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The Disaggregation of Credit and the Components of China's Growth Model An Empirical Analysis of How Bank Credit Affects Investment, Consumption and Growth in China

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Abstract: This thesis examines the role of credit allocation in China's growth model. Based on the 'Quantity Theory of Disaggregated Credit', it focuses on how the growth in different types of bank credit is associated with GDP growth and its components. By making use of a disaggregated credit dataset from 2008 up to 2025, this thesis finds that both household and enterprise credit have a positive relationship with China's GDP growth. The direction of Granger-causality is found to be unidirectional between the percentage change in household and enterprise loans and real GDP growth. It also found a positive relationship between bank loans to non-financial corporations and gross fixed capital formation. Unexpectedly, no positive or significant effect of the 'Made in China 2025' industrial policy on the relationship between bank loans and fixed-asset investment in the manufacturing industry could be observed. Finally, the results showed a positive association between bank lending to households and household consumption growth. In particular, the growth in short-term consumption loans was positively associated with the growth in consumption, while the proxy for mortgage loans did not have a positive relationship with consumption. These findings suggest that the rising share of enterprise loans in total new bank loans may contribute to the investment-bias in China's growth model, while the declining share of household loans may make it more difficult for China to 'rebalance' the sources of growth from investments and exports toward domestic consumption.

Keywords: bank credit, investment, consumption, GDP growth, industrial policy

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1. Introduction

In recent decades, China experienced spectacular economic growth, averaging 9.1% between 1978 and 2023, becoming the second largest economy in the world (see Figure 1). However, scholars still disagree on how to explain the ‘Chinese economic miracle’. Neoclassical economists have attributed China’s economic success to market-oriented reforms, such as promoting inward foreign direct investment (FDI), deregulating markets, expanding the private sector and keeping the tax burden low (Lardy, 2014; Yao, 2011; Perkins, 2018; Huang, 2008). Chinese economists, however, argue that China has followed a unique development model through policy experimentation and gradual market reforms (Wang, 2024; Li, 2015).

In contrast to the neoclassical paradigm, the Chinese government has played an important role in the economy in the last four decades. In fact, China has emulated important aspects of the East Asian development model since the late 1970s, leading the emergence of a ‘developmental state with Chinese characteristics’. As Japan, South Korea and Taiwan did during the postwar era, China has relied heavily on sector-specific industrial policies, such as ‘Made in China 2025’, to nurture the development of strategically important industries. In particular, the provision of low-interest loans by the state-dominated banking system is one of the most important instruments of industrial policy that the Chinese government has at its disposal (Naughton, 2021; Geißendörfer & Haas, 2022). These industrial policies are government policies that explicitly target the structural transformation of the economy away from agriculture toward capital-and technology-intensive industries (Juhász et al., 2024). Aided by government financial support, Chinese firms have significantly increased their global market shares in key industries since the early 2000s, including solar cells, shipbuilding, rolling stock, wind turbines, batteries, and automobiles (OECD, 2025: 11).

At the same time, the massive amount of financial resources directed toward targeted industries has also led to over-investment, excess capacity and ‘vicious’ competition that drives down prices and profit margins (Leahy et al., 2025). China has followed an investment-led growth model, where banks create and allocate credit to finance large-scale investments in manufacturing, real estate and infrastructure to support growth (Pettis, 2013; Herr, 2010). The Chinese government has attempted to reduce the reliance on investment and exports and to shift toward more domestic demand-led growth. The aim is to ‘rebalance’ the sources of China’s growth toward domestic consumption.

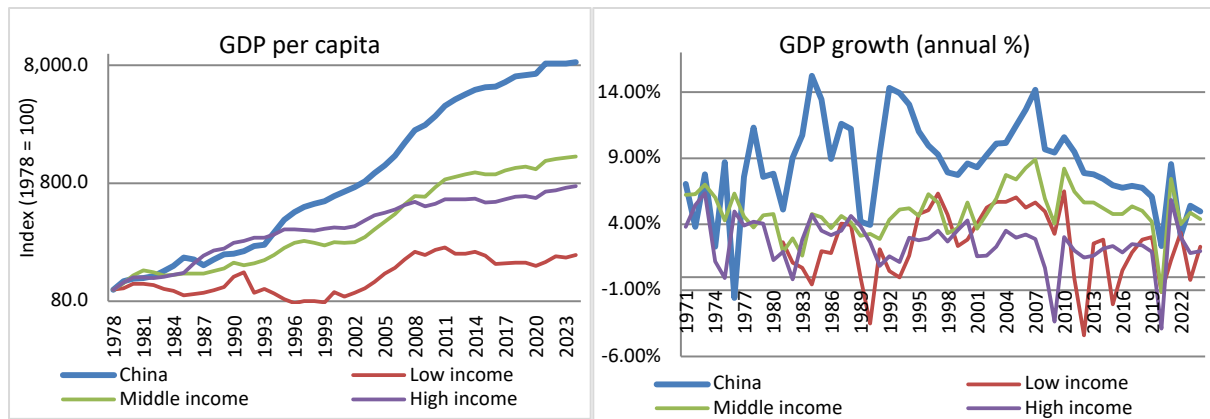


Figure 1: left: GDP per capita, Index: 1978=100; right: GDP growth, China vs low, middle and high-income countries.

Source: World Bank data (2026)

However, since the early 2020s, household consumption has been subdued due to a property slump caused by restrictions on bank lending to the real estate sector. By 2025, loans to enterprises accounted for 94% of the net increase in credit, while loans to households accounted for only 2.7% of new bank lending (PBoC, 2026). This imbalance in the allocation of credit makes it difficult for China to shift its growth model from investment-led growth to more domestic demand-led growth. China's reliance on investment and exports has, in turn, fueled trade tensions with its trading partners, as its trade surplus continues to hit record highs.

1.1 Research Problem

Rather than focusing on China's high savings rate as an explanation for the high levels of investment, this thesis relies on the theories provided by Schumpeter (1934) and Werner (1997), emphasizing the role of commercial banks as the *creators* of credit or money and how the allocation of credit affects economic growth. In the existing literature, banks are regarded as mere 'intermediaries' that reallocate savings from depositors to borrowers. Many studies in the finance and growth literature tend to rely on static variables, such as the *size* of the financial system, to examine how *financial development* contributes to growth. In the case of China, however, few have studied the role of the state-controlled banking system and the allocation of credit in China's growth model. The literature has largely neglected the role of state-controlled banks in the Chinese 'economic miracle'. Hence, this thesis aims to answer the following research question: *To what extent is disaggregated bank lending associated with China's economic growth and its components?*

To answer the research question, this thesis empirically examines three hypotheses focusing on: (1) the relationship between credit to businesses and households and economic growth; (2) the association between loans to non-financial corporations and investment; and (3) the association between loans to households and consumption.

1.2 Contributions and Findings

This thesis contributes to the existing finance and growth literature by: (a) focusing on the *growth* and *disaggregation* of credit, such as different types of household and enterprise loans, (b) examining how credit affects the *components* of Gross Domestic Product (GDP), such as investment and consumption, and (c) investigating whether the credit variables *predict* real GDP growth and its components. Using disaggregated bank credit data from 2008 to 2023 for China, the empirical results showed that growth in both enterprise and household loans are positively associated with GDP growth, and both exhibit a unidirectional Granger-causal relationship. The findings also showed that different types of credit to non-financial businesses are positively associated with gross fixed capital formation. Even though the allocation of bank credit is increasingly coordinated with industrial policy, a positive effect of the ‘Made in China 2025’ plan on the relationship between enterprise loans and manufacturing investment could not be observed. Finally, the results showed that the proxy for consumer loans is positively associated with the growth in consumption, whereas the proxy for mortgage loans has no positive effect on consumption.

1.3 Outline of the Thesis

This thesis proceeds as follows. Section 2 provides a historical overview of the evolution of China’s banking system and the institutional background. Section 3 aims to explain key aspects of China’s growth model and presents the main theories explaining the role of credit in the economy based on the work of Schumpeter and Werner. It reviews the existing finance and growth literature and presents the three hypotheses. Section 4 describes how data has been collected and what variables are used for the empirical analysis, while also explaining the methodology and presenting the regression models. Section 5 presents and discusses the empirical results, and the thesis concludes with some policy recommendations for China.

2. Historical and Institutional Background

The first section provides a historical overview of the evolution of China's banking system and its role in the Chinese economy. The second section provides an institutional background on China's banking system and government policies of 'financial repression'.

2.1 Historical Background

2.1.1 The Monobank System (1949-1979)

In the late 1940s, the Chinese Communist Party (CCP) established a centrally planned economy modeled on the Soviet Union. All firms were nationalized and required to meet production quotas under the Five-Year Plan. The central bank, subordinated to the Ministry of Finance, was tasked with ensuring sufficient funds to meet the investment needs of the Plan. The banking system was virtually non-existent, as banks were abolished or absorbed into the 'monobank system', with the People's Bank of China (PBoC) acting as a single state bank. The PBoC performed both central bank functions – controlling the money supply and setting interest rates – and commercial bank functions by providing short-term loans to industry (Kwong, 2011: 163–165). The main instrument of monetary policy was the annual credit plan, which determined the total amount of credit for earmarked purposes, laying the foundation for directed credit programs in China (Chengyao, 2016: 146–147).

2.1.2 Banking Reforms and the Credit Plan (1979-1993)

Following China's 'opening up and reform' in the late 1970s, the government dismantled the 'monobank system' by splitting off the PBoC's commercial banking functions into four 'specialized banks': the Agricultural Bank of China, serving rural areas; the Bank of China, handling foreign trade and investment transactions; the Construction Bank of China, financing construction and fixed-asset investment projects; and the Industrial and Commercial Bank of China, providing funds to commercial businesses (Allen, Qian & Qian, 2008: 509-510). A two-tiered banking system emerged consisting of specialized banks and a 'modern' central bank. Banks primarily extended loans to state-owned enterprises (SOEs), as the state shifted from financing fixed-asset investment projects through direct budget grants to interest-bearing bank loans (Lardy, 2014: 43). From 1985, the PBoC determined the total amount of credit banks were allowed to extend through the annual credit plan. The PBoC head office set credit quotas that were distributed through a pyramid-shaped allocation system in which the head offices of

the specialized banks would set the ceilings for their provincial branches, which in turn determined credit quotas for local bank branches. The PBoC set separate ceilings for different credit categories, broken down by sector, subsectors, and major projects (Negret, 1995: 31). Banks could ask for larger quotas from the PBoC, which would be assigned on the condition that low-cost loans were extended to sectors and regions that the state wished to support (Chengyao, 2016: 148-149).

Throughout the 1980s and 1990s, local governments supported the development of 'special economic zones' by providing preferential treatment, including low-interest bank loans, to attract foreign investment in labor-intensive manufacturing industries (Lu & Tang, 1997: 42-45). Local bank branches were hence pressured by local governments to extend loans to finance the construction of infrastructure and real estate. This local interference in credit allocation made it difficult for the PBoC to control credit aggregates (Chen & Zha, 2018: 4).

2.1.3 Financial System Reform and the 'Guided' Market Economy (1993-2003)

The 'Decision on Financial System Reform' of 1993 centralized the conduct of credit and monetary policies to the PBoC head office. Three policy banks were also established to take over policy lending from specialized banks, providing long-term, preferential loans to infrastructure, agriculture and export-oriented industries in line with industrial policy (He & Wei, 2022: 21-22). In 1995, the specialized banks were transformed into profit-seeking commercial banks capable of making independent lending decisions. The PBoC gained greater operational independence, and maintaining price stability and promoting economic growth became the main aims of monetary policy. Meanwhile, the credit plan was 'relaxed' and imposed only on the four largest banks (Bell & Feng, 2013).

From the late 1980s, China increasingly resorted to Japanese-style industrial policy to steer resource allocation and achieve structural transformation. Five-Year Plans became more 'indicative' rather than imperative, seeking to 'guide' the market economy through indirect incentives, such as improved access to credit for targeted industries (Heilmann, 2018: 187). The 'Outline of State Industrial Policies for the 1990s', for example, selected 'pillar' industries, including automobiles, petrochemicals, steel, machinery, shipbuilding and electronics, for state promotion (Wang, 2021: 214). Banks were urged to provide low-cost loans to often loss-making SOEs in pillar industries, resulting in high levels of non-performing loans (NPLs).

Following the Asian financial crisis of 1997-98, four asset management companies were established that purchased 1.4 trillion yuan of NPLs at book value to ‘clean’ up banks’ balance sheets (Stent, 2017: 83-86). In 1998, the PBoC abolished the credit plan and instead resorted to monetary targeting, setting quantitative targets on M2 (money supply) and credit growth in line with the targeted growth rate of nominal GDP (Chengyao, 2016: 152-153). Figure 2 shows that actual M2 growth was roughly in line with the M2 targets, except in 2009 when these targets were relaxed (for the correlation between credit and M2 growth, see Figure A1 in Appendix A).

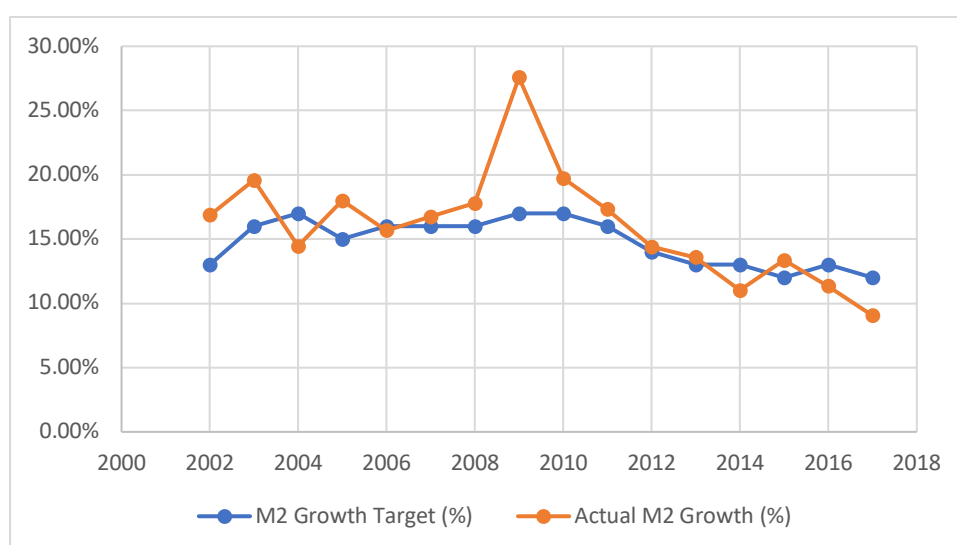


Figure 2: Targeted and actual growth of M2

Source: Government Work Reports and PBoC’s Monetary Policy Reports, IMF

2.1.4 Credit Guidance and Industrial Policy (2003 - present)

Since the early 2000s, the state has played a resurgent role in the Chinese economy through ambitious industrial policies promoting ‘indigenous innovation’ and industrial upgrading. During the 2008 global financial crisis, the ‘strategic emerging industries’ (SEI) program was introduced, identifying promising technologies that would become future ‘growth engines’, including renewable energy, biotechnology, and next-generation information technology. Firms targeted by the SEI policy received preferential treatment, including subsidies, tax breaks, and low-cost loans from state-owned banks (Ling & Naughton, 2016: 2147-48). Meanwhile, the PBoC continued to use credit quotas or ‘window guidance’ to control business cycles by ‘discouraging’ bank lending when credit growth was deemed excessive or ‘encouraging’ banks

to increase their lending when credit growth slowed down. As Figure 3 shows, window guidance has been quite effective in controlling loan growth. In 2009, the PBoC temporarily removed credit quotas to stimulate the economy, resulting in a rapid increase in lending allocated primarily to SOEs, local governments and the real estate sector (Chengyao, 2016: 150-154). From 2010, the PBoC pursued a ‘differentiated credit policy’ that is more coordinated with industrial policy to ‘optimize’ the *credit structure* (PBoC, 2010; Chen et al., 2017: 29-30). For example, the PBoC has relied on window guidance and ‘green credit policies’ to increase lending to clean technology sectors and renewable energy, while curbing credit to heavy-polluting sectors to reduce carbon emissions (Dikau & Volz, 2023: 125-129).

Since 2018, the government has promoted ‘inclusive finance’ to reduce the lending bias toward SOEs, urging banks to expand lending to small businesses and privately-owned enterprises. To reduce leverage and control financial risks, authorities also cracked down on the ‘shadow banking system’ and restricted bank lending to local governments (Orlik, 2022).

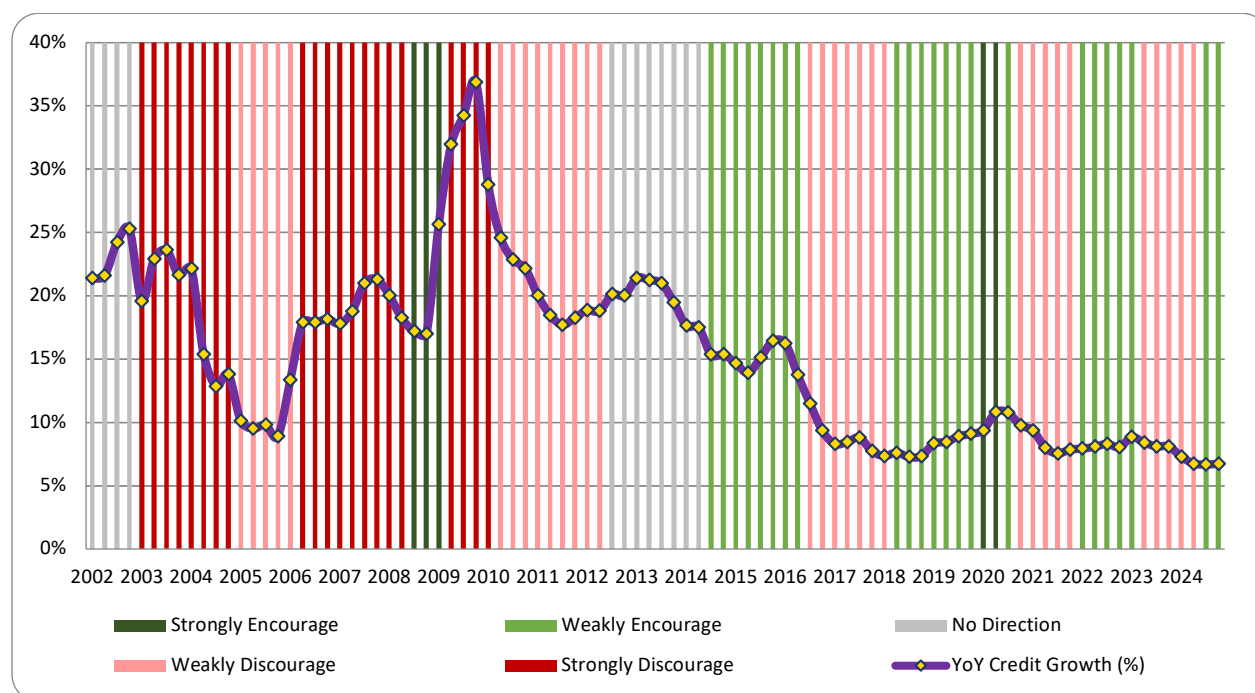


Figure 3: The relationship between the PBoC's window guidance stance and credit growth.

Source: BIS. Note: the window guidance (WG) stance was calculated using the five-level WG indicators provided by Chen et al. (2017) and the PBoC's Monetary Policy Reports. The PBoC's WG stance can be weakly/strongly discouraging (red) to reduce credit growth or weakly/strongly encouraging (green) to stimulate lending.

In 2015, the ‘Made in China 2025’ (MIC2025) industrial policy was introduced aimed at ‘upgrading’ traditional industrial sectors, which identified ten priority sectors for promotion, including robotics, high-tech ships, and new energy vehicles. A dedicated MIC2025 project database has been created to assist financial institutions in providing funds to targeted industries (Zenglein & Holzmann, 2019: 44-45). State-owned banks have channeled funds into ‘Government Guidance Funds’ investing in high-technology firms targeted by the MIC2025 plan (Naughton, 2021: 80-82).

From the early 2020s, the PBoC has ‘guided’ banks to support ‘*new-quality productive forces*’ aimed at nurturing the development of nascent industries, such as semiconductors and artificial intelligence. Meanwhile, to prevent a speculative real estate bubble, the government curbed lending to indebted property developers in 2020, while setting ceilings on mortgage lending by banks (Ke & Xie, 2022: 781-782). This has shifted banks’ credit allocation away from real estate and infrastructure – which made up 60% of new lending in 2016 – toward ‘five major areas’, such as inclusive, green and technology finance – accounting for 70% of new bank lending by 2025 (Xueqing, 2025).

2.2 Institutional Background

2.2.1 China’s Banking System

Despite market-oriented reforms, government ownership remains high in China’s banking sector, with foreign and privately-owned banks forming a small minority (Tobin & Volz, 2018). China’s banking sector comprises four main types of commercial banks: the ‘Big Five’ state-owned commercial banks (SOCBs), the joint-stock banks, city commercial banks, and rural commercial banks (Dong et al. 2016). The central government holds equity stakes of 60-90% and appoints the senior management of the five largest SOCBs (Turner, 2012: 57). There are 12 joint-stock banks that are controlled by SOEs and/or local governments of major cities and provinces, but some have large private and foreign shareholders. More than 130 city commercial banks were originally wholly owned by local governments, though the ownership structure has become more diversified since the 2000s. Both city banks and joint-stock banks are subject to less central government influence and tend to have more market-oriented business models than the large SOCBs. Finally, there are more than 1,500 small rural banks, controlled by rural governments, that specialize in lending to firms in specific regions (Xu, 2024: 13; Williams, 2018).

