of financial institutions and markets. By doing so, macroprudential policies aim to prevent financial crises, maintain credit flow to the economy, and avoid adverse effects on economic growth and stability. Our results once again reinforce the finding from the research of Kim et al. (2023) that contractionary macroprudential policy is implemented to stabilise credit in response to credit shocks. Despite economic, political, and social differences, both Vietnam and China can leverage macroprudential policy to address credit shocks. This reinforces its flexibility and crucial role in macroeconomic stability and growth.

The impacts of industrial production shocks on macroprudential policies volatility are also statistically significant and its effect lasts for about eight periods. This was also considered in one of the most recent studies of Kim et al. (2023) and Sinclair and Sun (2021). Industrial production shocks can significantly impact macroprudential policies volatility by affecting overall economic stability. When industrial production experiences shocks, such as sudden declines or surges, it can disrupt financial markets and increase systemic risks. This prompts macroprudential authorities to adjust policies to mitigate potential vulnerabilities in the financial system. By addressing these shocks, macroprudential policies aim to maintain financial stability, ensure sustainable economic growth, and prevent adverse spillover effects on other sectors and the broader economy.

On the contrary, the impacts of CPI volatility shocks on macroprudential policies volatility are not statistically significant. Macroprudential policy primarily focuses on controlling systemic financial risks, while the CPI reflects price fluctuations and is a target of monetary policy. The CPI is often not directly related to financial risks, so it does not prompt adjustments in macroprudential policy. Macroprudential policy tends to respond more strongly to credit or asset price fluctuations rather than CPI volatility. The role of controlling CPI lies mainly with monetary policy, which reduces its interaction with macroprudential policy. Additionally, limitations in data or specific economic contexts may also diminish the statistical significance of research findings.

Figure 5: Impact of shocks in macroeconomy to macroprudential policy



(a) Impact of a shock in CPI

(b) Impact of a shock in outstanding credit to the economy

(c) Impact of a shock in industrial production

4.3.3 The interaction between monetary policy and macroeconomy

Figure 6 show that a shock in monetary policy volatility causes a significant change in CPI volatility but this effect is not statistically significant. CPI may be influenced by other factors, or monetary policy impacts it with varying lags. This suggests inflation control requires complementary tools beyond monetary policy alone. It also causes a slight change in industrial production and this effect lasts for about 8 periods. Tightening monetary policy typically reduces the CPI by decreasing aggregate demand, increasing savings, and lowering inflation expectations.

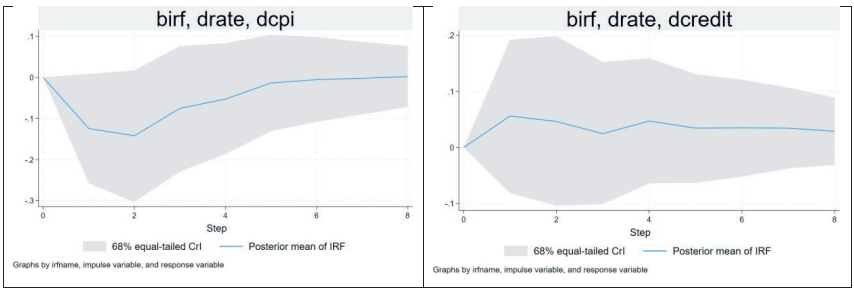
In most cases, tightening monetary policy by rising interest rates tends to slow industrial production growth, especially in economies where businesses rely heavily on borrowed capital to finance their operations. Richter et al. (2019) highlighted that central banks are increasingly turning to macroprudential tools to manage financial cycles. While the estimates lack precision, they suggest that lowering maximum loan-to-value (LTV) ratios results in a decline in output, akin to a policy rate increase in emerging

markets. However, under conditions where firms interpret the rate hike as an indicator of robust economic expansion and heightened future demand. In this context, the expected profitability from increased demand may outweigh the immediate rise in borrowing costs, prompting firms to accelerate production. Moreover, if the interest rate increase is perceived as a proactive measure to curb potential inflation in a rapidly growing economy, firms may further advance production schedules to preempt anticipated cost escalations. This behaviour underscores the role of expectations in driving industrial output, even amid tightening monetary conditions.

The impact of monetary policy volatility on credit volatility is unclear and statistically insignificant for several reasons. First, monetary policy, such as changes in interest rates, may not have an immediate or clear impact on credit due to other factors, such as market expectations, changes in borrowing demand, or the credit policies of banks, which may obscure the effect of monetary policy. Second, businesses and individuals may seek alternative sources of finance outside traditional banks, such as issuing bonds or borrowing from non-bank financial institutions, thus reducing the impact of monetary policy on bank credit. Finally, if monetary policy is not implemented uniformly or there is insufficient accurate data on its effects, the results will be unclear and lack statistical significance. These findings align with Kim et al. (2023) on China, showing that monetary policy has a weaker impact on credit than macroprudential policy and does not significantly respond to credit shocks.

