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Abstract

Economic shocks from a massive flood in May 2022 created an enormous shock to the Chinese economy. We construct a scenario after the financial market is affected by a natural disaster based on the flood disaster in Zhengzhou, China in July 2021. In this scenario, we refer to the changes in the financial market before and after the impact, including before the market liquidity became worse, how most enterprises lost their assets and were forced to seek loans from the central bank called the People's Bank of China (PBC), and the massive sale of bonds in the affected areas leading to higher interest rates. The recommendation for the PBC is to allow the central bank to extend their loans, change the interest rate to become more expansionary and flexible, and reduce the reserve requirement ratio to allow for more cash to be allocated to the affected sectors.

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TABLE OF CONTENTS

1. Macroeconomic Environment and Financial Market Conditions

The Chinese economy is said to be the economic miracle of the century. In 2021, China's economy will grow by 8.1 %, and in March of 2022, the Chinese government set a target for 5.5% GDP growth for all of 2022. (McCully 2022) This follows a robust economic recovery from the pandemic that China first faced in early 2020. Since Deng Xiaoping first opened up the economy with economic reforms in 1978, the Gross Domestic Product (GDP) has been growing at an average of 10% every year, bringing China to the status of an upper-middle-income country. (The World Bank, 2022) China's economy consists primarily of natural resources, manufacturing, exports, low-cost labour, and building up its capital. For the remainder of 2022, China's government has pledged to increase public expenditure on infrastructure and small to medium-sized businesses. (McCully & Desormeaux, 2022) However, with the introduction of four unforeseen shocks, the growth of China's economy is now in question.

The omicron variant of SARS-Cov-2 has introduced more widespread infection rates, leading city and provincial officials to close and seal off their cities. (In February 2022, the Russian Armies entered Ukrainian territory, leading to international condemnation and large amounts of sanctions against the Russian economy, influencing global oil and natural gas prices. Many economies are also experiencing higher than expected rates of inflation, leading to higher transportation and storage costs and an acceleration of the growth in wages. The increase in inflation, in addition, leads to an increase in interest rates, causing domestic equity to decrease by more than 40% by the middle of May. Key domestic financial markets have now become unable to be liquified; exchange rates are now highly volatile. In addition, China domestically has experienced a significant flood inducing additional stress into the economy through the destruction of agriculture and affecting the supply of natural resources, transportation, and the inflation of goods in the economy.

With these shocks, China's economic growth will slow down. The Chinese government is likely to implement policies with city-wide lockdowns with public health and mobility restrictions. (Coulton et al., 2022) Tangible changes include retail sales by 3.5%, reduced industrial production and investment, disrupted supply chains, and decreased labour availability and employment, leading to overall reduced investment into local businesses and the economy while in addition facing decreases in exports due to the disrupted supply chains. The war in Ukraine has led to minimal impact on the Chinese economy. However, it still influences China's GDP growth goals. With the increases in gas prices, China has needed to resort to increased domestic coal production and consumption as importing gas has become unavailable, leading to the economic goals of developing new clean energy alternatives being put on hold. (Endresen, 2022) Brought upon by the global pandemic, global inflation has increased substantially, and China is no exception, facing increases in consumer inflation with price indexes increasing by almost 3.3%. (Bloomberg News, 2022) The charts of the growth rate of GDP and CPI see Appendix A.

At the beginning of 2022, China's stock market was hit hard by the FED's interest rate hike and reduction of balance sheets (January), the Russia-Ukraine war (March), and the lockdown of Shanghai (April). The two major indices, the SSE and SZSE Composite, experienced remarkable decreases, with more than 3,000 stocks at their worst tumbling simultaneously. We can also see from the chart(sees Appendix B) that the first quarter of 2022 saw the stock market plunge spectacularly in January, March and April, only to see some recovery in February. So, for now, China's stock market is still in danger, as it is now heading into the second quarter, and many uncertainties exist about China's Covid response, especially in big cities. (Cheng, E., & Chao, D.2022)That is a challenge for the Chinese stock market. There is no doubt that if there is another shock to the economy, confidence in the Chinese stock market will erode further. The stock market shows the confidence of investors. The heavy rain and flood could further reduce people's confidence in investment because the flood could hurt the transportation of production materials.

Commercial banks have maintained acceptable liquidity, but there is a downward slope from 2021 Q4 to 2022 Q1 for liquidity coverage ratios and Loan-deposit ratios. By the end of the first quarter of 2022, the liquidity coverage rate of commercial banks was 143.22%, which was reduced by 2.07% from the end of the previous quarter. Liquidity ratio of 61.22%, 0.91 percentage points higher than the end of last quarter. The loan-to-deposit ratio (domestic RMB loans and deposits) was 78.70%, which decreased by 0.98% from the end of the previous quarter. (Charts of liquidity see Appendix C)The trends shown in the charts suggest that the Chinese government is trying to protect the economy from slowing growth and plummeting stock markets by keeping liquidity high. If there is a new shock, the economy could face a more severe challenge due to the increased transaction cost of economic activities. The liquidity will decrease as well. (China banking and insurance regulatory commission.2022, February 11, June 2)

In 2021, widespread heavy rainfall in Hunan province caused floods and urban waterlogging, affecting tens of millions of people and leaving hundreds dead or missing. The rain has dealt a heavy blow to Zhengzhou, one of China's most important transport nodes, leading to widespread cancellations of flights and trains. If a new flood occurs in May, disrupted transport will hit productivity in the short term, weakening the supply side, negatively affecting the economy and decreasing investors' confidence. In the short run, it could lead to lower incomes and higher unemployment. On the other hand, the general cost of rescuing and evacuating people could add to the government's deficit. At the beginning of this article, we introduced that China's economic growth is slowing down at this time and that a new heavy rainstorm in May 2022 will further worsen the economy. If the government does not act, GDP will fall, the stock market will continue to fall further as it did in Q1 2022, and liquidity ratios will continue to fall.

