Chinese Monetary Policy:

Theory and evidence

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Summary

The content of this thesis is two-fold. First, I present a detailed overview of the setup and conduction of monetary policy in China. I describe the most important participants, the goals and instruments, and discuss the concepts of independence and transparency in a Chinese setting. I show that conduction of monetary policy in China has come a long way from the Mao-era when the People's Bank of China (PBC) operated as a department of the Ministry of Finance, and the central authorities managed all financial transaction over the state budget. However, in terms of independence the ties between the central bank, other ministries and the China Communist Party are still tight and the areas of responsibility are vaguely defined. In addition, several commercial market participants have close ties to the government and should also be considered as important for the conduction of monetary policy. In sum, I argue that, the PBC cannot be regarded an independent central bank.

Furthermore, even though the mandate of monetary policy is given in the law on People's Bank of China, it is not clear how this mandate is integrated in the every-day decision making. In this thesis, I argue that the PBC operates under a two-fold policy goal of price stability and economic growth in the short run, but that it lacks one long-run inflation target rate. Instead, the State Council sets targets for both the inflation rate and the economic growth annually. I argue that these targets must be regarded as maximum and minimum levels respectively. I also show that the PBC officially considers the monetary aggregate, M2, as the intermediate target of monetary policy.

The second part of this thesis is an empirical analysis of the conduction of monetary policy in China. As a bridge between the two parts I present a recap on the theoretical background of the inflation bias as presented by Barro and Gordon (1983). Barro and Gordon (1983) and later literature show that a positive inflation bias could evolve in the economy as a consequence of the central bank's wish to stabilize growth around a level that exceeds the natural level of growth. My empirical analysis describes the difficulties in measuring inflation in an emerging economy as the Chinese one. By the use of available data, I show that the Chinese households must me regarded increasingly rational when forming their inflation expectations. Moreover, I argue that it seems like the general public finds the PBC credible, and the inflation expectations seems to follow the development in the annual inflation targets defined by the State Council. Finally, I make use of both official statistics on the inflation rate

and the market's inflation expectations to search for a positive inflation bias in the Chinese economy. I show that the realized inflation in China has exceeded the inflation target for about 35 percent of the time since 1996. I argue that, even though my description of the conduction of monetary policy in China shows that many of the necessary conditions for inflation bias to evolve are fulfilled, this is a too little share of time to conclude that such inflation bias is present in the Chinese economy. Nonetheless, I show that the inflation rate has been highly volatile over the same period, both compared to inflation in other countries and to domestic economic growth. I argue that this could indicate that the PBC places a majority of the weight on output when conducting monetary policy.

In this thesis, I also present possible steps forward for the conduction of monetary policy in China that could create a more stable inflation rate and avoid the future possibility for a positive inflation bias in the Chinese economy. Most importantly, I argue that replacing the constantly shifting inflation target by a medium- or long term constant inflation rate would make the Chinese monetary policy more predictable, and if communicated the right way increase the transparency of the conduction of monetary policy. The cost will be a somewhat higher volatility in output growth. On the other side, the gain will be a much more stable inflation rate in the long run, which in itself could lead to higher growth as it makes it easier for the general public to form their expectations about future inflation.

Preface

This thesis is the result of my wish to combine two fields of interests and knowledge: Economics and China. The thesis also marks the end of a long educational journey and I now look forward to new opportunities and challenges in the time ahead.

Several people deserve thanks for their contribution to this thesis and for making the process of writing it easier and more enjoyable.

First and foremost, I am deeply grateful to my supervisor Nina Larsson Midthjell for her guidance, enthusiastic encouragement and detailed feedback throughout the writing process. Her countless hours spent on reading the thesis, and discussing it with me, have without doubt improved the final result.

Furthermore, I wish to thank Ole André Kjennerud and Martin Sommerseth Jaer for all help gaining a better understanding of the Chinese economy and statistics. I also want to thank my brother Kristian Netland for reading through and commenting on an earlier draft. A warm thank also to Marianne Andersen for all the breaks, lunches and fun discussions during the last few months.

Finally, and most importantly, I want to thank my beautiful wife Kristina, who has supported me and encouraged me during the process of writing this thesis. Without her, this thesis would have been impossible.

Needless to say, any remaining mistakes are fully my responsibility.

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1 Introduction

The conduction of monetary policy in China has come a long way from the Mao-era when the People's Bank of China (PBC) operated as a department of the Ministry of Finance, and the central authorities managed all financial transaction over the state budget. In 1995, the Law of the People's Republic of China on the PBC laid the foundation for Chinese monetary policy and granted the PBC the main responsibility (Bell and Feng, 2013). In practice the ties between the central bank, other ministries and the China Communist Party are tight and the responsibility borders are vague. In addition, several commercial market participants have close ties to the government and must also be considered as important for the conduction of monetary policy.

More important than *who* conducts monetary policy, however, are *why* and *how* monetary policy is conducted. Although the mandate of the PBC is stated in the law, it is not clear how well this mandate is integrated in the every-day decision-making. In this thesis, I argue that the People's Bank of China operates under a two-fold policy goal of price stability and economic growth in the short run, but that it lacks the long run inflation target that most other developed central banks, like the European Central Bank, Bank of England and Norges Bank, operate under. The central authorities, both the PBC and other institutions, have a series of instruments available to reach these policy goals. As I will show in this thesis, some of these instruments are quite different from what central banks in most OECD countries use when conducting monetary policy.

The fundamental problem faced by any author or researcher who search for answers regarding Chinese monetary policy in general, and the PBC in particular, is the limited transparency surrounding the Chinese governmental system. Consequently, the literature on the field is somewhat limited. Bell and Feng (2013) discuss the growth of the PBC in an institutional framework and conclude that the increasing importance of the PBC reflects the mutual dependence between the PBC and the communist party. Conway et al (2010) and Laurens and Maino (2007) present possible future reforms of the conduction of monetary policy in China and argue that China should shift focus from a government controlled system to a fully market-based monetary policy. The literature on the broader concept of the Chinese financial sector is richer. Naughton (2007), Lardy (1998, 2000, 2012) and Walter and Howie (2011) all cover the transformation of the Chinese economy during the reform period and also discusses

the current state of the sector, but they do not take on the monetary policy in detail. IMF (2011) presents an objective view on the Chinese financial sector, and provide a series of possible future reforms. One of the more thorough analyses of Chinese monetary policy is probably Geiger (2010) who provides an overview of Chinese monetary policy with a discussion of targets, instruments and independence, and of whether monetary policy is efficient under the given mandate. He finds that the PBC has a good record of reaching the annual targets for inflation and economic growth over the period 1994-2008, and argues that there is a close link between the monetary aggregate (M2) and inflation. However, Geiger (2010) does not discuss the transparency and credibility of the PBC, and in my view fails to fully discuss the problems caused by the close ties between the central bank, the government and the ruling party. Furthermore, household's inflation expectations, which are crucial for the efficiency of monetary policy, are almost let out from the analysis.[1] In addition to presenting a detailed description of how monetary policy is conducted in China, this thesis contributes further to the literature by providing a thorough analysis of the degree of transparency, credibility and the central bank independence (all of crucial importance for the efficiency of monetary policy); by presenting a thorough empirical analysis of the importance of inflation expectations: and by discussing whether Chinese monetary policy is exposed to a positive inflation bias.

The content of this thesis is two-fold. First, I present a detailed overview of the setup and conduction of monetary policy. I describe the most important participants, the goals and instruments and discuss the concepts of independence and transparency in a Chinese setting. Second, by the use of available data, I search for rational expectations and a possible positive inflation bias in the economy. Such positive inflation bias could be the consequence if the central bank tries to stabilize growth around a level that exceeds the natural level of growth. The two parts of the thesis are closely related to each other and the empirical analysis in part two will build on the knowledge and information presented in part one. As a bridge between the two parts I present a recap on the theoretical background of the inflation bias as presented by Barro and Gordon (1983).

The rest of this thesis is organized as follows: Section 2 presents the recent history and most important participants of the Chinese financial sector, as well as the three most important

[1] The importance of inflation expectations for monetary policy efficiency will be further discussed in section 4 and 5 below.

decision-making authorities for the conduction of monetary policy in China: The People's Bank of China, the State Council and the China Communist Party. In section 3, I dig deeper into the conduction of monetary policy in China and present a detailed description of the policy goals, targets and instruments of monetary policy. The section also questions the independence and transparency of the People's Bank of China. Section 4 defines the inflation bias and presents the theoretical background of such possible inflation bias building on Barro and Gordon (1983) and Kydland and Prescott (1977). I further discuss the relevance of the model for the Chinese context. In section 5, I conduct an empirical analysis of the Chinese monetary policy. I discuss how choice of inflation measure matters for the outcome, and the rationality of the Chinese household when forming their inflation expectations. Next, I make use of two different measures of inflation expectations to analyze the credibility of the People's Bank of China. Furthermore, I make use of available data on inflation and inflation expectations to search for an inflation bias. Finally, by combining the information and knowledge from sections 3 and 4 with the results in section 5, I present some policy implications and possible steps forward for the conduction of Chinese monetary policy. Section 6 summarizes and concludes.

2 China's Financial Sector: History and Participants

As in any other economy, the structure and functioning of the Chinese financial market is of high importance for the conduction of monetary policy. Naughton (2007) argues that the Chinese financial sector has been one of the most protected and overregulated industries in the country. On the surface the sector looks very much like any other developed economy's financial sector with bank and non-bank institutions, domestic and foreign banks, private and state-owned banks, stock and bond markets, central bank and financial regulators. However, if you look under the surface, you will find a series of characteristics that distinguish the Chinese financial sector from any modern financial sector in the developed world. This section starts with an overview over what make these characteristics.[2] Sections 2.1 and 2.2 take on the development of the sector in the post-Mao period while section 2.3 summarizes the current state of the financial sector and present the most important market participants. One of the most important characteristics of the Chinese financial sector is the way monetary policy is conducted. In most modern economies the conducting of monetary policy is fully or partly entrusted to an independent central bank. In China, however, the picture is quite different, and several institutions, parties, and even individuals, play an important role of Chinese monetary policy. In section 2.4 and 2.5, I will consider the participants in Chinese monetary policy. The most important institution remains the central bank, but I will argue that other government ministries and especially the Communist Party also must be considered key participants. Finally, in section 2.6, I describe the hierarchy of the Chinese financial sector.

2.1 The first wave: Economic reforms

Under the Mao-era (1949-1976), China operated a mono-banking system where the People's Bank of China (PBC) acted both as the central bank and as a commercial bank that accepted deposits and granted loans.[3] The government and the Communist Party fully controlled the PBC and it was in fact organized as a department of the Ministry of Finance (MOF). Other banks, such as Bank of China (BOC) or China Construction Bank (CCB), were either sub-

[2] An in-depth-analysis of the Chinese financial sector is outside the scope of this thesis. Good references on the subject are IMF (2011), Lardy (1998, 2000), Naughton (2007) and Walter and Howie (2011). This section will draw on these references.

