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Analysis of the Mediating Effect of Economic Policy Uncertainty Affecting Commercial Bank Credit

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ABSTRACT

We analyze the annual microdata of China's 100 commercial banks from 2007 to 2018 using the mediating effect analysis method, analyze the negative impact of economic policy uncertainty on the credit scale of commercial banks, and then verify the intermediary effects of the operational risks and short-term capital liquidity of commercial banks in the impact of economic policy uncertainty on the scale of commercial bank credit, separately. Moreover, we find that non-state-owned commercial banks, large-scale commercial banks, low-leverage commercial banks, and commercial banks with low profitability are more susceptible to economic policy uncertainty affecting commercial bank credit growth through short-term capital liquidity, and vice versa.

KEYWORDS

Economic policy uncertainty, Mediating effect, Credit scale

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1. Introduction

China has written "maintaining the continuity and stability of macroeconomic policies" into the government work report and raised the policy level of preventing the negative impact of economic policy uncertainty since 2014. Besides, China's central bank has gradually used new monetary policy tools such as medium-term lending facilities, collateralized supplementary loan tools, and standing lending facilities to adjust the short-term capital supply in the money market, and has gradually normalized these monetary tools. The importance of the monetary policy transmission process, but in the process of providing liquidity to the market, the credit scale of commercial banks faces the impact and impact of policy uncertainty. First, the impact of economic policy uncertainty brought about by international financial risks. The China Economic Policy Uncertainty (EPU) Index provided by Baker et al. (2016) shows that in December 2008 China's EPU index rose from 93.8 in December 2007 to 232.8. In December 2009, as the policy became clearer, the index fell from 232.8 in December 2008 to 74.9, falling to the level of China's economic policy uncertainty index before the US subprime mortgage crisis. Second, the impact of economic policy uncertainty brought about by monetary policy and fiscal policy. Since 2007, almost every quarterly monetary policy implementation report published by the central bank has emphasized prudent monetary policy. Every fine-tuning and setting of the monetary policy will have an impact on the credit policy of commercial banks. In addition, the uncertainty brought about by the fiscal policy mainly comes from the changes in fiscal expenditure and the uncertainty brought about by the reform of the tax system. The tax reform will directly affect the cash flow and investment and financing strategies of enterprises and affect the changes in credit demand, thereby impacting the scale of bank credit.

Since the economic environment becoming more and more open, banks are no longer under the excessive protection of the central bank, and they are more and more likely to be impacted by the outside world, and the credit scale of commercial banks would directly affect the liquidity they provide to the market scale. Therefore, it is of great significance to study the impact of economic policy uncertainty on the credit scale of commercial banks to resist external risks more effectively.

2. Literature review

The current literature on this issue is mainly reflected in the impact of economic policy uncertainty on financial markets. First, rising economic policy uncertainty will lead to lower private investment and consumption, thereby lowering output (Brogaard and Detzel, 2015). When a company's operating performance declines, the government tends to change its policies, and the company's stock price tends to fall when a policy change is announced. If the government's policy has high uncertainty and there are signs of recession before the policy change, the stock price will fall faster, and the policy change increases the stock volatility risk premium and the index options volatility risk premium (Pastor and Veronesi, 2012; Buraschi et al., 2014). High economic policy uncertainty leads to a significant increase in market volatility, and high economic policy uncertainty tends to make investment behavior irrational and generate speculative mispricing under the constraints of short selling (Chen et al., 2017). If economic policy uncertainty factors are added to the volatility model, the prediction accuracy of stock volatility can be improved (Liu and Zhang, 2015). Williams (2014) finds that investors give more weight to bad news after economic policy uncertainty increases, compared to investors giving equal weight to both good and bad news after economic policy uncertainty decreases. Similarly, Antoniou et al. (2015) find that in terms of asset allocation, when economic policy uncertainty increases, investors' liquidity preference and risk aversion are more obvious, and the weight of asset allocation will be adjusted. Specifically, investors are less likely to invest in stocks and more likely to be redeemed by stock funds. Pastor and Veronesi (2013) believe that politically-related news will affect stock prices. When the economy is weak, the government tends to change policies, effectively protecting the market. This implicit

investment protection value is reduced due to political uncertainty.

Some existing studies have discussed the impact of uncertainty on economic decision-making. For example, Stokey (2009) theoretically analyzes the "economics of inaction", focusing on how stochastic control tools can be applied to decision-making dynamics under uncertainty when there are fixed costs, and introduces information about Brownian motion and other diffusion processes, develop methods for analyzing each type of problem, and discuss applications to pricing setting, investment, and durable goods purchases. At the macro level, Karnizova and Li (2014) find that economic policy uncertainty helps predict recessions, but few studies have explored how economic policy uncertainty may affect commercial bank credit decisions. After the subprime mortgage crisis in the United States, the year-on-year growth rate of the credit scale of China's commercial banks has entered a downward channel since 2009 and has stabilized at around 15% since 2015. Does the uncertainty of economic policy limit the loan growth of China's commercial banks in the post-crisis era, and how does it affect the decision-making of commercial banks' credit scale? To solve these problems, this paper uses the mediation effect analysis method to discuss how economic policy uncertainty affects commercial bank credit by affecting individual commercial bank operations.