Since the early 2000s, a series of banking reforms—including capital injections, stock exchange listings, and the establishment of boards of directors—have improved the performance of Chinese banks (Dong et al., 2014). The share of non-performing loans in the banking system has fallen from above 25% of outstanding loans in 2001 to just 1.5% in 2024. While SOCBs have become more commercially oriented, they still prefer to lend to SOEs, which is perceived as economically and politically less risky. Small banks, by contrast, have become an important source of financing for small and medium-sized enterprises, where large SOCBs have traditionally been weak (Allen, Qian, & Qian, 2019; Xu, 2024).

The lending distribution of the ‘Big Five’ banks is illustrated in Figure A2 in Appendix A, showing a rapid increase in mortgages since 2008 and a modest increase in loans to manufacturing since the early 2020s. China’s banking system is large relative to the economy, with total assets of banking institutions reaching 480 trillion yuan (\$69.7 trillion) by the end of 2025, equivalent to 340% of China’s GDP. The banking sector dominates China’s financial system, accounting for over 90% of total financial sector assets, while indirect financing provided by banks accounts for 70% of total social financing (PBoC, 2024).¹

2.2.2 Financial Repression in China

Unlike central banks in advanced economies, the PBoC is not politically independent as the government must approve all major monetary policy decisions, including setting interest rates, reserve requirements or exchange rates (Bell & Feng, 2013: 53-54). The PBoC still uses quantity-based tools to control credit aggregates as the intermediate target of monetary policy, rather than relying solely on market-based instruments like interest rates or open market operations. In 2003, the responsibility for banking regulation was transferred to the China Banking Regulatory Commission, tasked with safeguarding financial stability through prudential regulations (Turner et al., 2012: 56-58).² Along with the PBoC, banking regulators engage in ‘moral suasion’ or informal ‘window guidance’ to articulate warnings, provide ‘suggestions’, or signal risks to financial institutions (Ping, 2014: 65-66).

¹ Total social financing represents all funds (loans, bonds, and equity) received by the real economy from the financial system.

² In 2023, the National Financial Regulatory Administration took over most regulatory responsibilities from the central bank and the banking regulator.

Like other East Asian economies, China has maintained state control over the financial system to selectively direct the allocation of capital in line with industrial policy. This ‘financial repression’ is characterized by a bank-based financial system, state control of interest rates guaranteeing low costs of funding, and strict capital controls to ensure the availability of funds for domestic investment (Heep, 2014: 11-14). The capital market is also dominated by banks, which are the main purchasers of corporate and government bonds. China’s credit-based system, where firms rely on bank borrowing as the primary source of financing, enhances the *capacity* of the state to implement industrial policies effectively (Zysman, 1983: 72-77; Woo, 1991; Vittas & Cho, 1996). Until 2015, the PBoC imposed ceilings on deposit and lending rates, thereby creating excess demand for credit and enabling authorities to ration the supply of credit to priority sectors – allowing SOEs to obtain access to low-cost loans (Xu, 2024; Lardy, 2008). Despite interest rate liberalization, the PBoC continues to rely on quantity-based monetary policy tools, such as ‘window guidance’ (Geiger, 2008).

Modelled on the Japanese practice, the PBoC sets annual loan growth targets for each bank through window guidance. In practice, central bank officials – either at the PBoC’s head office in Beijing or at the local branches of the PBoC – hold monthly meetings with bank executives to issue oral or written instructions ‘guiding’ them to adjust their lending behaviors in line with monetary and credit policy objectives (Chen et al., 2017; Guofeng, 2015; Chengyao, 2016). These instructions are not limited to assigning banks credit targets for the pace of new loans: they can also ‘persuade’ them to allocate credit toward a specific sector, region or type of borrower. China’s bank-based and state-controlled financial system has made window guidance an effective policy instrument in controlling loan growth (Fukumoto et al, 2010). If banks exceeded or failed to meet their quotas, the PBoC would raise their reserve requirement ratio as a punishment (Chengyao, 2016: 154).

As financing has increasingly shifted beyond traditional bank loans, the PBoC introduced the Macro-Prudential Assessment system in 2016 to control the growth of ‘broad loans’ (including off-balance sheet loans, bonds and credit to nonbanks) through a reward and punishment system (Zheng, 2018: 6-11; Wang, 2017). Banks will also be evaluated on how they use central bank funds. The PBoC actively ‘guides’ credit allocation through ‘structural monetary policy’ tools, providing low-cost funds to banks on the condition that they first extend loans to targeted industries. These special lending facilities, amounting to 6.3 trillion yuan by 2024, induce banks to increase their lending to small businesses, clean energy, and sci-tech innovation.

Finally, a key feature of China's financially repressed system is the use of capital controls to insulate the domestic financial system from 'speculative' capital inflows. By keeping the currency (renminbi) non-convertible under the capital account, the PBoC has been able to 'manage' the exchange rate to make Chinese exports internationally competitive. In 2005, China replaced the fixed exchange rate to the US dollar – amid accusations of keeping the renminbi undervalued – with a managed float system, allowing the currency to fluctuate within a daily trading band set by the PBoC (Cui, 2014). The PBoC has intervened in the foreign currency market to avoid currency appreciation (depreciation) by purchasing (selling) foreign exchange. In recent years, the PBoC has avoided direct interventions and relied on 'window guidance' by asking state-owned banks to buy or sell foreign currency (Setser, 2024). China has also pursued gradual capital account liberalization, restricting domestic firms and individuals from borrowing abroad or purchasing foreign assets without prior approval. This has allowed China to maintain an independent monetary policy and a stable value of the currency, while restricting capital mobility (Fang, 2013).

3. Theoretical Background and Previous Research

This section provides an overview of the theories used to explain how the creation and allocation of credit affects economic growth based on the work of Schumpeter (1934) and Werner (1997) and briefly describes China's growth model. It summarizes the finance and growth literature and presents this thesis' three hypotheses.

3.1 Credit Creation and the Schumpeterian Perspective on the Finance–Growth Nexus

Neoclassical growth theories, such as the Solow (1956) model, hold that capital accumulation is one of the main determinants of economic growth through higher saving and investment rates. An increase in the capital stock can be achieved through a higher level of investment only if individuals decide to consume less and save more of their disposable incomes. These theories have also been used to 'explain' China's economic rise, which has been attributed to the rapid increase in both the investment and savings rates since the 1980s (see Figure A3 in Appendix A). The emphasis on saving also applies to 'endogenous growth theory', where long-run growth stems from technological progress achieved through investment in human capital (R&D or education) financed through existing savings (Dullien, 2009: 2-4). However, neoclassical growth models tend to obscure the distinctive role of banks in the economy, ignore the role of the state in development and assume that investment is always financed from savings.

In the modern economy, however, around 97% of the money supply is created 'out of nothing' by commercial banks in the act of lending (Werner, 2014). Whenever a bank extends a loan, it simultaneously creates new deposits in the borrower's account, thereby creating new money. This stands in contrast to how economics textbooks explain the process of credit creation through 'maturity transformation' or the 'money multiplier'. These theories are based on the misconception that banks act merely as 'financial intermediaries' collecting deposits that savers place with them and lending those out to borrowers. However, existing savings do not determine how much banks can lend, since banks can simply create new money when making loans (McLeay et al., 2014). Once loans get repaid, bank loans are 'destroyed', reducing the money supply. Hence, unlike other financial institutions, only banks (and the central bank) are *credit creators*. According to Richard Werner (1997), bank credit is the most appropriate measure of money, as it represents 'effective' purchasing power used directly for transactions. Moreover, unlike traditional money supply measurements, such as M1, credit aggregates can often be used to analyze the allocation of credit (Werner, 1997: 282-283).

Joseph Schumpeter recognized the ‘special’ role of banks as creators of credit and money. In his ‘*Theory of Economic Development*’ (1934), Schumpeter argued that banks are an important source of financing for firms and that credit creation drives technological innovation by enabling firms to carry out ‘new combinations’ – new products, production methods, or markets (Schumpeter, 1934: 69-74; Mazzucato & Wray, 2015: 15). Schumpeter also distinguished between ‘productive’ loans to pioneering entrepreneurs to finance investments that raise productivity, and ‘consumptive’ loans to households that fund the purchase of consumer durables but do not generate new output. While consumptive credit could increase aggregate demand, it could also lead to inflation as more money chases a given amount of goods and services (Schumpeter, 1934: 153-159). Schumpeter (1939: 110) observed that banks could finance investment through credit creation *without* the need of scarce savings. In his own words:

It is much more realistic to say that the banks ‘create credit,’ that is, that they create deposits in their act of lending, than to say that they lend the deposits that have been entrusted to them’ (Schumpeter, 1955: 1080).

According to the Schumpeterian perspective on the finance and growth nexus, the causation runs from investment to saving, rather than from saving to investment. It starts when banks create and allocate credit to firms for investment, which then generates employment, income and thereby savings. Hence, capital accumulation and growth depend on the decision of the entrepreneur to invest in productive activities and the *willingness* of banks to expand the supply of credit for investments (Dullien, 2009: 7-8; Herr, 2010: 79-80). Furthermore, while the finance and growth literature recognizes the role of financial institutions in economic development, these studies still assume that the main role of banks is to mobilize savings to fund investments (Levine, 1997; Rousseau, 2003). King and Levine (1993) explicitly refer to Schumpeter to emphasize the importance of ‘financial development’ for economic growth, focusing on the *size* of banks or the *depth* of capital markets, without analyzing the role of banks as credit *creators*. Neglecting the role of credit-creating banks and the state when analyzing China’s economic development is particularly problematic (Bofinger et al., 2023: 27-36).

3.2 The Quantity Theory of Disaggregated Credit

Proponents of the ‘credit view’ argue that banks are mere ‘financial intermediaries’ and that credit aggregates should thus not be treated as an ‘independent causal factor affecting the economy’ and do not have meaningful *predictive* power for real variables (Bernanke & Gertler,

1995: 43-44). This is related to the concept of the *neutrality of money* (credit), in which the change in the money supply only affects nominal variables, such as inflation, but has no effect on real variables, such as real GDP growth (Patinkin, 1987). Keynes (1930), on the other hand, argued that different types of loans *created* by banks could have different effects on the economy. In his *A Treatise on Money*, Keynes distinguished between 'productive' loans used for industrial purposes, such as financing business investments, and 'unproductive' loans used for financial purposes, such as speculation in securities (Keynes, 1930: 41-42). According to Richard Werner's (1997) 'Quantity Theory of Disaggregated Credit', productive loans are defined as those that finance transactions in the real economy and are represented by nominal GDP, while unproductive loans are used to fund 'financial transactions' in existing assets, which are not captured by GDP. This theory is a modernized version of the traditional 'equation of exchange', which describes the link between money, inflation and output as follows:

$$MV = PY \quad (1)$$

where M represents the quantity of money, V for transactions velocity, P is the price level of goods and services, and Y is national income or output (Congdon, 2024: 33). Since this thesis is interested in *dynamic* situations, such as economic growth, the net change or growth in the variables over time can be obtained as follows:

$$\Delta MV = \Delta(PY) \quad (2)$$

According to this equation, an increase in national income measured by nominal GDP equals the increase in the amount of money that is actually used in the economy. By defining money as credit created by banks, the notation of M is changed to C, and after replacing Y with Q for the quantity of transactions we get:

$$\Delta CV = \Delta(PQ) \quad (3)$$

Because not all transactions are represented by GDP, Werner (1997) argues that it is important to distinguish between credit used for 'real' transactions that are part of GDP, such as investment or consumption, and credit used for 'financial' transactions that are not part of GDP:

$$\Delta CV = \Delta C_R V_R + \Delta C_F V_F \quad (4)$$

$$\Delta PQ = \Delta P_R Q_R + \Delta P_F Q_F \quad (5)$$

$$\Delta C_R V_R = \Delta(P_R Q_R) = \Delta(P_R Y) \quad (6)$$

$$\Delta C_F V_F = \Delta P_F Q_F \quad (7)$$

Hence, an increase in nominal GDP represented by $P_R Y$ can only take place if there has been an increase in the amount of credit used for GDP-based transactions (ΔC_R). Meanwhile, an increase in credit creation (ΔC_F) for asset-based or financial transactions ($P_F Q_F$) does not increase economic growth, but merely drives up existing asset prices and increases overall debt levels (Werner, 2005: 185-190). Hyman Minsky (1982) and Charles Kindleberger (1978) have described how a rapid expansion in credit for ‘speculative’ purposes could lead to asset price bubbles and undermine the stability of the financial system. The robustness or fragility of the financial system thus depends on the type of loans that banks extend. If banks provide loans based on future cash flows from income-generating activities that enable borrowers to service and repay these debts, rather than loans that are based solely on the value of pledged collateral (such as real estate), this would be conducive to a more stable financial system (Minsky, 1986: 260-261). In addition, credit creation can be further disaggregated based on the different components of GDP according to the expenditure approach. In a closed economy, the GDP components are given by the following equation:

$$PY = C + I + G \quad (8)$$

where C stands for consumption, I for private investment and G for government spending. Hence, credit used for GDP transactions can similarly be disaggregated into credit used for consumption, credit used for investment and credit used for government expenditure:

$$C_R = C_c + C_I + C_G \quad (9)$$

As Bezemer and Hudson (2016: 753-754) explain, if banks extend loans to *non-financial corporations* that use the money for productive purposes, such as capital expenditures or research and development (R&D) spending, this increases production and sales, from which wages are paid and profits are realized. Productive credit not only expands output, but also creates the income needed to buy the products. *Consumer credit* also supports economic growth by increasing demand for goods and services. However, they could pose a risk to financial stability, since these loans are not used to generate future income streams needed to repay the loans. Consumer credit could create financial vulnerabilities for households, especially since these loans often carry high interest rates. *Mortgage credit* increases debt, but not the income of households. Mortgage loans can be considered an ‘unproductive’ type of credit, as they are primarily used to finance the purchase of existing properties, driving up home prices. While it could generate capital gains on real estate, it does not create income from producing and selling goods and services, thereby increasing financial fragility (Bezemer & Hudson, 2016: 747-749).

3.3 Financial Repression and Credit Market Imperfections

Neoclassical economists have argued that state intervention in financial markets through ‘financial repression’, such as interest rate ceilings, capital controls and quantitative credit limits, ‘distorts’ market forces and inhibits economic growth. McKinnon (1973) and Shaw (1973) argued that state intervention led to unstable financial systems and to resource misallocation, as politically-connected firms received access to low-cost loans at the expense of more productive firms. This view provided the theoretical grounds for the World Bank and the IMF to encourage countries to deregulate and liberalize the financial system (Bezemer et al., 2018: 11-12). In unconstrained markets, the price of capital is determined by market equilibrium, allowing credit to flow to those able to pay the highest rates, leading to a more efficient allocation of resources (Alexander et al., 1995: 15).

However, the main aim of selective credit policies has not been to create a more ‘efficient’ banking system, but to address ‘market failures’ by widening access to credit for farmers, small businesses and strategic industries, while restricting lending to sectors deemed ‘unproductive’ (Bezemer et al., 2018: 12-13). Stiglitz and Weiss (1981) argue that state intervention in credit markets may be justified due to market imperfections. In markets with ‘imperfect information’, banks cannot perfectly assess the probability of default and must screen the creditworthiness of loan applicants to mitigate issues like *adverse selection*. Even with high demand for credit, banks will not raise interest rates because this would deteriorate the quality of the loan pool and reduce profits. Instead, banks ration credit to minimize risks and maximize returns, selecting borrowers whose loan applications are approved, while denying credit to others (Stiglitz & Weiss, 1981: 393-394).

Because aggregate demand for credit is far larger than supply, the credit market is more likely to be supply-rationed, which means that credit is *exogenously* determined by credit-creating institutions. Rationed markets are by definition not in equilibrium, since banks determine the quantity and allocation of credit supplied (Werner, 2005: 194-196). This means the credit market is determined by the *quantity* rather than the *price* (the interest rate) of credit. Because market failures are pervasive in financial markets, Stiglitz (1993) argues that some forms of financial repression or directed credit may improve economic performance and the efficiency with which capital is allocated. For example, since financial repression creates scarcity, the government could ensure that credit flows to borrowers who perform well – as measured by growth potential, productivity or exports. According to Stiglitz (1993: 42-43), there are several

rationales for a directed credit program, including that it can be used as an instrument of industrial policy to finance productive investments that does not require taxpayer money, and to maintain financial stability by restricting the supply of credit to ‘unproductive’ sectors.

3.4 China’s Growth Model: The Neoclassical Explanation vs the Developmental State

Neoclassical economists have attributed China’s economic success to the ‘opening up and reform’ policy since 1979, which opened China’s economy to inward FDI, facilitated the development of the private sector, and boosted export-led growth through the liberalization of international trade (Whalley & Xin, 2006; Huang, 2008; Liu et al., 2024). They have applied neoclassical growth models to ‘explain’ the causes of China’s growth, where an increase in saving and investment led to a higher output per worker and greater capital deepening (Knight & Ding, 2012: 312-315; Fernández-Villaverde et al., 2023). Lardy (2019) and Huang (2008) assert that China grew rapidly when the state expanded the role of ‘market forces’, strengthened property rights and promoted private companies, and that growth slowed down when ‘distortive’ state interventions rose. While China was initially praised for promoting ‘market reforms’ and ‘free trade’ after joining the World Trade Organization in 2001, it has in recent years been accused of ‘non-market practices’, such as statist industrial policies favoring inefficient SOEs and repressive financial policies leading to a misallocation of resources (Poon & Kozul-Wright, 2019: 38). Because of these contradictory explanations of China’s growth story, it remains unclear what the true causes have been behind China’s ‘economic miracle’.

An alternative explanation of China’s economic success is offered by the developmental state literature, which recognizes the important role of the state in economic development (Johnson, 1982; Amsden, 1989; Wade, 1990; Evans, 1995). China has emulated many key elements of the East Asian developmental state model: setting up ‘*special economic zones*’ (SEZs) to attract FDI; protecting and fostering large SOEs into globally competitive ‘national champions’ akin to the Japanese *keiretsu* or Korean *chaebol*; and promoting the development of designated export-oriented industries while protecting infant industries from foreign competition (Ma, 2000; Leutert, 2022; Naughton, 2015; Heilmann & Shin, 2013; Baek, 2005; Meier, 2009). In the late 1970s, Deng Xiaoping shifted the focus of the Chinese Communist Party from class struggle to economic development and encouraged officials to learn from Asian economic systems and to *pragmatically* experiment with policies that ‘worked’ (Vogel, 2011; Hofman, 2018). Deng also implemented civil service reforms to create a more competent state bureaucracy, where officials are recruited and appointed based on *merit*. Because local officials

are evaluated on various ‘performance targets’, such as to achieve economic growth, they have pursued local industrial policies to attract investment and increase their chances for promotion, reinforcing China’s investment-led growth model (Knight, 2014: 1338-1339). A more cohesive and centralized *developmental state* emerged by the early 2000s following the creation of powerful and autonomous ‘pilot agencies’, such as the National Development and Reform Commission, with strong *state capacity* to effectively formulate and implement industrial policies and long-term development plans (Gomes & ten Brink, 2023: 27-28). In recent years, sector-specific industrial policies have been introduced to *create* new comparative advantages, become more self-sufficient in key technologies and achieve ‘industrial upgrading’ – moving from labor-intensive light industries to more technology-intensive industries (Wang, 2024). Industrial policy has become more ‘market-driven and government guided’, steering private investments in high-tech industries through *carrots* and *sticks* (Zenglein & Holzmann, 2019).

Hence, China has followed a modified version of the East Asian developmental state model, resulting in a ‘developmental state with Chinese characteristics’(Beeson, 2017). However, while the developmental state literature has successfully explained *why* industrial policy ‘worked’ in East Asia, it has largely neglected the ‘developmental’ role of central banks. In fact, credit policy is one of the most important instruments of industrial policy to direct capital to strategic industries (Zysman, 1983; Woo, 1991; Loriaux, 1991; Pérez, 1997; Epstein, 2007). In China, the PBoC acts as a ‘*developmental central bank*’, relying on selective credit policies, such as informal ‘window guidance’, to *guide* the quantity and allocation of credit to develop key industries and promote investment-led growth. These credit policies favoring credit to non-financial corporations in targeted industries, while restricting bank lending to households, have in turn contributed to China’s high investment rate and low share of consumption in GDP.