2. Financial Market Liquidity Operations

In the difficult times brought by the economic shocks from the May 2022 events, the ability to use the available assets to settle liabilities will prove to be a key player in the path to economic recovery. Luckily for China, China has large amounts of assets that can be used for economic support. There are three primary operations to be discussed and compared as China attempts to move out of the economic situation brought on by the May 2022 shocks.

Reverse Repo

A *reverse repo* is a transaction in which the PBC purchases securities from a primary dealer and makes agreements to sell the securities to the same primary dealer on a specific date in the future. It is an operation in which the central bank increases liquidity in the market, and it expires as an operation in which the central bank withdraws liquidity from the market. A more straightforward explanation of this liquidity option is that the transaction of actively lending funds and obtaining bond pledges is called a reverse repo transaction when the investor is the financier who accepts bond pledges and lends funds.

In the first quarter of 2022, the PBC strengthened monitoring and analysis of various liquidity supply and demand factors, such as the Spring Festival cash injection, government bond issuance, end-of-quarter regulatory assessment, and epidemic, and made an excellent cross-cycle design to flexibly conduct open market operations to maintain a reasonable abundance of liquidity. Before the Spring Festival, the 14-day reverse repo operation was launched in a timely manner to inject liquidity across the Spring Festival, and the operation scale was flexibly adjusted to hedge against short-term disturbances such as peak cash injection and meet the liquidity needs of institutions across the Spring Festival, while arranging for an essential match between reverse repo maturity and cash repossession after the Spring Festival, so as to maintain a balanced supply and demand of funds, without loosening or tightening. After the Spring Festival, PBC insists on conducting daily open market reverse repo operations, taking into account changes in the internal and external market environment and expectations, as well as the impact of the epidemic and other factors, and flexibly grasping the strength and pace of reverse repo operations to iron out short-term fluctuations in a timely manner and maintain a reasonable abundance of liquidity and stable market expectations.

Medium-term Lending Facility(MLF)

PBC launched MLF in September 2014, which is one of the critical monetary tools. In general, MLF is the main mechanism of commercial Banks or policy Banks (the government to enforce the government's economic policies, in particular areas to conduct financial business and set up to meet the requirements of prudent management specialty, the nonprofit financial institutions) to the central bank to provide three months to 12 months of eligible collateral. This is usually agreed by the central bank, which sets interest rates. After that, the PBC will give the money to commercial banks or policy banks, which then lend it to companies that need it. (Zhao, Z. et al.,2021)

MLF plays the role of "medium-term policy interest rate" to provide guidance and encouragement for major domestic financial institutions to provide low-cost funds to the real economy and reduce the social financing transaction costs. This provides sufficient and essential convenience for financial stocks, banks, insurance and securities companies, as their financing costs are relatively low. Another reason is that financial firms invest in many other companies, which can improve their performance. (Zhao, Z. et al.,2021)

In fact, in response to the economic downturn, the central bank had already started to cut the MLF rate by 0.1 percent at the beginning of 2022, from 2.95 percent to 2.85 percent (Reuters Staff. 2022) in an attempt to boost liquidity. The government also issued more than 2 trillion yuan in MLF supplements in 2021 on the liquidity needs of financial institutions. (Monetary policy analysis group,2022)

Small and medium-sized enterprises will be in desperate need of new loans in the wake of natural disasters, as many are likely to have their capital chains disrupted by the lack of transport in the short run. (Liu, K. 2019) The lower MLF provides a lower cost of the loan for companies which were hurt in the natural disaster in May. The influence of the flood will not last long. When the rainy season ends, the recovery of the economy will come back. So the reduction of the MLF rate does not need to be a long-term policy. 6-12 months can be a suitable time for the recovery. Moreover, at the same time, the central bank should inject more money into the MLF system in order to save more medium and small enterprises which were affected by the flood.

Short Term Liquidity Operations:

First introduced in 2013, Short-Term Liquidity Operations (SLO) is a monetary policy used to inject liquidity into the economy by pumping cash into the reserves of banks. In 2016, the PBC injected over 150 billion yuan into the banks over a three-day-long operation. During that time, it was to meet the demand of cash shortages during the Chinese New Year. (Thomson Reuters, 2016) This kind of policy helps adjust the interest rates allowing the margins for collateral to be lowered, whereas lowering the margin for collateral allows the perceived risk for default to be lowered, meaning asset prices can be raised. Changes like these can positively affect both the financial market and the real economy, which can prove beneficial to the economy as a result of the May 2022 shocks. The main benefit is that changing the collateral margins gives the central bank more space to navigate financial cycles and shocks. (Fang et al., 2020)

The main drawback of this operation is the nature of it being short-term. This operation typically is not in effect for a very long time. Compared to the other two operations mentioned, where one is medium-term, and the other can pick and choose a specific date to conduct the operation, SLO is limited as injecting funds into banks to change liquidity and asset prices will inevitably lead to inflation, therefore is only used for short-term operations. (Girardin et al.,2017)

These liquidity operations provide a way for the economy to have funds and cash available for the economy, and during an economic shock, no matter what drawback or benefit each operation has, they are important to the recovery process of the economy.

3. Monetary Policy Options

China has a number of monetary instruments that vary from formal (conventional) to relatively informal (unconventional) measures, ranging from Open Market Operation (OMO), Required Reserve Ratio (RRR), and Medium-term Lending Facility (MLF), and Standing Lending Facility (SLF).

Open market business(conventional)

By definition, open market business is a policy tool that is used by the central bank to adjust the amount of money circulating in the market by buying and selling securities, thereby affecting economic development. When the economy is in a recession due to floods, the central bank buys marketable securities to release money into the market. When the money supply increases, interest rates fall, and financial institutions have more funds to use, which in turn stimulates the increase in planned investment, output and income, and ultimately stimulates the prosperity of market economic activity. When the economy is prosperous, in order to curb the continuous rise of inflation, the central bank can choose to sell securities, thereby reducing the money supply in the market, rising interest rates, and then inhibiting the loan business of financial institutions investment, output and income. Then it will reduce and then achieve the policy effect of restraining economic overheating and inflation (Harvey & Huang, 2002).

