

## The Evolution and Effectiveness of China's Monetary Policy: An Introspection from the People's Bank of China (PBC) to the Present

By Johanne A. GUERRERO <sup>†</sup>

**Abstract.** China's monetary policy has evolved from obscurity into spotlight due to its torrid economic expansion in recent times, as well as its exchange rate regime that has been under constant scrutiny of its trading partners. While China's economy is centrally-planned, it is veering more towards a market-based system with goals of stability and growth. With this in mind, this paper is an introspection of China's monetary policy since the establishment of the People's Bank of China (PBC) to the present. Additionally, this paper surveys empirical literature on the effectiveness of policy tools undertaken by the PBC. Recommendations are made to Chinese monetary authority on how to navigate the turbulent waves of economic fluctuations with a managed exchange rate, within its borders and beyond.

**Keywords.** Community tourism, Households, Island, Logistic regression, Income, Traditional trades.

**JEL.** I13, I20, I30.

### 1. Introduction

China's monetary policy has evolved from obscurity into spotlight due to its torrid economic expansion in recent times, as well as its exchange rate regime that has been under constant scrutiny from its trading partners. While China's economy is centrally-planned, it is veering more towards a market-based system with goals of stability and growth. It is important to trace the beginnings of China's modern monetary policy in order to understand how the country manages its growing economy. This is because the core of modern market-based economy is the role of the central bank linking the real economy to the practice of monetary policy to affect aggregate demand and economic growth. Given China's exchange rate inflexibility and capital restrictions, monetary policy effectiveness can be limiting. However, in October 2016, as the Chinese currency renminbi became one of the five currencies that makes up the special drawing rights (SDR) of the IMF, the country would need to further loosen controls on its currency.

There is a dearth of literature on the modern monetary history of China. This paper is the first to trace the origin of China's foray into modern monetary policy, and follows its development from a closed, command-economy to a more open and market-based system. Moreover, in order for monetary policy to be more effective in achieving macroeconomic goals, a set of recommendations is proposed for China's monetary authority to consider.

With this in mind, this paper is an introspection of China's monetary policy since the establishment of the People's Bank of China (PBC) on December 1, 1948 to the present. Additionally, this paper surveys empirical literature on how effective the policy tools are to navigate the turbulent waves of economic fluctuations, with a fixed exchange rate, within its borders and beyond. This

<sup>†</sup> University of Bridgeport, Ernest C. Trefz School of Business, Bridgeport, CT, USA. 

allows for further understanding of the PBC's actions, and for market participants to anticipate and manage risks associated with China's monetary policy, financial markets, and economy in the future.

Recommendations to the PBC going forward are for it to implement further financial reforms towards a more market-oriented system, at a moderate and managed pace so as not to have too much disruptions to its financial markets. For instance, by expanding its capital markets to more participants, including foreign entities; increasing exchange rate flexibility and the convertibility of its currency.

On the monetary policy front, instead of placing its primary focus on high growth rate, it should also keep track of the stability of inflation and unemployment issues, as its growth rate slows down to a more moderate pace. In the longer term perspective, as its annual growth rate slows down to a more sustainable and moderate pace, its monetary policy should have a Taylor Rule in place to adjust its nominal interest rate instead of having an unstable, discretionary monetary policy regime. This can pave way for a more independent central bank, and monetary policy that does not rely on a specific regime. However, this cannot be accomplished without further liberalization of interest rates and financial markets.

Since China's development of central banking system is nascent, the scope of this paper is first to outline the history behind the development of monetary policy after Communist rule in Section One. Section Two reviews the tools that the PBC utilizes for monetary policy. Section Three chronicles the development of money markets in China. Section Four discusses China's managed exchange rate system. Section Five is an empirical literature survey of the effectiveness of China's monetary policy in recent times. Section Six completes this paper with concluding remarks.

## **2. The four phases of monetary development**

The development of China's monetary policy can be separated into four distinct phases. The first phase lasted for almost forty years prior to China's extraordinary economic growth in recent times.

The People's Bank of China (PBC) is the central bank of China, with the authority to control monetary policy and regulate financial institutions in China. It was established on December 1, 1948 through the merger of Huabei Bank, the Beihai Bank and the Xibei Farmer Bank. From 1949 to 1984, it was the only bank in mainland China, and thus was given the dual function as a central bank and commercial banking operations during that time period. It wasn't until the late 1970s when China opened its economy that it decided to revamp its monetary structure.

