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Nonbank finance and monetary policy transmission in Asia

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NONBANK FINANCE AND MONETARY POLICY TRANSMISSION IN ASIA

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and Ulrich Volz

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Abstract

Focusing on Asian economies over the period 2006 to 2019, we find that while nonbank finance appears to complement rather than substitute credit provision by the traditional banking sector, weaker regulatory quality is an important driving factor. Moreover, while we find that central bank policy rates countercyclically affect credit provision by nonbanks, impulse responses to monetary policy shocks with and without nonbank finance indicate that the effectiveness of monetary policy as a transmission channel to GDP growth, inflation, house prices, and traditional bank credit is weakened in the presence of nonbank finance. Our paper has implications for monetary policy implementation, potentially incorporating nonbanks into central bank operations and liquidity provision, as well as for financial supervisors in mitigating regulatory arbitrage.

Keywords: nonbank finance, fintech, monetary policy, Asia

JEL Classification: E5, E44, G20

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1. INTRODUCTION

“Today’s central banks typically affect asset prices through primary dealers, or big banks, to which they provide liquidity at fixed prices—so-called open-market operations. But if these banks were to become less relevant in the new financial world, and demand for central bank balances were to diminish, could monetary policy transmission remain effective?” – Christine Lagarde (2018: 6)

This paper examines the impact of credit provision by nonbanks in Asia (including fintech and big tech credit) on the transmission of monetary policy over the period 2006 to 2019. A panel structural VAR (PSVAR) approach is used to generate impulse responses of key macroeconomic and financial variables—GDP growth, inflation, house prices, private credit to GDP—to monetary policy shocks in empirical models without and with nonbank finance to gauge the effect of nonbank finance on the monetary policy transmission mechanism. A stronger response of policy target variables in the former set of models to monetary policy shocks would imply that nonbank finance weakens the effectiveness of monetary policy transmission. There is no consensus in the literature on the role of nonbank finance for monetary policy, either theoretically or empirically, with much of the empirical work focusing on the United States. This paper contributes to the empirical literature using a novel approach, with a focus on Asian economies, that enables a counterfactual analysis to be undertaken. The paper has implications for monetary policymakers in understanding the role of nonbank finance in monetary policy effectiveness. This is particularly important given the rapid growth of alternative forms of credit in the nonbank sector over the past decade. There are also implications for financial stability and regulatory policy, as central banks seek to find the right balance in the monetary policy framework that both maximizes the benefits of nonbank finance for monetary policy transmission and also minimizes the risks.

Overall, this paper finds that while monetary policy has a statistically significant countercyclical effect on credit provision by nonbanks in Asia, nonbank finance weakens the monetary policy transmission to GDP growth, inflation, house prices, and traditional bank credit. Our results may reflect frictions in the bank lending channel of monetary policy due to competitive pressures from nonbanks. Our baseline results are robust to alternative estimation specifications and sub-samples of nonbank credit.

The research question in this paper is motivated due to the increased importance of nonbanks in credit provision in Asia in recent years which has stimulated debate about whether it enhances or worsens monetary policy transmission (e.g., Mohanty and Rishabh 2016). Related to this, the development of digital finance or fintech has continued strongly over the past decade or so, particularly in Asia, with implications for the transmission of monetary policy. From a theoretical perspective, with enhanced access to the financial system due to digitalization, via savings and credit channels, households and firms can smoothen consumption over time (e.g., Mehrotra and Yetman 2014), which is particularly important in the face of a negative output shock. This implies that the central bank could affect intertemporal consumption decisions of a larger proportion of the economy, thereby improving the effectiveness of monetary policy transmission, i.e., nonbank credit provision via fintech may improve the transmission of monetary policy through reducing financial frictions. There is also a counter theoretical argument whereby the monetary policy transmission mechanism may be disrupted via regulatory arbitrage, with policy tightening by the central bank potentially leading to a loosening of credit conditions via the nonbank sector (e.g.,

Buchak et al. 2018). In addition, as credit intermediation by nonbanks would rise, this would have implications for the information content of monetary aggregates that form the basis of monetary policy formulation, and more broadly for how the economy responds to monetary policy (e.g., Bernoth, Gebauer, and Schäfer 2017).

Against this background, focusing on Asian economies over the period 2006 to 2019, this paper aims to empirically test the effect of nonbank finance and fintech credit developments on the effectiveness of monetary policy in the region. The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 presents the data and empirical methodology. Section 4 presents the empirical results. Section 5 concludes.

