Examining the impact of China's fiscal and monetary policy measures on global economic growth: a VAR analysis

Andreas Engström, 41670

Master's thesis in Economics

Supervisor: Eva Österbacka

Faculty of Social Sciences, Business and Economics, and Law

Åbo Akademi University

2022-2023

Preface

I am thankful for my family and friends' tireless support and love throughout my studies. Your encouragement has been a continuous source of motivation, especially during challenging times.

During my studies, I have pursued various sports, such as cross-country skiing, football, martial arts, and weightlifting. These physical activities have taught me the values of discipline and focus while teaching me the importance of balancing exertion with rest. Additionally, hanging out with friends, music, reading, Sauna, and winter swimming have been excellent outlets for relaxation and mental expression.

Alongside my studies and hobbies, I work full-time as an analyst for Nordic Healthcare Group, applying the skills and knowledge I acquired during my studies to real-world problems. This work experience has given me valuable lessons that will help me in the future.

I am also thankful to the University of Glasgow, where I spent a semester as an exchange student and began writing this thesis. This experience broadened my horizons, exposed me to new ideas and perspectives, and taught me the importance of joy and mindful living.

Finally, I want to sincerely thank my home university, Åbo Akademi University, for providing me with a world-class education. I am particularly thankful for my economics teachers and professors, whose expertise, world-class teaching, and passion have inspired me throughout my academic journey.

I extend my heartfelt thanks to everyone who has inspired and supported me. Come on <3.

Andreas Engström 13 May 2023

ÅBO AKADEMI UNIVERSITY – Faculty of Social Sciences, Business and Economics, and Law

Abstract for Master's thesis

Subject: Economics
Writer: Andreas Engström
Title: Examining the impact of China's fiscal and monetary policy measures on global economic growth: a VAR analysis
Supervisor: Eva Österbacka
Abstract: This study examines the impact of China's fiscal and monetary policies on countries worldwide and the OECD region over two separate periods (2001-2010 and 2011-2019) to provide a comprehensive understanding of how China's economic policies affect the global economy. The study includes a literature review of fiscal and monetary policy theories and prior research on China's policies. It also introduces a hypothetical model to explain how China's expansionary policy affects itself and the outside world. Using a vector autoregression (VAR) model with Granger's causality test and orthogonalized impulse response functions, the study's results indicate that the impact of China's policies on other countries is more significant in the later period. The study reveals that China's monetary policy variables, such as M2, domestic credit, RMB per USD, market capitalization, and total imports, significantly impact other countries, with more potent effects observed in the later period. Additionally, China's fiscal policy variables, including direct investment abroad and taxes, significantly impact other countries' GDP and CPI, with stronger effects observed in the later period. Furthermore, the study highlights the impact of China's growth indicators, specifically the consumer price index (CPI) and producer price index (PPI), on other countries. The results show that China's PPI has a more substantial impact on outside countries than CPI. Overall, this study emphasizes the significant role of China's economic policies in the global economy and provides insights into the trends and changes in China's economic impact on other countries over time. These findings can be used by policymakers and investors to manage and respond to China's economic policies in the future.
Keywords: China, monetary policy, fiscal policy, transmission channel, transmission mechanism, vector autoregression

Date: 13 May 2023	**Number of pages:** 71

Contents

1 Introduction

1.1 Background

> ”Understanding Chinese monetary policy is more important than ever before. Growth and financial stability in China are important drivers of other countries' cycles – in Asia and beyond.”
>
> (Chen, Chow, och Tillmann, 2017, 1)

As highlighted above, and according to many academic papers, research on China's impact on the outside world has become increasingly significant (Cashin, Mohaddes & Raissi, 2017; Economy, 2010; Prasad, 2004). Understanding how China's fiscal and monetary policy affects countries worldwide is essential, as China has become a key player in the global markets. Furthermore, China's dynamic private sector integration into the world economy has been the most extensive economic development in recent decades (Sznajderska, 2019; Prasad, 2004). China has become a crucial importer of raw materials from a global perspective, as highlighted by Prasad (2004) and Roache (2012). The integration and special growth rates have caused significant changes in the world economy (Song, Storesletten & Zilibotti, 2011). Therefore, China is a good growth indicator for the outside world as its spillover effects spread globally more rapidly and efficiently than ever (Sznajderska, 2019).

This thesis compares the effects of China's fiscal and monetary policy on countries worldwide during two separate periods, the first from December 2001 to December 2010 and the second from January 2011 to December 2019. Additionally, this thesis aims to determine if China's fiscal and monetary policy role has increased globally in the 21st century. Xue, Yilmazkuday, and Taylor (2020) explain that after the global financial crisis in 2008, China implemented several countermeasures to maintain growth. However, the cost of maintaining growth has increased financial risks as Chinese commercial banks now have a large number of loans with high risks (Xue, Yilmazkuday & Taylor, 2020).

Table 1: Countries' e*xport and import shares with China (in percent).*

		2001	2019
Australia	Export	6.4	39.1
	Import	7.7	25.2
Japan	Export	7.5	18.4
	Import	15.5	23.2
South Korea	Export	11.6	24.5
	Import	9.5	22.2
Germany	Export	1.9	7.5
	Import	2.9	8.3
Russia	Export	5.7	14.3
	Import	4.8	19.8
Brazil	Export	3.3	27.6
	Import	2.4	20.5
USA	Export	2.7	6.8
	Import	6.7	18.0
South Africa	Export	1.8	15.4
	Import	4.0	18.2

Source: The Observatory of Economic Complexity (n.d.).

Table 1 illustrates a clear trend indicating that countries' export and import trade shares with China have become increasingly significant. The sample countries, representing every continent, were selected based on their total trade share with China in 2001, the year when China joined the World Trade Organization (WTO). Specifically, each country chosen had the largest trade share with China in their respective continent, as reported by The Observatory of Economic Complexity (n.d.) for 2001. Thus, the central question of this thesis is: Has the worldwide impact of China's fiscal and monetary policy measures undergone significant changes during the early 21st century?

1.2 Goal of this thesis

The study seeks to answer the question in the previous section by examining how the sample countries' and total OECD growth variables respond to China's fiscal and monetary policy variables[1]. That is to say, whether countries have become more or less dependent on China's actions during the 21st century. This thesis will determine how desperate countries' growth worldwide is for China's policy and trade actions. Furthermore, how has the impact changed in the two different periods in the 21st century? Considering that China has become a greater

[1] The variables will be discussed later in the chapter "Methodology."

player in terms of trade (see Table 1), it would be logical to assume that China's fiscal and monetary impact on other countries should also have developed in the same direction.

In other words, as previously mentioned, the importance of world economic trends and cycles has become increasingly crucial for countries in a global world. Therefore, understanding China's fiscal and monetary policy has become more critical for other countries (e.g., when China is a significant trade partner for many countries, it is evident that their actions matter). However, this thesis's primary goal is to determine how much China matters and how quickly China's role has increased compared with the two periods in the 21st century since it joined WTO.

This study will primarily approach the research question using a standard vector autoregression (VAR) analysis[2]. Correlations between China's fiscal and monetary policy variables and the response variables of the countries under study will be measured using Granger causality estimates. Orthogonalized impulse response functions (ORIF) will also be included to examine the impact of China on the studied countries. The differences between the two periods can be conveniently discussed based on these measurements.

The final goal is to offer macroeconomic policy recommendations to countries and industries worldwide that cooperate with China, primarily in the concluding remarks chapter. These recommendations may include guidance on how to respond more effectively when China implements contractionary or expansive policies, which variables in China should be considered, which fiscal or monetary policy channels in China are dominant, and which theories and hypotheses receive support from the study's results. For instance, such recommendations may inform policy and investment decisions when China's response is familiar.

The thesis will begin with a chapter on theory and empirical evidence, presenting and discussing fiscal and monetary policy theories. The chapter will also review previous studies focusing on China's fiscal and monetary situation and its impact on the outside world, including empirical papers examining China's impact on both itself and other countries. Additionally, the chapter will introduce a hypothetical model that attempts to explain how China's expansionary policy is expected to affect itself and the external world, both nearby and distant.

In the methodology chapter, the study's variables and the model will be described in detail. Next, the results chapter will present and analyze the study's estimates, including the results of

[2] The chapter "Methodology" will provide a detailed discussion of Vector Autoregression (VAR).

the robustness check. Finally, the results will be comprehensively discussed and critically reviewed.

The study will conclude with remarks that discuss the implications of the findings for theory and practice, including which theories receive support from the study's results and whether the study's hypothesis is supported. A Swedish summary will also be included to summarize the thesis's main points in Swedish.

2 Theory and empirical evidence

This chapter provides an overview of the theories and channels related to fiscal and monetary policies discussed in previous literature. Additionally, it discusses China's implementation of fiscal and monetary policies and the resulting consequences based on empirical evidence from previous studies. The final sections of the chapter explore the impact of China's policy measures on both its domestic economy and the global economy.

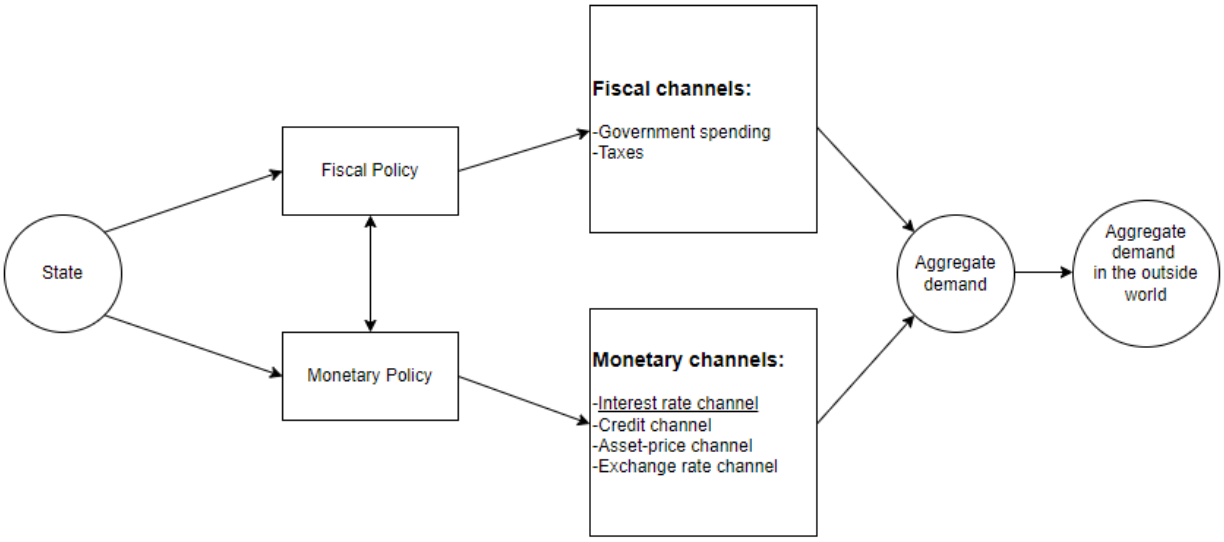


Figure 1: *The fiscal and monetary policy channels and their impact on aggregate demand.*

Figure 1 illustrates the core theory of this thesis, which examines how a country as large as China, with a central bank, can affect aggregate demand domestically and internationally through various channels. This chapter will address each of the channels represented in the figure and explore how policy measures can ultimately impact other countries from China's perspective, leading to what is commonly referred to as spillover effects.

2.1 Fiscal policy theory

> "The government can increase total spending by spending more itself or by reducing taxes so that the taxpayers have more money left to spend. It can reduce total spending by spending less itself or by raising taxes so that tax payers have less money left to spend."
>
> (Lerner, 1943, 39-40)

The citation by Lerner (1943) explains that a government can employ fiscal policy to increase or decrease total spending by either spending more or less itself or by adjusting taxes to give taxpayers more or less money to spend. The citation highlights the different options available to a government to manage the economy. However, modern fiscal policy traces its origins back to Keynes's (1936) idea of how the business cycle is affected by aggregate demand. Keynes proposed that the state and the central bank should pursue a macroeconomic stabilization policy, implementing expansive fiscal policy in recessions and contractionary fiscal policy in booms while the central bank drives monetary policy. The basic idea is, for example, that the state should pursue a temporary expansionary fiscal policy during a recession to increase growth and inflation, reduce unemployment, and thus even the country's income distribution.

In contrast, the neoclassical theory argues that a country's production always returns to the natural level in the long run. Therefore, the idea that an active fiscal policy is a good idea is questioned; as Perotti (2001, 24) notes, "We should honestly admit that, at present, our area of ignorance even on basic signs of fiscal multipliers is too great. At a minimum, this should suggest using fiscal policy very sparingly." However, Keynes (1936) argues that the process from a recession to a natural state is too slow, and it is best to pursue a temporary stabilization policy.

$$Y^{ad} = C + I + G + X - IM \quad (1)$$

Where Y^{ad} = Aggregate demand, C= Consumption[3], I = Investments, G= Government spending, X= Export and IM = Import.

The formula above shows the traditional components that drive aggregate demand: G and T represent the fiscal policy, as in the modern monetary theory (MMT) proposed by Lerner (1943). According to Formula 1, changes in these variables by the government will affect aggregate demand. For instance, Zhang et al. (2019) demonstrate that increasing China's

[3] $C = C_0 + C_1 (Y-T)$ describes consumption more specifically, where Y stands for income and T for Taxes, and where the $Y-T = Y^d$, where the Y^d is the disposable income (Blanchard, 2016).

government expenditure will positively and significantly affect aggregate demand. Furthermore, their results suggest that China's fiscal multipliers are more pro-cyclical than counter-cyclical. In other words, China's fiscal policy stimulates growth during booms using fiscal tools and does the opposite in recessions. Additionally, Liu, Sun, and Chang (2021) find that fiscal policy has a more significant effect on inflation rates in China than monetary policy.

2.1.1 Fiscal transmission mechanism and channels

As mentioned above, fiscal policy involves adjusting government spending (G) and taxes (T)[4]. This section discusses the channels through which expansionary fiscal policy operates. An increase in government spending (G) is an example of expansionary fiscal policy. The spending can be financed by raising taxes, increasing the money supply, or borrowing (Kopcke et al., 2006). Consequently, aggregate demand increases as government spending rises, increasing income, consumption, investments, and aggregate demand (refer to Process 1 below). The effectiveness of this action depends on the size of the multiplier. Spencer and Yohe (1970) defined the multiplier as an economic concept that refers to the impact of government spending or taxation changes on the overall level of economic activity. When the multiplier is greater than 1, an initial increase in government spending or a reduction in taxes leads to a larger increase in total spending through repeated consumption by consumers and businesses. In other words, the multiplier boosts the initial impact of the fiscal policy. On the other hand, if the multiplier is less than 1, government spending weakens aggregate demand, and the impact of fiscal policy is less significant.

$$G\uparrow \rightarrow Y^{ad}\uparrow \rightarrow Y\uparrow \rightarrow C\uparrow \rightarrow I\uparrow \rightarrow Y^{ad}\uparrow. \quad (1)$$

As explained above, the state can also pursue expansionary fiscal policy by lowering taxes, which increases disposable income. The increase in disposable income results in increased consumption and investment, ultimately increasing aggregate demand (Kopcke et al., 2006). This process is illustrated in Process 2 below.

$$T\downarrow \rightarrow C\ \&\ I\uparrow \rightarrow Y^{ad}\uparrow. \quad (2)$$

The multiplier effect of tax cuts depends on the marginal propensity to consume, which refers to how much more is consumed when disposable income increases. The cost of tax cuts is the income that the state loses, which means the state must borrow to finance the loss. The

[4] According to Fatás & Mihov (2001) and Perotti (2001), the definition of government spending (G) includes both government consumption and investments.

Ricardian equivalence theory argues that it is irrelevant to households whether taxes or loans finance public sector expenditure (Romer, 2012). In other words, if the state raises taxes, households' consumption opportunities will decrease. However, conversely, if the state borrows to finance its expenses, households will save the corresponding amount from not paying that debt. This is because households anticipate that taxes will increase again in the future, which will reduce their consumption opportunities. Therefore, according to this theory, households adjust their consumption decisions based on their expectations of future tax burdens, regardless of the financing method used by the government.

2.2 Monetary policy theory

> "The economy grows in the long run because of all kinds of fundamental factors: the skills of the workforce, the quality of the infrastructure, how effective the tax system is, research and development, all of those things. Monetary policy can't do much about longer-term growth. All we can try to do is try to smooth out periods where the economy is depressed because of lack of demand."
>
> *(Ben Bernanke,* July 18, 2012)

The citation by Ben Bernanke highlights that long-term economic growth is driven by fundamental factors such as workforce skills, infrastructure quality, and research and development. While monetary policy cannot do much about longer-term growth, it can help to stabilize the economy during periods of low demand. However, according to Lerner's (1943) Modern Monetary Theory (MMT), fiscal policy has the potential to directly influence the money supply within an economy through government spending and taxes. Conversely, monetary policy can affect the price of money in the economy, wherein high-interest rates indicate a higher price for money and lower borrowing, and vice versa. Additionally, monetary policy can indirectly impact the money supply through interest rates, as borrowed money is a form of liquidity, and directly through open market operations, as discussed by Friedman (1995)[5]. As such, fiscal and monetary policies can function in tandem, as Figure 1 illustrates. The primary distinction between these policies lies in their governing bodies, with the central bank overseeing monetary policy and the government managing fiscal policy via the state

[5] Market operations refer to the measures taken by central banks to stimulate the real economy, such as buying securities (such as bonds) from the market, which increases market liquidity.

budget. However, the subsequent section will explore how monetary policy influences aggregate demand.

2.2.1 Monetary transmission mechanism and channels

This section discusses how monetary policy finally impacts aggregate demand, primarily based on Mishkin's (1995 & 2019) and Taylor's (1995) literature, focusing on the transmission mechanisms. Transmission channels refer to the theories that explain how central banks influence aggregate demand, while transmission variables allow for the empirical measurement of their effects. Central banks use these channels to attain their monetary policy objectives, aiming to impact aggregate demand through them. Chen, Chow, Tillmann (2017), and Sun (2015) investigate how China's real economy governs monetary policy. The research suggests that the People's Bank of China (PBoC) uses multiple tools to implement monetary policy measures, resulting in the effectiveness of monetary policy stimuli on Chinese markets. Specifically, expansionary monetary policy has increased share prices and borrowing in China.

Given that the measures implemented are sufficiently large, the effects of the transmission channels can spread across borders, and therefore, they are now considered global[6]. Figure 1 illustrates how monetary policy impacts aggregate demand through the four transmission channels. The key channel, the interest rate, plays a critical role in monetary policy. It is typically believed to influence all other channels through its effect (Ireland, 2010). Nonetheless, according to Mishkin (1995), the interest rate channel operates simply by following this path:

$$r\downarrow \rightarrow I \uparrow \rightarrow Y^{ad} \uparrow. \qquad (3)$$

Process 3 illustrates that when the central bank lowers the interest rate, investments increase, leading to a rise in aggregate demand, where r represents the interest rate, I represent investments, and Y^{ad} represents aggregate demand[7]. The well-known Taylor rule suggests that the central bank should adjust interest rates according to changes in inflation and GDP[8]. Kamber and Mohanty's (2018) study shows that China has followed the Taylor rule in recent decades by raising interest rates as inflation increases, and vice versa. As a result, loans become cheaper

[6] China's spillover effects will be discussed later in this chapter.

[7] Mishkin (1995, 2019) defines investment as household, private, and public sector loans, consumption, and investments.

[8] The Taylor rule can be shown as follows: $i = r^* + \alpha(\pi-\pi^*) + \beta(Y - Y^*/ Y^*)$. Where i = central bank short-term interest rate, r^* = equilibrium interest rate, π = actual inflation, π^* = inflation target, Y = actual GDP, Y^* = potential GDP, α and β = monetary policy constants (Burda & Wyplosz, 2012, p. 225).

when implementing expansionary monetary policy through the interest rate channel, leading to increased borrowing for households and companies. Additionally, a decrease in the interest rate increases investments' net present value, making them more profitable. As shown in Process 3 above, investments ultimately affect aggregate demand. Therefore, central banks can use interest rates to control households' and companies' consumption and investment decisions. However, an economy can experience a liquidity trap, where increased liquidity fails to generate new investments and does not increase aggregate demand.

Mishkin (1995) identifies the credit channel, also known as the credit view, into two parts: the bank lending channel and the balance sheet channel. The bank lending channel primarily impacts companies, while the balance sheet channel is more relevant for households (Mishkin, 1995). Breitenlechner and Nuutilainen (2019) point out that the credit channel plays a vital role in China's monetary policy as monetary policy measures significantly affect loan supply and demand. For example, when the People's Bank of China (PBoC) lowers the interest rate, it boosts the money supply and credit growth (refer to Figures A3, A4, A5, and A6 in the appendix). However, according to Mishkin (1995), the bank lending channel operates as follows:

$$\text{Bank reserves} \uparrow \rightarrow \text{bank deposits} \uparrow \rightarrow \text{bank loans (liquidity)} \uparrow \rightarrow I \uparrow \rightarrow Y^{ad} \uparrow. \quad (4)$$

I.e., when bank reserves increase, this causes bank deposits to increase, which increases liquidity in the economy, and the increasing liquidity indicates more investments to happen, which finally affects the aggregate demand. While Mishkin (1995) illustrates the balance sheet channel as follows:

$$r \downarrow \rightarrow P_s \uparrow \rightarrow \text{firms' net worth} \uparrow \rightarrow \text{adverse selection} \downarrow \rightarrow \text{moral hazard} \downarrow \rightarrow \text{lending} \uparrow \rightarrow I \uparrow \rightarrow Y^{ad} \uparrow. \quad (5)$$

As interest rates fall, stock prices rise (Ps), increasing companies' net worth, which reduces adverse selection[9] and moral hazard. When valuation increases, the probability of making poor decisions decreases. Consequently, bank lending increases, giving rise to more investments and finally increasing aggregate demand. Mishkin (2019) highlights why the credit channel is a significant monetary policy transmission mechanism:

1. Numerous empirical studies show a strong correlation between the credit channel and companies' employment and spending.

[9] Adverse selections are considered wrong decisions due to asymmetric information. With moral hazards, institutions or consumers behave non-optimal as they do not fully bear the consequences of their risk-taking.

2. Smaller companies are more sensitive to monetary policy decisions because they are more likely to be credit-constrained than larger companies.
3. The credit channel explains several economic phenomena, such as financial institutions, specific financial systems, and the impact of financial crises throughout history on the economy.

Thus, according to Mishkin (1995 & 2019), the asymmetric information theory supports the reality that the credit channel is an essential monetary transmission mechanism[10]. However, Bernanke and Gertler (1995) argue that the credit channel is not an independent transmission channel, as interest rates significantly affect the channel. As interest rates fall, the risk of taking out a loan decreases, increasing liquidity and demand for loans.

The third channel studied is the asset-price channel. According to Mishkin (2001), the asset-price channel comprises several channels that can be observed in the financial market. The study adopts Mishkin's (1995) division of the asset-price channel, which includes Tobin's q theory and the wealth effect[11]. A Nobel Prize winner, James Tobin, developed a theory explaining how monetary policy decisions affect stock valuation. Tobin defines q as the company's market value divided by the replacement cost of capital. A high q indicates that the company's value is relatively high compared to the replacement cost of capital (Tobin, 1969). For instance, if the q is high, an investment for a company is relatively advantageous compared to the company's market value. Therefore, the company can issue shares for high prices related to the investment costs of goods and equipment.

$$r\downarrow \rightarrow P_s\uparrow \rightarrow q\uparrow \rightarrow I\uparrow \rightarrow Y^{ad}\uparrow. \quad (6)$$

Process 6, described above, demonstrates how a decrease in interest rates impacts Tobin's q. As interest rates decline, the expected return on bonds becomes less attractive, causing shares to become more attractive than bonds (Ioannidis & Kontonikas, 2008). When interest rates drop, companies benefit from lower interest costs, increasing profits and making stocks even more attractive than bonds. Furthermore, since q is high, companies can invest in new assets for only

[10] For example, when two parties have asymmetric information, meaning they do not have equivalent information at the time of decision-making, it can lead to catastrophic events such as the financial crisis of 2008 (Mishkin, 2019).
[11] Both Tobin's q and the wealth effect allow a broad definition of capital, enabling the theory to be applied to different markets.

a small percentage of shares[12]. Finally, this leads to higher stock values, a higher q, and more investments (I), increasing aggregate demand (Y^{ad}).

The other channel discussed within the asset-price channel is the wealth effect (or wealth channel), based on two well-known works. One is Milton Friedman's hypothesis of permanent changes in income, and the other is Franco Modigliani's hypothesis about the life cycle. These hypotheses suggest that consumers smooth out their consumption throughout their lifetime and that marginal changes in wealth do not significantly affect consumption, whereas permanent changes do (Cooper & Dynan, 2016). A crucial component of lifetime consumption is financial wealth, such as shares. Mishkin (1995) explains the channel as follows:

$$r\downarrow \rightarrow P_s\uparrow \rightarrow \text{wealth}\uparrow \rightarrow \text{consumption}\uparrow \rightarrow Y^{ad}\uparrow. \quad (7)$$

When interest rates fall, stock prices rise, leading to an increase in households' financial wealth and lifetime consumption. As a result, aggregate demand also increases. The housing market also illustrates the asset-price channel, where housing serves as the capital. When house prices increase, it lowers the cost of compensation for consumption, leading to an increase in q. Therefore, housing is a good measure of wealth, and rising housing prices and consumption increase aggregate demand. In China's economy, the housing market has played a significant role in recent decades, as a crucial part of its growth has been in house construction (Wu, Gyourko, & Deng, 2012).

The final transmission channel considered in the study is the exchange rate channel. With increasing global trade, exchange rates have become increasingly important in monetary policy because exchange rates primarily affect interest rates, imports, exports, and aggregate demand (Mishkin, 1995 & 2019). For instance, when interest rates drop, a country's currency becomes less attractive to other currencies, leading to a depreciation of the exchange rate. However, this also causes price levels to become cheaper relative to other countries, increasing exports[13].

$$r\downarrow \rightarrow E\downarrow \rightarrow NX\uparrow \rightarrow Y^{ad}\uparrow. \quad (8)$$

Process 8 suggests that a drop in the interest rate causes the specific country's currency (E) to depreciate, making it weaker than other international currencies. This, in turn, increases the country's net exports, ultimately raising the aggregate demand. For instance, a study by Feldkircher and Korhonen (2014) shows that the appreciation of the RMB (China's currency)

[12] Conversely, when q is low, the effect is the opposite.
[13] The currency is assumed to be a floating exchange rate, meaning the central bank can manage the currency by adjusting the interest rate.

leads to a decline in Chinese exports, resulting in a slight reduction in China's GDP. This, in turn, negatively affects several countries exporting raw materials to China.

2.3 Fiscal and monetary policy in China

> "What matters is not monetary stimulus per se, but whether monetary stimulus is paired with fiscal stimulus (otherwise known as helicopter money) and whether monetary policy is communicated in a way that helps the fiscal authority maintain stimulus for as long as private deleveraging continues. "
>
> (McCulley & Pozsar, 2013, 1)

Song, Storesletten, and Zilibotti (2011) believe that emerging countries usually start their growth with an investment-driven strategy that finally becomes a consumption-driven strategy as household consumption expands. For instance, Economy (2010) notes that China adopted an investment-driven approach and became the world's second-largest economy. However, this strategy, shaped by monetary and fiscal policy decisions, often neglects the relatively underdeveloped household sector and domestic market (Aziz & Cui, 2007; Song, Storesletten, and Zilibotti, 2011).

The introduction to this thesis emphasizes the importance of understanding China's fiscal and monetary policies on a global scale. While growth fundamentals, such as capital, labor force, education, technology (research and development), infrastructure, rules, and population growth, are crucial in the long run, an economy as large as China can have short-term impacts on other economies through its policy measures, such as fiscal and monetary policy, which can affect investment and consumption levels, as discussed in previous sections. For instance, with a population of approximately 1.4 billion (as shown in Table 2), China holds significant economic power and generates spillover effects when trading with other countries.

