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-RESEARCH ARTICLE-

ANALYZING CHINA'S MONETARY POLICY: A PRE- AND POST-US TRADE WAR PERSPECTIVE

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—Abstract—

This study examines the evolution of China's monetary policy before and after the trade war with the United States, with a particular focus on interest rates and the money

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supply. Employing Granger causality tests on data spanning from January 2015 to May 2021, we evaluate the effectiveness of these monetary instruments on various economic variables. The analysis of the pre-trade war period (2015-2017) reveals that both interest rates and M2 had limited impacts, while the exchange rate exerted a significant influence. Conversely, during the post-trade war period (2018-2021), interest rates remained ineffective, whereas M2 notably affected exports and imports, indicating a strategic policy shift by Chinese authorities. This shift is attributed to M2's adaptability in responding to external shocks, coupled with the structural characteristics of China's financial system. Based on these findings, we recommend several policy measures: enhancing interest rate transmission mechanisms, utilizing M2 for dynamic liquidity management, and improving the coordination between monetary and fiscal policies. Additionally, effective inflation management and fostering international cooperation are deemed essential. The implementation of these strategies is expected to strengthen China's monetary policy framework, facilitating improved management of external economic shocks and promoting a stable economic environment.

Keywords: Monetary Policy, Trade War, Interest Rate, M2, China

JEL Classification: E42, F41, G28

INTRODUCTION

As the largest developing country, China has experienced remarkable economic growth over the past four decades, with an average annual GDP expansion of 9% attributable to its reform and opening-up policies. However, despite this rapid growth, China is now confronting new internal pressures and external challenges, particularly in light of escalating trade frictions with the United States. This situation signifies a critical shift in the stage of China's economic development. It is essential to identify these challenges and comprehend the gaps in existing research to effectively analyse the impacts of these global dynamics on China's monetary policy.

As noted by Li et al. (2018), both China and the United States have incurred substantial economic damage as a result of the trade war. The ongoing trade conflict has underscored the necessity for a strategic monetary policy response aimed at stabilising growth and alleviating adverse impacts. Consequently, the implementation of a monetary policy that addresses China's specific economic needs is imperative for fostering steady and rapid development, thereby imposing greater demands on the government's policy formulation. This study aims to investigate how China's monetary policy has adapted to these challenges, with a particular focus on the shifts in response to the trade war and the COVID-19 pandemic. The research intends to address existing gaps in the literature by evaluating the specific mechanisms through which these global events have influenced policy shifts (Leikuma-Rimicane et al., 2022).

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Monetary policy is essential for effective macroeconomic management. Prior to the 1970s, Keynesian policies aimed to address insufficient demand through increased government expenditure; however, this approach ultimately contributed to the phenomenon of "stagflation" (Nelson & Nikolov, 2004). In the post-1980s period, the emphasis of monetary policy shifted towards inflation control through various monetary measures (Taylor, 1995). These theoretical frameworks have been widely endorsed and implemented by numerous governments (Goodfriend & King, 1997). The historical progression of monetary policy—from Keynesian demand management to a focus on inflation control—provides the theoretical foundation for this study, highlighting the necessity of adapting policies in response to evolving economic conditions (Rajabto et al., 2022).

China's monetary policy is designed to regulate currency and credit in order to achieve macroeconomic objectives, which include final goals, policy instruments, operational indicators, and intermediary targets. A central aim is often to strike a balance between economic growth and price stability (Goodfriend & Prasad, 2007). Key instruments employed in this framework include financing schemes, central bank credit facilities, interest rate policies, and cash reserve requirements. The operational metrics primarily focus on the deposits held by specialised banking institutions at the central bank, as well as the primary currency. The intermediate objectives typically involve managing variables such as the currency in circulation, M2 money supply, and the volume of loans issued by national banking entities. This research specifically examines how China’s monetary policy—particularly its objectives of managing currency and credit while balancing economic growth with inflation—has evolved in response to external shocks, including the trade war and the COVID-19 pandemic. In doing so, it seeks to address critical questions regarding the effectiveness of these policy shifts (Song & Kim, 2024).

The ongoing trade war between the United States and China, originating from trade imbalances and influenced by evolving political relations and international developments, generates considerable uncertainties for both economies and the global market (Degasperi et al., 2020). Notably, fluctuations in exchange rates and the effects of tariffs have a significant impact on export trade. Understanding the monetary policies of both the United States and China within the framework of their respective economic interests is essential. In response to the trade war, the United States, under Trump's tax reduction policies, implemented a combination of "expansionary fiscal policy and slightly tighter monetary policy," whereas China adopted a strategy of "proactive fiscal policy alongside neutral loose monetary policy" to mitigate the impacts of the trade conflict (Bown, 2021; Caliendo & Parro, 2023).

Monetary policy exerts an indirect influence on aggregate demand by managing the money supply, interest rates, and credit availability, with the objective of achieving a balance between aggregate demand and supply. An increase in the money supply

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enhances market liquidity, which can lead to a decrease in bank interest rates, while a reduction in the money supply diminishes liquidity, potentially resulting in higher rates. During periods of economic recession, China utilises expansionary monetary policy to increase the money supply. Conversely, during inflationary periods, a contractionary policy is implemented to reduce the money supply and withdraw excess liquidity (Bernanke & Gertler, 1995).

The trade war intensifies these dynamics, necessitating adjustments in China's monetary policy to mitigate external shocks. By lowering interest rates and increasing the money supply, the policy facilitates external funding for enterprises, thereby reducing capital costs and promoting production, which in turn stimulates trade. However, an overly accommodative policy can lead to heightened inflation (Svensson, 1999). In response to rising inflation, the central bank may opt to increase interest rates, which restricts credit availability, curtails consumption and investment demand, and ultimately controls inflation by moderating price increases (Bernanke & Mishkin, 1997).

