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AN EXAMINER OF CHINA COMMERCIAL BANKS' LOANS THROUGH CREDIT CHANNEL PRIOR COVID-19

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ABSTRACT

Purpose- China's economy has greatly developed in the last few decades, catapulting the nation to the second-biggest economy in the world. Financial growth took off over the last couple of decades because of the nation's expansion into the world economy and support for monetary policy. The purpose of this study is to analyse commercial bank-level data to examine a credit channel of the monetary policy transmission mechanism in emerging economies, such as China, from BRICS countries. Among the important questions that central banks, econo mists, and policymakers have raised in this area are: Does the impact of bank characteristics and macroeconomic variables affect the amount of loans in China? Do interacting bank characteristics and macroeconomic elements affect the amount of a loan in China?

Methodology- Data analysis is achieved using static panel data with a random-effect model. 216 commercial banks in China were used as a sample, and the study was conducted from 2009 to 2018. The statistical software Stata is utilised for data analysis.

Findings- According to findings from China's statistics, the capital ratio, GDP, inflation, and ROA interactions have a statistically significant but negative impact on the loan amount. The hypothesis is that capital ratio, total assets, and return on assets have a stati stically significant and positive effect on the amount of the loan. The robust standard error coefficient showing a probable causal relationship between the variables was positive. Also,the results demonstrate that macroeconomic factors like interest rates, GDP, and inflation have a statistically insignificant positive impact on loan amounts. Hence, this study found enough evidence to accept the hypothesis that the loan amount had an insignificant effect.

Conclusion- The authors contribute to the existing literature by identifying the key determinants of monetary policy transmission channels through credit in China and, furthermore, through a country-level data analysis and disaggregation at the commercial bank level, as well as economic conditions.

Keywords: Panel Data, Banks, Monetary Policy Transmission Mechanism, Credit Channel, China economy.
JEL Codes: C23; E51; E52

1. INTRODUCTION

In macroeconomic literature, the monetary policy transmission mechanism (MPTM) is a complicated and fascinating topic. The MPTM concept predicts that a rise in the money supply will increase prices, which should theoretically lead to a rise in real GDP. MPTM is transmitted through several channels, involving the asset price channel, exchange rate channel, interest rate channel, and credit channel (Mishkin, 2006). The most crucial channel is credit, and it may contribute a significant amount to resolving the MPTM issue. There are two sub-channels comprising the credit channel: the bank lending channel (BLC) and the balance sheet channel (BSC). The capacity of the bank lending channel to provide bank loans to a firm is affected. Instead, the balance sheet channel represents firms' and individuals' financial conditions plus their capacity to approach the market of credit (Bernanke and Gertler, 1995). Consequently, credit channels demonstrate a crucial function in the investigation of macroeconomic trends.

The macroeconomic parameters for the MPTM use the credit channel as a major instrument. Further, a country's economic performance can be directly impacted by monetary policy transmission. The channel acts as an analytical method that explains the effect of money-related methods by applying loan supply in the country (Mishkin, 1996). Moreover, a new general credit channel manifests that credit itself depends upon the level of monetary activity. This infers the presence of a giant representative group in the country that depends on money correlated with various nations for market activities. It implies that the essential responsibility of financial markets and loans of banks in bank developments and money market

developments creates critical consequences for the safe banking area and credit marketplaces (Singh et al., 2008; Altunbas et al., 2009). As a consequence, it is important to realise the routes over which MPTM is conveyed in a country.

Giving to (Farajnezhad et al., 2022) to examine a credit channel of the monetary policy transmission mechanism in India. According to the data, the bank's features have a large and negative liquidity ratio compared to the loan amount. Furthermore, there is a significant but negative relationship between the interaction of inflation and interest rates with the liquidity ratio and loan amount in India. Equally, with the line of research (Farajnezhad and Suresh, 2019), according to a Malaysian study, there is a credit channel.

The following concerns are addressed in this research: (a) What is the impact of the characteristics of banks and macroeconomic factors on the amount of loans in the Chinese economy? (b) Do the interacting features of a bank and macroeconomic elements affect credit supply in China's economy? The influence of this research is its contribution to the credit channel concerning the MPTM that influences the lending behaviour of China. The conclusion of this study has been shown in China that, according to empirical results, the author of this research has established that in China. Only a considerable and positive association exists between the interaction interest rate, capital ratio, and loan amount. The capital ratio, total assets, and return on assets hypothesis all have a statistically significant and positive impact on the loan amount. Additionally, the liquidity ratio influences the loan amount in a statistically meaningful but negative way. According to the findings, macroeconomic factors (interest rate, GDP, and inflation) have a statistically irrelevant positive impact on loan amounts. Hence, this research noticed enough proof to accept the hypothesis of the insignificant effect of the loan amount.