According to Chen, Chow, and Tillmann (2017), China's monetary policy has become increasingly crucial in predicting world economic trends. They argue that the world economy is now more affected by China's policy regimes and related measures, and as such, Liu, Sun, and Chang (2021) suggest that China's regimes should be carefully examined when analyzing macroeconomic dynamics. In recent decades, China's primary goals have been maintaining growth, financial stability, and currency stability (Chen, Chow, and Tillmann, 2017; China, 2014). Chow (1997) suggests that China's fiscal and monetary policies interact to achieve these goals, resulting in more potent effects than what only monetary policy would cause, as

McCulley and Pozsar (2013, 1) point out in the citation above. This is possible because one party mainly controls political decision-making in China, making the most remarkable difference between China's and Western countries' procedures (Bell, 2016).

Moreover, Sun (2015) reports that PBoC uses several monetary policy instruments simultaneously, which can be divided into three groups. The first group systematically affects the real economy, the second consists of instruments that increase liquidity through market operations, and the third group consists of exogenous instruments unaffected by the previously mentioned instruments. Gul (1999) and Wei (2007) confirm the effectiveness of policy measures and point out that the Chinese state owns significant shares in several domestic companies, which enables adequate financing to companies with state resources. However, it is more challenging to determine whether it is a fiscal or monetary policy question because the Chinese government primarily finances commercial banks, which lend money to companies (Chang et al., 2017). Moreover, China's ambitious regimes, aimed at maintaining economic growth and promoting long-term financial stability, have resulted in several procyclical stimuli in recent decades, as noted by Zhang et al. (2019).

2.3.1 China's policy effects on the outside world

China's spillover effects are directly proportional to how much the outside world trades with it, making China's openness to the outside world crucial. Song, Storesletten, and Zilibotti (2011) show that China has increasingly opened up to the outside world in recent decades, particularly by joining the WTO in 2001 (as shown in Table 1). Anderson and Wincoop (2003) and Pugel (2016) discuss the gravity model of international trade[14], which can explain how China's spillover effects are likely to extend to both nearby and distant countries. The size of economies, as measured by GDP, and the distance between countries determine the extent of their trading relationship. However, the model can also account for other factors, such as shared languages or historical ties, membership in the same union, or the use of the same monetary policy.

It is worth noting that lower levels of trade can stem from factors like a lack of trade agreements, corruption, legacy policies, or other political disputes. However, based on the gravity trade

[14] According to Anderson and Wincoop (2003), the gravity trade model can be mathematically represented as follows:
$F = G(M1^{\alpha} * M2^{\beta}) / D^{\gamma}$, where F represents the trade flow between two countries, M1 and M2 represent the economic dimensions (e.g., GDP) of the two countries, D represents the distance between them, and G, α, β, and γ are constants.

model, China's trade primarily occurs with its neighboring countries, considering the size of their economies. When China employs expansionary economic policies, the effects first ripple through neighboring Asian countries and then to more distant nations. These effects occur directly between China and its trading partners and indirectly through China's neighboring countries.

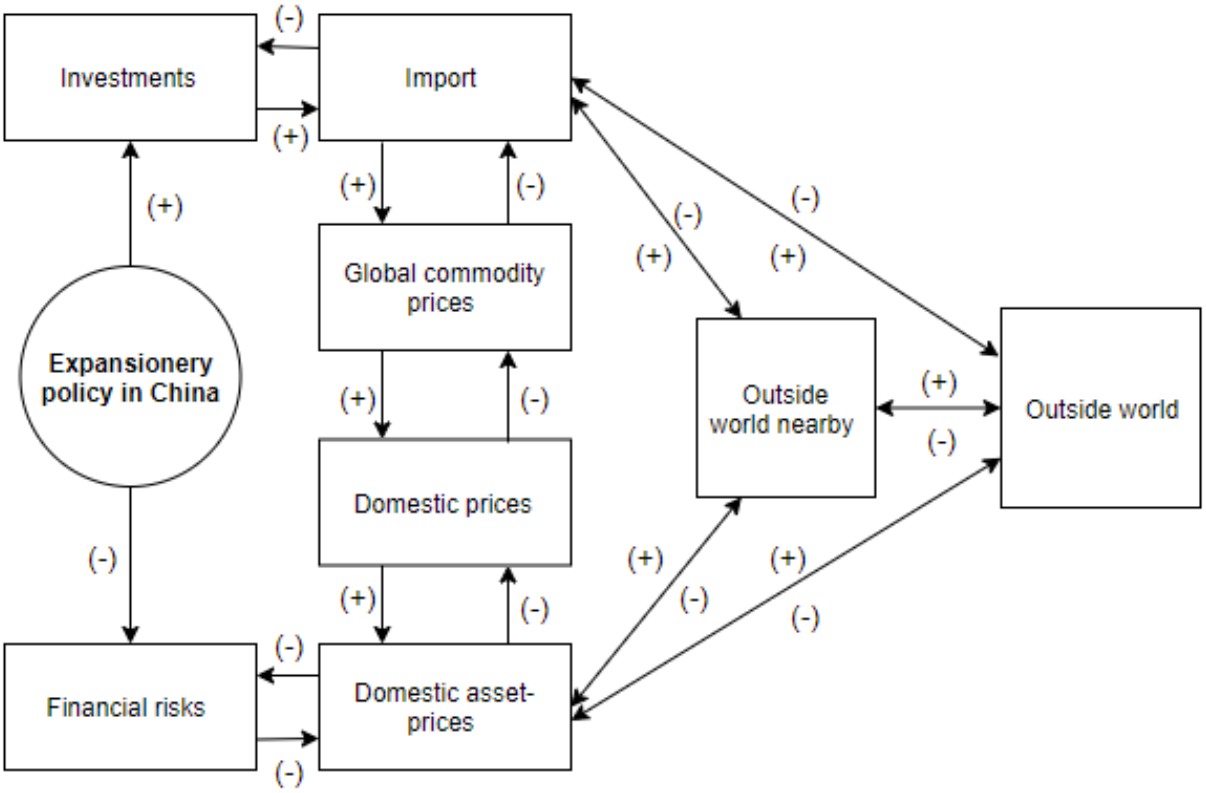


Figure 2: *A hypothetical model of China's expansionary policy's effects on the domestic and global economy.*

Figure 2 presents a hypothetical model that illustrates how China's expansive measures could impact both its economy and the global economy, forming this study's core. China's comprehensive policy, which contains fiscal and monetary measures, has two main effects: increased liquidity and heightened financial debt. Furthermore, the comprehensive policy boosts investment and, to a lesser extent, consumption through almost all fiscal and monetary channels, which likely leads to increased imports and exports with the rest of the world. For instance, lower interest rates affect numerous channels that promote investment, while fiscal policy measures such as government spending and tax cuts also increase investment. Notably, given that China imports approximately 50% of the world's industrial metals in value (The

Observatory of Economic Complexity, n.d.), it is a major importer of raw materials, as confirmed by Trinh et al. (2006) and Roche (2012). Therefore, while China's increased imports result in more significant exports to the rest of the world (i.e., global growth), its import behavior also influences world raw material prices[15].

As raw material prices continue to rise, China is experiencing an increase in domestic prices, particularly in producer prices. This rise in producer prices positively impacts Chinese companies as price changes are reflected in their income statements. As Yang, Li, and Zhang (2014) reported, industrial production in China substantially impacts financial markets. Additionally, the increase in asset prices, such as share prices or housing prices, explained by the asset-price channel, contributes to increased trade with other countries. This is because households, companies, and the government can afford to invest and consume more. The increase in asset-price values makes households feel wealthier, thereby increasing consumption in theory. On the other hand, property price bubbles can lead to economic crises, as seen in the financial crisis of 2008.

Moreover, the other side of Figure 2 illustrates that China's stimulative policy also carries financial risks, such as increased indebtedness to households, companies, and the state. This can adversely affect China's economy and the outside world, especially if it leads to a slowdown or a crisis. Additionally, spillover effects work in both directions; as the Chinese economy grows, so does the outside world, and vice versa. For instance, if China's imports to the outside world decrease, the outside world's exports would immediately decline.

Several studies have assessed the impact of China on the global economy. For instance, Sznajderska (2019) investigates China's influence on the world and reports that China has become the world's primary production hub and a critical player in global economic growth. However, the results show variation in different regions, with more significant impacts observed in Asia and Europe. Cashin, Mohaddes, and Raissi (2017) analyze the effect of China's growth and financial markets on other countries, using 26 response countries from around 14 world regions. Again, the study finds heterogeneity in different regions, with emerging countries in Asia being most significantly affected by China, but Europe also exhibits significance. Finally, Inoue, Kaya, and Ohshige's (2015) study focuses primarily on Asia and investigates the macroeconomic effects of China on the region. The study concludes that

[15] Higher commodity prices can also adversely affect certain countries, particularly those with inelastic demand for imported raw materials, such as oil.

adverse economic shocks in China significantly impact other Asian countries, particularly regarding industrial products and raw materials. Additionally, the researchers contend that China's economic downturns, particularly in raw material imports, can have negative economic effects on other countries in Asia.

In summary, when assessing the economic impact of China's fiscal and monetary policy channels on the outside world, it is reasonable to expect that the effects will be felt more quickly in nearby countries than in more distant ones, considering the countries' size and their level of economic integration with China. However, it is essential to note that effects can work in both positive and negative directions. Moreover, the magnitude of these effects depends on the extent of other countries dependence on China's economic policies.

China's position as a significant global economic player has led to its increasing interconnectedness with the rest of the world, and its policies can have significant implications for other countries. For example, as one of the world's largest importers of raw materials, China's economic downturns can have far-reaching consequences for other countries that rely on exporting such materials. On the other hand, China's growth can also be a source of opportunity for other countries, particularly those with strong trade ties with China or those that can attract investment from Chinese firms. Overall, China's economic impact on the outside world is complex and multifaceted, with opportunities and challenges for other countries.

3 Methodology

"Accurate measurement of the effects of changes in monetary policy on the economy is essential, both for good policy-making and for choosing among alternative macroeconomic theories."

(Bernanke & Mihov, 1998, 1)

As emphasized in the above quotation, accurate measurements of monetary policy, among other things, are crucial for determining how policy measures should be implemented and, more importantly, which theories should be considered. Hence, the interplay between theory and empiricism plays a crucial role. This chapter focuses on selecting variables for the study, primarily governed by the theories and hypotheses outlined in the previous section and by previous studies. Furthermore, this chapter explores various topics, including standard vector autoregression (VAR), stationarity, Granger causality, and impulse response functions.

3.1 Model data

The study variables are categorized into three groups[16]. The first group includes China's transmission variables, which can be further divided into fiscal and monetary variables and other economic growth indicators[17]. The second group consists of response variables, while the third group encompasses the study's exogenous variables.

3.1.1 Fiscal policy variables

Fiscal variables are primarily selected concerning government spending financed through taxes. As a result, these variables encompass government spending and taxes. This study employs two variables related to China's government spending: direct investments abroad and government fixed assets investment. Perotti (2001) notes that a significant portion of government spending consists of government investment and consumption. However, due to insufficient data, government consumption is not included in the study. Furthermore, it is not easy to distinguish between state and private investments in China, as the state owns a significant amount of shares

[16] All variables can be found visualized in Appendix.
[17] All China variables can be found on the Census and Economic Information Center databases. (Census and Economic Information Center, n.d.)

in Chinese companies (Yu, 2013). Additionally, since the early 1990s, China has made substantial overseas investments (Lardy, 1995), which can be interpreted as fiscal decisions made by the country for various reasons.

The process of selecting appropriate tax variables is more complex due to data limitations. In addition, the variables used in this study - namely government tax revenue and enterprise income tax revenue - may contain information unrelated to fiscal policy. For example, an increase in government tax revenue could be attributed to a rise in GDP over a specific period. Therefore, it would be more appropriate to use variables that provide information on tax rates and their changes, such as VAT or corporate tax.

3.1.2 Monetary policy variables

When selecting monetary variables, I have considered the various monetary policy transmission channels discussed in the previous section. As a result, four monetary policy channels have been identified: the interest rate channel, the credit channel, the asset-price channel, and the exchange rate channel. Two transmission variables are linked to each channel to measure the effects of China's monetary policy. For example, the transmission variables for the interest rate channel are China's Short-Term Interest Rate and Discount Rate, respectively.

Angeloni, Kashyap, Mojon, and Terlizzese (2003) and Ireland (2010) argue that the interest rate channel is crucial in monetary policy stimulus. These researchers emphasize that the interest rate channel affects other transmission channels and the real economy. Previous studies have also used interest rates as transmission variables (Arestis & Sawyer, 2002; Dickinson & Jia, 2007).

This study's credit channel transmission variables are China's Domestic Credit and the aggregate money M2[18]. When interest rates decrease, loans become more attractive, causing households, companies, and the government to increase borrowing (Mishkin, 1995). As a result, China has experienced significant liquidity in recent decades, as shown in Figure A5 in the appendix. Notably, strong stimuli in 2009, 2013, and 2016 have led to increased domestic debt in China, as illustrated in Figure A6 in the appendix[19]. Breitenlechner and Nuutilainen (2019) contend that the credit channel is a crucial aspect of China's monetary policy.

[18] According to Burda and Wyplosz (2012), M1 is the most liquid definition of money, while M2 includes M1 and financial assets such as securities.
[19] China's domestic debt consists of household, government, and corporate debt.

The study links the asset-price channel to Tobin's q theory. According to Tobin (1969), changes in monetary policy, primarily interest rate adjustments, affect share prices. The study utilizes "House Prices" and "Market Capitalization" as transmission variables for the asset price channel in China. Market capitalization provides information on the total market value of China's domestic enterprises. Furthermore, efficient markets allow the stock market to respond quickly to endogenous and exogenous shocks (Campbell, Gordon, Loeb, and Zhou, 2003), making the market value of shares a good indicator of monetary policy. Therefore, share prices in China respond rapidly to monetary policy measures, after which the effects are assumed to spread outside the country. As for housing prices, it can be stated that houses are significant assets, making "House Prices" a relevant variable for the asset price channel in China's large housing market.

The variables associated with the "exchange rate channel" in this study are "RMB per USD" and China's "total imports." The significance of the exchange rate channel has increased over the years as international exchange rates and financial markets have become increasingly global (Mishkin, 1995). When the currency is devalued or revalued, it is assumed to affect China's export and import behavior, changing the exchange rate relative to another currency. For example, if China increases its interest rates, its currency becomes more attractive than other currencies, increasing its relative value. As a result, China can import more when its currency is more valuable than other currencies. Therefore, "total imports" is a relevant variable for the exchange rate channel. Additionally, China's imports are believed to impact the outside world's growth. Table 1 illustrates how trade shares have changed between China and specific response countries since it acceded to the WTO in 2001.

3.1.3 Economic growth indicators

The economic growth indicators selected for this study include China's real GDP, consumer price index, producer price index, and industrial production index, excluding construction. Although these variables are not the main focus of the study, they provide additional information on China's impact on other countries. Therefore, the estimates of the impact of China's growth indicators on other countries and the total OECD will be presented in the appendix as Granger p-values.

3.1.4 Response and exogenous control variables

The response variables in this study are measures of growth in specific countries. The study's main objective is to estimate the impact of China's actions on countries worldwide. Variables used to measure growth in the specific response countries include real GDP and consumer price index growth from the previous period[20]. The specific response countries selected for this study are Australia, Japan, South Korea, Germany, Russia, Brazil, the USA, and South Africa, representing each continent. These countries were chosen based on the highest total trade share with China in their respective continents when China joined the WTO in 2001. Additionally, the study includes the total OECD, which considers the GDP and inflation of all OECD member countries.

Exogenous control variables increase the likelihood of more accurate and expected value-correct estimates as the error term variance decreases. In other words, appropriate control variables improve the probability of more accurate results regarding the measured variables, thereby increasing the chances of establishing a causal relationship. Therefore, this study aims to analyze the effects of China on countries worldwide and determine the actual impact that China is causing while minimizing the influence of other aspects that could affect the results. To this end, I selected exogenous control variables from Peersman and Smets (2001): US real GDP and US short-term (three-month) interest rates. Peersman and Smets (2001) explain that these variables control changes in world demand and inflation and thus help avoid the so-called price puzzle[21].

Furthermore, Peersman and Smets (2001) suggest that global commodity prices effectively influence imported inflation. However, using the global commodity index presents a challenge since it is difficult to determine whether it is endogenous or exogenous, particularly given China's significant role in the global commodity market. As such, I assume that China's actions impact global commodity prices and, thus, cannot be used as an exogenous variable.

[20] All response and exogenous control variables are retrieved from OECD databases (OECD. (n.d.). OECD.Stat.)

[21] The price puzzle refers to the phenomenon where inflation rises in the short term when interest rates increase, which contradicts the Taylor rule.

3.2 Model

The study uses a standard vector autoregression (VAR) model with the variables discussed in the previous section. In addition, this section presents VAR accompanied by stationarity and Granger causality, where Granger Causality test p-values are used as study pre-estimation. In addition, impulse response functions are also discussed. Furthermore, this chapter will also discuss the use of Orthogonalized Impulse Response Functions (OIRF) to analyze the dynamic effects of the identified shocks on the study's response variables.

3.2.1 Vector Autoregression (VAR)

VAR models estimate values based on a linear function of historical observations. The value is estimated based on a variable and its historical values in a standard time series analysis. In VAR, the same applies, except that the estimate is also affected by the other variables in the model. VAR is thus a multiple time series analysis, i.e., an analysis of a variable and its lags and other variables and their lags. In addition, it is assumed that the other variables and their historical values also help capture more realistic estimates, given that the variables are appropriate. Thus, VAR models estimate forecasts, identify structural shocks, and analyze impulse responses. In recent decades, VAR models have also become more common for estimating monetary policy, fiscal policy, and other macroeconomic analyses. For example, Christopher Sims was awarded Sweden's Riksbank's Nobel Prize in 2011 for his work with VAR models for estimating effects and causal relationships between several variables (Sims 1980, 1992; Kungliga vetenskapsakademien, 2011). The VAR models are thus good tools for measuring the correlation between several variables but provide no evidence of underlying causality, which is why the VAR models have been criticized.

However, VAR models enable sign restrictions, which enables the application of economic theories, and thus the probability of capturing causal relationships can increase. When using VAR models in studies, two common problems arise for the researcher. That is, which endogenous and exogenous variables should belong to the study and how many lags should be implemented in the models. This study uses VAR to analyze how endogenous variables interact dynamically and systematically. The exogenous control variables are applied to capture more accurate effects.

$$Y_t = c + A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + \varepsilon_t \,. \tag{2}$$

Equation 2 illustrates a standard vector autoregressive (VAR) multivariate time series model that estimates the relationship between variables using lagged values. Y_t is a vector of all variables in period t, and it is estimated based on historical values of all variables and their lagged values for a specific number of lags (p). Y_{t-p} is the lagged vector of all variables. c is a constant vector, while $A_1 ... A_p$ is a matrix of coefficients for each lag. ε_t is a vector of error terms, which is assumed to be normally distributed and include all relevant variables that may affect Yt (Lütkepohl, 2005). Moreover, it is assumed that the error term is uncorrelated with all independent variables and that the covariance between the error term and all independent variables is zero. The number of periods is denoted by t, and the optimal number of lags should be chosen based on information criteria (Kungliga vetenskapsakademien, 2011)[22].

Several information criteria estimate the appropriate amount of lag lengths in a model. Examples include Akaike's final prediction error (FPE), Akaike's information criterion (AIC), Hannan and Quinn's information criterion (HQIC), and Schwartz's Bayesians' information criterion (SBIC). FPE and AIC tend to overestimate the number of lag lengths (Liew, 2004). HQIC and SBIC recommend smaller lag lengths, which are more likely to give more accurate predictions (Shahrabi, Hadavandi, and Asadi, 2013). The study aims to keep the model simple while achieving relatively high prediction accuracy. Therefore, the lag lengths should be kept as small as possible. When conducting VAR analyses and forecasts, running several robustness tests with different lag lengths may be appropriate. In this analysis, I start with the FPE recommendation, which recommends more lag lengths. This is appropriate because China's effects are assumed to come with a delay to the outside world.

3.2.2 Stationarity

In the context of this study, stationarity is a statistical assumption that economic shocks will eventually return to their long-run mean. For instance, in China's economy, shocks will not persist indefinitely but recover after a certain period. If a time series is not stationary, the variance of the error term may be correlated with the endogenous variables, leading to biased or inconsistent estimates. Non-stationary time series often require differentiation because their mean values, variances, and autocorrelations vary significantly (Bowerman, O'Connell, and

[22] The amount of lags in a VAR model determines how many past values of the variable are used in the estimation and should be chosen such that the error term is interpreted as white noise.

Koehler, 2005). When a time series remains stationary after differentiation, it should be integrated once[23]. If the time series requires two differentiations, it should be integrated twice, and so on.

However, Sims, Stock, and Watson (1990) criticize differentiation because differentiated series lose aspects of the broader business cycle and the ability to identify long-term trends. Nevertheless, the Dickey-Fuller test is used in this study to check whether a time series is stationary. The test examines whether the null hypothesis can be rejected, assuming the model is stationary. For instance, in the context of VAR, if the null hypothesis cannot be rejected, the Dickey-Fuller test gives so-called unit roots[24]. In VAR analysis, it is recommended to confirm that all values on the unit root circle are within the range of -1 to 1, as values outside this range may lead to unrealistic estimates that are less reliable (Lütkepohl, 2005). However, it is worth noting that even if a value is outside this range, the results may still be valid, albeit with a lower degree of confidence.

3.2.3 Granger Causality

The Granger causality test was developed in 1960 and has since been used in quantitative studies. The Granger causality test is a method to measure the correlation between the variables. In addition, the test is used to check the significance of the VAR estimates in this study. According to Lütkepohl (2005), the Granger causality test is a static concept to estimate relationships. For example, if X1 has information that affects X2, historical values of X1 should support the prediction of X2, checked for previous values of X2. The test's p-values are crucial in the study as they clarify the level of significance where the null hypothesis can be rejected. Granger causality, however, is not the same as causality. If something is granger-causal, it does not mean causality is necessarily behind the correlation.

Furthermore, according to Lütkepohl (2005), Granger causality cannot predict an optimal relationship. Therefore, Granger causality should be interpreted as a less strict form of causality, but Granger causality is still, as I said, a good measure for assessing correlations. Other problems with measurements and causality are discussed in the section Critical Review.

[23] Technically, differentiation is a mathematical operation that involves computing the rate of change of a variable over time by subtracting the variable's value in one period from its value in the next period. This rate of change can be positive or negative, depending on whether the variable is increasing or decreasing over time.
[24] A unit root is a stochastic trend in the time series that emphasizes that the trend in the time series is a "random walk" (Bowerman, O'Connell, and Koehler, 2005).

3.2.4 Impulse and response

The impulse response function (IRF) plays a central role in the VAR analysis conducted in this study, which is an excellent method for simulating shocks in endogenous variables. By introducing a shock in the error term, the analysis strives to determine the effects of the shock on specific response variables and the duration of its impact on the recovery process. According to Lütkepohl (2005 & 2010), impulse response functions (IRFs) are used to evaluate the results of the VAR analysis. Specifically, the study simulates one standard deviation shock to China's transmission variables, which are expected to impact the response variables.

$$Y_t = c_0^i + A\,(L)\,Y_{t-1}^i + B(L)\,X_t + \varepsilon_t^i\,. \tag{3}$$

Equation 3 above consists of "vectors of coefficients" A (L) and B (L), where L refers to the number of lags in a shock (Peersman & Smets, 2001). c_0^i is the constant at time zero and ε_t^i is the specific error term. Y_{t-1}^i is the vector of endogenous variables for a specific variable i, while X_t is the vector of exogenous variables (Peersman & Smets, 2001). In this study, the number of lags is selected individually for each measurement, mainly according to the FPE recommendation.

An IRF analysis assumes that shocks occur in only one variable at a time. The assumption works as long as one assumes that the variables are independent. Macroeconomic variables, however, tend not to be independent but correlate. Thus, it is impossible to separate the effect of variable one on variable two from the effect of variable two on variable one (Lütkepohl, 2010). Therefore, the IRF measurement uses orthogonalized impulse response functions (OIRF). OIRF allows statically independent shocks where, for example, variables placed before in the model do not correlate with the other variables placed after it in the model. In OIRF, Cholesky decomposition is implemented in the form of a G-matrix. With Cholesky decomposition, the identification problem can be solved by the variable order in the G-matrix. OIRF thus constructs the structural shock.

$$G = \begin{pmatrix} g11 & 0 & 0 \\ g21 & g22 & 0 \\ g31 & g32 & g33 \end{pmatrix}. \tag{4}$$

The G-matrix is one of the most common recursive identifications for VAR models, introduced by Sims (1980, 1989). The matrix is a simple matrix with three variables, where ones and zeros are placed in the model to prevent unwanted correlations. This matrix is used, among other things, when implementing character restrictions to support economic theories and carry out

structural shocks. The G-matrix provides a theoretical framework for the study's orthogonalized IRF measurements, as the matrix creates significance for the variable order. For example, in the VAR measurements of the study, it is assumed that China's monetary policy transmission variables affect the response variables and not the other way around. Therefore, the study uses orthogonalized IRF (OIRF)[25]instead of standard IRF. In this study, OIRF means that Cholesky decomposition is implemented in macroeconomic survey measurements. As mentioned earlier, shocks to macroeconomic variables are seldom isolated but somewhat correlated. In addition, monetary policy shocks are often assumed not to have long-term effects on the real economy. Because of these reasons, it is difficult to assess the effects on specific response variables after a shock (Ciccarelli et al., 2017; Peersman & Smets, 2001).

Cholesky decomposition is an alternative method to avoid these problems. When implementing the method, the variable order has a meaning, which the G-matrix also illustrates - variables placed earlier in the model do not correlate with variables placed later in the model. If the variable order proves convincing, the identification problem is solved (Kungliga vetenskapsakademien, 2011). Therefore, the variable order should be supported by theories and previous research. Unfortunately, the study does not include more character restrictions, as there is a risk that complex VAR models may cause bias. If complex character restrictions are implemented in VAR models, they should be appropriate, as there is a risk that the effects will be distorted. On the other hand, if a convincing model with specific character restrictions is successfully implemented, the estimates can be more accurate, and the interpretation can be more causal. Therefore, further research is needed, especially as there are several ways to identify restrictions using macroeconomic theories.

$$Y_t = [\, I - A_1 L - A_2 L^2 - \ldots - A_p L^p]^{-1} G \varepsilon_t, \tag{5}$$

where Y_t is the vector for the history of structural shocks, shown in Equation 5 (Kungliga vetenskapsakademien, 2011). The intercept I represent the long-term trend, and L^p is a lag operator[26] that shows how a shock in the period t-p affects Y_t. A represents impulse-response values that show the recovery process from a shock for a specific variable that varies with p, and the value of A also depends on the lag number given by p. Finally, $G\varepsilon_t$ stands for the implementation of the G-matrix in the model, which provides the interpretation for the

[25] Orthogonalized IRFs allow for independent shocks, where earlier variables in the model do not affect later variables.

[26] The lag operator, denoted by L^p, is a statistical tool that describes a variable Y_t fixed in p periods backward ($L^pY_t \equiv Y_{t-p}$).

structural shock in the error term. In other words, the G-matrix allows for modeling the impact of structural shocks on the variables of interest.

4 Results

This section begins with an overview of descriptive statistics for the countries included in the study. Then, my analysis aims to estimate correlations between China's fiscal and monetary policy variables and economic growth indicators on specific countries' response variables and the total OECD. To achieve this, I employ Granger Causality Test p-values and Orthogonalized Impulse Response functions. My main goal is to compare the results of the two time periods under consideration, and I present all my findings with this in mind. Additionally, I perform robustness tests by adjusting the number of lags for previous measurements and discussing the results. Finally, I conclude the section with a discussion of my findings. Moreover, I also critically review the causality of the results and discuss causality in macroeconomic studies.