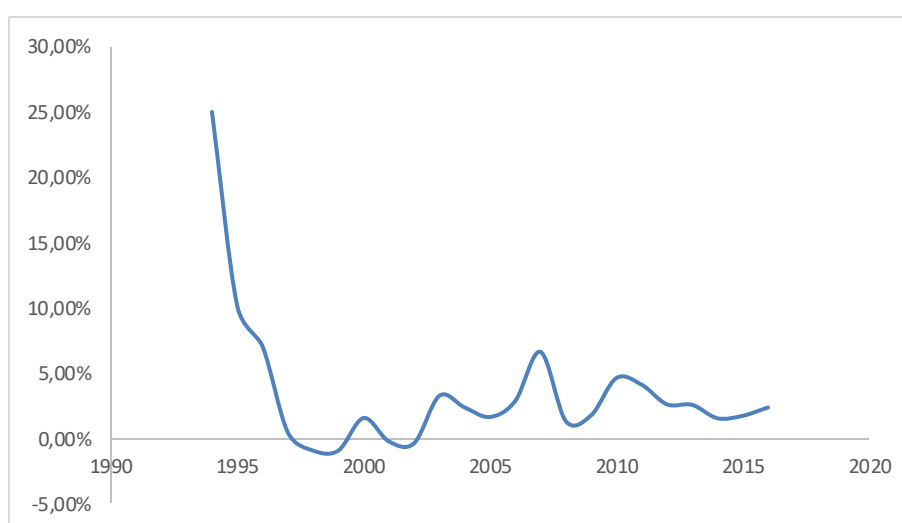
During 1949 – 84, not only was PBC the country's central bank, but it was also the sole commercial bank. Moreover, its main responsibility was to be the accounting agent for the government by acting as an intermediary between the Ministry of Finance, which collected taxes, and the State Planning Commission, which allocated spending of those tax revenues collected. Basically, it took deposits from the Ministry of Finance and distributed the funds based on the directive of the State Planning Commission.

The second period of development started in 1984, when a series of bank reforms were implemented. The purpose of these reforms was aimed to decentralize the monopolistic banking system at the time, so as to enable the

banking system to become more competitive and profit-oriented, in tune with the economy that was also starting to experiment with more market-based approach. While it was expected that the PBC was to assist in the transformation of China's nascent growing economy, its authority and efforts were often sidestepped by the local government due to difference in goals of the local authorities and the PBC. In this second period of development, PBC was officially renamed as the central bank of China, but its policies at that time was not specific in setting monetary targets, since the central government at the time set fiscal and monetary policies.

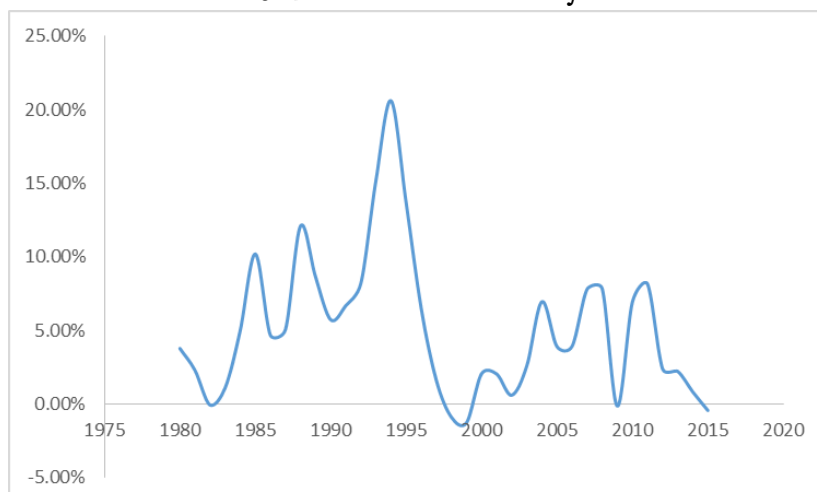
In 1986, the PBC started to provide more traditional bank loans in the market place. This foray into private banking was to keep pace with the opening of the Chinese economy and its transition into a more market-based approach. The PBC's lending policy was driven by the government's overall macroeconomic plans for the country, and thus the PBC acted in accordance with the Chinese government's political goals and objectives. Due to the multiple roles of the PBC as a national bank, government entity, and local bank branches, conflicts started to surface, especially since the local branches of the PBC were actually controlled by the local governments, while the central bank was controlled by the national government.