A sample of 216 commercial banks from China was included in this empirical investigation from 2009 to 2018. The choice of country enables analysis of the impact of loan bank supply responsiveness to MPTM through the credit channel while removing the prejudice created by changing monetary rules. Also, the dataset used for this study includes all the times when the central bank of a developing nation operated a single monetary policy in the Chinese economy. For data analysis, STATA, a statistical package, is utilized. The study is achieved using the random effect model method for panel data. This methodology enables employing methods to regulate both unobservable variability and the issues of endogeneity concerning MPTM and bank characteristics. This method creates accurate and fair assessments of the correlations between macroeconomic factors and bank features.

The remainder of the study is organised as follows: The concerned literature is examined in Section 2. Section 3: Data and methodology Section 4 presents empirical results. The further discussions on the random effect model in China in Sections 5 and 6 are the conclusion of the research.

2. LITERATURE REVIEW

China's economy has greatly developed; it has catapulted in recent years the nation to the second-biggest market in the world. China recently became the second-biggest market and is gradually playing a significant role in the global economy. Financial growth took off over the last couple of decades because of the nation's expansion into the world economy and the administration's striking support for monetary policy. The People's Bank of China (PBOC) expresses and controls MPTM, stops and resolves financial risks, and protects economic steadiness.

In 1978, China experienced a financial change. Several achievements from this shift originated at the start of the 21st century, particularly from 1996 to 2006. This denotes China's coordination with the globe. This change significantly affects Chinese and global history. In Chinese economics, monetary policy has assumed a significant role in steadying the economy, which has stimulated many theoretical discussions on the effect of MPTM in China (Sun, Ford, et al., 2010).

The most important part of China's monetary transmission system is made up of credit channels. Due to the lack of interest rate liberalisation, the stock and bond markets in China need development. Reserved income and bank loans are the most significant sources of funding for businesses in China, whereas interest rate channels and other asset price channels are negligible in contrast to credit channels. The bank lending channel of the MPTM views bank deposits and other sources of bank funding as insufficient replacements. Following the strengthening of credit supply by the central bank, banks cannot completely replace declining deposits with another financial resource. Therefore, the banks should deal with loaning, which will decrease the firm's assets as well as production, while restraining credit accessibility (Li and Lee, 2015a). Little progress has been made in the study of China's monetary policy direction. Ping (2004) utilises total statistics and finds that cash is unbiased with respect to growth in the long term, which is linked to inflation. Qin et al. (2005) research the influence of various MPTM instruments on aggregates of monetary and price levels. Liu, Waggoner, et al. (2009) study the long-run connection between inflation and deposit rates. Yet, all of the aforementioned research applies collective information and the Granger causality assessment to study the connection among credit supply and macroeconomic factors, focusing primarily on the influence of China's monetary policy. Sun, Ford, et al. (2010), based on a VECM model, explored whether bank lending

could be used to transmit MPTM in China. In the long term, bank lending channel activity in China impacts MPTM, which is negatively related to necessary reserve ratios and the one-year lending rate.

According to Gunji and Yuan (2010), applying a general method of moments demonstrated that banks with less productivity tend to have a subtler MPTM. The impact of MPTM exists more on the stocks of small companies' business banks than on those of vast country-held business banks. Banks with greater liquidity tend to be susceptible to MPTM because the impact of MPTM on banks is uncertain. The study by Zhaohui (2006) studied MPTM with macroeconomic features such as GDP, CPI, interest rates, and total foreign trade. To analyse the impact of MPTM on economic activity from 1994 to 2004, Granger causality tests were used. The findings indicate that the monetary aggregate could affect price levels, but interest rates could not. Price is the greater cause of interest rates. The credit channel is a significant channel of MPTM. Like the exchange rate channel, which is low in this case owing to the fixed exchange rate and the limited stock market, the interest rate channel also has a meaningful impact.

China's growth continues today. In China, monetary policy is contrasted with that of more nations as far as accessible policy tools and policy conditions. The policy administration is transferring to a marketplace, and the national bank utilises a combination of established and cost-established devices (Tsang, 2011). As discussed by Fernald and Jones (2014), to assess the effects of Chinese MPTM in China, factor-augmented vector auto-regression (FAVAR) was used to integrate economic activity and inflation. The outcome of this research is that rising bank reserve provisions decrease economic activity and inflation. Likewise, shifting interest rates have a considerable impact on those factors through the different scale of the shift in credit situations, for instance, a shock to M2 or in different credit situations, such as when there is a shock to the money supply. Nguyen and Boateng (2013) evaluated bank loans and the impact of bank features on credit supply in reaction to monetary policy variations in China through an overall method of instants. The results show that involuntary excess reserves, bank measurements, and liquidity are essential in assessing the effect of monetary policy on credit development.

