Monetary Policy Uncertainty, Market Structure and Bank Risk-taking: Evidence from China

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Abstract

We identify the impact of monetary policy uncertainty (MPU) on bank risk-taking by exploiting the regional heterogeneity of bank market structure in China. Our findings show that a bank facing more competition will take more risk following an increase in MPU, compared with a bank facing less competition, thus confirm a positive impact of MPU on bank risk-taking. In addition, we find that MPU positively affect bank risk-taking by deteriorating its profitability and balance sheet. These findings suggest that central banks can alleviate bank risks by enhancing the transparency of monetary policy.

JEL classification**:** E52, G21

Keywords**:** Monetary policy uncertainty; Market structure; Bank risk-taking; Regional heterogeneity

1. Introduction

The influence of monetary policy uncertainty (MPU) on economic activities has been an important subject of research in the aftermath of the Great Recession. An extensive literature points out that a bank's leverage and risk-taking are negatively associated with the short-term interest rates (Borio and Zhu, 2008; Dell'Ariccia et al. 2017). It is therefore a natural step forward to contemplate that MPU might have a pronounced impact on bank risk-taking, since the uncertainty of short-term rate movement constitutes a main element in MPU. While there is an emerging literature on MPU and its impacts, it primarily focuses on financial markets and non-financial firms,[1] paying much less attention to bank risk-taking.[2]

We fill this gap by identifying the relationship between bank risk-taking and MPU using the regional heterogeneity approach of Nakamura and Steinsson (2018). In particular, we exploit differential bank market structure across prefectural cities in China. Market structure, a key aspect of bank competition, is closely related to bank risk-taking (Borio and Zhu, 2008; Laeven and Levine, 2009). In addition, Drechsler et al. (2017) show that market structure is also a primary determinant of the influence on bank behavior by monetary policy. Consequently, we hypothesize that regional differences in market structure will lead to differential bank risk-taking behavior, under the same MPU shocks.

We estimate a panel regression model accordingly, with a sample of 465 Chinese commercial banks over the period of 2007-2020. The reason of choosing China as our research setting is twofold. First, China's monetary policy making is less transparent than those of advanced economies, and there is no officially pronounced policy rules existing in China. As a result, time to time there are considerable debates and

[1] See, for example, Kurov and Stan (2018), Husted et al. (2020), Lakdawala et al. (2021), and Fasani et al. (2022).

[2] Phan et al. (2021) and Wu et al. (2021) both focus on the general measure of economic policy uncertainty and its impact on bank risk-taking using cross-country data, and largely dismiss the identification issue. Ouyang et al. (2022) investigate the spillover effect on emerging markets' bank systemic risk from the US MPU.

speculations on the future trajectories of monetary policy in China, which translate into an overall high level of MPU with significant fluctuations over time. Second, while China's banking market is the largest one in the world with rich heterogeneity across regions, the entire banking sector is subject to a unified regulatory framework nationwide. As a result, it provides us with a rare opportunity to more precisely identify the impact of MPU on bank risk-taking by exploiting the cross-region heterogeneity in bank market structure. This is important, since MPU is an aggregate time series measure, which renders it very difficult to identify a causal relationship solely relying on the time variations in MPU per se.

In this study, we find that a bank located in a less concentrated market structure, hence facing more competition, will take more risk after an increase in MPU. This confirms a positive impact of MPU on bank risk-taking. The principal results still hold when additional endogeneity concerns on the measure of MPU are taken into account. Moreover, we find that a rise in MPU increases bank risk-taking by deteriorating its profitability and balance sheet.