[3] A list of all abbreviations used in this thesis is presented in the appendix.

ordinated to the PBC or operated only as a tool of the MOF (Lardy 2000). On the commercial side, the PBC controlled over 80 percent of all deposits and was the source of 93 percent of all loans by financial institutions (Lardy, 1998). On the central bank side of its business, the PBC regulated the money supply, fixed interest rates, managed China's holdings of foreign exchange and controlled and supervised all other financial institutions. In a centrally planned economy as this, the scope for financial intermediation is small and limited. Pricing and allocation of capital was determined by the government and the five-year plan, and not by the financial system (Huang et al, 2013a).

The economic reforms initiated by Deng Xiaoping in the late 1970s *"…affected every aspect of life in China and left no institution untouched"* (Saich, 2011, p.67). This is also true for the financial sector which has changed substantially since the reform and opening up started.

2.1.1 Creating the "Big Four"

One of the most important reforms initiated in the late 1970s was the abolishment of the monobanking system and a gradual reconstruction of financial institutions. In 1979, BOC and CCB were separated from the PBC and the MOF, and specialized in foreign exchange transactions and large investment projects respectively. The same year, the Agriculture Bank of China (ABC) was established to handle any agriculture-related commercial bank activities. In 1983, the transfers of all commercial activities from PBC was completed when the fourth large state-owned commercial bank, Industrial and Commercial Bank of China (ICBC), was established. The ICBC's role was to handle all deposit and lending functions of the PBC, which now were designated as the central bank of China. ICBC immediately became the largest financial institution, as it overtook the vast branch network of the PBC (Lardy 2000). Together the ICBC, the BOC, the ABC and the CCB formed the "Big Four" that even today dominate the banking sector of China.

2.1.2 Introducing competition to the financial market

From the mid-1980s, the government allowed a gradually increase of competition in the banking sector. Lardy (1998) argues that this happened both by letting the Big Four operate outside their traditional scope of business, and by introducing new financial institutions, both bank- and non-bank institutions. National level banks, such as Bank of Communications (BOCOM) and the China Merchants Bank, were established in 1986 and 1987, both joint-

stock commercial banks with the government as the main shareholder. In addition, a larger number of regional banks were introduced (both rural and urban), such as Merchants Bank and the Shanghai Pudong Development Bank. The first private bank, Minsheng Bank, was first established in 1995.

In 1994, the government established three policy banks to secure lending to policy objectives and to ease the burden of lending to such objectives for the Big Four.[4] The introduction of non-bank institutions, as trust and investment companies (TICs), should also help divide up investment and commercial banking activities (Geiger, 2010). In 1988, only a decade after reforms started, there were as many as 745 TICs operating in the Chinese economy (Lardy, 1998).

2.1.3 Introducing foreign banks to the financial market

The introduction of foreign commercial banks has followed a gradual pattern, and only most recently have they been granted full access to the financial market. Prior to 1991, foreign banks were only allowed to conduct business in special economic zones, later new areas were opened up for foreign banks, starting with coastal and central cities. The initial scope of business for foreign banks was limited to foreign currency and export activities. After China's entry into the World Trade Organization (WTO) in 2001 it became easier for foreign banks to conduct business in China. An immediate effect was that all foreign banks were allowed to operate foreign currency business to all clients, both domestic and foreign. Five years later, after the transition period ended, foreign banks were also allowed to conduct local currency business all over the country and by that complete the gradual introduction of foreign banks into the Chinese financial markets. By 2010, there were 130 foreign banks present in China (IMF, 2011). However, foreign banks' share of total banking assets and liabilities remain marginal.[5]

2.1.4 Introducing additional sources for finance and credit

As the reform proceeded and the economy grew, the need for additional sources of finance and credit became clear. The large state-owned enterprises (SOEs) raised all the capital they

[4] The three policy banks are China Development Bank, The Export-Import Bank and the Agriculture Development Bank.
[5] Only 2,25 percent of the commercial banking assets were hold by foreign banks in 2012 (CEIC Data).

needed from the large state-owned banks. The small- and medium-sized enterprises, on the other side, found it hard to raise capital. The hope was that a stock market would make financing for such firms easier. In 1990, two domestic stock exchanges were established in Shanghai and Shenzhen. In addition to providing an alternative source of capital, the government wanted to encourage restructuring of the large SOEs (Geiger, 2010). The stock markets grew rapidly, and the number of listed companies increased from 10 in 1990 to 2342 in 2011 (National Bureau of Statistics, 2012). The quality, however, was, and still is, hurt by strict government control, limited transparency and limited availability for foreign investors.

In 1981, the MOF started to issue treasury bonds. Gradually, different types of bonds have been introduced to the financial market including central bank bills, financial bonds issued by banks and non-bank financial institutions, corporate bonds issued mainly by large SOEs and inter-bank bonds. Despite this variety of types of bonds the corporate bond market has played, and still plays, a minor role in China's financial sector.

2.2 The second wave: Ownership reforms

Another important reform for the financial sector was the changes made to the governing of the SOEs. In the pre-reform period these firms received funding directly over the government's budget, and all profits were seized by the MOF. The large SOEs also functioned as a welfare system and provided "cradle-to-grave" care for its workers.[6] Starting in the mid-1980s, most SOEs were no longer funded over the budget. Thus, these firms started to use the financial markets, mainly the large state-owned banks, to fund investments. This means that funding of the SOEs shifted from the government directly to the state-owned banks. Many of these SOEs were outdated, inefficiently organized and the economic burden of providing welfare for its huge working force became gradually heavier. World Bank (1997) estimates show that as many as 50 percent of all SOEs incurred net losses in 1996. Further reforms were needed, and in 2003, the State Asset Supervision and Administration Commission (SASAC) was established to handle the ownership of SOEs. SASAC reports directly to the State Council and is today responsible for 117 centrally-owned large SOEs (excluding the state-owned banks).[7] Naughton (2007) argues that SASAC has stepped up the focus of efficiency and profitability, and during the 2000s the SOEs budget constraints have

[6] Workers employed by the SOEs was said to be provided an "iron rice bowl". The SOEs provided health care, education, housing and food (see for example Halskov Hansen and Thøresen (2013)).
[7] See section 2.5 for a further presentation of the State Council.

become gradually harder, i.e. the enterprises themselves are accountable for their economic performance and debt.[8]

2.2.1 Creating Asset Management Companies

Even though the first commercial banks were established in the late 1970s, it was first in 1995 that the Commercial Bank Law was passed by the National People's Congress and by that giving a formal legislation for the commercial banks. Despite the increased competition, the introduction of policy banks and commercializing of the banking sector, the main role of the large banks remained feeding the large SOEs with capital according to the wishes of the government (Saich, 2011). The inefficiency of these SOEs then gave rise to a large portfolio of non-performing loans (NPLs) for the large state-owned banks. In the late 1990s the NPL-ratio exceeded 40 percent of the total outstanding loans (Naughton, 2007). The Asian financial crisis in 1997-1998 further illustrated the need for additional reform to the bank sector and especially to the Big Four. In 1999, four Asset Management Companies (AMC) were established, one for each of the four large state-owned banks. In 2000, almost all of the non-performing loans were transferred from the Big Four to the newly established AMCs. The banks were now relieved from the troubling loans. However the root of the problem remained and by 2003 the NPL-ratio of the Big Four was still above 20 percent of the total outstanding loans (Naughton, 2007).

2.2.2 The Big Four go public

The government now decided that an ownership reform of the banks was needed and started to prepare the banks for public listing on the international stock market. During 2004-2005, the Bank of China (BOC), the Industrial and Commercial Bank of China (ICBC) and the China Construction Bank (CCB) all received new capital from the government and transferred more non-performing loans (NPLs) to the AMCs. In the autumn of 2005, CCB raised more than 70 billion RMB on its initial public offering (Walter and Howie, 2011).[9] The other banks followed, first by the BOC, then the ICBC. Finally, in 2010, the Agricultural Bank of China (ABC) was the last of the Big Four to get listed on the stock market.

[8] The number of SOEs under SASAC's control has declined from 196 in 2003 to the current 117. In addition, local governments have established their own SASACs with responsibility for locally-owned state enterprises.
[9] The renminbi (RMB) is the official currency in People' Republic of China. End of September 2013 the exchange rate RMB to USD was 6.148 (CEIC Data)

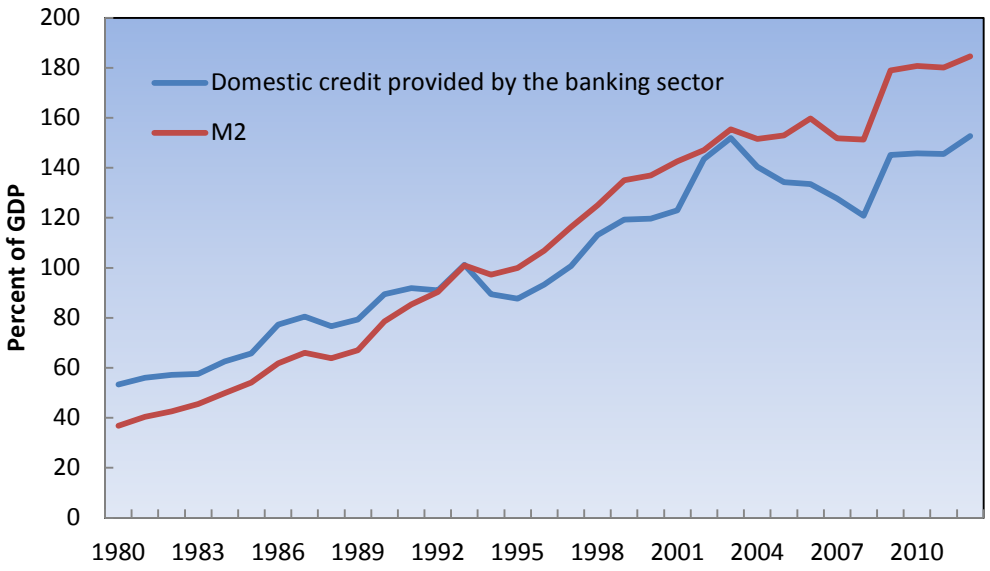
2.3 Current state of the financial sector: A deep, but narrow sector

Naughton (2007) describes the current financial sector of China as *"deep, but narrow"*. *Financial depth* is measured by the ratio of financial assets to gross domestic product (GDP), and *financial width* is measured by the variety of financial instruments and institutions. I argue that Naughton's characteristic of the financial sector still remains valid.

2.3.1 A deep sector

The gradually increasing depth of the Chinese financial sector is illustrated by figure 1 below. M2, defined as currency in circulation plus any savings and demand deposits, increased substantially from only 36,8 percent of GDP at the start of the reform period, to 187 percent in 2012. Naughton (2007) argues that the most important component of this dramatically increase in M2 was household deposits, and figure 1 also illustrates the similar rapid increase in domestic credit provided by the banking sector. Notice that the trend started to level out, and even decline, in the beginning of the 2000s, but following the outbreak of the global financial crisis in 2008, both M2 and domestic credit started to increase again as a direct consequence of the 4 trillion RMB large fiscal stimulus package provided by the government.