In 1998, when the China economy was sluggish, in order to stimulate economic prosperity, the People's Bank of China resumed open market business bond trading and conducted 36 open market business transactions, netting 70.1 billion yuan in base currency (Xie, 2004).

Reserve requirement policy(conventional)

The deposit reserve is a policy tool to regulate the economy by adjusting the reserves paid by commercial banks. When the economy is in a downturn due to floods, in order to stimulate the money supply, the central bank chooses to reduce the reserve ratio. When the central bank wants to shrink the scale of credit, it increases the statutory reserve ratio, shrinks the money supply, and curbs inflation (Cui & Yu, 2013).

In 1999, the People's Bank of China lowered China's statutory deposit reserve ratio from 8% to 6% in November of that year in order to cooperate with China's policy of expanding domestic demand and increasing the funds available to China's commercial banks (Xu, 2011). These two adjustments to the statutory deposit reserve ratio increase the money supply in order to cope with the deflation crisis brought by the financial turmoil in our country.

Central bank loan(unconventional)

As the central bank of China, lending to professional banks and other financial institutions is an important part of the daily business of the People's Bank of China, as well as the main means of its monetary policy implementation. Unlike central banks in other countries, the most common form of lending by the People's Bank of China is unsecured credit lending, which means lending directly to specialized banks and other financial institutions.

The objectives of the central bank's loans are 1. to control the total size of loans; 2. Adjust the loan structure and control the total amount of loans. 3. Have a plan to tighten the loans of the

People's Bank of China; The size of loans directly affects the expansion or contraction of the money supply. (Bailey, Warren, Wei Huang, and Zhishu Yang, 2011)

When a major flood comes, the central bank will provide emergency loans to enterprises that have caused losses. The loans are applicable to borrowers of enterprises and institutions that have the production conditions of relevant materials and social services to deal with emergencies. (PSBC, Nov.8th, 2020)

Interest rate policy(conventional)

Interest rate policy refers to the policies and measures that are adopted by the central bank to control and adjust the market interest rate and influence the supply and demand of social funds. It is an important means for the People's Bank of China to control the credit scale indirectly. The central bank's interest rate is based on the monetary policy target, and the change in market fund demand and supply is an important parameter of the central bank's interest rate policy. The importance of this parameter to the PBC's interest rate policy largely depends on the extent to which China uses market mechanisms to regulate economic activity. At present, the People's Bank of China adopts the following interest rate tools (Yi Gang, 2021):

1. Adjust the benchmark interest rates of the central bank, including lending rate, rediscount rate, deposit reserve ratio and excess deposit reserve ratio.

2. Adjust the legal deposit and lending rates of financial institutions.

3. Formulate floating ranges for deposit and loan rates of financial institutions.

4. Formulate relevant policies and adjust various interest rate structures and levels.

China's interest rate management system is relatively single and has long been a strictly regulated interest rate regime. The basic condition of the interest rate management system of interest rate reform, transmission mechanism, and the external environment is not yet complete, making saving, consumption, investment and economic growth of the elasticity of the interest rate are not big, directly affect the full implementation of China's reform of marketization of interest rate. In times of disaster, such as a flood, interest rates are raised by bond sales, and the central bank keeps interest rates within a range to prevent excessive inflation, but the range is unstable because of the imperfection of China's interest rates.

The exchange rate policy(conventional)

Exchange rate policy refers to the government's control of imports, exports, and capital flows in an economy through the rise and fall of the exchange rate. Controlling the currency in this way can help achieve balance and equilibrium in payments. As one of China's main monetary policies, exchange rate policies have certain operating rules and objectives due to the relationship with other countries. While in theory, the goal of China's exchange rate can either be maintaining sustained economic growth, full employment, maintaining stability in its currency (such as controlling inflation), or a combination of all of these objectives, in practice, China's exchange rate objective is often constrained lots of factors and may be changed with relation to reality. In any case, the objective of the exchange rate regime will always be relatively fixed at a certain stage.

On July 21, 2005, the People's Bank of China lowered the value of the Yuan by 2.1% by redefining it from 8.27 to 8.11 per US dollar. This small change started the official modification of China's exchange rate system. Although the exchange rate has become more flexible over time, it is still carefully managed. In order to absorb external shocks and combat future economic stresses, a flexible, market-determined exchange rate is needed for the People's Bank of China in order to manage the domestic economic conditions better. (Sonali Das, 2019)

Standing lending facility (unconventional)

Standing Lending Facility (SLF) is another unconventional monetary policy that essentially lends off large-scale liquidities to financial institutions with maturity rates from 1-3 months. (Liu, 2019) This means that a shock should occur. The central bank can allocate funds to other sectors such as agriculture and rural areas. (Wang et al., 2022) Practically, this means banks can obtain liquidity from the PBC at a discounted rate and on short-term maturity, which is great for meeting temporary liquidity demands. (Maino & Laurens, 2007) (Markets Committee, 2019) This allows financial institutions to obtain short-term liquidity from the central bank to aid in its own liquidity management. China first implemented this policy in 2013, and it has shown results in supporting financial institutions, which thereby can support the real economy. With a large-scale allocation of funds and lending, this operation could provide market liquidity and increase investment opportunities. (Wang et al., 2022)

The objective constraint of Chinese monetary policy is mainly reflected in two aspects: one is the multi-objective constraint. According to the Tinbergen principle, to achieve several independent policy objectives, at least several independent and effective policy instruments are needed. In terms of the ultimate goal, though, the central bank's monetary policy goal states that they must "maintain the stability of the value of the RMB and thus promote economic growth." Nevertheless, in fact, maintaining the stability of domestic prices, maintaining the stability of foreign exchange rates, and promoting the reform of state-owned enterprises and state-owned banks are all considered in the implementation of monetary policy by the central bank. From the point of view of intermediary targets, there are also multiple target constraints such as basic money quantity, money supply, interest rate and loan amount, which makes the single monetary policy seem powerless due to multiple target constraints. The second is the controllability constraint of the target.