Our paper makes two contributions to the existing literature. First, a substantial body of literature has examined the nexus between MPU and corporate performance, such as firm investment (Husted et. al, 2020), and firm risk-taking (Luo et. al, 2022), while we pay closer attention to the nexus between MPU and bank performance, especially bank risk-taking. Second, the existing literature mainly focus on the effect of level changes in monetary policy (i.e., measured by the short-term interest rate) on bank risk-taking (Borio and Zhu, 2008; Dell'Ariccia & Marquez, 2013; Dell'Ariccia et. al, 2017), and by far only a few papers investigate the relationship between MPU and bank risk-taking but do not directly address the identification issue. This paper, in contrast, presents evidence on the positive impacts of MPU upon bank risk-taking identified via regional heterogeneity in bank market structure in China, and provides further evidence on the two channels, profitability and balance sheet, through which MPU affects bank risk-taking.

The rest of paper is organized as follows. Section 2 formulates the model and examines that relationship between MPU and bank risk-taking. Section 3 investigates the channels through which MPU affects bank risk-taking. Section 4 concludes.

2. Empirical analysis

2.1. The model settings

Exploiting the regional heterogeneity in market structure across prefectural cities, we specify the following panel regression to identify the impact of MPU on bank risk-taking:

$$RISK_{ic,t} = \beta_1 + \beta_2 MPU_{t-1} + \beta_3 MPU_{t-1} \times HHI_{c,t-1} + \beta_4 HHI_{c,t-1} + \boldsymbol{X}_{i,t}^{\top}\boldsymbol{\phi} + \boldsymbol{Z}_{t}^{\top}\boldsymbol{\theta} + \alpha_i + \epsilon_{ic,t}, \quad (1)$$

where i, c, t index for bank, city and year, respectively; $RISK$ denotes bank risk-taking; MPU is an indicator of China's monetary policy uncertainty constructed by Huang and Luk (2020);[3] HHI is the city-level bank market structure measured by Herfindahl-Hirschman index in bank asset shares for city c where bank i is located; $\boldsymbol{X}$ and $\boldsymbol{Z}$ are vectors of control variables at the firm and macro levels; and α_i is bank fixed effect.[4] We also control for year fixed effect α_t below to fully absorb all macro-level variations.

2.2. Sample and data sources

We construct a panel data sample comprising 465 Chinese commercial banks over the period of 2007-2020. We exclude policy and foreign banks, and also banks with observations less than 3 year. The sample includes all state-owned banks, joint stock banks, city commercial banks, and more than 300 rural commercial banks. The assets of sample banks account for 98% of the total asset of China's banking sector.

We consider three indicators of bank risk-taking: Z-score in logarithm ($ZSCORE$), non-performing loan ratio (NPL), and provision coverage ratio (PC). Following Laeven and Levine (2009), Z-score is defined by

$$ZSCORE_{i,t} = (ROA_{i,t} + EAR_{i,t})/\sigma\big(ROA_{i,t}\big), \tag{2}$$

where ROA is the return on assets, EAR is the equity-to-asset ratio, and $\sigma(ROA)$ denotes the standard deviation of ROA. The bank-level controls include the logarithm of bank assets ($SIZE$), return on equity (ROE), operating cost to operating income ratio ($EFFI$), deposit to liability ratio (DTL), loan to deposit ratio (LTD), reserve ratio (RES), and city-level HHI.[5] Bank level data, including HHI, are obtained from the China Banking Database (CBD).[6] To control for macroeconomic conditions, we retrieve from the CSMAR database GDP growth (GDP), M2 growth ($M2$), inflation (INF), Bank Boom Index ($BOOM$) and Shanghai Composite Index (SCI), with the last two in logarithm. Following Husted et al. (2020), we also control for expectations of future economic conditions, including the one-year-ahead projected GDP growth ($EGDP$) from the World Bank, and Consumer Confidence Index (CCI) plus Investor Sentiment Index (ISI) in logarithm from the CSMAR database.

To limit the influence of outliers, we winsorize all bank-level variables at 1% and

[3] The measure is constructed using 114 mainland Chinese newspapers, by far the most comprehensive one on China's policy uncertainty, and is available at https://economicpolicyuncertaintyinchina.weebly.com.