In 2020, the COVID-19 crisis presented a significant global challenge. The United States responded by implementing a loose monetary policy, reducing interest rates to stimulate economic activity (Bhar & Malliaris, 2021). Similarly, China adopted a loose monetary policy; however, it implemented slight tightening measures post-2021 to mitigate financial risks and maintain stability during its recovery from the pandemic (Wei & Han, 2021). This dual challenge of a trade war and a global pandemic has underscored the critical role of monetary policy in fostering economic stability and growth. By comprehending these dynamics, policymakers can more effectively navigate the complexities of China's economic environment, thereby ensuring sustainable growth and stability amid international challenges. The strategic application of monetary policy in response to both the trade war and other external pressures highlights its significance in maintaining economic resilience. The interest rate, which reflects the balance between the supply and demand for money, represents the cost of borrowing or lending funds. Concurrently, monetary policy functions as a mechanism for regulating the flow and accessibility of currency within the economy. Under a prudent monetary policy framework, the maintenance of stable interest rates helps prevent excessive speculation among market participants. As illustrated in Figure 1, China has consistently upheld a relatively stable level of interest rates. Even following the escalation of trade frictions between the United States and China in March 2018, China refrained from significantly lowering interest rates to stimulate economic growth in response to these tensions.

China's significant reduction of interest rates occurred in the spring of 2020, primarily as a response to the challenges posed by the global COVID-19 pandemic. Despite the severity of this crisis, the Chinese government remained committed to maintaining

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control over interest rates. Within six months of the initial outbreak, China successfully managed to contain the epidemic, leading to a rebound in interest rates to pre-pandemic levels. This timely adjustment effectively mitigated the risk of excessive speculation that could arise from persistently low interest rates.

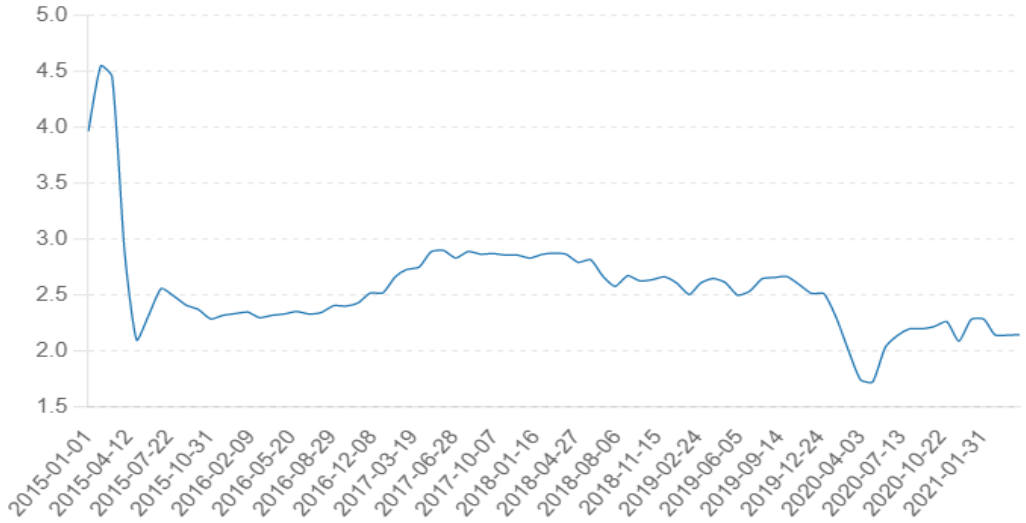

Figure 1: Interest Rate of China (Jan 2015 - May 2021)

Interest rates are a critical mechanism for regulating the money supply. Maintaining stable interest rates poses challenges when attempting to inject a substantial amount of money into the market through rate reductions. However, to support economic growth, it is essential for the money supply to increase concurrently; otherwise, the risk of deflation may arise. As illustrated in Figure 2, China's M2 money supply (seasonally adjusted) has demonstrated consistent growth. This trend ensures that China avoids currency shortages during its sustained economic development.

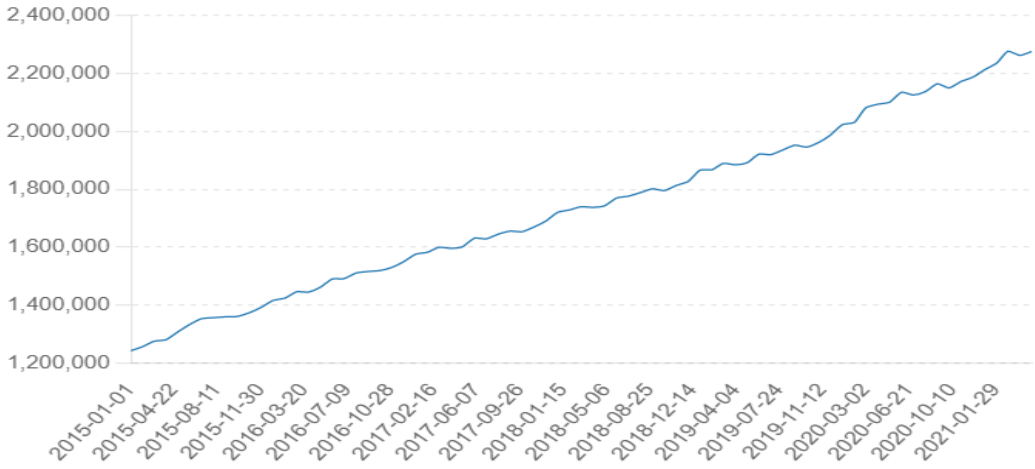

Figure 2: M2 of China (Jan 2015 - May 2021)

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As illustrated in Figure 3, there is a clear relationship between the exchange rate and the CPI. When the CPI line falls below 100, it signifies a reduction in the prices of goods, a phenomenon that has been infrequently observed in China over recent years. This study posits that this occurrence is associated with exchange rate inflation, as inflation of the renminbi (RMB) can generate a deflationary effect. The inflationary trend of the RMB, alongside deflation in the United States, corresponds with the trend observed in the CPI. In response to this situation, China aims to increase the M2 money supply to alleviate the deflationary pressures, rather than reducing interest rates, which could introduce systemic financial risks.