3.5 Underconsumption and Economic Rebalancing

Since the early 2000s, the Chinese leadership has attempted to ‘rebalance’ the sources of economic growth toward domestic demand-led growth. China’s economy has become too reliant on investment and exports, while the share of domestic consumption in GDP has gradually declined (see Figure A4 in Appendix A). The share of household consumption in GDP is low in China, while the share of investment is high, even in comparison with other East Asian countries (see Figures A5 and A6). Michael Pettis (2013: 4) argues that China has followed Hobson’s (1902) theory of ‘underconsumption’, where growing income inequality leads to high levels of savings and inadequate consumption, making it difficult for domestic

demand to absorb all that is produced. Inequality is aggravated by the *hukou* registration system restricting upward mobility for migrant workers, while the weak social safety net and financial repression have further contributed to high saving and investment rates (Dollar, 2018: 161). This overinvestment has led to excess capacity and increased China's trade surplus through rising exports, fueling trade tensions with global trading partners (Lardy & Borst, 2013). However, mainstream economists tend to focus on China's high *saving rate* to explain its investment-driven growth model, ignoring the role of *credit creation* by banks in financing investment. The allocation of credit to firms not only explains China's high investment rate – it may also affect consumption. According to Keynes's (1936) 'Absolute Income Hypothesis', consumption expenditure is determined by disposable income. In modern, credit-based economies, however, consumption is also affected by the availability of credit, where households borrow against future income to fund current spending. Consumption could be adversely affected through 'credit constraints' limiting access to credit for households (Bang-Andersen et al., 2013: 54-55). In China, the ability and willingness of consumers to spend could be influenced by access to credit and changes in wealth through the 'wealth effect'. Since the late 1990s, the increase in bank lending to households and the property sector has driven up house prices – an important source of household wealth – and the increase in capital gains in turn boosted consumption through the *housing wealth effect* (Kharroubi & Kohlscheen, 2017). However, large state-owned banks continue to favor loans to non-financial corporations, particularly SOEs. In line with Alexander Gerschenkron's (1962) theory of 'economic backwardness', as a *latecomer* to development, China has thus relied on a state-controlled banking system to direct capital to nascent industries and achieve 'catch-up' growth by prioritizing investment over consumption.

3.6 Previous Research

The 'finance and growth' literature is broad, with most studies focusing on the relationship between 'financial development' and economic growth (Goldsmith, 1969; Levine, 1997; Beck, Levine, & Loayza, 2000; Rousseau, 2003). However, these studies do not recognize the 'special' role of banks in the economy. Unlike capital markets that reallocate existing purchasing power, only banks can *create* new money by making loans (Werner, 2005). Furthermore, when using aggregate bank lending as a measurement of financial development, many studies focus on how the level of private credit to GDP ('financial depth') is associated with growth, rather than the *type* of credit (King & Levine, 1993). While King and Levine (1993) find a positive relationship between indicators for financial development and economic

growth, other studies have found that high credit-to-GDP ratios (above 100% of GDP) have a negative effect on growth (Arcand et al., 2012; Gecchetti & Kharroubi, 2012). Following the financial crisis of 2008, studies have shown that the *allocation* rather than the *quantity* of credit *per se* matters for economic growth. Beck et al. (2012) were the first to decompose bank credit into enterprise and household credit using data for 45 countries over 1994-2005. Their cross-country regressions showed a positive association between bank lending to non-financial corporations and economic growth, but not for household loans. However, rather than focusing on how the *growth* of different loans affect GDP growth, the study measured total enterprise and household credit as a ratio relative to GDP. Bezemer et al. (2016) found that mortgage credit has a negative effect on growth using a fixed-effects (FE) panel data model over 1990-2011 for 46 countries. As banks in industrialized countries have shifted from providing loans to companies toward asset markets (particularly mortgages to households), this has led to higher debt levels and a disconnect between credit and economic growth. This means that studies who do not use disaggregated credit data tend to underestimate the effect of credit on growth.

In line with Schumpeter's view that bank credit, not savings, drives investment and growth, Bofinger et al. (2022), using FE panel regressions for 43 countries over 1940-2019, find that credit growth has a strong positive effect on GDP per capita growth, while *saving* is irrelevant for both credit and GDP growth. They also find a bidirectional causal relationship between credit growth and GDP growth using Granger causality tests. Finally, Werner (2005) examined the relationship between 'credit to the real economy' (total credit excluding loans to the property, construction and financial sectors) and GDP growth for Japan using a parsimonious OLS model from 1984 to 2001, finding a positive association between these two variables.

In the case of China, the finance and growth literature has found mixed results concerning the relationship between financial development and economic growth. Liang and Teng (2006) find that causality runs from growth to financial development using data from 1952 until 2001. Zhang et al. (2012), using generalized-method-of-moments (GMM) estimators for panel data of 286 Chinese cities over 2001-2006, find that most traditional indicators of financial development are positively associated with economic growth. Chen and Ji (2023), however, find that financial development measured by the credit-to-GDP ratio is associated with lower growth, using city-level data for 275 Chinese cities from 2009 until 2018. Zhang and Bezemer (2016), using GMM estimators for Chinese province-level data over 1995-2013, found that the effect of the credit-to-GDP ratio on GDP was negative or insignificant, and that the change in

the credit stock was associated with a decline in the growth of consumption. Many papers in the literature on the Chinese growth model also regard the state-controlled banking system as a ‘drag’ on growth (Berger et al., 2009). The finance and growth literature has primarily focused on the relationship between financial development and growth, ignoring the role of the state in economic development. Because of financial liberalization and deregulation in advanced economies since the 1980s, China is the only major economy that still relies on ‘credit guidance policies’ to control the money supply and to selectively direct the allocation of credit to nurture the development of targeted industries (Bezemer et al., 2018: 11).

To the best of our knowledge, Geißendörfer and Haas (2022) are the first to analyze the effect of targeted bank lending on GDP growth in China. Using a self-constructed dataset from Chinese provincial yearbooks for the period 1985 to 2019, they create a proxy for credit extended by both banks and non-banks to the non-financial corporate sector. Because economic growth is a *dynamic* process, they use the growth in credit as the main explanatory variable rather than a static variable for financial development. Based on the Schumpeterian approach, they examine the relationship between bank lending and growth, with the results showing that the growth rates of total credit and credit to non-financial corporations are positively associated with real GDP growth. Their fixed-effects and random-effects models show positive effects of corporate lending on GDP growth in all regions, with a stronger effect of the credit variables for eastern provinces. To assess the effect of state-directed credit as a tool of China’s industrial policy on economic growth, they also find that corporate credit growth had a more positive effect on GDP growth after the ‘Strategic Emerging Industry’ plan was announced in 2010.

3.7 Contributions and Hypotheses

This thesis aims to fill several gaps in the finance and growth literature. **First**, rather than using static variables to analyze the effect of financial development on growth, such as the *size* of the financial system or the credit-to-GDP ratio (*credit stock*), this thesis focuses on the *growth* and *disaggregation* of credit, that is, how changes in different *types* of loans are associated with economic growth in China. Credit growth is a dynamic indicator that reflects the year-on-year percentage change in the supply of credit and is better suited to capturing how new bank lending affects GDP growth. A differentiated credit dataset is used to examine how different *types* of household and enterprise credit, such as consumer loans, mortgages or medium and long-term business loans, affect the Chinese economy. **Second**, in line with the ‘Quantity Theory of Disaggregated Credit’, this thesis aims to examine how bank credit is associated with the

different *components* of GDP, such as investment and consumption. The disaggregation of credit makes it possible to investigate whether different household loans are more positively associated with consumption, or whether different enterprise loans have stronger relationships with investment. **Third**, rather than focusing only on the correlational relationship between the credit variables and economic growth, this thesis uses tests for Granger causality to assess whether the past values of different types of loans *predict* the current values of GDP and its components. This thesis empirically examines the research question – to what extent disaggregated bank lending is associated with China’s GDP growth – through three hypotheses:

H1: ‘productive’ corporate lending exhibits a stronger positive relationship with economic growth than ‘less-productive’ household lending.

Based on the theories of Schumpeter, the first hypothesis utilizes differentiated credit data to examine whether ‘productive’ corporate lending has a stronger positive relationship with China’s economic growth than ‘less-productive’ bank lending to households.

H2: the growth in loans to non-financial corporations is positively associated with the growth in investment.

The second hypothesis examines the association between the growth in short and medium to long-term loans extended to non-financial corporations and gross fixed capital formation. It focuses on whether China’s investment-led growth model can be explained by the allocation of credit to the corporate sector. It also complements the paper by Geißendörfer and Haas (2022) by studying whether the ‘Made in China 2025’ industrial policy announced in May 2015 has a positive effect on the relationship between business lending and fixed-asset investment in manufacturing – a sector prioritized by China’s developmental state – using more recent data that covers the period from 2015 to 2025.

H3: the growth in lending to households is positively associated with the growth in consumption.

Finally, the third hypothesis analyzes the relationship between household loans and consumption and whether the growth in different types of household loans *predict* household consumption growth. It is related to the debate on ‘economic rebalancing’, focusing on the role of credit in contributing to the shift toward domestic demand-led growth, which has become an important policy priority for the Chinese leadership in recent years.

4. Data and Methodology

To empirically examine the three hypotheses, this section describes the data sources, variable selection, data limitations, and the econometric methods and models used in the analysis.

4.1 Data Sources

The data for analysis have primarily been obtained from official data sources that are publicly available, including the Organization for Economic Co-operation and Development (OECD), the Bank for International Settlements (BIS), the People's Bank of China (PBoC), and the National Bureau of Statistics (NBS) of China. The hypotheses are examined using either quarterly or monthly time series data. For example, quarterly data on exports and imports, and real GDP growth were obtained from the OECD. Quarterly data on the credit-to-GDP ratio has been obtained from the BIS. Because of the lack of quarterly data available from official sources on the GDP components for China, seasonally adjusted data on China's expenditure-based GDP has been obtained from Chen, Higgins, and Zha (2024), including on government expenditures, gross fixed capital formation and household consumption.

To obtain a more detailed breakdown on the *type* of loans extended by Chinese banks, monthly data on the 'sources and uses of credit funds of depository financial institutions' has been manually collected from the statistical database of the PBoC. These reports provide detailed information on the outstanding amounts of different loans to households and non-financial corporations. These were also converted into quarterly variables for the first hypothesis examining the effect of different loans on GDP (which is unavailable monthly). For the second and third hypotheses, monthly data on the money supply (M2), consumer price index (CPI), fixed-asset investment in manufacturing and retail sales of consumer goods have been obtained from the NBS, while data on the 3-month interbank rate and export growth were obtained from the OECD. For monthly data, January observations are not reported by the NBS for some key variables because of the Lunar New Year. Instead, the NBS provides data for the combined January to February period. The observations for February have been used to fill in these missing values for January. While there are concerns regarding the reliability of Chinese economic data, this thesis utilizes national-level data from the NBS, which is considered more reliable than local-level data (Fernald et al., 2013; Holz, 2014; Lau, 2018). The study period for the monthly dataset runs from January 2008 to December 2025, while the quarterly dataset covers the period from the first quarter of 2008 to the fourth quarter of 2023. Tables 1 and 2 provide summary statistics of the variables in the quarterly and monthly datasets, respectively.

Table 1: Descriptive Statistics – Quarterly Data

Variable	Obs	Mean	Std. Dev.	Min	Max
Real GDP growth	64	7.228	3.124	-6.8	18.9
NFC loan growth	64	12.816	4.762	7.214	31.865
Short-term NFC loan growth	64	9.447	6.623	1.357	26.135
MLT NFC loan growth	64	15.698	7.926	7.233	43.196
Household loan growth	64	19.586	9.554	5.346	51.939
Short-term consumption loan growth	64	26.496	18.472	-11.358	66.401
MLT consumption loan growth	64	20.28	11.45	.952	57.027
Credit-to-GDP ratio	64	166.186	26.456	106.3	194.7
Trade openness	64	38.744	7.597	27.472	59.619
Government	64	11.19	1.188	8.803	13.132
Real GFCF	64	7.947	5.345	-4.272	25.574
Interest rates	64	3.618	1.117	1.153	6.177
Real government expenditure growth	64	7.365	5.544	-2.611	24.545
Export growth	64	6.942	12.348	-24.803	42.986
Nominal consumption growth	64	10.753	5.461	-1.671	23.742
CPI growth	64	2.299	1.867	-1.531	8.097
M2 growth	64	13.516	5.13	7.971	29.257
Property price growth	64	3.081	4.284	-5.907	10.624

Note: all variables are expressed as year-on-year growth rates, except for the interest rate, credit-to-GDP ratio, trade openness, and size of government, which are reported in levels. For example, the average real GDP growth rate for this sample is 7.2%, and the highest (maximum) and lowest (minimum) values for the credit-to-GDP ratio in this dataset is 194.7% and 106.3%, respectively.

4.2 Selection and Construction of Variables

Dependent Variables

The dependent variable for the first hypothesis (H1) is the year-on-year percentage change of real gross domestic product (GDP) provided by the OECD. Real GDP measures the value added created through the production of goods and services in a country over a given time period adjusted for inflation. In contrast to nominal GDP, which can rise simply due to an increase in prices, real GDP captures the actual change in the volume of goods and services produced, that is, the ‘true’ growth in an economy. Because GDP data is not available on a monthly basis, H1 is analyzed using quarterly time series data. The dependent variable for the second hypothesis (H2) is the percentage change in real gross fixed capital formation (GFCF) provided by Chen, Higgins, and Zha (2024), which measures how much of new value added is invested in an economy. In addition, a more granular measurement for fixed-asset investment (FAI) in the manufacturing sector provided monthly by the NBS is used as a dependent variable to examine whether bank lending to non-financial corporations affects investments more closely related to production and industrial policy objectives, such as Made in China 2025. Investment in fixed assets is a key component of GDP and is financed primarily through retained earnings, with self-raised funds accounting for 60% of total fixed-asset investment in China (Geng & N’Diaye, 2012: 7).

Table 2: Descriptive Statistics – Monthly Data

Variable	Obs	Mean	Std. Dev.	Min	Max
Fixed-asset investment growth (manu)	216	13.504	12.086	-31.5	37.3
MLT NFC loan growth	216	15.114	7.703	6.916	44.933
Short-term NFC loan growth	216	9.257	6.3	1.07	27.06
Interest rates	216	3.445	1.223	1.09	6.96
Export growth	216	8.421	17.494	-26.4	154.9
Profit growth	180	8.182	25.241	-38.3	178.9
Retail sales growth	216	10.395	8.208	-20.5	33.9
Short-term consumption loan growth	216	23.178	19.807	-11.564	70.232
MLT consumption loan growth	216	18.23	12.261	.367	58.731
M2 growth	216	12.638	4.941	6.2	29.7
CPI growth	216	2.065	1.905	-1.8	8.7
Consumer confidence index	216	105.888	11.666	85.5	127

Note: the number of observations for profit growth falls to 180 because it is only available monthly from 2011. All variables are expressed as year-on-year growth rates, except for the interest rate and the consumer confidence index, which are reported in levels.

Finally, the dependent variable for the third hypothesis (H3) is the growth in nominal household consumption expenditure provided by Chen, Higgins, and Zha (2024), which is an important component of GDP. As a robustness check, the change in total retail sales of consumer goods, provided monthly by the NBS, is used as a proxy for consumption, as goods (rather than services) are more typically financed through consumer loans. The second and third hypotheses are analyzed using both quarterly and monthly data.

Independent Variables

The main independent variables for the first hypothesis are the growth rates in total loans to households and non-financial corporations (NFCs). This data has been obtained from the PBoC, covering different types of outstanding loans for each month. These have then been converted into year-on-year growth variables by calculating the percentage change from the previous year. The scatterplot illustrated in Figure 4 shows a positive relationship between the growth in total loans to NFCs and real GDP growth in China, confirming the finance and growth nexus. The correlation between the growth rate in household loans and real GDP growth is relatively high, as is shown in Figure 5, suggesting that household lending is positively associated with economic growth. In contrast to most studies in the existing finance and growth literature, which primarily focus on general or corporate bank lending, this thesis examines the effect of credit on GDP growth by using disaggregated data on different *types* of household and enterprise loans. These relatively more precise explanatory variables are the change in medium-and long-term (MLT) loans to NFCs, short-term consumption loans, and medium- and long-term consumption loans. Figures A7 and A8 in Appendix A illustrate that both the change in MLT loans to NFCs and total credit are positively related to real GDP growth, which is noteworthy

since total credit also encompasses ‘unproductive’ loans. Table B1 in Appendix B shows a correlation matrix for the key variables of H1, where the credit growth variables are all positively correlated with real GDP growth, except for the credit-to-GDP ratio. The main independent variables for the second hypothesis are the growth in MLT loans to NFCs, which capture corporate loans with maturities above one year and are primarily used for productive business investments, such as capital expenditures or research and development (R&D) spending, and the growth in short-term loans to NFCs, which capture loans to businesses with maturities of one year or less that are primarily used for short-term working capital needs.

In line with Schumpeter’s theory that credit is a key funding source for investment, Figure 6 shows a clearly positive relationship between the growth rate in NFC loans and real gross fixed capital formation. Even though fixed-asset investments are primarily financed through retained earnings, this positive correlation suggests that the allocation of credit to NFCs remains an important driver of investments in China. The correlation matrix presented in Table B2 in Appendix B confirms this positive correlation between NFC loans and real GFCF. Finally, the main independent variables for the third hypothesis are the growth in household loans, short-term consumption loans, and MLT consumption loans. Short-term consumption loans represent loans to individuals with maturities of one year or less and are primarily used for personal consumption (such as the purchase of durable goods), while medium- and long-term consumption loans (with maturities above one year) primarily consist of mortgages to households that are used for the purchase of residential real estate.

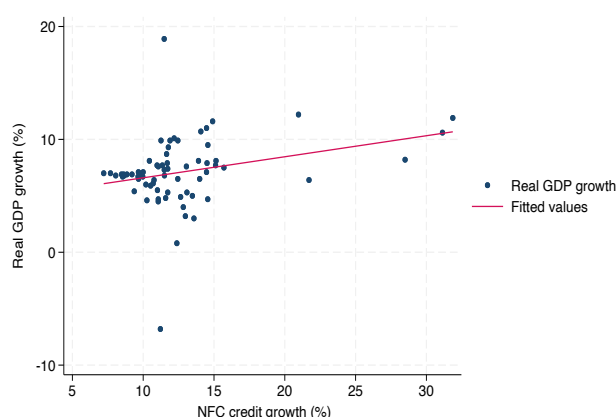


Figure 4: Relationship between NFC credit and real GDP growth

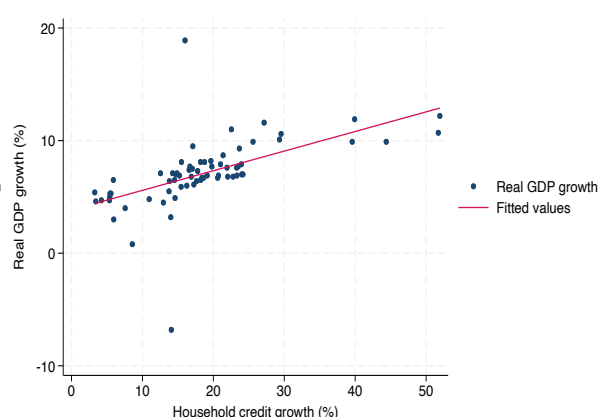


Figure 5: Relationship between household credit and real GDP growth

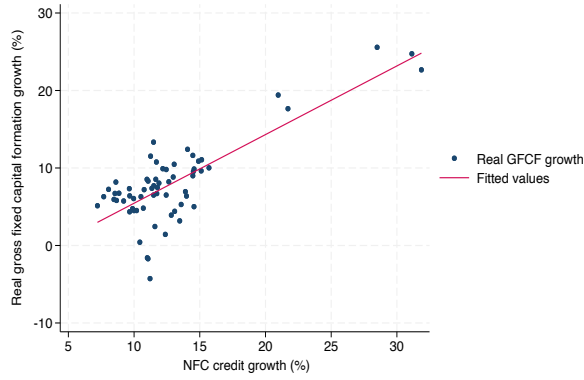


Figure 6: Relationship between NFC credit and GFCF growth

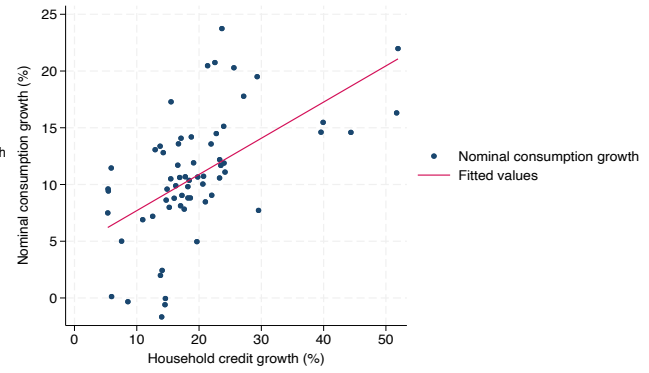


Figure 7: Relationship between household credit and consumption growth

Figure 7 illustrates the relationship between the growth rate in household credit and nominal consumption growth, showing a positive association between the increase in household lending and consumption. The correlation matrix in Table B3 also shows a positive correlation between the change in different household loans, including short-term and medium-to long-term consumption loans, and household consumption growth.