Figure 1: Domestic credit provided by banking sector and M2 as percent of GDP



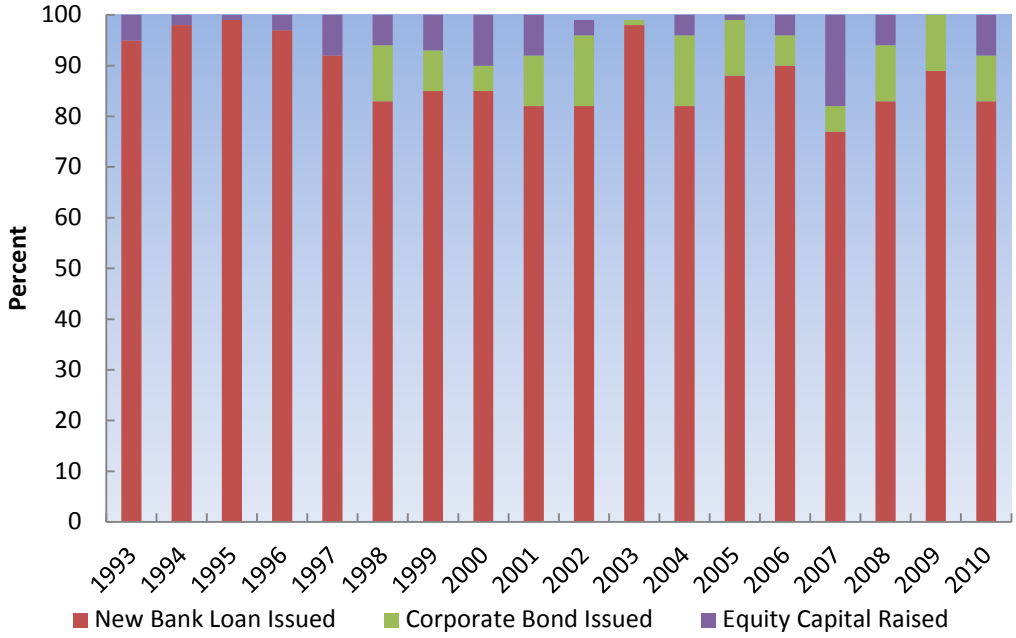
Source: World Bank Data

2.3.2 A narrow sector dominated by large state-owned banks

Despite the many attempts of increasing competition and introducing new financial sources in the reform period, the financial sector as a whole remains narrow in the sense that it heavily relies on the large banks.

The limited width of the Chinese financial sector is two-sided: First, the financial sector as a whole suffers by lack of diversification. Walter and Howie (2011) states: *"In China the banks are the financial system"* (p.27). In 2010, more than 80 percent of all corporate capital raised came from the banking sector, see figure 2.

Figure 2: Corporate capital raised 1993-2010



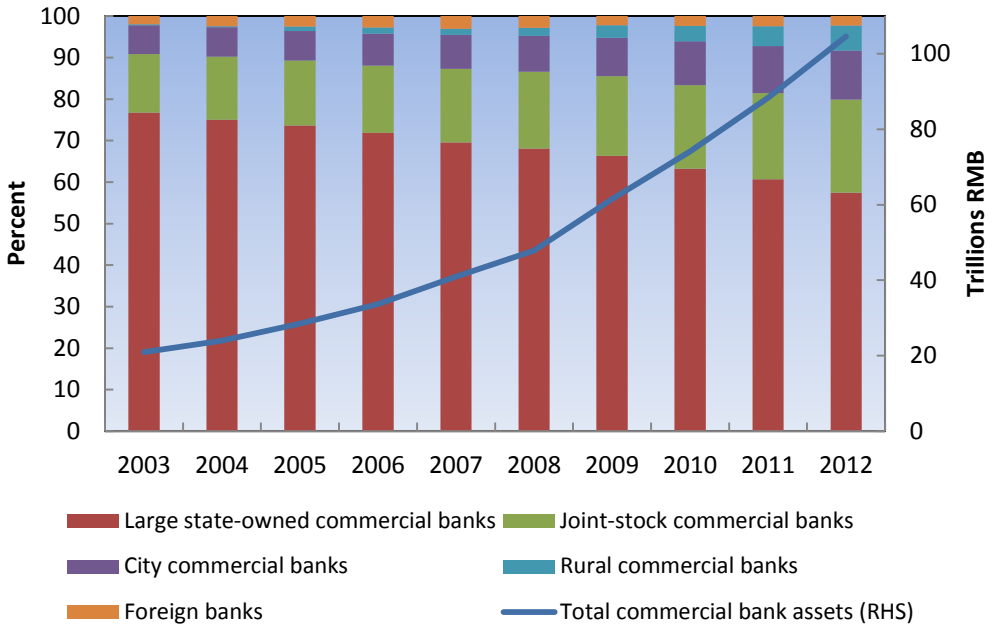
Source**:** People's Bank of China, Walter and Howie (2011, Figure 1.8, p.16)

Recently, more of the total capital is raised outside of the banking sector, in the shadow market, i.e. by informal lending or off-balance sheet lending. I will return to this under the discussion of financial stability in section 2.3.5. For now, it is important to notice that also the funding raised in the shadow market indirectly comes from the banking sector.

The second side of the narrow financial sector concerns the banking sector itself. As shown in figure 3, the banking sector is dominated by a few large participants. Even though the market shares of the large state-owned banks have decreased over the last decade, these banks still

dominate the banking sector.[10] More than half of all commercial bank assets are held by the large state-owned banks.[11] Even if assets held by non-commercial banks, credit cooperatives and non-bank financial institutions are included, the large state-owned banks hold more than 45 percent of all assets.

Figure 3: Composition and evolution of the commercial banking sector



Source: CEIC Data

Measured by market capitalization and assets, the Industrial and Commercial Bank of China (ICBC) is the largest of the Chinese banks. In 2012, ICBC alone held more than 16 percent of all commercial banking assets (CEIC Data). Data on Chinese state-owned enterprises' market capitalization are, however, somewhat misleading, given that only a fraction of the total shares are tradable (Walter and Howie, 2011). Nonetheless, no matter how one measures the size, Chinese banks are massive institutions. In 2012, the banking sector employed about 3.3 million workers. Almost half were employed by the five large state-owned banks (CEIC Data). In their "Global 2000"-list over the largest public companies considering sales, profits and assets in addition to market value, Forbes places all of the Big Four among the world's top eleven.[12] Their massive size and their important role in the economy indicate that these large banks are protected by an implicit guarantee. It is doubtful that the government would

[10] The large state-owned commercial banks consist of the Big Four and the Bank of Communication (BOCOM).
[11] In 2012, 57 percent of all commercial banking assets were held by the large state-owned banks (CEIC Data).
[12] ICBC places 1st, CCB 2nd , ABC 8th and BOC 11th, see http://www.forbes.com/global2000/ .

let these banks fail, and this guarantee could of course give root to some serious moral hazard problems, where banks take on too high risk.

2.3.3 Financial regulation

Under the Maoist-era and early years of reform, the People's Bank of China (PBC) had all regulatory and supervisory responsibilities in the financial sector. As the financial sector improved, and PBC developed into a more traditional central bank, also the supervision tasks were transferred to other institutions. Today, the regulatory and supervision system consists of several institutions.[13] China Securities Regulatory Commission (CSRC) was established as early as in 1992 as a direct consequence of the establishment of the domestic stock market. China Insurance Regulatory Commission (CIRC) was established in 1998. And finally, in 2003, the banking supervision tasks were transferred from PBC to the newly established China Banking Regulatory Commission (CBRC), the same year as the Law on Banking Regulation and Supervision was implemented.

CSRC shall, among other duties, create policies, laws and regulations for the securities and future markets, and administer and supervise the issuance, listing, trading, custody and settlement of stocks and bonds of different types (CSRC, 2013a). Since the establishment in 1992, CSRC has worked for improving the quality of the domestic stock markets and the quality of the listed companies. Even though there are still several shortcomings of the stock market, there is no doubt that the work of CSRC has had an impact. CIRC formulates policies, strategies and plans, draft laws and regulations for the insurance industry (CIRC, 2013). CIRC has focused on the solvency of insurance companies. Given the important role that banks play in the Chinese economy, CBRC's role cannot be emphasized enough. CBRC supervises all types of banks: commercial, policy and foreign funded. CBRC's main objectives are to provide fair competition and promote the safety and soundness of the banking sector (CBRC, 2012). By setting requirements on capital adequacy, loan provision and risk control CBRC tries to control the stability of the sector.

[13] Some of them have a more unofficial supervision role, such as the MOF, the PBC and the National Development and Reform Commission (NDRC). I will return to these in section 3 below. In this section I consider the three distinct institutions with responsibility for securities, insurance and banking regulation.

2.3.4 Problems with the regulatory system

There are several good reasons not to have one super-regulatory institution in charge of all parts of the financial sector and instead organize the regulatory system as it is done in China. The problem for the Chinese economy, however, is that the borders between the different institutions are vague and in many cases the institutions have overlapping responsibilities. The IMF concludes that: *"The legal and regulatory framework for banking has been brought closer in line with international standards, but gaps remain"* (IMF, 2011, p. 41). Officially, the three national institutions (the MOF, the NDRC and the PBC), and the three sector institutions (the CBRC, the CSRC and the CIRC) are all at ministerial level and report directly to the State Council. In this sense they are all equally strong. However, Geiger (2010) argues that *"the actual status of an organization within institutional framework of China depends to a large degree on the personal power and the personal ranking of its leaders in the system"* (p.50).