The work of He and Wang (2012) explained that financial experts determine lending rates, deposits, and window directions for lending in China's double-rate framework, while markets determine security rates. According to Liu and Zhang (2010), as part of China's mixed MPTM, both interest rates and money supply are set under a new Keynesian model. Consequently, consolidating the outcome illustrates the effectiveness of monetary policy regarding the largest welfare improvements evaluated by strength in inflation and production. Monetary policy operations involve both interest rates and the amount of money.

There have been numerous empirical investigations in China about monetary policy transmission mechanisms, in particular credit channels, since 2000 (Jiang et al., 2005; Wang and Wang, 2000). Yang and Shao (2016) found that commercial banks with low market capacity while increasing the growth of loans are less exposed to monetary policy shocks. So, increased banks of challenge in China are reducing the effect of MPTM through the credit channel. Consequently, improved competition among Chinese banks decreases the efficacy of MPTM in the bank lending channel. Furthermore, this effect is strong for well-capitalised banks, liquid banks, and city-commercial banks. Another study demonstrated that credit channels are incessantly adjusting for MPTM's impact on the economy in China (Fan and Jianzhou, 2011).

China's economy has had remarkable structural changes in recent years. This structure might change the effectiveness of counter-cyclical monetary policy for Chinese economic elements and inflation (Fernald et al., 2014). In China, financial stability and development are an extremely significant indicator of their economies in Asia and even in the world. Although the interpretation of MPTM in China is not simply due to the fact that the People's Bank of China (PBOC) uses more than one mechanism to perform monetary policy transmission, Certainly, for the People's Bank of China (PBOC) to set policy, the Fed usually uses a variety of tools, ranging from required reserve percentage-determined lending rates to deposit rates (McMahon et al., 2018).

Recently, China's MPTM has been investigated by numerous academics. For instance, Zhensheng (2002) assumed that the credit channel is a regulating part of the MPTM in China. According to Jiang and Zeng (2008), the bank lending channel shows the extremely essential responsibility of achieving the final objectives of monetary policy. Sun, Ford, et al. (2010) argued that credit, interest rate, and asset price channels all play a role in the MPTM in China, and the part of the bank lending channel looks mostly essential. According to Sun and Ma (2004), China's MPTM uses its influence on the country over money channels rather than credit channels.

Chen et al. (2016) found that the MPTM is more important in deficiency situations than in regular times, and monetary policy transmission has an unbalanced impact on the loan of the bank. Fernald et al. (2014) In general, the result has shown that the MPTM channels have encouraged development in developed countries. But, according to Geiger (2008), Ping (2004), and Xia and Liao (2001) considered, there is an unconstrained relationship between monetary aggregate and real economic

activity due to a control issue with monetary aggregate in PBC. Also, Geiger (2008) and Rudebusch and Wu (2008) examined the interest rate channel, which does not have any impact on the MPTM Chinese economy.

In the examination of the evolution of monetary policy (Koivu et al., 2008; Laurens and Maino, 2007; Liu and Zhang, 2010; Pan and Tao, 2006), opposite to the West, China aims to achieve its financial objectives through a range of tools. As an alternative, a variant of the instrument is accepted. (Liu and Zhang, 2010; Porter and Xu, 2009) argued that acceptance of a combination of MPTM tools in China had a possible extra impact on maintaining inflation below the mechanism. More significantly, according to Fang et al. (2018), the relationship between MPTM and bank loans is unimportant in banks with official-and-director (OAD), indicating monetary policy is channelled through lending, which is missing when studying the OAD. Others generally empirical results on monetary policy transmission are: (Berkelmans et al., 2016; Chen et al., 2013; Chen et al., 2017; Chen et al., 2016; Chen and Hu, 2011; Chengping and Xu, 2012; Chuang and Xuwen, 2013; Fungáčová et al., 2016; Funke et al., 2015; He et al., 2013; Leeper and Zhou, 2013; Li and Lee, 2015b; Liu, Margaritis, et al., 2009; Lombardi et al., 2018; Nagai and Wang, 2007; Poon and Wong, 2011; Qin et al., 2005; Shaoping et al., 2012; Sheng and Wu, 2009; Sun, Ford, et al., 2010; Sun, Gan, et al., 2010; Wang and Wang, 2000; Yao et al., 2013; Yi, 2007; Yue and Zhou, 2007; Zhang and Clovis, 2009; Zhang et al., 2018).