[4] We do not include city fixed effects, since except for a few large banks operating across the entire country, most banks in our sample are small banks operating within one city. As a result, even if city fixed effects are added, they will largely be absorbed by bank fixed effects.

[5] Except for the state-owned banks and joint stock banks, most banks in China operate within the cities they headquartered. Only a handful city and rural commercial banks operate across cities or provinces, but the business shares outside the home cities are typically limited. For a state-owned or joint stock bank, we use the average of city level HHIs where the bank has branches, weighted by the ratio of the number of branches in a city to the total number of branches of the bank.

[6] CBD is a newly constructed database on China's banking sector, covering more than 1,000 banks over the past two decades. To our knowledge, the CBD is the most comprehensive micro database for banks in China, and the coverage outweighs other popular bank-level database, including Bankscope/Bankfocus, WIND and CSMAR.

99% level, excluding HHI. No macro variable is winsorized. Table 1 reports summary statistics of all variables.

Table 1. Summary statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Bank-level variables					
ZSCORE	5,425	3.217	0.572	1.230	4.468
NPL	4,905	0.020	0.014	0.001	0.094
PC	4,423	2.715	1.852	0.446	13.173
SIZE	5,682	10.379	1.607	7.612	15.889
ROE	5,433	0.127	0.061	0.001	0.319
EFFI	4,738	0.626	0.150	0.303	1.000
DTL	5,544	0.832	0.131	0.427	0.985
LTD	5,576	0.665	0.129	0.362	1.200
RES	4,395	0.187	0.068	0.068	0.474
PROFIT	4,730	0.013	0.007	0.000	0.035
MARGIN	3,265	0.026	0.011	0.002	0.059
FIN	4,172	0.041	0.091	-0.002	0.804
DEBTR	5,666	0.922	0.024	0.834	0.973
LEV	5,664	14.116	4.763	5.969	35.192
CAR	5,067	0.138	0.029	0.064	0.259
HHI	4,680	0.105	0.039	0.046	0.224
Macro-Level variables					
MPU×HHI	4,680	0.515	0.205	0.204	1.217
MPU	5,094	4.865	0.307	4.394	5.429
GDP	5,738	0.075	0.022	0.024	0.142
M2	5,738	0.131	0.043	0.083	0.266
INF	5,738	0.000	0.019	-0.062	0.040
BOOM	5,738	4.265	0.099	4.136	4.449
SCI	5,738	7.969	0.226	7.507	8.568
ISI	5,738	4.008	0.306	3.468	4.880
CCI	5,738	4.685	0.079	4.561	4.825
EGDP	5,738	7.157	2.171	1.200	11.200

2.3. Results

Table 2 reports the estimation results of eq. (1). In even columns, we additionally control for year fixed effect. As shown in columns (1) and (2), the coefficients of the interaction term are positive and significant at 1% and 5%, indicating that a higher level of market competition (less concentration) enhances the positive effect of MPU on bank risk-taking, as Z-score is an inverse indicator for bank risk-taking. Intuitively, the interest margins in general are lower for banks in a more competitive market, so that they are more vulnerable to MPU shocks which raise funding uncertainty and costs. In addition, these banks may face a dilemma on credit rationing and market shares as MPU

rises. Credit rationing could attenuate risk exposure to MPU, but doing so might undermine their market shares. When the loss of market shares has a persistent effect on the banks' businesses, they are less likely to ration loans in response to a rise in MPU. Thus, market competition is associated with a significantly stronger effect of MPU on bank risk-taking. The same logic also applies to the two alternative indicators of bank risk-taking; see columns (3)-(6).