2.3.5 Financial stability and shadow banking

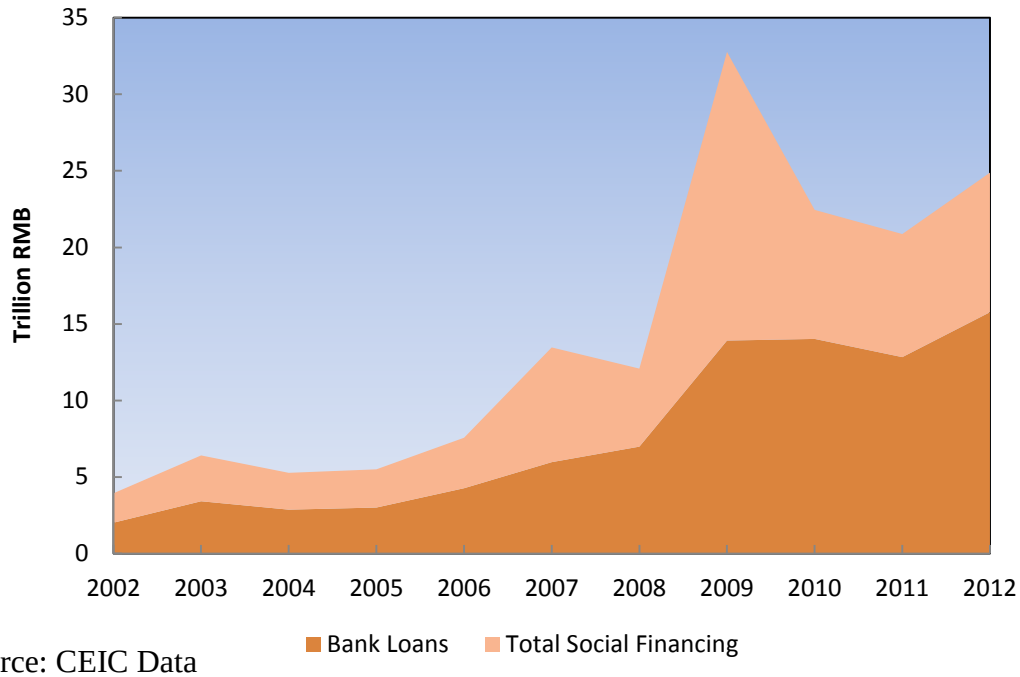
IMF (2011) concludes that the overall stability of the Chinese financial sector is robust, but mentions some potential risk for the near-term. IMF (2011) further describes several characteristics of the macroeconomic and institutional environment that contribute to a build-up of vulnerabilities. Low cost of capital, underdeveloped capital markets, incomplete interest rate deregulation, limited exchange rate flexibility, high reliance of credit growth and government involvement in the financial sector are among the characteristics included. As later sections in this thesis will show, some of these characteristics are directly linked up to the way China conducts monetary policy.

One of the potential risk factors that the financial sector faces is increased dependence on shadow banking. Shadow banking is not a problem in itself and, considering the narrow financial market in China, it's rather a good thing that more financing takes place outside of the banking sector.[14] The problem of this shadow banking is the close link to the regular banking sector. Often, large SOEs obtain loans from the Big Four at low interest rates and then lend the funds to small- and medium sized enterprises that are unable to obtain loans directly from the banking sector. Trust companies also rely on bank funding. And perhaps most importantly: the large state-owned banks provide Wealth Management Products to

[14] Naturally, the underground unregulated part of shadow banking is problematic.

investors and trust companies, which are held off banks' balance sheets. Figure 4 illustrates the rapid increase of off-balance lending following the global financial crisis.

Figure 4: Flow of Total Social Financing* and Bank loans

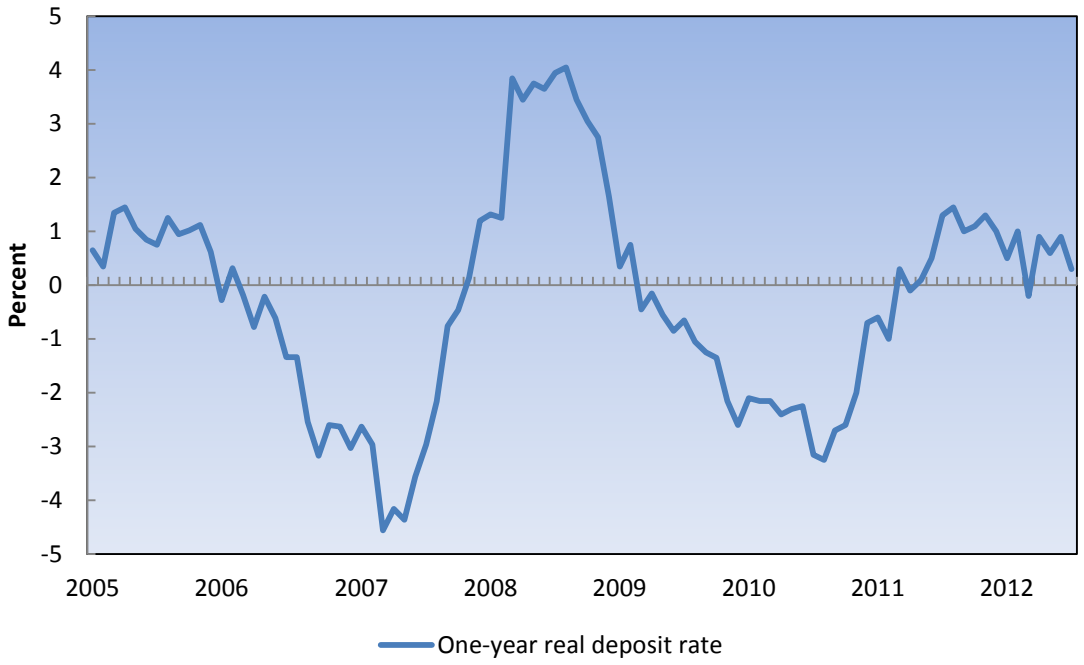


Source: CEIC Data

* Total Social Financing (TSF) consists of trust and entrust loans, bank acceptance loans, corporate bond financing and non-financial enterprise equity financing in addition to regular bank loans.

There are several reasons for the rapid increase in shadow banking and there are at least two links to the way China conducts monetary policy. First, the stimulus package following the financial crisis led to a rapid increase in lending (see figure 1 and figure 4). To limit this growth in loans, the authorities increased the banks' required reserves ratios several times during 2010 and 2011. Small- and medium sized firms found it hard to raise capital from the large state-owned banks, and then looked for other sources in the informal market. Second, PBC operates a strict control on interest rates and then puts an upper bound on the deposit rates that the bank may offer. Figure 5 shows that the real one-year interest rate on deposits was *negative* during at least two periods, 2006-2008 and 2009-2010. When the real interest rate is negative, the deposits placed in the banks yield a loss, because the inflation, the overall price increase in the economy, exceeds the interest earned on the deposits. One may say that the depositors pay a tax on their deposits. These factors led investors, enterprises and wealthy individuals to seek the shadow market for higher returns, and to raise capital.

Figure 5: One-year real deposit rate



Source: World Bank Data

2.4 The Central Bank – People's Bank of China

The People's Bank of China (PBC) was founded in 1948. A monobanking system was established with the PBC as the only real bank. The PBC's function was to allocate capital and funds according to the state plan and annual budgets (Yabuki and Harner, 1999). As shown in section 2.1, the PBC was gradually transformed into a modern central bank. However, it was not until 1995 that The Law of the People's Republic of China on the People's Bank of China (hereafter just "the law on PBC") was approved by the National People's Congress (NPC). The law was amended in 2003 when China Banking Regulatory Commission (CBRC) was established and the PBC no longer was the main regulator of the commercial banks. The law on PBC strictly regulates the targets, instruments and organizational structure of the PBC, as well as currency and supervision issues.

2.4.1 Organizational structure

The head office of the PBC is located in Beijing and consists of 18 departments and bureaus, however, only one third of these departments are directly relevant to monetary policy decisions. Geiger (2010) argues that the most important departments for monetary policy are the Monetary Policy Department (MPD), the Financial Market Department (FMD), the

Financial Stability Bureau (FSB), the State Treasury Bureau, the International Department and the Research Bureau. Of these, the MPD is the single most important. The MPD is *"Responsible for setting the intermediate target of monetary policy and coordinating efforts to achieve the target"* (PBC, 2009). The MPD is also responsible for proposing monetary policy instruments and the implementation of policies. Of the other departments, the two concerning financial stability, the FMD and the FSB, are of increasing importance.

In addition to the 18 departments and bureaus, the State Administration of Foreign Exchange (SAFE) "partly" lies under the PBC. I write "partly" because the SAFE also functions as an separate institution in itself, directly under the State Council. The fact that the SAFE both reports directly to State Council and functions as a PBC subordinate probably reflects the increasing importance of the SAFE and the foreign exchange reserves. Still, the administrator of the SAFE is to be recruited from within the current leadership group of the PBC. The SAFE is responsible for drafting and implementing laws and regulations of foreign exchange activities, and managing the foreign exchange reserves (SAFE, 2013).

2.4.2 Current leadership

The law on PBC states that PBC shall have a governor nominated by the premier, decided by the NPC and appointed by the president (PBC, 2003a). Together with a set of deputy governors and assistant governors, the governor is the final authority of all matters regarding the PBC (Geiger, 2010), i.e deputy governors, departments, bureaus, branches and committees only have an advisory and monitoring role; all final decisions (at least decisions of some importance) within the PBC must be approved by the governor.

Currently, the leadership of the PBC consists of one governor, five deputy governors, two assistant governors and one commissioner of discipline inspection. Table 1 presents the current group of leaders and their background. As part of the Chinese leadership transition, Zhou Xiaochuan was reappointed as governor of the PBC by the NPC, in March 2013, even though he already had reached the ten-year limit for official positions in the Chinese government.[15] Deputy Governor Yi Gang is seen as a likely successor the day Governor Zhou steps down (Li, 2010).

[15] Walter and Howie (2011) describe Zhou as one of the architects behind the recapitalization and restructuring of the commercial banks in the late 1990s and early 2000s.

There is a tradition to recruit governors and deputy governors from within the PBC departments and subordinates.[16] Bell and Feng (2013) argue that the increasing importance of the PBC reflects a clear strategy of recruiting highly skilled economists and financial expertise. As shown in table 1, the academic level of the leadership is high. However, only Deputy Governor Yi has educational background from outside of China.[17]

Table 1: Current leadership of the People's Bank of China

Who	Background
Governor Zhou Xiaochuan	Ph.D. in Economic Systems Engineering, Tsinghua University, Beijing. Chairman CSRC. President CCB. Deputy Governor PBC. Administrator, SAFE.
Deputy Governor Hu Xiaolian (F)	Master's degree in Economics. Alternate member of the CCP Central Committee. Assistant Governor PBC. Administrator, SAFE
Deputy Governor Liu Shiyu	Master's degree in Management Engineering. Assistant Governor, PBC. Director-General, Various Departments PBC.
Deputy Governor and Administrator of SAFE Yi Gang	Ph.D. in Economics, University of Illinois, USA. Professor Beijing University. Assistant Professor Indiana University, USA. Assistant Governor PBC. Director-General Monetary Policy Department.
Deputy Governor Pan Gongsheng	Ph.D. in Economics. Executive Director and Vice-President of ABC.
Deputy Governor Li Dongrong	Ph.D. in Economics. Assistant Governor, PBC. Deputy Administrator, SAFE.
Commisioner of Discipline Inspection Wang Huaqing	Ph.D. in Economics. Member of CCP Central Committee. Commissioner of Discipline Inspection and Assistant Chairman, CBRC. Director-General Banking Supervision Department, PBC.
Assistant Governor Guo Qingping	Bachelor's degree Economics. President, Tianjin Branch of PBC. Director-General, Various Departments PBC.
Assistant Governor Jin Qi	Director-General at various Departments, PBC.