Those findings mostly concentrate on the practical evaluation of the pertinence of money supply as a middle goal and excavate our knowledge of the MPTM. Achieving China's monetary policy goals consists of mostly two elements: monetary aggregates and exchange rates. China is essentially depending on credit to execute monetary policy. Monetary policy through loan cost and wealth channels assumes a generally reduced role in ordinary circumstances.

This study attempts to examine the factors related to credit channels in monetary policy transmission mechanisms among banks in China, focusing on credit supply (amount of loan) and policy transmission mechanisms. Additionally, the research objectives are to estimate banks and macroeconomic variables that are affected by the credit channel of MPTM and their effect on bank lending and the balance sheet channel. Due to a lack of literature on China, the aim of this study is to compare elements that define credit channels and balance sheets in MPTM across China.

3. DATA AND METHODOLOGY

This study makes use of Fitch's International Bank Database and bank scope. Just commercial banks were chosen for the sample, which spans the years 2009 to 2018. There are 216 commercial banks in the final panel sample. Data on macroeconomics is provided by the World Bank Development Indicators and the International Monetary Fund (IMF).

This study examines the bank credit channel using balance sheet data to determine the cross-sectional relevance of loan availability following the financial crisis. (Kashyap and Stein, 2000) with relation to the bank lending channel (Bernanke et al., 1996). These academic efforts are presented in the following (Bernanke et al., 1999; Holmstrom and Tirole, 1997). The capital ratios of banks are the focus of this study. Instead of Kashyap and Stein (2000) and Bernanke et al. (1996), liquidity ratios of banks are similarly examined in this study (Mar´ ıa Cantero Saiz and errez, 2017; Jimenéz et al., 2014; Jiménez et al., 2012; Juurikkala et al., 2011; Gunji and Yuan, 2010; Gambacorta, 2005; Ehrmann et al., 2003).

This research investigates the relationship between the MPTM and bank characteristics such as capital, liquidity, and size to examine the effect of these parameters on lending reactions to the MPTM. Lastly, this study shows three macroeconomic pointers as control variables: The factor controlling the demand for loans is the GDP growth rate. The increasing economic condition is affecting profitable investment plans, which is why the demand for bank loans is rising. The variables described below are listed in Table 1. They are also listed in the previous section according to their notation.

Table 1: Description of Variables

Variables	Units	Definition
Dependent variable		
Ln Δ amount loan it	00.00.00	Growth rate of loans lagged one year
Independent variables		
Macroeconomics condition (t)		
Δ IR t interest rate	%	Annual change of the country 3 -month interbank interest rate. Calculated as the nominal interest rate minus inflation in country j at time t.
Δ GDP	%	Gross domestic product growth rate

Δ Inflation rate	%	Measures the annual percentage change in the general price level during a period in an economy
Bank characteristic(b)		
Δ Bank capital it	%	The ratio of equity over total assets
Δ Bank liquidity it	%	The ratio of cash and securities over total assets
Ln total assets it	-	The log of the total assets of the bank
ROA it	%	The total net income over assets of the bank

The evaluation of this research strategy is based on the contributions of Mar' ıa Cantero Saiz and Errez (2017), Jimenéz et al. (2014), Jiménez et al. (2012), Juurikkala et al. (2011), Gunji and Yuan (2010), Gambacorta (2005), and Ehrmann et al. (2003). These investigators point out the significance of a few forms of heterogeneity issues for the MPTM, and this is found in presenting an interaction term between the policy method and the candidate source of heterogeneity. The empirical analyses for the MPTM by banks method emphasise the response of the credit supply to monetary shocks. Ultimately, it is important to determine whether some types of banks experience a big drop in lending after a monetary tightening. Numerous bank characteristics are connected to the examination of how sensitive banks are to the lending channel, according to bank-lending channel research.

To account for macroeconomic growth and the different reactions of different styles of banks to such growth, use factors are added to the model. Real GDP growth, interest rate, and inflation are contained in the regressors as control variables. To raise knowledge of the impact of MPTM on the loan supply, the focus is on the supply of the lending across several bank categories. That is the reason for the previously stated category elements included in the model, i.e., size, liquidity, and capitalization. For the purpose of describing the influence that these characteristics have on MP fluctuations, this study involves interaction terms between MPTM components and the bank-particular feature (size, LIQ, and CAP).