3. Research hypothesis and model setting

3.1. EPU affects the operating risks of commercial banks

Increased economic policy uncertainty will make corporate investment behavior more cautious, and investment and financing activities will be less motivated. Banks would also make bank lending more cautious, thereby reducing bank operating risks. Rising economic policy uncertainty will weaken banks' willingness to take risks proactively, but will intensify banks' passive risk-taking and bankruptcy risks. Therefore, we set the first hypothesize:

H1: If the uncertainty of economic policy increases, the operating risk of commercial banks decreases, and the credit growth rate of commercial banks slow down. The operating risk of commercial banks plays a mediating effect on the impact of economic policy uncertainty on commercial bank credit.

3.2. EPU affects the liquidity of commercial banks

Shadow banking becomes illiquid when economic policy uncertainty surges (Moreira and Savov, 2017). Shadow banking reduces scarce collateral and expands the supply of liquidity, boosting asset prices and growth, but also heightening vulnerabilities. Using an event study approach, Raunig and Sindermann (2017) find that after a surge in uncertainty, highly liquid banks reduce their loans more than less liquid banks. Therefore, we set the second hypothesize:

H2: If the uncertainty of economic policy increases, the liquidity of commercial banks decreases, and the growth rate of credit of commercial banks slow down. The short-term liquidity of commercial banks plays a mediating effect on the impact of economic policy uncertainty on commercial bank credit.

3.3. Model setting

To examine the impact of economic policy uncertainty on the credit scale of commercial banks, we first use the analysis method of Bordo et al. (2016) to construct a basic regression equation to analyze the impact of economic policy uncertainty on the credit scale of individual commercial banks:

$$loan_{it} = \alpha + \beta_0 EPU_t + \beta_1 GDP_t + \beta_2 rr_t + \beta_3 assets_{it} + \beta_4 adeq_{it} + \beta_5 lev_{it} + \varepsilon_{it} \#(1)$$

Among them, the explained variable $loan_{it}$ is the growth rate of credit scale of the commercial bank i . GDP_t

represents the economic growth rate of the period t , rr_t indicates the real interest rate of the period t . GDP_t and rr_t are macroeconomic factors. EPU_t is the impact of economic policy uncertainty in the period t . Considering that the individual characteristics of commercial banks would also affect their credit growth rate, this model adds variables such as assets (total assets), adeq (capital adequacy ratio), and lev (financial leverage ratio) as the control variable of the individual commercial bank. ε_{it} is the disturbance term. Considering the availability of data, this model uses annual data to examine the impact of economic policy uncertainty on the growth rate of commercial bank credit scale under the macro environment and individual differences of commercial banks.

Based on the basic regression equation, the influence of economic policy uncertainty on commercial bank risk and liquidity as intermediary variables is analyzed, and the following regression equation can be constructed:

$$risk_{it} = \alpha + \beta_0 EPU_t + \beta_1 GDP_t + \beta_2 rr_t + \beta_3 assets_{it} + \beta_4 adeq_{it} + \beta_5 lev_{it} + \varepsilon_{it} \#(2)$$

$$liq_{it} = \alpha + \beta_0 EPU_t + \beta_1 GDP_t + \beta_2 rr_t + \beta_3 assets_{it} + \beta_4 adeq_{it} + \beta_5 lev_{it} + \varepsilon_{it} \#(3)$$

Finally, we take the bank operating risk, and the liquidity into account, respectively. The regression equation can be set as follows:

$$loan_{it} = \alpha + \beta_0 EPU_t + \beta_1 GDP_t + \beta_2 rr_t + \beta_3 assets_{it} + \beta_4 adeq_{it} + \beta_5 lev_{it} + \beta_6 risk_{it} + \varepsilon_{it} \#(4)$$

$$loan_{it} = \alpha + \beta_0 EPU_t + \beta_1 GDP_t + \beta_2 rr_t + \beta_3 assets_{it} + \beta_4 adeq_{it} + \beta_5 lev_{it} + \beta_6 liq_{it} + \varepsilon_{it} \#(5)$$