Source: People's Bank of China

2.4.3 The regional branches of the PBC

In 1998, nine trans-provincial branches of the PBC were established and replaced the previously 31 provincial branches. The branches, according to the law, are responsible for maintaining financial stability and handling *"relevant business operations"* (PBC, 2003a, Article 13) in their respective regions. The actual importance and influence of the branches

[16] Deputy Governor Pan of the current leadership is the only one recruited from outside of the PBC system.
[17] In addition, Deputy Governor Pan has a short stay at University of Cambridge, but his PhD degree is from Renmin University in Beijing.

are unclear. When established, the branches played an important role in supervising and regulating the important bank sector. However, when these responsibilities were transferred to China Banking Regulatory Commission (CBRC) in 2003, the branches lost much of its influence.[18] The establishment of regional branches instead of provincial branches must be seen as an attempt to increase the PBC's independence and autonomy. With provincial branches the local governments could to some extent influence the conduction of monetary policy directly. By creating larger branches, the authorities removed this direct link between the provincial governments and the PBC and consequently increased the PBC's independence. This is important because the local government traditionally have placed a larger focus in economic growth than the central government (Huang et al, 2013a).

In 2005 a second head office was established in Shanghai, a move to better the PBC information and access to the increasingly important financial markets in Shanghai. Bell and Feng (2013) argues that the setup of a second head office was: *"A clear attempt to copy the institutional pattern of the Federal Reserve Bank in New York…"* (p. 145).

2.4.4 The monetary policy committee

According to The law on PBC, the PBC shall establish and lead a Monetary Policy Committee (MPC), however, unlike many other MPCs and executive boards around the world, the MPC of China has only an advisory role (see PBC, 2003b and Patra and Samantaraya, 2007).[19] Table 2 shows the current members of the MPC and their positions outside the committee. The Committee meets once per quarter and (occasionally) presents short meeting records on the PBC webpage after the meeting. It is clear from table 2 that there is an uneven distribution between internal and external members. Only four out of fifteen members are internal from the PBC. The use of external members is common in MPCs around the world. In Norway the MPC consists of 2 internal and 5 external members. There are several arguments why a MPC should include external members. The most important are to avoid group-thinking and bringing in fresh arguments from outside the central bank (Qvigstad et al, 2013 and Blinder, 2008). However, if the external members have self-interest in the way monetary policy is conducted it could reduce the credibility of the central bank.

[18] PBC also operates more than 300 municipal sub-branches, 1809 county-level sub-branches and five overseas representative offices.

[19] Article 12 states: *"The People's Bank of China shall establish a monetary policy committee, whose functions, composition and working procedures shall be prescribed by the State Council and reported to Standing Committee of the National People's Congress for the record"* (PBC, 2003a).

Consequently, in most MPCs the external members are restricted from participating in other financial activities, political activity and government service outside the central bank (Patra and Samantaraya, 2007). In contrast, table 2 shows that several of the external members of the Chinese MPC stem from other institutions and ministries that have self-interest in monetary policy decisions. Most remarkable is it that the commercial banks have their own representative in the MPC since the position as president in China Association of Banks (CAB) is usually held by one of the chairmen in the "Big Four". That these banks are included in the conduction of monetary policy through a representative in the MPC, reflect their position in the Chinese economy. Other external members could be considered politicians, such as the two Vice-Ministers Zhu and Li, and Deputy Secretary-General You, which represent institutions and ministries that may have other targets and goals than the PBC. If, for example, the National Development and Reform Commission (NDRC) puts more weight on economic growth than PBC, their representative could advocate a more expansive monetary policy than a non-politician representative would have done. As I show in later sections, this is one of the main arguments for why the conduction of monetary policy should be handed over to an independent central bank.

Table 2: Members of the monetary policy committee in the PBC

Internal members		External member	
Name	**Position**	**Name**	**Position**
Zhou Xiaochuan	Governor PBC	You Quan*	Deputy Secretary-General State Council
Yi Gang	Deputy Governor PBC and administrator of SAFE	Zhu Zhixin	Vice-Minister NDRC
Hu Xiaolian	Deputy Governor PBC	Li Yong	Vice-Minister MOF
Du Jinfu*	Deputy Governor PBC	Ma Jiantang	Commissioner NBSC
		Jiang Jianqing	President China Association of Banks and Chairman ICBC
		Shang Fulin	Chairman CBRC
		Xiao Gang	Chairman CSRC
		Xiang Junbo	Chairman CIRC
		Qian Yingyi	Professor Tsinghua
		Chen Yulu	Professor Renmin University
		Song Guoqing	Professor Beijing University

Source: People's Bank of China and Caixin (2013)

* Du Jinfu and You Quan left the positions in the PBC and the State Council in conjunction with the leadership transition March 2013, according to the law on PBC they should then be replaced in the MPC. Nonetheless, as far as to my knowledge, they have in October 2013 not been replaced.

The law on PBC states that the MPC *"shall play an important role in the State macro-control and the formulation and adjustment of monetary policies"* (PBC, 2003a), however, how to interpret *"an important role"* is unclear. As mentioned above, the MPC only has an advisory role. Patra and Samantaraya (2007) create an index for MPC empowerment and place the Chinese MPC in the lower scale.[20]

Nonetheless, given the high positions of the members and the important institutions represented in the MPC, it is my opinion that one should not underestimate the influence of the MPC.

2.5 Other participants in the Chinese monetary policy

For China it is important to distinguish between theoretical and de facto power. In theory, the National People's Congress (NPC) is the highest organ of state power (Saich, 2011) and the parliament of China. However, the NPC meets only once a year and has, in reality, limited influence.[21] All major decisions and appointments are made by the communist party. In this section, I will distinguish between the *state* and the *party* (even though the borders between them in most cases are quite vague) and shortly summarize their influence over Chinese monetary policy. As will be evident, both the party and the state have direct power and influence over the conduction of monetary policy, not only by setting goals and targets, but also through decision making and implementation of monetary policy.

2.5.1 The Party – China Communist Party

Even though the constitution may say otherwise or the setup of institutions looks much like any other modern country, one should not be in doubt: The Chinese Communist Party (CCP) holds the real power in China. Li (2010) puts it in clear words: *"…power in the People's Republic of China (PRC) ultimately resides not in the government, but in the ruling CCP—not in the State Council, but in the Politburo and especially its Standing Committee"* (Li, 2010,

[20] The index considers ten attributes of MPC including legal mandate, absence of government and decision making roles. The index goes from 0 to 10, where 10 is the highest empowerment, and China get a resulting index of 3. As a comparison the Norges Bank receive 6, the European Central Bank 7, and Bank of England 9 (Patra and Samantaraya, 2007).

[21] The NPC usually meets in March every year. The standing committee of the NPC meets once every second month.

p.2). Although there are other political parties in the Chinese system, it is only the CCP that matters; the party had more than 83 million members in 2011 (Halskov Hansen and Thøresen, 2013). The basic organizational principle of the CCP is a hierarchical organization formed as a pyramid with the real power consolidated within a small group of individuals. In theory, the top of the pyramid is the National Party Congress and its Central Committee.[22] In practice, however, the real power lies with the Politburo of the Central Committee and, most importantly, the Standing Committee of the Politburo.

Today, the Standing Committee of the Politburo (herafter just "Standing Committee") consists of seven members who are the de facto leaders of the People's Republic of China (PRC), no matter what other position they may hold. The members also have an internal ranking within the Standing Committee, where Xi Jinping is number one. He is General Secretary of the CCP Central Committee (leader of the party), President of the PRC (leader of the state) and Chairman of the CCP Military Commission (leader of the military). All members have their own portfolio with certain responsibilities such as economy, corruption and propaganda. Of the current members, Wang Qishan is the most skilled economist with background from the People's Bank of China (PBC) and the China Construction Bank (CCB). The actual working of the Standing Committee is somewhat unclear; they meet frequently and the debates are said to be unrestrained (Saich, 2011). All major decisions concerning monetary policy, the financial sector and the economy in general must be approved by the Standing Committee.

Within the party system there are also more informal bodies and groups, which main role is to advise the Politburo and its Standing Committee. One of these is the Central Group for Finance and Economics (CGFE), which, not surprisingly, covers economic issues. There is a large degree of overlapping members between the Standing Committee, the State Council and the CGFE (Geiger, 2010). The CGFE is normally headed by one of the members in the Standing Committee and most commonly the Premier.

The CCP's power over the Chinese economy is not only a top-down concept; the CCP is present at every level of decision making; regional, provincial, companies etc. Article 19 of the Company Law of PRC states:

[22] The National Party Congress meets once every fifth year with more than 2000 delegates from all over the country. Formally the congress elects members to the Central Committee, in reality they are just approved by the Congress and elected by the party leaders.

"An organization of the Chinese Communist Party shall, according to the Charter of the Chinese Communist Party, be established in the company to carry out activities of the Chinese Communist Party. And the company shall provide necessary conditions for the activities of the Chinese Communist Party." (Central People's Government of the People's Republic of China, 2005)

All major banks have a party committee, usually headed by the chairman of the bank, this shall secure that all activities by the bank are in accordance with the party's policy. All senior bankers are appointed directly by the party. All ministries, under the State Council also have a party committee. In addition to being the governor of the PBC, Zhou Xiaochuan also holds the title: Secretary of CCP Party Committee of PBC.

2.5.2 The State – State Council

The State Council, in theory appointed by the NPC (in reality appointed directly by the party), is the highest executive organ of state administration and in practice the government of China (Saich, 2011). The State Council is a massive and complex bureaucratic institution with various ministries, commissions, bureaus, institutions and organizations at several layers.[23] The first layer is the Standing or Executive Committee. It consists of the premier, four vice premiers and five state councilors, and the committee normally holds meetings once every week. Each of the vice-premiers and state councilors oversees certain areas of the administration where of one handles economic and monetary issues.

The second layer of the State Council is the ministry-level. Currently, there are 25 ministries and commissions at this level, which of several have a direct relevance for conduction of monetary policy, such as the PBC, the NDRC, and the MOF, and to some extent also the National Audit Office. The head of all ministries and commissions are entitled to meet at the full meeting of the State Council, which meets once every six month. The MOF's primary role is to handle fiscal policy, provide the annual national budget, issue bonds, and, together with other institutions, handle the foreign exchange reserves. Traditionally, and still today, the MOF has a close link and relationship to the large commercial banks. The MOF owns China Investment Corporation (CIC), which again holds Central Huijin Investment Ltd. as a fully-

[23] In total more than 60 ministries, institutions, organizations and bureaus lie directly under the State Council and report directly to the standing committee with various importance. Among these, we find the CBRC, the CIRC and the CSRC, as well as the large State-owned Assets Supervision and Administration Commission (SASAC). These institutions and organizations report directly to the Executive Committee and then officially hold the same rank as the 25 ministries, however, as argued by Li (2010), these are usually considered as the third layer of the State Council.

owned subsidiary.[24] Central Huijin holds the majority of the governments share in the large Chinese banks.[25] In addition to be the indirect owner of the banks, the MOF also plays a role in supervising and regulating the financial sector, illustrating the mixture and overlapping roles and responsibilities in the Chinese system.