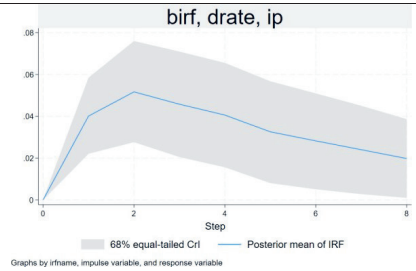
However, only the effect of the policies volatility shock on industrial production is statistically significant, while the effect on the CPI volatility is not statistically significant. Additionally, the effects of the policy volatility on credit volatility are not both clear and statistically significant.

Figure 6: Impact of shocks in monetary policy to macroeconomy



(a) Impact of a shock in monetary policy to CPI

(b) Impact of a shock in monetary policy to CPI

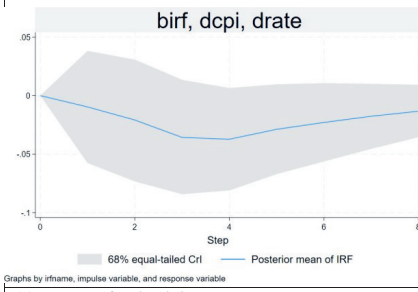


(c) Impact of a shock in monetary policy to industrial production

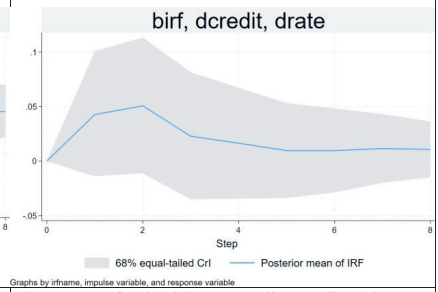
Figure 7 show that CPI volatility, credit volatility, and industrial production volatility shocks have impacts on monetary policy, but these impacts are not statistically significant.

The lack of statistically significant impacts of CPI volatility, credit volatility, and industrial production volatility shocks on monetary policy can be attributed to several factors. First, monetary policy often operates with a lag, meaning that changes in interest rates or liquidity measures may take time to affect variables like CPI, credit, or industrial production, which could explain why their immediate impacts are not detectable. Second, monetary policy decisions are influenced by a wide range of economic factors, including global conditions, fiscal policies, and market expectations, which may overshadow the specific volatility shocks. Additionally, the relationship between monetary policy and these factors is complex, with other underlying dynamics or counteracting influences potentially reducing the visibility of their direct effects. Lastly, data limitations, such as insufficient or imprecise information, could contribute to the lack of statistical significance, as incomplete data may fail to capture the full scope of the economic variables or their timing. Therefore, while these shocks theoretically influence monetary policy, the observed effects appear muted due to these contributing factors.

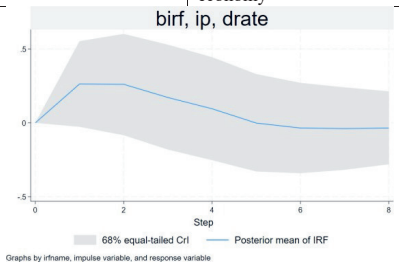
Figure 7: Impact of shocks in macroeconomy to monetary policy



(a) Impact of a shock in CPI



(b) Impact of a shock in outstanding credit to the economy

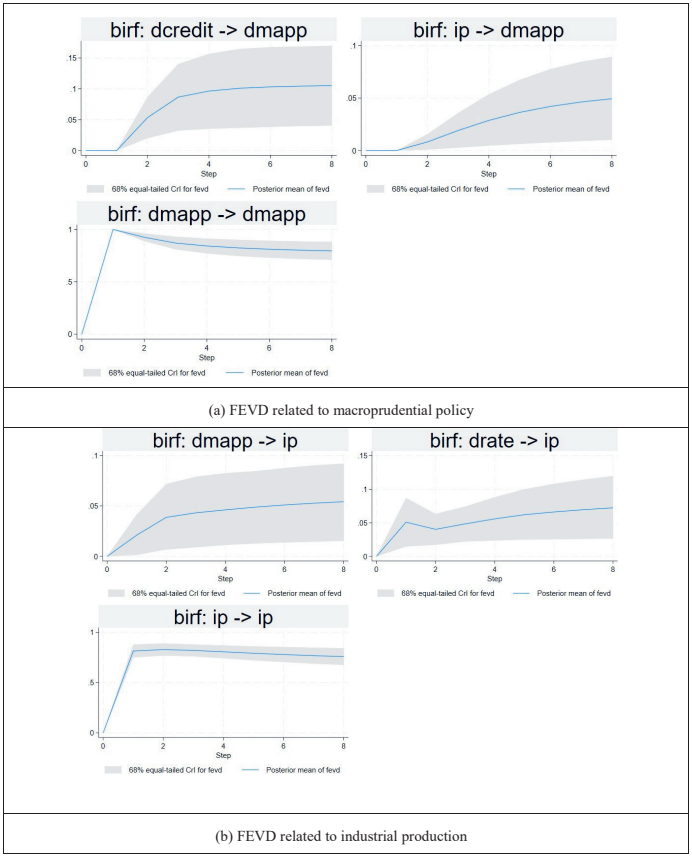


(c) Impact of a shock in industrial production

4.3.4 Forecast error variance decomposition

FEVD decomposes forecast error variance by shocks, identifying their roles in variable fluctuations and how their impacts evolve over time.