2. RELATED LITERATURE

This paper contributes to the growing literature on the implications of nonbank finance and fintech for the macroeconomic management of the economy through its effect on the monetary policy transmission mechanism. Early work by Cecchetti (2002) noted that macroeconomic management becomes more complex in an environment of fintech given shifting trend productivity and difficulties in estimating potential output. The shift in financial intermediation away from traditional banks has implications for the transmission of traditional monetary policy, as large technology firms increasingly engage in the provision of financial services (Bernoth, Gebauer, and Schäfer 2017; Navaretti et al. 2017; Mancini-Griffoli et al. 2018; Wong and Eng 2020; Hasan, Kwak, and Li 2021). In addition, the involvement of so-called “nonbanks” in liquidity transformation and leveraged lending creates financial vulnerabilities at the systemic level, and opportunities for regulatory arbitrage (Bank for International Settlements 2019). These vulnerabilities are amplified given the interconnectedness of nonbanks with the traditional banking sector.

There is limited empirical research on the implications of fintech and the involvement of nonbanks in lending for the effective transmission of monetary policy, and in particular how the traditional channels of monetary policy may be disrupted. One of the channels that may be affected by an increasing involvement of nonbanks is the balance sheet channel, which is based on the premise that interest rate changes will affect the balance sheets of firms, thereby affecting the lending behavior of credit providers. Where there is a high or growing proportion of nonbanks relative to traditional banks, the traditional balance sheet channel may be impaired as traditional banks compete with nonbanks and therefore will have a greater incentive to insulate borrowers from monetary policy shocks (e.g., Bolton et al. 2016). Nonbanks may also have implications for the bank lending channel of monetary policy. Monetary policy easing could facilitate higher leveraging of nonbanks compared to traditional banks given that the latter may be constrained by prudential regulation. Capital requirements could also lead to a delayed response of traditional banks to interest rate changes (Van den Heuvel 2002). Therefore, nonbanks could facilitate an amplified transmission of monetary policy in the presence of regulatory constraints on the traditional banking sector. There is no clarity, however, on the extent of the effect of nonbanks on the bank lending channel of monetary policy, given the substantial differences in elasticities across nonbanks to monetary policy shifts due to wide heterogeneity in firm size and access to capital markets, as well as variations in risk-taking preferences (IMF 2016). Some other empirical literature indicates that higher financial inclusion is associated with stronger monetary policy transmission to output in emerging Asia (e.g., Mehrotra and Nadhanael 2016).

On risk preferences, competition from the traditional banking sector for deposits and funding may lead to excessive risk-taking. Therefore, while the ongoing diffusion of digital finance into financial intermediation activity can spur economic activity and promote financial inclusion, there may be scope for rising financial fragility and systemic risk. The monetary policy risk-taking channel may thus be amplified due to an increasing presence of nonbanks in the market as a result of differences in their business structures and operations compared to traditional banks, including through a higher reliance on short-term wholesale funding (Adrian and Shin 2011). The effectiveness of monetary policy can also be enhanced where fintech increases the sensitivity of asset prices to interest rate changes (e.g., Mylonas et al. 2000).

Overall, there is a lack of consensus in the empirical literature on the extent and direction of the effect of nonbanks on monetary policy transmission. The development of fintech and big tech credit over the past decade may improve the transmission of monetary policy via the reduction of financial frictions and enhancing financial inclusion (e.g., Rajan 2006). There is also an argument whereby the monetary policy transmission mechanism may be disrupted via regulatory arbitrage, with policy tightening by the central bank leading to a loosening of credit conditions via the nonbank sector (e.g., Buchak et al. 2018; Hasan, Kwak, and Li 2021). In addition, as credit intermediation by nonbanks would rise, this would have implications for the information content of monetary aggregates that form the basis of monetary policy formulation, and more broadly for how the economy responds to monetary policy. The lack of consensus in the literature on the overall effect of fintech on monetary policy transmission is related to differences in studies on how to measure nonbanks, differences in time periods and methodologies, and differences across economies. Many US-based studies find that the balance sheet and bank lending channels of monetary policy are dampened due to fintech and nonbank lending, i.e., the effect of monetary policy shocks has the expected response in the traditional banking sector, but nonbanks nullify this effect. For example, a monetary policy tightening may lead to constrained lending by traditional banks, with nonbanks being less responsive to such shocks (Altunbas, Gambacorta, and Marques-Ibanez 2009). There lacks a clear consensus, however, with other studies finding that the bank lending channel seems to be amplified due to nonbanks, where nonbank responses to monetary policy shocks are found to be greater in magnitude than those of traditional banks (IMF 2016). Using data on regional-level adoption of fintech in the People's Republic of China (PRC), Hasan, Kwak, and Li (2021) find that fintech adoption mitigates monetary policy transmission to real GDP, consumer prices, and housing prices in the short term, and the growth of bank loans in the longer term, effects they attribute to regulatory arbitrage and competition between fintech and banks. Building on previous studies, with a focus on Asia, our paper uses a panel structural VAR approach to generate impulse responses of macroeconomic and financial variables to monetary policy shocks with and without nonbank finance, enabling a counterfactual assessment.