Another part of the supervision system is the National Development and Reform Commission (NDRC), which concentrates on the securities market. The NDRC is one of the most powerful ministries under the State Council. Its responsibilities include formulating and implementing medium- and long term development plans and monitor current macroeconomic trends. There is no doubt that the NDRC plays an important role in the conduction of Monetary Policy as its "main functions" are to *"… participate in the formulation of fiscal, monetary and land policies, and formulate and implement price policies"* (NDRC, 2013). Under the NDRC is also the Department of Price, which is responsible for changing and setting prices under government control. Bell and Feng (2013) argue that the NDRC care more about growth than inflation.[26]

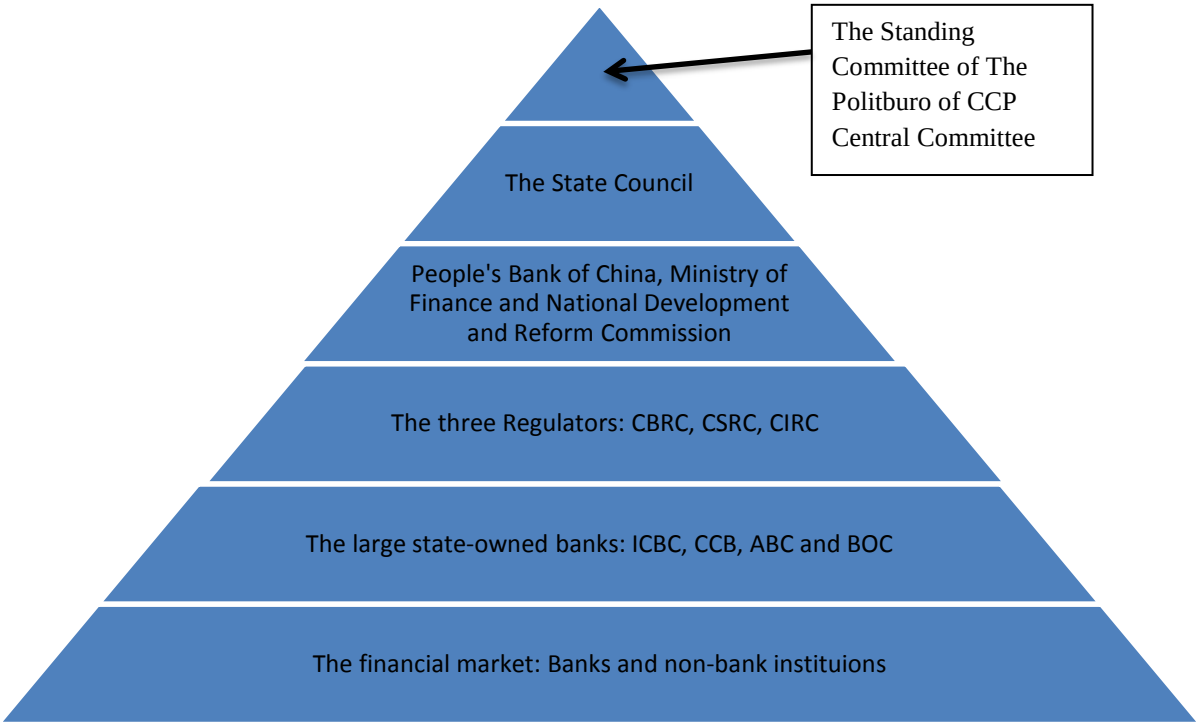
2.6 The hierarchy of China's financial sector and monetary policy

To sum up my discussion of participants in the Chinese financial sector and conduction of monetary policy, figure 6 below intends to illustrate the hierarchy of the sector. There are many overlapping responsibilities and roles, and in many cases the actual power of an institution is defined by the personal power of the leader (and the corresponding personal political ranking), rather than the ranking of the institution per se. It is therefore difficult to illustrate and describe the actual hierarchy of the financial sector. It is even harder to describe the decision making process of monetary policy. Nonetheless, I will try to sketch the decision process for issues of some importance. The Monetary Policy Committee (MPC) meets quarterly to discuss and suggest possible actions. The PBC leads this committee and is represented with four members, but also other high ranked institutions and market actors are

[24] CIC reports directly to the State Council, but was funded by the MOF when established in 2007. The close relationship was last illustrated when the previous chairman of CIC, Lou Jiwei, was appointed as the new Minister of Finance in March 2013.
[25] In December 2012, Central Huijin controls 67,72 percent of BOC's, 57,21 percent of CCB's, 47,63 percent of CDB's, 40,21 percent of ABC's and 35,46 percent of ICBC's of the tradable shares.
[26] I will return to the role of growth versus inflation in the conduction of Chinese monetary policy in section 3 below.

present. Then, the leaders of the PBC meet and decide upon what policy recommendations they will send over to the State Council. The Executive Committee of the State Council then meets and makes the final decision, based upon the PBC's recommendations and the MPC's suggestions. In cases of high importance the State Council could seek advice with the Standing Committee of the Politburo, or be instructed directly. Finally, the decision is sent back to the PBC (or the relevant institution), which will implement the decision. It seems clear that the PBC plays an important and central role, and Bell and Feng (2013) state that *"Monetary policy remains more or less an exclusive turf of the PBC…"* (p.53). I agree that this seems to be the case in many decisions, and the Executive Committee of the State Council will routinely approve all the minor decision recommendations that the PBC sends over. However, some parts of the monetary policy decisions are of so high importance, and could ultimately threaten the social stability, hence it seems likely that these issues are discussed all the way to the top of the CCP, and that the State Council and the PBC will get direct instructions from the Standing Committee of the Politburo.

Figure 6: The hierarchy of China's financial sector



Sources: Author's own illustration based on Bell and Feng (2013), Geiger (2010), IMF (2011), Walter and Howie (2011), Huang et.al (2013) and own research.

3 Monetary Policy in China

In this section, I will discuss the implementation of monetary policy in China. I have divided the section into four parts, covering the important concepts of *targets*, *instruments*, *independency* and *transparency*. The sections will provide general definitions of the concepts, and make use of these definitions when considering the characteristics of Chinese monetary policy.

3.1 Monetary policy targets

When discussing monetary policy implementation, Walsh (2010) carefully distinguishes between operating targets, intermediate targets and policy goals. The *policy goals* represent the ultimate goal of monetary policy, which Bofinger (2001) argues should be to maximize the welfare of the population. Typically these ultimate goals are more well-defined such as price stability, maximum employment or economic growth. These goals lay the foundation for all monetary policy, indicated by the first box in figure 7 below. In the following, I will distinguish between policy goals and what I call *final targets*, where the latter are variables that secure that the policy goals are reached, i.e. if price stability is the policy goal, the final target will be an inflation level that are consistent with price stability.[27] The *instruments* of monetary policy are what the central bank (or the responsible authority) controls directly.[28] These instruments are then used in such way that the *operational targets* are achieved, where the operational targets are defined as a pre-determined economic variable that the central bank can control with a short time lag. Furthermore, there is often a considerable time lag between the operational targets and the final targets, hence the need for *intermediate targets*, which must be closely related to both operational- and final targets. The intermediate targets then provide the central bank with information about economic development that affects the ultimate variables and final targets. This section will, by using the different definitions of monetary policy targets, consider the targets for monetary policy in China.

[27] The terms final targets, ultimate goals and policy goals are all frequently used in the literature and there is no clear cut between the terms. However, policy goals and ultimate goals are often referred to as more vague goals such as maintaining the value of the currency or maximize employment, while final targets are more explicit goals such as an inflation rate or growth rate.

[28] The concept of monetary policy instruments are further introduced and explained in section 3.2 below.

Figure 7: The sequential line of monetary policy implementation in practice

3.1.1 Policy goals and final targets

The policy goal of the Chinese monetary policy is formally stated in Article 3 in the law on PBC: *"The aim of monetary policies shall be to maintain the stability of the value of the currency and thereby promote economic growth"* (PBC, 2003a). The interpretation of this article, however, is a bit problematic, as there is disagreement on how to interpret the phrase: *"maintain the stability of the value of the currency"*. One could easily argue that it means controlling the exchange rate, and this could then explain why the currency has been so stable, and constantly undervalued, the last two decades. On the other hand, one could also argue that it means controlling the purchasing power of the population and then controlling the stability of domestic prices, i.e. price stability. If there is a rapid domestic price increase, without a corresponding wage increase, the real value of money will fall. I will follow the last interpretation, which has become the common practice (see for example Geiger, 2010 and Bell and Feng, 2013).[29] I further interpret Article 3 such that the policy goal of the monetary policy in China is two-fold: first, ensure price stability and second, as a consequence, promote economic growth. Such flexible inflation targeting is similar to the conduction of monetary policy in many other central banks, for example the Bank of England (BoE) where the monetary policy objective is to: *"… deliver price stability – low inflation – and, subject to that, to support the Government's economic objectives including those for growth and employment"* (BoE, 2013).[30] The term flexible inflation targeting means that the central bank puts weight on both inflation and other targets such as unemployment and growth. The majority weight is typically placed on price stability. With flexible inflation targeting the central bank is willing to trade away some price stability against growth and employment

[29] In box 3.1 I further elaborate on the role of the exchange rate as a target for monetary policy in China.
[30] Other central banks that practice flexible inflation targeting are e.g. the Norges Bank, the Federal Reserve and the Sveriges Riksbank.

stability in the short term (Galí, 2008). It seems like PBC, in addition to the two-fold policy goal stated in the law, is given additional mandates. When commenting on the mandate, Governor Zhou Xiaochuan of the PBC confirms my interpretation of Article 3 as focusing on price stability and inflation and states that*: "China's monetary policy has multiple objectives. The first is low inflation; the second is to promote economic growth; the third is to maintain full employment and keep the unemployment rate relatively low; the fourth is to keep a balanced balance of payments."* (Caixin, 2012).[31] Neither of the two latter, full employment and the external balance, are mentioned in the law on PBC, and in this section, I will focus on the two goals stated in the law; price stability and economic growth.

Similarly to other central banks, the People's Bank of China (PBC) uses the inflation rate as a measure of price stability and GDP growth as a measure of economic growth, and then constructs final targets by the use of these variables. However, since the PBC does not have goal independence, it cannot freely set these targets.[32] Instead, the State Council sets annual inflation and growth targets. Table 3 below shows the annual final targets for GDP growth and inflation for the time period 1996 to 2013. Targets are sat annually and presented under the "Report on the Work of the Government" during the NPC.[33]

Table 3: Final targets for monetary policy 1994-2013

Year	Inflation (%)	GDP growth (%)
1996	10	8
1997	6	8
1998	5	8
1999	2	8
2000	1	8
2001	1-2	7
2002	1-2	7
2003	1	7
2004	3	7
2005	4	8
2006	3	8
2007	3	8
2008	4,8	8
2009	4	8
2010	3	8

[31] Caixin is a Chinese economic magazine.
[32] The concept of independence are defined and discussed in section 3.3.
[33] The Report on the work of the Government is similar to the American «State of the Union» held by the President of USA and is held by the premier at NPC every year.