Due to the imperfect financial market, the instability of foreign exchange funds and financial innovation and other aspects of the impact. As the intermediary target of monetary policy, the money supply is increasingly unstable, and MO, M1 and M2 become difficult to distinguish, and their controllability keeps declining. From the point of view of the intermediary target of interest rate, only the nominal interest rate can be controlled, while the real interest rate that really affects investment and consumption cannot be effectively controlled. However, the defects of the term structure of interest rate (reflected in the low long-term bond interest rate and the low short-term interest rate) directly disturbed the realization of the central bank's regulation measures.

The empirical analysis of Xiong Lu and Hao Lianfeng shows that since the central bank began to take base money and money supply as monitoring targets in 1994, the money supply is not ideal most of the time. Shen Neng's paper on the test of structural Changes in Money supply and prices in China believes that the central bank's goal of stabilizing prices through the regulation of money supply cannot be achieved under the current financial system transition, and it is more likely to aggravate macroeconomic fluctuations and bring negative effects on the economy.

4. Monetary Policy Implementation

Since the central bank of China, the People's Bank of China (PBC), began undertaking responsibilities similar to other central banks, the monetary policy has always been changing to meet the challenges introduced with an opening and growing economy.

Central Bank Loan

The People's Bank of China has been lending money for a long time, starting from 1955 when government shares were added to private banks, making PBC the central bank and the only bank of China(The rest, like PSBC, is its branch). As the central bank of China, lending to professional banks and other financial institutions is an important part of the daily business of the PBC, as well as the main means of its monetary policy implementation. Compared to central banks in other countries during history and now, the most common form of lending by the PBC is unsecured credit lending, which means lending directly to specialized banks and other financial institutions. (Bailey, Warren, Wei Huang, and Zhishu Yang, 2011)

The types of loans are:

(1) Annual loan, the master term is generally one year, the longest is not more than two years;

(2) Seasonal loans are the loans that professional banks and other financial institutions need to adjust to the central bank due to the increase in seasonal payments. The term is generally 2 to 4 months.

(3) Day-call loans, which are loans that professional banks and other financial institutions apply to the central bank for the temporary capital shortage. The term is usually 10 to 20 days.

(4) Redundant, professional banks and other financial institutions hold discounted and unexpired legal, commercial acceptance bills or bank acceptance bills and transfer bills to the central bank to obtain loans from the central bank, generally for 3 to 6 months or more.

Interest Rate Policy

If the PBC allows for an increased opening of the exchange rate, this means the liberalization of interest rates. In the past, the Chinese government, in the Third Plenary Session of the Fourteenth Communist Party Central Committee, has laid out a plan to open up the interest rates in November 1993. Ten years later, in 2003, the Third Plenary Session reiterated the importance of introducing and opening up the national interest rates to allow for a more market-based monetary policy. The original 1993-2003 plan stated that the most efficient method for liberalizing interest rates was through lifting restrictions on wholesale transactions. This allows those who work in these markets to borrow loans with reduced interest leading to increased activity in foreign exchange. (Laurens and Maino, 2014)

Exchange rate policy

The PBC has continually maintained a fixed exchange rate for the RMB since the mid-1990s. While publicly, the central bank states that the exchange room does have space to fluctuate and change, in reality, the RMB has not changed significantly, and any fluctuations that do occur are due to the changes in the US dollar, which the RMB has maintained a 2.1% value of. (Goodfriend and Prasad, p.26, 2006)

This was done so that the PBC could maintain the exchange rate more efficiently, allowing them to keep the currency stable and correct the problems if they occur. It can be recommended that the foreign exchange policy can be modified to allow for quick changes. (Goodfriend and Prasad, p.27, 2006) It can be encouraged that the central bank opens up the management of the exchange rate to the market, allowing the free market to control the exchange rate. This may allow for an increase in trade volume and increase the overall amount of trade China can engage in with foreign investment.

Reserve requirement policy(conventional)

China's response to the financial crisis is as follows: First, since September 2008, the RMB deposit reserve ratio of financial institutions has been lowered four times, including a cumulative reduction of 2% points for the large deposit-taking financial institutions and a cumulative reduction of 4% points for small and medium-sized deposit-taking financial institutions. In 2009, the statutory reserve ratio remained unchanged. In 2010, the economic situation began to improve, and the statutory deposit reserve ratio was raised by three percentage points. (Liu, 2009) From the changes in the statutory reserve ratio during the financial crisis in China, it can be seen that it has remained unchanged from September 2008 to 2009, indicating that the policy effect of the statutory reserve ratio in 2009 has taken effect, effective for approximately one quarter. (Jovanovski & Muric, 2011).

After the financial crisis broke out, the US GDP fell sharply, and the unemployment rate also rose sharply. The government's regulation is urgently needed. (Xu, 2011). Against the background of a gloomy economic situation, high unemployment rate and falling into a liquidity preference trap, the policy of increasing the money supply is a necessary choice. For example, lowering the statutory deposit reserve ratio, lowering the central bank's rediscount rate for financial institutions, and making public purchases in the financial market will work. However, the premise for these policy tools to be effective is the normal operation of financial institutions such as commercial banks, but after falling into a financial crisis, commercial banks themselves cannot guarantee or even go bankrupt. (Liu, 2009).

Open market business(conventional)

China used open market operations in its response to the financial crisis. The PBC also lowered the interest rate for open market operations in a timely manner. At the end of 2008, the interest rates of 3-month central bank bills, 1-year central bank bills and 28-day repurchase operations fell by about 240 basis points, 180 basis points and 180 basis points, respectively, from the peak of the year. 230 basis points. In 2009, the central bank continued to issue 4 trillion yuan of bills (Xu, 2011).

Also, compared with the United States, the effect of traditional monetary policy tools is much lower than expected due to the fact that commercial banks in the United States are unable to protect themselves or even go bankrupt after the outbreak of the financial crisis (Xu, 2011).