Figure 8: Forecast error variance decomposition



(a) FEVD related to macroprudential policy

(b) FEVD related to industrial production

Figure 8 (a) shows that macroprudential policy volatility initially stems almost entirely from internal shocks, reflecting its endogenous nature with minimal external influence. Over time, credit's impact rises to 10%, while industrial production reaches 5%. By periods 8–10, fluctuations stabilise. Early dominance of internal shocks underscores the policy's systemic risk focus, while external factors gain influence as the framework matures, aligning with long-term stability goals.

Figure 8 (b) shows that industrial production volatility is initially driven 80% by internal shocks like production capacity, supply chain disruptions, and consumer demand shifts. Macroprudential policy plays a minor role, stabilising at 5% after two periods, mainly through financial channels. Monetary policy, contributing 6%, reflects economic sensitivity and delayed

effects on borrowing and investment. By periods 8–10, volatility stabilises as internal shocks fade and policy measures gain influence, highlighting the economy's shift from short-term internal fluctuations to greater policy-driven stability.

Figure 8 (c) shows that consumer price volatility is initially driven 90% by internal shocks, mainly production costs and demand. Macroprudential policy's influence rises in the first six periods, stabilising at 4%, indicating a modest but consistent impact. By periods 8–10, equilibrium is reached as the economy adjusts. Consumer prices, shaped by raw material costs, wages, and demand shifts, are primarily influenced by internal factors in the short term. Macroprudential policy, affecting credit and financial costs, acts as a stabiliser rather than a key volatility driver, emphasising systemic risk mitigation over direct price control.

Across all three charts, the data reveals a common theme: the economy stabilises over time as internal shocks dissipate and external factors, including macroprudential and monetary policies, gradually play larger roles. This emphasises the critical importance of maintaining stable, long-term policies to minimise economic fluctuations.

5. Conclusion and Future Directions

This study examines the interaction between macroprudential policy, monetary policy, and macroeconomic variables in Vietnam from 2012 to 2021. Macroprudential policy significantly affects macroeconomic variables, particularly CPI, and its short-term shocks suggest that tightening can help stabilise inflation. Additionally, it impacts industrial production, similar to monetary policy but in the opposite direction. As a regulatory tool ensuring financial stability, macroprudential policy mitigates crises, maintains credit flow, and safeguards economic stability. When credit shocks occur, macroprudential policy responds clearly, while monetary policy shows little reaction. Macroprudential tightening (e.g., credit restrictions, higher capital requirements, lower LTV ratios) limits lending, reduces investment and potentially slows industrial production. However, its impact is smaller since it mainly targets financial stability rather than directly influencing borrowing costs. In contrast, monetary easing lowers borrowing costs, boosting credit and industrial production. When both policies operate in opposite directions, their effects on industrial output may offset each other. This suggests that

inflation control need not hinder industrial production if macroprudential and monetary policies are well-coordinated. Macroprudential policy can address credit and industrial production shocks, allowing financial stability without excessive interest rate intervention.

Given its significant macroeconomic impact, macroprudential policy must be applied carefully to avoid unintended consequences. Its interaction with monetary policy varies by context, meaning their relationship is not fixed. Limited coordination between the two suggests they are not substitutes, highlighting the need for a more integrated policy framework to ensure consistency and prevent conflicts. Comparative analysis reinforces that policy impacts depend on each country's economic context, emphasising the need for flexible, precise, and well-calibrated implementation.

We acknowledge several limitations in this study. First, data constraints limited the analysis to a short time frame. Second, the study used a composite macroprudential policy index, without evaluating the effects of individual policy measures. Third, crisis factors (e.g., economic crises and COVID-19) were not explicitly considered in the interaction between macroprudential policy, monetary policy, and the macroeconomy. These limitations highlight research gaps for further exploration. Future studies could extend the analysis over a longer period in Vietnam, use individual macroprudential indicators, and incorporate crisis factors' impact on the policy-macro economy interactions.

Credit author statement

Le Dinh Hac, **Vuong Thi Huong Giang**: Conceptualisation. **Le Dinh Hac**, **Vuong Thi Huong Giang**: Design of methodology. **Nguyen Kim Thai Ngoc**: Data collection/ curation. **Nguyen Kim Thai Ngoc**: Formal analysis. Nguyen Kim Thai Ngoc: Writing - Original draft preparation and editing.

Acknowledgements

This paper is part of the doctoral thesis by Nguyen Kim Thai Ngoc at Ho Chi Minh University of Banking, under the supervision of Prof. Le Dinh Hac and Dr. Vuong Thi Huong Giang.

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