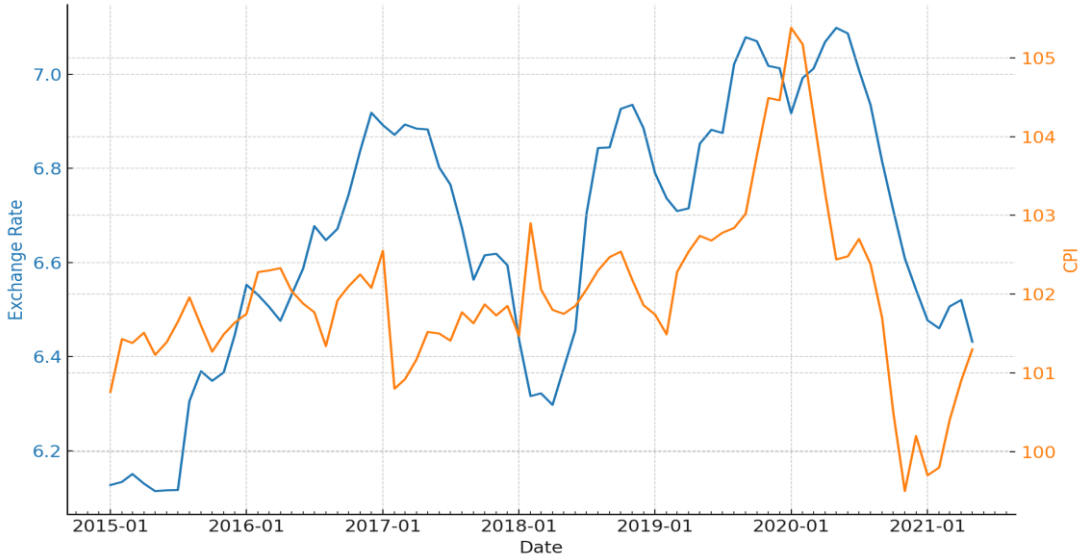

Figure 3: Exchange Rate and CPI of China (Jan 2015 - May 2021)

This study identifies a strategic shift in China's monetary policy following the trade war, emphasising the growing importance of the money supply (M2) relative to interest rates (Int) in influencing exports and imports. It also provides policy recommendations aimed at enhancing the effectiveness and coordination of monetary instruments in addressing external economic shocks. The structure of the document is as follows: Chapter 2 reviews relevant scholarly literature; Chapter 3 outlines the practical methodology employed; Chapter 4 presents the findings derived from this methodology; Chapter 5 summarises the conclusions and offers recommendations; and, finally, Chapter 6 provides a comprehensive recap of the entire study.

LITERATURE REVIEW

The Reasons for a Trade War between China and the US

Since 2018, the escalation of US-China trade frictions has attracted considerable scholarly attention globally. The core of a trade war lies in the competition for

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developmental opportunities and market supremacy, reflecting a conflict of trade interests between nations. The trade war initiated between China and the US has gained international focus, highlighting a more profound struggle over developmental prospects and market control. A comprehensive trade war encompasses a range of trade frictions, competitive actions, retaliatory measures, and counterretaliations. The manifestations of a trade war include tariff barriers, price undercutting, currency devaluation, economic sanctions, and unilateral actions. Scholars have investigated various forms of trade frictions, such as tariffs, currency manipulation, and unilateral sanctions, as critical components of this trade war. Liu and Woo (2018) identify several primary motivations behind the US's decision to initiate a trade war with China.

China's sustained trade surplus is viewed as a hindrance to job creation in the United States. The US contends that the growing bilateral trade imbalance with China has contributed to increasing unemployment rates in the American manufacturing sector and has negatively impacted the overall health of the US economy. In response, the US administration has enacted protectionist measures, attributing the trade war to China's trade practices. This surplus is interpreted as evidence of China's protectionist policies and its reluctance to be recognised as a market economy. Furthermore, allegations have been made regarding China's illegal and unfair acquisition of American technology. In recent years, the US has implemented stringent measures to curtail China's access to high-tech products, citing national security concerns. Since the onset of the trade war, the US has employed various strategies to limit China's engagement in the high-tech sector, including imposing restrictions on high-tech companies and products entering the American market. Finally, the US perceives China as a threat to its national security and international standing. The overarching goal of US policy towards China is to maintain global hegemony, prevent China from challenging its leadership as a rising power, and continue to promote its political values.

Although the trade imbalance between China and the United States may seem to be a direct consequence of bilateral trade, it is shaped by various factors. These factors include disparities in economic development levels, differences in factor endowments, methodologies for trade valuation, trade structures, export controls, and fluctuations in exchange rates. Hausmann et al. (2007) argue that the economic development gap between China and the US significantly affects the technological and trade complementarity inherent in their bilateral trade, suggesting that the trade imbalance is a normal occurrence that complicates efforts to achieve trade equilibrium between the two nations. Upward et al. (2013) attribute the growth of China’s high-tech export sector to the increasing prominence of exports, which heavily rely on imported components and materials. Furthermore, it has been noted that the sophistication of Chinese exports has been on the rise, largely driven by advancements in expertise and technological progress within the manufacturing sector. McKinnon (200) points out that the US has exerted pressure on China to allow the RMB to appreciate. However,

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Chinese financial authorities have opted to maintain RMB exchange rate fluctuations within a narrow band to sustain the competitiveness of their export sector. The US has accused China of engaging in currency manipulation, a practice that is frequently cited as a significant contributor to trade tensions between the two countries.