Table 2. The impact of MPU on bank risk-taking

	(1)	(2)	(3)	(4)	(5)	(6)
	ZSCORE	ZSCORE	NPL	NPL	PC	PC
MPU×HHI	1.129***	0.738**	-0.082***	-0.062***	20.205***	17.179***
	(0.298)	(0.311)	(0.021)	(0.023)	(4.199)	(4.353)
MPU	-0.232***		0.008***		-1.764***	
	(0.035)		(0.002)		(0.402)	
HHI	-6.119***	-3.697**	0.421***	0.301**	-92.783***	-74.577***
	(1.601)	(1.684)	(0.113)	(0.121)	(21.111)	(22.253)
SIZE	-0.051*	-0.102***	0.002**	0.004***	-0.516**	-0.848***
	(0.027)	(0.030)	(0.001)	(0.001)	(0.226)	(0.268)
ROE	-1.620***	-1.522***	-0.027***	-0.031***	3.902**	4.483***
	(0.209)	(0.212)	(0.007)	(0.007)	(1.513)	(1.518)
EFFI	-0.813***	-0.787***	0.028***	0.027***	-1.516***	-1.411***
	(0.069)	(0.069)	(0.003)	(0.003)	(0.455)	(0.446)
DTL	0.696***	0.663***	0.006**	0.007***	-1.957***	-2.124***
	(0.078)	(0.076)	(0.003)	(0.003)	(0.739)	(0.743)
LTD	0.531***	0.516***	0.013***	0.015***	-3.032***	-3.200***
	(0.071)	(0.070)	(0.004)	(0.004)	(0.552)	(0.565)
RES	0.032	0.001	-0.001	0.000	0.273	0.026
	(0.131)	(0.132)	(0.009)	(0.009)	(0.874)	(0.889)
GDP	8.398***		0.035		10.675	
	(1.288)		(0.080)		(15.274)	
M2	-3.346***		0.035**		-13.780***	
	(0.284)		(0.016)		(2.370)	
INF	-0.418		-0.045***		11.270***	
	(0.268)		(0.013)		(2.642)	
BOOM	0.245**		-0.028***		5.311***	
	(0.096)		(0.005)		(0.906)	
SCI	0.241***		-0.005***		0.566*	
	(0.029)		(0.001)		(0.308)	
ISI	-0.114***		0.000		-0.112	
	(0.025)		(0.001)		(0.254)	
CCI	-1.113***		0.017**		-1.883*	
	(0.147)		(0.007)		(1.134)	
EGDP	-0.064***		0.001*		-0.293**	
	(0.010)		(0.001)		(0.124)	

Constant	7.759***	3.948***	-0.009	-0.044***	5.520	13.193***
	(0.598)	(0.362)	(0.033)	(0.015)	(4.527)	(3.411)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
Adj. R^2	0.303	0.318	0.285	0.294	0.246	0.255
Num. banks	465	465	452	452	444	444
Obs.	3674	3674	3375	3375	3140	3140

Notes: Standard errors are in parentheses, clustered at the bank level. $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$.

2.4. Robustness checks

As argued by Gulen and Ion (2016) and Kaviani et al. (2020), the news-based policy uncertainty index may be contaminated by measurement error. Although this index is designed to measure monetary policy uncertainty, it may nonetheless embed other information, such as general economic uncertainty unrelated to monetary policy. To address this problem, we use a method developed by Kaviani et al. (2020) to regress China's MPU on Japan's counterpart, and then take the residuals as an alternative measure of China's MPU ($RMPU$).[7] Given close economic ties, the two countries are likely exposed to common shocks to general economic uncertainty. Consequently, Japan's MPU measure may preserve some common components of general economic uncertainty that are related to Chinese economy, and thus the use of residual MPU will help reduce measurement error.

Table 3 reports the results by replacing MPU with $RMPU$ in Eq. (1). Evidently, the results are robust to this alternative measure. In addition, the benchmark results are also robust to measuring HHI by loan shares and controlling for other types of policy uncertainties.[8]

Table 3. Robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
	ZSCORE	ZSCORE	NPL	NPL	PC	PC
RMPU×HHI	0.931**	0.855**	-0.075***	-0.071***	21.117***	20.023***
	(0.386)	(0.387)	(0.027)	(0.026)	(5.143)	(5.119)
RMPU	-0.055		0.002		-1.250**	
	(0.043)		(0.003)		(0.525)	
HHI	-0.533	-0.113	0.015	0.001	6.258	8.983*
	(0.452)	(0.469)	(0.020)	(0.020)	(4.593)	(4.929)
Constant	4.857***	3.933***	0.097***	-0.043***	-10.906***	12.909***
	(0.509)	(0.361)	(0.026)	(0.015)	(3.819)	(3.442)
Controls	Yes	Yes	Yes	Yes	Yes	Yes

[7] The frequency of MPU used in the regression is monthly. We convert the monthly residuals to annualized residuals simply by taking average.