4.1 Descriptive data

Table 2: *Descriptive data (China, specific response countries, and total OECD).*

Country	Year	GDP (Million USD)	GDP per capita (USD)	Population (Million)	Young population (%)	Eldery population (%)	Working age population (%)	Labour force participation rate	Price level index (OECD=100)	Imports, % of GDP	Exports, % of GDP
Austrailia	2001	569 498	29 546	19.275	20.55	12.550	66.90	74.06	77.0	20.73	20.7
	2019	1 337 586	52 732	25.366	18.70	15.928	65.38	78.49	121.0	20.23	24.0
Japan	2001	3 552 841	27 946	127.291	14.36	17.964	67.67	72.59	138.0	9.48	10.1
	2019	5 352 170	42 421	126.167	12.06	28.442	59.50	79.55	113.0	17.75	17.5
South Korea	2001	934 349	19 724	47.370	20.80	7.538	71.66	64.91	66.0	30.44	31.8
	2019	2 247 126	43 410	51.765	12.46	14.854	72.69	69.48	87.0	36.48	39.3
Germany	2001	2 336 514	28 663	82.350	15.42	16.855	67.73	71.47	94.0	30.22	31.8
	2019	4 769 306	57 397	83.093	13.65	21.647	64.70	79.24	96.0	41.02	46.7
Russia	2001	1 152 998	7 899	145.976	17.34	12.521	70.14	69.52	32.0	22.29	34.2
	2019	4 398 115	29 967	146.765	17.67	14.042	68.68	74.23	45.0	20.91	28.5
United states	2001	10 581 929	37 100	284.969	21.21	12.384	66.40	76.81	112.0	13.26	9.7
	2019	21 380 976	64 690	328.330	18.46	16.458	65.08	74.11	118.0	14.58	11.9
Brazil	2001	1 640 062	9 307	176.209	29.60	5.935	64.47	71.10	38.0	14.56	12.4
	2019	3 241 317	15 424	210.147	21.10	9.519	69.38	71.75	68.0	14.77	14.1
South Africa	2001	359 676	8 025	47.230	34.24	4.190	61.57	59.07	38.0	25.43	29.4
	2019	757 984	13 219	58.533	28.68	5.983	65.34	59.55	55.0	29.35	29.9
China	2001	4 080 386	3 197	1 272.740	23.78	7.121	69.10	-	37.0	18.21	20.3
	2019	23 441 904	16 625	1 421.864	18.26	12.022	69.72	-	72.0	17.34	18.5
Total OECD	2001	30 792 033	25 444	1 210.754	20.76	12.956	66.28	69.84	100.0	22.91	22.3
	2019	63 581 567	46 663	1 363.577	17.87	17.135	64.99	72.79	100.0	29.54	29.9

Data source: OECD (n.d.). OECD stat. Note: Data for 2001 and 2019.

The table above provides descriptive information on all countries included in the study. Its purpose is to highlight any changes between 2001 and 2019, which could explain any observed differences between the two periods. By examining these variables, we can better understand how economic and demographic changes have influenced the results and provide a more nuanced interpretation of the study's estimates later in this chapter. For instance, Table 2 shows that every country's GDP per capita and population has increased. However, regarding population, the working-age population has decreased in Australia, Japan, Germany, Russia, the United States, and the entire OECD region. The table also reveals that prices have increased

in every country except Japan. A crucial finding is that every country and the total OECD have experienced an increase in their import and export shares of GDP between 2001 and 2019, except for Russia and China. However, China's decrease in the trade shares of GDP does not necessarily mean that its imports and exports have decreased. This could be explained by China's rapid increase in GDP in the 21st century.

4.2 Estimates

This section presents the central estimates of the study, focusing on the results of Granger causality estimates. The estimates are divided into two categories: the effects of China's monetary policy on the country's GDP and CPI and the effects of China's fiscal policy on the countries' GDP and CPI. Additionally, the impact of China's economic growth indicators on the response variables is presented in the appendix. All tables in this section display p-values obtained from the Granger causality test. The methodology used for the estimates is explained in detail in the Methodology chapter.

4.2.1 Granger causality estimates

Table 3: *Link between China's monetary policy variables and response countries' GDPs (p-values).*

Country	Response variable (time period)	L	Short-Term Interest Rate	L	Discount Rate	L	M2	L	Domestic Credit	L	House Prices	L	Market Capitalization	L	National Currency per USD	L	Total Imports
Austrailia	GDP (2001-2010)	4	0.430	4	0.197	4	0.781	5	0.011**	5	0.092*	3	0.157	4	0.343	4	0.807
	GDP (2011-2019)	3	0.394	3	0.262	3	0.403	4	0.031**	4	0.013**	3	0.010**	3	0.042**	3	0.079*
Japan	GDP (2001-2010)	4	0.000***	4	0.000***	3	0.201	5	0.565	5	0.089*	3	0.226	4	0.293	3	0.396
	GDP (2011-2019)	4	0.843	4	0.409	3	0.048**	5	0.002***	4	0.068*	4	0.005***	3	0.091*	3	0.090*
South Korea	GDP (2001-2010)	4	0.879	3	0.388	5	0.000***	3	0.015**	4	0.006***	4	0.110	3	0.304	4	0.133
	GDP (2011-2019)	2	0.276	2	0.031**	5	0.000***	3	0.016**	4	0.031**	4	0.000***	3	0.599	2	0.025**
Germany	GDP (2001-2010)	4	0.000***	2	0.035**	4	0.000***	5	0.199	5	0.000***	4	0.006***	3	0.185	3	0.014 **
	GDP (2011-2019)	4	0.012**	3	0.166	5	0.049**	5	0.008***	5	0.005***	4	0.000***	3	0.229	3	0.002***
Russia	GDP (2001-2010)	4	0.290	4	0.240	3	0.090*	4	0.007***	4	0.653	3	0.000***	4	0.288	3	0.383
	GDP (2011-2019)	4	0.049**	4	0.170	3	0.000***	4	0.000***	4	0.374	3	0.011**	4	0.013**	4	0.045**
United states	GDP (2001-2010)	3	0.000***	3	0.000***	3	0.291	4	0.711	4	0.185	3	0.460	3	0.165	3	0.647
	GDP (2011-2019)	4	0.148	4	0.585	4	0.001***	5	0.001***	5	0.000***	3	0.299	4	0.190	4	0.010**
Brazil	GDP (2001-2010)	3	0.441	3	0.001***	3	0.065*	3	0.668	4	0.029**	3	0.007***	2	0.006***	3	0.659
	GDP (2011-2019)	5	0.019**	3	0.249	4	0.000***	4	0.000***	4	0.489	4	0.000***	3	0.116	3	0.046**
South Africa	GDP (2001-2010)	5	0.033**	6	0.000***	4	0.315	3	0.413	4	0.848	3	0.956	4	0.894	3	0.655
	GDP (2011-2019)	6	0.662	5	0.406	5	0.023**	4	0.019**	5	0.581	5	0.902	4	0.043**	4	0.000***
Total OECD	GDP (2001-2010)	2	0.001***	3	0.002***	2	0.226	3	0.227	3	0.183	3	0.000***	3	0.103	2	0.384
	GDP (2011-2019)	2	0.041**	2	0.256	2	0.031**	2	0.047**	2	0.113	2	0.002***	2	0.000***	2	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 3 presents the estimated findings on the correlation between the variables considered during the two periods. The results reveal that interest rates had a stronger correlation with the response countries' GDP in the earlier period compared to the later period. In contrast, the

opposite trend was observed for other variables. Notably, China's M2, domestic credits, market capitalization, and total imports showed a stronger correlation with the response countries' GDPs in the later period compared to the earlier period. This observation is consistent with the trend observed in the GDP of the total OECD.

Table 4: *Link between China's fiscal policy variables and response countries' GDPs (p-values).*

Country	Response variable (time period)	L	Direct Investment Abroad	L	Fixed Assets Investment	L	Govt Revenue: Tax	L	Govt Revenue: Tax: Enterprises Income
Austrailia	GDP (2001-2010)	2	0.035**	2	0.978	2	0.154	4	0.849
	GDP (2011-2019)	2	0.087*	2	0.938	3	0.011**	4	0.001***
Japan	GDP (2001-2010)	2	0.838	3	0.960	2	0.326	4	0.231
	GDP (2011-2019)	3	0.022**	3	0.058*	3	0.000***	4	0.000***
South Korea	GDP (2001-2010)	5	0.001***	2	0.539	2	0.279	4	0.054*
	GDP (2011-2019)	4	0.649	2	0.402	2	0.007***	4	0.075*
Germany	GDP (2001-2010)	6	0.000***	4	0.905	3	0.101	4	0.000***
	GDP (2011-2019)	5	0.007***	4	0.067*	4	0.000***	4	0.000***
Russia	GDP (2001-2010)	6	0.000***	3	0.370	4	0.969	4	0.864
	GDP (2011-2019)	5	0.013**	4	0.000***	4	0.000***	4	0.033**
United states	GDP (2001-2010)	3	0.295	3	0.526	2	0.301	4	0.258
	GDP (2011-2019)	3	0.910	3	0.174	3	0.550	4	0.599
Brazil	GDP (2001-2010)	3	0.015**	4	0.988	3	0.335	4	0.014**
	GDP (2011-2019)	4	0.003***	2	0.098*	3	0.567	4	0.662
South Africa	GDP (2001-2010)	4	0.203	3	0.853	3	0.399	4	0.761
	GDP (2011-2019)	3	0.093*	3	0.090*	4	0.081*	4	0.407
Total OECD	GDP (2001-2010)	3	0.608	3	0.908	3	0.623	4	0.037**
	GDP (2011-2019)	2	0.004***	2	0.007***	3	0.000***	3	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 4 illustrates the effects of China's fiscal variables on response countries' GDP during the two periods under consideration. The results reveal that China's fiscal variables had a more significant impact on response countries' GDP in the later period, particularly fixed assets investment, where there were no significant values in the earlier period. Additionally, tax variables exhibited a stronger correlation in the latter period compared to the earlier period. However, the relationship between China's direct investments abroad and response countries' GDP is more complex, and the significance level varies between the two periods. Noteworthy is also that all estimates in the later period for the total OECD GDP show statistical significance at 1% (p-value under 0.01). In contrast, in the earlier period, only one significant estimate was for the total OECD GDP.

Table 5: *Link between China's monetary policy variables and response countries' CPIs (p-values).*

Country	Response variable (time period)	L	Short-Term Interest Rate	L	Discount Rate	L	M2	L	Domestic Credit	L	House Prices	L	Market Capitalization	L	National Currency per USD	L	Total Imports
Austrailia	CPI (2001-2010)	4	0.203	3	0.208	3	0.865	6	0.413	4	0.544	4	0.077*	3	0.169	3	0.984
	CPI (2011-2019)	6	0.008***	2	0.036**	3	0.015**	3	0.018**	4	0.086*	4	0.034**	3	0.152	4	0.017**
Japan	CPI (2001-2010)	4	0.018**	2	0.240	4	0.217	6	0.513	4	0.485	3	0.061*	2	0.003***	2	0.831
	CPI (2011-2019)	4	0.080*	2	0.582	3	0.014**	3	0.021**	4	0.001***	3	0.676	2	0.810	3	0.030**
South Korea	CPI (2001-2010)	2	0.000***	2	0.016**	3	0.413	3	0.844	3	0.373	2	0.023**	2	0.000***	2	0.004***
	CPI (2011-2019)	4	0.118	4	0.158	3	0.743	3	0.000***	4	0.649	2	0.040**	3	0.492	3	0.000***
Germany	CPI (2001-2010)	3	0.007***	3	0.589	4	0.535	6	0.002***	6	0.367	3	0.156	2	0.016**	3	0.137
	CPI (2011-2019)	3	0.003***	3	0.028 **	3	0.003***	5	0.038**	5	0.886	4	0.069*	3	0.070*	3	0.023**
Russia	CPI (2001-2010)	3	0.471	4	0.920	2	0.000***	4	0.740	4	0.564	2	0.149	2	0.003***	2	0.075*
	CPI (2011-2019)	3	0.258	3	0.457	3	0.091*	4	0.004 ***	4	0.020**	3	0.000***	3	0.029**	3	0.008***
United states	CPI (2001-2010)	4	0.181	3	0.004***	2	0.811	3	0.961	4	0.474	3	0.080*	2	0.000***	3	0.618
	CPI (2011-2019)	4	0.001***	3	0.094*	3	0.845	3	0.513	5	0.099*	3	0.000***	2	0.021**	3	0.003***
Brazil	CPI (2001-2010)	5	0.673	4	0.128	4	0.190	3	0.030**	3	0.078*	3	0.721	3	0.012**	3	0.007***
	CPI (2011-2019)	4	0.000***	4	0.009***	5	0.084*	3	0.003***	4	0.003***	3	0.027**	2	0.021**	3	0.003***
South Africa	CPI (2001-2010)	3	0.325	3	0.909	4	0.439	3	0.025**	3	0.275	3	0.161	4	0.134	3	0.193
	CPI (2011-2019)	4	0.647	3	0.058*	4	0.079*	4	0.038**	3	0.072*	2	0.014**	4	0.929	3	0.001***
Total OECD	CPI (2001-2010)	2	0.025**	2	0.217	4	0.250	4	0.504	3	0.331	2	0.584	3	0.000***	2	0.092*
	CPI (2011-2019)	2	0.009***	2	0.003***	4	0.079*	3	0.020**	3	0.080*	3	0.005***	2	0.062*	2	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 5 delivers results on the correlation between China's monetary variables and response countries' CPI, including total OECD CPI, during the two periods. Again, the results reveal that the later period showed a more statistical significance in the estimates than the earlier period in almost every measurement, except for China's national currency per USD, where the earlier period is generally more statistically significant for most countries.

Table 6: *Link between China's fiscal policy variables and response countries' CPIs (p-values).*

Country	Response variable (time period)	L	Direct Investment Abroad	L	Fixed Assets Investment	L	Govt Revenue: Tax	L	Govt Revenue: Tax: Enterprises Income
Austrailia	CPI (2001-2010)	3	0.665	4	0.307	4	0.052*	3	0.000***
	CPI (2011-2019)	3	0.004***	3	0.002***	4	0.005***	4	0.004***
Japan	CPI (2001-2010)	2	0.274	4	0.428	3	0.474	4	0.180
	CPI (2011-2019)	2	0.511	3	0.065*	3	0.010**	4	0.665
South Korea	CPI (2001-2010)	2	0.904	2	0.579	3	0.042*	3	0.040*
	CPI (2011-2019)	3	0.030**	3	0.958	3	0.007***	3	0.087*
Germany	CPI (2001-2010)	3	0.218	2	0.922	3	0.002***	2	0.008***
	CPI (2011-2019)	2	0.000***	2	0.007***	3	0.009***	2	0.000***
Russia	CPI (2001-2010)	2	0.000***	2	0.499	2	0.003 ***	2	0.003***
	CPI (2011-2019)	2	0.000***	3	0.688	2	0.704	3	0.000***
United states	CPI (2001-2010)	2	0.957	3	0.819	3	0.270	3	0.633
	CPI (2011-2019)	3	0.092*	3	0.547	3	0.604	3	0.032**
Brazil	CPI (2001-2010)	4	0.000 ***	4	0.194	3	0.032**	4	0.000***
	CPI (2011-2019)	3	0.051*	3	0.033**	3	0.085*	3	0.069*
South Africa	CPI (2001-2010)	3	0.049**	3	0.661	3	0.370	5	0.132
	CPI (2011-2019)	4	0.000***	3	0.085*	3	0.840	5	0.048**
Total OECD	CPI (2001-2010)	4	0.170	3	0.580	2	0.008***	3	0.486
	GPI (2011-2019)	3	0.000***	3	0.000***	3	0.046**	2	0.002***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 6 presents findings on the statistical significance of China's fiscal variables and their correlation with response countries' CPI and total OECD CPI during the two periods. The estimates show that the later period generally exhibits a higher statistical significance and a higher number of significant values than the earlier period. Notably, the most considerable differences were observed for China's direct investments abroad and fixed assets investment when the response variable is CPI. On the other hand, significant p-values between China's tax variables and the response variables can be found relatively equally in both periods.

The p-values for China's economic growth indicators and response variables are in the appendix. The estimates in Tables A1 and A2 (in appendix) suggest that China's real GDP and production index have a statistically more significant impact on response countries' GDP and CPI in the later period compared to the earlier period. Additionally, China's PPI exhibits more significant estimates for almost all response countries and total OECD variables in both periods than China's CPI, particularly when considering its correlation with response countries' CPI.

4.2.2 Impulse and response estimates

This section presents the study's results in graphical form using orthogonalized impulse response functions. This section provides a different way of estimating the values of the variables in the study. The immediate purpose of this section is to demonstrate how response variables react to impulses in China's variables, specifically, how response variables respond when an impulse (one standard deviation) is introduced into China's fiscal and monetary variables' error term in the specific VAR function. The graphs presented enable us to observe differences in fluctuations between the two periods, whether the effect is decreasing or increasing after the shock, and how the recovery process looks like eight quarters after the shock. However, the study explicitly compares the differences between the two periods.

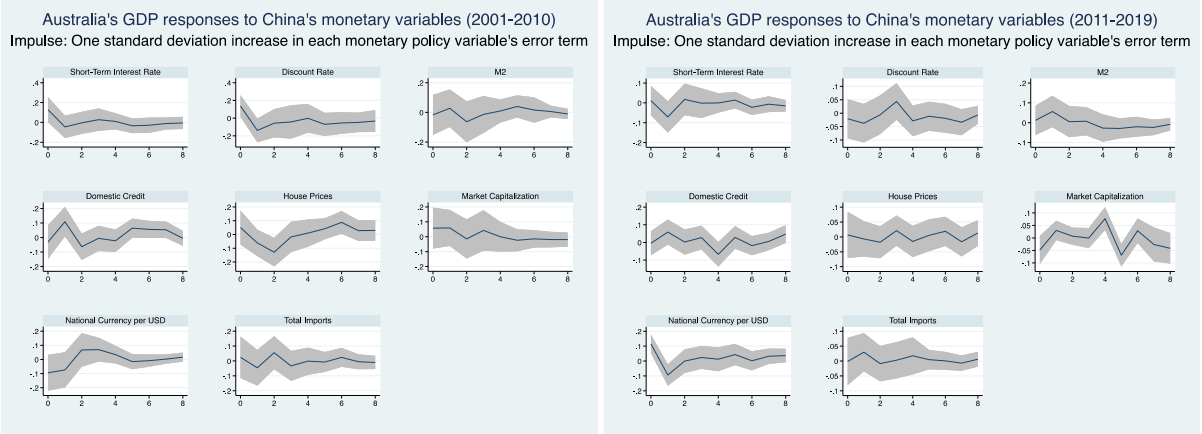
The previous Granger p-values showed us the strength of the correlation between the variables but did not provide any additional information. This section complements that information by analyzing how China's variables affect the response variables. The Granger p-values indicated that, generally, the period from 2011 to 2019 had a stronger correlation with China's variables than from 2001 to 2010.

The focus of this section is to analyze the responses of countries' GDP to China's fiscal and monetary policy shocks. Therefore, it will examine the countries' GDP responses in detail.

However, the reactions of countries' CPI to shocks in China's variables can be found in the appendix.

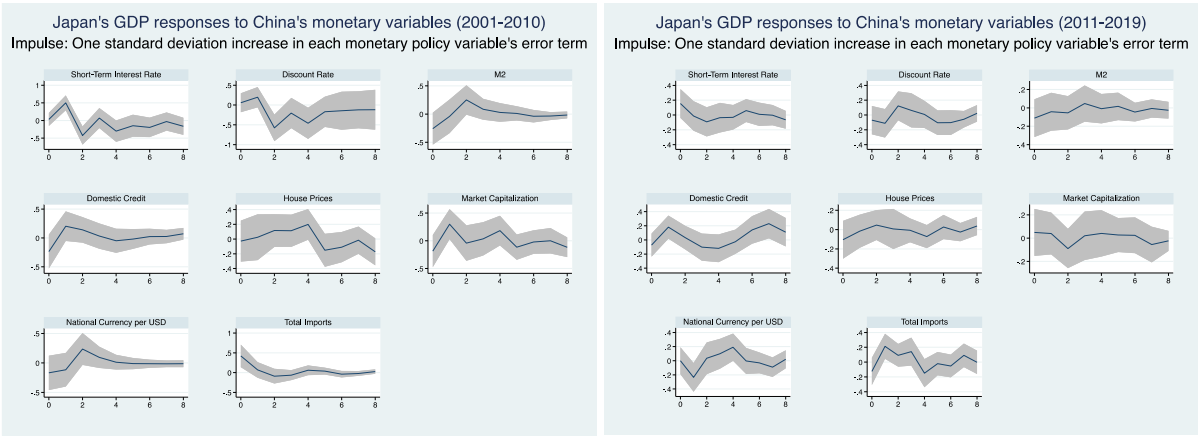
4.2.3 Shocks in China's monetary policy variables

Firstly, I will analyze how a shock in China's monetary policy variables affects the GDP of specific countries during the two time periods. It is interesting to observe how the GDP of a particular country responds to shocks and how this response has changed between the different periods. Additionally, it is noteworthy to identify which variables have the strongest effects on GDPs and which variables have undergone significant changes. The selection of the monetary policy variables and the model is discussed in detail in the Methodology chapter.



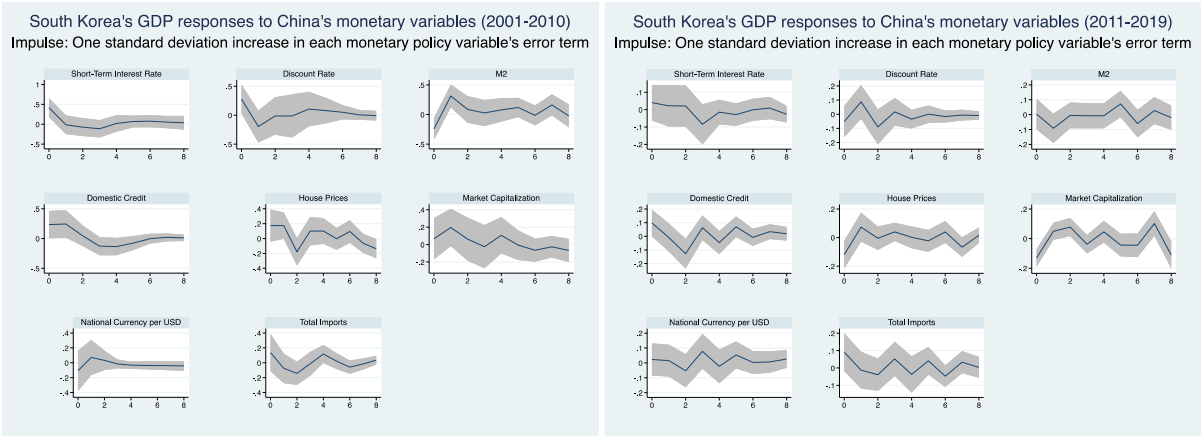
Figures 3 and 4: *Orthogonalized impulse response functions of Australia's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

Figures 3 and 4 show that Australia's GDP responds differently to shocks in China's interest rates in the two periods. The GDP response to M2 and domestic credit follows a similar pattern in the first two-quarters of both periods, but then there are differences in the shock recovery. The house prices affect both periods similarly, while market capitalization has a more substantial effect on Australia's GDP in the later period, especially in the first four quarters. Lastly, a shock in China's national currency affects Australia's GDP in the opposite direction in the first two quarters, but the recovery process is similar. However, the GDP response to China's total imports is identical between the two periods.



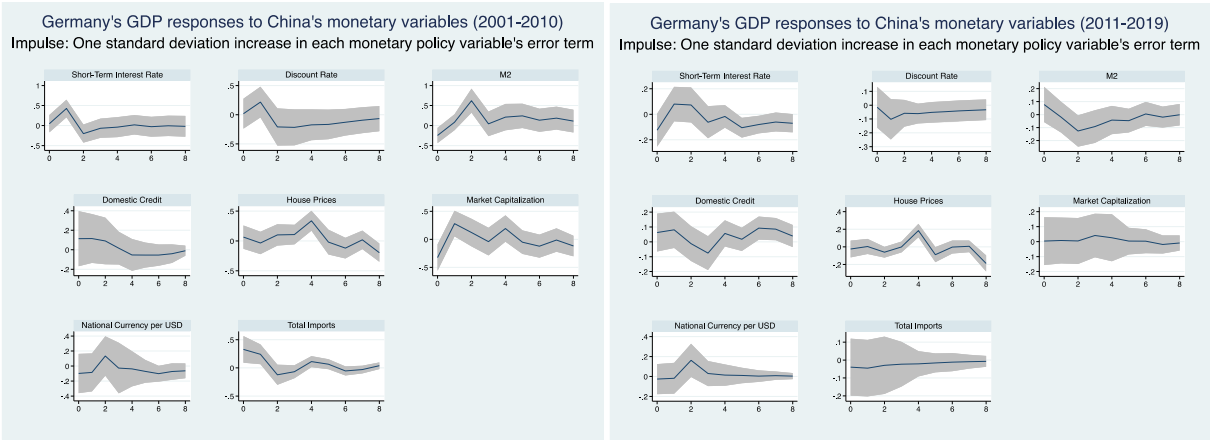
Figures 5 and 6: *Orthogonalized impulse response functions of Japan's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

Figures 5 and 6 provide insights into the impact of various shocks from China on Japan's GDP. The analysis reveals that in the later period, a shock in China's imports had a more substantial effect on Japan's GDP compared to the earlier period. Similarly, the shock in China's house prices had a more prolonged and increasing impact on Japan's GDP in the later period. However, the effects of China's M2, domestic credit, and market capitalization on Japan's GDP mainly increased in both periods. Additionally, Japan's GDP dropped more heavily after a shock in China's interest rate variables in the earlier period. Moreover, the recovery process from a shock in China's national currency per USD is more potent in the later period.



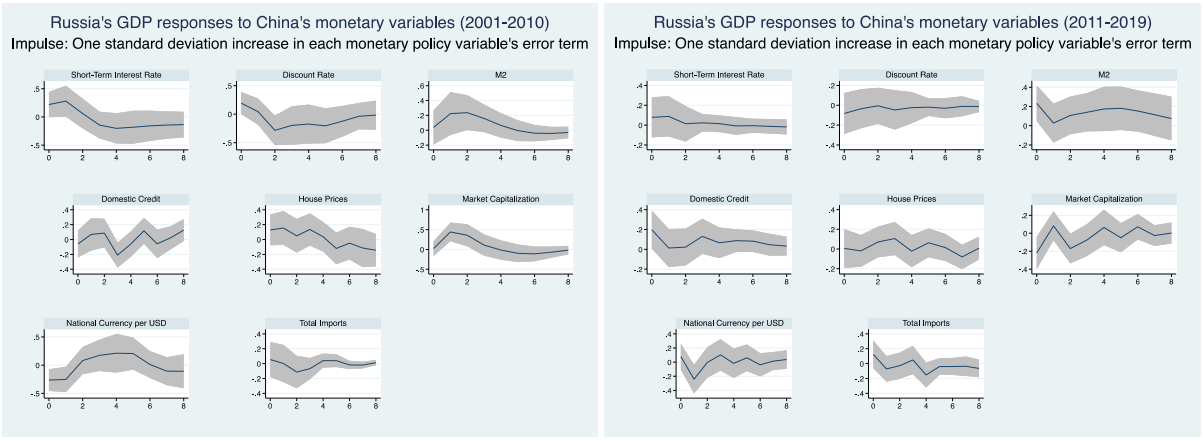
Figures 7 and 8: *Orthogonalized impulse response functions of South Korea's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

Figures 7 and 8 demonstrate that a shock in China's domestic credit, house prices, and market capitalization has a notably more substantial effect on South Korea's GDP in the later period, particularly in the first two quarters. Conversely, a shock in China's M2 immediately impacts South Korea's GDP, but this is not the case in the later period. Moreover, shocks in China's interest rates show a relatively stable recovery process in South Korea's GDP after the first two quarters. Shocks in the other variables show more fluctuation in the later period concerning South Korea's GDP.