This work only examines the applications that are recognised and gives a pointer for applications submitted by firms at the time that are approved (the amount of the loan). The practical model of this research investigates the main factors of credit expansion with banks by various categories of ownership. In this research, the model is like those employed by the researchers previously described. We estimate a linear model to examine the correlation among MPTM and extensive margin amounts of loans (Mar´ ıa Cantero Saiz errez, 2017; Nguyen and Boateng, 2013; Jimenéz et al., 2012; Gunji and Yuan, 2010) that is used to investigate if banks respond to shocks in MPTM differently. The model utilises the equation, which uses expressions of interaction derived from the showing of monetary policy and a particular trait of the bank. Based on the static linear panel data, the following equation can be used to define the model:

$$\text{Ln } \Delta amount\ loan\ it = \beta 1 \Delta IRt + \beta 2 \Delta\ GDPt + \Delta INF\ \beta 4\ capital\ ratioit{-}1 + \beta 5 liquidityit{-}1 + \beta 6\ Ln\ total\ assest\ it{-}1 + \beta 7\ ROA\ it{-}1 + \beta 8(\Delta IRt \times CAPit{-}1\ ) + \beta 9(\Delta IRt \times LIQit{-}1\ ) + \beta 10(\Delta GDPt \times CAPit{-}1) + \beta 11(\Delta GDPt \times LIQit{-}1\ ) + \beta 12(\Delta INFt \times CAPit{-}1) + \beta 13(\Delta INFt \times LIQit{-}1\ ) + \beta 14(\Delta GDPt \times Ln\ Total\ assetsit{-}1) + \beta 15(\Delta GDPt \times ROA\ it{-}1) + \beta 16(\Delta INFt \times Ln Total\ assetsit{-}1) + \beta 17(\Delta INFt \times ROAit{-}1) + \beta 18\ (\Delta IRt \times Total\ assetsit{-}1) + \beta 19(\Delta IRt \times ROA\ it{-}1) + \varepsilon it \quad (1)$$

4. EMPIRICAL RESULTS

4.1. Variables Correlation Matrix

Table 2 shows a correlation matrix based on unbalanced data from 216 Chinese-listed commercial banks.

Table 2 Variables Correlation Matrix in China

	AL	TA	ROA	LIQ	CAP	GDP	INF	IR	GDP x LIQ	GDP x CAP	INF x LIQ
AL	1										
TA	**0.9762*** **	1									
ROA	0.1821***	0.1564***	1								
LIQ	-0.5664***	.0 4941***	-0.1515***	1							
CAP	-0.5897***	-0.5023***	-0.3109***	0.4824***	1						
GDP	0.0628	0.1008***	0.0514	-0.0325	-0.0041	1					
INF	0.0221	0.0388	0.0417	-0.0078	-0.0211	0.7441***	1				
IR	-0.0742**	-0.1172***	-0.0184	-0.673*	0.2171***	-0.9548***	-0.5666***	1			

GDP x LIQ	-0.2596***	-0.2003***	-0.0569**	0.4711***	0.6480***	0.3523***	0.27771***	-0.3169***	1		
GDP x CAP	-0.4177***	0.3462***	-0.2293***	0.3583***	0.6482***	0.2954***	0.2473***	-0.2775***	0.6299***	1	
INF x LIQ	0.0142	-0.0048	-0.0362	-0.0045	-0.0419	0.0575**	0.5948***	0.1239***	0.1802***	0.1385***	1
INF x CAP	-0.0074	0.0305	-0.0081	0.0214	-0.0193	0.0464	0.5205***	0.1163***	0.1224***	0.1793***	0.828***
IR x LIQ	0.0688	0.0355***	0.1215***	-0.0681*	-0.1356***	-0.1035***	0.2609***	0.3097***	-0.3857***	-0.2393***	0.5011***
IR x CAP	0.1351***	0.0840**	0.0964***	0.0516**	-0.2571	-0.067**	0.2312***	0.259***	-0.2006***	-0.277***	0.4279***
GDP x TA	0.0687***	0.1039***	0.0533***	-0.0508	-0.0106	**0.9819*** **	0.7290***	-0.9384***	0.3298***	0.2672***	0.0554
GDP x ROA	0.2236***	0.2310***	0.5544***	-0.1875***	-0.1877***	0.3294***	0.2044***	-0.3251***	0.1336***	-0.0198	0.0017
INF x TA	-0.0007***	0.0129	0.0316	0.0073	-0.0064	0.7184***	**0.9829*** **	-0.5412***	0.2690***	0.02359***	0.5881***
INF x ROA	-0.0062	-0.0036	0.0196	0.0029	-0.0435	0.0179	0.5123***	0.1455***	0.0383	0.0114	0.6744***
IR x TA	-0.0400***	-0.0786**	-0.0167	0.0653	-0.0209	0.9322***	-0.5475***	**0.9813*** **	-0.3000***	-0.2615***	0.1255***
IR x RQA	-0.0417	-0.0566**	-0.0474	0.0864	-0.018	-0.055	0.3018***	0.2864***	0.041	0.0121	0.4461***