[8] Due to the limited length of the paper, these results are provided upon request.

Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
Adj.R^2	0.296	0.317	0.288	0.293	0.247	0.253
Num. banks	465	465	452	452	444	444
Obs.	3674	3674	3375	3375	3140	3140

Notes: Standard errors are in parentheses, clustered at the bank level. $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$.

3. Inspecting the Mechanisms

The preceding results have shown that higher level of market competition will enhance the positive effect of MPU on bank risk-taking. In this section, we investigate the two channels through which MPU affects bank risk-taking: profitability and balance sheet. To identify possible mechanisms, we adopt an approach, developed by Bertrand and Mullainathan (2001), to construct a two-stage regression model, which allows us to explore the transmission of MPU to bank risk-taking. We use the following specification to estimate the average effect of MPU on a particular channel variable:

$$M_{ic,t} = \beta_1^M + \beta_2^M MPU_{t-1} + \beta_3^M MPU_{t-1} \times HHI_{c,t-1} + \beta_4^M HHI_{c,t-1} + \boldsymbol{X}_{i,t}^{\top}\boldsymbol{\phi}^M + \boldsymbol{Z}_t^{\top}\boldsymbol{\theta}^{\boldsymbol{M}} + \alpha_i + \epsilon_{ic,t}, \quad (3)$$

where $M_{ic,t}$ is a channel variable of the banks, and the definitions of the other variables are the same as those of Eq. (2). All coefficients are indexed by superscript M to distinguish those from the baseline model. Based on the first-stage regression model, we estimate the average effects of MPU on bank risk-taking in a city:

$$\widehat{M}_{c,t} = \hat{\beta}_1^M + \hat{\beta}_2^M MPU_{t-1} + \hat{\beta}_3^M MPU_{t-1} \times HHI_{c,t-1} + \hat{\beta}_4^M HHI_{c,t-1}, \quad (4)$$

where $\hat{\beta}^M$ are the coefficient estimates from Eq. (3). Then we replace the core explanatory variables in Eq. (2) with $\widehat{M}_{c,t}$ to construct the second-stage specification:

$$RISK_{ic,t} = \gamma + \delta\widehat{M}_{c,t} + \boldsymbol{X}_{i,t}^{\top}\boldsymbol{\phi} + \boldsymbol{Z}_t^{\top}\boldsymbol{\theta} + \alpha_i + \epsilon_{ic,t}, \quad (5)$$

where δ is the key coefficient that captures the effects of the variations in channel variables induced by MPU on bank risk-taking.

To gauge how MPU affects bank risk-taking, we focus on the two potential channels that have been most widely examined in the literature: profitability and balance sheet channels.

3.1 Profitability

The existing literature has emphasized that increased uncertainty will raise the costs of debt financing due to higher likelihood of default incurred (Greenwald and Stiglitz, 1990; Gilchrist et al., 2014). For banks, an increase in MPU leads to higher uncertainty of the marginal bank funding costs, which translates into higher overall costs of bank liability by increasing the shadow costs of bank liquidity management,

and thereby reducing their profitability. In this paper, we consider three measures of profitability: operating profit to asset ratio ($PROFIT$), net interest margin ($MARGIN$), returns on financial assets (FIN). Net interest margin is defined as the net interest divided by the sum of reserve, loans, financial and interbank assets.