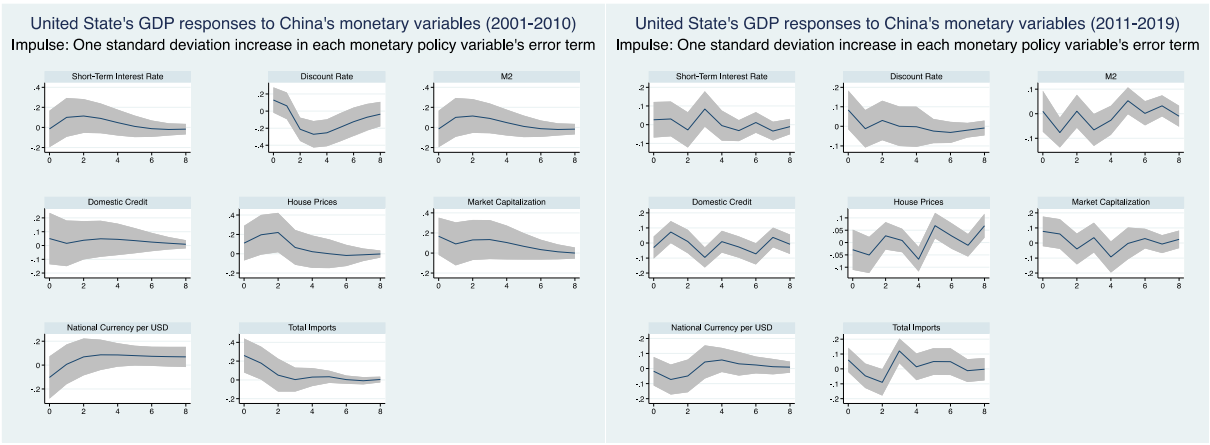
Figures 9 and 10: *Orthogonalized impulse response functions of Germany's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

Germany's GDP response to shocks in China's monetary policy variables is relatively consistent across the discount rate, house prices, and national currency per USD between the two periods. Interestingly, a shock in China's M2 substantially affected Germany's GDP in the earlier period, while the opposite is true for domestic credit. Furthermore, shocks in China's market capitalization and total imports had a more fluctuating effect on Germany's GDP in the earlier period. Regarding total imports, the impact in the earlier period is decreasing, while the effect in the later period is increasing.



Figures 11 and 12: *Orthogonalized impulse response functions of Russia's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

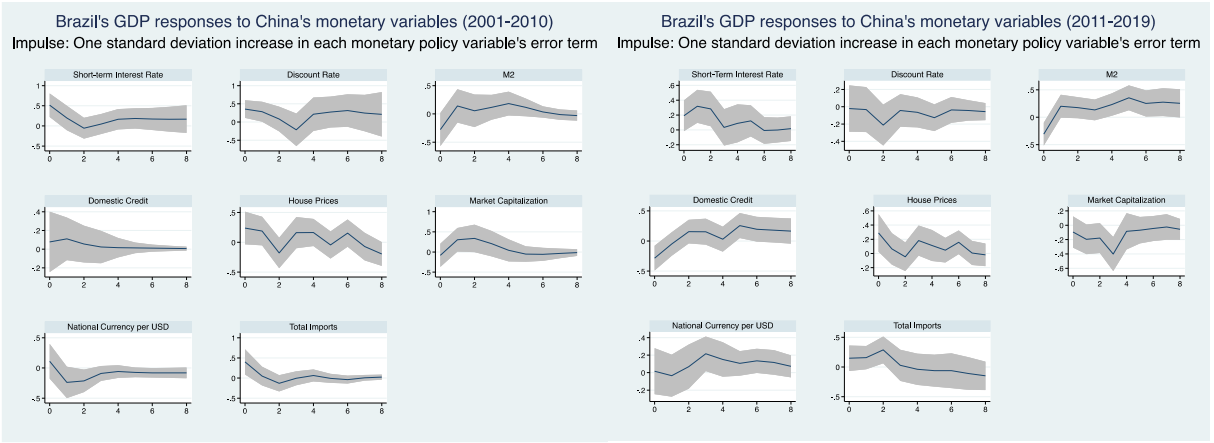
Russia's GDP responds differently to shocks in China's monetary policy variables in different periods. The most significant variations can be observed in the effects of China's domestic credit, market capitalization, and currency, with domestic credit showing more fluctuations in the earlier period. In contrast, market capitalization and national currency have a more substantial impact in the later period. Additionally, shocks in China's short-term interest rate and house prices lead to a decreasing recovery process for Russia's GDP in the earlier period. In contrast, the recovery process is more stable in the later period.



Figures 13 and 14: *Orthogonalized impulse response functions of the United States' GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

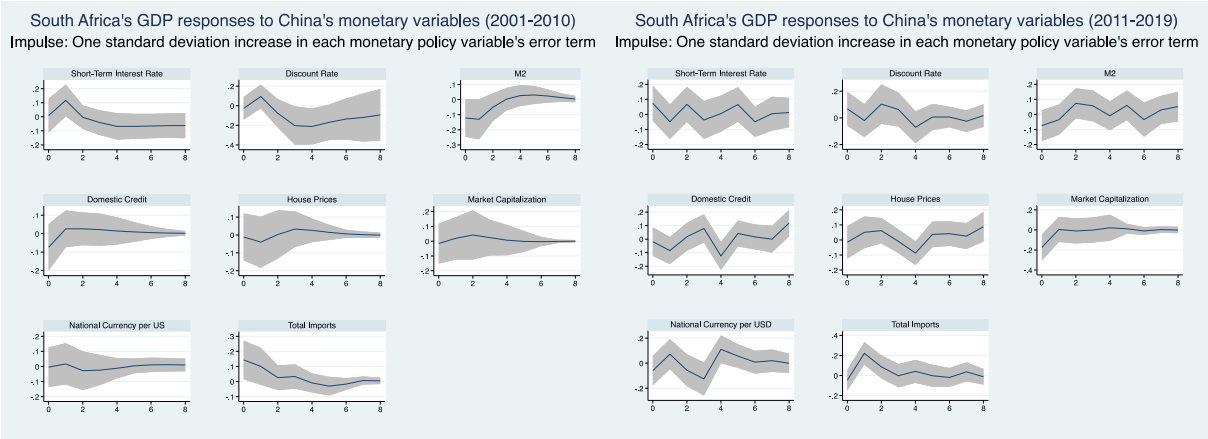
The figures above demonstrate how the United States GDP responds to shocks in China's monetary variables. We can observe that the effects of a shock in China's variables are more

potent in the later period, except for the discount rate and national currency. On the other hand, M2, house prices, and total imports have a more positive effect on the US GDP in the later period, particularly during the first six quarters. Furthermore, it is observed that shocks in China's short-term interest rate and domestic credit cause more fluctuations in the US GDP in the later period.



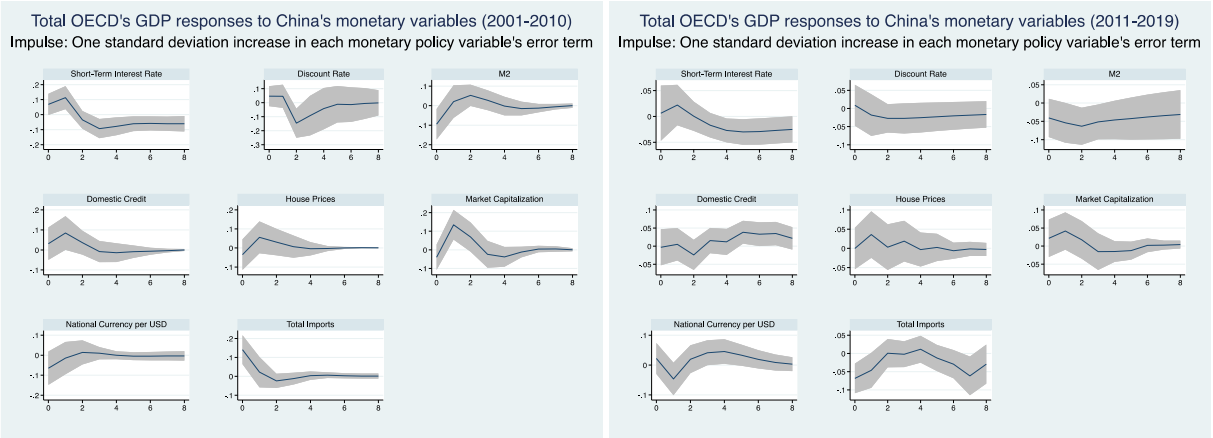
Figures 15 and 16: *Orthogonalized impulse response functions of Brazil's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above illustrate Brazil's GDP response to shocks in China's monetary variables, revealing significant differences between the two periods. In general, the later period shows a more positive impact on Brazil's GDP than the earlier one. For instance, while a standard deviation shock in China's M2 significantly affects Brazil's GDP in both periods, the impact is more substantial in the latter. Similarly, a shock in domestic credit has a stronger effect in the later period than in the first one, which remains relatively flat. However, a shock in China's national currency per USD and total imports had the opposite effect in the early quarters between the periods. The effect decreases in the former and slightly increases in the latter.



Figures 17 and 18: *Orthogonalized impulse response functions of South Africa's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above demonstrate that South Africa's GDP is substantially and increasingly impacted by shocks in both periods in China's M2 and domestic credit. Additionally, the later period shows more significant fluctuations than the earlier one. For instance, after a shock, market capitalization, and total imports have a more positive effect on South Africa's GDP in the early quarters of the later period. Furthermore, it is observed that shocks in China's interest rates, house prices, and national currency per USD have a more pronounced impact on South Africa's GDP during the later period.



Figures 19 and 20: *Orthogonalized impulse response functions of total OECD's GDP responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The overall response of Total OECD GDP to China's monetary shocks indicates that M2 has a stronger effect in the earlier period, particularly in the first quarter. However, the effect is

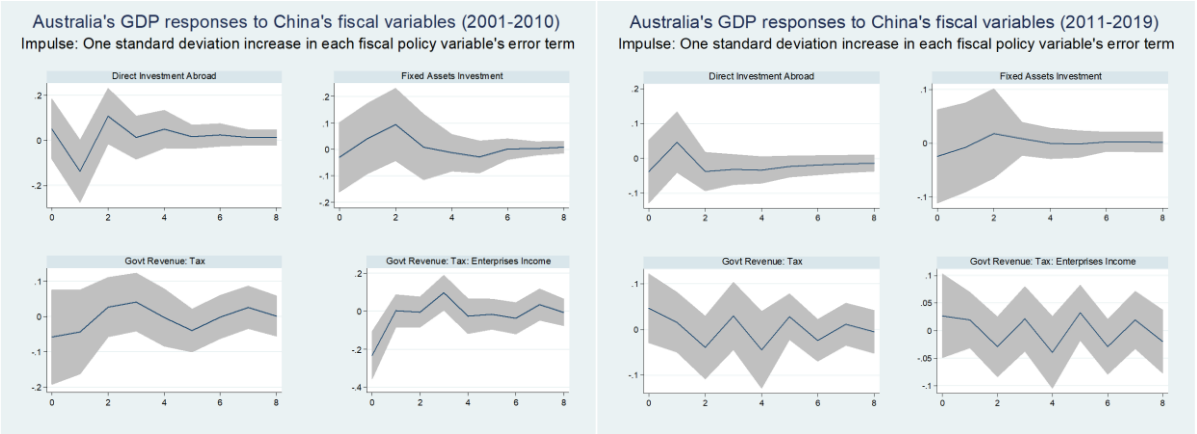
positive in both periods. Furthermore, shocks to China's domestic credit have a more prolonged and significant impact in the later period, observed over eight quarters. The essential difference lies in the effects of shocks on China's total imports, with the latter period showing an apparent positive effect. In contrast, the earlier period shows a negative impact one year after the shock. Additionally, shocks to China's interest rates negatively impacted the Total OECD GDP in the earlier period.

To summarize, there is generally more fluctuation in the later period, and shocks in China's domestic credit and total imports have a stronger and more positive effect on response countries and total OECD GDP in the later period. Interest rates do not show significant differences between the periods but have slightly more negative effects on countries, as well as total OECD GDP in the earlier period. Germany, the United States, Brazil, and South Africa are among the countries where the effects have been more significant in the later period. The total OECD provides a good overview of the scenario, showing a more positive effect in the later period for domestic credit, national currency per USD, and total imports, as well as slightly more fluctuations in house prices after the shock.

The appendix explains how shocks in China's monetary variables affect countries and the total OECD's Consumer Price Index (CPI). In summary, it is found that interest rate shocks generally have a more decreasing effect on countries' CPI in the later period compared to the earlier period, which is the opposite of when GDP is used as the response variable for the countries. Additionally, the results align with the GDP findings, as shocks in China's domestic credit and total imports have a more increasing effect on countries' CPI in the later period compared to the earlier. Furthermore, there is no significant difference in fluctuation between the two periods. Notably, Germany and Brazil exhibit the most significant difference between the periods, with more potent effects observed in the later period.

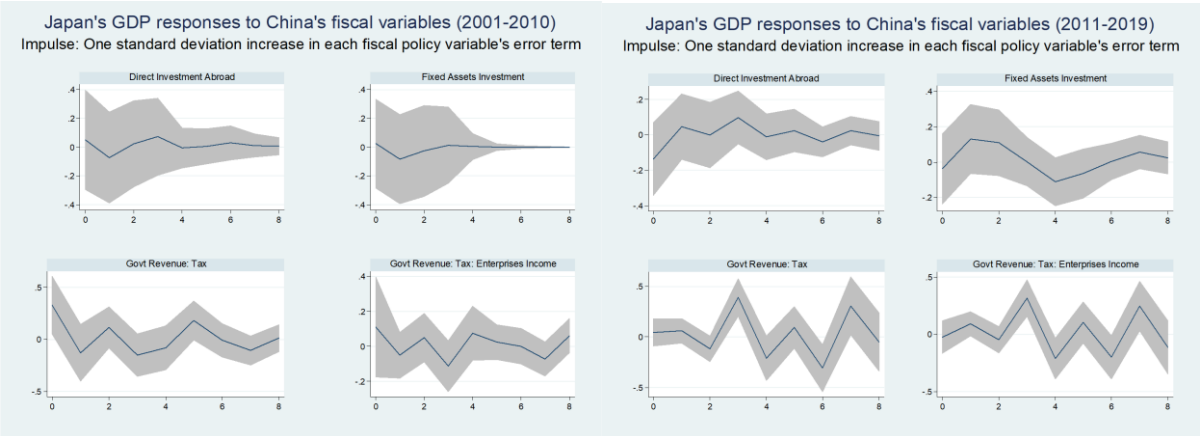
4.2.4 Shocks in China’s fiscal policy variables

The figures presented below are similar to those above. However, the impulse variables, in this case, are China's fiscal policy variables. These graphs demonstrate how the GDPs of specific countries (and CPI, as described in the appendix) respond when the error terms of China's fiscal variables are subjected to a one-standard-deviation shock. The selection of the fiscal policy variables is discussed in detail in the Methodology chapter.



Figures 21 and 22: *Orthogonalized impulse response functions of Australia's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

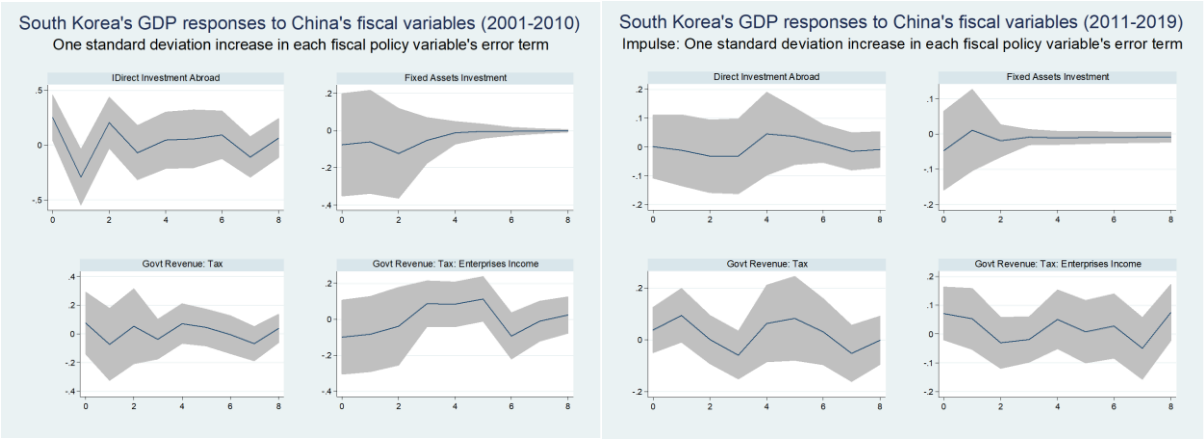
The figures above demonstrate that a shock in China's investment variables diminishes Australia's GDP in both periods after approximately two quarters. Furthermore, a shock in China's government tax revenue has a slightly increasing effect on Australia's GDP in the first period, followed by a slightly decreasing effect and greater fluctuations in the later period. The most significant differences between the periods can be observed in China's enterprise income tax revenue. As a result, Australia's GDP increases considerably in the earlier period and exhibits slight negativity in the later period with significant fluctuations.



Figures 23 and 24: *Orthogonalized impulse response functions of Japan's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

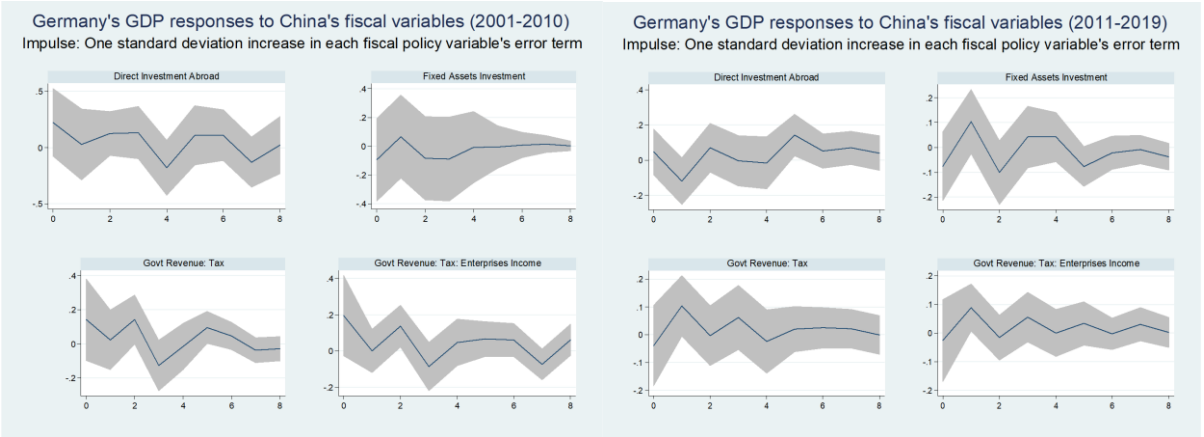
The figures above demonstrate that a shock to China's investment variables has an increasing effect on Japan's GDP in the later period of the first two quarters. However, the opposite is true

in the earlier period, and the effect diminishes in the later quarters. The tax variables in both periods are challenging to interpret after a shock due to the fluctuations in GDP. However, in the first quarter, the effect appears negative in the first period and stable in the latter.



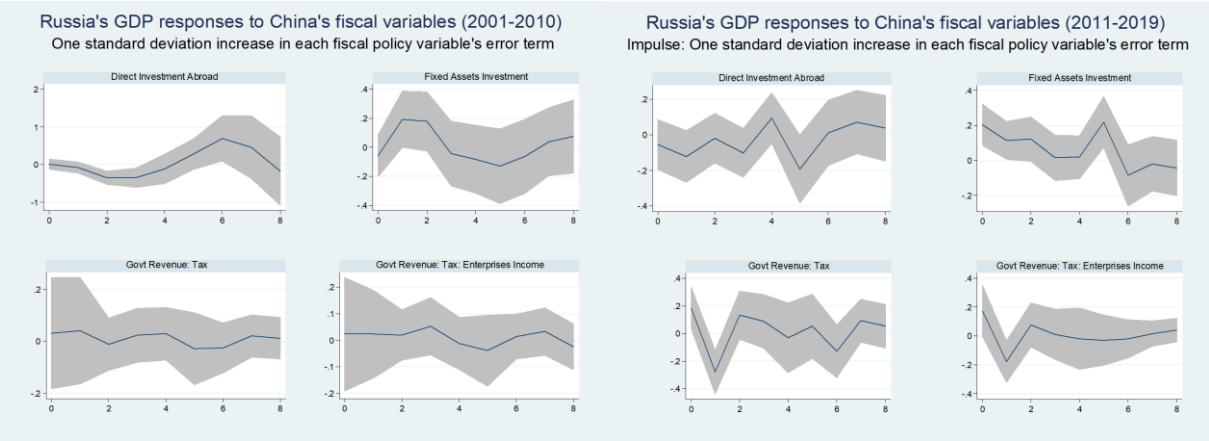
Figures 25 and 26: *Orthogonalized impulse response functions of South Korea's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above illustrate that the two periods exhibit similarities in how different shocks affect South Korea's GDP, except for a shock in direct investments abroad. This shock causes a sharp decrease followed by a steep increase in the first quarter of the first period, after which it stabilizes. However, the GDP remains relatively stable throughout the quarters in the later period.



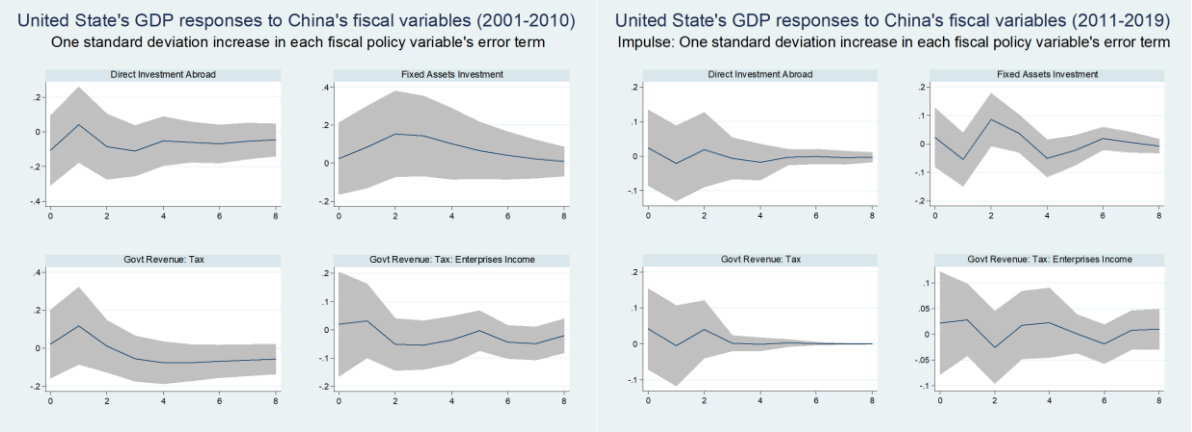
Figures 27 and 28: *Orthogonalized impulse response functions of Germanys's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above illustrate that the responses to the shocks in the first quarter for Germany's GDP were adverse in the earlier period, with the only exception being the shock in fixed assets investment, which is positive. In contrast, it is positive, except for direct investment abroad in the later period. Furthermore, the figures also demonstrate that shocks in tax variables have a slightly positive impact on Germany's GDP after one year. Conversely, in the earlier period, the opposite is true.



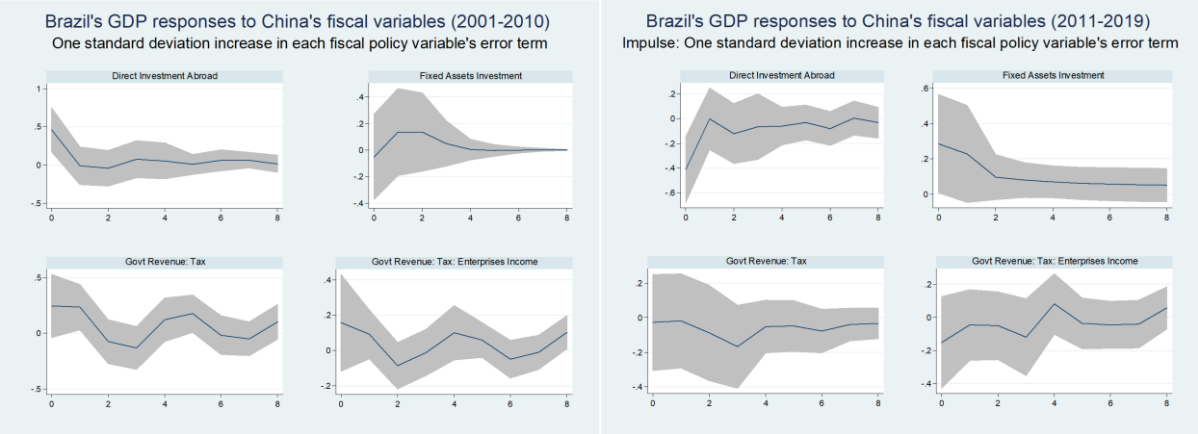
Figures 29 and 30: *Orthogonalized impulse response functions of Russia's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above indicate differences in Russia's responses between the two periods. In the case of a shock in China's direct investment abroad, the impact on Russia's GDP occurs approximately three quarters later, but the reaction varies across the two periods. The response to fixed asset investment begins immediately in the earlier and later periods, with a slight increase after one year in the former and a decrease followed by an increase and a subsequent decrease in the latter. Shocks in tax variables remain stable in the first period, while in the later period, they immediately drop and then increase after one quarter, returning to the initial point and remaining stable thereafter.



Figures 31 and 32: *Orthogonalized impulse response functions of the United States' GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

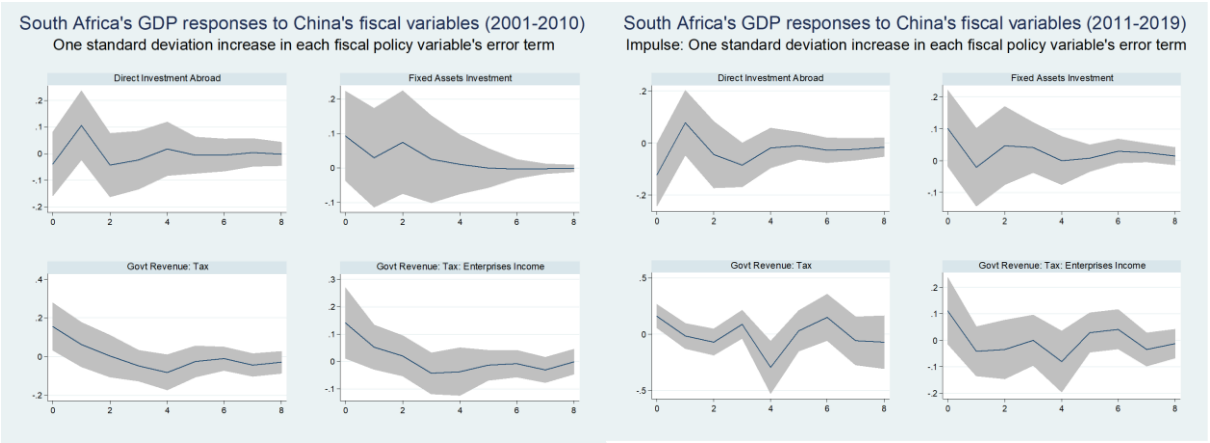
The main findings from Figures 31 and 32 are that a shock in China's fixed assets investment increases the US GDP aggressively after the first quarter in the later period. The scenario is different in the earlier period. The other responses from shocks in China's variables are stable after the first quarter.



Figures 33 and 34: *Orthogonalized impulse response functions of Brazil's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

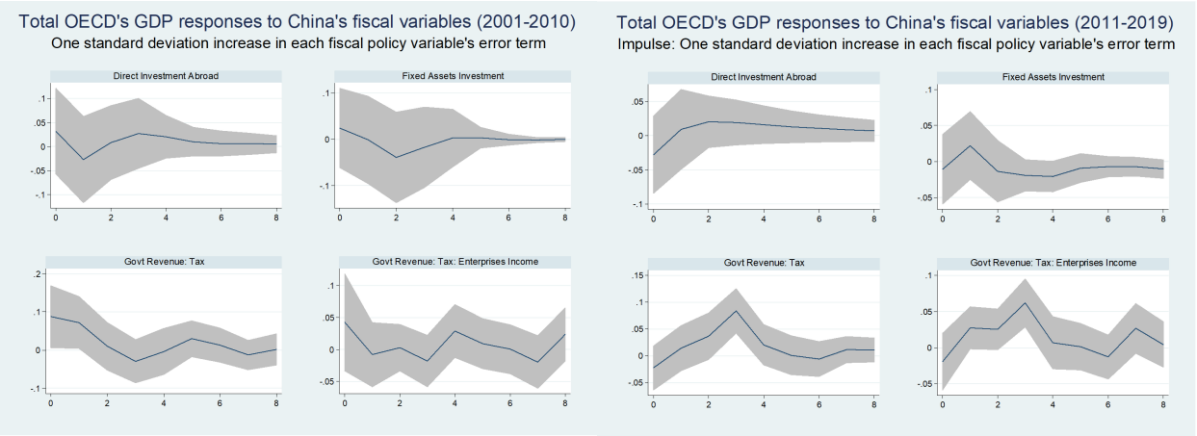
The main findings of the analysis on the impact of China's fiscal variable shocks on Brazil's GDP indicate that direct investment abroad has a significant and long-lasting positive effect for at least two years. However, the effect is almost the opposite in the earlier period. Shocks in fixed assets investment exhibit a slightly increased effect in the earlier period, followed by a slightly decreasing effect in the later period, but remain stable after the first two quarters in both

periods. Tax variables, on the other hand, show some fluctuations in both periods. However, GDP recovers to the same level after two years, with a minor exception of the shock in China's enterprise income tax in the later period, where the effect is slightly positive after two years when considering Brazil's GDP.