Although the local branches of the PBC had the authority to allocate credit, the local governments had strong influences over these branches, since the branches were also part of the local government. As a result of this structure, local governments could appoint top personnel running these local PBC branches, and exerted a great deal of influence over the policies of these local branches. Local government placed their own regional economic interest over national interest, and pressured the local PBC branches to expand money supply beyond control. Ikeya (2002) points out that the result was increase instability from high inflation that decreased people's purchasing power, and the subsequent radical credit tightening by the government exacerbated financial turmoil, a possible source of provocation leading to the Tiananmen incident. Furthermore, the increasing investment, particularly from foreign sources, fueled double-digit inflation (Figure 1<sup>1</sup> and Figure 2).



**Figure 1.** China's Annual Inflation Rate Since 1994 (Percentage Change in CPI from December to December) [Retrieved from].

<sup>1</sup> CPI date prior to 1994 is not available.



**Figure 2.** *China's GDP Deflator – Annual Percentage<sup>2</sup>*

The year 1993 marked the beginning of the third development phase, as the Chinese Communist Party Central Committee proclaimed for the first time that the ultimate target of monetary policy was to maintain currency stability through the management of the country's money supply, and bestowed upon the central bank the authority to make and implement monetary policy. Its main roles were to support economic growth and maintain the value of currency. Thereafter, a series of major reforms included the announcement of the money supply system in 1994, the removal of upper limits on interbank lending rates, and the specification of M2 as the intermediary monetary target in 1996. According to several sources, including Yu (1997), Laurens & Maino (2007), and Porter & Xu (2009), the effort to control M2 is a better predictor of future price movements than the original bank credit system. These changes were modeled after the U.S Federal Reserve System, as well as to strengthen the central government's control by eliminating local government influence over the local branches. While similar to the Federal Reserve in that the PBC also issues notes, serving as a bank for other banks, and the bank of the central government, it also provides management directives to the local banks so that the local banks comply with the macroeconomic objectives of the central government. As a result of this guidance, the PBC is able to control credit creation by banks in China, limit foreign investment, and control the size of the capital market.

In 1998, a major restructuring with the PBC abolished all provincial and local branches, and instead the central bank opened nine regional branches, whose boundaries did not correspond to local administrative boundaries. This marked the beginning of the fourth phase of development. Additionally, the State Council proclaimed its policy to maintain the stability of its exchange rate in order to promote economic growth in 1998 (Laurens & Maino 2007). Together with this major restructuring is a need for money markets in order to facilitate the implementation of monetary policy, since open market operations is the primary policy tool for central banks in developed economies. In China, the practice of actively implementing monetary policy to influence the real economy began in 1998. Since monetary policy cannot be

<sup>2</sup> World Development Indicators, the World Bank.

properly implemented with money markets, Section Three of this paper chronicles the formation and development of China's money markets.

In 2003, the Chinese Congress passed an amendment law to strengthen the role of PBC as the monetary authority. That allowed it further influence in making and implementing monetary policy to safeguard the overall financial stability, and to provide financial services to an expanding economy. As such, monetary policy in communist China is a recent concern, and close scrutiny of the PBC's actions did not start until the 1990's. Particular of interest to China's trading partners globally is the fixed-exchange rate regime undertaken by the Chinese government, and most academic studies of Chinese monetary policy placed primary focus on its exchange rate policy.

### 3. Monetary policy instruments in China

The People's Bank of China Act, which was promulgated in 1995, established the main objectives of monetary policy as to "maintain the stability of the value of the currency and thereby promote economic growth" [Retrieved from]. While price stability is important, economic growth is also of great importance, as the Chinese government sets a target growth rate each year as a guideline for the implementation of monetary policy by the PBC. Consistent with this mandate, the PBC actively keeps the renminbi within a floating range via foreign exchange interventions. With these primary objectives of price and exchange rate stability, together with consistent high growth, the PBC utilizes several monetary policy instruments to achieve these goals; this is unlike advanced economies' use of target interest rate as the main monetary tool.

Monetary policy instruments utilized by PBC include required reserve ratio, central bank base interest rate, rediscounting, central bank lending, open market operations and other policy instruments specified by the State Council [Retrieved from].