Some other previous work shows that fintech has a negative influence on the transmission mechanism of monetary policy, based on the premise that fintech encourages savings and investment outside traditional banking channels (Mumtaz and Smith 2020; Agarwal and Zhang 2020). In addition, digital finance in the form of currency has implications for monetary policy, although there remain some uncertainties on whether digital currency complements or substitutes the prevailing monetary system (Brunnermeier, James, and Landau 2019). The emergence of private, decentralized cryptocurrencies erodes the ability of central banks to affect the money supply, thus negatively affecting monetary policy effectiveness (Fernández-Villaverde and Sanches 2019). This has led to discussions by central banks globally on whether they should issue their own digital currency (BIS 2018). While the scale

of private cryptocurrencies is at the moment not at a level that would detrimentally affect macroeconomic stability and the conduct of monetary policy, there still remain questions as to how a central bank digital currency would affect traditional bank operations (particularly in times of financial crisis). That said, some academic research indicates that a central bank digital currency would enhance the effectiveness of monetary policy to the extent that these currencies bear interest (Bordo and Levin 2017).

Our paper is also related to the wider literature that considers the effect of nonbanks and fintech on financial stability, the other core mandate of the central bank. In particular, challenges faced by policymakers in the regulation of nontraditional credit providers mean that it may complicate the central bank's mandate on safeguarding financial stability (Philippon 2017). However, as with the case of monetary policy, there is no consensus in the empirical literature on whether fintech enhances or worsens financial stability (Fung et al. 2020). Kirilenko and Lo (2013) find that financial stability risks may rise due to fintech as represented by algorithmic trading strategies that can exacerbate stock market contagion in crisis times. Other papers have pointed to the vulnerability of the peer-to-peer lending market where lenders are unable to appropriately price the risk of borrower default, thereby worsening the financial stability outlook (e.g., Mild, Waitz, and Wockl 2015). There also exists a range of studies that stress the benefits for financial stability due to fintech as a result of the greater efficiency of financial transactions and the diversification and risk-sharing features that it affords the financial system as a whole, as well as information transparency (e.g., Kosmidou et al. 2017). Other related literature includes work on the implications of fintech and digital technological advancement in the financial sector for the structure of the financial system as a whole, such as studies on the effect of blockchain technology on central bank payment and clearing operations, which also have knock-on effects on the effective transmission of traditional monetary policy (e.g., Raskin and Yermack 2016).

3. DATA AND METHODOLOGY

For nonbank finance, data is attained for the period 2006Q1 to 2019Q4 for seven Asian economies (the PRC; Hong Kong, China; India; Indonesia; Japan; the Republic of Korea; Singapore). For fintech/big tech, data is available for 2013Q1 to 2019Q4 across ten Asian economies (the PRC; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam). The first stage examines the determinants of nonbank finance and fintech credit, based on a set of banking sector variables, domestic fundamentals, and global factors. Drawing on the literature that examines the determinants of fintech credit, the banking sector variables include banking credit/GDP, the return on equity (ROE) of banks, and the Z-score of banks; domestic controls include GDP growth, GDP per capita, inflation rate, interest rate, house prices, regulatory quality, and risk indicators denoted by the VIX and a domestic financial stress index. These variables have been collected from Bloomberg, the BIS, the FSB, the IMF International Financial Statistics, and the World Bank. With regard to the fintech/big tech credit (relative to GDP), the data are taken from a new data set constructed by Cornelli et al. (2020), whereby fintech credit is defined as credit activity facilitated by electronic platforms that are not operated by commercial banks.