Continue Table 2: Variables Correlation Matrix in China

AL	INF x CAP	IR x LIQ	IR x CAP	GDP x TA	GDP x RQA	INF x TA	INF x RQA	IR x TA	IR. ROA
TA									
RQA									
LIQ									
CAP									
GDP									
INF									
IR									
GDP x LIQ									
GDP x CAP									
INF x LIQ									
INF x CAP	1								
IR x LIQ	0.4645***	1							
IR x CAP	0.5718***	0.7888***	1						
GDP x TA	0.0426	-0.0958	-0.0597**	1					
GDP x RQA	-0.0543	-0.0269	-0.0145	0.3357***	1				
INF x TA	0.4975***	0.2615***	0.2212***	0.7299***	0.2029***	1			
INF x RQA	0.5155***	0.4109***	0.3021***	0.0187	0.0782***	0.5350***	1		
IR x TA	0.1129***	0.3024***	0.2475***	-0.9503***	-0.3193***	-0.5422***	0.1539***	1	
IR x RQA	0.3602***	0.5663***	0.4705***	-0.0557	-0.1412***	0.3190***	0.6572***	0.3004***	1

This table shows the correlation matrix between loan amount and bank-level determinants and economic determinants based on the unbalanced country sample (China). The sample consists of 216 commercial bank-year observations from 2009 to 2018. The independent variables are liquidity ratio, capital ratio, and Ln total assets. ROA, AGDP, A INF, and A IR AL: amount loan; LIQ: liquidity ratio; CAP: capital ratio; TA: total assets; LIQ: A GDP x liquidity ratio; GDP *CAP: A GDP x Capital Ratio; INF*LIQ: A INF x Liquidity Ratio; INF*CAP: A INF x Capital

Ratio; IR*LIQ: A IR x Liquidity Ratio; IR*CAP: A IR x Capital Ratio: GDP *LN TA: A GDP x total assets; INF*LNTA: A INF x total assets; INF*ROA: A INF x ROA; IR* Ln TA: A IR x total assets;

The table presents the Pearson correlation coefficients among variables with their significant *** Significant at the 1 percent level. ** Significant at the 5 percent level. Significant at the 10 percent level.

According to Table 2, the interest rate and the interaction between interest rate and size are highly correlated (r = 0.95), implying the existence of a multicollinearity problem. Nevertheless, in multicollinear regression, interest rate and its interaction with size would not be included in the same model, so the outcome would not be affected by multicollinearity. Similarity: both the interactions between inflation and capital ratio and the interactions between inflation and return on assets are statistically significant (r = 0.93 and r = 0.92, respectively), suggesting a potential multicollinearity problem. Both inflation-capital-ratio and inflation-return-on-assets interactions would not affect the outcome of the regression.

4.2 MULTICOLLINEARITY

As evident from Table 3, the result shows for China that the tolerance values for the main elements range between 0.221279 and 0.88505. Additionally, the value of VIF for the major variables ranges from 1.13 to 4.52. Besides, the tolerance values for main variables with interaction elements span from 0.100092 to 0.605912. Furthermore, the values of VIF for all elements span between 1.65 and 9.99. The results demonstrate that the tolerance for all factors is larger than 0.1, and so the VIF is smaller than the 10 recommended by Hair et al. (2011). As a result, the VIF tolerances of the variables in this study are within the recommended ranges.

Table 3: Variance Inflation Factor (VIF)

Δ INF	4.52	0.221279
Capital Ratio	1.58	0.632031
Total assets	1.51	0.661271
Liquidity Ratio	1.47	0.680090
ROA	1.13	0.885050
Mean VIF	**2.04**	
Δ IR× Liquidity Ratio-1	9.99	0.100092
Δ GDP × Liquidity Ratio-1	7.75	0.129056
Δ INF ×Capital Ratio -1	7.67	0.130422
Δ IR ×Capital Ratio -1	7.20	0.138971
Δ GDP ×Capital Ratio -1	6.32	0.158165
Capital Ratio	4.62	0.216538
Total assets	4.24	0.236018
Δ IR ×ROA -1	3.96	0.252580
Liquidity Ratio	2.97	0.3369720
Δ GDP ×ROA -1	1.79	0.560182
ROA	1.65	0.605912
Mean VIF	5.28	

4.3. Unıt Root Test

Table 4 depicts the unit root test in China. Based on the country sample, the dependent variable (Ln amount loan) does not have a unit root. The calculated ADF test value with lags (0) in the general sample is -89.354, and the PP test value with lags (0) is -208.09. The GDP, INF, IR GDP, IR, INF, capital ratio, total assets, liquidity ratio, and the interaction factors of the country of China do not have a unit root. There is a stationery as a result. Interestingly, none of the variables under evaluation have a unit root problem, as shown by table 4, and the data are stationary. Additionally, both the dependent and independent variables' p-values are significant. Thus, we disregard H0 and accept H1. This indicates that the data are steady and that none of the study's variables have a unit root issue.