Figures 35 and 36: *Orthogonalized impulse response functions of total South Africa's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above indicate that shocks in China's direct investment abroad have an immediate positive effect on South Africa's GDP, followed by a decrease after the first quarter and then remaining stable. Shocks in China's fixed assets investment have a similar effect in both periods. On the other hand, shocks in the tax variables exhibit more fluctuations in South Africa's GDP in the later period compared to the earlier period, where the GDP steadily decreases for one year after the shock.



Figures 37 and 38: *Orthogonalized impulse response functions of total OECD's GDP responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the GDP response. Confidence intervals = 95%.*

The figures above display the responses of total OECD GDP to shocks in China's fiscal policy variables, highlighting the impact of China and the specific variables. The findings indicate that direct investment abroad has a more significant effect in the later period. In contrast, a shock in fixed assets investment increases the GDP in the first quarter of the later period while it decreases in the earlier period. A standard deviation shock in China's government tax revenue affects the total OECD GDP increasingly until the third quarter when it diminishes in the later periods. In the earlier period, the effects from the shock are constantly diminishing in the first three quarters. A shock in China's enterprise income tax also positively affects the total OECD GDP in the first three quarters, while it decreases in the earlier period.

To summarize, the impact of shocks to China's fiscal variables on the GDP of specific countries follows the same pattern as that of monetary variables, with a slightly stronger effect seen in the later period. Notably, Germany, Brazil, and the total OECD exhibit more significant changes between the two periods, with the later period showing more substantial and increasing effects, particularly in response to shocks in China's direct investment abroad and enterprise income tax variables.

Figures that include CPI as response variables are available in the appendix. In summary, the results indicate that shocks to China's direct investment abroad have a significant effect, with a more pronounced response observed in the later period for most countries and the total OECD GDP, though some exceptions exist.

4.3 Robustness check

This section discusses the concept of a robustness check, which evaluates the sensitivity of the study's results. The primary purpose of a robustness check is to ensure that minor changes in the measurements do not significantly affect the results, which could lead to systematic measurement errors. The study will perform a robustness check using standardized lags to achieve this. If the p-values of the Granger causality test change significantly when the lag order is altered, it may indicate that the econometric model or the data used is not robust. This lack of robustness can lead to unexpected measurement errors, decreasing the probability of a causal interpretation. Therefore, a robustness check is essential to ensure the accuracy and reliability of the study's findings.

This section presents tables that display earlier tables with a standardized lag order of four lags, representing one year in this study. The robustness check employs four lags because it is logical to assume that China's effects do not appear directly, as it takes time for the economy to spread the effects to the outside world. Therefore, one year is a reasonable time frame for this purpose.

In these tables, a light red color indicates whether a previously statistically significant value has become less or more statistically significant. An orange color indicates whether a value has changed from a non-significant value to a significant value or vice versa. No color change indicates whether the value has changed from a non-significant value to another non-significant value or whether there is no change in the value or the significance level.

Table 7: *Link between China's monetary policy variables and response countries' GDPs (p-values).*

Country	Response variable (time period)	L	Short-Term Interest Rate	L	Discount Rate	L	M2	L	Domestic Credit	L	House Prices	L	Market Capitalization	L	National Currency per USD	L	Total Imports
Austrailia	GDP (2001-2010)	4	0.430	4	0.197	4	0.781	4	0.041**	4	0.069*	4	0.112	4	0.343	4	0.807
	GDP (2011-2019)	4	0.295	4	0.367	4	0.358	4	0.031**	4	0.013**	4	0.009***	4	0.017**	4	0.058*
Japan	GDP (2001-2010)	4	0.000***	4	0.000***	4	0.532	4	0.173	4	0.041**	4	0.217	4	0.293	4	0.343
	GDP (2011-2019)	4	0.843	4	0.409	4	0.032**	4	0.000***	4	0.068*	4	0.005 ***	4	0.099*	4	0.011**
South Korea	GDP (2001-2010)	4	0.879	4	0.285	4	0.006***	4	0.059*	4	0.006***	4	0.110	4	0.454	4	0.133
	GDP (2011-2019)	4	0.184	4	0.056*	4	0.000***	4	0.038**	4	0.031**	4	0.000***	4	0.612	4	0.002***
Germany	GDP (2001-2010)	4	0.000***	4	0.039**	4	0.000***	4	0.288	4	0.000***	4	0.006***	4	0.345	4	0.000***
	GDP (2011-2019)	4	0.012**	4	0.105	4	0.029**	4	0.000***	4	0.009***	4	0.000***	4	0.349	4	0.001***
Russia	GDP (2001-2010)	4	0.290	4	0.240	4	0.077*	4	0.007***	4	0.653	4	0.145	4	0.288	4	0.188
	GDP (2011-2019)	4	0.049**	4	0.170	4	0.000***	4	0.000***	4	0.374	4	0.148	4	0.013**	4	0.045**
United states	GDP (2001-2010)	4	0.017**	4	0.008***	4	0.169	4	0.711	4	0.185	4	0.567	4	0.225	4	0.348
	GDP (2011-2019)	4	0.148	4	0.585	4	0.001***	4	0.006***	4	0.053***	4	0.348	4	0.190	4	0.010**
Brazil	GDP (2001-2010)	4	0.392	4	0.000***	4	0.042**	4	0.563	4	0.029**	4	0.006***	4	0.007***	4	0.235
	GDP (2011-2019)	4	0.055*	4	0.227	4	0.000***	4	0.000***	4	0.489	4	0.000***	4	0.119	4	0.046**
South Africa	GDP (2001-2010)	4	0.082*	4	0.000***	4	0.315	4	0.047**	4	0.848	4	0.921	4	0.894	4	0.142
	GDP (2011-2019)	4	0.789	4	0.085*	4	0.004***	4	0.019**	4	0.302	4	0.877	4	0.043**	4	0.000***
Total OECD	GDP (2001-2010)	4	0.000***	4	0.029**	4	0.498	4	0.202	4	0.157	4	0.025***	4	0.109	4	0.321
	GDP (2011-2019)	4	0.000***	4	0.218	4	0.000***	4	0.011**	4	0.086*	4	0.002***	4	0.055*	4	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 7 presents estimates for the same variables as Table 3 but with a different lag order. Comparing the two tables reveals some minor changes in several measurements. Nonetheless, despite these changes, the results remain statistically significant. In the case of the total OECD, the statistical significance remains the same or even more pronounced. The only exception pertains to the effect of market capitalization on Russia's GDP, where the significance changes from significant to non-significant.

Table 8: *Link between China's fiscal policy variables and response countries' GDPs (p-values).*

Country	Response variable (time period)	L	Direct Investment Abroad	L	Fixed Assets Investm	L	Govt Revenue: Tax	L	Govt Revenue: Tax: Enterprises Income
Austrailia	GDP (2001-2010)	4	0.046**	4	0.911	4	0.132	4	0.849
	GDP (2011-2019)	4	0.094*	4	0.976	4	0.041**	4	0.001***
Japan	GDP (2001-2010)	4	0.543	4	0.960	4	0.482	4	0.231
	GDP (2011-2019)	4	0.013**	4	0.031**	4	0.034**	4	0.000***
South Korea	GDP (2001-2010)	4	0.006***	4	0.619	4	0.311	4	0.054*
	GDP (2011-2019)	4	0.649	4	0.492	4	0.005***	4	0.075*
Germany	GDP (2001-2010)	4	0.001***	4	0.905	4	0.059*	4	0.000***
	GDP (2011-2019)	4	0.003***	4	0.067*	4	0.000***	4	0.000***
Russia	GDP (2001-2010)	4	0.000***	4	0.264	4	0.969	4	0.864
	GDP (2011-2019)	4	0.002**	4	0.000***	4	0.000***	4	0.033**
United states	GDP (2001-2010)	4	0.542	4	0.245	4	0.271	4	0.258
	GDP (2011-2019)	4	0.746	4	0,386	4	0.320	4	0.599
Brazil	GDP (2001-2010)	4	0.044**	4	0.988	4	0.135	4	0.014**
	GDP (2011-2019)	4	0.003***	4	0.134	4	0.458	4	0.662
South Africa	GDP (2001-2010)	4	0.203	4	0.853	4	0.235	4	0.761
	GDP (2011-2019)	4	0.098*	4	0.220	4	0.081*	4	0.407
Total OECD	GDP (2001-2010)	4	0.328	4	0.342	4	0.600	4	0.037**
	GDP (2011-2019)	4	0.000***	4	0.000***	4	0.003***	4	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 8 displays minimal changes in the level of statistical significance when compared to Table 4. Specifically, only two estimates have shifted from significant to non-significant values: China's fixed assets investment's effects on Brazil's and South Africa's GDP in the later period.

Table 9: *Link between China's monetary policy variables and response countries' CPIs (p-values).*

Country	Response variable (time period)	L	Short-Term Interest Rate	L	Discount Rate	L	M2	L	Domestic Credit	L	House Prices	L	Market Capitalization	L	National Currency per USD	L	Total Imports
Austrailia	CPI (2001-2010)	4	0.203	4	0.121	4	0.491	4	0.298	4	0.544	4	0.077*	4	0.541	4	0.732
	CPI (2011-2019)	4	0.056*	4	0.000***	4	0.011**	4	0.005***	4	0.086*	4	0.034**	4	0.504	4	0.017**
Japan	CPI (2001-2010)	4	0.018**	4	0.162	4	0.217	4	0.000***	4	0.485	4	0.091*	4	0.000***	4	0.431
	CPI (2011-2019)	4	0.080*	4	0.131	4	0.049**	4	0.000***	4	0.001***	4	0.392	4	0.531	4	0.050*
South Korea	CPI (2001-2010)	4	0.023**	4	0.011**	4	0.531	4	0.254	4	0.261	4	0.000***	4	0.045**	4	0.084*
	CPI (2011-2019)	4	0.118	4	0.158	4	0.743	4	0.004***	4	0.649	4	0.000***	4	0.117	4	0.005***
Germany	CPI (2001-2010)	4	0.003***	4	0.431	4	0.535	4	0.083*	4	0.932	4	0.080*	4	0.138	4	0.199
	CPI (2011-2019)	4	0.001***	4	0.000***	4	0.007***	4	0.000***	4	0.221	4	0.069*	4	0.092*	4	0.000***
Russia	CPI (2001-2010)	4	0.454	4	0.920	4	0.099*	4	0.740	4	0.564	4	0.112	4	0.000***	4	0.000***
	CPI (2011-2019)	4	0.123	4	0.382	4	0.142	4	0.004 ***	4	0.020**	4	0.045**	4	0.009***	4	0.000***
United states	CPI (2001-2010)	4	0.181	4	0.001***	4	0.543	4	0.863	4	0.474	4	0.030**	4	0.004***	4	0.852
	CPI (2011-2019)	4	0.001***	4	0.055*	4	0.662	4	0.496	4	0.395	4	0.001***	4	0.033**	4	0.009***
Brazil	CPI (2001-2010)	4	0.421	4	0.128	4	0.190	4	0.000***	4	0.651	4	0.361	4	0.077*	4	0.267
	CPI (2011-2019)	4	0.000***	4	0.009***	4	0.044**	4	0.000***	4	0.003***	4	0.051*	4	0.001***	4	0.003***
South Africa	CPI (2001-2010)	4	0.321	4	0.911	4	0.439	4	0.025**	4	0.651	4	0.222	4	0.134	4	0.190
	CPI (2011-2019)	4	0.647	4	0.028**	4	0.079*	4	0.038**	4	0.431	4	0.000***	4	0.929	4	0.000***
Total OECD	CPI (2001-2010)	4	0.007***	4	0.341	4	0.250	4	0.504	4	0.145	4	0.695	4	0.000***	4	0.097*
	CPI (2011-2019)	4	0.001***	4	0.432	4	0.079*	4	0.002***	4	0.033**	4	0.014**	4	0.017**	4	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 9 exhibits minor changes in significant values compared to Table 5, with only a few estimates transitioning from significant to non-significant. However, there are some non-significant values highlighted in orange, which include the correlation between China's discount rate and the total OECD CPI in the later period, China's M2 and Russia's CPI in the later period, housing prices linkages between US CPI and South Africa CPI in the later period, Brazil's CPI in the earlier period, and China's national currency per USD linkages between Germany's CPI in the earlier period. Finally, a non-significant value exists in China's total imports linkages with Brazil's CPI in the earlier period.

Table 10: *Link between China's fiscal policy variables and response countries' CPIs (p-values).*

Country	Response variable (time period)	L	Direct Investment Abroad	L	Fixed Assets Investment	L	Govt Revenue: Tax	L	Govt Revenue: Tax: Enterprises Income
Austrailia	CPI (2001-2010)	4	0.334	4	0.307	4	0.052*	4	0.001***
	CPI (2011-2019)	4	0.002***	4	0.000***	4	0.005***	4	0.004***
Japan	CPI (2001-2010)	4	0.221	4	0.428	4	0.672	4	0.180
	CPI (2011-2019)	4	0.396	4	0.066*	4	0.040**	4	0.665
South Korea	CPI (2001-2010)	4	0.847	4	0.880	4	0.012**	4	0.050*
	CPI (2011-2019)	4	0.039**	4	0.934	4	0.007***	4	0.090*
Germany	CPI (2001-2010)	4	0.192	4	0.909	4	0.000***	4	0.000***
	CPI (2011-2019)	4	0.000***	4	0.000***	4	0.000***	4	0.000***
Russia	CPI (2001-2010)	4	0.010**	4	0.394	4	0.022**	4	0.000***
	CPI (2011-2019)	4	0.000***	4	0.430	4	0.583	4	0.000***
United states	CPI (2001-2010)	4	0.763	4	0.542	4	0.293	4	0.459
	CPI (2011-2019)	4	0.053*	4	0.447	4	0.103	4	0.088*
Brazil	CPI (2001-2010)	4	0.000 ***	4	0.194	4	0.157	4	0.000***
	CPI (2011-2019)	4	0.049**	4	0.183	4	0.145	4	0.000***
South Africa	CPI (2001-2010)	4	0.089*	4	0.553	4	0.493	4	0.112
	CPI (2011-2019)	4	0.000***	4	0.048**	4	0.304	4	0.000***
Total OECD	CPI (2001-2010)	4	0.170	4	0.299	4	0.100	4	0.108
	GPI (2011-2019)	4	0.000***	4	0.006***	4	0.097*	4	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table 10 presents fewer minor changes between significant values compared to the previous table, Table 6. However, there are four instances where significant values have transitioned to non-significant ones. Specifically, three changes were observed in the correlation between China's government tax revenue and Brazil's and the total OECD CPI. Additionally, one significant value has changed to a non-significant value in the correlation between China's fixed assets investment and Brazil's CPI in the later period.

The robustness tables examining the impact of China's economic growth indicators on other countries' GDPs and CPIs can be found in the appendix (Table A3 and A4) . In brief, the results are consistent with those presented above, with only four estimates transitioning from significant to non-significant values and one transitioning from non-significant to significant. Nevertheless, as observed in the previous tables, there are several instances where there are minor changes from one significant level to another.

In summary, most results are robust, with relatively few changes from significant to non-significant values. However, there are slightly more changes from one significance level to another.

4.4 Results discussion

The study presents its results in two main categories: Granger p-value tables and OIRF measurements. In the appendix, additional Granger p-value tables explore the link between China's economic growth indicators and the response variables—moreover, OIRF measurements featuring CPI as the response variable is also included in the appendix.

The results suggest that China's fiscal and monetary policies had a more significant impact during the latter period (2011-2019) than the earlier period (2001-2010). These findings are supported by the Granger p-value tables and, in most cases, the OIRF measurements. Nonetheless, China's impact in the later period can be considered more robust in most measured variables, with some exceptions. For example, in cases where China's interest rates and fixed assets investment impact the response countries' GDP and CPI, the differences between the periods could be more apparent.

The study found that several monetary variables significantly correlated with the countries studied and the total OECD in both periods. These variables include China's M2, domestic credit, national currency per USD, total imports, and, in some cases, interest rates, house prices, and market capitalization. However, this trend had some exceptions where the OIRF results did not align with the p-values. Additionally, the study found that fiscal variables, particularly China's direct investments abroad and enterprise income tax revenue, significantly impacted the GDP and CPI of the countries studied, particularly during the later period, supported by p-values and OIRF measurements.

The p-value analysis for economic growth indicators in the study was noteworthy. Specifically, China's producer price index was found to have a more significant impact on the countries studied and the total OECD than the consumer price index. Furthermore, the analysis revealed that China's real GDP and production index, excluding construction, had more significant p-values on countries in the later period when both GDP and CPI were considered response variables.

Moreover, the results of the robustness check provide further support for the measurements. The Granger p-values were recomputed with a standardized lag order of four lags, and the analysis revealed only a few significant changes.

The study's results indicate that China's fiscal and monetary policies and growth indicators significantly impacted the countries studied and the total OECD in both periods examined. The

evidence is stronger in the later period, which supports previous studies, such as Breitenlechner and Nuutilainen (2019), Cashin et al. (2017), Chen et al. (2017), Feldkircher and Korhonen (2014), and Sznajderska (2019), that also highlight China's substantial impact on other countries through its policies. These studies indicate that China has emerged as a major player in the global economy in the 21st century.

However, it is difficult to determine whether China's variables significantly impact the response variables GDP or CPI more. Both variables significantly correlate with China's variables on a large scale, as supported by the OIRF. The differences in statistical significance between the two periods are apparent through the p-values. The OIRF results also support these findings, although interpreting the OIRF may be more challenging than interpreting p-values in some estimates. For example, in several cases, the OIRF results may be inconsistent with the p-value findings, although most results align with the p-values. Finally, the study's findings suggest that countries near China, such as South Korea, Japan, and Australia, do not show significantly different values compared to more distant countries, such as Germany, Brazil, and South Africa, as supported by the OIRF estimates. Moreover, the OIRF measurements revealed no significant delays between the countries in which the impact of China's variables was observed, irrespective of their geographical distance from China.

4.5 Critical review

In this section, I critically examine the study focusing on causality, both in the study itself and in macroeconomic investigations more generally. John Stuart Mill, a philosopher, and economist, outlines the assumptions required for causal interpretation in his influential work "A System of Logic: The Principles of Evidence and the Methods of Scientific Investigation" (1867). Duckworth, Tsukayama, and May (2010) discuss three of Mill's assumptions for causal interpretation, which we consider in this study:

1. The cause must have occurred before the effect.
2. The cause and effect must have a significant correlation.
3. Alternative explanations that could affect the outcome must be considered.

The first assumption emphasizes, for example, that the effects of China's actions on response countries can only be observed after the actions occur. Therefore, it is expected that China's policies and actions will have a more significant impact on other countries than vice versa. The

study places China's transmission variables at the beginning of the model, as the variable order is significant (see the Methodology chapter for more details).

Regarding the second assumption, an example could be that if the GDP of a response country increases along with China's GDP, removing the effect of China's GDP should lead to a decrease in the response country's GDP.

Regarding the third assumption, it is crucial for investigations to consider alternative explanations for the causes, such as the possibility of a response country's GDP increasing due to factors other than China's implementation of expansionary policies. Satisfying this assumption may result in systematic measurement errors, such as underestimating or overestimating the effects. For instance, the 2008 financial crisis had an impact not directly related to China but coincided with the country's policies. However, incorporating exogenous control variables in VAR models reduces the likelihood of more significant measurement errors, increasing the possibility of more precise results. Nevertheless, the causal interpretation of the findings cannot be guaranteed, as several other factors in the error term may remain uncontrolled or cannot be controlled for various reasons.

Therefore, it is important to exercise carefulness when drawing causal inferences from macroeconomic investigations, considering possible measurement errors. The study handles these concerns by including relevant control variables and theories and conducting robustness checks. However, limitations remain in the study's findings, and further research is necessary to obtain more accurate results.

As mentioned above, avoiding the correlation between independent variables and the error term in macroeconomic research presents a significant challenge. This challenge is compounded by the increasing interconnectedness of the global market and the growing correlation between macroeconomic variables. For instance, if an analysis shows a notable correlation between China's actions and the growth of another country, several factors such as an external crisis, an economic shock, or the response country simultaneously stimulating its economy with China may contribute to this correlation.

However, this study does not focus primarily on significant results but rather on significant trends and changes over time, which are more easily identifiable. It is essential to note that all results in the study are estimates and not exact calculations, which require robustness control to ensure reliable findings. Additionally, verifying the study's findings by comparing them with previous similar studies is appropriate.

Considering that the differences between periods can significantly affect the results, it is especially critical to consider such issues in this study. Therefore, accounting for such variables and testing the robustness of the results is crucial to ensure their reliability. Finally, it is essential to discuss the findings with careful consideration of the possible measurement errors, limitations, and assumptions made in the study to provide a more comprehensive understanding of the research's implications.

5 Concluding remarks

This study aims to deliver a deeper understanding of how China's economic policies affect the global economy and identify any trends or changes during two periods in the 21st century. By examining the impact of China's fiscal and monetary policies on a selection of countries and the entire OECD region, the study aims to provide a more comprehensive picture of how China can influence other countries globally.

The study's results are interesting and indicate an increase in the effects of China's fiscal and monetary policy on other countries during the later period. This may have several reasons, including that China has increased its global presence and influence and that the Chinese economy has become more integrated into the global economy. The study also shows that some variables may have stronger effects during the earlier period, but the overall effect is stronger during the later period. The result can help decision-makers better understand China's economic policies' global consequences and adapt them accordingly. Further research may be needed to study how these results can affect countries and regions in the long run and how to develop sustainable and balanced global economic growth that benefits all parties.

Furthermore, the study suggests that China's monetary policy variables impact other countries, particularly noticeable during the later period (2011-2019) and during the earlier period (2001-2010). For example, variables such as China's interest rates, M2, domestic credits, national currency per USD, and total imports significantly impact other countries' GDP and CPI (consumer price index). Granger p-values and OIRF measurements support these findings, suggesting that China's monetary policy decisions have a more significant impact on the world than several previous studies have reported.

The study also shows that China's fiscal policy variables significantly impact other countries' GDP and CPI. In addition, variables such as foreign direct investment, investment in fixed assets, and tax variables significantly impact the world, especially during the latter period. Although Granger p-values show more significant findings for these variables, OIRF measurements are still an essential component in understanding the long-term effects of China's fiscal decisions.

Another interesting discovery from the study is that China's growth indicators, especially the PPI (producer price index), have a greater impact on other countries than the CPI. The observation is important because it may have far-reaching consequences for countries

dependent on China's economy, which may also have implications for China's role in the global economy. Thus, the stronger PPI in China indicates that companies have greater importance in China's economy than consumers, which explains why the PPI has a more significant impact on other countries than the CPI. This result has important implications for businesses and economic decision-makers working with trade with China and can help shape trade strategies.

It is essential to note that although the study's results appear robust, there is always uncertainty in macroeconomic studies. Because economic factors are interconnected globally, it can be challenging to bypass these uncertainties entirely. Despite this, the study focuses on identifying significant trends and changes over the period. It can contribute to providing an overall picture of China's expansionist measures and their effects on other countries. It is also essential to emphasize the need for further research and analysis to increase understanding of these complex relationships and their implications for the global economy.

Overall, a relevant objective of this study is to determine whether the hypothetical model (Figure 2) connected to the theories discussed in the previous chapter on Theory and Empirical Evidence could explain China's impact on other countries through monetary and fiscal channels. In other words, do the results support the model, transmission channels, and mechanisms? Based on the results, it appears that the variables associated with the fiscal and monetary policy channels (see Figure 1), such as interest rates, M2, domestic credit, house prices, market capitalization, exchange rates, total imports, investments, and tax variables, do affect the outside world. Moreover, the results suggest that these channels impact other countries, as demonstrated by the findings. However, it is difficult to determine which channel or channels are the strongest. At least variables connected to the interest rate, credit, exchange rate channels, as well as investments showed effects on the outside world. As mentioned above, the study's primary goal is to compare the periods when the latter seems more affected by China.

Furthermore, the hypothetical model also includes China's domestic prices, such as the Producer Price Index (PPI) and the Consumer Price Index (CPI). The results indicate that these variables significantly impact the outside world, especially considering the PPI. Moreover, the model also includes the impact of China's domestic asset prices, such as market capitalization and house prices, on the global economy. The study's analysis reveals significant correlations between variables related to the asset price channels and the outside world. Although the asset price channel may not be the strongest of all monetary channels, it is an influential factor that warrants further investigation.

The hypothetical model also accounts for financial risks, and the findings suggest a strong dependence on China for the countries and the total OECD. However, this dependence should also work in the opposite direction, such that if China's economy slows down or faces a crisis, the adverse effects should also spread to the outside world. For example, OIRF measurements show that implementing a positive shock in the interest rate often has a negative effect on a country's GDP and CPI. In contrast, implementing a shock in China's M2, credit, or total imports usually has a growing effect on most variables, including GDP and CPI. As the hypothesis model explains, these results support that China's measures work in both directions.

However, as mentioned earlier, the countries neighboring China do not show a stronger correlation with China than the more distant countries. Thus, the abovementioned gravity model of trade model does not support the study's results. Despite Germany, Brazil, and South Africa not having the same geographical proximity to China as the Asian countries, the results show significant correlations with China's economic activities. The results underscore the importance of considering other factors affecting trade relations between countries. However, including more sample countries could lead to different results regarding the gravity model of trade.

This study provides a comprehensive overview of China's importance in the global economy and highlights its increasing role as a trading partner for several countries during the 21st century. By examining China's fiscal and monetary policies, the study provides insights into how these factors affect other countries and can help decision-makers and investors understand and manage the challenges that may arise in the future. It is also noteworthy that the study opens up new research opportunities, particularly in advanced and more accurate VAR models, to further understand China's impact on other countries worldwide. Furthermore, the study emphasizes political issues that need to be addressed and further examined, such as China's economic ambitions and its impact on global trade and geopolitics.

To sum up, the study provides insight into China's position in the global economy and its economic policies. It is a good starting point for further exploring these issues and addressing the challenges that may arise in the future.

6 Summary in Swedish – Svensk sammanfattning

Undersöker effekten av Kinas finans- och penningpolitiska åtgärder på den globala ekonomiska tillväxten: en VAR-analys

Syftet med denna studie är att inte bara bidra till en djupare förståelse för hur Kinas ekonomiska politik påverkar den globala ekonomin, utan också att identifiera eventuella trender eller förändringar under två tidsperioder på 2000-talet. Genom att undersöka inverkan av Kinas finans- och penningpolitik på ett urval av länder och i hela OECD-regionen, syftar studien till att ge en mer heltäckande bild av hur Kina kan påverka andra länder på en global nivå.

För att uppnå detta syfte ger studien först en grundlig överblick av teorier och tillvägagångssätt som rör finans- och penningpolitik, inklusive en genomgång av tidigare studier som har undersökt Kinas finans- och penningpolitik samt Kinas inflytande på andra länder. Därvid inkluderas olika kanaler för både finans- och penningpolitik, såsom offentlig spendering och skatteeffekter samt ränte-, kredit-, tillgångspris- och valutakanalen. Genom att tillhandahålla en sådan omfattande bakgrund, ger studien en stark grund för att bedöma hur Kinas ekonomiska politik kan påverka andra länder i framtiden. I syfte att ge en mer detaljerad beskrivning av studiens metod och teoretiska underlag, presenteras i studien en hypotesmodell som bygger på tidigare forskning och teori.