Details of the definition of the data, including sources, are shown in the Appendix.¹ More specifically, the following baseline equation is estimated:

$$y_{i,t} = \beta_1 x_{i,t-1} + \gamma_1 z_{i,t-1} + \chi_1 VIX_{t-1} + \delta_{1i} + \lambda_{1t} + \varepsilon_{1i,t} \quad i=1, \dots, N, \quad t=1, \dots, T \quad (1)$$

where $y_{i,t}$ represents nonbank finance, the narrow measure of nonbank financial intermediate lending, or fintech/big tech credit/GDP; $x_{i,t}$ represents a vector of banking sector-specific variables, including the banking credit/GDP, ROE of banks, and the z-score of banks; $z_{i,t}$ represents a set of domestic fundamentals; VIX is the Chicago Board Options Exchange (CBOE) Volatility Index, a measure of global risk aversion; δ_{1i} are country-specific fixed effects; λ_{1t} represents time fixed effects, a control for global shocks; and $\varepsilon_{i,t}$ is the error term. The variables are lagged by one period to mitigate against endogeneity concerns.

Second, a panel structural vector autoregressive (PSVAR) model is used to examine (i) the response of nonbank sector credit provision to monetary policy shocks, and (ii) the response of GDP growth, inflation, house prices, and bank credit/GDP to shocks imposed on monetary policy where nonbank finance is an active market player compared to when it is excluded (i.e., switched off in the VAR). The PSVAR is implemented in a setup across the same economies as in the fixed-effects panel analysis. The PSVAR can be denoted as follows in its general specification, with structural shocks identified by a recursive restriction:

$$A(L)X_{i,t} = \mu_{i,t} \quad (2)$$

where $A(L)$ is the matrix of the lag polynomial; X_t refers to the demeaned value of endogenous variables of country i to accommodate country-specific fixed effects; and μ_t is a vector of structural disturbances. Crucially, monetary policy shocks are identified by assuming a Taylor-type rule for the monetary authority. Our identification strategy is based on a block recursive restriction (Christiano et al. 1999), which results in the following matrix A to fit a just-identified model:

$$A = \begin{bmatrix} a_{1,1} & 0 & \dots & 0 \\ a_{2,1} & \ddots & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ a_{n1,1} & \dots & a_{n1,n-1} & a_{n,n} \end{bmatrix} \quad (3)$$

The ordering of the variables imposed in the recursive form implies that the variables at the top (such as $a_{1,1}$) will not be affected by contemporaneous shocks to the lower variables (such as $a_{2,1}$, $a_{n,1}$), while the lower variables will be affected by contemporaneous shocks to the upper variables. Usually, it is preferable for slower-moving variables to be ordered before fast-moving variables (Bruno and Shin 2015). It follows, therefore, that we place the growth rate of GDP and inflation rate before the interest rate, reflecting a long-standing view that many macroeconomic variables are not affected instantaneously by monetary policy shocks (Christiano, Eichenbaum, and Evans 1999). Following the interest rate, we place house prices and banking sector variable—the bank credit to GDP ratio—in the ordering, which implies that these variables will only be affected by contemporaneous shocks to

¹ In terms of preliminary analysis (shown in Table A2 in the Appendix), the fixed-effects model is justified on the basis of results from a Hausman test. We use the quadratic interpolation procedure to convert the time series into a quarterly frequency. The interpolated variables include: fintech and big tech credit/GDP, ROE of banks, and the z-score of banks.

macroeconomic fundamentals and monetary policy. We place the nonbank credit variable in last place in the ordering, which is not only based on the assumption that macroeconomic, monetary policy, and banking variables will affect the development of nonbank finance, but also on the consideration of our first-stage empirical results that imply that these factors are driving nonbank finance. The lag selection of the panel SVAR model is based on the Akaike information criterion (AIC), which suggests that our model should have two lags.

4. EMPIRICAL RESULTS

Table 1 outlines the determinants of nonbank finance and fintech/big tech credit. In terms of monetary policy effectiveness, we find a negative and significant relationship between nonbank finance and the interest rate, indicating that the conduct of monetary policy is effective and countercyclical in nature. For fintech/big tech credit, however, we find no significant effect of the interest rate, indicating some friction in the transmission of monetary policy. Columns 1 and 2 report the results of our basic equation specification that examines the determinants of nonbank finance and fintech/big tech credit. The results show that the development of nonbank finance and fintech/big tech credit is significantly affected by domestic traditional banking sector credit, GDP per capita, house prices, and global risk aversion.