While most developed economies use interest rate adjustments as the primary tool of monetary policy, China's monetary policy encompasses more instruments than others. Unlike the Federal Reserve's target of the Fed Funds rate as a primary monetary tool, China lacks a clear policy to target a specific interest rate. Yao, Luo, & Loh (2011) point out that aside from interest rate, the PBC also utilizes money supply, specifically M2 as an intermediate target, and bank reserve ratio as a way to meet its monetary goals of price stability and promote economic growth. China needs more than interest rate adjustment as a monetary tool since the impact of a change in interest rate on the economy is not as effective as it would have been in other economies due to various reasons.

A consensus was established among literature regarding China's lack of liberalization of its interest rate system, including Laurens & Maino (2007), Geiger (2008), and Porter & Xu (2009). Bank deposits and lending rates are mostly dictated by the PBC, and while some liberalization had occurred, for instance, in 2004, PBC removed the lending rate ceiling, but still kept the lending rate floor and deposit rate. Moreover, the banking industry remains dominated by large, state-owned banks. According to Dickinson & Liu (2007), these large state-owned institutions enjoyed monopoly power and absorbed over 60 percent of bank loans, thus they netted a significant amount of irregular profits that were not sensitive to interest rate changes. Wan & Zhang

(2002) show that base rate adjustments may not be effectively transmitted to certain market sectors due to the lack of competition and prevalent liquidity constraints. Xie & Yuan (2003) find that bank lending, mainly from state-owned enterprises, continues to be the main funding source for Chinese enterprises, despite the establishment of corporate bond and stock markets in the early 1990's. These financial markets were heavily controlled by the government and are still not mature enough as a source of raising funds for Chinese businesses. Furthermore, Yue & Zhou (2007) point out that the consumption behavior of Chinese consumers is not sensitive to changes in interest rate. Chinese households have a high saving rate, and do not fund their spending with credit. As a result, changes in interest rate do not alter their spending habits, thus reducing the effectiveness of interest rate as a policy instrument for PBC.

#### 4. Development of money market in China

The major restructure with the PBC in 1998 with the intent of replicating a modern, more developed central-banking system led to the need for adjusting central bank balance sheet to implement effective monetary policy. As such, October 1998 marked the beginning of open market operations for PBC, when it started cash trading of bonds. Its public debt to GDP ratio has been steadily increasing since 1984, and as of 2015, stand at 42.92% [Retrieved from] (Figure 3).

China's interbank markets comprises of several sub-markets described in this section.

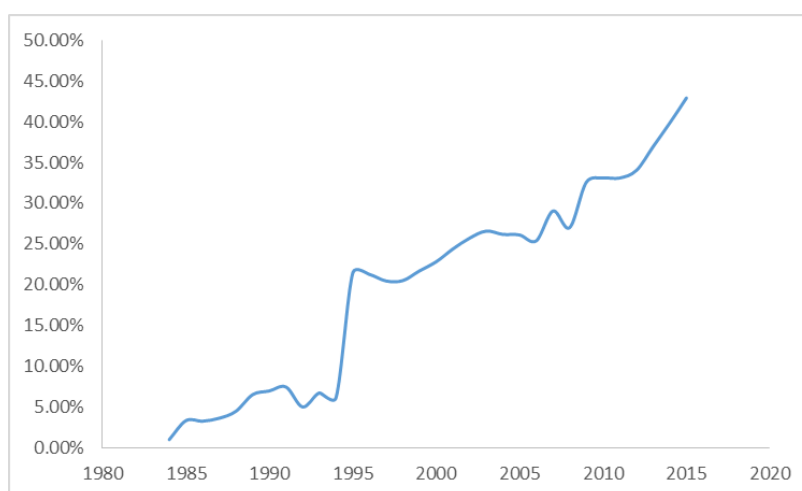


Figure 3. Percentage of China's Public Debt to GDP [Retrieved from].

##### 4.1. Interbank market

Reforms on interest rates and the interbank market started in 1996, where the PBC combined the segmented market into a national platform, where all members of this market must trade via an electronic trading system. Rules on member qualifications, as well as trading terms, have been specified so as to have a unified national system. Starting in 1996, the PBC lifted the upper limits on interbank lending rates, financial institutions were given the ability to set their own rate for interbank lending and borrowing. Additionally, the interbank offered rates (CHIBOR) are published on a regularly basis (Duo, 2002). Thereafter, a series of interest rates liberalization materialized,

including the rates on financial bonds by policy banks and Treasury bonds in 1998, corporate bonds in 2005, and corporate notes in 2008 ([Porter & Xu 2009](#)).