Control Variables

The control variables included in the regression models for the empirical analysis are primarily based on those used in the existing finance and growth literature. For example, to examine the first hypothesis, the credit-to-GDP ratio provided by the BIS has been included, which is widely used in the literature. Additional controls include trade openness, which is the sum of exports and imports of goods divided by GDP using OECD and NBS data, as well as the size of government measured by real government expenditure as a share of GDP using data provided by Chen, Higgins, and Zha (2024). The control variables for the models examining the second hypothesis include the interest rate measured by the (3-month) interbank rate provided by the OECD, which affects the lending rates and thereby the costs of making investments. Another control variable is the growth rate of total profits of industrial enterprises provided by the NBS, since profits or retained earnings is one of the main funding sources for fixed-asset investment in China. Moreover, to take into account China's export-led growth model, where investment decisions are influenced by external demand, a control variable has been included capturing the year-on-year change in exports of goods based on OECD data. Control variables for the models examining the third hypothesis include: the growth in M2, a measure of money in circulation, from the PBoC; the change in real residential property prices obtained from the BIS, which may affect consumption through the 'housing wealth effect'; and the consumer confidence and

consumer price indexes from the OECD and the NBS that capture the *willingness* of consumers to spend and how changes in the price level of consumer goods and services affect household consumption. Finally, because quarterly data on income per capita is only available after 2014 (providing too few observations for reliable empirical analysis), data on real GDP growth from the OECD is used as proxy for income growth.

4.3 Data Limitations

Because disaggregated long-term data on the allocation of credit by sector in China is not available, credit data from the PBoC on different types of household and enterprise loans is used based on reports on the ‘sources and uses of credit funds of depository financial institutions’. These reports only provide data on outstanding loans from January 2007. Because of data limitations, it is not possible to use a longer study period to examine how different types of loans affect economic growth in China. As a result, the number of observations for the quarterly dataset is relatively small. When possible, estimations are made using monthly data that increase the number of observations and the statistical power of the models. An important data limitation concerns the reliability of economic data provided by the Chinese government. While the National Bureau of Statistics has improved the quality of macroeconomic data by adopting international standards, there are still issues with the reliability of official statistics, such as the falsification of data at local levels and the lack of transparency (Lardy & Huang, 2025). The NBS also combines some key data, such as the growth rate in retail sales of consumer goods and fixed-asset investment, for January and February to smooth out distortions caused by the Lunar New Year Holiday. Therefore, quarterly data on both investment and consumption have been obtained from external data sources to supplement the official statistics (Chen, Higgins, & Zha, 2024). The reliability of national-level data has improved, however, and China scores high relative to other middle-income countries in terms of statistical capacity – the ability to produce and disseminate high-quality aggregate data (Owyang & Shell, 2017).

4.4 Methodology

This thesis empirically analyzes the three hypotheses by using quantitative methods. One important condition when using time series data for an empirical analysis is that the variables are stationary. For example, economic time-series data that possess features like trends, that is, a sustained upward or downward movement over time, are said to be non-stationary. Stationary

time series, on the other hand, are not determined only by the change of time (Shrestha & Bhatta, 2018: 72-73). Many macroeconomic time series (such as bank lending and GDP growth) may also move together over time – called cointegration. However, methods or tests for cointegration are needed only if the time series are non-stationary. To test for stationarity, the ADF-GLS test has been conducted, which tests for a unit root by transforming the series through generalized least-squares regression. In contrast to the ordinary (augmented) Dickey Fuller test, this modified test provides the best overall performance in terms of small sample size and power (Elliott et al., 1996: 813). Because the test is sensitive to the number of lags, maximum lag length has been determined based on the frequency of the data, such as 4 for quarterly data and 12 for monthly data (Wooldridge, 2016: 612-613). The test statistic has been selected based on the optimal lag order chosen by the Ng-Perron sequential t-test and the Schwarz criterion. The time series are deemed stationary if the test statistic is larger than the critical value at the 5% level of significance.

The hypotheses are analyzed using quarterly or monthly data, as the latter provides more observations, increasing the statistical power of the model. Time series observed at monthly or quarterly intervals may exhibit seasonality. All variables used in the empirical analysis were either already seasonally adjusted or did not show patterns of seasonality according to the Wald test after running regressions with seasonal dummies. Because this thesis aims to examine how dynamic *changes* in the supply of credit affect economic growth rather than the *stock* of credit, the relevant variables have been transformed into growth variables. The advantage of taking the year-on-year (YoY) *percentage change* of a variable is that it leads to more stationary time series by detrending and de-seasonalizing the data. The YoY percentage change or growth rates are equivalent to using the first difference of log-transformed data (Wooldridge, 2016: 380).

Finally, because the study period covers ‘external shocks’ that could affect both bank lending and economic growth, such as the global financial crisis of 2008 and the Covid-19 pandemic, binary or dummy variables have been created to control for structural breaks. The Supremum Wald test has been used to test for structural breaks at an unknown date. All the regression models have hence been reestimated using binary variables associated with these breaks (Stock & Watson, 2020: 590-595). Another issue when working with time series data is the presence of serial correlation or autocorrelation in the residuals, where the present value of a variable may be influenced by its own past values. The Breusch-Godfrey LM test has been conducted to test for serial correlation after running the regression models. The null hypothesis is that there is no serial correlation, which can be rejected if the p value is less than 0.05. The choice of the

method that is appropriate for the empirical analysis is guided by the presence of serial correlation in the errors. The Prais-Winsten (PW) method produces more reliable estimates than ordinary least squares (OLS) in the presence of serial correlation, which estimates the parameters in a linear regression model using generalized least squares (GLS). The Durbin and Watson (DW) statistic is computed for the PW estimations and a test statistic close to the value of two indicates that the model is ‘free’ of autocorrelation. However, the PW standard errors only correct for first order autocorrelation. To address for higher orders of serial correlation, the Newey-West (NW) method is more appropriate, which uses OLS to estimate the parameters but produces a form of heteroskedasticity-and autocorrelation-consistent (HAC) standard errors. These Newey-West standard errors are robust to general forms of serial correlation and provide more valid test statistics. Wooldridge (2016: 399) recommends computing the Newey-West standard errors by selecting at least 4 lags for quarterly data and 12 lags for monthly data. The results of these estimation models should be interpreted as associational relationships rather than as evidence of causal effects.

Moreover, this thesis not only aims to examine correlational associations between the different credit variables and the growth rate of GDP and its components, but also whether there are predictive causal relationships. Granger causality tests are conducted to examine whether the past values of X *predict* the current values of Y , while the lag length has been determined using the Akaike and the Hannan and Quinn information criterion (AIC and HQIC). Finally, since the main regressors (the credit variables) could also have a *delayed* effect on the dependent variable, such as GDP growth, the total *cumulative* effect over a certain period of time is estimated through a finite distributed lag regression (FDL) model using Newey-West standard errors, where the current value of the dependent variable Y depends on the current and past values of the explanatory variable X , within a maximum number of lags (Stock & Watson, 2020: 609). Stock and Watson (2020:613) argue that, when using time series data, it is possible to estimate ‘dynamic causal effects’, that is, the time path of the effect on the outcome of interest, if the explanatory variable X is *exogenous*. This thesis computes the cumulative dynamic multipliers of the main variables for the three hypotheses, which represent the cumulative effect of a change in X on Y over a specific period of time. The sum of all the individual dynamic multipliers (or coefficients) is called the long-run dynamic multiplier (Stock & Watson, 2020; 618-619). The specified time period is at least one full year, giving a lag length for the FDL models of 4 for quarterly data and 12 for monthly data to stay consistent with NW estimations.

4.5 Models

The three hypotheses are examined through the following main models that estimate the effects of the regressors on each outcome variable:³

$$\Delta GDP_t = \beta_0 + \beta_1 \Delta CreditNFCs_t + \beta_2 \Delta CreditHouseholds_t + \gamma X_t + \varepsilon_t \quad (1)$$

$$\Delta INV_t = \beta_0 + \beta_1 \Delta STCreditNFCs_t + \beta_2 \Delta MLTCreditNFCs_t + \gamma X_t + \varepsilon_t \quad (2)$$

$$\Delta Consumption_t = \beta_0 + \beta_1 \Delta CreditHouseholds_t + \gamma X_t + \varepsilon_t \quad (3)$$

where β_0 is the intercept, t stands for time, and ε_t represents the error term. X_t represents a set of different control variables. ΔGDP_t is the dependent variable of the first model and equals the growth rate in real GDP. $\Delta CreditNFCs_t$ and $\Delta CreditHouseholds_t$ are the main independent variables and represent the year-on-year percentage changes in bank credit to NFCs and households, respectively. The model for H1 is analyzed using quarterly data, since monthly time series on GDP are unavailable for China. ΔINV_t is the main response variable for H2, which represents the change in investment measured by real gross fixed capital formation and is examined using quarterly data. In addition, the association between corporate lending and fixed asset investment in manufacturing – a dependent variable that is more closely related to investments in industrial production – is examined using monthly data. $\Delta STCreditNFCs_t$ and $\Delta MLTCreditNFCs_t$ are the main independent variables for the second model and represent the growth rate in short-term and medium-and long-term loans to NFCs, respectively. Finally, $\Delta Consumption_t$ is the main dependent variable for H3 and represents the change in nominal household consumption expenditure, examined using quarterly data. The main regressor is $\Delta CreditHouseholds_t$, which represents the change in credit to households. Moreover, using monthly data, the change in retail sales of consumer goods is used as a response variable for the robustness check, where a distinction is made between two different types of household loans for consumptive purposes. To examine the cumulative dynamic associations of the main regressors on each dependent variable, the long-run cumulative multipliers are computed using the finite distributed lag model as described by Stock and Watson (2020: 616):

$$Y_t = \beta_0 + \beta_1 X_t + \beta_2 X_{t-1} + \beta_3 X_{t-2} + \dots + \beta_{r+1} X_{t-r} + \gamma X_t + \varepsilon_t \quad (4)$$

where the dependent variable Y_t is expressed as distributed lag of current and past values of the regressor X_t , while r denotes the number of lags, X_t represents a set of control variables and ε_t is the error term. The cumulative dynamic multiplier is the sum of all the lag coefficients.

³ Equation numbers refer to the main empirical models rather than the sequential order of all the equations.

5. Empirical Analysis

This section first presents the results of the empirical analysis for the three hypotheses, followed by a discussion of the findings in relation to the existing literature and the limitations of the methods used.

5.1 Empirical Results of Hypothesis 1

As is shown in Tables B4 and B5 in Appendix B, according to the results of the ADF-GLS test for unit root, all the variables in the monthly and quarterly datasets were stationary at the 5% significance level, except for a few control variables, which were made stationary after applying the first difference. Since the main variables of interest are stationary, methods and tests for cointegration are inapplicable. The Supremum Wald test was used to test for unknown structural breaks, which detected a break at the first quarter of 2020 during the Covid-19 pandemic. All regression models are estimated with structural break dummies for the 2008 global financial crisis and the Covid-19 pandemic. However, these structural break dummies were not statistically significant. Moreover, for the regression models that use monthly data, a binary variable has been included for January to address the issue of duplicate observations, since the NBS combines the data for January and February for some key variables.

The first hypothesis (H1) states that: *‘productive’ corporate lending exhibits a stronger positive relationship with economic growth than ‘less-productive’ household lending*. To investigate H1, the appropriate estimation method has been determined based on the degree of serial correlation in the residuals. As is shown in Table B6 in the Appendix, according to the Breusch-Godfrey LM test for autocorrelation, after running a simple OLS regression for the first model, the p value is 0.068, thereby failing to reject the null hypothesis of no autocorrelation at the 5% significance level. However, at the 10% significance level, the p value does reject the null and there might be weak evidence of autocorrelation. Therefore, to obtain more reliable test statistics, the regression model is estimated using the Prais-Winsten (PW) estimation method that corrects for first-order autocorrelation or AR(1). The New-West (NW) estimations do not change the OLS coefficients but correct for higher-order serial correlation. The estimation results for both the PW and NW regression models are presented in Table 3, which show that there is a positive and statistically significant relationship between the growth rate in *both* enterprise and household credit and real GDP growth from the first quarter of 2008 to the fourth quarter of 2023. This means that we can reject H1, since ‘productive’ credit to non-financial

corporations does not seem to have a substantially stronger relationship with economic growth than ‘less-productive’ bank lending to households. A one percentage point increase in credit to non-financial corporations is associated with a 0.15 to 0.16 percentage point increase in real GDP, while a one percentage point increase in credit to households is associated with around 0.15 percentage point increase in real GDP, *ceteris paribus* (see column 1 and 2). The R-squared in column 2 shows that the explanatory variables in the model explain 44% of the variation in the dependent variable. To examine whether bank lending to NFCs is positively associated with real GDP growth following the introduction of the MIC2025 policy in May 2015, an interaction term is used between the time dummy variable for MIC2025 and the growth in credit to NFCs from the second quarter of 2015. As is shown in columns 3 and 4 in Table 3, however, corporate credit growth appears to be negatively associated with real GDP growth *after* 2015, though these results are not statistically significant. Meanwhile, the credit *stock* variable or the credit-to-GDP ratio is *not* positively associated with real GDP growth, suggesting that the total amount of credit matters less for growth than the allocation of credit to the real economy.

Table 3: Estimation Results for the PW and NW Regressions of H1

Empirical model Dependent: ΔGDP_{real}	PW (1)	NW (2)	PW (3)	NW (4)
$\Delta Credit_{NFC}$	0.147** (0.056)	0.164** (0.070)	0.111*** (0.036)	0.129*** (0.038)
$\Delta Credit_{Households}$	0.153*** (0.030)	0.156*** (0.036)	0.085*** (0.024)	0.075*** (0.021)
Credit-to-GDP ratio	-0.340* (0.191)	-0.394* (0.228)	-0.417** (0.208)	-0.462* (0.232)
Trade openness	0.185 (0.131)	0.099 (0.137)	0.213 (0.144)	0.179 (0.148)
Government	-0.329 (0.395)	-0.159 (0.463)	-0.326 (0.457)	-0.244 (0.515)
Interest rates	-0.379 (0.407)	-0.346 (0.355)	-0.488 (0.456)	-0.452 (0.400)
$MIC2025 * \Delta Credit_{NFC}$			-0.155 (0.226)	-0.224 (0.177)
Constant	2.902*** (0.880)	2.589** (1.089)	6.103*** (0.931)	6.144*** (0.782)
DW statistic	1.980	-	1.962	-
R-squared	0.38	0.44	0.47	0.53
Observations	64	64	64	64

Note: semi-robust and Newey-West standard errors are in parentheses. The Durbin Watson (DW) statistic is given only for the OLS and PW estimations. All models include structural break dummies, covering time periods during the global financial crisis and the Covid-19 pandemic. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. The number of lags for the NW estimations is 4 based on the frequency of the data, which is quarterly. The credit variables are in YoY percentage change, while the control variables are in levels. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The other control variables do not have a statistically significant relationship with GDP growth. The Durbin-Watson statistic for the PW estimations in Table 3 are close to 2, suggesting that these models are free of autocorrelation. As a robustness check, the variable for household credit is broken down into short-term consumption loans (a proxy for consumer loans) and medium and long-term (MLT) consumption loans (a proxy for mortgage loans). A narrower variable for medium and long-term loans to NFCs has been included instead of total NFC loans. The results of the OLS estimations, which had no autocorrelation in the residuals, are presented in Table B7 in Appendix B, showing that both the change in MLT loans to NFCs and short-term consumption loans have a positive and statistically significant effect on real GDP growth and that MLT consumption loans are not positively associated with economic growth.

To examine whether the past values of the growth in credit to NFCs and households *predict* the current values of real GDP growth, Granger causality tests have been conducted. The results in Table 4 show that the percentage change in credit to NFCs Granger-causes real GDP growth only at the 10% level of significance. The direction of Granger-causation is unidirectional since real GDP growth does not predict the change in credit to NFCs. The growth in credit to households Granger-causes real GDP growth at the 5% level of significance. The results also indicate unidirectional Granger-causation, with real GDP growth having no Granger-causal relationship with the change in household credit. Finally, as is shown in Table 5, since bank lending could also have a delayed effect on economic growth, cumulative multipliers have been computed after running a FDL model based on the model presented in Table 3.

Table 4: Results of the Tests for Granger Causality

Related pair of variables	Null hypothesis	Lag length	P-value
% change of credit to NFCs	$\Delta Credit_{NFCs} \not\Rightarrow \Delta GDP_{real}$	2	0.052*
vs % change in real GDP	$\Delta GDP_{real} \not\Rightarrow \Delta Credit_{NFCs}$	2	0.235
% change of credit to households	$\Delta Credit_{Households} \not\Rightarrow \Delta GDP_{real}$	2	0.044**
vs % change in real GDP	$\Delta GDP_{real} \not\Rightarrow \Delta Credit_{Households}$	2	0.948
% change of credit to NFCs	$\Delta Credit_{NFCs} \not\Rightarrow \Delta GFCF_{real}$	2	0.000***
vs % change in real gross fixed capital formation	$\Delta GFCF_{real} \not\Rightarrow \Delta Credit_{NFCs}$	2	0.681

Note: quarterly data. The sample period covers the first quarter of 2009 to the fourth quarter of 2023, providing a total of 60 observations. Granger causality is tested by regressing the dependent variable on its own lagged values and the lagged values of the explanatory variable and then applying an F-test to determine if the latter lagged coefficients are jointly significantly different from zero. The optimal lag length is determined by the AIC and HQIC information criterion. Significance level is denoted as * p<0.1; ** p<0.05; *** p<0.01

Table 5. Cumulative Multipliers for FDL Model 1

Dependent: ΔGDP_{real}	Long-run multiplier coefficient	(Std. err.)	95% CI	p-value
Variable				
NFC loan growth (lags 0–4)	0.236*	(0.119)	[−0.004, 0.477]	0.054
Household loan growth (lags 0–4)	0.160***	(0.040)	[0.080, 0.240]	0.000

Notes: The dependent variable is real GDP growth. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. The cumulative multipliers represent the sum of all lag coefficients from lag 0 through lag 4, estimated using a finite distributed lag (FDL) model with Newey-West standard errors based on model 1 of the first hypothesis. The sums are computed as linear combinations of the estimated coefficients. The maximum number of lags is 4 based on the frequency of the data, which is quarterly. Significance level is denoted as * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

The results indicate that over a one-year period, both the change in credit to NFCs and households are positively associated with real GDP growth. A one percentage point increase in corporate and household credit is associated with a cumulative increase of 0.236 and 0.16 percentage points in real GDP growth, respectively. While the cumulative multiplier coefficient for the change in loans to NFCs has a larger magnitude than for the change in loans to households, the level of significance is stronger for household credit than for loans to NFCs.

5.2 Empirical Results of Hypothesis 2

The second hypothesis (H2) states that: *the growth in loans to non-financial corporations is positively associated with the growth in investment*. As is shown in Table B6 in the Appendix, according to the Breusch-Godfrey LM test for autocorrelation, after running an OLS regression for the first model of H2, the p value is 0.000, rejecting the null hypothesis of no autocorrelation at the 1% significance level and concluding that the model has significant serial correlation. Because Prais-Winsten estimations could be less reliable in the presence of higher-order serial correlation, as it only corrects for first-order autocorrelation, the NW estimation is the preferred specification, where Newey-West standard errors remain valid under unknown forms of serial correlation. Consistent with the hypothesis, the results of the NW estimations presented in Table 6 show that the growth rate in medium- and long-term (MLT) loans to NFCs is positively associated with the change in real gross fixed capital formation (GFCF), which is statistically significant at the 1% level.

For example, column 2 shows that a one percentage point increase in MLT loans to NFCs is associated with a 0.34 percentage point increase in real GFCF, holding all other factors constant. In addition, the growth in short-term loans to NFCs is also positively associated with the change in GFCF. Except for real GDP growth, the control variables for interest rates, export growth, and the change in government expenditures do not have any positive or statistically significant effects on the change in real GFCF. One interesting finding is that the growth in credit to NFCs is negatively associated with GFCF *after* the introduction of the Made in China 2025 industrial policy, as is shown by the negative coefficient for the interaction term between MLT loans to NFCs and the MIC2025 dummy (see column 3). Moreover, to examine whether bank lending to NFCs is positively associated with investment in manufacturing, a sector targeted by China's industrial policies, a NW regression model has been estimated using monthly data from 2008 to 2025. The Breusch-Godfrey LM test for autocorrelation showed a p value of 0.000 for the second model of H2 after running an OLS regression, rejecting the null hypothesis of no autocorrelation at the 1% level of significance.

Table 6: Estimation Results for the NW Regressions of H2

Empirical model Dependent: $\Delta GFCF_{real}$	NW (1)	NW (2)	NW (3)
<i>Interest rates</i>	0.155 (0.671)	0.016 (0.538)	-0.090 (0.481)
$\Delta Exports$	-0.185*** (0.046)	-0.165*** (0.039)	-0.146*** (0.034)
$\Delta GovernmentExp_{real}$	-0.006 (0.066)	-0.128 (0.085)	-0.225*** (0.067)
$\Delta Real\ GDP$	1.050*** (0.132)	0.902*** (0.093)	0.940*** (0.114)
$\Delta MLTCredit_{NFC}$	0.276*** (0.087)	0.340*** (0.062)	0.397*** (0.033)
$\Delta STCredit_{NFC}$		0.225*** (0.081)	0.300*** (0.094)
$MIC2025^* \Delta MLTCredit_{NFC}$			-0.868*** (0.206)
Constant	-2.873** (1.309)	-4.098*** (1.173)	-5.489*** (2.049)
R-squared	0.76	0.81	0.87
Observations	64	64	64

Note: Newey-West standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. All variables are in YoY percentage change, except for interest rates that is in levels. The number of lags for the NW estimations is 4 based on the frequency of the data, which is quarterly. Significance levels denoted as * p < 0.10, ** p < 0.05, *** p < 0.01

The NW estimation results, addressing for higher-order serial correlation, are presented in Table 7, indicating that the growth in MLT loans to NFCs remains positively associated with the growth in fixed-asset investment (FAI) in the manufacturing industry. However, whereas the growth in short-term loans to NFCs remains statistically significant consistently after adding control variables, the growth in MLT loans to NFCs loses significance after including the growth in industrial profits. As is shown in column 5, a one percentage point increase in short-term NFC loans and industrial profits raise FAI in manufacturing by 0.905 and 0.268 percentage points, respectively. The R-squared, a measurement for the goodness of fit, shows that the model explains 77% of the variation in the dependent variable. The Made in China 2025 industrial policy does not seem to affect the relationship between MLT loans to NFCs and the growth in manufacturing FAI (see column 6). As a robustness check, Table B8 and B9 show Prais-Winsten estimations for the regression models of H2. Even though the PW method only corrects for first-order serial correlation, it re-estimates the model coefficients via GLS. The estimated coefficients are consistent across both the PW and NW methods, showing a positive association between the growth in credit to NFCs and the change in real GFCF, and that the MIC2025 industrial policy has no positive effect on this relationship. However, when controlling for profit growth, the credit variables do not seem to have any positive or statistically significant relationships with manufacturing FAI in the PW estimations (see Table B9).