We find that a higher level of GDP per capita leads to an increase in nonbank and fintech/big tech credit, indicating the importance of economic development as well as technological progress. On metrics from the traditional banking sector, overall, we find a positive relationship with nonbank finance and fintech/big tech credit.² This indicates that the nonbank sector may act as a complement to, rather than substitute for, the traditional banking sector. This is in alignment with the well-documented “credit rationing” to the private sector in EMEs compared to advanced economies, with domestic banks in EMEs historically more risk-averse to lending to the private sector. Nonbank finance and alternative credit may help to fill that gap in EMEs. Interestingly, we find that a booming asset market (i.e., the housing market) negatively affects the nonbank finance and fintech/big tech credit, perhaps related to consumer preferences for lending by more traditional sources in the case of housing and mortgage loans. On risk, we find that nonbank finance (and fintech/big tech credit) is significantly affected by the level of global risk aversion. Higher risk in the global financial system leads to an increase in nonbank finance, suggesting regulatory arbitrage may be at play. To add further weight to the regulatory arbitrage narrative, we find that lower regulatory quality boosts both nonbank finance-based lending and fintech/big tech lending. Lastly, we also find that financial soundness negatively affects the development of nonbank finance.

In an alternative specification, we also examine more closely the role of central bank independence on nonbank finance in Asia as well as interactions of regulatory quality with the domestic banking sector variables.³ Central bank independence (CBI) is an important factor that can influence the development of nonbank finance. Using the Central Bank Transparency Index of Dincer and Eichengreen (2014) as a proxy CBI indicator, we find that a higher level of CBI leads to an increase in nonbank finance in Asia. This is in alignment with the finding that CBI may incentivize a government authority to deregulate the financial market (Kern, Negre, and Aklin 2021). In regard to

² The data of banks' ROE and z-score from the World Bank are only updated to 2017, and therefore are not available over the whole sample period.

³ Additional specification of the empirical results is provided in Table A3 in the Appendix.

the potential effect of CBI on the effectiveness of monetary policy, we examine this by including an interaction term that gauges the role of CBI in interest rate transmission. We find that the negative effect of the interest rate on nonbank finance becomes stronger if the level of CBI is higher, which is in line with the related literature on CBI and monetary policy effectiveness. We also interact regulatory quality with the domestic banking sector variables to examine the role of regulatory quality in the effect of the traditional banking sector's development on nonbank finance. Our estimates indicate that a higher level of regulatory quality significantly dampens the positive relationship between the traditional banking sector and nonbank finance.

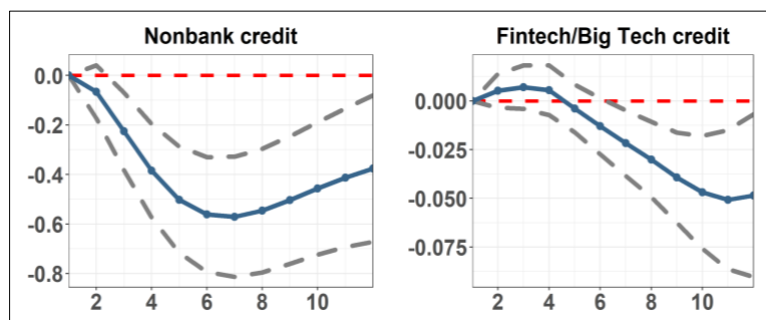
**Table 1: Determinants of Nonbank Finance and Fintech/Big Tech Credit:
Panel Estimates**

	(1) Nonbank Finance	(2) Fintech/Big Tech Credit
Domestic banking sector factors		
Bank credit (% GDP)	0.301*** (0.0268)	0.0261*** (0.00411)
Bank ROE (%)	2.692*** (0.290)	0.0650** (0.0257)
Bank z-score (log)	0.345*** (0.102)	0.283*** (0.102)
Domestic macroeconomic and institutional factors		
Real GDP growth (%)	-0.141 (0.179)	-0.0417* (0.0244)
GDP per capita (log)	41.74*** (8.303)	9.160*** (1.294)
Inflation rate (%)	0.0256 (0.204)	0.0677** (0.0268)
Interest rate (%)	-0.756** (0.320)	-0.0314 (0.0442)
House prices (log)	-22.67*** (3.412)	-2.165*** (0.595)
Regulatory quality (index)	-46.92*** (3.934)	-0.565 (0.517)
Financial soundness (log)	-16.28*** (5.700)	0.279 (0.660)
Global factors		
VIX (log)	62.3** (27.9)	4.252*** (0.727)
Constant	-236.1*** (84.55)	-75.14*** (12.21)
Observations	278	208
R-squared	0.791	0.528
Number of economies	7	10
Time Effects	Yes	Yes
Country Fixed Effects	Yes	Yes

Note: Standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

The regression analysis helps to provide empirical insights into the main macroeconomic and financial factors that drive nonbank finance, including a separate analysis for fintech/big tech credit. Importantly, we find a significant relationship between nonbank finance and the interest rate, demonstrating a role for monetary policy on nonbanks. To probe this relationship further, turning to the impulse response analysis, we first estimate the response of credit provision by nonbanks and fintech providers to a monetary policy shock, as shown in Figure 1 below.