2011	4	8
2012	4	7,5
2013	3,5	7,5

Sources: Central People's Government of the People's Republic of China (2000-2013) and Geiger (2010)

The relative weights put on the two targets, however, are not known. Bell and Feng (2013) argue that the focus on inflation in Article 3 in the law on PBC was a result of the two periods of high inflation in the late 1980s and mid-1990s, which made the government more cautious about high inflation.[34]

The claim that price stability is the primary goal for monetary policy is further strengthened by several comments made by the previous premier, Wen Jiabao. At a press conference following the National People's Congress (NPC) in 2011, he states that: *"inflation is like a tiger; once it gets free, it is difficult to put back in the cage"* (China Daily, 2011). Premier Wen repeated the focus on inflation at his last NPC when he stated that inflation always will be one of the most important macro-control targets (Xinhua, 2013). Rapid price rise is politically sensitive for the leaders of China and could be a source of instability for China's Communist Party (CCP). Naughton (2011) states that *"Inflation is very unpopular in China, and when price increases are this evident, it provokes frustration and anger, particular among middle-class urban dwellers"*.[35] However, given that the PBC cannot be considered independent, and the fact that Chinese leaders above all are evaluated by their ability to contribute to economic growth (Li and Zhou, 2005), it has to be doubted whether the PBC can pay less attention to the goal of economic growth. Lower economic growth means lower household income growth, which may be a source of social instability. Also, the governors and leaders of the PBC are evaluated by their contribution to economic growth, indicating that it is worse for the PBC to deviate from the growth target than to deviate from the inflation target. If this means that the PBC puts too high weight on economic growth, i.e. tries to achieve higher growth than the natural rate, it could lead to an inflation bias. The PBC is well aware of this problem and the PBC officials often emphasize the importance of price stability. Governor Zhou Xiaochuan states that: *"Among the four, keeping inflation at bay has always*

[34] In 1988 the annual CPI was 18,7 percent and in 1994 it surpassed 24 percent (World Bank Data). Some authors, for example Huang et.al (2013), argue that the high inflation in the late 1980s was one of the main sources that contributed to the widespread social unrest in 1989 that culminated with the Tiananmen Square protest.

[35] The Consumer Price Index (CPI) peaked at 6,5 percent in July 2011 (CEIC Data).

been the most important mandate of the central bank and has the heaviest weight" (Caixin, 2012).

From table 3, however, it should be clear that the PBC does not operate under any long run inflation target, like for example the European Central Bank (ECB), the Bank of England (BoE), the Federal Reserve (FED) or Norges Bank.[36] Such long-term targets give the central banks flexibility when facing trade-offs between conflicting goals at the same time as it helps anchoring the inflation expectations. In China, however, the annual target has changed rapidly during the last two decades. Geiger (2010) argues that the use of annual inflation targets is a direct result of the lack of independence between the PBC and the government, and states that: *"Often inflation targets have to be seen as political rather than monetary targets derived from an economic rationale"* (p.136). I argue that the lack of a long run inflation target makes it harder for the PBC to anchor inflation expectations.

Finally, the annual inflation target should be interpreted as a ceiling or <u>maximum</u> level, rather than a desired level. In 2007, premier Wen Jiabao, when presenting the Report on the Work of the Government, said: *"The overall price level should remain basically stable, the overall increase in consumer prices should stay <u>below</u> 3%"* (Central People's Government of the People's Republic of China, 2007) (My emphasis). This stands in contrast to for example the BoE, where it is stated that: *"Inflation below the target of 2 % is judged to be <u>just as bad</u> as inflation above the target"* (BoE, 2013)(My emphasis). Similarly, the GDP growth target in China should be interpreted as a <u>minimum level</u>.

For economic growth, it has only happened twice (since 1996) that the target was not reached. As a comparison, the inflation target, when interpreted as a maximum level, was only reached 65 percent of the time over the same period, again indicating that economic growth has been the main priority. Such focus on economic growth could lead to a positive inflation bias.[37] However, the rapid comments from Party officials and the PBC officials on the importance of price stability, make me conclude that the PBC, in normal times, operates under a kind of flexible inflation target, i.e. put some weight on both inflation and economic growth. However, this target is only for the short run as the targets for growth and inflation only are valid for one year and renewed annually. In section 5, I argue that the lack of a long run and

[36] The ECB's long term inflation target is *"close to, but below 2 percent"*, while the BoE and the FED operate under a 2 percent inflation target, and Norges Bank's long-run inflation target is 2,5 percent.
[37] The possible inflation bias will be the main topic of section 4 and 5.

flexible inflation target increase the possibility for a positive inflation bias in China and I argue that several steps could be taken in order to reduce the probability of an inflation bias.

3.1.2 Intermediate targets

The intermediate targets should be some economic variables that the central bank can control within relative short time lag and they should have a known relationship with both final targets and operational targets. Typical intermediate targets include monetary aggregates such as M1 or M2, the exchange rate, and some medium- and long run level for interest rates (Bofinger, 2001). The PBC officially considers *M2-growth* as intermediate targets of monetary policy (Conway et al, 2010).[38] In addition, in box 3.1 below, I argue that the exchange rate might be considered an intermediate target of the Chinese monetary policy, however, this is not officially stated.

M2:

Ever since 1990, the monetary aggregate M2 has been the main intermediate target for the PBC (PBC, 2002). The annual targets for M2-growth are presented in table 5 below together with the realized annual M2-growth. Similarly to the final targets, the intermediate target is determined by the State Council, and cannot be chosen freely by the PBC. Since 1998, the average M2-growth in China has been 17 percent. This is very high compared to developed countries and indicates that China still is an emerging economy.[39] Since 1994, the realized average annual M2-growth has turned out to be higher than the target in 13 out of 20 years and every year since 2005.

[38] Also domestic loan growth has been regarded as an intermediate target for monetary policy in China. The domestic loan growth has traditionally been closely related to the M2-growth. One problem concerning the domestic loan growth as an intermediate target is that it represents a too narrow concept that does not capture that an increasing amount of liquidity and capital are kept outside of the banking sector, as discussed in section 2.3. In time, the broader concept of total social financing (TSF), discussed in section 2.3, may take the role as an intermediate target for the PBC.

[39] Since 1998 USA, United Kingdom, Japan and France have had an average M2 growth of respectively 6.6, 0.15, 6.8 and 6.6 percent (There is no data available for M2-growth in France for the years 1998 and 1999. 6,6 percent is the average M2-growth since 2000). As a comparison, M2-growth in Brazil, Russia and India was 16.7, 33.4 and 16.9 respectively (All calculations are based on World Bank Data).

Table 4: Targets for and realized M2-growth 1994-2013

Year	Target (%)	Realized (%)
1994	24	31,5
1995	23-25	29,5
1996	25	25,3
1997	23	20,7
1998	16-18	14,9
1999	14-15	14,7
2000	14-15	12,3
2001	15-16	15,0
2002	13	13,1
2003	16	19,2
2004	17	14,9
2005	15	16,7
2006	14	22,1
2007	16	16,7
2008	16	17,8
2009	17	28,4
2010	17	18,9
2011	16	17,3
2012	14	14,4
2013	13[40]	

Sources: Central People's Government of the People's Republic of China (2000-2013), Geiger (2010) and World Bank Data

The intermediate target needs to show a correlation to the final targets, meaning there must be a correlation between M2 growth and inflation. It is debatable whether such a link exists in China. Geiger (2010) argues that there indeed exists such a link and reports a correlation coefficient for the period 1994-2008 of 0,935.[41] In table 5 below, however, I provide calculations that suggest more ambiguous results, depending on what period we consider as well as the frequency of the reported variables.

The agents of the economy need time to adjust their behavior. I therefore use lagged data on M2-growth because it is reasonable that the M2-growth must lead inflation with some period of time. I use 12 and 24-month lagged data for M2-growth and look for correlation with the

[40] In an interview following the NPC in 2013, Governor Zhou said that 13 percent should be interpreted as a forecast rather than a target.

[41] Geiger (2010) uses monthly data over the period referring to various sources. He does not report whether or not the coefficient is calculated using lagged M2 numbers which would be the correct correlation to measure because it takes time before the agents of the economy responds to changes in the M2-grwoth.

consumer price index (CPI).[42] The results are presented in figure 8 and 9 below, with the corresponding correlation coefficients presented in table 5.

Table 5: Correlation coefficients 12- and 24-month lagged M2-growth and CPI

Source: World Bank annual ly reported data*	**1987-2013**	**1987-2008**	**2005-2012**	**2009-2012**
12-month lag	0,735	0,753	0,219	0,234
24-month lag	0,661	0,648	0,622	0,780
Source: CEIC Data monthly year-on-year data	**1998-2013**	**1998-2008**	**2005-2013*****	**2009-2013*****
12-month lag	0,410	0,405	0,296	0,435
24-month lag	0,315**	0,105**	0,275	0,545

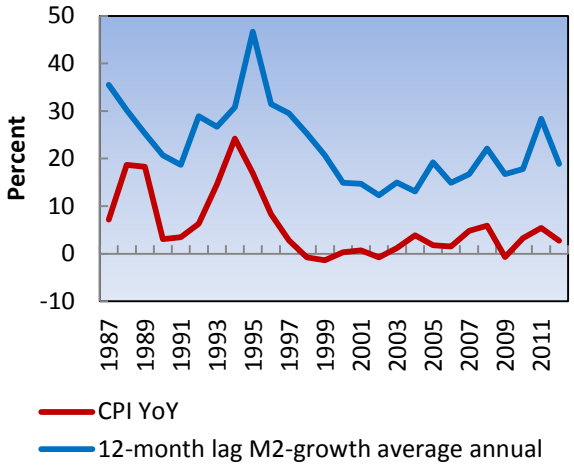
*Average annual growth rate in money and quasi money (M2) and annual percentage change in CPI.
** From 1999.
*** Until June 2013.