Standing Lending Facility

The Standing Lending Facility (SLF), in general, across most well-developed countries, is implemented by changing the interest rates. Through regular lending tools to banks, the short-term and long-term interest rates can be adjusted through the adjustment of the collateral. In general, the lowering of the interest rate level will promote higher investment, which can help promote greater development in the economy. China first implemented the policy in 2013, where it was executed during the Spring Festival, where the standing loan was augmented, which helped provide sufficient liquidity support. (Liu et al., 2017) During the 2014-2015 period, the implementation of SLF has provided increased investment opportunities and short-term liquidity in the market. (Wang et al., 2022)

5. Potential Effectiveness and Risks

Central bank loan

From the perspective of money circulation, PBC's loans to commercial banks are the release of base money, which can also affect the circulation of social money and the total scale of credit. As soon as the PBC increases its lending to commercial banks or other financial institutions, commercial banks' deposits or cash stocks at the PBC rise correspondingly. Commercial banks use the funds to expand their loans and to increase the circulation of social money according to the principle of derivative deposit. On the contrary, when the PBC reduces its loans to commercial banks, the source of capital to commercial banks correspondingly gets reduced, thus forcing commercial banks to decrease their credit scale, thereby reducing the money supply in circulation. However, the disadvantages are also quite obvious:

First, it encourages financial institutions to rely on each other, forcing central banks to use large amounts of base money each year to make up for hard gaps in funding demand. Thus increasing the difficulty of base currency control.

Second, the imbalanced use of central bank loans does not aid fair competition between the financial institutions. (Bailey, Warren, Wei Huang, and Zhishu Yang, 2011)

Interest Rate Policy

In May and July 1993, the People's Bank of China for the economy was overheating, and the market price rose persistently high. Two improved the deposit and loan interest rates, in

January 1995 and July again twice raised lending rates, these adjustments to effectively control the inflation and the scale of investment in fixed assets and also to demonstrate the effectiveness of interest rate policy. However, there are some problems with the use of interest rate policy in China. One of the problems is that China's interest rate policy will be strictly controlled after it is implemented, and there are distortions in the interest rate structure. For example, excessive deposit and loan spreads lead to a lack of competition among banks, banks' financing costs are high, and interest rate differences are large, leading to low deposit rates. The second problem is that under control caused by the interest rate policy, the non-marketization of interest rate formation destroys the internal balance mechanism of interest rate, resulting in excessive credit contraction and excessive credit expansion. The last problem is the process of setting interest rate policy: PBC adjusting the interest rate target is not pure sex because there is no full consideration to the interests of the parties (including higher, lower interest rates lead to affect the interests of), lead to interest rates will be subject to the constraints of balancing the interests of all parties, the structure of interest rate policy eventually become parties to the negotiation, PBC is no longer a pure policymaker, lead to the interest rate policy effect will sell at a discount greatly. (JingYi Zhao, November 2010)

Reserve requirement policy(conventional)

A statutory deposit reserve is a commonly used policy tool for monetary policy. Its policy effect is remarkable. A slight change can cause a significant change in the money supply. However, the effectiveness of monetary policy and possible risks cannot be ignored. First, the statutory deposit reserve policy itself is inflexible. That is, any tiny changes in the statutory deposit reserve ratio will definitely cause considerable changes in the money supply. Therefore, sometimes there may be too much force, which is inconsistent with the ideal monetary policy.

The effect is very different, and it will even bring about bad fluctuations in the economy. By considering the issue of operational risk, most countries do not take the statutory deposit reserve ratio policy as a common policy tool (Kim, 2010). Second, economists find that monetary policy is neutral in the medium and long term (Westerlund & Costantini, 2008)(King, & Watson, 1992)(Boschen & Mills, 1995). Third, the deposit reserve policy, as a commonly used monetary policy, has the same effectiveness problem as monetary policy—the time lag effect. According to the research summary of previous scholars, usually, the time for the statutory deposit reserve policy to take effect in about half a year (Tsuzuki, 2014).

Open market business(conventional)

Open market operations are a commonly used policy tool for monetary policy. Unlike other monetary policies, which are prone to time-lag effects, open market operations can avoid this problem. However, the effectiveness of monetary policy and the possible risks cannot be ignored. For example, if the open market operates in a relatively subtle and frequent fashion, the public's reception and impact on the commercial banks will also be relatively weak, and the notification effect will be weak. At the same time, the central bank may not be able to get the cooperation of commercial banks when conducting open market operations, and the effect of monetary policy will be greatly reduced (Auerbach & Obstfeld, 2005). In addition, the central bank conducts open market operations, which are costly and cumbersome (Thornton, 2007).

Exchange-Rate Policy

Maintaining the exchange rate to be fixed while beneficial in maintaining control and efficiency of the RMB and also presents consequences and risks in the nature of being an exchange rate. The PBC makes money through its acquisition of assets in the form of USD foreign assets. However, with the exchange rate being relatively fixed, it presents a potential risk as the USD is a market-based currency, meaning its value will change. If one currency changes while the other does not, that can present a problem for the monetary worth of the RMB, such as potential capital losses.

Standing Lending Facility

While SLF can help promote investment and improve the real economy by changing the interest rate level through loans, this policy can also present some economic risks. One consequence of this policy is that only the PBC lends out the loans. This policy is only beneficial to large lenders. (Liu et al., 2017) In addition, in 2013, the lending became relatively loose, which caused problems as the monetary policy continued to be firm. Towards the end of the credit crisis, from January to March 2014, the great demand for credit and capital because of the large amounts of lending before the Spring Festival increased the interest rates, thereby increasing the risks in the market. The PBC initially stabilized the market by allowing the interest rates to decrease, which provided the market with short-term liquidity. Eventually, these operations ended the credit crisis, but increased market risks are shown to be a result of this operation. (Wang et al., 2022)

6. Policy Recommendations

Exiting the economic shocks introduced by the flood, the pandemic, as well as the other economic shocks overall requires a change to the current approach in the monetary policy that is handled in China. Three policies are most likely to bring the most support and sustainable change to the economic recovery effort from the May 2022 shocks. Policy options such as open market business, exchange rate, or standing lending options would offer some short-term impact on the economy but would not change the public perception or boost consumer confidence significantly. In addition, the open market business requires cooperation from both the public and the commercial banks in order to play a better regulatory role. However, the degree of cooperation during the flood period is difficult to be controlled by the central bank. These policies should boost the economy while also comforting consumers and restoring confidence.