Table 7: Estimation Results for the NW Regressions of H2

Empirical model Dependent: ΔFAI_{mamu}	NW (1)	NW (2)	NW (3)	NW (4)	NW (5)	NW (6)
$\Delta MLTCredit_{NFC}$	0.552*** (0.158)	0.609*** (0.122)	0.608*** (0.121)	0.487*** (0.083)	0.131 (0.233)	0.259 (0.233)
$\Delta STCredit_{NFC}$		0.976*** (0.156)	0.976*** (0.156)	0.894*** (0.120)	0.905*** (0.096)	0.629*** (0.105)
Interest rates			0.184 (0.809)	-0.009 (0.855)	-0.016 (0.555)	0.034 (0.551)
$\Delta Exports$				0.264*** (0.057)	0.030 (0.032)	0.029 (0.033)
$\Delta Profits$					0.268*** (0.039)	0.255*** (0.038)
$MIC2025 * \Delta MLTCredit_{NFC}$						-0.091 (0.431)
Constant	5.314 (3.817)	-4.725* (2.513)	-4.705* (2.493)	-4.262** (1.888)	3.537* (2.011)	4.149 (3.583)
R-squared	0.25	0.50	0.50	0.63	0.77	0.79
Observations	216	216	216	216	180	180

Note: Newey-West standard errors are in parentheses. All models include structural break dummies for the 2008 global financial crisis and the Covid-19 pandemic in 2020. The models also include a dummy variable for January to address the issue of duplicate observations since the NBS releases data for some key variables together with February due to the Lunar New Year Holiday. The total number of observations drops from 216 to 180 because the control variable for profits is only available monthly from 2011. All variables are in YoY percentage change, except for interest rates that is in levels. The number of lags for the NW estimations is 12 based on the frequency of the data, which is monthly. Significance levels denoted as * p < 0.10, ** p < 0.05, *** p < 0.01

Table 8. Cumulative Multipliers for FDL Model 2

Dependent: ΔFAI_{manu}	Long-run multiplier coefficient	(Std. err.)	95% CI	p-value
Variable				
MLT NFC loan growth (lags 0–12)	0.569***	(0.106)	[0.360, 0.778]	0.000
Profit growth (lags 0–12)	0.296***	(0.067)	[0.165, 0.428]	0.000

Notes: The dependent variable is the growth rate in fixed-asset investment (FAI) in the manufacturing sector. The sample period covers January 2008 to December 2025. The cumulative multipliers represent the sum of all lag coefficients from lag 0 through lag 12, estimated using a finite distributed lag (FDL) model with Newey-West standard errors based on model 2 of the second hypothesis. The model includes structural break dummies and for January duplicate observations. The sums are computed as linear combinations of the estimated coefficients. The maximum number of lags is 12 based on the frequency of the data, which is monthly. Significance level is denoted as * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

The Granger causality test in Table 4 shows that the percentage change in loans to NFCs Granger-causes the change in real gross fixed capital formation at the 1% level of significance. The direction of Granger-causation is unidirectional as the change in real GFCF does not Granger-cause the change in NFC loans. Finally, Table 8 shows the cumulative dynamic multipliers for the growth in MLT loans to NFCs and profits after running a FDL model based on the model presented in Table 7. It shows that the growth in manufacturing FAI is responsive to both profits and MLT loans to NFCs. However, the magnitude of the multiplier coefficient is larger for NFC loans than that for profits, suggesting that, over a one-year period, MLT loans to NFCs exert a stronger positive (delayed) association with manufacturing investment.

5.3 Empirical Results of Hypothesis 3

The third hypothesis (H3) states that: *the growth in lending to households is positively associated with the growth in consumption*. Table B6 in the Appendix presents the results of the Breusch-Godfrey LM test for autocorrelation, showing that after running an OLS regression for the main model of H3, the p value is 0.000, meaning that the model has significant serial correlation. The results of the NW estimations that address for serial correlation and heteroskedasticity are presented in Table 9. Consistent with the hypothesis, the results show that the growth in bank credit to households has a positive and statistically significant relationship with nominal household consumption growth, *ceteris paribus*. The results also indicate that the growth in consumption is positively associated with income growth measured

by real GDP growth. The change in M2, a measurement for (potential) purchasing power, is not positively associated with consumption growth. Meanwhile, the change in house prices, a control variable measuring the effect of the ‘housing wealth effect’ – where higher home prices increase household wealth and enhance consumer confidence – does not appear to be positively associated with consumption, though the results are not statistically significant. As a robustness check, the results of the Prais-Winsten estimations are presented in Table B10 in the Appendix, confirming the positive relationship between the change in household lending on the change in consumption. Since loans to households encompass both consumer loans and mortgages, the results of a disaggregation of household loans between short-term consumption loans – a proxy for consumer loans – and medium and long-term consumption loans – a proxy for mortgage loans – are presented in Table 10. The results indicate that the percentage change in short-term consumption loans is positively associated with growth in retail sales of consumer goods, while the growth in medium and long-term consumption loans is negatively associated with consumption for the period 2008 to 2025.

Table 9: Estimation Results for the NW Regressions of H3

Empirical model Dependent: $\Delta Consumption_{Nom}$	NW (1)	NW (2)	NW (3)	NW (4)	NW (5)	NW (6)
$\Delta Credit_{Households}$	0.281*** (0.062)	0.158*** (0.058)	0.093* (0.048)	0.129** (0.064)	0.131* (0.069)	0.169** (0.067)
ΔGDP_{real}		0.684** (0.291)	0.743*** (0.177)	0.764*** (0.196)	0.764*** (0.197)	0.766*** (0.198)
ΔCPI			1.139*** (0.274)	1.095*** (0.302)	1.096*** (0.305)	1.137*** (0.319)
$\Delta M2$				-0.130 (0.107)	-0.131 (0.109)	-0.173** (0.079)
<i>Interest rates</i>					-0.073 (0.489)	-0.029 (0.488)
$\Delta House\ prices$						-0.096 (0.118)
Constant	6.004*** (1.412)	3.487** (1.602)	1.622 (1.488)	2.579 (1.657)	2.559 (1.669)	2.529 (1.654)
R-squared	0.42	0.52	0.66	0.67	0.67	0.67
Observations	64	64	64	64	64	64

Note: Newey-West standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. All variables are in YoY percentage change, except for interest rates that are in levels. The number of lags for the NW estimations is 4 based on the frequency of the data, which is quarterly. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one percentage point increase in short-term consumption loan growth is associated with a 0.41 percentage point increase in retail sales growth, holding all other factors constant (see column 6). The results of the PW estimations in Table B11 in the Appendix confirm these findings, showing a positive association between the growth in short-term consumption loans and the change in retail sales of consumer goods, and a negative association for the change in MLT consumption loans. Table 11 presents the results of the Granger causality tests, indicating that the percentage change in credit to households Granger-causes the change in nominal household consumption at the 1% level of significance. This relationship is unidirectional, since the change in nominal consumption does not predict the change in household lending. Breaking down the household credit variable, the results indicate unidirectional Granger-causation between the change in short-term consumption loans and nominal consumption at the 1% level of significance, while there is bidirectional Granger-causation between the change in MLT consumption loans and the change in nominal consumption. These latter results indicate a pattern of two-way causality, where the change in MLT consumption loans Granger-causes the change in consumption at the 10% level of significance, while the change in nominal consumption Granger-causes the change in MLT consumption loans at the 5% level of significance, which may suggest that there could be a problem of ‘reverse causality’.

Table 10: Estimation Results for the NW Regressions of H3

Empirical model Dependent: $\Delta Retail\ sales$	NW (1)	NW (2)	NW (3)	NW (4)	NW (5)	NW (6)
$\Delta STCredit_{consumption}$	0.281*** (0.048)	0.378*** (0.109)	0.382*** (0.123)	0.369*** (0.149)	0.415*** (0.151)	0.414*** (0.152)
$\Delta MLTCredit_{consumption}$		-0.199 (0.149)	-0.196 (0.138)	-0.168 (0.117)	-0.170 (0.118)	-0.171*** (0.117)
ΔCPI			-0.153 (0.771)	-0.238 (0.847)	-0.243 (0.853)	-0.234 (0.858)
$\Delta M2$				-0.239 (0.317)	-0.246 (0.321)	-0.244* (0.324)
<i>Interest rates</i>					0.511 (0.621)	0.501 (0.608)
<i>Consumer confidence index</i>						0.045 (0.137)
Constant	3.491** (1.386)	4.745*** (0.907)	4.904*** (1.127)	6.800** (3.342)	6.896** (3.398)	6.891*** (3.411)
R-squared	0.47	0.51	0.51	0.52	0.52	0.52
Observations	216	216	216	216	216	216

Note: Newey-West standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The models also include a dummy variable for January to address the issue of duplicate observations since the NBS releases data for some key variables together with February due to the Lunar New Year Holiday. The sample period covers January 2008 to December 2025. All variables are in YoY percentage change, except for interest rates and the consumer confidence index that are in levels. The number of lags for the NW estimations is 12 based on the frequency of the data, which is monthly. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Results of the Tests for Granger Causality

Related pair of variables	Null hypothesis	Lag length	P-value
% change in credit to households vs % change in nominal consumption	$\Delta Credit_{households} \not\Rightarrow \Delta Consumption_{nom}$	4	0.000***
	$\Delta Consumption_{nom} \not\Rightarrow \Delta Credit_{households}$	4	0.112
% change in short-term consumption loans vs % change in nominal consumption	$\Delta STCredit_{consumption} \not\Rightarrow \Delta Consumption_{nom}$	4	0.002***
	$\Delta Consumption_{nom} \not\Rightarrow \Delta STCredit_{consumption}$	4	0.149
% change in medium and long-term consumption loans vs % change in nominal consumption	$\Delta MLTCredit_{consumption} \not\Rightarrow \Delta Consumption_{nom}$	4	0.059*
	$\Delta Consumption_{nom} \not\Rightarrow \Delta MLTCredit_{consumption}$	4	0.029**

Note: quarterly data. The sample period covers the first quarter of 2009 to the fourth quarter of 2023, providing a total of 60 observations. Granger causality is tested by regressing the dependent variable on its own lagged values and the lagged values of the explanatory variable and then applying an F-test to determine if the latter lagged coefficients are jointly significantly different from zero. The optimal lag length is determined by the AIC and HQIC information criterion. Significance level is denoted as * p<0.1; ** p<0.05; *** p<0.01

Finally, to examine whether short-term and MLT consumption loans could have a delayed effect on consumption, a FDL model is estimated to compute the cumulative dynamic multipliers. The results in Table 12 indicate that over a one-year period, the growth in short-term consumption loans has a cumulative dynamic association with growth in retail sales of consumer goods of 0.296 percentage point at the 1% level of significance, whereas the change in MLT consumption loans has a negative and statistically insignificant cumulative association with retail sales growth over a one-year period.

Table 12. Cumulative Multipliers for FDL Model 3

Dependent: $\Delta retail\ sales$	Long-run multiplier coefficient	(Std. err.)	95% CI	p-value
Variable				
Short-term consumption loan growth (lags 0–12)	0.296***	(0.081)	[0.137, 0.456]	0.000
MLT consumption loan growth (lags 0–12)	-0.143	(0.149)	[-0.437, 0.152]	0.340

Notes: The dependent variable is the growth in retail sales of consumer goods. The sample period covers January 2008 to December 2025. The cumulative multipliers represent the sum of all lag coefficients from lag 0 through lag 12, estimated using a finite distributed lag (FDL) model with Newey-West standard errors based on model 2 of H3. The sums are computed as linear combinations of the estimated coefficients. The maximum number of lags is 12 based on data frequency, which is monthly. Significance level is denoted as * p<0.1; ** p<0.05; *** p<0.01

5.4 Discussion of Results

The aim of this thesis is to examine the extent to which disaggregated bank lending is associated with China's economic growth and its main components – investment and consumption. This research question was investigated through three hypotheses that led to the following results. First, the findings from the Prais-Winsten and Newey-West estimations in Table 3 reject H1, showing that *both* the growth in enterprise and household credit are positively associated with real GDP growth using quarterly data from 2008 to the end of 2023 and that the relationship between 'productive' lending to NFCs and economic growth is *not* substantially stronger than that for 'less-productive' household lending. In line with the 'Quantity Theory of Disaggregated Credit', the findings showed that credit to the real economy, including short-term consumption loans and MLT loans to NFCs, is positively associated with real GDP growth, while the proxy for mortgage loans (or asset-based transactions) is negatively associated with real GDP growth (see Table B7, column 3). The long-run cumulative multipliers for the FDL model presented in Table 5 also showed that loans to NFCs and households are positively associated with real GDP growth over a one-year period. Moreover, the percentage change in credit to both NFCs and households Granger-cause real GDP growth, and the direction of Granger-causation is unidirectional since the past values of GDP are not significant in predicting the credit variables. This suggests that the growth in bank lending is not merely a response to economic growth, but that credit creation may have an independent effect on growth.

Second, consistent with H2, the NW estimations in Table 6 showed that both the change in short-term and MLT loans to NFCs are positively associated with the change in real gross fixed capital formation. The change in loans to NFCs exhibits a unidirectional Granger-causal relationship with the change in real GFCF. However, when using monthly data from 2008 to 2025 and controlling for profit growth, only the growth in short-term loans to NFCs has a significant relationship with the growth in fixed-asset investment in manufacturing – a sector targeted by industrial policy. The cumulative multipliers for the FDL model presented in Table 8, on the other hand, showed that over a one-year period, the change in MLT loans to NFCs has a stronger positive relationship with FAI in manufacturing than that for profit growth.

Third, consistent with H3, the results of the NW estimations in Table 9 showed that the change in household credit is positively associated with household consumption growth. However, when breaking down household loans into short-term consumption loans and MLT consumption loans, the results in Table 10 showed that only the change in consumer loans is

positively associated with consumption growth, while the proxy for mortgage loans has a negative association with the change in retail sales of consumer goods. The Granger causality tests have shown that the direction of Granger-causation is unidirectional for the relationship between the change in the proxy for consumer loans and the growth in household consumption, but bidirectional for the mortgage proxy. Moreover, the findings failed to confirm the ‘housing wealth effect’ as property prices did not have a positive association with consumption, nor did the proxy for mortgages have a positive delayed effect on consumption. Moreover, to address the issue of serial correlation in the models for H2 and H3, Newey-West estimations were used as the baseline inference, an estimator that is heteroskedasticity and autocorrelation-consistent, thereby providing more valid test statistics. The main downside of using OLS with Newey-West standard errors, however, is that they may be too large, which may lead to insignificant results (Wooldridge, 2016: 404-408). The Prais-Winsten method is used as a robustness check, which re-estimates the coefficients – unlike Newey-West – but assumes first-order serial correlation. The results for both H2 and H3 remained consistent across both specifications.

The results are in line with the findings of Werner (2005), Bofinger et al. (2022) and Geißendörfer and Haas (2022), who all found positive associations between the *percentage change* in total credit and loans to NFCs with GDP growth. However, these papers did not distinguish between different *types* of household and enterprise loans or examine how these credit variables affect the *components* of GDP. Meanwhile, most studies in the existing finance and growth literature, such as Beck et al. (2012), Zhang and Bezemer (2016), and Bezemer, Grydaki and Zhang (2016), analyze the relationship between bank lending and GDP growth by focusing on the credit *stock* (credit-to-GDP ratio) or by calculating the credit *flow* as the change of credit stocks relative to lagged GDP. The results of these credit ratios primarily show that credit flows are more positively associated with economic growth than credit stocks. The results presented in Table 3 confirm these findings, as the different credit growth variables are positively associated with real GDP growth, whereas the credit-to-GDP ratio is negatively associated with economic growth. This suggests that the allocation of credit to the real economy, such as loans used for consumption and investment, matters more for growth than the total *quantity* of credit, which could be a drag on growth. One reason for this is that total credit also encompasses loans used for ‘unproductive’ purposes that do not contribute to GDP growth, including mortgage loans used for the purchase of existing real estate. If a large share of bank lending is allocated toward asset-based transactions, then the growth effectiveness of credit may diminish (Werner, 2005; Bezemer, Grydaki & Zhang, 2016).

As long as credit is extended to the real economy, bank lending has a positive effect on economic growth. The positive association between different NFC loans and gross fixed capital formation indicates that selective credit policies pursued by the PBoC, such as *window guidance*, aimed at ‘guiding’ state-owned banks to expand lending to NFCs in priority sectors, may contribute to the investment-bias in China’s growth model. Meanwhile, the positive association between household credit (short-term consumption loans in particular) and household consumption suggests that the decline in the share of new bank loans to households, as illustrated in Figure A9 in Appendix A, may weaken domestic consumption, making it more difficult for China to ‘rebalance’ the sources of growth from investment and exports toward greater domestic demand-led growth. Figure A10 in the Appendix shows that the share of household loans to total bank credit initially rose from 17% in 2007 to 35% by 2020, before declining after the property slump to 29% in 2025, while the share of corporate loans fell from 84% in 2007 to 60% in 2021 and then rose again to 66% in 2025 as the Chinese government prioritized lending to targeted industries.

Furthermore, since the early 2000s, China has become the epitome of the *developmental state* in contemporary era, launching ambitious state-led industrial policies to nurture the development of strategic sectors. The provision of loans by state-owned banks is one of the most important industrial policy instruments. As illustrated in Figure A11 in the Appendix, the increase in credit to the industrial sector in recent years suggests that bank lending is increasingly directed in line with industrial policy goals, while lending to the property sector and mortgages to households have drastically declined since 2021.⁴ However, one unexpected finding is that no positive relationships between bank loans to NFCs and GDP growth or between MLT loans to NFCs and the growth in manufacturing investments could be observed *following* the introduction of the ‘Made in China’ 2025 industrial policy (see Tables 3 and 7). If credit is increasingly being channeled toward manufacturing industries targeted by the MIC2025 policy, then bank lending is expected to be positively associated with fixed-asset investment in manufacturing after 2015. An explanation for this is that the variable for NFC loans is an aggregate variable that also captures sectors that are not targeted by the MIC2025 policy, such as real estate and infrastructure, which diminishes the effect of credit on

⁴ Although the PBoC does not provide long-term data on the sectoral allocation of credit, it does publish quarterly reports on the ‘credit structure’ since 2012. These reports provide information on the total amount and growth of credit for a few selected sectors.

manufacturing FAI. Moreover, banks already allocated credit toward the manufacturing sector prior to 2015, and the MIC2025 policy thus had no significant effect in altering this relationship. Another explanation for the negative association between bank lending to NFCs and investment after the introduction of the MIC2025 plan is that state-owned banks continued to favor loans to SOEs (including ‘zombie firms’) that are not *used* productively, instead of lending to more efficient privately-owned firms (Xu, 2024; Lam, 2017). SOEs often used loans to roll over existing debts, and firms in sectors with overcapacity may be reluctant to use loans for new capital investments (Orlik, 2022). The MIC2025 interaction term is a blunt test of industrial policy and should be interpreted with caution as its results are not statistically significant in some regression models.

Finally, one key finding of this thesis is that loans to households used for consumptive purposes matter for economic growth. In recent years, an important goal of China’s economic policy is to ‘rebalance’ the sources of growth toward more domestic demand-led growth by promoting household consumption and reducing the reliance on exports and investments. However, the fall in property prices triggered by government policies that restricted access to credit for households and property developers since the early 2020s has eroded consumer confidence (Huang, 2023). As new bank lending to households has declined, the Chinese government has encouraged banks to increase their lending to consumers by providing interest subsidies for personal consumption loans. As shown in Table 10, only short-term consumption loans have a positive effect on consumption, while mortgage loans do not have growth-enhancing effects.