3.4. Variable setting and data description

3.4.1. Variable setting

In this paper, we use the China EPU index¹ constructed by Baker et al. (2016) as an indicator to measure the uncertainty of China's economic policy. The China Economic Policy Uncertainty Index constructed by Guangming Daily is used as a proxy variable. Macro factors include economic growth and real interest rates. The total asset size and capital adequacy ratio of commercial banks are taken as individual characteristics, and the risk and short-term asset liquidity of commercial banks are selected as intermediary variables. Considering the availability of data, the annual data from 2007 to 2018 are selected for analysis. In the selection of commercial bank samples, the samples whose variables were missing for five consecutive years were deleted, and finally, 100 commercial banks were obtained, including 5 large state-owned commercial banks, 11 large joint-stock banks, and 64 city commercial banks. The commercial bank credit growth rate is calculated using the loan balance of each commercial bank². In the robustness test, the loan-to-deposit ratio (the ratio of total loans to total deposits) is used instead of the credit growth rate indicator to measure the liquidity creation ability of commercial banks.

Table 1 provides the descriptive statistics of each variable. Among them, the maximum annual growth rate of a loan is 270.5%³, the lowest growth rate is -7%, the average growth rate is 21.7%, and the standard deviation is 8.5%. It can be seen that the individual credit growth of commercial banks The rate difference is large; the minimum value of EPU is 82.35, the maximum value is as high as 460.47, the mean value is 209.236, and the standard deviation is 118.032, which shows that China's economic policy uncertainty varies significantly during the sample period.

Table 1. Descriptive statistics.

variable	Mean	S.D.	min	median	max	N
loan	0.217	0.085	-0.07	0.217	2.705	1129
ldr	0.456	0.127	0.000	0.433	1.100	1191

¹ <http://www.policyuncertainty.com>.

² The relevant data of commercial banks and macroeconomic variables in this chapter come from the Wind database.

³ The maximum value is the credit growth rate of Bank of Kunlun in 2009, which is due to the extreme value of the credit growth rate caused by its restructuring and establishment in 2009.

epu	209.236	118.032	82.25	174.84	460.47	1200
cepu	128.8	56.553	50.4	116.55	277.8	1200
gdp	8.625	2.137	6.60	7.85	14.2	1200
assets	16.509	1.814	12.615	16.177	21.791	1193
adeq	7.5	6.961	-15.72	10.5	52.15	1191
lev	24.263	34.048	-7.192	15.274	243.455	1195
risk	0.009	0.007	-0.013	0.009	0.125	1191
liq	0.443	0.238	-0.87	0.471	1.152	1191
profi	0.031	0.027	-0.017	0.027	0.318	1176

4. Analysis of empirical results

4.1. Analysis of the mediating effect of commercial bank operating risk and short-term liquidity

In this part, we regressed the basic model and the mediation effect model, and the results are shown in Table 2. Model (1) tests the direct effect of EPU on commercial bank credit growth, and the regression coefficient of EPU is -0.014, which is significantly negative at the 1% level. It can be seen that the increase in EPU would cause a decrease in commercial bank credit growth. Model (2) examines the influence of EPU on the operating risk of commercial banks. The results show that EPU has a significant negative effect on the operating risk of commercial banks at a confidence level of 5%. Therefore, the increase in economic policy uncertainty would slightly reduce the operating risk of commercial banks. This is mainly due to the lack of economic policy. Increased certainty would make banks more cautious in lending, and more inclined to companies with higher credit ratings. Therefore, the risk of bank loan defaults is reduced. Model (3) examines the impact of EPU on the short-term liquidity of commercial banks. The results show that economic policy uncertainty has a significant positive effect on the short-term liquidity of commercial banks at a confidence level of 1%. Therefore, the increase in EPU would make commercial banks increase their short-term liquidity to prevent the phenomenon of runs and credit risk. Model (4) added commercial bank operating risk to the initial regression equation and found that, under the condition of controlling commercial bank operating risk, EPU still had a significant negative impact on commercial bank credit growth, while commercial bank operating risk hurt commercial bank credit growth. Therefore, the operating risk of commercial banks plays a mediating role in the process of EPU affecting credit growth. Model (5) adds the short-term capital liquidity of commercial banks into the initial regression equation and finds that, when the short-term capital liquidity of commercial banks is controlled, EPU still has a significant negative impact on the credit growth of commercial banks. While the short-term capital liquidity has a significant positive impact on commercial bank credit growth. Therefore, the increase in economic policy uncertainty will increase the short-term capital liquidity of commercial banks, thereby slowing down the growth of commercial bank credit.

Table 2. Analysis of the Mediating Effect of Operating Risk and Short-term Fund Liquidity.