Porter and Xu (2009) formulate an empirical model of China's 7-day and show that regulated rates in China do have an influence on interbank rates, thus assets valued via interbank rates do not reflect true market conditions. The authors conclude that additional liberalization of deposit and lending rates would enable the interbank rate to serve the role of independent benchmark and monetary policy implementation.

#### 4.2. Repo market

The repo market is considered the largest, most liquid money market instrument in China. Chinese repo markets follow standardized policies and procedures of the more developed financial markets, offering two types of repo: interbank and stock exchange. Of the two types, stock exchange repo offers quasi-sovereignty counterparty risk and timelier settlement than interbank repo. Compared to interbank repo, stock exchange repo in China is more market-driven and being monitored in real-time, thus is considered the most accurate indicator of liquidity and the cost of credit.

The PBC conducts open market operations for liquidity and financial stability through the interbank repo market, and the central bank decides on the yield of its repo trades. As such, interbank repo yields are generally more stable than stock exchange repo yields, and also provide market participants indications as to what the central bank feels about market and economic conditions.

#### 4.3. Bond Markets

In recent year, due to the slowing of China's economy, significant cash has been flowing out of the country. It is estimated that individuals and companies have moved approximately \$1 trillion out of the country over the past year and a half [[Retrieved from](#)].

To offset this exodus of money out of the country, and ease the downward pressure on the renminbi, the PBC announced on February 24, 2016 to lift quotas on foreign investments in its interbank bond market. Eligible foreign financial institutions that are included are commercial lenders, insurance companies, securities firms and asset managers [[Retrieved from](#)]. This effort to stop money flowing out of the country was urgent, since the PBC used up almost \$300 billion in its foreign exchange reserves to support its currency in the prior few months [[Retrieved from](#)]. It is too early to speculate the consequences of this relaxed foreign capital restrictions, as bad assets start to accumulate in the interbank markets as banks and nonbank financial institutions take on investments seeking higher returns with increased risks.

### 5. Chinese monetary policy and the exchange rate

The Chinese government defends its fixed exchange rate regime as the need for stability of its economy. The Chinese monetary authority has emphasized its macroeconomic goals of price stability, growth, full employment and balanced balance of payment account, particularly through a managed floating exchange rate regime. However, its exchange rate has been under heavy control and despite international pressures to let the renminbi adjust to

supply and demand, the Chinese currency remains fairly fixed against the U.S. dollar.

While the nominal rate of renminbi is fixed against the U.S. dollar, its movements against other major currencies are anything but stable. Given the unpredictability of the dollar against major currencies as the euro and the Japanese yen, if the dollar appreciates against the yen, so does the renminbi. Furthermore, as points out by Lardy (2005), the Chinese government has made numerous major adjustments in its exchange rate since 1978, when it began economic reform.

In January 1981, the authorities devalued the renminbi by 50 percent in trade transactions by introducing an internal settlement rate of 2.8 renminbi to the dollar while the official rate remained at 1.5. From this period until the end of 1984, the authorities gradually depreciated the official rate until it reached 2.8, and ended the internal settlement rate. The official rate continued to depreciate, and hit 3.2 by mid-1986. On July 5, 1986, the authorities, in a single stroke, devalued the currency to 3.7 versus the U.S. dollar, a whopping 15 percent decrease. In 1989, the authorities again devalued the currency significantly in one step, this time by 21.2 percent. Thereafter, the authorities allowed exporters to retain a share of their foreign exchange earnings, and transactions in the secondary market continued to expand as a result.

In January 1994, the government unified the two rates at 8.7, and the currency began to appreciate gradually until it reached a value of 8.28 by mid-1995, and the nominal rate has remained fixed at that level. The fixed exchange rate regime as a requirement for economic stability expressed by the monetary authority has little basis, since the nominal rate has been adjusted repeatedly, sometimes by significant amounts over the years since economic reform began.

Additionally, the real trade-weighted exchange rate has not been stable due to the huge trade surplus of the Chinese economy against its trading partners. In recent years, the Chinese government has begun to appreciate its currency against the U.S. dollar due to increased pressures from its trading partners, as well as internal inflationary pressures and assets bubbles in its housing and stock markets. However, its currency is still considered undervalued by most measures.