Development of China's Monetary Policy

Scholars have extensively analyzed the evolution of China's financial strategies, documenting the transition from a centralized economic model to one that incorporates market-oriented principles. The People's Bank of China (PBOC) has consistently modified its policy instruments and framework to foster economic growth, ensure price stability, and mitigate financial risks. Over time, China's monetary policy has undergone substantial transformation, shifting from direct administrative controls to more market-driven approaches, especially in response to external shocks such as the trade war and the global financial crisis. In the early stages of economic restructuring, China's fiscal policy was primarily characterized by explicit regulations and bureaucratic interventions. The PBOC predominantly employed credit quotas and interest rate controls to regulate monetary conditions. During this era, the central bank wielded considerable authority over credit allocation, favoring state-owned enterprises and critical industries, which resulted in constrained market mechanisms.

The monetary reforms of the 1990s, particularly the implementation of open market operations and the liberalization of interest rates, were crucial for China's transition towards a market-oriented economy. These reforms established the foundation for China's contemporary strategies in addressing both domestic and international economic challenges. The incorporation of indirect monetary policy instruments, such as open market operations, reserve requirements, and central bank lending rates, enhanced the efficiency and effectiveness of monetary policy within an increasingly intricate and market-driven financial system (Goodfriend & Prasad, 2007; Ping, 2004). Following its accession to the World Trade Organization (WTO) in 2001, China's increasing engagement in the global economic arena necessitated a more sophisticated approach to monetary policy. The PBOC redirected its focus toward utilizing interest rates and currency exchange mechanisms as instruments for controlling inflation and ensuring economic stability. The establishment of a more flexible exchange rate system in 2005 represented a significant milestone in this strategic transition. The global economic crisis of 2008-2009 presented unprecedented challenges, prompting the PBOC to adopt an exceptionally accommodative monetary policy. In response, the central bank significantly lowered interest rates and reserve requirements while injecting substantial liquidity into the economy to stimulate growth and maintain financial stability (Lardy, 2012).

In recent years, the People's Republic of China has adjusted its monetary policy to balance economic growth with fiscal stability. The PBOC has adopted a neutral stance

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to prevent asset bubbles and mitigate systemic risks while fostering sustainable growth (Huang et al., 2019). This includes implementing macroprudential policies and enhancing its toolkit with strategies such as the Medium-Term Financing Facility (MFF) and the Secured Additional Credit (SAC), reflecting a more sophisticated approach. Furthermore, the trade tensions between China and the United States have introduced an additional layer of complexity to the policy considerations of the PBOC. The central bank is required to address intricate external shocks while ensuring domestic economic stability, which encompasses monetary easing, exchange rate management, and structural reforms aimed at strengthening the resilience of the financial system (Filardo et al., 2016).

Hypothesis

Economic theories posit that interest rates significantly influence trade dynamics by affecting exchange rates, which in turn impact export and import volumes. Elevated interest rates typically result in the appreciation of the domestic currency, rendering exports less competitive in the international market, while lower rates have the opposite effect. For instance, an increase in interest rates generally enhances the value of the local currency, making exports more expensive and reducing the cost of imports. Dawson and Hubbard (2004) examined this phenomenon and found that interest rates significantly affect trade volumes in Central and Eastern European countries during their transitional phases. Similarly, Aristotelous (2001) highlighted that exchange rate volatility, influenced by interest rates, is critical in determining trade flows between Germany and the United States. Edwards (1993) also noted that higher interest rates in developing countries diminish export competitiveness due to currency appreciation (Chen, 2024).

The money supply, particularly M2, plays a crucial role in influencing international trade dynamics. An increase in monetary circulation typically leads to lower interest rates, which depreciates the value of the domestic currency, resulting in more competitive exports and higher costs for imports. Ghartey (1993) provided empirical evidence indicating that variations in the money supply directly impact trade balances by affecting domestic currency valuations. Furthermore, Feder (1983) demonstrated a positive relationship between the growth of the money supply and export performance, suggesting that enhanced liquidity in the economy improves production capabilities and bolsters international competitiveness (Cordeiro-Rodrigues, 2022).

The research conducted by A. Giles and Williams (2000) further investigates this relationship, demonstrating that increases in the money supply can promote export-led growth by boosting economic activity and enhancing production capacities. In contrast, Dawson and Hubbard (2004) noted that an excessive increase in the money supply might generate inflationary pressures, thereby undermining the competitive advantages associated with a depreciated currency. Based on the theoretical frameworks and

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empirical research examined, this study formulates the following hypotheses to explore the effects of interest rates and M2 on China's trade performance amid the US-China trade war and other external economic challenges. By connecting these hypotheses to the gaps identified in the existing literature, this research aims to enhance the understanding of the role of monetary policy in shaping international trade dynamics.

H1: *The level of interest rates greatly influences export activity.*
H2: *The influence of interest rates on import levels is considerable.*
H3: *The monetary aggregate M2 plays a crucial role in affecting export dynamics.*
H4: *M2 has a significant impact on Import.*

Interest rates and M2 serve as fundamental instruments of monetary policy. This study investigates their distinct impacts on export and import performance, thereby offering a more comprehensive understanding of how adjustments in monetary policy react to external shocks, including the US-China trade war.