Central Bank Loan: PBC will decide whether or not to extend loans to affected companies according to the situation, extent and severity of the disaster. After a flood, the insurance company will pay a fixed amount of insurance for the affected companies first. The PBC will also tighten credit standards for the more flood-affected companies by charging higher interest rates and requiring more collateral to prevent financial shocks. The most important of these is the impact on other potential disasters in the future. If the flood does not recede, the losses of affected financial institutions and companies will be further magnified, forcing the central bank to make more loans as the situation requires. Therefore, PBC Loan is a policy that must be adopted and is destined to be recommended.

Interest Rate Policy: The PBC should follow an expansionary policy that lowers the interest rate to best improve the economic recovery effort. However, easing the monetary stance at a time when domestic output is temporarily low risks fuelling a rise in the inflation rate. On the other hand, natural disasters raise the marginal cost for domestic producers and put upward pressure, thereby increasing the rate of inflation. To prevent inflation from rising further, the central bank needs to tighten the policy even more by raising nominal interest rates, but this policy will further reduce the output. This suggests that the PBC cannot expand output and also lower the inflation rate simultaneously after an economic shock. Therefore, however, the monetary policy changes after the flood disaster are unclear. It should be a priority to change to address the shocks. Thus, one could argue that whatever direction the natural disasters affect monetary policy is ultimately going to be decided by the experience of the policy maker. Generally speaking, the interest rate policy can be adopted, but it must be carefully formulated according to the actual situation, such as losses. Otherwise, it will lead to a financial crisis in the Chinese market.

Reserve Requirement Policy: To further improve the economic situation, the PBC can reduce the reserve requirement ratio. The PBC has already cut the ratio in April 2022 (Xinhua, 2022). That policy brought a reduction of 0.25 percentage points to the reserve requirement ratio, meaning banks are reducing the number of cash reserves. However, this will move the cash from the reserves to move to other projects and help support the real economy. For the economic shock brought in May 2022, China can further reduce the reserve ratio, which will further allow more cash to be allocated to economic recovery and boost market confidence. (Xinhua 2022) The agricultural sector that was hit hardest by the flood can also be significantly supported with the new funds allocated to them.

Exiting an intense economic shock that has brought massive trouble to a large sector of the Chinese economy will require large changes to the economy and the monetary policy. With changes to the reserve requirement, interest rate, and the way the central bank offers loans, China's economic situation can have a strong economic recovery.

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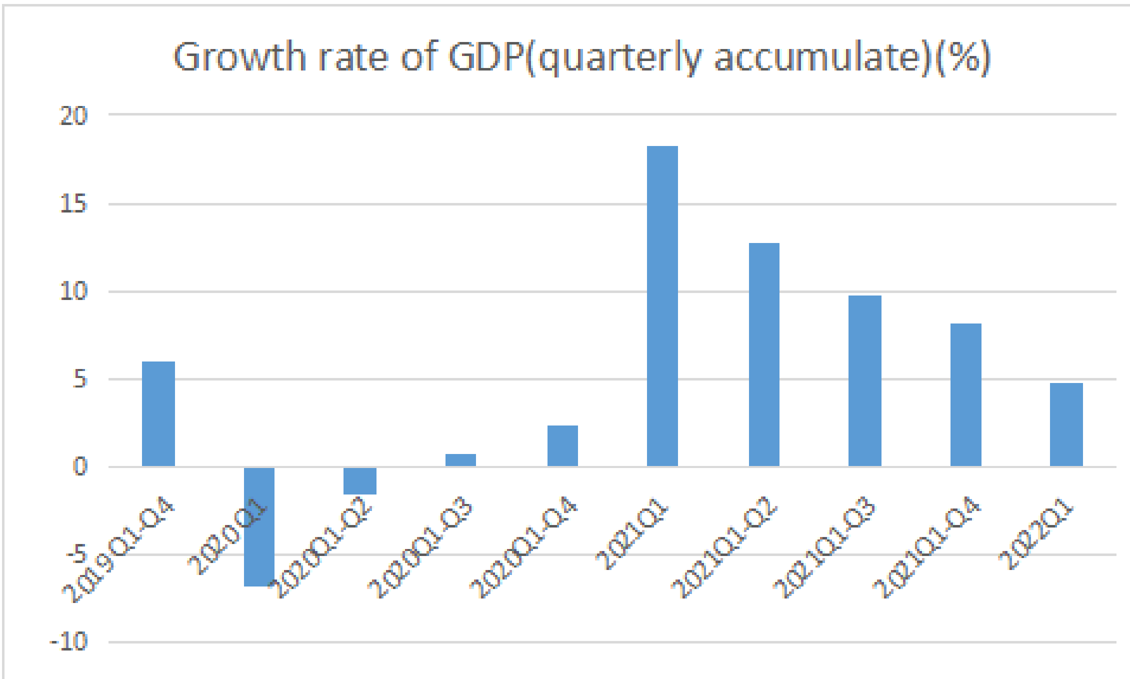
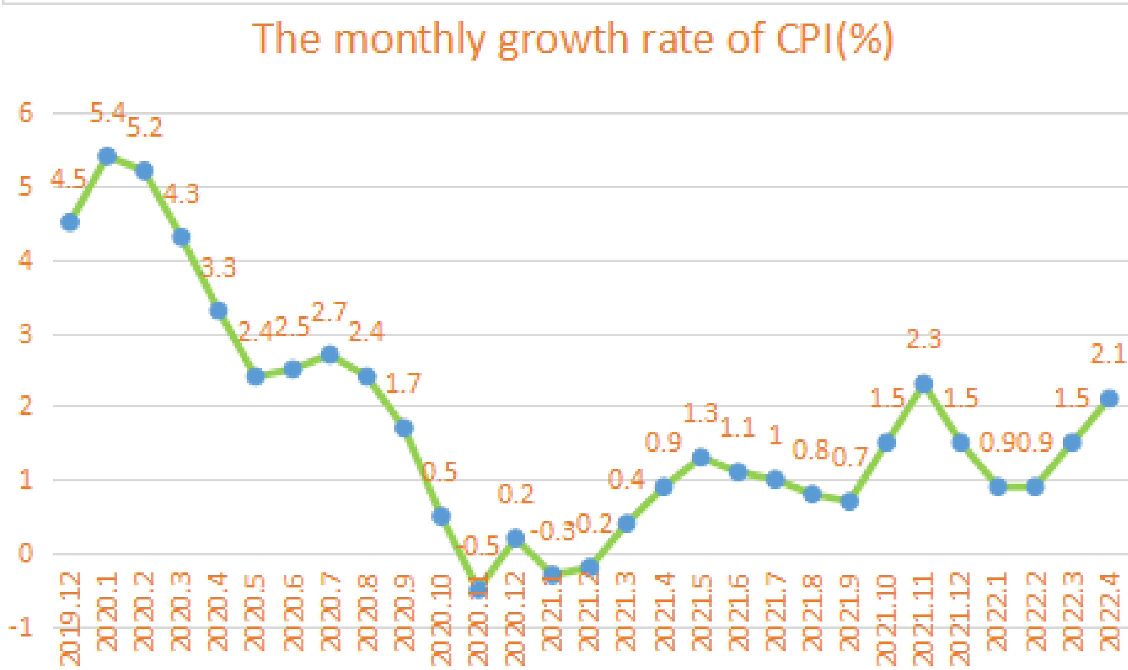
Appendix