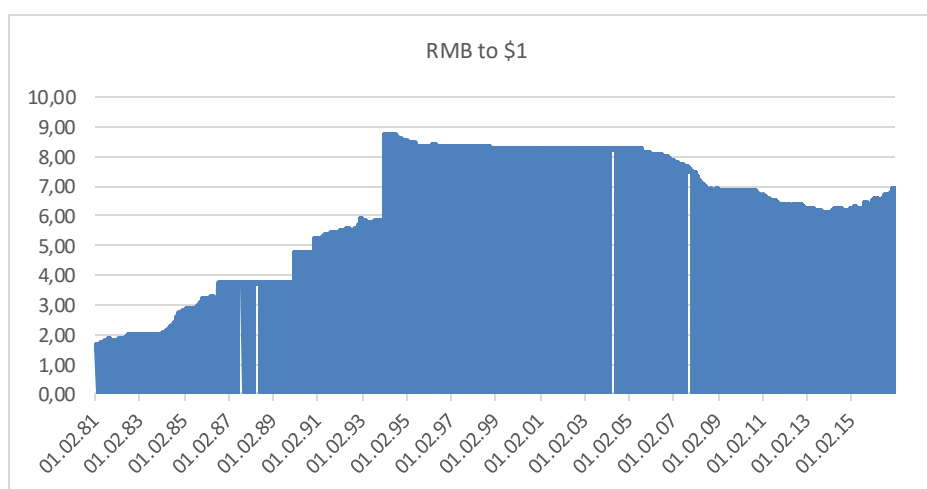


Figure 4. Daily renminbi (RMB) rate since 1981<sup>3</sup>

<sup>3</sup>Federal Reserve Bank of St. Louis FRED

## 6. Empirical review of China's monetary policy

For monetary policy to be effective, the central bank needs independence in its actions. Its current monetary policy is discretionary and its tools are dependent on economic conditions, having a high and sustainable growth rate, with a managed exchange rate and some capital control, especially to prevent capital outflow. It does not have an inflation target, and is currently not a major concern for the PBC as its annual inflation rate have been relatively low and stable in recent years (Figure 1 and 2).

Aside from the obvious recommendation to let interest rates and exchange rate be more market-driven, China needs to reform its financial system so monetary policy implementations can have proper transmission mechanisms. Goodfriend & Prasad (2006) recommend the PBC to implement a low inflation objective as the nominal anchor, with the view that stabilizing inflation and employment against macroeconomic shocks as the most reliable policy method. The authors do not advocate a full-fledged inflation targeting regime for China giving that its economy is undergoing major structural and financial changes, instead they advocate a more modest set of reforms such as further interest rate and currency liberalizations that would allow for market driven mechanisms to function, and provide PBC a credible nominal anchor of inflation target.

Ping & Xiong (2003) find that Taylor rule can be a suitable benchmark for measuring the stance of China's monetary policy. They show that China's monetary policy is currently an unstable regime inconsistent with the Taylor Rule. Going forward, they recommend for the country to implement further interest rate reforms and have the interest rate of money market as the intermediate target for the PBC.

Guo & Ma (2016) find that China's nominal interest rate does not respond adequately to inflation, while very responsive to the output gap. Going forward, the authors recommend for the PBC to let interest rate be more flexible to changes in inflation.

Chen, *et al.*, (2016) develop a framework grounded with institutional elements to approximate China's monetary policy in practice. They find strong evidence showing that monetary policy is designed to support the central government's mandate of real GDP growth. Additionally, their findings strongly support consensus of M2 growth rate as the primary policy tool of the PBC, and bank lending channel as an important monetary transmission mechanism.

There is no consensus in literature on whether the Taylor Rule is suitable for China's transition economy, or whether having an interest rate target or inflation target is a more suitable and consistent tool for the PBC, while agreeing on the recommendation of further interest rate and financial market reforms for the country.

## 7. Conclusion

A review of China's recent monetary policy, particularly since economic reform started in 1978, revealed the Chinese government's need for stability and sustainable economic growth. While the government's stance of the fixed exchange rate system is misguided, its intent is clear– it will deploy as many

tools as it can in order to achieve its macroeconomic goals internally and internationally. Together with the fixed exchange rate regime, its monetary tools of controlling interest rate, targeting the money supply, and reserve ratio seem to be guiding the developing and growing economy into prosperity for its households, while steering it safely during the most recent financial crisis. Going forward, in order for monetary policy to be more effective as a tool to manage its economy, the Chinese central bank should loosen its control on interest rates and exchange rates so as to let borrowing costs better reflect their market conditions.