DATA AND METHODOLOGY

Data

On March 23, 2018, President Donald Trump of the United States signed a memorandum that authorized significant tariffs on Chinese imports, imposing duties on goods valued at approximately $60 billion. Additionally, the memorandum restricted Chinese entities from participating in merger and acquisition activities within the United States. This action marked the commencement of the trade conflict between the United States and China, concurrently signaling alarm in the international financial markets. Research suggests that although the formal implementation of tariff measures commenced in March 2018, discussions and rhetoric surrounding trade tensions had already considerably influenced market expectations and economic activities in the months leading up to this date (Zeng et al., 2022). Additionally, another study indicates that by early 2018, markets had begun to respond to anticipated policy changes, demonstrating the rapid adjustments made by market participants in response to uncertainty (de Nicola et al., 2020). Collectively, these studies indicate that the market dynamics and policy dialogues of early 2018 significantly shaped the economic environment. The analysis utilizes monthly statistics from the Wind database, covering the period from January 2015 to May 2021. This timeframe is further divided into two distinct intervals: January 2015 to December 2017, and January 2018 to May 2021. The escalation of trade tensions between the United States and China serves as a critical delineation for examining changes in China's fiscal strategy in the periods preceding and following the trade conflict. Table 1 presents the factors considered for this research.

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Table 1: List of Variables

Variables	Descriptions	Unit of Measurement	Sources
Int	Interest Rate	Percent	Wind
ExRate	Exchange Rate	Percent	Wind
CPI	Consumer Price Index	Percent	Wind
M2	Broad Money	RMB(hundred million)	Wind
Exp	Export	RMB(hundred million)	Wind
Imp	Import	RMB(hundred million)	Wind

Unit Root Test

Augmented-Dickey Fuller (ADF) Test

The Augmented Dickey-Fuller (ADF) test represents an advanced extension of the traditional Dickey-Fuller test, designed to assess the presence of a unit root in a time-series dataset. This test incorporates lagged values of the dependent variable to address autocorrelation within the residuals. Furthermore, the inclusion of the lagged difference of the variable y_t in the ADF test aids in reducing higher-order serial correlation.
The equation for the ADF test is articulated as follows:

$$\Delta y_t = \psi y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + u_t \qquad (1)$$

μ represents a fixed parameter, whereas β signifies the slope associated with a temporal progression. Meanwhile, p indicates the degree of the autoregressive process's delay, and Ɛ stands for the residual component. The assessment of stationarity can be further elucidated through the following hypotheses:

$$H_0 : \psi = 0$$
$$H_1 : \psi < 0$$

The test statistic of DF equation(2) refers to

$$DF = \frac{\hat{\gamma}}{\mathrm{SE}(\hat{\gamma})} \sim \tau \text{ distribution} \qquad (2)$$

Additionally, the null hypothesis is rejected if the calculated DF statistic exceeds the critical values established by MacKinnon, indicating that the time series y_t is integrated of the first order. To identify the most appropriate lag length for the unit root test, it is essential to select the lag that minimizes the information criteria, including the Akaike Information Criterion (AIC), as illustrated in equation (3), and Schwarz's Bayesian Information Criterion (BIC) as presented in equation (4).

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$$AIC = n\sum \tilde{\varepsilon}_t^{\ 2} + 2m \qquad (3)$$

$$BIC = n\sum \tilde{\varepsilon}_t^{\ 2} + m\ln n \qquad (4)$$

In the given statistical model, ε_t represents the remainder from conducting a unit root test regression analysis, whereas m denotes the coefficient within the regression framework, incorporating a constant term as part of its composition.

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

The effectiveness of the ADF test diminishes when the time series is near the boundary of non-stationarity. To reinforce the findings from the unit root analysis, additional tests for stationarity are employed. In this context, the KPSS test, introduced by Kwiatkowski et al. in 1992, is utilized. The KPSS test serves as a complementary unit root test that accounts for a time trend, as represented in equation (5).

$$y_t = \mu + \beta t + \varphi\sum_{i=1}^{t}\varepsilon_{t-1} + u_t \qquad (5)$$

In the scenario where μ remains unchanged, u_t represents a stable process, with the preceding error ε_{t-1} adhering to an i.i.d distribution with mean (0,1). Assuming the null hypothesis holds true, the sequence y_t is considered stable. In contrast, under the alternative hypothesis, y_t is deemed unstable. Consequently, by default, the sequence is perceived as stable under the assumption of the null hypothesis.

$H_0: y_t \sim I(0)$
$H_1: y_t \sim I(1)$

Vector Autoregression (VAR)

The multivariate time series are analyzed using the VAR model, denoted as VAR(p), which extends the fundamental univariate autoregressive framework. When the k variables are not co-integrated, the VAR model with lag p can be expressed as shown in equation (6).

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + \varepsilon_t \qquad (6)$$

Where y_t defined as ($y_{1,t}$, $y_{2,t}$,$y_{k,t}$) of $k \times 1$ vector, each c is a $k \times 1$ vector of constant (intercept), each A_i is a $k \times k$coefficient matrix and ε_i is $k \times 1$ error terms vector.

The duration of the lag in the VAR(p) model can be ascertained through the application of model selection criteria. The conventional Akaike Information Criterion (AIC) is

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represented by formula (7).

$$\text{AIC} = n\sum \widehat{u_t}^2 + 2(k+1) \qquad (7)$$

Where u_t is the residuals applied in selecting a lag length.