Figure 1: Impulse Responses to Monetary Policy Shocks on Credit Provision by Nonbanks



Note: Median responses with 95% confidence bands in dashed lines are reported. The size of the tightening monetary policy shock is 25 basis points, and the unit of the horizon axes refers to time in quarters.

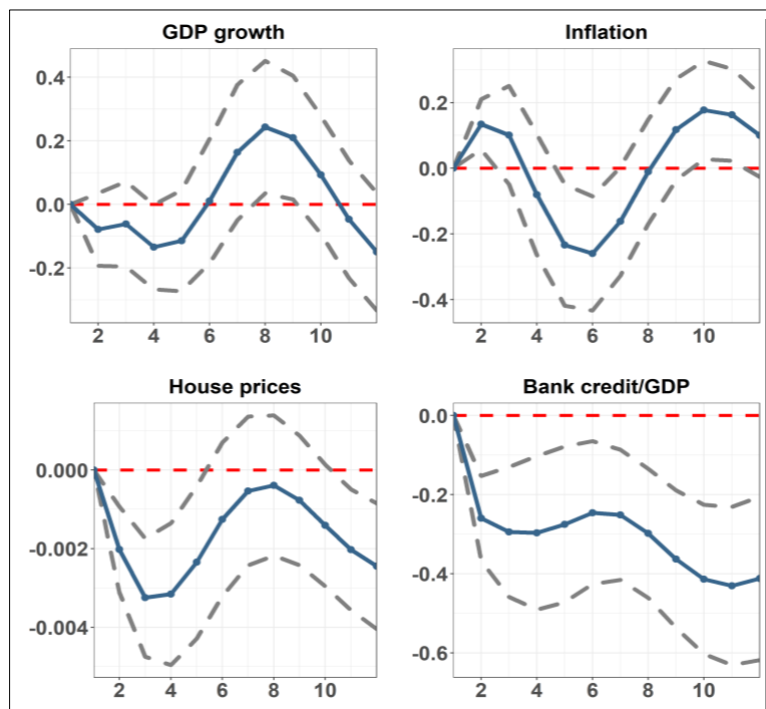
As can be seen in Figure 1, the response of nonbank credit to a tightening of monetary policy is statistically significant and negative, in line with intuition. The significance of the reaction of nonbank finance is consistent with the earlier panel regression estimates, also affirming the countercyclicality of monetary policy. The response of fintech and big tech is also as expected, although its effect becomes significant only after some delay.

Figures 2 and 3 delve further into the role of nonbank finance in monetary policy transmission, presenting the impulse responses of key monetary policy target variables to a tightening monetary policy shock, based on our estimated PSVAR model.⁴ Figure 2 presents the results for a monetary policy transmission where nonbank finance is activated in the system, while in Figure 3, nonbank finance is excluded. The monetary policy shock is defined as a 25 basis points (bp) increase in the policy rate. The dashed lines in the figure report 95% confidence intervals.

From Figure 2, we find that the negative response of inflation becomes statistically significant only after five quarters, and the effects are time-varying, while the response of GDP growth is not significant. For bank credit, this declines sharply on impact, and exhibits persistence and statistical significance over the full horizon due to the monetary policy tightening shock, with a peak effect of 0.42 percentage points. In addition, house prices respond downward and significantly, at least in the short run. In order to examine the comparative effect of nonbank finance on monetary policy transmission to key target variables, we also compute the monetary policy shocks where nonbank finance is excluded from the PSVAR, as shown in Figure 3.