	(1)	(2)	(3)	(4)	(5)
	loan	risk	liq	loan	loan
epu	-0.014***	-0.000**	0.024***	-0.009***	-0.013***
	(-4.09)	(-2.03)	(2.59)	(-3.45)	(-3.83)
risk				8.164***	
				(26.38)	
liq					-0.050***
					(-4.78)
assets	0.064***	0.004***	-0.011	0.027***	0.064***
	(6.56)	(5.45)	(-0.42)	(3.40)	(6.61)
cash	-0.074***	-0.004***	-0.030	-0.035***	-0.076***

	(-6.85)	(-4.99)	(-1.07)	(-4.06)	(-7.10)
lev	0.000***	0.000**	0.000	0.000	0.000***
	(2.73)	(2.49)	(0.24)	(1.54)	(2.78)
adeq	0.002***	0.000	0.006***	0.002***	0.003***
	(5.67)	(1.24)	(5.03)	(5.79)	(6.20)
gdp	0.005**	-0.001***	-0.013**	0.012***	0.004**
	(2.36)	(-5.91)	(-2.50)	(7.08)	(2.10)
rr	0.008***	0.000**	-0.007	0.006***	0.008***
	(3.98)	(2.11)	(-1.14)	(3.40)	(3.83)
_cons	0.215***	0.008*	1.225***	0.142***	0.278***
	(3.55)	(1.75)	(7.28)	(2.99)	(4.54)
industry fixed effect	yes _	yes _	yes _	yes _	yes _
N	1123	1186	1186	1123	1123
R-Square	0.180	0.281	0.128	0.496	0.197
Adj.R -quare	0.17	0.28	0.12	0.49	0.19

Notes: Standard deviations are in brackets, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Through the above analysis, it can be found that the EPU affects the credit growth of commercial banks by affecting the operating risks of commercial banks on the one hand and the liquidity of short-term funds of commercial banks on the other hand. In terms of control variables, model (1) finds that the regression coefficients of macroeconomic factors such as GDP growth rate, commercial bank size, commercial bank reserved cash, capital adequacy ratio, and leverage ratio are all consistent with expectations, and the regression coefficients are significant. It is consistent with the research results of Bordo et al. (2016) on the impact of individual differences in commercial banks on credit scale.

4.2. Heterogeneity Analysis of Commercial Banks

Furthermore, we classify commercial banks from individual heterogeneity such as type, scale, leverage ratio, and profitability, and find that non-state-owned commercial banks, large-scale commercial banks, low-leverage commercial banks, and commercial banks with low profitability are more susceptible to EPU, and vice versa⁴.

4.3. Robustness analysis

First, since the loan-to-deposit ratio is also an important indicator to measure the credit scale of commercial banks (Cole and Turk-Ariss, 2008), we replace the credit growth rate in the initial model with the loan-to-deposit ratio to examine the robustness of the empirical results. Second, we examine the impact of economic policy uncertainty (CEPU) on credit growth. The results show that EPU still has a significant negative impact on the credit scale measured by the loan-to-deposit ratio. The impact of economic policy uncertainty measured by CEPU on the credit growth rate is also significantly negative⁵.

Table 3. Robustness check.

	(1)	(2)
	ldr	loan
epu	-0.015***	
	(-3.18)	
cepu		-0.016***

⁴ Due to space limitations, the results are not listed.

⁵ The result is shown in table 3.

		(-3.04)
assets	-0.065***	0.059***
	(-4.89)	(6.11)
cash	0.075***	-0.068***
	(5.08)	(-6.41)
lev	0.000	0.000***
	(1.44)	(3.82)
adeq	-0.001**	0.003***
	(-2.05)	(6.16)
gdp	0.004	0.008***
	(1.41)	(4.25)
rr	-0.000	0.011***
	(-0.04)	(5.59)
_cons	0.387***	0.181***
	(4.45)	(3.04)
industry fixed effect	yes _	yes _
N	1186	1123
R-Square	0.194	0.175
Adj.R -Square	0.19	0.17

Notes: Standard deviations are in brackets, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Conclusion

This paper uses the intermediary effect analysis method to analyze the annual microdata of 100 commercial banks in China from 2007 to 2018 and verifies the negative impact of economic policy uncertainty on the credit scale of commercial banks. The mediating effect of bank operating risk and short-term capital liquidity on the impact of economic policy uncertainty on the credit scale of commercial banks. The following two points of inspiration can be drawn: First, since commercial bank operating risk and short-term capital liquidity constitute two important channels, through which EPU affects the credit scale of commercial banks. Facing of domestic and foreign natural disasters, black swan Events, as well as the uncertainty brought about by domestic monetary policy and fiscal policy, commercial banks first need to maintain the liquidity of short-term capital, prevent risks, and maintain the steady and healthy development of commercial bank credit growth. Second, non-state-owned commercial banks, large-scale commercial banks, low-leverage commercial banks, and commercial banks with low profitability are more susceptible to economic policy uncertainty affecting commercial bank credit growth through short-term capital liquidity, and vice versa.

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Declaration of Competing Interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

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