I metodkapitlet diskuteras studiens variabler ingående, inklusive Kinas finans- och penningpolitik, ekonomiska tillväxtindikatorer samt responsländernas variabler och exogena kontrollvariabler. Vidare förklaras studiens modell, som är en vektorautoregression (VAR), inklusive stationaritet och Granger-kausalitet. För att uppskatta resultaten används ytterligare ortogonaliserade impulsresponsfunktioner (OIRF) med en specifik identifieringsteknik. Med hjälp av VAR-modellen kan studien undersöka hur olika variabler påverkar varandra över tid, vilket gör det möjligt att uppskatta effekterna av Kinas ekonomiska politik på andra länder under två tidsperioder på 2000-talet. Genom att inkludera OIRF ger studien en mer detaljerad bild av de dynamiska effekterna av Kinas finans- och penningpolitik på andra länder.

Resultaten från studien är intressanta och pekar på en ökning i effekterna av Kinas finans- och penningpolitik på andra länder under den senare perioden. Detta kan ha flera orsaker, inklusive att Kina har ökat sin globala närvaro och sitt globala inflytande samt att den kinesiska ekonomin har blivit mer integrerad i den globala ekonomin. Studien visar också att vissa variabler kan ha starkare effekter under den tidigare perioden, men den övergripande effekten är starkare under

den senare perioden. Resultatet kan hjälpa beslutsfattare att bättre förstå de globala konsekvenserna av Kinas ekonomiska politik och anpassa sina egna politiska åtgärder därefter. Vidare forskning behövs för att undersöka hur dessa resultat kan påverka olika länder och regioner på lång sikt och hur man kan utveckla en hållbar och balanserad global ekonomisk tillväxt som gynnar alla parter.

Därutöver tyder studien på att Kinas penningpolitiska variabler har en inverkan på andra länder, och detta är särskilt märkbart under den senare perioden (2011–2019), men också på den tidigare tidsperioden (2001–2010). Variabler som Kinas räntor, M2, inhemska krediter, valutakurs och total import visar en betydande påverkan på andra länders BNP (bruttonationalprodukt) och KPI (konsumentprisindex). Granger p-värdena och OIRF-mätningarna stödjer dessa fynd, och detta tyder på att Kinas penningpolitiska beslut har en större påverkan på omvärlden än vad flera tidigare studier har redovisat.

Vidare visar studien att Kinas finanspolitiska variabler också har en betydande inverkan på andra länders BNP och KPI. Direktinvesteringar utomlands, investeringar i anläggningstillgångar och skattevariabler är exempel på variabler som visar en betydande påverkan på omvärlden, särskilt under den senare perioden. Även om Granger p-värdena visar mer signifikanta fynd för dessa variabler, är OIRF-mätningarna ändå en viktig komponent för att förstå de långsiktiga effekterna av Kinas finanspolitiska beslut.

En annan intressant upptäckt från studien är att Kinas tillväxtindikatorer, särskilt PPI (producentprisindex), har en större inverkan på andra länder än KPI. Detta är en viktig observation eftersom det kan ha långtgående konsekvenser för länder som är beroende av Kinas ekonomi, och detta kan också ha implikationer för Kinas roll i den globala ekonomin. Därmed framgår det tydligt från resultaten också att företag har en större betydelse i Kinas ekonomi än konsumenter, vilket förklarar varför PPI har en större inverkan på andra länder jämfört med KPI. Detta resultat har viktiga implikationer för företag och ekonomiska beslutsfattare som arbetar med handel med Kina och kan bidra till att forma handelsstrategier. Dessutom visar resultaten att studies hypotesmodell är delvis korrekt men att gravitationsmodellen inte helt stämmer överens med studiens fynd. Trots att Tyskland, Brasilien och Sydafrika inte har samma geografiska närhet till Kina som de asiatiska länderna, visar resultaten att de har signifikanta samband med Kinas ekonomiska aktiviteter. Detta understryker vikten av att ta hänsyn till andra faktorer som kan påverka handelsförbindelserna mellan länderna.

Det är viktigt att notera att även om resultaten från studien verkar vara robusta, finns det alltid osäkerhet i makroekonomiska undersökningar. Eftersom alla ekonomiska faktorer är sammankopplade i en global värld kan det vara svårt att helt kringgå dessa osäkerheter. Trots detta är studien inriktad på att identifiera stora trender och förändringar över tidsperioden och kan bidra till att ge en övergripande bild av Kinas expansionistiska åtgärder och deras effekter på andra länder. Det är också viktigt att betona behovet av att bedriva mer forskning och analysera mer detaljerat för att öka förståelsen av dessa komplexa samband och deras implikationer för den globala ekonomin.

Denna studie ger en omfattande översikt av Kinas betydelse i den globala ekonomin och visar på dess ökande roll som handelspartner för flera länder under 2000-talet. Genom att undersöka Kinas finans- och penningpolitik ger studien insikter i hur dessa faktorer påverkar andra länder och kan hjälpa beslutsfattare och investerare att förstå och hantera de utmaningar som kan uppstå i framtiden. Det är också viktigt att notera att studien öppnar upp för nya forskningsmöjligheter, särskilt inom avancerade och noggrannare VAR-modeller för att ytterligare förstå Kinas inverkan på andra länder runt om i världen. Vidare betonar studien också politiska frågor som behöver tas upp och undersökas vidare, såsom Kinas ekonomiska ambitioner och dess påverkan på global handel och geopolitik.

Sammanfattningsvis ger denna studie en insikt i Kinas roll i den globala ekonomin och dess ekonomiska politik. Det är en utmärkt utgångspunkt för att fortsätta undersöka dessa frågor och ta itu med de utmaningar som kan uppstå i framtiden.

References

Anderson, J. E., & Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. American economic review, 93(1), 170–192.

Retrieved from:

https://pubs.aeaweb.org/doi/pdfplus/10.1257/000282803321455214

Angeloni, I., Kashyap, A. K., Mojon, B., & Terlizzese, D. (2003). The output composition puzzle: a difference in the monetary transmission mechanism in the euro area and US.

Retrieved from:

https://www.nber.org/system/files/working_papers/w9985/w9985.pdf

Arestis, P., & Sawyer, M. C. (2002). Can monetary policy affect the real economy?.

Retrieved from:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=335620

Aziz, M. J., & Cui, L. (2007). Explaining China's low consumption: the neglected role of household income (No. 7-181). International Monetary Fund.

Retrieved from:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1007930

Bell, D. A. (2016). The China Model. In The China Model. Princeton University Press.

Retrieved from:

https://www.jstor.org/stable/j.ctt1q1xrbj

Bernanke, B. S. (2012, February 29). Semiannual monetary policy report to the Congress: Testimony before the Committee on Financial Services, U.S. House of Representatives.

Retrieved from:

https://www.govinfo.gov/content/pkg/CHRG-112hhrg76116/html/CHRG-112hhrg76116.htm

Bernanke, B. S., & Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. Journal of Economic perspectives, 9(4), 27-48.

Retrieved from:

https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.9.4.27

Bernanke, B. S., & Mihov, I. (1998). Measuring monetary policy. The quarterly journal of economics, 113(3), 869–902.

Retrieved from:

https://academic.oup.com/qje/article/113/3/869/1851149?login=true

Blanchard, O. (2016). Macroeconomics (Seventh edition, global edition.). Pearson.

Bowerman, B. L., O'Connell, R. T., & Koehler, A. B. (2005). Forecasting, time series, and regression: an applied approach (Vol. 4). South-Western Pub.

Breitenlechner, M., & Nuutilainen, R. (2019). China's monetary policy and the loan market: How strong is the credit channel in China? (No. 15/2019). BOFIT Discussion Papers.

Retrieved from:

https://www.econstor.eu/bitstream/10419/212923/1/bofit-dp2019-015.pdf

Burda, M. & Wyplosz, C. (2012). Macroeconomics: A European text (6th ed.). Oxford: Oxford University Press.

Campbell, K., Gordon, L. A., Loeb, M. P., & Zhou, L. (2003). The economic cost of publicly announced information security breaches: empirical evidence from the stock market. Journal of Computer Security, 11(3), 431–448.

Retrieved from:

https://www.researchgate.net/publication/220065342_The_Economic_Cost_of_Publicly_Announced_Information_Security_Breaches_Empirical_Evidence_from_the_Stock_Market

Cashin, P., Mohaddes, K., & Raissi, M. (2017). China's slowdown and global financial market volatility: Is world growth losing out?. Emerging Markets Review, pp. 31, 164-175

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S1566014117301747

Chang, M., Jang, H. B., Li, Y. M., & Kim, D. (2017). The relationship between the efficiency, service quality and customer satisfaction for state-owned commercial banks in China. Sustainability, 9(12), 2163.

Retrieved from:

https://www.mdpi.com/2071-1050/9/12/2163/htm

Chen, H., Chow, K., Tillmann, P., 2017. The effectiveness of monetary policy in China: Evidence from a qual VAR. China Economic Review 43, 216–231.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S1043951X17300287

China. (2014). Financial stability report.

Retrieved from:

http://www.centerforfinancialstability.org/fsr/chn_fsr_201407.pdf

Chow, G. C. (1997). Challenges of China's economic system for economic theory. The American Economic Review, 87(2), 321-327

Retrieved from:

https://www.jstor.org/stable/2950939?seq=1#metadata_info_tab_contents

Ciccarelli, M., Osbat, C., Bobeica, E., Jardet, C., Jarocinski, M., Mendicino, C., ... & Stevens, A. (2017). Low inflation in the euro area: Causes and consequences. ECB occasional paper, (181).

Retrieved from:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2910978

Cooper, D., & Dynan, K. (2016). Wealth effects and macroeconomic dynamics. Journal of Economic Surveys, 30(1), 34-55.

Retrieved from:

https://onlinelibrary.wiley.com/doi/epdf/10.1111/joes.12090

Dickinson, D., & Jia, L. (2007). The real effects of monetary policy in China: An empirical analysis. China Economic Review, 18(1), 87–111.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S1043951X06000204

Duckworth, A. L., Tsukayama, E., & May, H. (2010). Establishing causality using longitudinal hierarchical linear modeling: An illustration predicting achievement from self-control. Social psychological and personality science, 1(4), 311-317

Retrieved from:

https://journals.sagepub.com/doi/pdf/10.1177/1948550609359707

Economy, E. C. (2010). The Game Changer-Coping with China's Foreign Policy Revolution. Foreign Aff., 89, 142.

Retrieved from:

https://heinonline.org/HOL/Page?collection=journals&handle=hein.journals/fora89&id=1036&men_tab=srchresults

Fatás, A., & Mihov, I. (2001). The effects of fiscal policy on consumption and employment: theory and evidence. Available at SSRN 267281.

Retrieved from:

https://faculty.insead.edu/fatas/fiscal.pdf

Feldkircher, M., & Korhonen, I. (2014). The Rise of China and Its Implications for the Global Economy: Evidence from a Global Vector Autoregressive Model. Pacific Economic Review, 19(1), 61-89.

Retrieved from:

https://onlinelibrary.wiley.com/doi/epdf/10.1111/1468-0106.12052

Friedman, M. (1995). The role of monetary policy. In Essential Readings in Economics (pp. 215–231). Palgrave, London.

Retrieved from:

https://link.springer.com/chapter/10.1007/978-1-349-24002-9_11

Gul, F. A. (1999). Government share ownership, investment opportunity set and corporate policy choices in China. Pacific-Basin finance journal, 7(2), 157–172.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0927538X99000049

Inoue, T., Kaya, D., & Ohshige, H. (2015). The impact of China's slowdown on the Asia Pacific region: an application of the GVAR model. The World Bank.

Retrieved from:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2674444

Ioannidis, C., & Kontonikas, A. (2008). The impact of monetary policy on stock prices. Journal of policy modeling, 30(1), 33-53.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0161893807000932

Ireland, P. N. (2010). Monetary transmission mechanism. In Monetary economics (pp. 216–223). Palgrave Macmillan, London.

Retrieved from:

https://www.researchgate.net/publication/304638364_Monetary_Transmission_Mechanism

Kamber, G., & Mohanty, M. S. (2018). Do interest rates play a major role in monetary policy transmission in China?.

Retrieved from:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3158506

Keynes, J. M. (1936). The general theory of employment, interest, and money.

Retrieved from:

https://www.files.ethz.ch/isn/125515/1366_KeynesTheoryofEmployment.pdf

Kopcke, R. W., Tootell, G. M., & Triest, R. K. (2006). Introduction: The macroeconomics of fiscal policy.

Retrieved from:

http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=284964F1D42442E0334F7D2B5008A87D?doi=10.1.1.173.2510&rep=rep1&type=pdf

Kungliga vetenskapsakademien. (2011). Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2011.

Retrieved from:

https://www.nobelprize.org/uploads/2018/06/advanced-economicsciences2011.pdf

Lardy, N. R. (1995). The role of foreign trade and investment in China's economic transformation. The China Quarterly, pp. 144, 1065–1082.

Retrieved from:

https://www.cambridge.org/core/journals/china-quarterly/article/abs/role-of-foreign-trade-and-investment-in-chinas-economic-transformation/6057B3B938889879CFA839901BC51F3B

Lerner, A. P. (1943). Functional finance and the federal debt. Social research, 38-51.

Retrieved from:

https://www.jstor.org/stable/40981939?seq=1#metadata_info_tab_contents

Liew, V. K. S. (2004). Which lag length selection criteria should we employ?. Economics bulletin, 3(33), 1-9.

Retrieved from:

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=885505

Liu, D., Sun, W., & Chang, L. (2021). Monetary–fiscal policy regime and macroeconomic dynamics in China. Economic Modelling, 95, 121-135.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0264999320312724

Lütkepohl, H. (2005). New introduction to multiple time series analysis. Springer Science & Business Media.

Lütkepohl, H. (2010). Impulse response function. In Macroeconometrics and time series analysis (pp. 145-150). Palgrave Macmillan, London.

Retrieved from:

https://link.springer.com/chapter/10.1057/9780230280830_16

McCulley, P., & Pozsar, Z. (2013). Helicopter money: or how I stopped worrying and love fiscal-monetary cooperation. Global Society of Fellows, p. 7.

Retrieved from:

https://www.interdependence.org/wp-content/uploads/2013/01/Helicopter_Money_Final1.pdf

Mill, J. S. (1867). A system of logic: The principles of evidence and the methods of scientific investigation. Indianapolis: Liberty Fund

Mishkin, F, S. (2019). The Economics of money, banking, and financial markets–Global edition, 12th edition.

Mishkin, F. S. (2001). The transmission mechanism and the role of asset prices in monetary policy (No. w8617). National Bureau of Economic Research.

Retrieved from:

https://www.nber.org/system/files/working_papers/w8617/w8617.pdf

Mishkin, F. S. (1995). Symposium on the monetary transmission mechanism. Journal of Economic perspectives, 9(4), 3–10.

Retrieved from:

https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.9.4.3

Peersman, G., & Smets, F. (2001). The monetary transmission mechanism in the euro area: more evidence from var analysis (mtn conference paper).

Retrieved from:

https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp091.pdf?1da206533d7d8e412a87eac433780af0

Perotti, R. (2001). What do we know about the effects of fiscal policy?. Politica Fiscale flessibilità dei mercati e crescita, Franco Angeli, Milano.

Retrieved from:

http://www.siepweb.it/siep/wp/wp-content/uploads/2021/03/1397925830013.pdf

Prasad, E. S. (2004). China's growth and integration into the world economy: Prospects and challenges. International monetary fund.

Retrieved from:

https://www.imf.org/external/pubs/ft/op/232/op232.pdf

Pugel, T. (2016). International economics (16th ed.). McGraw-Hill Education.

Roache, M. S. K. (2012). China's Impacton World Commodity Markets. International Monetary Fund.

Retrieved from:

https://www.imf.org/external/pubs/ft/wp/2012/wp12115.pdf

Romer, D. (2012). Advanced macroeconomics. McGraw Hill.

Shahrabi, J., Hadavandi, E., & Asadi, S. (2013). Developing a hybrid intelligent model for forecasting problems: Case study of tourism demand time series. Knowledge-Based Systems, 43, 112-122.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0950705113000269

Sims, C. A. (1980). Macroeconomics and reality. Econometrica: journal of the Econometric Society, 1- 48.

Retrieved from:

https://www.jstor.org/stable/1912017?seq=1#metadata_info_tab_contents

Sims, C. A. (1989). Models and their uses. American Journal of Agricultural Economics, 71(2), 489- 494.

Retrieved from:

https://www.jstor.org/stable/1241619?seq=1#metadata_info_tab_contents

Sims, C. A., Stock, J. H., & Watson, M. W. (1990). Inference in linear time series models with some unit roots. Econometrica: Journal of the Econometric Society, 113-144.

Retrieved from:

https://www.jstor.org/stable/2938337?seq=1#metadata_info_tab_contents

Sims, C. A. (1992). Interpreting the macroeconomic time series facts: The effects of monetary policy. European economic review, 36(5), 975-1000.

Retrieved from:

https://www.sciencedirect.com/science/article/abs/pii/001429219290041T

Song, Z., Storesletten, K., & Zilibotti, F. (2011). Growing like china. American economic review, 101(1), 196-233.

Retrieved from:

https://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.101.1.196

Spencer, R. W., & Yohe, W. P. (1970). The" crowding out" of private expenditures by fiscal policy actions. Federal Reserve Bank of St. Louis Review, (October 1970).

Retrieved from:

https://core.ac.uk/download/pdf/6958298.pdf

Sun, R. (2015). What measures Chinese monetary policy?. Journal of International Money and Finance, 59, 263-286.gu

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0261560615001242

Sznajderska, A. (2019). The role of China in the world economy: evidence from a global VAR model. Applied Economics, 51(15), 1574-1587.

Retrieved from:

https://www.tandfonline.com/doi/pdf/10.1080/00036846.2018.1527464?needAccess=true

Taylor, J. B. (1995). The monetary transmission mechanism: an empirical framework. journal of Economic Perspectives, 9(4), 11-26.

Retrieved from:

https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.9.4.11

Tobin, J. (1969). A general equilibrium approach to monetary theory. Journal of money, credit and banking, 1(1), 15–29.

Retrieved from:

https://www.jstor.org/stable/1991374?seq=13#metadata_info_tab_contents

Trinh, T., Voss, S., Dyck, S., Lanzeni, M. L., Giesel, B., & Walter, N. (2006). China's commodity hunger. Iron and steel, 23(2), 9-0.

Retrieved from:

http://frankhaugwitz.com/doks/security/2006_06_China_Commodity_Hunger_Implications_for_Africa.pdf

Wei, G. (2007). Ownership structure, corporate governance and company performance in China. Asia Pacific Business Review, 13(4), 519-545

Retrieved from:

https://www.tandfonline.com/doi/full/10.1080/13602380701300130

Wu, J., Gyourko, J., & Deng, Y. (2012). Evaluating conditions in major Chinese housing markets. Regional Science and Urban Economics, 42(3), 531-543.

Retrieved from:

https://www.nber.org/system/files/working_papers/w16189/w16189.pdf

Xue, W., Yilmazkuday, H., & Taylor, J. E. (2020). The impact of China's fiscal and monetary policy responses to the great recession: An analysis of firm-level Chinese data. Journal of International Money and Finance, 101, 102113.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0261560619304085

Yang, R., Li, X., & Zhang, T. (2014). Analysis of linkage effects among industry sectors in China's stock market before and after the financial crisis. Physica A: Statistical Mechanics and its Applications, pp. 411, 12–20.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S0378437114004658

Yu, M. (2013). State ownership and firm performance: Empirical evidence from Chinese listed companies. China Journal of Accounting Research, 6(2), 75–87.

Retrieved from:

https://www.sciencedirect.com/science/article/pii/S1755309113000130

Zhang, W., Zhang, Y., Zheng, X., & Zhang, L. (2019). China's fiscal multiplier and its state dependence. The Manchester School, 87(2), 205–227.

Retrieved from:

https://onlinelibrary.wiley.com/doi/full/10.1111/manc.12235

Data sources

Census and Economic Information Center. (n.d.).

Retrieved from:

https://www.ceicdata.com/en

OECD. (n.d.). OECD.Stat.

Retrieved from:

https://stats.oecd.org/index.aspx

The Observatory of Economic Complexity. (n.d.).

Retrieved from:

https://oec.world/

Appendix

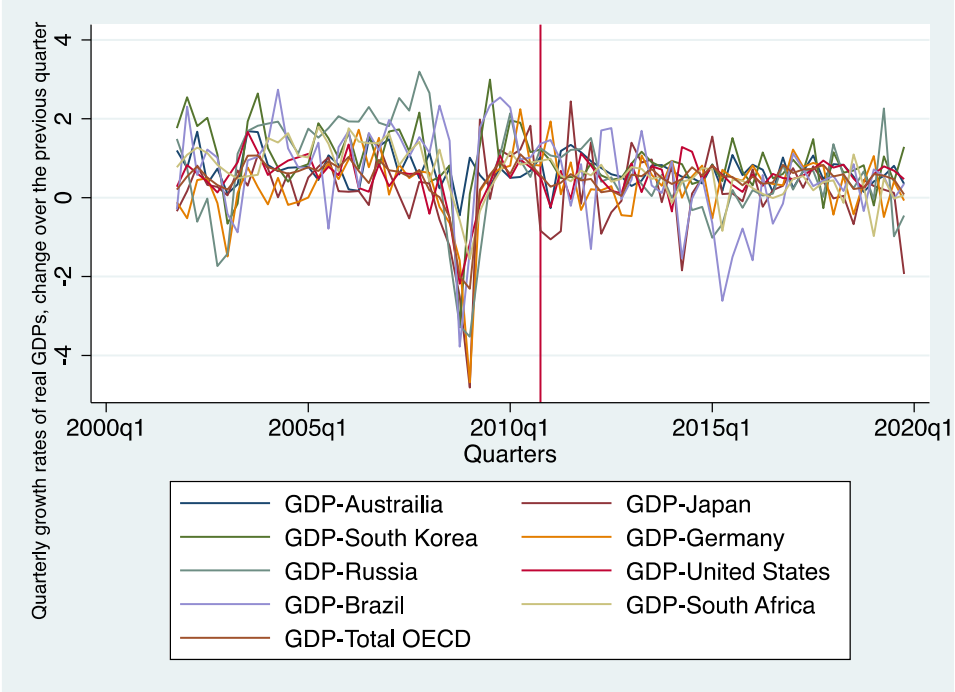


Figure A1: *Quarterly growth rates of real GDPs for countries and the total OECD changes from the previous quarter. The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: OECD. (n.d.). OECD.Stat.*

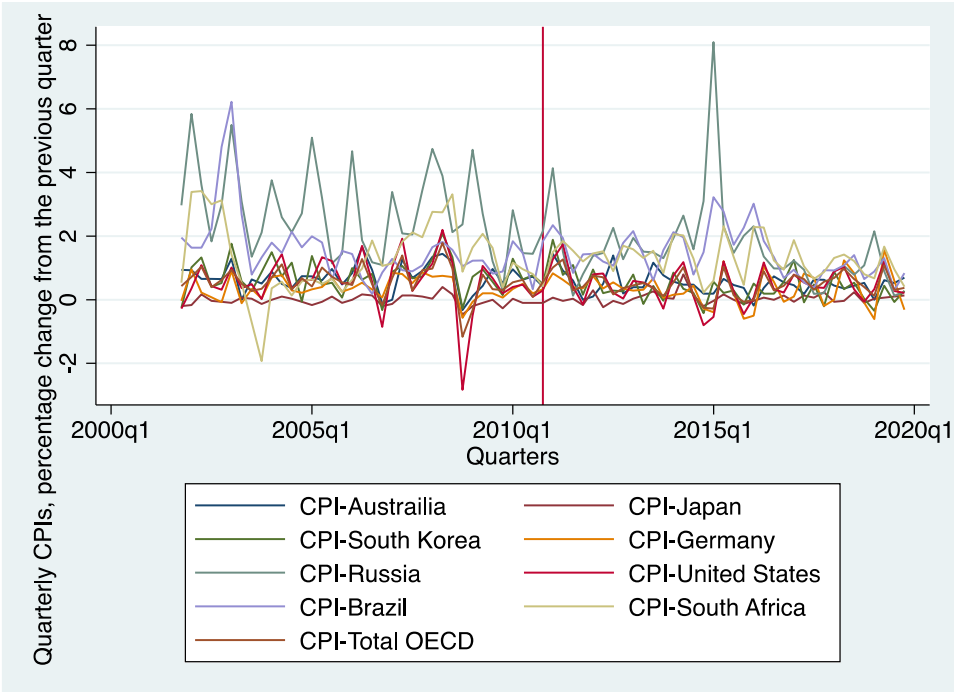
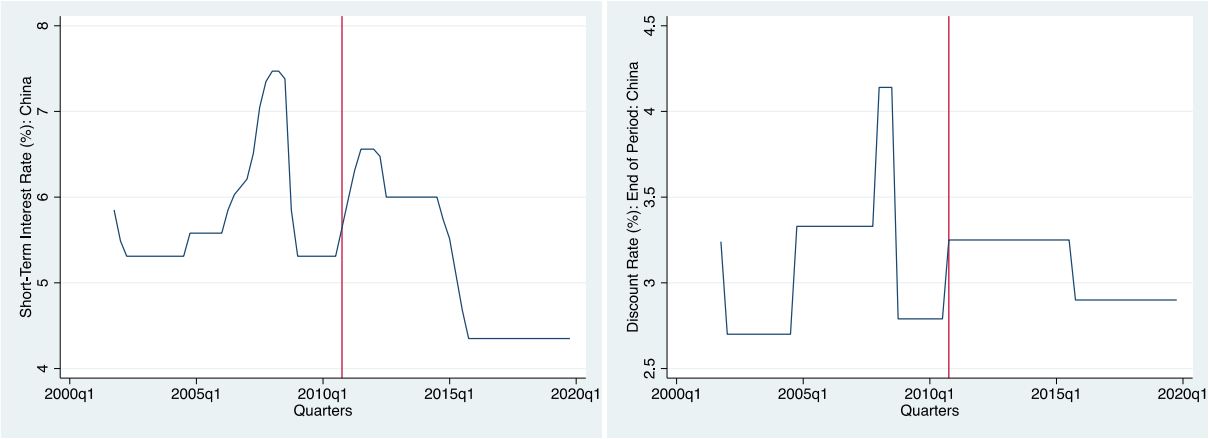
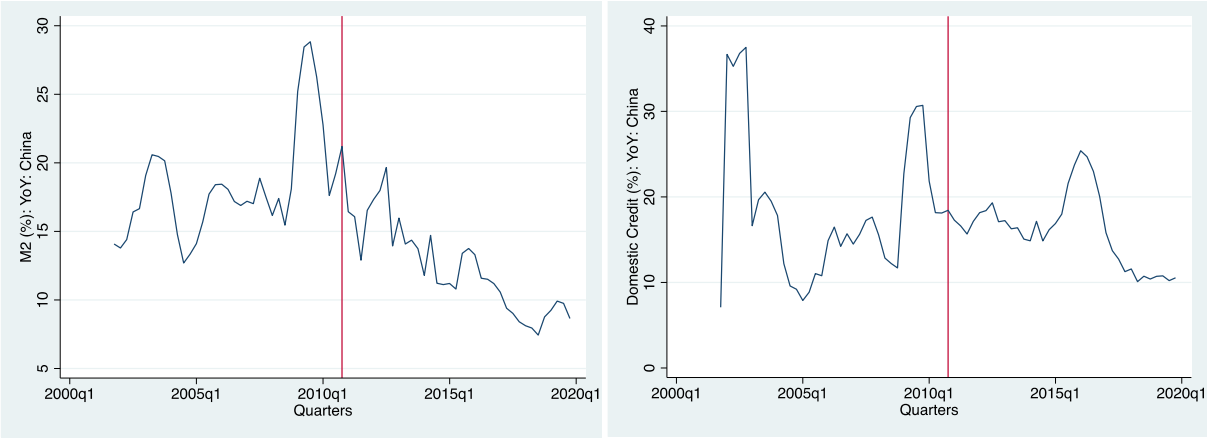