Granger Causality Test

Causality examinations aim to evaluate the predictive significance of prior indicators. Granger's test, developed in 1969, operates within a two-variable framework, suggesting that if variable x Granger-causes variable y, the mean squared error (MSE) of predicting y using historical data from both variables will be lower than if it relies solely on y's past values. The autoregressive model used in Granger causality analysis is represented in equation (8). Notably, differencing is applied only to variables exhibiting unit roots.

$$\Delta y_t = \alpha + \sum_{i=1}^{p} \beta_i \, \Delta y_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta x_{t-i} + \varepsilon_t \qquad (8)$$

The testing joint hypothesis is as follow.

$$H_0 : \gamma_1 = \gamma_2 = ... = \gamma_p = 0$$

H1: At least one of the γ_i is not equal to zero

If the asymptotic chi-square test rejects the null hypothesis, it confirms a causal relationship where the preceding indicator x influences the concurrent indicator y. A significant test statistic indicates that x can predict changes in y better than y's past data. Granger's causality analysis evaluates the causal direction among equity style indices, stock indices, and economic indicators using constrained test statistics, as shown in equation (9). The model parameters are assessed with an optimal lag length, assuming no Granger causality exists between the two series, as suggested by (Engle & Granger, 1987).

$$\text{F} = \frac{(RSS_R - RSS_U)/\, p}{RSS_U /(n-2p-1)} \qquad (9)$$

Where RSS_R is the residual sum of squares of a restricted model, while the RSS_u is the residual sum of the square of an unrestricted model; n represents sample size, and p is the number of restricted parameters.

RESULTS

Descriptive Statistics

This study employs monthly data from January 2015 to May 2021, segmented into two distinct sub-periods. The first sub-period, encompassing January 2015 to December

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2017, reflects the pre-US-China trade war context, while the second sub-period, spanning January 2018 to May 2021, pertains to the post-trade war phase. Table 2 outlines the variables utilized in this analysis.

Table 2: Descriptive Statistics

Variables	Int	ExRate	M2	Exp	Imp	CPI
Panel A: Before Trade War Break: Jan/2015 - Dec/2017						
Mean	2.68	6.54	1478569	1863.25	1421.16	101.66
Median	2.50	6.57	1491025	1906.70	1420.80	101.64
Maximum	4.54	6.91	1690235	2317.90	1771.70	102.55
Minimum	2.09	6.11	1242710	1200.80	935.50	100.76
Std. Dev.	0.55	0.26	132531	225.93	177.55	0.42
Skewness	2.22	-0.31	-0.13	-1.00	-0.22	-0.11
Kurtosis	7.59	1.95	1.81	4.94	3.57	2.69
Jarque-Bera	61.47	2.22	2.20	11.65	0.79	0.22
Probability	0.00	0.32	0.33	0.00	0.67	0.89
Sum	96.72	235.46	53228494	67077.2	51162	3660.07
Sum Sq. Dev.	10.83	2.43	6.15E+11	1786608	1103440	6.36
Observations	36	36	36	36	36	36
Panel B: After Trade War Break: Jan/2018 - May/2021						
Mean	2.44	6.76	1973778	2155.10	1779.39	102.24
Median	2.53	6.84	1945601	2167.40	1784.75	102.30
Maximum	2.87	7.09	2276488	2819.28	2273.36	105.38
Minimum	1.72	6.29	1720814	803.80	1311.20	99.50
Std. Dev.	0.30	0.25	175458.5	348.83	206.63	1.36
Skewness	-0.60	-0.41	0.20	-1.39	0.10	0.15
Kurtosis	2.56	1.85	1.74	7.41	3.41	3.12
Jarque-Bera	2.80	3.41	2.98	46.59	0.36	0.18
Probability	0.24	0.18	0.22	0.00	0.83	0.91
Sum	100.36	277.29	80924912	88359.44	72955.30	4192.17
Sum Sq. Dev.	3.63	2.50	1.23E+12	4867431	1707831	74.33
Observations	41	41	41	41	41	41

Unit Root Test Results

Upon examining Table 3, Panel A reveals that the first differentiation of LNInt, LNExRate, and LNM2 results in stationarity, indicating that these variables, while non-stationary in their original form, achieve stationarity after differentiation, thus exhibiting first-order integration (I(1)). In contrast, LNExp, LNImp, and LNCPI are stationary at their original levels, signifying that they are I(0) series, requiring no differencing. Furthermore, Panel B of Table 3 indicates that LNInt, LNExRate, LNM2, and LNCPI become stationary after first differencing, reaffirming their classification as I(1) variables during this period, while LNExp and LNImp remain stationary at the original level, categorized as I(0).

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Table 3: Unit Root and Stationary Test Results

Variables	ADF Test		KPSS Test	
	Level	First Difference	Level	First Difference
	Panel A: Before Trade War Break: Jan/2015 - Dec/2017			
LNInt	0.33(0)	0.00(0)***	0.20(3)**	0.31(11)
LNExRate	0.99(0)	0.00(0)***	0.17(4)**	0.37(1)
LNM2	0.33(0)	0.01(0)***	0.20(4)**	0.28(3)
LNExp	0.01(0)***		0.10(1)	0.50(34)
LNImp	0.00(0)***		0.15(3)**	0.12(3)
LNCPI	0.00(0)***		0.16(3)	0.28(18)
	Panel B: After Trade War Break: Jan/2018 - May/2021			
LNInt	0.13(1)	0.00(0)***	0.62(4)**	0.05(3)
LNExRate	0.70(1)	0.01(0)***	0.18(5)**	0.30(4)
LNM2	0.07(0)	0.00(0)***	0.79(4)***	0.10(2)
LNExp	0.00(0)***		0.11(2)	0.50(39)
LNImp	0.01(0)**		0.26(4)	0.34(24)
LNCPI	0.76(1)	0.00(0)***	0.15(5)**	0.14(2)

Note: *, ** and *** denote statistical significance at 10%, 5% and 1% level respectively. The ADF test uses the P value, and the KPSS test uses the statistical value. The figures within brackets signify the ideal delay duration. The symbol Ln indicates that every sequence has been converted into its natural logarithmic form.