Table 4: Unit Root Test

Variables	ADF*	Lags	PP**	Lags
Main variables				
Ln Δ amount Loan	-89.354	0	-208.09	0
Liquidity Ratio	-3.0122	0	-8.4701	0
Capital Ratio	-8.1641	0	-14.054	0
Ln total assets	-21.378	0	-33.864	0
ROA	18.9282	0	843.924	0
ΔGDP	-70.100	0	-157.48	0
Δ IN	-58.921	0	-101.75	0
Δ IR	-64.121	0	-147.12	0
Interaction variable				
Δ GDP × Liquidity Ratio-1	-35.001	0	-58.132	0
Δ GDP × Capital Ratio -1	-74.331	0	-154.57	0
Δ INF × Liquidity Ratio-1	-19.471	0	-22.178	0
Δ INF × Capital Ratio -1	-21.177	0	-25.027	0
Δ IR × Liquidity Ratio-1	-13.893	0	-15.755	0
Δ IR ×Capital Ratio -1	-12.797	0	-14.744	0
Δ GDP × Ln total assets-1	-67.567	0	-155.40	0
Δ GDP × ROA -1	-19.126	0	-26.283	0
Δ INF × Ln total assets-1	-56.181	0	-93.857	0
Δ INF × ROA-1	-21.263	0	-23.808	0
Δ IR × Ln total assets-1	-63.264	0	-144.48	0
Δ IR ×ROA -1	-13.644	0	-14.213	0

Note: *ADF (Augmented Dickey Fuller), **PP (Philip- Perron)

5. FURTHER DISCUSSIONS, FIXED EFFECT MODEL

In the bank scope of China, there are 216 commercial banks included, all of which have unbalanced panel data. The following equation calculates the correlation between the loan amount and the bank-level determinants using the pooled OLS and fixed effect analysis:

$Ln\ \Delta amount$ loan it= 1.04+0.018 ΔIRt-0.002Δ GDPt + 0.009ΔINF − 1.003 CAP − 1.05 LIQ + 0.83 size + 0.00.12(ΔIRt×CAPit−1) CAPit−1)+0.03(ΔIRt× LIQit−1)−0.006(ΔGDPt×CAPit−1)+ 0.006(ΔGDPt × LIQit−1)+ 0.085(ΔINFt× CAPit−1) - 0.027 (ΔINFt LIQit−1) -0.00042 (Δ GDP × 0.001+ 0 .001 (ΔGDP× ROA)+ 0.001 (ΔINF× Size) -0.018 (ΔINF× ROA) – 0.004 (ΔIR × Size) + 0.025 (Δ IR ×ROA)+ εit

Table 5: Fixed Effect Model

Variables	Fixed effects (within) regression	P-value	Robust Standard Error
TA	0.8327644	0.000***	0.0276766
Standard Error	0.0152172		
ROA	0.0944011	0.019**	0.0399401
Standard Error	0.0143111		
LIQ	-1.049879	0.000***	0.1074435
Standard Error	0 .0621728		
CAP	-1.003637	0.231	0.8347947

Standard Error	0 .1781264		
ΔGDP	-0.0020702	0.803	0.0083058
Standard Error	0 .008374		
Δ INF	0.0089159	0.791	0.0336248
Standard Error	0 .0319895		
Δ IR	0.0184682	0.817	0.0795965
Standard Error	0 .0831198		
Δ GDP x LIQ	0.0066523	0.518	0.0102651
Standard Error	0 .0067868		
Δ GDP x CAP	-0.0066739	0.848	0.0347033
Standard Error	0 .0195406		
Δ INF x LIQ	-0.0272305	0.349	0.0347033
Standard Error	0 .0279897		
Δ INF x CAP	0.0847229	0.512	0.0289914
Standard Error	0 .0674581		
Δ IR LIQ	0.0362019	0.679	0.1289585
Standard Error	0 .0715775		
Δ IR x CAP	0.1245168	0.527	0.0873792
Standard Error	0.1616176		
Δ GDP x TA	-2.27E-04	0.686	0.1962553
Standard Error	0.0007169		
Δ GDP x ROA	0.0013645	0.355	0.0005596
Standard Error	0.0014035		
Δ INF x TA	0.0010302	0.62	0.0014704
Standard Error	0 .0026983		
ΔINF x ROA	-0.0179056	0.017**	0.0020755
Standard Error	0.0068388		
Δ IR x TA	-0.0047882	0.434	0.0074285
Standard Error	0.0071479		
Δ IR x ROA	0.0246422	0.349	0.0061078
Standard Error	0.00211206		
Constant	1.040717	0.001	0.262581
Standard Error	0 .1687106		
R-sq:	within = 0.8907		
	between = 0.9655		
	overall = 0.9685		
chi2(19) = (b-B)'[(V b-V B)^(- 1)](b-B)	136.44	Hausman test	