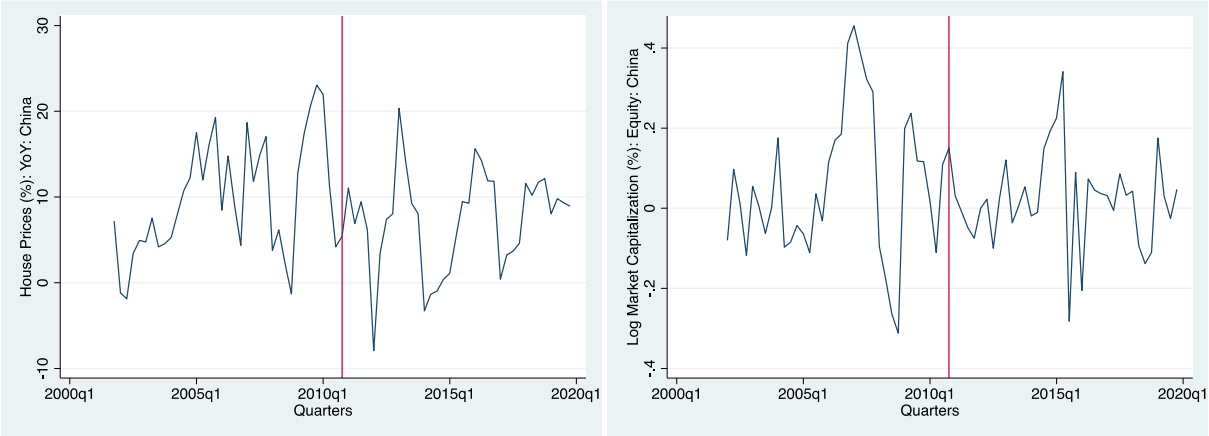
Figure A2: *Quarterly Consumer Price Index (CPI) percentage changes from the previous quarter for countries and the total OECD. The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: OECD. (n.d.). OECD.Stat.*



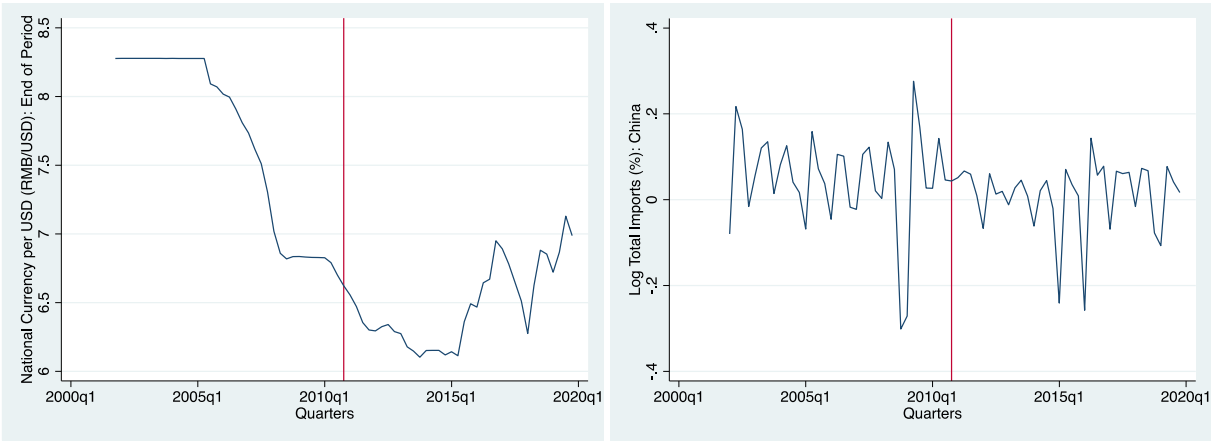
Figures A3 and A4: *China's short-term interest rate (%) and discount rate (%). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



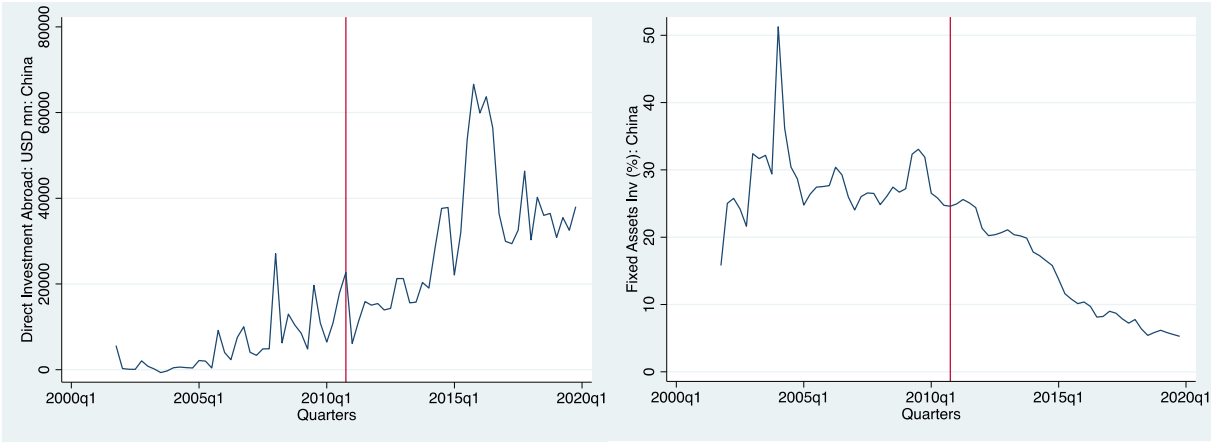
Figures A5 and A6: *China's M2 (%) and domestic credit (%).The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



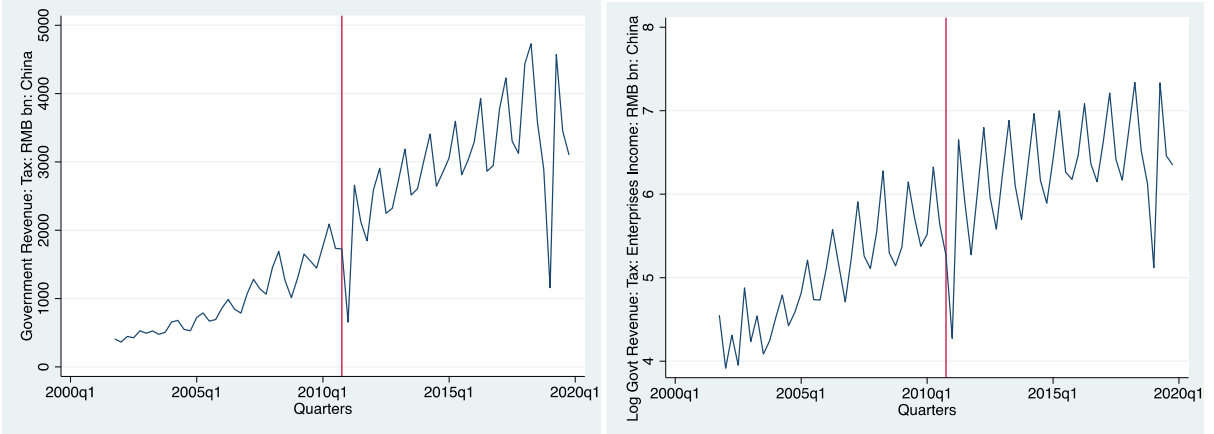
Figures A7 and A8: *China's House prices (%) and logged Market capitalization (%). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



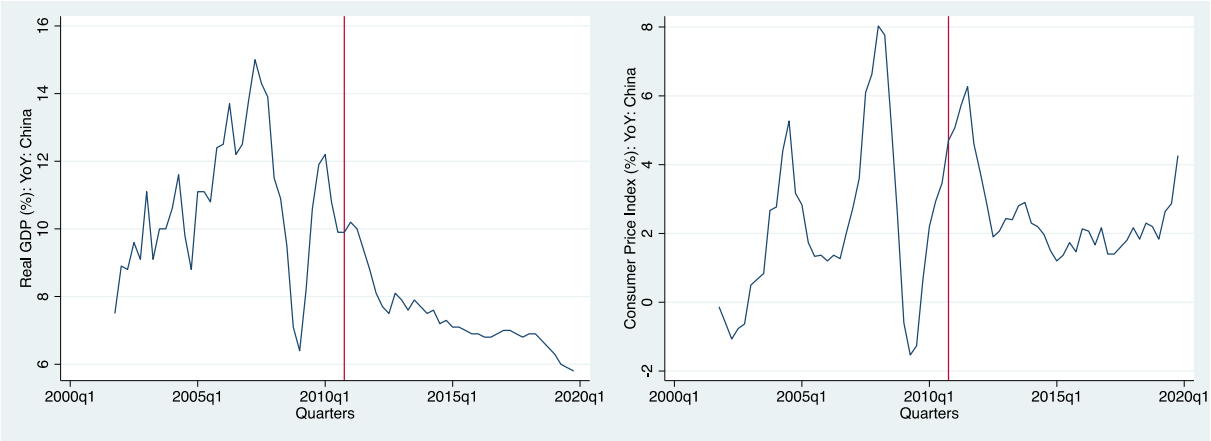
Figures A9 and A10: *China's national currency per USD (RMB/USD) and logged Total imports (%). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



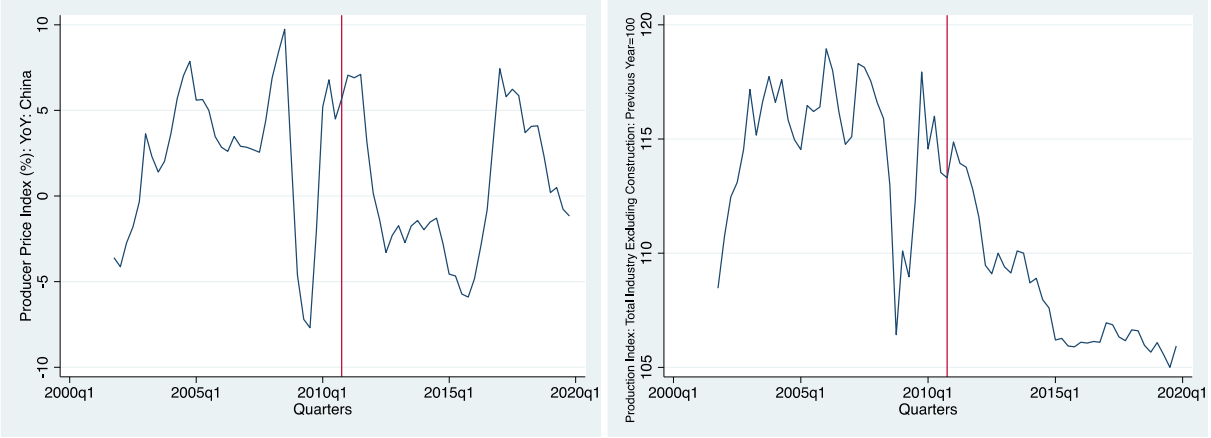
Figures A11 and A12: *China's direct investment abroad (USD mn) and fixed assets investment (%). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



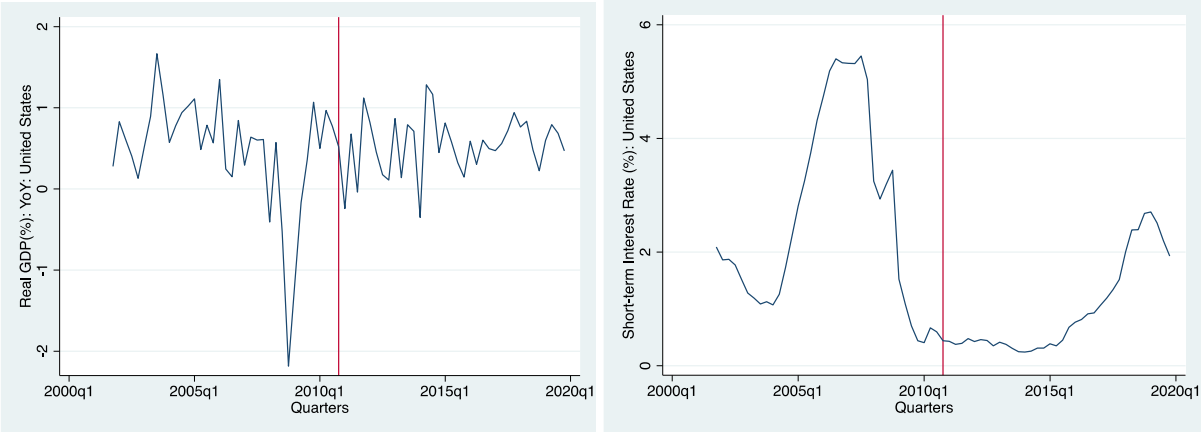
Figures A13 and A14: *China's government tax revenue (RMB bn) and logged enterprise income tax revenue (RMB bn). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



Figures A15 and A16: *China's real GDP (%) and consumer price index (%). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



Figures A17 and A18: *China's producer price index (%) and Production index (previous year =100). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).*



Figures A19 and A20: *United States real GDP (%) and short-term interest rate (%). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). OECD. (n.d.). OECD.Stat.*

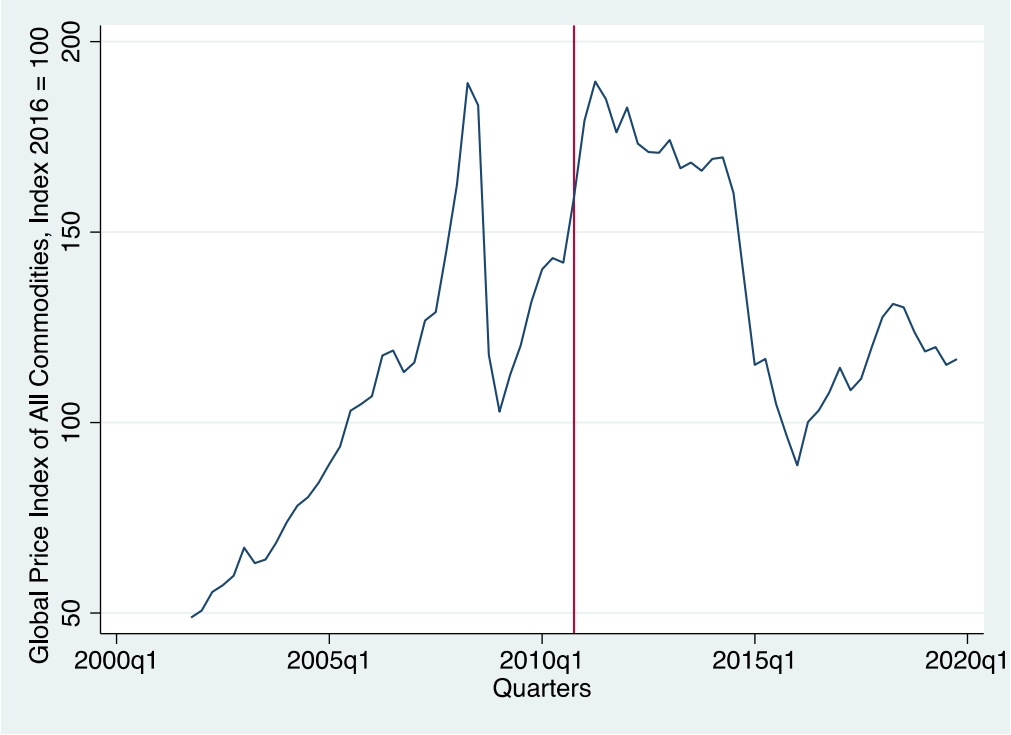


Figure A21: Global price index of all commodities (2016 =100). The red vertical line indicates the separation of the study's two time periods (January 1, 2011). Source: Census and Economic Information Center. (n.d.).

Table A1: *Link between China's economic growth indicators and response countries' GDPs (p-values).*

Country	Response variable (time period)	L	Real GDP	L	Consumer Price Index	L	Producer Price Index	L	Production Index: Total Industry Excluding Construction
Austrailia	GDP (2001-2010)	4	0.132	3	0.115	3	0.134	3	0.192
	GDP (2011-2019)	5	0.000 ***	5	0.352	4	0.001 ***	3	0.389
Japan	GDP (2001-2010)	4	0.414	4	0.113	3	0.002	3	0.000
	GDP (2011-2019)	4	0.022**	3	0.429	3	0.014**	2	0.039**
South Korea	GDP (2001-2010)	3	0.035**	4	0.177	3	0.461	2	0.379
	GDP (2011-2019)	4	0.001***	4	0.001 ***	3	0.027**	2	0.000***
Germany	GDP (2001-2010)	5	0.187	4	0.286	4	0.012**	4	0.112
	GDP (2011-2019)	5	0.000 ****	3	0.404	4	0.000***	4	0.018**
Russia	GDP (2001-2010)	4	0.252	3	0.712	3	0.968	4	0.019**
	GDP (2011-2019)	3	0.008***	3	0.007***	2	0.048**	3	0.002***
United states	GDP (2001-2010)	4	0.001***	3	0.005***	3	0.069*	5	0.728
	GDP (2011-2019)	3	0.001***	3	0.069*	4	0.000***	3	0.041**
Brazil	GDP (2001-2010)	3	0.013**	3	0.131	5	0.046**	3	0.606
	GDP (2011-2019)	3	0.000***	3	0.095*	3	0.042**	3	0.003***
South Africa	GDP (2001-2010)	5	0.026**	4	0.014**	3	0.502	3	0.019**
	GDP (2011-2019)	4	0.000***	3	0.459***	2	0.002***	3	0.004***
Total OECD	GDP (2001-2010)	4	0.375	4	0.227	2	0.010 **	4	0.086*
	GDP (2011-2019)	3	0.002***	3	0.001***	2	0.000***	4	0.005***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table A2: *Link between China's economic growth indicators and response countries' CPIs (p-values).*

Country	Response variable (time period)	L	Real GDP	L	Consumer Price Index	L	Producer Price Index	L	Production Index: Total Industry Excluding Construction
Austrailia	CPI (2001-2010)	2	0.232	2	0.567	3	0.323	3	0.121
	CPI (2011-2019)	3	0.032**	3	0.114	3	0.000***	2	0.006***
Japan	CPI (2001-2010)	3	0.345	4	0.143	4	0.021**	3	0.093*
	CPI (2011-2019)	2	0.222	3	0.082*	4	0.001***	2	0.057*
South Korea	CPI(2001-2010)	3	0.060*	3	0.112	3	0.068*	3	0.779
	CPI (2011-2019)	4	0.002***	4	0.090*	2	0.033**	4	0.013**
Germany	CPI (2001-2010)	4	0.0134	3	0.200	3	0.006***	3	0.030**
	CPI (2011-2019)	3	0.000***	4	0.101	4	0.002***	4	0.001***
Russia	CPI (2001-2010)	2	0.021**	2	0.344	4	0.120	3	0.044**
	CPI (2011-2019)	3	0.000***	5	0.121	3	0.000***	3	0.007***
United states	CPI (2001-2010)	3	0.034***	3	0.222	3	0.343	3	0.191
	CPI (2011-2019)	4	0.000***	5	0.179	2	0.023**	4	0.011**
Brazil	CPI (2001-2010)	5	0.234	3	0.345	4	0.133	3	0.435
	CPI (2011-2019)	4	0.085*	2	0.049**	5	0.231	4	0.098*
South Africa	CPI (2001-2010)	4	0.048**	4	0.494	3	0.088*	5	0.395
	CPI (2011-2019)	3	0.008***	3	0.111	2	0.032**	5	0.034**
Total OECD	CPI (2001-2010)	3	0.345	3	0.050*	4	0.000***	4	0.071*
	CPI (2011-2019)	3	0.007***	2	0.000***	3	0.000***	4	0.000***

*** p<0.01, ** p<0.05, * p<0.1

Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table A3: *Link between China's economic growth indicators and response countries' GDPs (p-values).*

Country	Response variable (time period)	L	Real GDP	L	Consumer Price Inde	L	Producer Price Ind	L	Production Index: Total Industry Excluding Construction
Austrailia	GDP (2001-2010)	4	0.132	4	0.171	4	0.155	4	0.123
	GDP (2011-2019)	4	0.004***	4	0.393	4	0.001 ***	4	0.322
Japan	GDP (2001-2010)	4	0.414	4	0.113	4	0.008***	4	0.001***
	GDP (2011-2019)	4	0.022**	4	0.493	4	0.024**	4	0.040**
South Korea	GDP (2001-2010)	4	0.065*	4	0.177	4	0.322	4	0.330
	GDP (2011-2019)	4	0.001***	4	0.001***	4	0.047**	4	0.000***
Germany	GDP (2001-2010)	4	0.217	4	0.286	4	0.012**	4	0.112
	GDP (2011-2019)	4	0.005***	4	0.354	4	0.000***	4	0.018**
Russia	GDP (2001-2010)	4	0.252	4	0.116	4	0.771	4	0.019**
	GDP (2011-2019)	4	0.002***	4	0.021**	4	0.008***	4	0.010**
United states	GDP (2001-2010)	4	0.001***	4	0.012**	4	0.077*	4	0.342
	GDP (2011-2019)	4	0.008***	4	0.088*	4	0.000***	4	0.049**
Brazil	GDP (2001-2010)	4	0.049**	4	0.198	4	0.012**	4	0.555
	GDP (2011-2019)	4	0.009***	4	0.067*	4	0.078*	4	0.022**
South Africa	GDP (2001-2010)	4	0.050*	4	0.014**	4	0.411	4	0.039**
	GDP (2011-2019)	4	0.000***	4	0.101	4	0.212	4	0.090*
Total OECD	GDP (2001-2010)	4	0.375	4	0.227	4	0.004***	4	0.086*
	GDP (2011-2019)	4	0.008***	4	0.109	4	0.000***	4	0.005***

*** p<0.01, ** p<0.05, * p<0.1

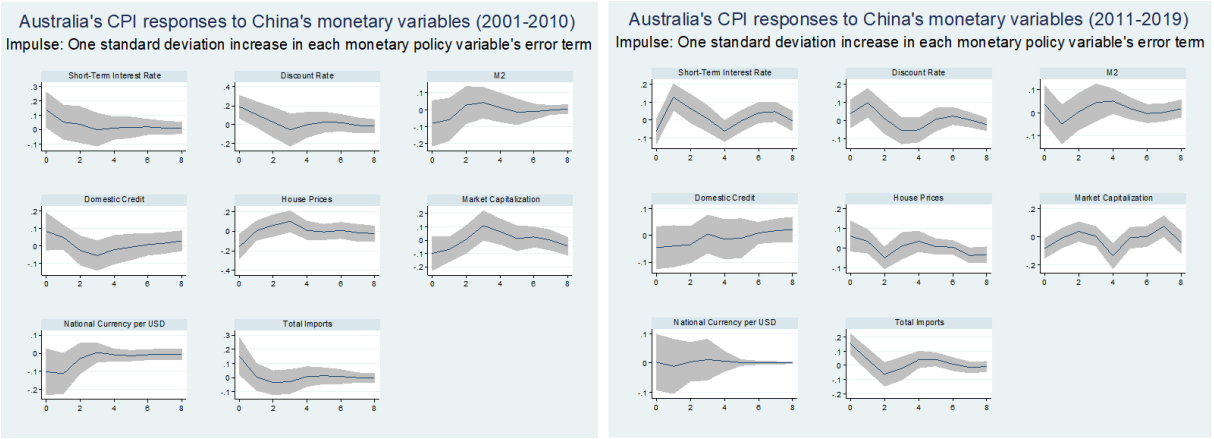
Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.

Table A4: *Link between China's economic growth indicators and response countries' CPIs (p-values).*

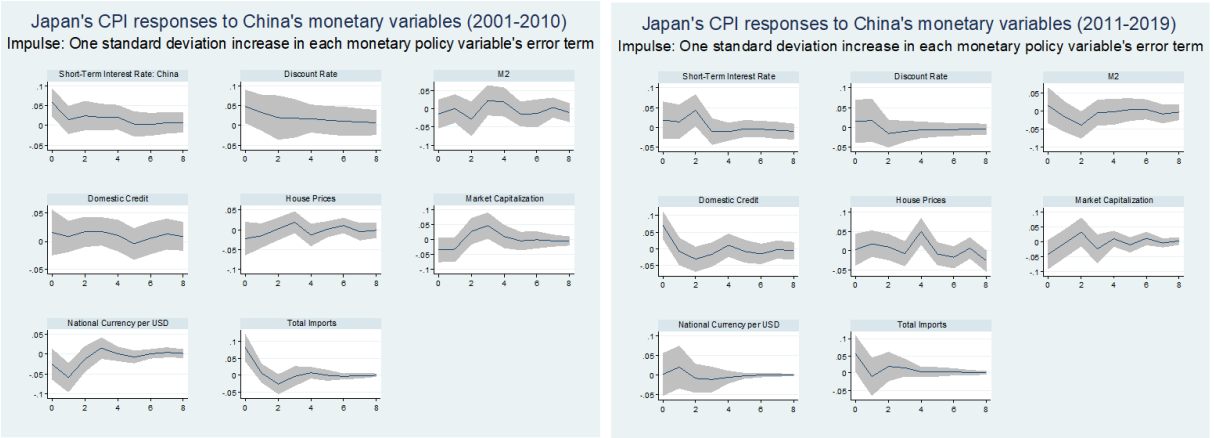
Country	Response variable (time period)	L	Real GDP	L	Consumer Price Index	L	Producer Price Index	L	Production Index: Total Industry Excluding Construction
Austrailia	CPI (2001-2010)	4	0.431	4	0.324	4	0.296	4	0.194
	CPI (2011-2019)	4	0.002***	4	0.145	4	0.000***	4	0.023**
Japan	CPI (2001-2010)	4	0.403	4	0.143	4	0.021**	4	0.044**
	CPI (2011-2019)	4	0.113	4	0.137	4	0.001***	4	0.007*
South Korea	CPI(2001-2010)	4	0.044**	4	0.169	4	0.027**	4	0.892
	CPI (2011-2019)	4	0.002***	4	0.090*	4	0.004**	4	0.013**
Germany	CPI (2001-2010)	4	0.0134	4	0.288	4	0.005***	4	0.098*
	CPI (2011-2019)	4	0.000***	4	0.101	4	0.002***	4	0.001***
Russia	CPI (2001-2010)	4	0.022**	4	0.455	4	0.120	4	0.064*
	CPI (2011-2019)	4	0.000***	4	0.176	4	0.010**	4	0.088**
United states	CPI (2001-2010)	4	0.011**	4	0.490	4	0.243	4	0.143
	CPI (2011-2019)	4	0.000***	4	0.466	4	0.008***	4	0.011**
Brazil	CPI (2001-2010)	4	0.674	4	0.209	4	0.133	4	0.404
	CPI (2011-2019)	4	0.085*	4	0.000***	4	0.017**	4	0.098*
South Africa	CPI (2001-2010)	4	0.048**	4	0.494	4	0.050*	4	0.212
	CPI (2011-2019)	4	0.000***	4	0.196	4	0.016**	4	0.002**
Total OECD	CPI (2001-2010)	4	0.300	4	0.184	4	0.000***	4	0.071*
	CPI (2011-2019)	4	0.006***	4	0.008***	4	0.006***	4	0.000***

*** p<0.01, ** p<0.05, * p<0.1

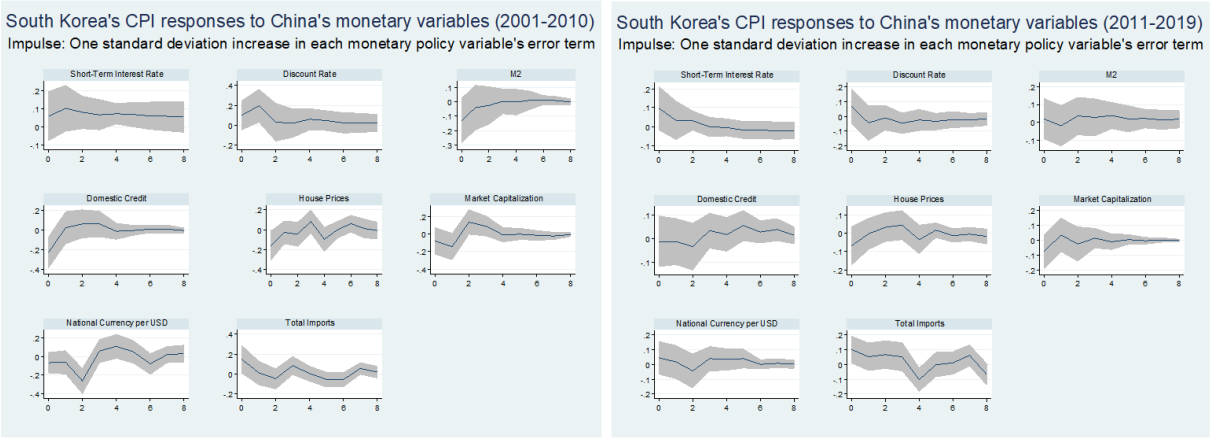
Note: The exogenous variables are the United States' real GDP and short-term interest rate, except when the United States GDP is the response variable. L = lags.