As shown in Columns (1)-(3) of Table 4, an increase in MPU undermines the bank's profitability, and higher market competition will enhance the negative effects of MPU. In addition, the second-stage regression results show that bank risk-taking is positively associated with profitability, irrespective of measures of profitability. Together with the first-stage regression results, it suggests that an increase in MPU raises bank risk-taking by reducing its profitability.

Table 4. Inspecting the mechanisms

Panel A: The first stage regression						
	(1)	(2)	(3)	(4)	(5)	(6)
	PROFIT	MARGIN	FIN	DEBTR	LEV	CAR
MPU×HHI	0.011**	0.036***	0.384***	-0.100***	-15.560***	0.250***
	(0.005)	(0.013)	(0.141)	(0.024)	(4.475)	(0.040)
MPU	-0.004***	-0.013***	-0.051***	0.021***	3.032***	-0.022***
	(0.001)	(0.001)	(0.014)	(0.003)	(0.536)	(0.005)
HHI	-0.050**	-0.114*	-1.823**	0.536***	85.001***	-1.173***
	(0.025)	(0.065)	(0.716)	(0.121)	(23.631)	(0.205)
Constant	0.107***	0.238***	0.487**	0.546***	-47.193***	0.324***
	(0.009)	(0.022)	(0.213)	(0.048)	(9.387)	(0.086)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No
Adj. R^2	0.801	0.517	0.028	0.332	0.371	0.159
Nub. of banks	465	410	457	465	465	456
Obs	3676	2839	3503	3676	3676	3481
Panel B: The second stage regression						
	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE	ZSCORE
PROFIT	41.283***					
	(8.026)					
MARGIN		6.832**				
		(2.781)				
FIN			2.525***			
			(0.779)			
DEBTR				-11.289***		
				(1.733)		
LEV					-0.076***	
					(0.013)	
CAR						1.949

						(1.308)
Constant	7.103***	6.134***	6.186***	7.779***	7.692***	5.256***
	(0.596)	(0.617)	(0.553)	(0.618)	(0.635)	(0.446)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No
Adj. R^2	0.300	0.296	0.298	0.303	0.303	0.295
Nub. of banks	465	465	465	465	465	465
Obs	3674	3674	3674	3674	3674	3674

Notes: Standard errors are in parentheses, clustered at the bank level. $^{*}p< 0.1$, $^{**}p< 0.05$, $^{***}p< 0.01$.

3.2. Balance sheet

The balance sheet theory postulates that increased uncertainty generates downward pressure on asset prices, leading to a deterioration in the banks' balance sheets. On the one hand, increased MPU leads to a decline in firms' investment and production (Mumtaz and Zanetti, 2013; Born and Pfeifer, 2014; Husted et al., 2020), and consequently, raises the costs of debt financing and the likelihood of default on their loans. In this way, the banks' asset side may deteriorate. On the other hand, increased MPU will drive up interbank rates and destabilize interbank positions, generating a negative impact on banks' liability side. We use three measures to proxy for the bank's balance sheet condition: debt-to-asset ratio ($DEBTR$), leverage ratio (LEV) and capital adequacy ratio (CAR). Note that bank leverage is defined as the ratio of assets over equity.

As shown in Table 4, we find that increased MPU deteriorates the bank's balance sheet by enhancing its debt ratio and leverage, and thereby raising bank risk-taking. In addition, higher bank competition strengthens the positive effects of MPU on bank risk-taking. That is, a bank facing more competition will take more risk following an increase in MPU, compared with a bank facing less competition.

4. Conclusion

In this paper, we identify the impact of MPU on bank risk-taking by exploiting the regional heterogeneity of market structure in China. Our findings show that a bank facing more competition will bear more risks, given an increase in MPU, confirming that higher MPU exacerbates bank risk-taking. Our results are robust to using alternative measures of risk-taking and accounting for additional endogeneity concerns. In addition, we find that MPU positively affect bank risk-taking by deteriorating its profitability and balance sheet. An important implication of this study is that central bank should enhance the transparency of monetary policy making. In doing so, it could curb bank risk-taking, and thus enhance financial stability.