A limitation with the findings is the relatively short time sample, which is dictated by data availability. Because disaggregated data on the year-on-year growth of different types of loans is only available from 2008 onward, the results for the regression models using quarterly data should be interpreted with caution due to the modest number of observations. Because no monthly data was available for GDP, estimations using monthly data that increase the statistical power of the models could only be used for H2 and H3. This lack of access to data has also constrained the ability to include a greater variety of control variables, which could lead to omitted variable bias. One measurement limitation is that the variable for loans to NFCs does not distinguish between targeted and non-targeted sectors or between SOEs and privately-owned firms. Detailed sectoral or borrower-level credit data is limited, and where official statistics are available, including from the PBoC, questions over their reliability remain. Nevertheless, official statistics remain the most comprehensive publicly available source of

financial and macroeconomic data for China. The findings of this thesis should be interpreted with this limitation in mind. Another limitation with the methodology is that while Newey-West standard errors are used to correct for heteroskedasticity and autocorrelation in the residuals, they do not solve the issue of endogeneity. This thesis relies on the theories provided by Schumpeter (1934) and Werner (1997) to assume that credit is *exogenous*, as banks create new deposits in the act of lending and make allocative decisions. Because of imperfect information, the credit market is more likely to be supply-rationed, with lenders selectively allocating credit to borrowers based on their creditworthiness to reduce the risk of default and maximize profits (Stiglitz & Weiss, 1981). In addition to the theoretical justification for the exogeneity assumption, Granger causality tests have been conducted to empirically examine whether the credit variables may have an independent effect on GDP and its components. As is shown in Table 4, both NFC credit growth and household credit growth have a one-way or *unidirectional* Granger-causal relationship with real GDP growth in China, which reduces concern about ‘reverse causality’. Hence, it can be said that these results fail to support the argument that credit may be ‘endogenous’ to growth (Werner, 2005: 60).

At the same time, whether a variable that improves the prediction of another variable should be regarded as a ‘causal effect’ remains subject to debate. Granger causality indicates predictive precedence but does not establish ‘true’ structural causation. This means that the Granger causality test results should not be considered as definitive ‘proof’ of causal effects. Unfortunately, due to limited detail of data from official Chinese statistics, it was not possible to analyze causal effects by applying valid instrumental variables (IVs). These limitations could be addressed in future research.

6. Conclusion

In recent decades, China has been able to achieve among the highest economic growth rates in history, becoming the second largest economy in the world. To explain China's 'economic miracle', mainstream economists have emphasized the high saving and investment rates and the role of market-oriented reforms. However, it remains unclear why China was able to achieve such high levels of investment or why it has been so difficult to achieve 'economic rebalancing' toward more domestic demand-led growth. This thesis emphasizes the important (but neglected) role of the creation and allocation of credit by banks for China's growth model. In China, state-owned banks are 'guided' by the central bank to allocate credit in line with the policy objectives of the state.

The People's Bank of China is the only major central bank that continues to rely on selective credit controls and quantity-based monetary policy tools to influence both the amount and allocation of credit to specific sectors of the economy. The high share of new loans allocated to NFCs to finance investments in targeted industries contributes to the investment-bias in China's growth model, crowding out loans to households that can be used to expand domestic demand by funding the consumption of goods and services. This thesis contributes to the existing finance and growth literature by: (1) examining how the percentage change and disaggregation of different types of enterprise and household loans are associated with economic growth; (2) investigating how credit creation is related to the different components of GDP, such as investment and consumption; and (3) analyzing whether the past values of the credit variables *predict* the current values of GDP and its components.

The findings suggest that both the growth in bank credit to NFCs and household loans used for consumptive purposes could be regarded as 'productive' in the sense that they are positively associated with economic growth, whereas the proxy for the change in mortgages should be regarded as 'unproductive' since it is not growth-enhancing. In particular, both short-term and medium to long-term loans to NFCs are positively associated with either aggregate investment or fixed-asset investment in manufacturing. Meanwhile, the growth in loans to households is positively associated with the growth in consumption. It was also shown that credit to both NFCs and households Granger-cause real GDP growth and not the other way around, while enterprise and household loans have a unidirectional Granger-causal relationship with investment and household consumption, respectively. These findings contradict the assumption that the change in credit does not have any independent effects on real variables.

One unexpected finding is that a significant positive association between bank loans to NFCs and manufacturing investment or economic growth following the introduction of the ‘Made in China 2025’ industrial policy could not be observed, which can be attributed to Chinese banks’ lending bias to SOEs that fail to make efficient investments. For future studies, once more detailed data on the sectoral allocation of credit or type of borrower becomes available, it would be interesting to see if credit to privately-owned NFCs has a stronger effect on investment than for SOEs, or how ‘productive’ bank lending to the corporate sector – excluding ‘unproductive’ loans to the real estate and financial sectors – affects economic growth.

In recent years, promoting consumption-led growth has become the overarching economic policy priority of the Chinese government, as inadequate domestic consumption has made the Chinese economy reliant on external demand for growth, resulting in a massive trade surplus. One policy recommendation from the findings is that China could ‘rebalance’ its growth model to reduce the reliance on investments and expand domestic household consumption by directing the allocation of credit toward consumptive purposes. Because of China’s ambitious state-led industrial policies, most loans are extended to firms in designated industries, resulting in a high investment-to-GDP ratio, while lending to households has declined. As the Chinese leadership seeks to find an optimal mix between domestic investment and consumption, achieving this goal requires an improved balance in the supply of credit between businesses and households.

Bibliography

Alexander Gerschenkron. (1962). *Economic Backwardness in Historical Perspective: A Book of Essays*. Cambridge, Massachusetts: Belknap

Alexander, W. et al. (1995). The adoption of indirect instruments of monetary policy. *International Monetary Fund Occasional Paper*, No. 126

Allen, Franklin, Qian, Jun, Qian, Meijun. (2008). China's Financial System: Past, Present, and Future. In Loren Brandt and Thomas G. Rawski (eds.) *China's Great Economic Transformation*. Cambridge, UK: Cambridge University Press.

Allen, Franklin, Qian, Jun 'QJ', Qian, Meijun. (2019). A Review of China's Institutions. *Annual Review of Financial Economics*. Vol. 11, pp. 39-64

Amsden, Alice H. (1989). *Asia's Next Giant: South Korea and Late Industrialization*. Oxford, UK: Oxford University Press.

Arcand. Jean-Louis et al. (2012). Too Much Finance? *IMF Working Papers*. Vol. 2012, Issue, 161, pp. 1-49

Bang-Andersen, Jens et al. (2013). Consumption, Income and Wealth. *Monetary Review*. Part 2. 2nd Quarter. Danmarks Nationalbank

Baek, Seung-Wook. (2005). Does China Follow "the East Asian Development Model"? *Journal of Contemporary Asia*. Vol. 35, Issue 4., pp. 485-498

Beeson, Mark. (2017). What does China's Rise Mean for the Developmental State Paradigm?. In Toby Carroll and Darryl S. L. Jarvis (eds.) *Asia after the Developmental State: Disembedding Autonomy*. Cambridge, UK: Cambridge University Press

Beck, Thorsten & Levine, Ross. Loayza, Norman. (2000). Finance and the sources of growth. *Journal of Financial Economics*. Vol. 58, Issues 1-2, pp. 261-300

Beck, Thorsten et al. (2012). Who Gets the Credit? And Does It Matter? Household vs. Firm Lending Across Countries. *The B.E. Journal of Macroeconomics*. Vol. 12, Issue 1, pp. 1-44

Bell, Stephen, Feng, Hui. (2013). *The Rise of the People's Bank of China: The Politics of Institutional Change*. Cambridge, Massachusetts: Harvard University Press

- Berger, A. et al. (2009). Bank ownership and efficiency in China: What will happen in the world's largest nation? *Journal of Banking & Finance*. Vol. 33, Issue 1, pp. 113-130
- Bernanke, Ben S. & Gertler, Mark. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic Perspectives*. Vol. 9, No. 4, pp. 27-48
- Bezemer, Dirk, Hudson, Michael. (2016). Finance Is Not the Economy: Reviving the Conceptual Distinction. *Journal of Economic Issues*. Vol. 50, No. 3, pp. 745-768
- Bezemer, Dirk et al. (2016). More Mortgages, Lower Growth?. *Economic Inquiry*. Vol. 54, Issue 1, pp. 652-674
- Bezemer, Dirk et al. (2018). Credit where it's due: A historical, theoretical and empirical review of credit guidance policies in the 20th century. *UCL Institute for Innovation and Public Purpose Working Paper Series*. (IIPP WP 2018-11)
- Bofinger, Peter et al. (2022). Discovering the True Schumpeter – New Insights into the Finance and Growth Nexus. *Würzburg Economic Papers*. No. 102. University of Würzburg
- Bofinger, Peter et al. (2023). Credit as an Instrument for Growth: A Monetary Explanation of the Chinese Growth Story. *Würzburg Economic Papers*. No. 107. University of Würzburg
- Chen, Hongyi, et al. (2017). To Guide or Not to Guide? Quantitative Monetary Policy Tools and Macroeconomic Dynamics in China. *HKIMR Working Paper*. No. 9., pp. 1-50
- Chen, Jingzhu & Ji, Yuemei. (2023). Finance and local economic growth: New evidence from China. *International Journal of Finance & Economics*. Vol. 29, Issue 4, pp. 4630-4659
- Chen, Kaiji & Zha, Tao. (2018). Macroeconomic Effects of China's Financial Policies. *Working Paper Series*. Federal Reserve Bank of Atlanta. Working Paper 2018-12
- Chen, Kaiji, Higgins, Patrick. Zha, Tao. (2024). Constructing quarterly Chinese time series usable for macroeconomic analysis. *Journal of International Money and Finance*. Vol. 143
- Chengyao, Lei. (2016). Credit Quotas. In Chen Yulu and Guo Qingwang (eds.) *Major Issues And Policies In China's Financial Reform. Volume 1*. Hong Kong, China: Enrich Professional Publishing
- Congdon, Tim. (2024). *The Quantity Theory of Money: A New Restatement*. London, UK: The Institute of Economic Affairs (IEA)

- Cui, Yuming. (2014). Revisiting China's Exchange Rate Regime and RMB Basket: A Recent Empirical Study. *International Journal of Economics and Finance*. Vol. 6, No. 2, pp. 150- 160
- Dikau, Simon, Volz, Ulrich. (2023). Out of the window? Green monetary policy in China: window guidance and the promotion of sustainable lending and investment. *Climate Policy*. Vol. 23, No. 1., pp. 122-137
- Dollar, David. (2018). Decentralisation, local innovation and competition among cities. In Ross Garnaut, Ligang Song and Cai Fang (eds.) *China's 40 Years of Reform and Development: 1978–2018*. ANU Press.
- Dong, Yizhe et al. (2014). Ownership structure and risk-taking: Comparative evidence from private and state-controlled banks in China. *International Review of Financial Analysis*. Vol. 36, Issue 1, pp. 120-130
- Dong, Yizhe et al. (2016). Evaluating the performance of Chinese commercial banks: A comparative analysis of different types of banks. *European Journal of Operational Research*. Vol. 252, Issue 1, pp. 280-295
- Dullien, Sebastian. (2009). Central Banking, Financial Institutions, and Credit Creation in Developing Countries. *Discussion Papers*. No. 193. UNCTAD.
- Elliott, G, Rothenberg, Thomas J., and James H. Stock. Efficient Tests for an Autoregressive Unit Root. *Econometrica*, 64:4, 1996, 813-836
- Epstein, Gerald, (2007), Central banks as agents of economic development, in Ha-Joon Chang (ed.) *Institutional Change and Economic Development*, Tokyo, Japan: United Nations University Press
- Evans, Peter. (1995). *Embedded Autonomy: States and Industrial Transformation*. Princeton, New Jersey: Princeton University Press
- Fang, Wang. (2013). Unification of Exchange Rates. In Chen Yulu and Guo Qingwang (eds.) *Major Issues and Policies in China's Financial Reform. Volume 3*. Honolulu, Hawaii: Enrich Professional Publishing.
- Fernald, John et al. (2013). On the Reliability of Chinese Output Figures. Federal Reserve Bank of San Francisco

- Fernández-Villaverde, Jesús et al. (2023). The Neoclassical Growth of China. *NBER Working Paper Series*. No. 31351
- Fukumoto, T., M. Higashi, Y. Inamura, T. Kimura. (2010). Effectiveness of Window Guidance and Financial Environment: In Light of Japan's Experience of Financial Liberalization and a Bubble Economy. *Bank of Japan Review Series*. pp. 1-11
- Gecchetti, Stephen G. & Kharroubi, Enisse. (2012). Reassessing the impact of finance on growth. *BIS Working Papers*. No. 381. Bank for International Settlements.
- Geiger, Michael. (2008). Instruments of Monetary Policy in China and Their Effectiveness: 1994-2006. *Discussion Papers*. No. 187. United Nations Conference on Trade and Development
- Geißendörfer, Lisa & Haas, Thomas. (2022). Schumpeter in Practice: the Role of Credit for Industrial Policy in China. *FMM Working Paper*, No. 85
- Geng, Nan & N'Diaye, Papa. (2012). Determinants of Corporate Investment in China: Evidence from Cross-Country Firm Level Data. *IMF Working Paper*. No. WP/12/80. Washington DC: International Monetary Fund
- Goldsmith, Raymond W. (1969). *Financial Structure and Development*. New Haven, Connecticut: Yale University Press.
- Gomes, Alexandre De Podestá & ten Brink, Tobias. (2023). *A Chinese Bureaucracy for Innovation-Driven Development?* Cambridge, UK: Cambridge University Press.
- Guofeng, Sun. (2015). *Reforms in China's Monetary Policy: A Frontbencher's Perspective*. London, UK: Palgrave Macmillan
- He, Zhiguo & Wei, Wei. (2022). China's Financial System and Economy: A Review. *NBER Working Paper*. No. 30324.
- Heep, Sandra. (2014). *China in Global Finance: Domestic Financial Repression and International Financial Power*. Heidelberg, Germany: Springer.
- Heilmann, Sebastian, Shin, Lea. (2013). The Rise of Industrial Policy in China, 1978–2012. *Harvard-Yenching Institute Working Paper Series*.
- Heilmann, Sebastian. (2018). *Red Swan: How Unorthodox Policy Making Facilitated China's Rise*. Hong Kong, China: The Chinese University Press

- Herr, Hansjörg. (2010). Credit expansion and development — A Schumpeterian and Keynesian view of the Chinese miracle. *European Journal of Economics and Economic Policies Intervention*. Vol. 7, Issue. 1, pp. 71-89
- Hofman, Bert. (2018). Reflections on 40 years of China's reforms. In Ross Garnaut, Ligang Song and Cai Fang (eds.) *China's 40 Years of Reform and Development: 1978–2018*. Canberra, Australia: ANU Press.
- Holz, Carsten A. (2014). The quality of China's GDP statistics. *China Economic Review*. Vol. 30, pp. 309-338
- Huang, Tianlei. (2023). Why China's housing policies have failed. Working Paper. Peterson Institute for International Economics.
- Huang, Yasheng. (2008). *Capitalism with Chinese Characteristics: Entrepreneurship and the State*. Cambridge, UK: Cambridge University Press.
- John Hobson. (1902). *Imperialism: A Study*. Cambridge, UK: Cambridge University Press
- Johnson, Chalmers. (1982). *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975*. Redwood City, California: Stanford University Press
- Juhász, Réka, Lane, Nathan, Rodrik, Dani. (2024). The New Economics of Industrial Policy. *Annual Review of Economics*. Vol. 16, pp. 213-242
- Ke, Dong, Xie, Chuyi. (2022). Analysis of the Development Process and Trend of China's Real Estate Industry. *Advances in Economics, Business and Management Research*. Vol. 215, pp. 778-785
- Keynes, John Maynard. (1930). *A Treatise on Money*. Volume 1. London, UK: MacMillan and Co.
- Keynes, John Maynard. (1936). *The General Theory of Employment, Interest and Money*. London, UK: Macmillan
- Kharroubi, Enisse & Kolscheen, Emanuel. (2017). Consumption-led expansions. *BIS Quarterly Review*. Bank for International Settlements.
- Kindleberger, Charles P. (1978). *Manias, Panics, and Crashes: A History of Financial Crises*. London, UK: Macmillan Publishers

- King, Robert G., Levine, Ross. (1993). Finance and Growth: Schumpeter Might be Right. *The Quarterly Journal of Economics*. Vol. 108, No. 3, pp. 717-737.
- Knight, John B. (2014). China as a Developmental State. *The World Economy*. Vol. 37, Issue 10, pp. 1335–1447.
- Knight, John & Ding, Sai. (2012). *China's Remarkable Economic Growth*. Oxford, UK: Oxford University Press.
- Kwong, Charles C.L. (2011). China's Banking Reform: From Mono-Banking to Globalisation. In Chan Lai-Ha, Gerald Chan, and Kwan Fung (eds.) *China at 60: Global- Local Interactions*. Singapore: World Scientific
- Lam, Raphael. W. (2017). Resolving China Zombies: Tackling Debt and Raising Productivity. *IMF Working Paper*. No. WP/17/266. Washington DC: International Monetary Fund
- Lardy, Nicholas R. (2008). Financial Repression in China. *Policy Brief*. Working Paper No. PB08-8. Peterson Institute for International Economics.
- Lardy, Nicholas R. (2014). *Markets Over Mao: The Rise of Private Business in China*. Washington, DC: Peterson Institute for International Economics
- Lardy, Nicholas R. (2019). *The State Strikes Back: The End of Economic Reform in China?* Washington, DC: Peterson Institute for International Economics.
- Lardy, Nicholas & Borst, Nicholas. (2013). A Blueprint for Rebalancing the Chinese Economy. *Policy Brief*. No. PB13-02, Peterson Institute for International Economics.
- Lardy, Nicholas & Huang, Tianlei. (2025). China's major economic data continue to improve. Washington DC: Peterson Institute for International Economics.
- Lau, Lawrence. (2018). Are Chinese Economic Statistics Reliable? *China US Focus*. January 30, Available at: <https://www.chinausfocus.com/finance-economy/are-chinese-economic-statistics-reliable>
- Leahy, Joe et al. (2025). Xi Jinping warns Chinese officials against over-investment in AI and EVs. *Financial Times*. July 18. Available at: <https://www.ft.com/content/9c19d26f-57b3-4754-ac20-eeb627e8723e?syn-25a6b1a6=1>
- Leutert, Wendy. (2022). Sino-Japanese Engagement in the Making of China's National Champions. *New Political Economy*. Vol. 27, No. 6, pp. 929–943

- Levine, Ross. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature*. Vol. 35, pp. 688-726
- Li, He. (2015). The Chinese Model of Development and Its Implications. *World Journal of Social Science Research*. Vol. 2, No. 2, pp. 128-138
- Liang, Qi & Teng, Jian-Zhou. (2006). Financial development and economic growth: Evidence from China. *China Economic Review*. Vol. 17, Issue 4, pp. 395-411
- Ling, Chen & Naughton, Barry. (2016). An institutionalized policy-making mechanism: China's return to techno-industrial policy. *Research Policy*. Vol. 45, Issue 10., pp. 2138-2152
- Liu, Hui-Zheng et al. (2024). Trade liberalization and export performance in China: Export-margin approach with firm-level data in 1995-2019. *Asia and the Global Economy*. Vol. 4, Issue 2, pp. 1-10
- Loriaux, Michael. (1991). *France after Hegemony: International Change and Financial Reform*. Ithaca, New York: Cornell University Press
- Lu, Ding, Tang, Zhimin. (1997). *State Intervention and Business in China: The Role of Preferential Policies*. Cheltenham, UK: Edward Elgar.
- Ma, Jun. (2000). *The Chinese Economy in the 1990s*. London, UK: Palgrave Macmillan.
- Mazzucato, Mariana., Wray, Randall L. (2015). Financing the Capital Development of the Economy: A Keynes-Schumpeter-Minsky Synthesis. *Levy Economics Institute of Bard College. Working Paper*. No. 837, pp. 2-64
- McKinnon, R. (1973). *Money and Capital in Economic Development*. The Brooking Institute, Washington DC.
- McLeay, Michael et al. (2014). Money creation in the modern economy. *Quarterly Bulletin*.
- Meier, Nicola. (2009). *China – The New Developmental State?: An Empirical Analysis of the Automotive Industry*. Hohenheimer volkswirtschaftliche Schriften. Lausanne, Switzerland: Peter Lang AG.
- Minsky, Hyman P. (1982). *Can “it” happen again? Essays on instability and finance*. Armonk, NY: M.E. Sharpe
- Minsky, Hyman P. (1986). *Stabilizing an Unstable Economy*. New Haven, CT: Yale University Press

Naughton, Barry. (2015). The Transformation of the State Sector: SASAC, the Market Economy, and the New National Champions. In Barry Naughton and Kellee S. Tsai (eds.) *State Capitalism, Institutional Adaptation, and the Chinese Miracle*. Cambridge, UK: Cambridge University Press.

Naughton, Barry. (2021). *The Rise of China's Industrial Policy, 1978 to 2020*. Mexico City, Mexico: Universidad Nacional Autónoma de México.

Negret, Fernando Montes. (1995). China's Credit Plan: An Overview. *Oxford Review of Economic Policy*. Vol. 11, No. 4., pp. 25-42

OECD. (2025). How governments back the largest manufacturing firms: Insights from the OECD Magic database. *OECD Trade Policy Papers*. No. 289. OECD Publishing

Orlik, Thomas. (2022). *China: The Bubble that Never Pops*. Oxford, UK: Oxford University Press

Owyang, Michael T., Shell, Hannah. (2017). China's Economic Data: An Accurate Reflection, or Just Smoke and Mirrors?. Federal Reserve Bank of St. Louis

Patinkin, Don. (1987). *Neutrality of Money*. London, UK: Palgrave Macmillan.