Additionally, China's banking system needs to be more privatized so that it can conduct effective monetary policy to achieve its macroeconomic goals. Recommendations to the PBC going forward are for it to implement further financial reforms towards a more market-oriented system. For instance, by expanding its capital markets to more participants, including foreign entities; increasing exchange rate flexibility and the convertibility of its currency. On the monetary policy front, instead of placing its primary focus on high growth rate, it should also keep track of the stability of inflation and unemployment issues, as its growth rate slows down to a more moderate pace. Furthermore, in the long run, its monetary policy should consider following Taylor Rule to adjust its nominal interest rate instead of having an unstable, discretionary monetary policy regime. This can pave way for a more independent central bank and monetary policy that does not rely on a specific regime. However, this cannot be accomplished without further liberalization of interest rates and financial markets.

## References

- Burdekin, R.C., & Siklos, P.L. (2008). What has driven Chinese monetary policy since 1990? Investigating people's bank's rule. *Journal of International Money and Finance*, 27(5), 847-859. doi. <https://doi.org/10.1016/j.jimonfin.2008.04.006>
- Chen, K., Higgins, P., Waggoner, D.F., & Zha, D. (2016). China pro-growth monetary policy and its asymmetric transmission. *Simpson Center Conference*. [Retrieved from].
- Duo, X. (2002). Analysis of the development of China's money market. *China & World Economy*, 10, 29-37.
- Geiger, M. (2006). Instruments of monetary policy in China and their effectiveness: 1994 - 2006. *United Nations Conference on Trade and Development, Discussion Papers*, No.187. [Retrieved from].
- Goodfriend, M., & Prasad, E. (2006). Monetary policy implementation in China. *BIS Papers*, No.31, 25-38. [Retrieved from].
- Guo, Y., & Ma, W. (2016). Time-varying coefficient Taylor rule and Chinese monetary policy: Evidence from the time-varying cointegration. *Journal of Economic Development*, 41(4), 27-44.
- Ikeya, K. (2002). China: Unique strengths and weaknesses of monetary policy. *R&I Asian Focus*. Rating and Investment Information Inc., Tokyo.
- Lardy, N.R. (2005). Exchange rate and monetary policy in China. *Cato Journal*, 25(1), 41-47.
- Laurens, B.J., & Maino, R. (2007). China: Strengthening monetary policy implementation. *IMF Working Paper*. [Retrieved from].
- Luo, D., & Yao, S. (2010). World financial crisis and the rise of Chinese commercial banks: An efficiency analysis using DEA. *Journal of Applied Financial Economics*, 20(19), 1515-1530. doi. <https://doi.org/10.1080/09603107.2010.508717>
- Ping, X., & Xiong, L. (2003). Taylor rule in transition economies: A case of China's monetary policy. *International Research Forum on Monetary Policy Conference Paper*. [Retrieved from].
- Porter, N., & Xu, T. (2009). What drives China's interbank market? *IMF Working Paper*. No.09/189. [Retrieved from].
- Xie, P., & Luo, X. (2002). Taylor rule and its empirical test in China's monetary policy. *Journal of Economic Research*, 3(1), 3-12.

## Journal of Economics Library

- Xie, P., & Yuan, Q. (2003). Analysis of the effects of China's interest rate policy in recent years. *Journal of Financial Research*, 27(5), 1-13.
- Yao, S., Luo, D., & Loh, L. (2011). On China's monetary policy and asset prices. *China Policy Institute Discussion Paper*, 71, 1-34. [Retrieved from].
- Yu, Q. (1997). Economic fluctuation, macro control, and monetary policy in the transitional Chinese economy. *Journal of Comparative Economics*, 25(2), 180-195. doi. <https://doi.org/10.1006/jcec.1997.1461>
- Yue, Y.-d., & Zhou, S.-h. (2007). Empirical analysis of the monetary policy transmission through interest rate channel in China. *Chinese Business Review*, 6(3), 8-13. doi. <https://doi.org/10.5539/ijef.v4n1p204>
- Zhang, Y., & Wan, G. (2002). Household consumption and monetary policy in China. *China Economic Review*, 13(1), 27-52. doi. [https://doi.org/10.1016/S1043-951X\(01\)00055-4](https://doi.org/10.1016/S1043-951X(01)00055-4)



**Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit: <http://creativecommons.org/licenses/by-nc-nd/4.0/>