References

Borio, C., and H. Zhu. 2008, Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism? *BIS Working Paper* No. 268.

Born, B., and J. Pfeifer. 2014. Policy Risk and the Business Cycle. *Journal of Monetary Economics*. 68, 68-85.

Dell'Ariccia, Giovanni, and Robert Marquez. 2013. Interest Rates and the Bank Risk-Taking Channel. *Annual Review of Financial Economics*. 5, 123–141.

Dell'Ariccia, G., L. Laeven, and G. A. Suarez. 2017. Bank Leverage and Monetary Policy's Risk-Taking Channel: Evidence from the United States. *Journal of Finance*. 72(2), 613-654.

Drechsler, I., A. Savov, and P. Schnabl. 2017. The Deposits Channel of Monetary Policy. *Quarterly Journal of Economics*, 132, 1819-1876.

Fasani S., H. Mumtaz, and L. Rossi. 2022. Monetary Policy Uncertainty and Firm Dynamics. *Review of Economic Dynamics*. Forthcoming.

Greenwald, B.C., and J.E. Stiglitz. 1990. Macroeconomic Models with Equity and Credit Rationing. Asymmetric Information, Corporate Finance, and Investment, 15-42. University of Chicago Press.

Gilchrist, S., J. W. Sim, and E. Zakrajsek. 2014. Uncertainty, Financial Frictions, and Investment Dynamics. National Bureau of Economic Research, Working Paper 20038.

Gulen, H., and M. Ion. 2016. Policy Uncertainty and Corporate Investment. *Review of Financial Studies*. 29(3), 523-564.

Huang, Y., and P. Luk. 2020. Measuring Economic Policy Uncertainty in China. *China Economic Review*, 59, 101367.

Husted, L., J. Rogers, and B. Sun. 2020. Monetary Policy Uncertainty. *Journal of Monetary Economics*. 115, 20-36.

Kaviani, M., L. Kryzanowski, H. Maleki, and P. Savor. 2020. Policy Uncertainty and Corporate Credit Spreads. *Journal of Financial Economics.* 138, 838-865.

Kurov A., and R. Stan. 2018. Monetary Policy Uncertainty and the Market Reaction to Macroeconomic News. *Journal of Banking and Finance*. 86, 127-142.

Laeven, L., and R. Levine. 2009. Bank Governance, Regulation and Risk-taking. *Journal of Financial Economics*. 93(2), 259-275.

Lakdawala A., T. Moreland, M. Schaffer. 2021. The International Spillover Effects of US Monetary Policy Uncertainty. *Journal of International Economics*. 133, 103525.

Luo, W., Y. Wang, and X. Zhang. 2022. Monetary Policy Uncertainty and Firm Risk-Taking. *Pacific-Basin Financer Journal*. 71, 101695.

Mumtaz, H., and F. Zanetti. 2013. The Impact of the Volatility of Monetary Policy Shocks. *Journal of Money Credit and Banking*. 45(4), 535-558.

Nakamura, E., and J. Steinsson. 2018. Identification in Macroeconomics. *Journal of Economic Perspectives.* 32(3), 59-86.

Ouyang, Z., Z. Dou, L. Wei, and L. Vasa. 2022. Nonlinear Spillover Effect of US Monetary Policy Uncertainty on China's Systematic Financial Risks. *Journal of Business Economics and Management*, 23(2), 364-381.

Phan, D. H. B., B. N. Iyke, S. S. Sharma, and Y. Affandi. 2021. Economic Policy Uncertainty and Financial Stability–Is There a Relation? *Economic Modelling*. 94, 1018-1029.

Wu, J., H. Li, D. Zheng, and X. Liu. 2021. Economic Uncertainty or Financial Uncertainty? An Empirical Analysis of Bank Risk-taking in Asian Emerging Markets. *Finance Research Letters*, 39, 101542.