Granger Causality Results

As indicated in Panel A of Table 4, during the pre-trade war period (January 2015 to December 2017), the monetary policy tools of interest rates (Int) and M2 did not exert any influence on the other variables. However, the exchange rate (ExRate) significantly affected both Int and M2, exhibiting p-values of 0.02 and 0.00, respectively, at the 5% and 1% significance levels. This suggests that fluctuations in exchange rates were pivotal in shaping both interest rates and money supply, likely reflecting China's strategic response to global market conditions prior to the escalation of the trade war.

As presented in Panel B of Table 4, following the trade war, Int continue to have no effect on the other variables, mirroring the pre-trade war findings. Conversely, M2, another critical instrument of monetary policy, demonstrates a significant influence on both Exp and Imp, with p-values of 0.00 and 0.01, respectively, indicating a notable shift from the pre-trade war scenario. Additionally, the results reveal that Exp serves as a Granger cause of the ExRate, with a p-value of 0.02, while Imp is identified as a Granger cause of M2. Furthermore, the CPI exerts an impact on ExRate, Exp, and Imp.

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Table 4: The Result of Granger Causality Before Trade War and After Trade War

Panel A: Before Trade War Break: Jan/2015 - Dec/2017						
	Independent Variables					
Dependent Variables	DLNInt	DLNExRate	DLNM2	LNExp	LNImp	LNCPI
DLNInt		3.46 (0.02)**	0.89 (0.49)	0.16 (0.95)	0.53 (0.72)	0.46 (0.77)
DLNExRate	0.28 (0.89)		0.49 (0.74)	0.75 (0.57)	0.42 (0.79)	1.40 (0.27)
DLNM2	0.30 (0.87)	5.35 (0.00)***		1.59 (0.21)	4.91 (0.01)**	0.19 (0.94)
LNExp	0.80 (0.54)	0.50 (0.73)	1.81 (0.16)		2.43 (0.08)*	1.39 (0.27)
LNImp	1.36 (0.28)	0.16 (0.95)	1.57 (0.22)	1.01 (0.42)		0.07 (0.99)
LNCPI	0.08 (0.99)	0.32 (0.86)	0.04 (1.00)	0.24 (0.91)	1.03 (0.41)	
Panel B: After Trade War Break: Jan/2018 - May/2021						
	Variables					
Dependent Variables	DLNInt	DLNExRate	DLNM2	LNExp	LNImp	DLNCPI
DLNInt		0.35 (0.84)	0.30 (0.88)	0.36 (0.84)	0.45 (0.78)	0.44 (0.78)
DLNExRate	0.15 (0.96)		2.06 (0.11)	3.72 (0.02)**	0.60 (0.66)	2.28 (0.09)*
DLNM2	1.31 (0.29)	1.65 (0.19)		1.90 (0.14)	2.26 (0.09)*	0.68 (0.61)
LNExp	0.71 (0.59)	0.18 (0.94)	5.47 (0.00)***		0.86 (0.50)	2.61 (0.06)*
LNImp	0.51 (0.73)	0.69 (0.60)	4.51 (0.01)**	0.41 (0.80)		2.46 (0.07)*
DLNCPI	0.38 (0.82)	1.32 (0.29)	0.10 (0.98)	0.28 (0.89)	0.48 (0.75)	

Note: *, ** and *** denote statistical significance at 10%, 5% and 1% level respectively. The figures within brackets signify the ideal delay duration. The symbol Ln indicates that every sequence has been converted into its natural logarithmic form.

DISCUSSION

This study examines the similarities and differences in China's monetary policy before and after the trade war, with the findings presented in Table 5.

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Table 5: Summary Results for the Hypothesis Testing

Hypotheses	Information Flow	Pre-Trade War	After-Trade War
H1	Int→Exp	/	/
H2	Int→Imp	/	/
H3	M2→Exp	/	Support
H4	M2→Imp	/	Support

Trade War's Influence on Monetary Policy Dynamics

As demonstrated in Panel A of Table 4, the pre-trade war period saw no significant impact of Int or M2 on crucial economic indicators such as exports and imports. This finding suggests that these monetary policy instruments were relatively ineffective in affecting broader economic variables during this stable period (Bernanke, 1990). In contrast, the ExRate exhibited a significant influence on both Int and M2, highlighting its essential role within China's monetary framework during this time. The management of the exchange rate functioned as a strategic tool aimed at stabilizing economic conditions in response to external pressures (Obstfeld & Rogoff, 1995).

Following the trade war, there was a notable shift in the effectiveness of monetary policy instruments. As indicated in Panel B of Table 4, Int continued to be largely ineffective in influencing other variables, aligning with the pre-trade war results. This persistent ineffectiveness underscores that interest rates did not serve as a primary tool in China's monetary policy, despite the evolving external environment (Liu & Woo, 2018). In contrast, M2 assumed a more pivotal role following the trade war, emerging as a significant determinant of both Exp and Imp. This shift indicates a strategic recalibration by policymakers, utilizing M2 to alleviate the negative consequences of the trade war. The heightened dependence on M2 underscores its effectiveness in regulating liquidity and credit conditions, which became essential for maintaining trade during this challenging period (Auray, 2023).