Appendix A





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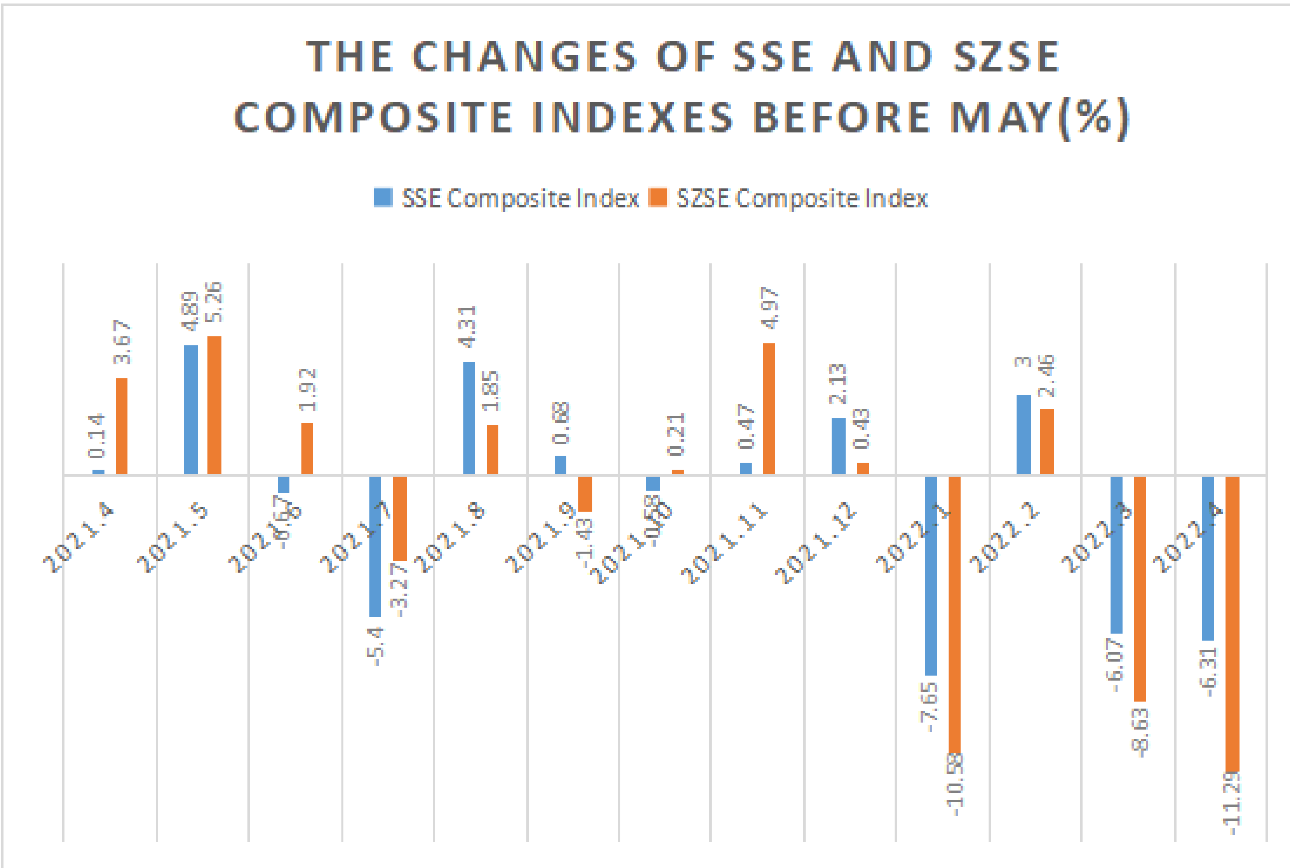