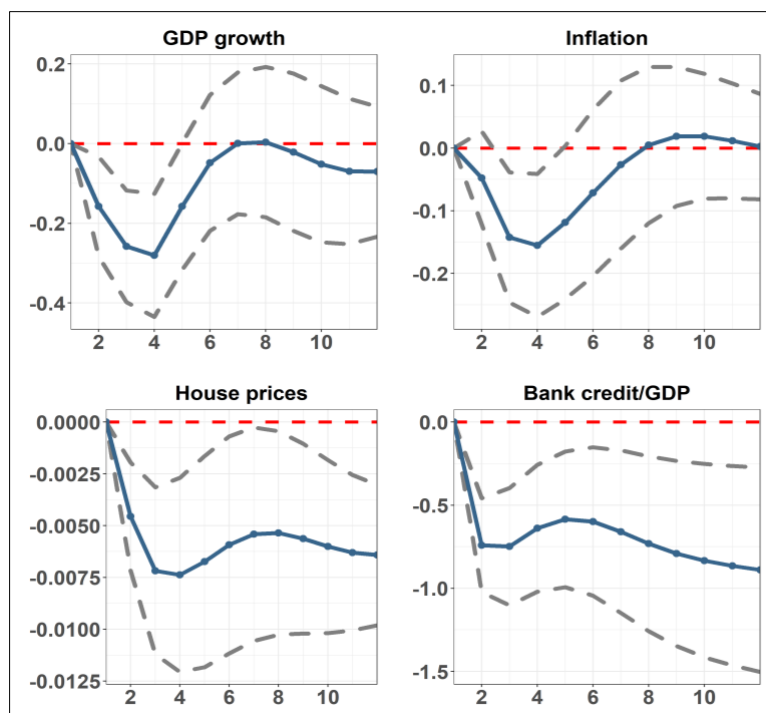
⁴ For robustness, we also computed impulse responses based on PSVAR systems with and without fintech/big tech credit, the results of which are consistent with our baseline.

**Figure 2: Impulse Responses to Monetary Policy Shocks:
With Nonbank Finance**



Note: Median responses with 95% confidence bands in dashed lines are reported. The size of the tightening monetary policy shock is 25 basis points, and the unit of the horizon axes refers to time in quarters.

**Figure 3: Impulse Responses to Monetary Policy Shocks:
Without Nonbank Finance**



Note: Median responses with 95% confidence bands in dashed lines are reported. The size of the tightening monetary policy shock is 25 basis points, and the unit of the horizon axes refers to time in quarters.

Figure 3 shows that, in the absence of nonbank finance, GDP growth contracts significantly due to a monetary policy tightening, with a peak effect of 0.25 percentage points after four quarters. The transmission to GDP growth is therefore more effective than in the case with nonbank finance where no significant effect was found. In the model without nonbank finance, we also find that the response of inflation is less ambiguous than in the model with nonbank finance, with monetary policy transmission demonstrating its expected effect. In particular, a 25 basis point rise in policy rate is associated with a drop in inflation of around 0.15 percentage points at the peak after four quarters. Moreover, house prices display a persistent negative decline after the tightening of monetary policy, which is in line with the previous literature that emphasizes the role of monetary policy in cooling down housing booms in support of financial stability (Williams 2016). The reaction of house prices is also more persistent and statistically significant where nonbank finance is switched off. In addition, the magnitude of the transmission to bank credit is twice as large and more persistent in the scenario without nonbank finance, with a peak effect of 0.85 percentage points. The evidence from the empirical work suggests therefore that the presence of nonbank finance in the financial system detrimentally affects the transmission of monetary policy.

While some of the prevailing literature finds that nonbank finance, and in particular fintech credit, as well as the availability of financial services by fintech providers, can strengthen monetary policy transmission (Bolton et al. 2016; Buchak et al. 2018), we find the opposite. This may be related to disturbances to the bank lending channel of monetary policy caused by competition from nonbanks. Closing the regulation gap between banks and nonbanks may help to improve the overall effectiveness of monetary policy.

5. CONCLUSIONS

This paper empirically examines the effect of nonbank finance on the effectiveness of monetary policy transmission in Asian economies. Overall, we find that while nonbank finance appears to complement rather than substitute credit provision by the traditional banking sector, weaker regulatory quality is an important driving factor. Moreover, we find a negative relationship between central bank policy rates and nonbank finance, which affirms the countercyclicality of monetary policy. In addition, we find that the effectiveness of monetary policy as a transmission channel to GDP growth, inflation, house prices, and traditional bank credit is shown to be weaker in the presence of nonbank finance providers.