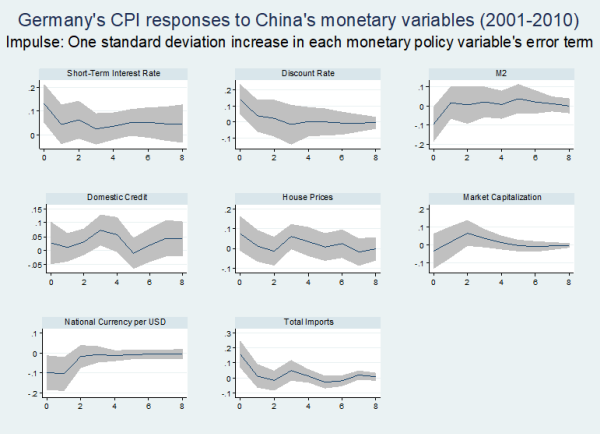
Figures A22 and A23: *Orthogonalized impulse response functions of Australia's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*

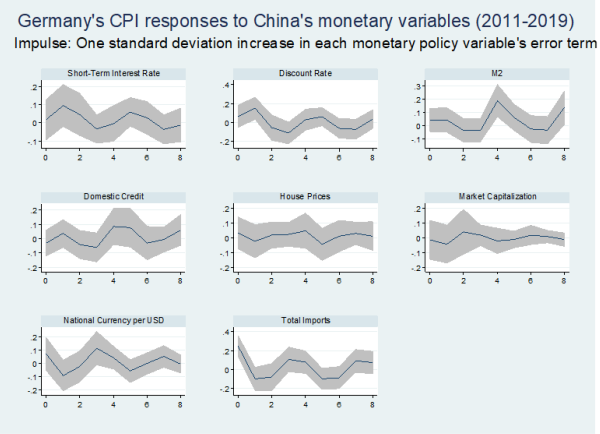


Figures A24 and A25: *Orthogonalized impulse response functions of Japan's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*

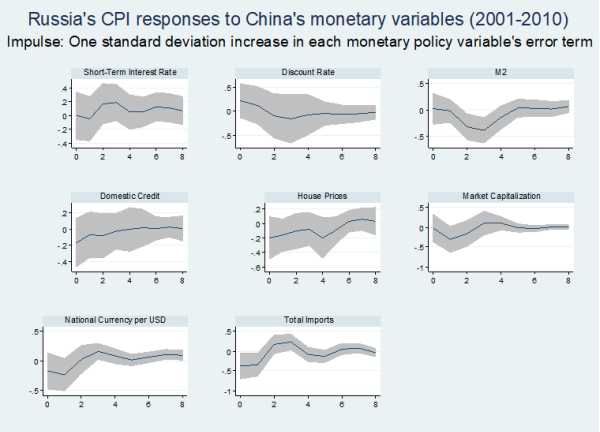


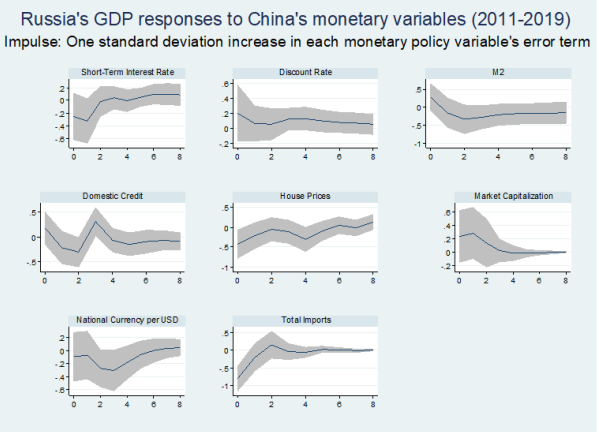
Figures A26 and A27: *Orthogonalized impulse response functions of South Korea's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



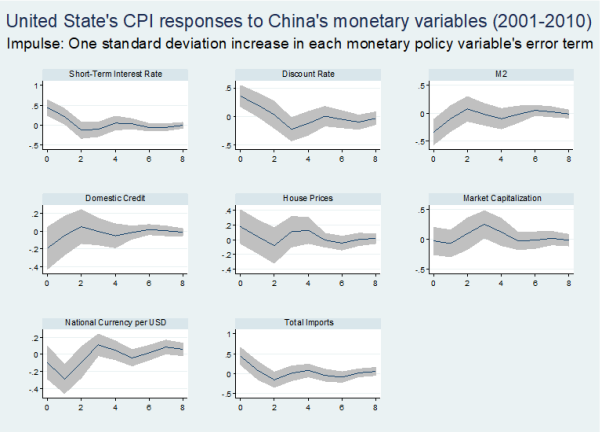


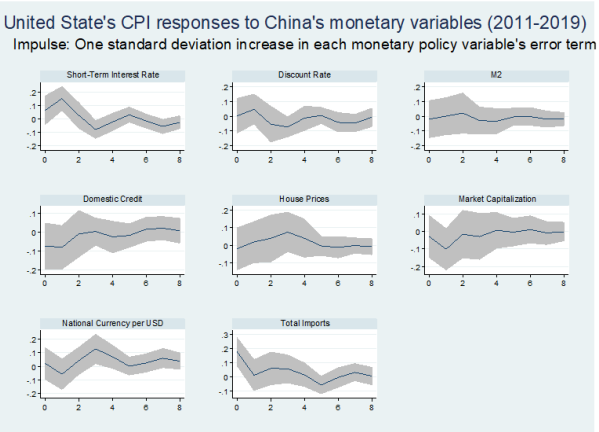
Figures A28 and A29: *Orthogonalized impulse response functions of Germany's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



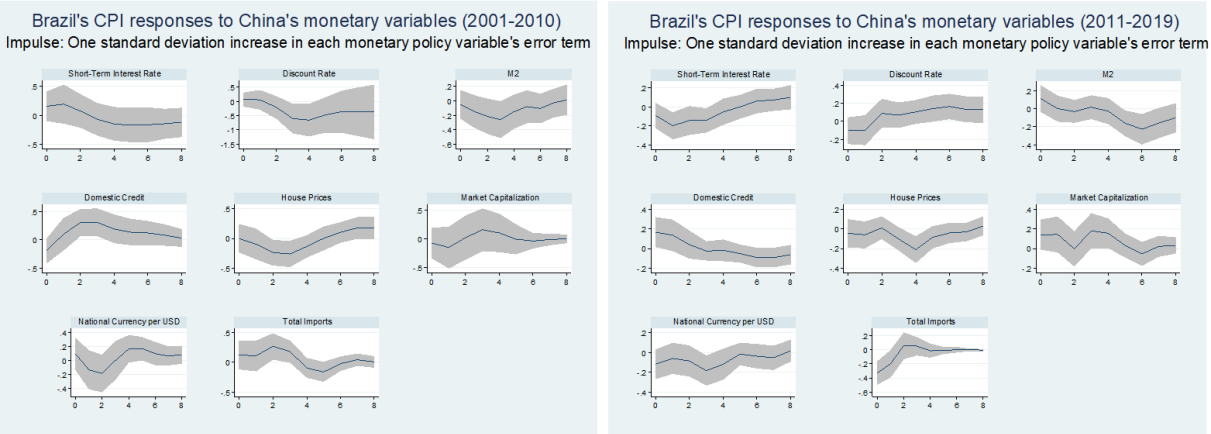


Figures A30 and A31: *Orthogonalized impulse response functions of Russia's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*

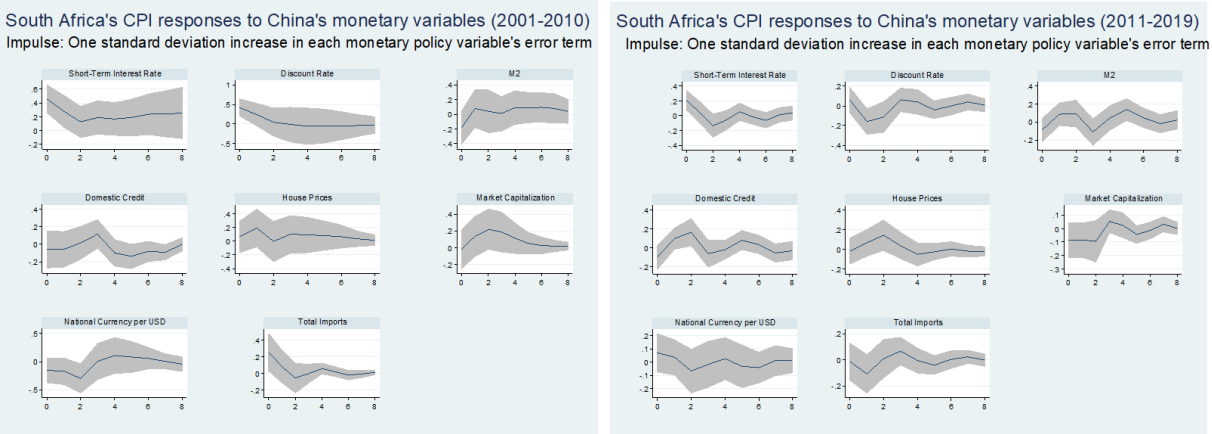




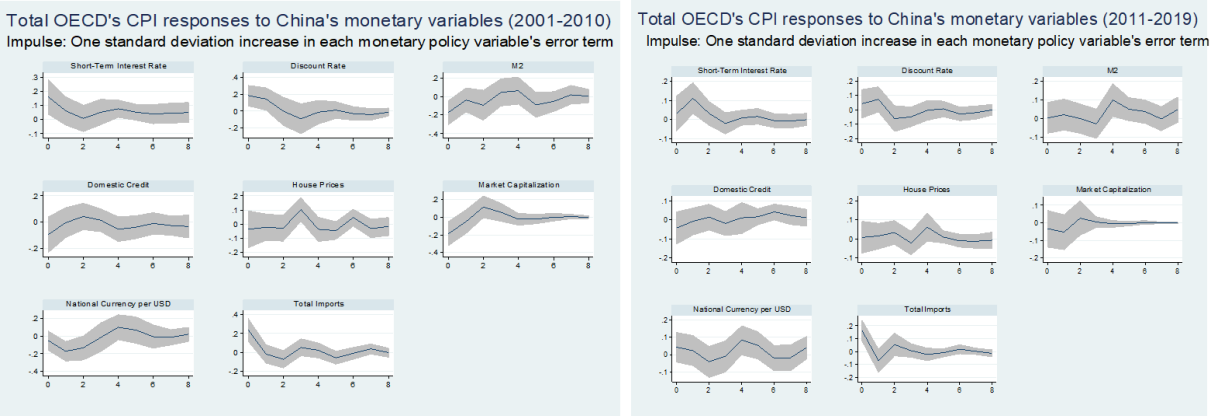
Figures A32 and A33: *Orthogonalized impulse response functions of the United states' CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



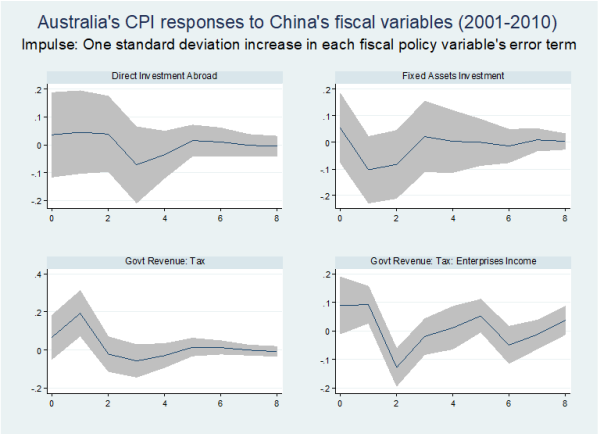
Figures A34 and A35: *Orthogonalized impulse response functions of Brazil's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*

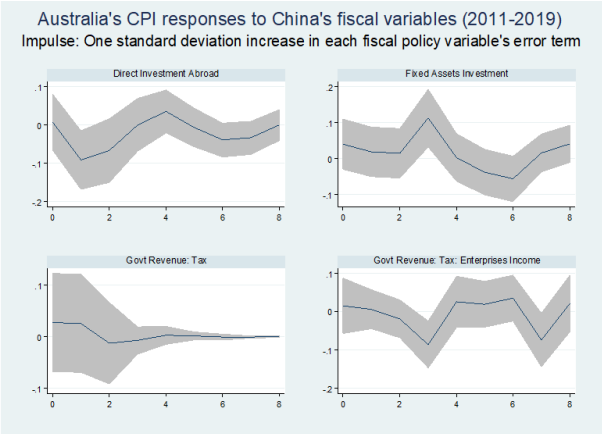


Figures A36 and A37: *Orthogonalized impulse response functions South Africa's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*

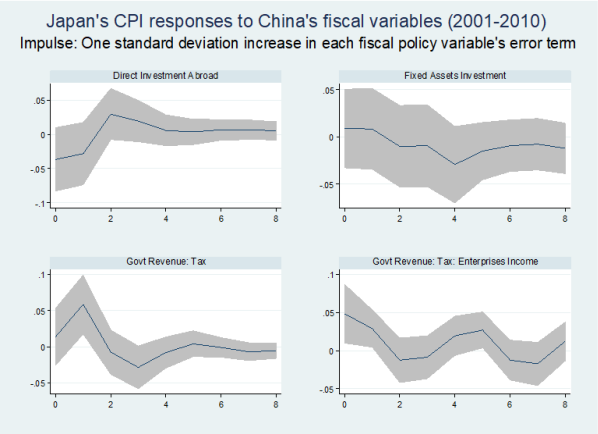


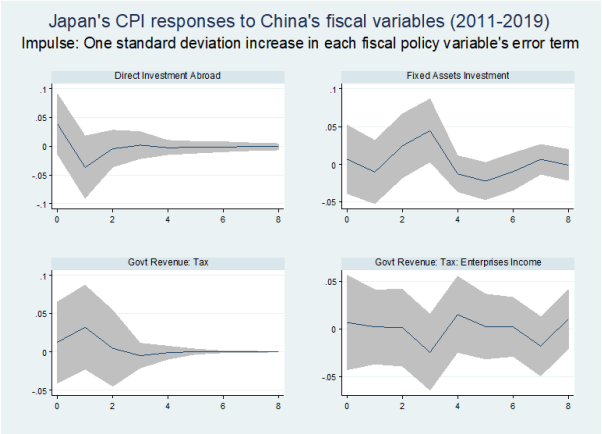
Figures A38 and A39: *Orthogonalized impulse response functions of total OECD's CPI responses (2001-2010 and 2011-2019) to shocks in China's monetary policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



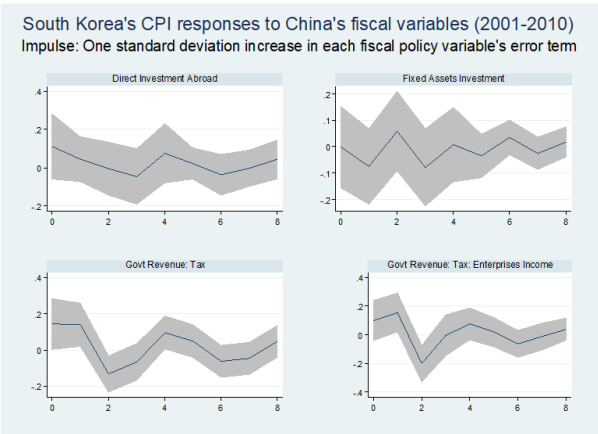


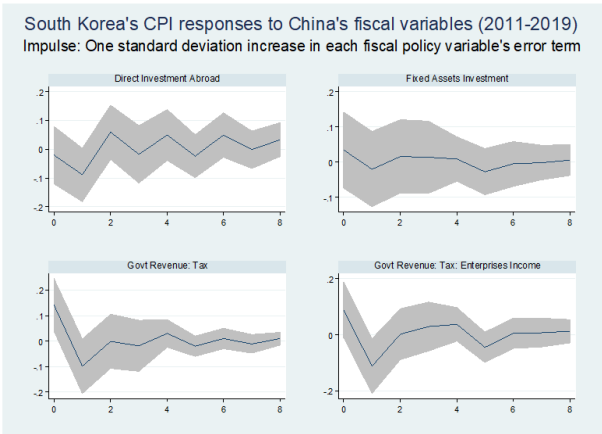
Figures A40 and A41: *Orthogonalized impulse response functions of Austarilia's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



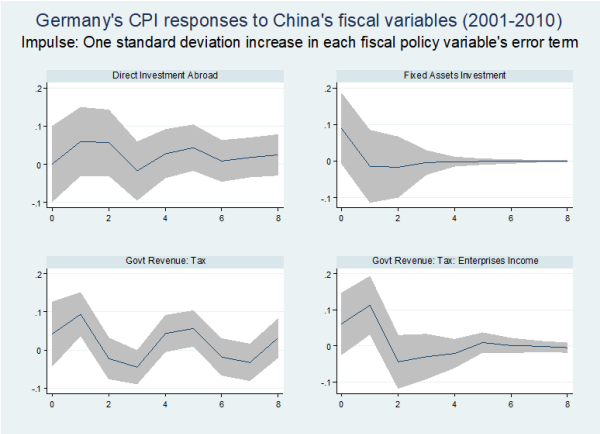


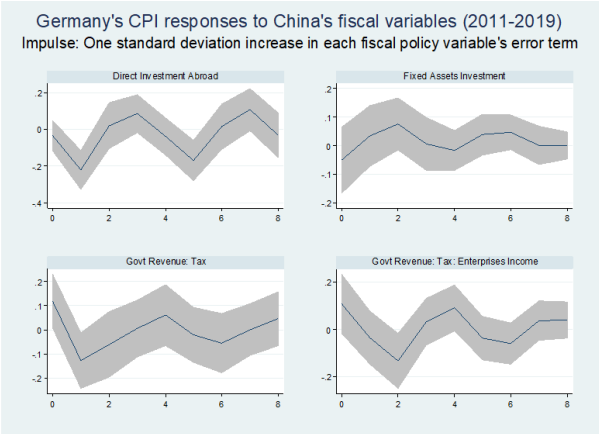
Figures A42 and A43: *Orthogonalized impulse response functions of Japan's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



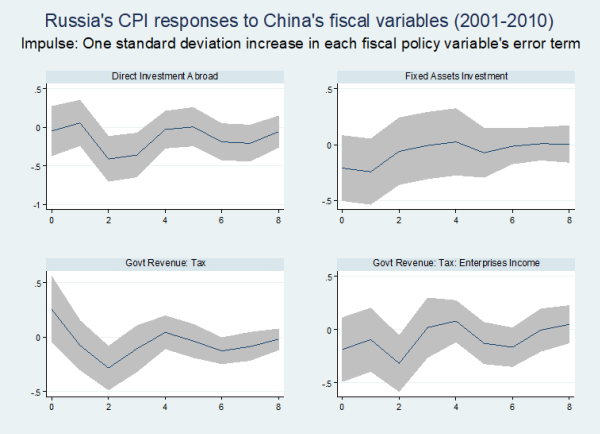


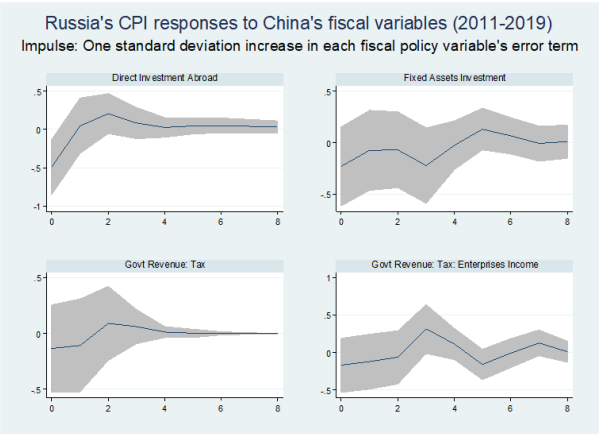
Figures A44 and A45: *Orthogonalized impulse response functions of South Korea's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



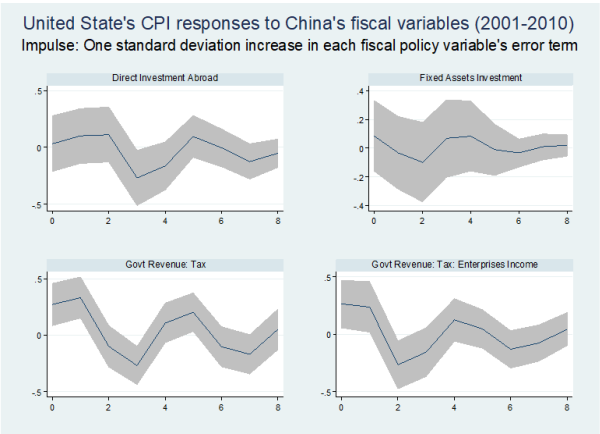


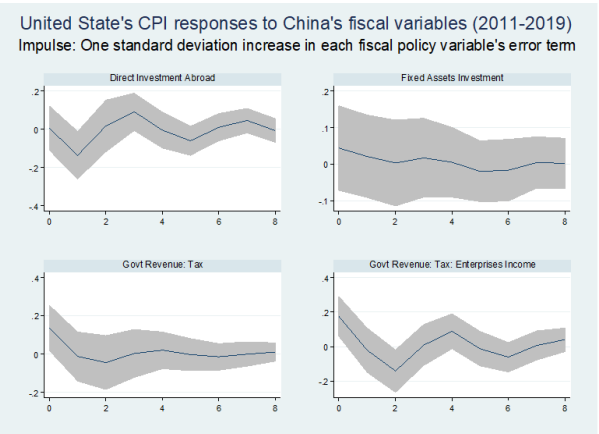
Figures A46 and A47: *Orthogonalized impulse response functions of Germany's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



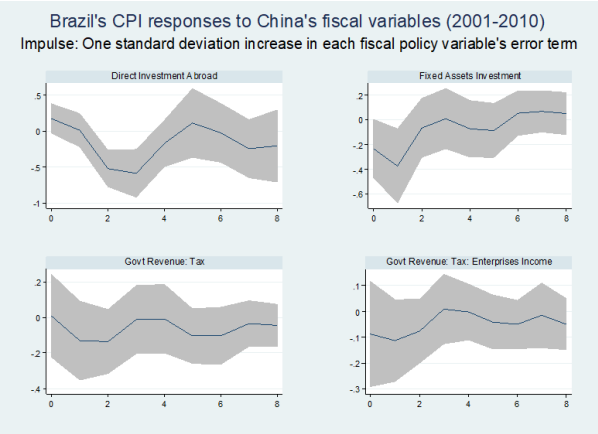


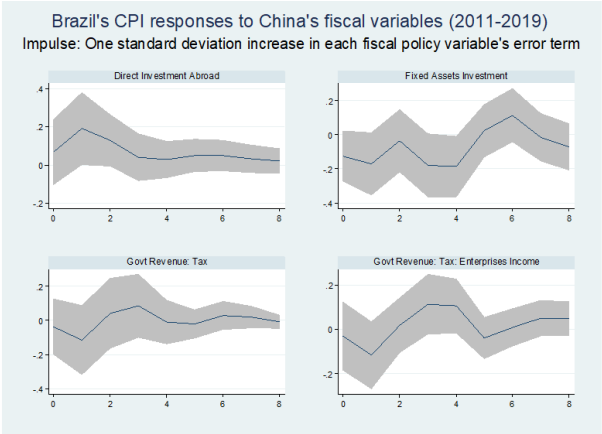
Figures A48 and A49: *Orthogonalized impulse response functions of Russia's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



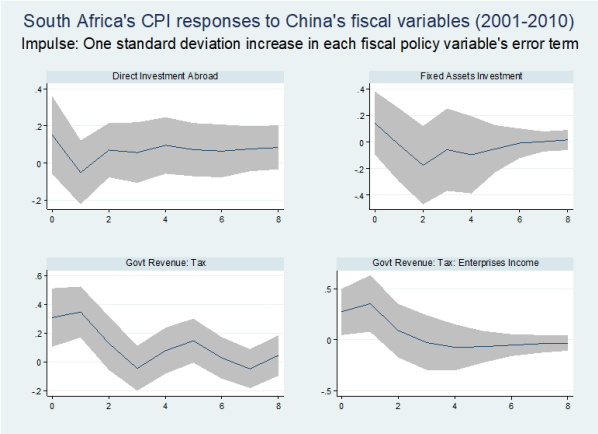


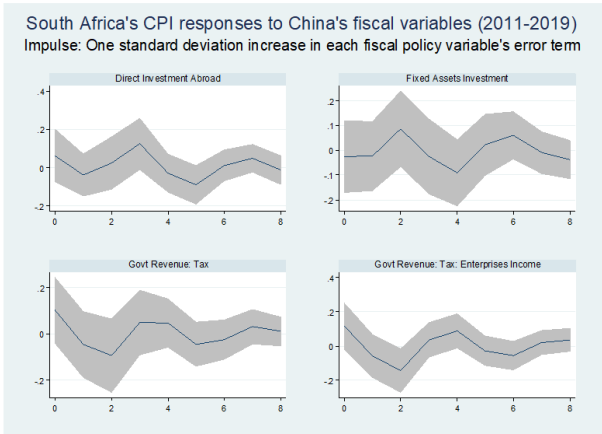
Figures A50 and A51: *Orthogonalized impulse response functions of the United States' CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*



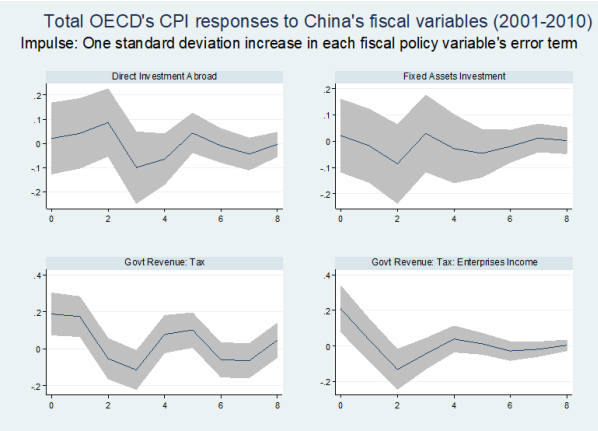


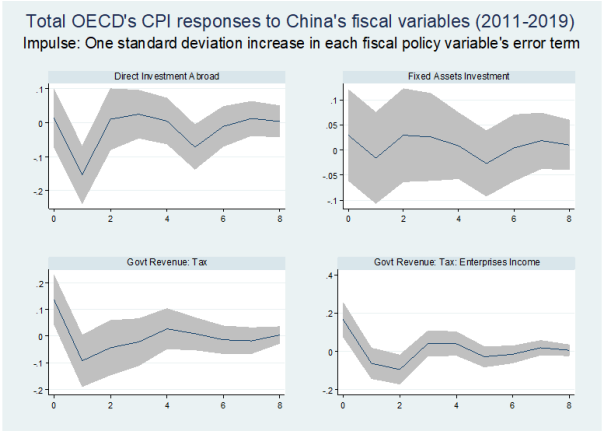
Figures A52 and A53: *Orthogonalized impulse response functions of Brazil's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*





Figures A54 and A55: *Orthogonalized impulse response functions of South Africa's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*





Figures A56 and A57: *Orthogonalized impulse response functions of total OECD's CPI responses (2001-2010 and 2011-2019) to shocks in China's fiscal policy variables. Note: The x-axis shows the number of quarters after the shock, and the y-axis shows the CPI response. Confidence intervals = 95%.*