Note: This table presents the relationship between variables based on unbalanced panel data. The dependent variable is the amount of the loan; the independent variable is the interest rate (AIR); gross domestic product (AGDP); inflation rate (AINF); capital ratio (CAP); liquidity ratio (LIQ); total assets (size); and return on assets (ROA). Tables shown are the coefficients of the variables, with the symbols ***, **, and * denoting the significance levels at 1%, 5%, and 10%, respectively, while the p-values shown in the parentheses are computed using panel-corrected standard errors. robust to heteroskedasticity and serial correlation. The DW statistic is the Durbin-Watson d test for autocorrelation. The asymptotic test statistic of the groupwise heteroskedasticity test shows Chi-square (n) scores, while the Wooldridge test for serial correlation shows the F statistic.

According to Table 5, a GLS regression with robust standard error correction in China was performed with a fixed effect model, and the p-values that were significant at 1,5 and 10 percent were accepted. The size (independent variable) is statistically significant and positively computed (coefficient = 0.83), with a p-value of 0.000p<0.01. According to the findings, hypothesis H0 is rejected and hypothesis H1 is not rejected. This shows that the variable of size determines the amount of loan in the Chinese economy from 2009 to 2018. Based on the liquidity ratio (an independent variable), it is statistically significant but negatively computed (coefficient = -1.04) with a p-value of 0.000 p < 0.01. According to the findings of this study, H0 is rejected and H1 is not rejected. This shows that the liquidity ratio variable influenced the amount of loan in the Chinese economy from 2009 to 2018. The return on assets (an independent variable) is statistically significant and positively computed (coefficient = 0.094) with a p-value of 0.019 p < 0.05. According to the findings of this study, the hypotheses H0 and H1 are rejected. This indicates that the variable of return on assets influenced the amount of loans in China's economy from 2009 to 2018. The interaction between inflation and return on assets (an independent variable) significantly but negatively affects the amount of loan (a dependent variable) computed (coefficient = 0.018) with a p-value of 0.017. According to the findings of this study, the hypotheses H0 and H1 are rejected. This indicates that the variable of interaction between Δ inflation and return on assets influences the amount of loans in China's economy from 2009 to 2018.

Other main and interaction variables such as ΔGDP, Δinflation rate, Δinterest rate, and interaction ΔGDP and liquidity ratio, interaction Δinflation rate and liquidity ratio, interaction Δinflation and capital ratio, interaction Δinterest rate and liquidity ratio, interaction Δinterest rate and capital ratio, interaction AGDP and size, interaction AGDP and return on assets, interaction Δinterest rate and size, interaction Δinterest rate and return on assets are insignificant. This means that these variables did not influence the amount of loan in China country from 2009 to 2018.

6. CONCLUSION

This work studied the credit channel of the monetary policy transmission mechanism MPTM in developing countries such as China, applying commercial banks from 2009 to 2018. The findings of the study have shown that, according to empirical results, the author of this research has established that in China.

The interaction between interest rate, capital ratio, and loan amount is only significantly and positively correlated in China. The capital ratio, total assets, and return on assets hypotheses all have a statistically significant and positive impact on the loan amount. The robust standard error coefficient was positive, indicating that there was a likely causal link between the variables. Additionally, the size of the loan is statistically significantly negatively affected by the liquidity ratio. The results demonstrate that macroeconomic factors like interest rates, GDP, and inflation have a statistically insignificant positive impact on loan amounts. Consequently, this study revealed sufficient support for the hypothesis that the size of the loan has no significant influence.

According to findings from China's statistics, the capital ratio, GDP, inflation, and ROA interactions have a statistically significant but negative impact on the loan amount. This study revealed sufficient data to disprove the notion that there is a significant and negative interaction between the size of the loan and GDP as well as bank capital. The amount of the loan is statistically influenced positively by the inflation-total-assets interaction hypothesis. According to findings from China's statistics, the capital ratio, GDP, inflation, and ROA interactions have a statistically significant but negative impact on the loan amount. A likely causal association between the components was shown by a robust standard error coefficient that was negative.

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