Our paper has implications for monetary policy implementation, potentially incorporating nonbanks into central bank operations and liquidity provision, as well as for financial supervisors in mitigating regulatory arbitrage through financial regulation reform. Policy makers need to ensure that nonbank finance is adequately taken on board in monetary policy decision making, recognizing that a substantial share of credit intermediation is accounted for outside of the traditional banking sector. Excessive risk-taking by nonbanks could lead to systemic risk vulnerabilities in economic downturns, with nonbanks facing potential loss absorption difficulties, thereby further impairing effective monetary policy transmission. Research going forward is warranted on the balance sheet composition of nonbanks and the related channels through which nonbank finance transmits to the macroeconomy at different stages of the business cycle.

APPENDIX

Table A1: Overview of Variables Used in the Empirical Analysis

Variable	Data Source	Definition
Fintech credit and Big tech/GDP	Cornelliet al. (2020)	The fintech and big tech credit to GDP ratio
Nonbank finance	Financial Stability Board	The narrow measure of nonbank financial intermediate lending
Real GDP growth	IMF	The real GDP growth rate
GDP per capita	IMF	The real GDP per capita
House prices	BIS	The real residential property price index
Inflation rate	Bloomberg	Year-over-year consumer price index
Interest rate	BIS and IMF	The short-term interest rate
VIX	Bloomberg	The Chicago Board Options Exchange (CBOE) Volatility Index, a measure of global risk aversion
Bank credit/GDP	BIS	The ratio of bank credit to GDP
Bank's ROE	World Bank	Commercial banks' after-tax net income to yearly averaged equity
Bank's z-score	World Bank	It captures the probability of default of a country's commercial banking system
Regulatory quality index	World Bank	Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development
Financial Soundness Indicator	IMF	The FSI is measured by the bank regulatory capital to risk-weighted assets ratio
Central bank independence	Dincer and Eichengreen (2014)	The central bank transparency index as a proxy for the level of central bank independence

Table A2: Preliminary Analysis

Hausman Test

Test Statistics	P-value
$\chi^2 = 198.39$	0.000

Table A3: Determinants of Nonbank Finance and Fintech/Big Tech Credit: Alternative Specifications

	(1) Nonbank Finance	(2) Nonbank Finance	(3) Fintech/Big Tech Credit	(4) Fintech/Big Tech Credit
Banking sector				
Bank credit (% GDP)	0.336*** (0.026)	0.631*** (0.045)	0.031*** (0.004)	0.072*** (0.006)
Bank ROE (%)	2.648*** (0.270)	2.406*** (0.427)	-0.00840 (0.024)	-0.0510 (0.035)
Banks z-score (log)	0.306 (0.841)	0.910 (0.899)	-0.059 (0.09)	-0.165* (0.090)
Domestic factors				
Real GDP growth (%)	-0.073 (0.167)	0.010 (0.145)	-0.042* (0.022)	0.013 (0.019)
GDP per capita (log)	46.58*** (7.781)	3.586 (9.929)	13.03*** (1.226)	4.894*** (1.529)
Inflation rate (%)	0.120 (0.191)	-0.125 (0.166)	0.061** (0.025)	0.019 (0.023)
Interest rate (%)	-0.848*** (0.299)	-2.974*** (0.941)	-0.128*** (0.044)	0.019 (0.125)
House prices (log)	-24.00*** (3.189)	2.403 (3.934)	-2.880*** (0.538)	-1.736*** (0.521)
Regulatory quality (index)	-42.59*** (3.734)	-15.90** (7.768)	0.491 (0.479)	-3.397*** (0.831)
FSI (log)	-15.79*** (5.315)	-33.97*** (5.017)	0.060 (0.611)	0.594 (0.554)
Central bank independence (index)	6.646*** (1.074)	5.936*** (1.014)	-0.591** (0.249)	-0.097 (0.238)
Global factors				
VIX (log)	0.087 (1.362)	0.146 (1.170)	0.118 (0.189)	-0.072 (0.165)
Interaction terms				
Central bank independence * Interest rate		-0.419*** (0.103)		-0.018 (0.015)
Regulatory quality * Bank credit		-0.229*** (0.028)		-0.025*** (0.003)
Regulatory quality * Bank ROE		0.397 (0.347)		0.068* (0.037)
Regulatory quality * Bank z-score		-3.603*** (1.152)		-0.230** (0.105)
Constant	-329.0*** (80.25)	-51.62 (92.79)	-103.5*** (11.50)	-44.41*** (12.79)
Observations	278	278	187	187
R-squared	0.819	0.869	0.682	0.775
Number of economies	7	7	9	9
Time effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Standard errors in parentheses.

*** p < 0.01, ** p < 0.05, * p < 0.1.

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