PBoC. (2010). *China Monetary Policy Report*. Quarter Four, 2009. Monetary Policy Analysis Group of the People's Bank of China.

PBoC. (2024). Making China's financial system better serve the real economy. BIS Papers chapters, in Bank for International Settlements (ed.) *Keeping the momentum: how finance can continue to support growth in EMEs*. Vol. 127, pp. 77-87

PBoC. (2026). *Statistical Report on the Credit Structure of Financial Institutions*. (Q4 2025).

Pérez, Sofia. A. (1997). *Banking on Privilege: The Politics of Spanish Financial Reform*. Ithaca, New York: Cornell University Press.

Perkins, Dwight H. (2018). The complex task of evaluating China's economic reforms. In Ross Garnaut, Ligang Song and Cai Fang (eds.) *China's 40 Years of Reform and Development: 1978–2018*. Canberra, Australia: ANU Press.

Pettis, Michael. (2013). *The Great Rebalancing: Trade, Conflict, and the Perilous Road Ahead for the World Economy*. Princeton, New Jersey: Princeton University Press.

Ping, Wei He. (2014). *Banking Regulation in China: The Role of Public and Private Sectors*. London, UK: Palgrave Macmillan.

Poon, Daniel, Kozul-Wright, Richard. (2019). Learning from East Asia: Catch-up and the Making of China's Developmental State. In Arkebe Oqubay and Kenichi Ohno (eds.) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-Up*. Oxford, UK: Oxford University Press.

Rousseau, Peter L. (2003). *Historical Perspectives on Financial Development and Economic Growth*. Washington DC, US: Federal Reserve Bank of St. Louis

Schumpeter, Joseph A. (1934). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press

Schumpeter, Joseph A. (1939). *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. Vol. 1. New York, NY: McGraw-Hill

Schumpeter, Joseph A. (1955). *History of Economic Analysis*. Abingdon, UK: Taylor & Francis e-Library

Setser, Brad W. (2024). China's New Currency Playbook. *Council of Foreign Relations*. February 5. Available at: <https://www.cfr.org/articles/chinas-new-currency-playbook>

Shaw, Edward S. (1973). *Financial Deepening in Economic Development*. Oxford, UK: Oxford University Press.

Shrestha, Min B., Bhatta, Guna R. (2018). Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science*. Vol. 4, Issue 2. pp. 1-19

Solow, Robert. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*. Vol. 70, No. 1, pp. 65-94

Stent, James. (2017). *China's Banking Transformation: The Untold Story*. Oxford, UK: Oxford University Press

Stiglitz, Joseph. (1993). The Role of the State in Financial Markets. *Proceedings of the World Bank Annual Conference on Development Economics*.

Stiglitz, Joseph E. & Weiss, Andrew. (1981). Credit Rationing in Markets with Imperfect Information. *The American Economic Review*. Vol. 71, No. 3, pp. 393-410

Stock, James H., Watson, Mark W. (2020). *Introduction to Econometrics*. Fourth Edition. London, UK: Pearson Education Limited

Tobin, D., & Volz, U. (2018). The Development and Transformation of the People's Republic of China's Financial System. *ADB Working Papers*. No. 825. Asian Development Bank Institute

Turner, Grant et al. (2012). The Chinese Banking System. *Bulletin*. September Quarter. Reserve Bank of Australia.

Vittas, Dimitri, Cho, Yoon Je. (1996). Credit Policies: Lessons from Japan and Korea. *The World Bank Research Observer*. Vol. 11, No. 2, pp. 277-298

Vogel, Ezra F. (2011). *Deng Xiaoping and the Transformation of China*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press

Wade, Robert. (1990). *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton, New Jersey: Princeton University Press.

Wang, Chaoqi. (2017). Analyze the Impact of MPA System on Current Commercial Banks. *Modern Economy*. Vol. 8, No. 4. pp. 494-506

Wang, Yingyao. (2021). Policy articulation and paradigm transformation: the bureaucratic origin of China's industrial policy. *Review of International Political Economy*. Vol. 28, Issue 1., pp. 204-231

Wang, Yingyao. (2024). *Markets with Bureaucratic Characteristics: How Economic Bureaucrats Make Policies and Remake the Chinese State*. New York City, New York: Columbia University Press.

Werner, Richard A. (1997). Towards a New Monetary Paradigm: A Quantity Theorem of Disaggregated Credit, with Evidence from Japan. *Kredit und Kapital*. Vol. 30, No. 2, pp. 276-309

Werner, Richard A. (2005). *New Paradigm in Macroeconomics: Solving the Riddle of Japanese Macroeconomic Performance*. London, UK: Palgrave Macmillan

Werner, Richard A. (2014). Can banks individually create money out of nothing? — The theories and the empirical evidence. *International Review of Financial Analysis*. Vol. 36, pp. 1-19

- Whalley, John. Xin, Xian. (2006). China's FDI and Non-FDI Economies and the Sustainability of Future High Chinese Growth. NBER Working Paper Series. No. 12249
- Williams, G. (2018). *The Evolution of China's Banking System, 1993–2017*. London: Routledge
- Woo, J. (1991). *Race to the Swift: State and Finance in Korean Industrialization*, New York: Columbia University Press.
- Wooldridge, Jeffrey M. (2016). *Introductory Econometrics: A Modern Approach*. Sixth Edition. Boston, MA: Cengage Learning
- Xu, Ying. (2024). Industrial Policy and State Ownership: How Do Commercial Banks Allocate Credit in China? *IMF Working Paper*. WP/24/262. Washington DC: International Monetary Fund
- Xueqing, Jiang. (2025). China optimizes credit structure, boosting support for key sectors. *China Daily*. August 26.
- Yao, Yang. (2011). The disinterested government and economic growth in China. in Ho-Mou Wu and Yang Yao (eds.) *Reform and Development in China: What can China offer the developing world?* London, UK: Routledge
- Zenglein, Max J., Holzmann, Anna. (2019). Evolving Made in China 2025: China's industrial policy in the quest for global tech leadership. *MERICCS Papers on China*. No. 8. Mercator Institute for China Studies.
- Zhang, Jin et al. (2012). Financial development and economic growth: Recent evidence from China. *Journal of Comparative Economics*. Vol. 4, pp. 393-412
- Zhang, Lu & Bezemer, Dirk. (2016). Finance and growth in China, 1995-2013: more liquidity or more development?. *Cambridge Journal of Regions, Economy and Society*. No. 9, pp. 613-631
- Zheng, Liansheng. (2018). The Macro Prudential Assessment Framework of China: Background, Evaluation and Current and Future Policy. *Centre for International Governance Innovation*.
- Zysman, John. (1983). *Governments, Markets, and Growth: Financial Systems and the Politics of Industrial Change*. Ithaca, New York: Cornell University Press

Appendix A

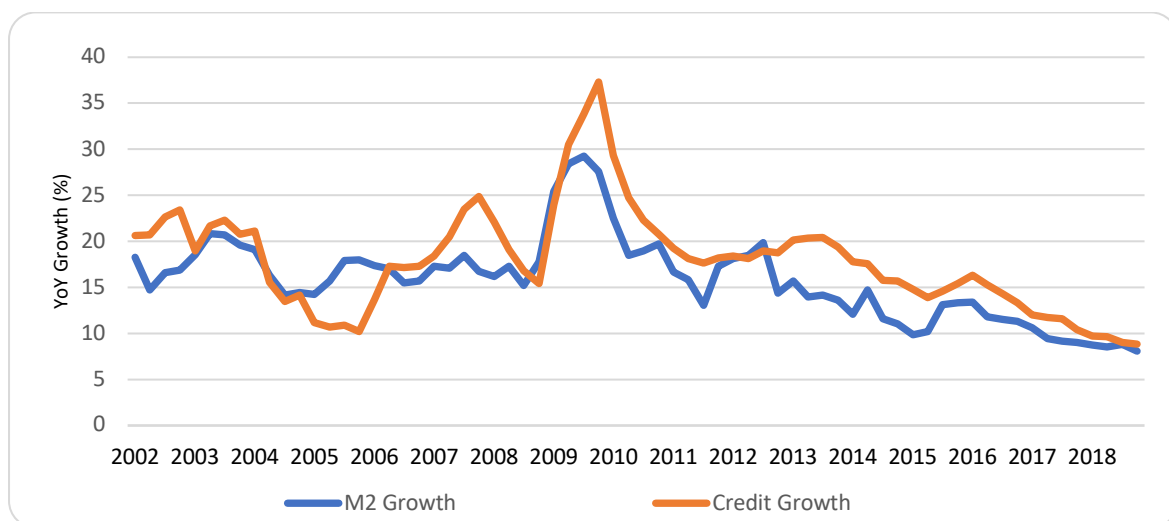


Figure A1: The relationship between the growth rates of M2 and total loans

Source: Bank for International Settlements (BIS), OECD

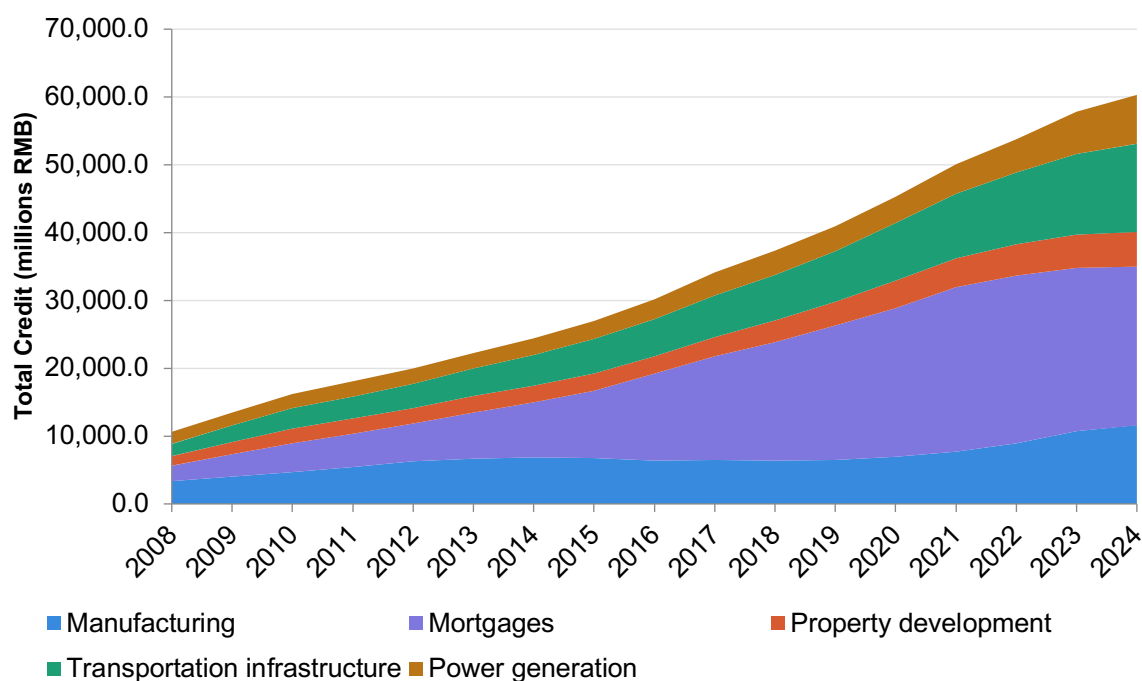


Figure A2: Total outstanding loans by sector of the five largest commercial banks

Source: based on sectoral credit exposure data provided by the annual reports of the five largest commercial banks: Industrial and Commercial Bank of China (ICBC); Agricultural Bank of China (ABC); China Construction Bank (CCB); Bank of China (BoC); and Bank of Communications (BoC).

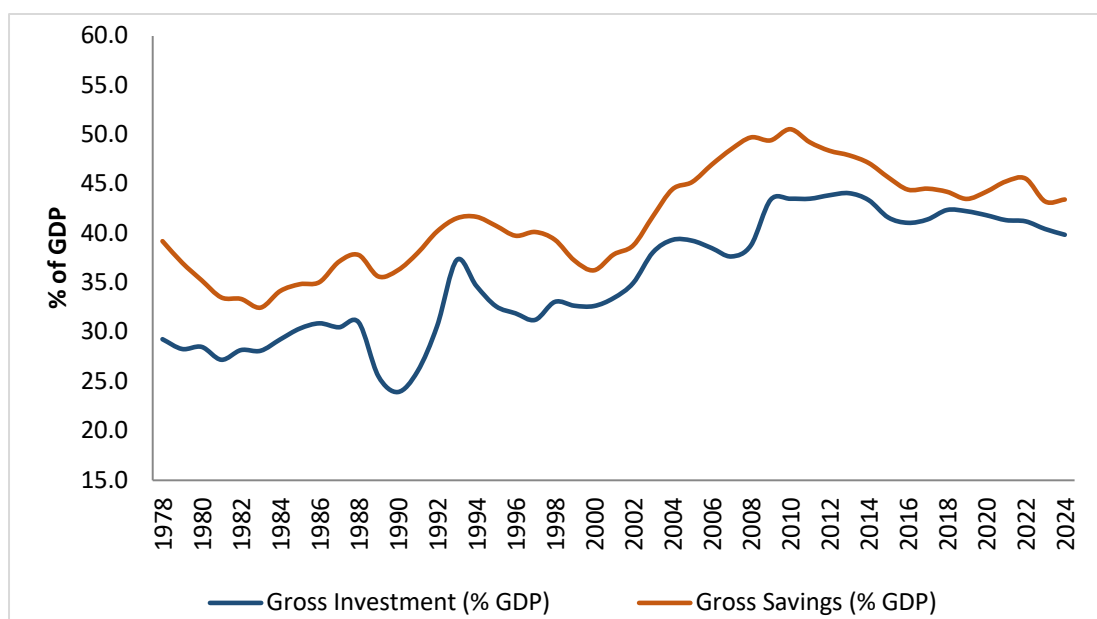


Figure A3: Gross investment and savings rates for China (% of GDP)

Source: World Bank (2026)

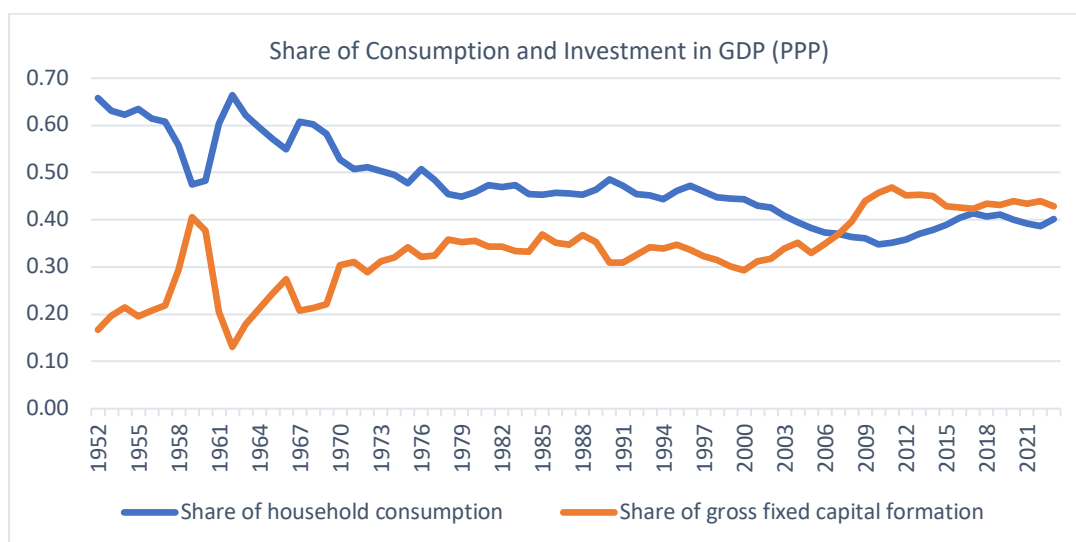


Figure A4: Share of consumption and investment in China's GDP (PPP)

Source: Penn World Table version 11.0 (2025)

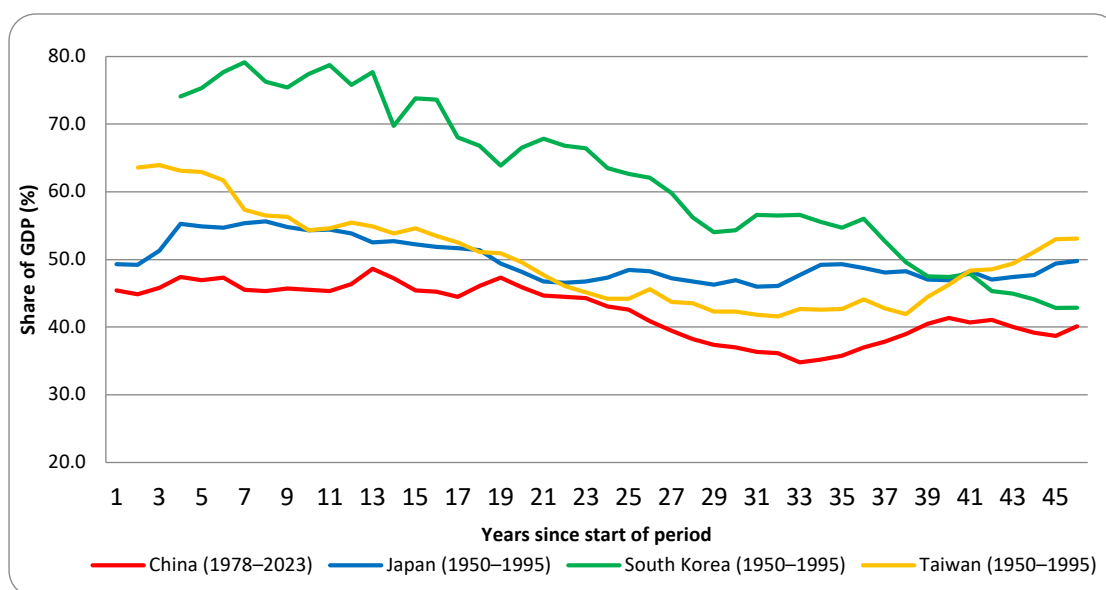


Figure A5: Share of household consumption in GDP (PPP) for East Asian economies

Source: Penn World Table version 11.0 (2025). Note: the time periods per country are based on their respective 'high-growth periods'.

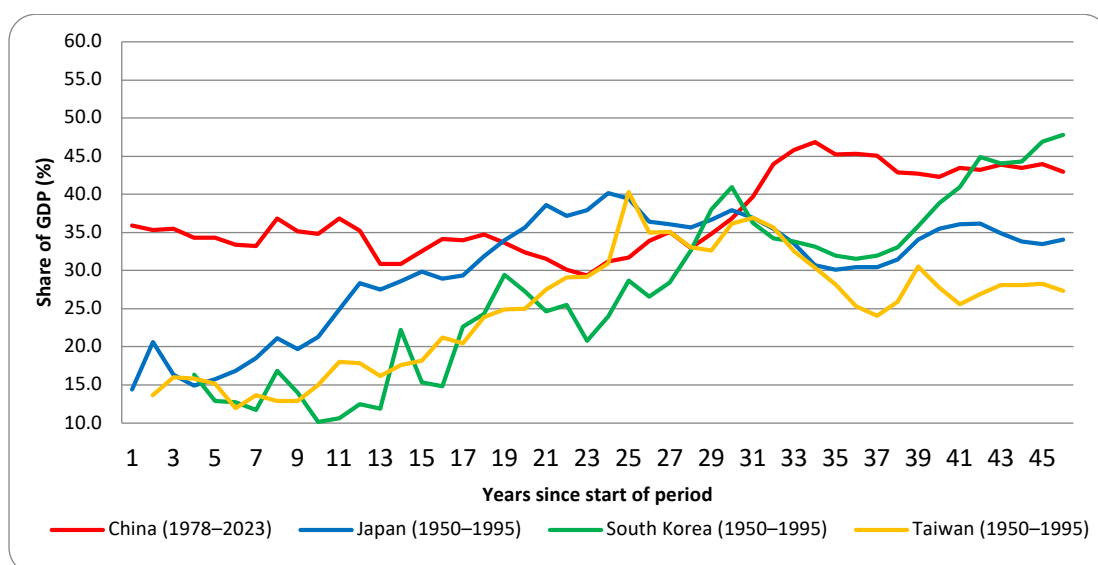


Figure A6: Share of gross fixed capital formation in GDP (PPP) for East Asian economies

Source: Penn World Table version 11.0 (2025). Note: the time periods per country are based on their respective 'high-growth periods'.