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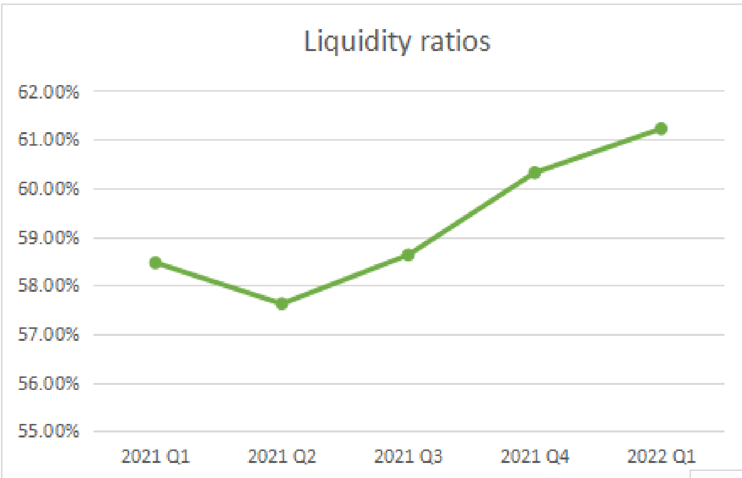
Appendix C



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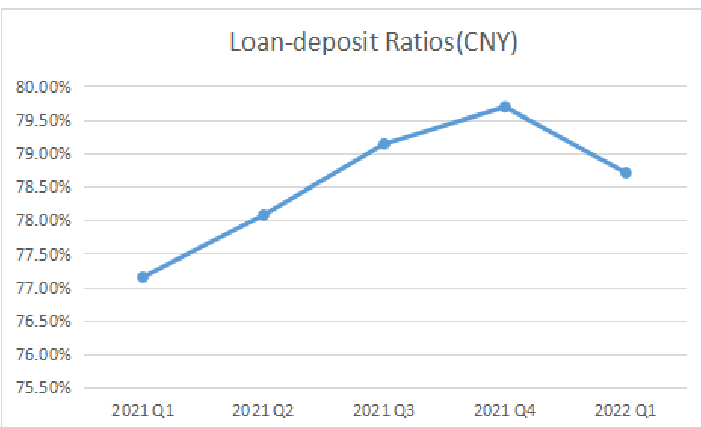

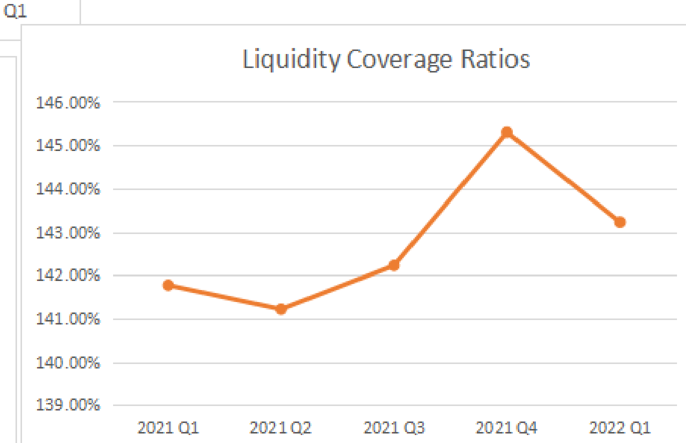

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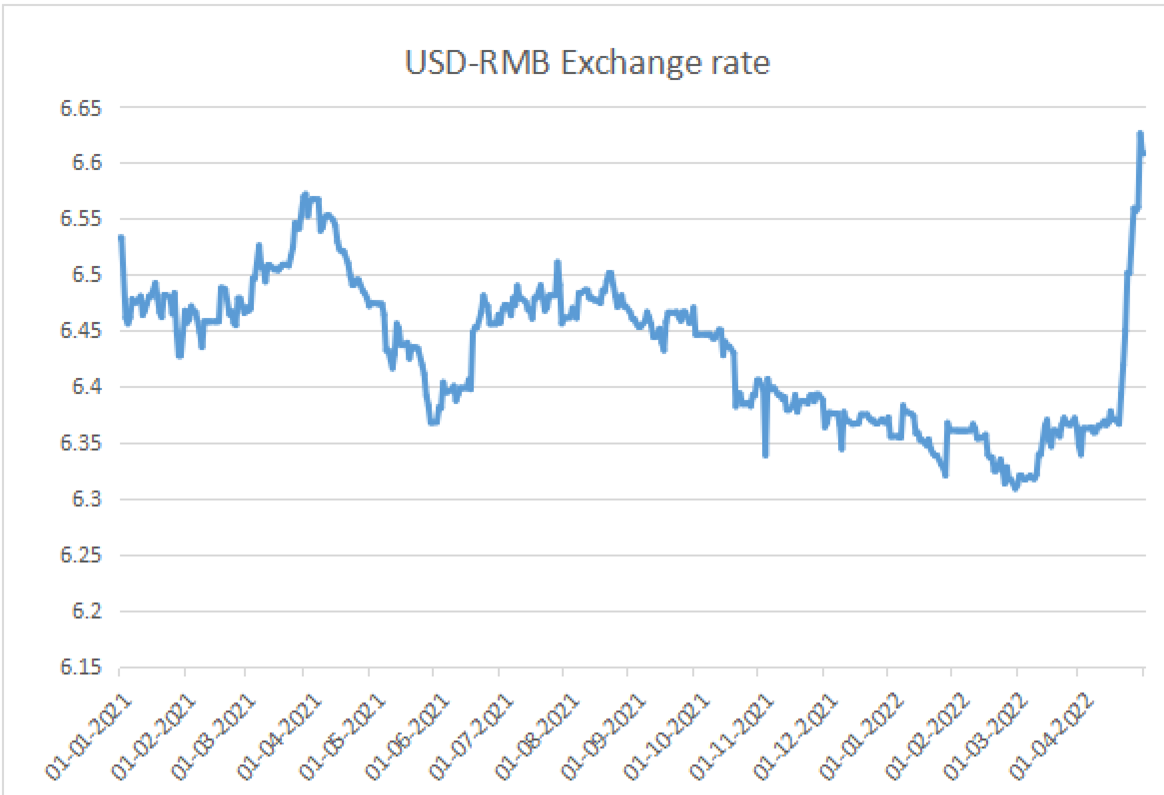
Appendix D



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