Exploring the Efficacy of M2 in China's Monetary Policy

The findings indicate a substantial shift in the role of M2 as a primary monetary policy instrument in China, particularly following the trade war. Several factors elucidate the prioritization of M2 over interest rates:

Firstly, the efficacy of China's monetary transmission mechanisms plays a crucial role in this preference. The weaker transmission of interest rate adjustments—attributable to factors such as the dominance of the banking sector and the gradual process of interest rate liberalization (Xu et al., 2020)—restricts the impact of interest rates on the economy. Consequently, interest rates exhibit limited effectiveness in driving economic change. In contrast, modifications to M2 enable the central bank to directly influence

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market liquidity and credit supply, allowing for a more efficient and immediate response to economic challenges. Secondly, M2 offers greater adaptability in addressing external shocks, such as those posed by the trade war. Adjustments to M2 can be executed more swiftly, resulting in a quicker effect on liquidity and credit availability than the slower response associated with interest rate changes. This characteristic renders M2 a more effective tool during periods of economic uncertainty, particularly those triggered by trade conflicts.

China's distinctive economic structure also elucidates the prioritization of M2. Given the significant role of bank credit within China's financial system, adjustments to M2 exert a direct influence on bank lending, rendering it a more effective tool than interest rates. Furthermore, despite ongoing reforms, interest rates remained somewhat administratively controlled during the trade war, positioning M2 as a more market-oriented and practical instrument. The trade war further necessitated the use of M2 to achieve multiple policy objectives, including stabilizing economic growth, controlling inflation, and ensuring financial stability. Adjustments to M2 provided policymakers with the flexibility to balance these competing goals. For instance, targeted reductions in reserve requirements or increases in lending quotas supported SMEs and export-oriented firms, helping them navigate the risks associated with the trade war (Amiti et al., 2020).

Lastly, external factors such as international capital flows also influenced the decision to prioritize M2. The trade war heightened uncertainty regarding capital flows, making M2 adjustments essential for stabilizing financial markets. Additionally, changes to M2 complemented exchange rate policies, affecting foreign exchange markets and capital flows to maintain the stability of the RMB. Collectively, these factors elucidate why M2 emerged as China's preferred monetary policy tool over interest rates during the trade war. The strategic adjustment of M2 demonstrates its flexibility, rapid transmission effects, and capacity to target specific sectors, thereby providing a more robust approach to maintaining economic stability in the face of trade tensions.

Implications and Policy Recommendations

To strengthen China's monetary policy framework in addressing external shocks, such as the trade war, several recommendations are put forward:

Improve the Interest Rate Transmission Mechanism: Accelerating the Liberalization of Interest Rates and Advancing the Maturity of Financial Markets Will Enhance the Effectiveness of Interest Rates in Influencing Economic Activity. A More Efficient Interest Rate Mechanism Will Ensure That Policy Adjustments Are Transmitted More Effectively Throughout the Economy, Which Is Particularly Crucial for Managing Disruptions Associated with Trade Conflicts.

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Leverage M2 for Dynamic Liquidity Management: The Trade War Underscored the Significance of M2 Adjustments in Managing Liquidity and Supporting Trade. Continued Implementation of Targeted Measures, Such as Adjustments to Reserve Requirements and Sector-Specific Lending, Will Be Essential in Providing Timely Support to Vulnerable Sectors and Ensuring Economic Stability During Future Shocks.

Coordinate Monetary and Fiscal Policies: An Integrated Policy Framework That Aligns Monetary and Fiscal Measures Will Enhance Overall Policy Effectiveness. For Example, Fiscal Initiatives Such as Tax Incentives and Public Investment Should Complement Monetary Policy Objectives to Stimulate Growth and Buffer the Economy Against the Impacts of Trade Wars (Bindseil, 2014).

Manage Inflation Proactively: Given the Potential Inflationary Pressures Introduced by the Trade War, Effective Inflation Management Remains Vital. Employing Transparent Communication Strategies Can Help Manage Inflation Expectations and Reinforce the Central Bank's Credibility (Liu, 2023).

Strengthen International Coordination: Considering the Global Economic Interdependence Highlighted by the Trade War, China Should Actively Participate in International Forums and Coordinate Exchange Rate Policies with Other Major Economies to Promote Global Stability and Mitigate the Risk of Competitive Devaluations.

By Implementing These Interconnected Recommendations, China Can Strengthen Its Monetary Policy Framework, Enabling It to Better Manage External Economic Shocks and Ensuring Greater Resilience and Stability in the Face of Future Trade Disruptions.

CONCLUSION

This study explores the changes in China's monetary policy before and after the US-China trade war, focusing on the effectiveness of key tools, particularly Int and M2. The analysis indicates that during the pre-trade war period (January 2015 to December 2017), neither Int nor M2 significantly impacted major economic variables like Exp and Imp, with the ExRate playing a crucial role in monetary outcomes. Conversely, in the post-trade war period (January 2018 to May 2021), M2 became a key determinant of Exp and Imp, reflecting a strategic shift in policy as China sought to mitigate the trade war's adverse effects. While M2 effectively managed liquidity and credit conditions, Int remained largely ineffective. However, the study acknowledges limitations, including its narrow time frame and the exclusion of other monetary or fiscal measures. Key policy recommendations include improving the interest rate transmission mechanism through financial reforms, leveraging M2 for liquidity management, enhancing coordination between monetary and fiscal policies, and actively managing inflation and international exchange rate policies to ensure economic stability amid global

integration. Future research could build on this study by investigating the long-term effects of China's post-trade war monetary policies and examining the interaction between monetary and fiscal strategies in more depth. Additionally, comparing China's responses to those of other countries facing similar external shocks could provide valuable insights into global economic resilience. In conclusion, China's strategic focus on M2 over interest rates during the trade war illustrates its adaptive and pragmatic approach to managing external economic challenges. By refining its monetary policy framework as recommended, China can strengthen its capacity to respond to future economic disruptions, thereby enhancing stability and resilience amid global uncertainties.

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