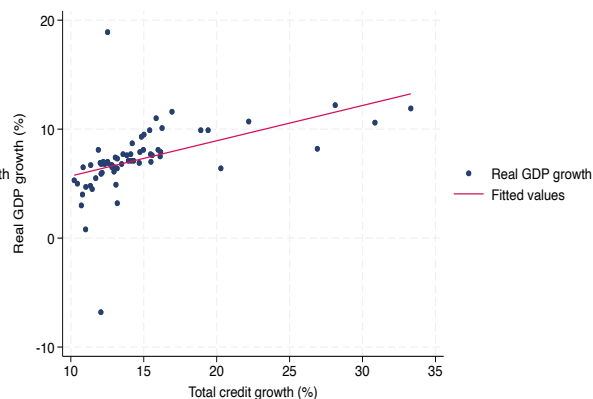
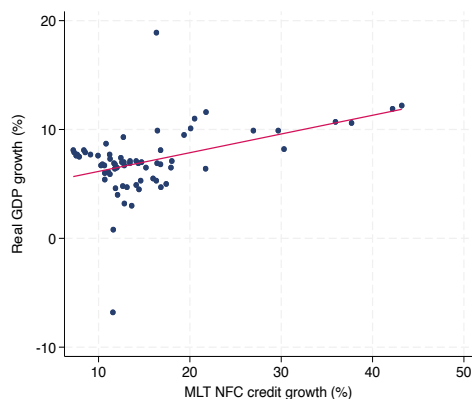


Figure A7: Relationship between MLT loans to NFCs and GDP growth Figure A8: Relationship between total credit and GDP growth

Source: PBoC, NBS

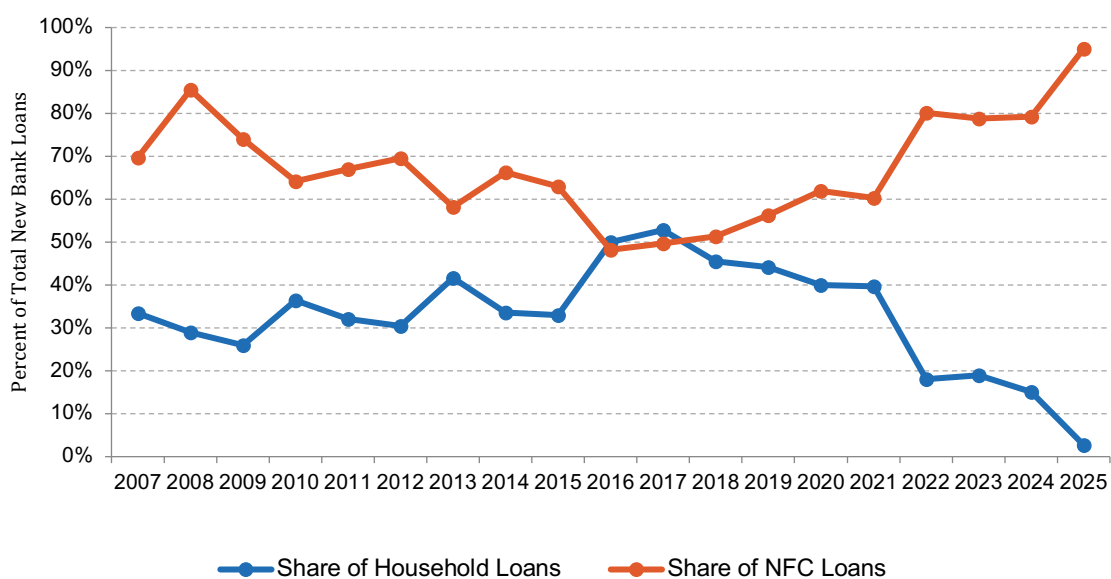


Figure A9: The share of new bank loans to households and NFCs

Source: PBoC, numerous Monetary Policy Reports

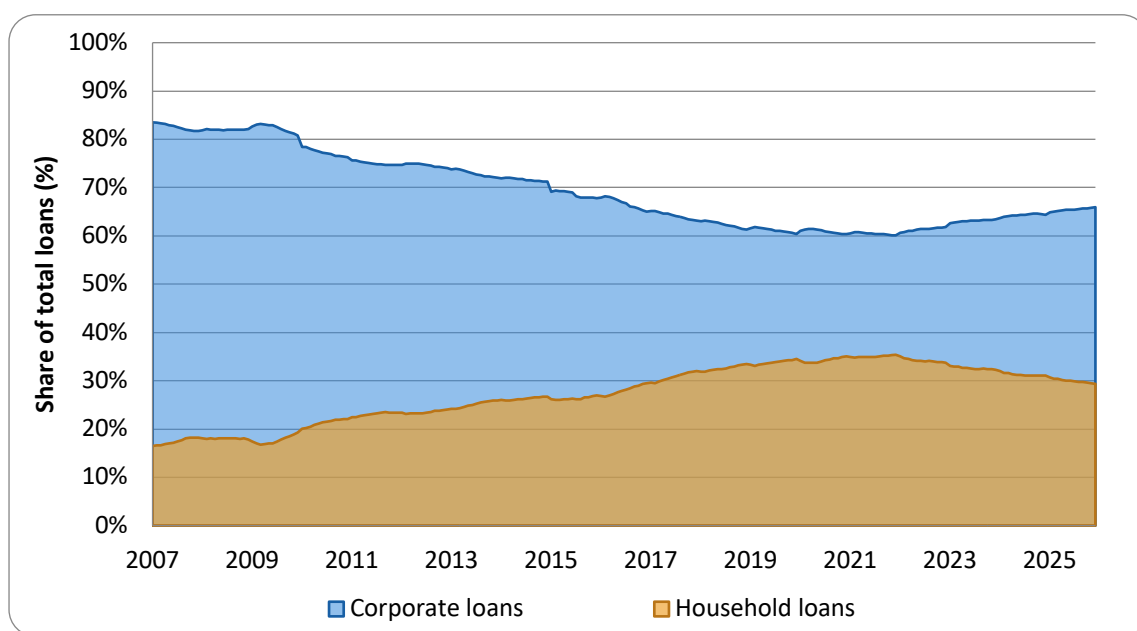


Figure A10: The share of household and corporate loans in total outstanding loans

Source: PBoC, numerous statistical reports on the 'Sources and Uses of Credit Funds of Financial Institutions'

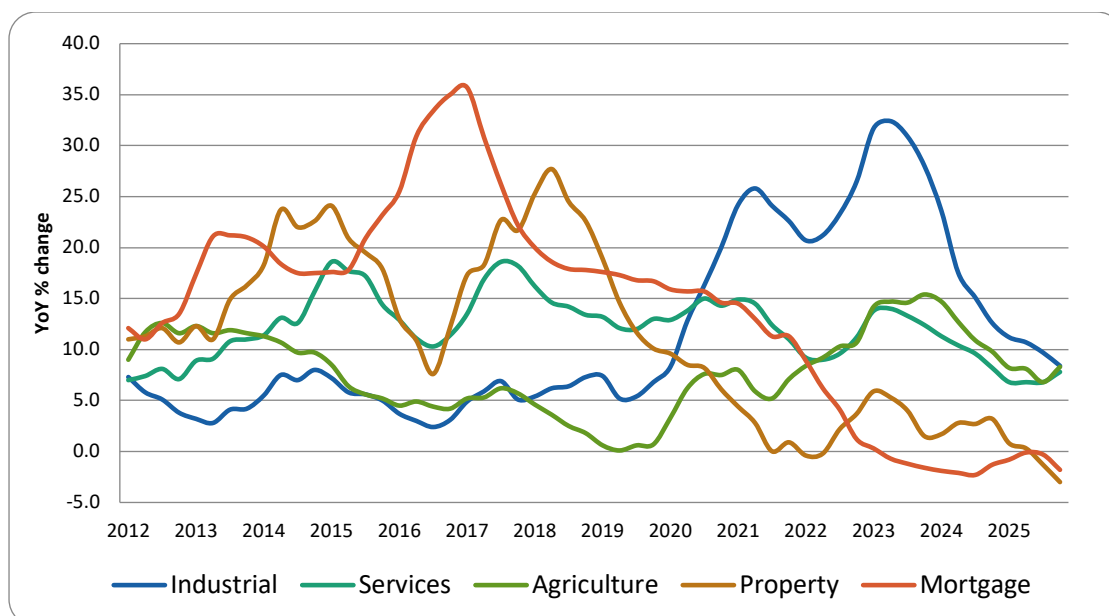


Figure A11: The allocation of credit by sector (in year-on-year percentage change)

Source: PBoC, quarterly statistical reports on the 'Credit Structure of Financial Institutions' (in both English and Chinese)

Appendix B

Table B1: Correlation Matrix for Key Variables of H1

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Real GDP growth	1.000								
(2) Household loan growth	0.564***	1.000							
(3) ST cons. loan growth	0.651***	0.805***	1.000						
(4) MLT cons. loan growth	0.434***	0.928***	0.631***	1.000					
(5) NFC loan growth	0.282**	0.281**	0.331***	0.178	1.000				
(6) MLT NFC loan growth	0.432***	0.631***	0.410***	0.580***	0.685***	1.000			
(7) Credit-to-GDP ratio	-0.673***	-0.556***	-0.737***	-0.399***	-0.552***	-0.464***	1.000		
(8) Trade openness	0.724***	0.565***	0.721***	0.391***	0.389***	0.378***	-0.928***	1.000	
(9) Government	0.598***	0.501***	0.756***	0.412***	0.183	0.070	-0.825***	0.803***	1.000

Significance level denoted as *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. ST cons. loan growth and MLT cons. loan growth represent short-term and medium and long-term consumption loan growth, respectively.

Table B2: Correlation Matrix for Key Variables of H2

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Real GFCF	1.000							
(2) NFC loan growth	0.789*	1.000						
(3) MLT NFC loan growth	0.641*	0.685*	1.000					
(4) ST NFC loan growth	0.303*	0.311*	-0.091	1.000				
(5) Credit-to-GDP ratio	-0.639*	-0.552*	-0.464*	-0.544*	1.000			
(6) Interest rates	-0.297*	-0.445*	-0.448*	0.422*	-0.042	1.000		
(7) Export growth	-0.049	-0.315*	0.132	-0.002	-0.228*	0.069	1.000	
(8) Real GDP growth	0.624*	0.282*	0.432*	0.253*	-0.673*	0.060	0.516*	1.000

Significance levels denoted as *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B3: Correlation Matrix for Key Variables of H3

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Nom. consumption growth	1.000								
(2) Household loan growth	0.558***	1.000							
(3) ST cons. loan growth	0.654***	0.805***	1.000						
(4) MLT cons. loan growth	0.400***	0.928***	0.631***	1.000					
(5) Real GDP growth	0.617***	0.564***	0.651***	0.434***	1.000				
(6) CPI growth	0.546***	0.331***	0.339***	0.293**	0.203*	1.000			
(7) M2 growth	0.178	0.504***	0.599***	0.369***	0.403***	-0.026	1.000		
(8) Interest rates	0.405***	0.142	0.348***	0.068	0.060	0.493***	-0.286**	1.000	
(9) Property price growth	0.430***	0.721***	0.529***	0.768***	0.358***	0.470***	0.027	0.334***	1.000

Significance levels denoted as *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B4: ADF-GLS Test for Unit Root

Variable	Test statistic	5% Critical value	Optimal lag
Real GDP growth	-6.215	-3.029	3
NFC loan growth	-4.838	-3.107	1
Household loan growth	-6.087	-3.107	1
d.Credit-to-GDP ratio	-4.546	-3.001	4
d.Trade openness	-5.249	-3.083	1
d.Government	-9.341	-3.096	1
Short-term consumption loan growth	-4.794	-3.048	3
MLT NFC loan growth	-3.984	-3.107	1
Short-term NFC loan growth	-3.208	-3.107	1
MLT consumption loan growth	-5.836	-3.107	1
Property price growth	-5.594	-3.107	1
d.Interest rates	-5.188	-3.083	1
Real GFCF	-5.015	-3.038	3
Real government expenditure growth	-4.158	-3.038	3
Export growth	-4.945	-3.029	3

Note: the number of optimal lags has been selected based on the Schwarz and the Ng–Perron seq information criterion. The maximum number of lags specified in the test is 4 based on the frequency of the data, which is quarterly. MLT loans stands for medium- and long-term loans. The control variables credit-to-GDP ratio, trade openness, size of government, and interest rates are in levels and had test-statistics smaller than the 5% critical value, meaning that they were non-stationary. Therefore, first differencing was used to make these variables stationary.

Table B5: ADF-GLS Test for Unit Root

Variable	Test statistic	5% Critical value	Optimal lag
Fixed-asset investment growth (manufacturing)	-3.690	-2.924	1
MLT NFC loan growth	-3.035	-2.887	6
Short-term NFC loan growth	-2.904	-2.887	6
d.Interest rates	-10.753	-2.924	1
Export growth	-3.436	-2.917	2
Profit growth	-4.723	-2.924	1
Retail sales growth	-3.185	-2.831	12
M2 growth	-3.206	-2.910	3
CPI growth	-3.119	-2.831	12
Short-term consumption loan growth	-2.944	-2.831	12
MLT consumption loan growth	-3.631	-2.903	4
d.Consumer confidence index	-10.493	-3.480	1

Note: the number of optimal lags has been selected based on the Schwarz and the Ng–Perron seq information criterion. The maximum number of lags specified in the test is 12 based on the frequency of the data, which is monthly. MLT loans stands for medium- and long-term loans. The control variables for interest rates and the consumer confidence index are in levels and initially had test-statistics smaller than the 5% critical value, meaning that they were non-stationary. These control variables have been made stationary after taking the first difference.

Table B6: Breusch-Godfrey LM Test for Autocorrelation

Model	Chi ²	df (Lags)	Prob > Chi ²
Model 1, Hypothesis 1	8.756	4	0.068
Model 1, Hypothesis 2	35.040	4	0.000
Model 2, Hypothesis 2	125.202	12	0.000
Model 1, Hypothesis 3	24.719	4	0.000
Model 2, Hypothesis 3	176.828	12	0.000

Note: The null hypothesis states that there is no serial correlation. The number of lags (p) is determined by data frequency: 4 lags for quarterly data and 12 lags for monthly data. All tests are conducted after OLS regressions for the respective models. A Prob > Chi² below 0.05 indicates serial correlation and rejection of the null hypothesis.

Table B7: Estimation Results for the OLS Regressions of H1

Empirical model Dependent: ΔGDP_{real}	OLS (1)	OLS (2)	OLS (3)
<i>Credit-to-GDP ratio</i>	-0.281 (0.185)	-0.279 (0.191)	-0.341** (0.161)
<i>Trade openness</i>	0.172 (0.183)	0.175 (0.185)	0.185 (0.139)
<i>Government</i>	-0.127 (0.661)	-0.150 (0.677)	-0.249 (0.589)
<i>Interest rates</i>	0.094 (0.459)	-0.089 (0.429)	0.079 (0.353)
$\Delta MLTCredit_{NFC}$	0.153*** (0.025)	0.099*** (0.037)	0.083*** (0.025)
$\Delta MLTCredit_{Consumption}$		0.061* (0.033)	-0.068 (0.044)
$\Delta STCredit_{Consumption}$			0.146*** (0.030)
Constant	5.322*** (0.586)	4.891*** (0.699)	3.581*** (0.429)
R-squared	0.29	0.32	0.62
Observations	64	64	64

Note: robust standard errors are in parentheses (to correct the issue of heteroskedasticity). All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. The Breusch-Godfrey LM test for auto-correlation was specified with 4 lags based on data frequency, which is quarterly. It showed a Prob > chi² value of 0.2867, meaning that we fail to reject the null hypothesis of no serial correlation and conclude that there is no autocorrelation in the residuals. Significance levels denoted as * p < 0.10, ** p < 0.05, *** p < 0.01

Table B8: Estimation Results for the PW Regressions of H2

Empirical model Dependent: $\Delta GFCF_{real}$	PW (1)	PW (2)	PW (3)
<i>Interest rates</i>	-0.335 (0.383)	-0.322 (0.365)	-0.359 (0.350)
$\Delta Exports$	-0.133*** (0.034)	-0.125*** (0.033)	-0.129*** (0.029)
$\Delta GovernmentExp_{real}$	-0.119** (0.056)	-0.142** (0.057)	-0.166*** (0.059)
$\Delta Real\ GDP$	1.066*** (0.164)	1.017*** (0.139)	1.061*** (0.112)
$\Delta MLTCredit_{NFC}$	0.235** (0.109)	0.269*** (0.092)	0.339*** (0.078)
$\Delta STCredit_{NFC}$		0.221*** (0.078)	0.239*** (0.086)
$MIC2025 * \Delta MLTCredit_{NFC}$			-0.898*** (0.224)
Constant	-2.037 (1.971)	-4.171** (1.905)	-5.316** (2.381)
R-squared	0.74	0.77	0.82
DW statistic	1.38	1.38	1.55
Observations	64	64	64

Note: robust standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. All variables are in YoY percentage change, except for interest rates that is in levels. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B9: Estimation Results for the PW Regressions of H2

Empirical model Dependent: ΔFAI_{manu}	PW (1)	PW (2)	PW (3)	PW (4)	PW (5)	PW (6)
$\Delta MLTCredit_{NFC}$	0.135 (0.129)	0.128 (0.116)	0.130 (0.119)	0.103 (0.116)	-0.004 (0.283)	-0.007 (0.382)
$\Delta STCredit_{NFC}$		0.252 (0.169)	0.248 (0.172)	0.207 (0.178)	-0.013 (0.278)	-0.003 (0.281)
Interest rates			-0.058 (0.149)	-0.071 (0.149)	0.103 (0.162)	0.109 (0.164)
$\Delta Exports$				0.023* (0.012)	-0.004 (0.006)	-0.004 (0.006)
$\Delta Profits$					0.227*** (0.031)	0.227*** (0.031)
$MIC2025^* \Delta MLTCredit_{NFC}$						-0.017 (0.538)
Constant	11.829** (4.633)	9.443** (4.232)	9.431** (4.238)	10.047** (4.334)	9.121** (3.692)	9.957** (4.209)
R-squared	0.03	0.04	0.04	0.05	0.63	0.63
DW statistic	1.79	1.77	1.77	1.85	1.78	1.77
Observations	216	216	216	216	180	180

Note: robust standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers January 2008 to December 2025. The models also include a dummy variable for January to address the issue of duplicate observations since the NBS releases data for some key variables together with February due to the Lunar New Year Holiday. All variables are in YoY percentage change, except for interest rates that is in levels. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B10: Estimation Results for the PW Regressions of H3

Empirical model Dependent: $\Delta Consumption_{Nom}$	PW (1)	PW (2)	PW (3)	PW (4)	PW (5)	PW (6)
$\Delta Credit_{Households}$	0.316*** (0.090)	0.240** (0.093)	0.145* (0.082)	0.194* (0.099)	0.208** (0.101)	0.236** (0.117)
ΔCPI		1.172*** (0.349)	1.293*** (0.311)	1.227*** (0.319)	1.239*** (0.336)	1.273*** (0.339)
ΔGDP_{real}			0.478*** (0.167)	0.4757*** (0.168)	0.469*** (0.177)	0.474*** (0.176)
$\Delta M2$				-0.187 (0.117)	-0.206* (0.121)	-0.226* (0.123)
<i>Interest rates</i>					-0.486 (0.500)	-0.476 (0.495)
$\Delta House\ prices$						-0.082 (0.168)
Constant	5.286** (2.187)	3.867* (2.129)	1.883 (2.054)	3.598 (2.279)	3.601 (2.360)	3.444 (2.359)
R-squared	0.28	0.40	0.50	0.51	0.51	0.51
DW statistic	1.74	1.77	1.84	1.88	1.85	1.85
Observations	64	64	64	64	64	64

Note: robust standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers the first quarter of 2008 to the fourth quarter of 2023. All variables are in YoY percentage change, except for interest rates that is in levels. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B11: Estimation Results for the PW Regressions of H3

Empirical model Dependent: $\Delta Retail\ sales$	PW (1)	PW (2)	PW (3)	PW (4)	PW (5)	PW (6)
$\Delta STCredit_{consumption}$	0.579** (0.253)	0.624*** (0.209)	0.627*** (0.209)	0.655*** (0.218)	0.657*** (0.218)	0.657*** (0.218)
$\Delta MLTCredit_{consumption}$		-0.691** (0.292)	-0.707** (0.295)	-0.648** (0.281)	-0.653** (0.282)	-0.653** (0.283)
ΔCPI			0.211 (0.286)	0.117 (0.282)	0.076 (0.280)	0.072 (0.283)
$\Delta M2$				-0.472 (0.322)	-0.481 (0.327)	-0.480 (0.326)
<i>Interest Rates</i>					0.215 (0.171)	0.214 (0.169)
<i>Consumer confidence index</i>						0.030 (0.037)
Constant	-2.856 (5.659)	8.710** (3.602)	8.424** (3.619)	12.949*** (4.822)	13.208*** (4.880)	13.261*** (4.909)
R-squared	0.38	0.50	0.51	0.52	0.52	0.52
DW statistic	1.91	1.75	1.74	1.81	1.82	1.83
Observations	216	216	216	216	216	216

Note: robust standard errors are in parentheses. All models include structural break dummies, covering time periods of the global financial crisis in 2008 and the Covid-19 pandemic in 2020. The sample period covers January 2008 to December 2025. The models also include a dummy variable for January to address the issue of duplicate observations since the NBS releases data for some key variables together with February due to the Lunar New Year Holiday. All variables are in YoY percentage change, except for interest rates and the consumer price index that are in levels. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

AI statement:

List of tools used: Claude

Degree of use: No AI-based tools were used in writing texts, generating ideas, or constructing datasets. However, AI tools like Claude were used to occasionally check grammar and advice on how to bring down the word count, how to illustrate self-collected data for some figures in Excel, and how to find STATA syntax. In particular, after collecting the relevant credit data and calculating the window guidance stance based on the PBoC's monetary policy reports and indicators developed by Chen et al. (2017), Claude was used to help create Figure 3 in section 2 to save on time. In section 5, Claude was used to provide the STATA syntax for how to calculate the cumulative dynamic multipliers for the FDL models (Tables 5, 8 and 12).