The calculations based on the annually reported data since 1987 indicates a close relationship between M2-growth and inflation in China with a correlation coefficient as high as 0.735. If one, on the other hand, restrict the analysis to the years after the mid- and late- 2000s the correlation coefficient, using 12-month lagged M2-growth annually reported data, fall to just above 0.2. If taken literary, this drop could indicate a weaker link between money growth and inflation. However, this result needs to be taken with some caution. The dramatic fall in correlation since the mid-2000s could be the result of the global financial crisis and the resulting stimulus package that injected more than 4 trillions of RMB into the economy. The stimulus package resulted in a M2-growth of 28.4 percent in 2009. The injection of money created, as expected, an increase in inflation, but it was first two years later in 2011 that the CPI peaked at 5,4 percent.[43] If one uses 24-month lagged average annually reported data for M2-growth over the period 2009-2013 the corresponding correlation coefficient is indeed back at 0.780. This result indicates that instead of getting worse on predicting future inflation, M2-growth leads inflation with a longer period of time. This result is to some extent strengthened by the more frequently reported CEIC Data, at least if one look at the time after the financial crisis where one gets a correlation coefficient of 0,545 by using the 24-month lagged data compared to 0,435 if using the 12-month lagged data. Nonetheless, one may ask

[42] I also ran the experiment with 3, 6 and 9 month lagged data for M2-growth, which resulted in lower correlation than what is presented in table 5. Friedman (1970) argued that it takes about 12-18 months from the change in the monetary growth to prices reacts.
[43] End of year change compared to the year before (CEIC Data).

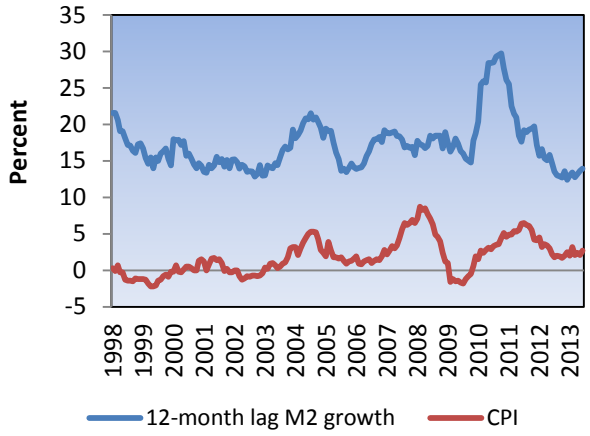
the question whether the correlation between M2-growth and inflation is sufficiently high. None of the calculated correlation coefficients above matches the 0,935 that Geiger (2010) reports. Laurenceson and Windsor (2011) use a SVAR model to investigate the connection between M2 growth and CPI and find that the link between M2-growth and inflation in China *"…is far from robust"* (p.18). In any case, M2-growth remains the official intermediate target for monetary policy in China, and my calculations above suggest that there is indeed a correlation between the intermediate target of M2-growth and the final target of price stability. One could argue that, given the high M2-growth in China, it is a good thing that the correlation between inflation and M2-growth is not higher than what it is. Hence, I argue that M2-growth remains a valid intermediate target for the monetary policy of China.

Figure 8: Annual data 12-month lag M2-growth and CPI 1987-2012



Source: World Bank Data

Figure 9: Monthly data 12-month lag M2 growth and CPI 1998-2013



Source: CEIC Data

3.1.3 Operational targets

Finally, I consider the operational targets, which are the targets the authority are able to control within a short time period. The operational target must be closely related to the intermediate target, and hence, if the intermediate target is valid, also with the final targets. In most cases there are two possible operational targets, one quantitative, like the monetary base of the central bank, or a market or price target, like the short-term interest rates. Most developed economies have today shifted from monetary base targets towards targeting the short-term interest rates.

Laurens and Maino (2007) conclude that China, when facing a mixture of short-term objectives, lacks a well-defined operational target for its monetary policy. Geiger (2010), on the other side, argues that the PBC follows a mixture of the two above-mentioned targets. Officially, the PBC is targeting the short-term interest rate, but because there are several inefficiencies related to PBC's interest rate policy they have to fall back on the quantity-based measures. I argue that in most cases the operational target of China's monetary policy seems to be the PBC's base money. In order for the short-term interest rate to be an appropriate operational target it must be correlated with the intermediate targets. As I show in the next section, this is hardly the case in China, at least as long as we consider M2-growth as the single intermediate target.

Box 3.1 The Exchange Rate: An intermediate target for Monetary Policy in China?

The exchange rate has played an important role for the rapid economic growth in China during the reform period. The undervalued currency has led to high demand for Chinese goods and subsequently created large current account surpluses. In this box, I will argue that the exchange rate has functioned as an intermediate target for the conduction of monetary policy in China.

Since the mid-1990s, China has operated two different types of exchange rate regimes: a de facto *peg* of the RMB against USD in two periods, 1997-2005 and 2008-2010 and a *crawling* regime against a basket of currencies, between 2005-2008 and after 2010, i.e. the PBC let the currency fluctuate within a band against a weighted average of the most important currencies (See table 6 below).[*] Since 2005 RMB has appreciated more than 25 percent, indicating that it was highly undervalued in 2005.

Should the exchange rate be considered a target for monetary policy in China? As far as I know, it has never been stated officially that the exchange rate is a *final target* of monetary policy. I argue, on the other hand, that the exchange rate has to be considered an *intermediate target*, rather than a final target. McKinnon and Schnabl (2009) states that: *"The main motivation for so fixing the exchange rate was to anchor the domestic price level and to stabilize the rate of growth"* (p.5). As with M2-growth, the exchange rate needs to be related with the final targets in order to be a valid intermediate target. Geiger (2010) argues that the exchange rate could work as a nominal anchor and then create stable inflation. It is also without doubt that the exchange rate is closely related to economic growth.

Operating with the exchange rate as an intermediate target for monetary policy does not come without costs for China. First, targeting the exchange rate lead to loss of exchange rate independence. Second, in order to achieve the desired level of exchange rate the PBC must intervene in the foreign exchange market. That is, to prevent the RMB from appreciating, the PBC need to purchase foreign exchange. The cost is that by purchasing foreign exchange, the PBC increases money supply, which again could lead to an overheated economy and high inflation if not sterilized. Sterilization means that the PBC neutralize the increase in money supply by a mixture of monetary policy instruments.

There is no doubt that the exchange rate has been some kind of target for the monetary policy in China. The way I see it, it must be regarded an intermediate target, even though the crawling regime must be regarded as an attempt to let the exchange rate fluctuate more freely. By holding the exchange rate stable or fixed, has the PBC anchored the domestic inflation at the same time as the undervalued currency has contributed to the economic growth.

Table 6: Exchange rate regime 1994-2013

Year	Exchange Rate (end of year RMB/USD)
1997	Pegged (8,28)
1998	Pegged (8,28)
1999	Pegged (8,28)
2000	Pegged (8,28)
2001	Pegged (8,28)
2002	Pegged (8,28)
2003	Pegged (8,28)
2004	Pegged (8,28)
2005	Crawling (8,07)
2006	Crawling (7,81)
2007	Crawling (7,30)
2008	Pegged (6,83)
2009	Pegged (6,83)
2010	Crawling (6,62)
2011	Crawling (6,30)
2012	Crawling (6,28)
2013	Crawling (6,18)

Source: CEIC Data

* The basket includes the USD, the Japanese Yen, the Euro, the South Korean won, the Australian dollar, the Canadian dollar, the British pund, the Malaysia ringgit, the Russian ruble, the Singaporean dollar, and the Thailand baht. The RMB is allowed to fluctuate ±0,5 percent (Fang et.al. 2012)

3.2 Monetary policy instruments in China

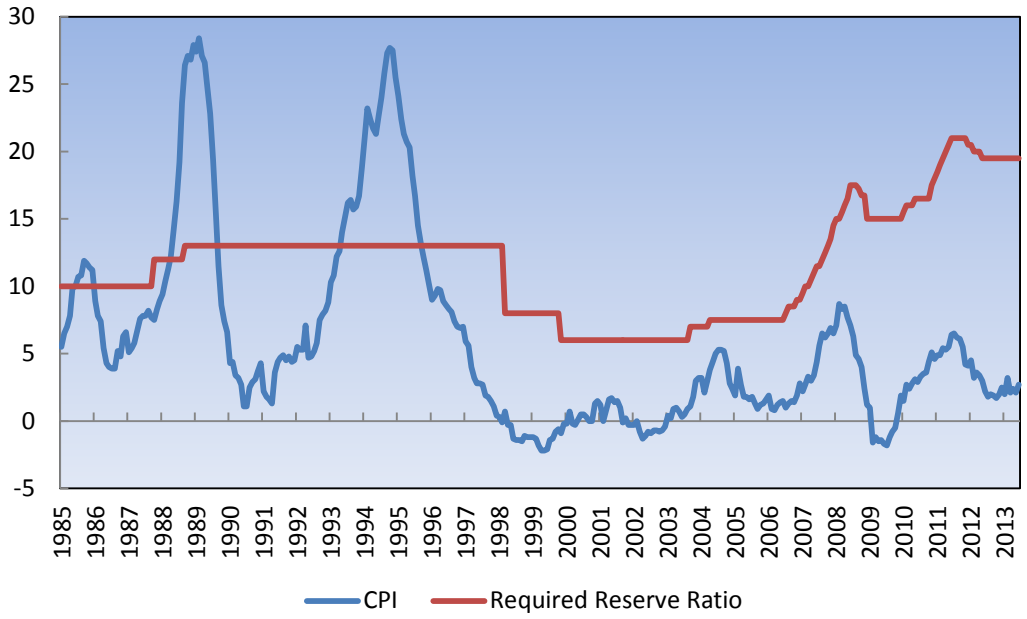
Monetary policy instruments are what the central bank actually controls. The most important future of the instrument is that it affects the operational target and intermediate targets. In this section, I describe the most commonly used instruments for the conduction of monetary policy in China. Like all other central banks, the People's Bank of China (PBC) has a number of instruments available for reaching the different targets for monetary policy discussed in the previous section. Some of these are similar to developed economies' instruments, like open market operations and setting benchmark interest rates, but others, such as reserve requirements and window guidance, are different from the commonly used instruments in developed economies. As I will show, many of the instruments used, and the efficiency of them, are more closely linked up to the exchange rate regime, rather than price stability per se. In addition to the instruments in the PBC's toolkit, the Chinese government also controls some prices and wages directly. Since price stability is the policy goal of monetary policy, direct price control must therefore be seen as an additional monetary policy instrument.

3.2.1 Reserve requirements ratio

Technically, the Reserve Requirements Ratio (RRR) is the minimum amount of reserves that the commercial banks must hold as a percentage of its deposits. The reserves are held in the PBC, where they earn an interest rate, usually lower than what they could expect from the market. The RRR affects directly bank liquidity. An increase in the RRR will lead to higher demand for central bank money as a consequence of commercial banks being less liquid. Although the use of minimum reserve requirements has diminished in most developed economies (Bofinger, 2001), it still remains one of the most powerful, and frequently used, instruments in the PBC's tool kit.[44] As shown in figure 10, the PBC has adjusted the RRR as many as 38 times since 2006 and a majority of the changes have been increases. During the deflation period following the financial crisis, the PBC reduced the RRR several times and then increased it again when the inflation pressure returned in 2010-2011.

[44] The Federal Reserve Bank still uses the RRR to some extent, however less frequently and at much lower ratios than the PBC. See http://www.federalreserve.gov/monetarypolicy/reservereq.htm#fn1 for the current RRR in the United States.

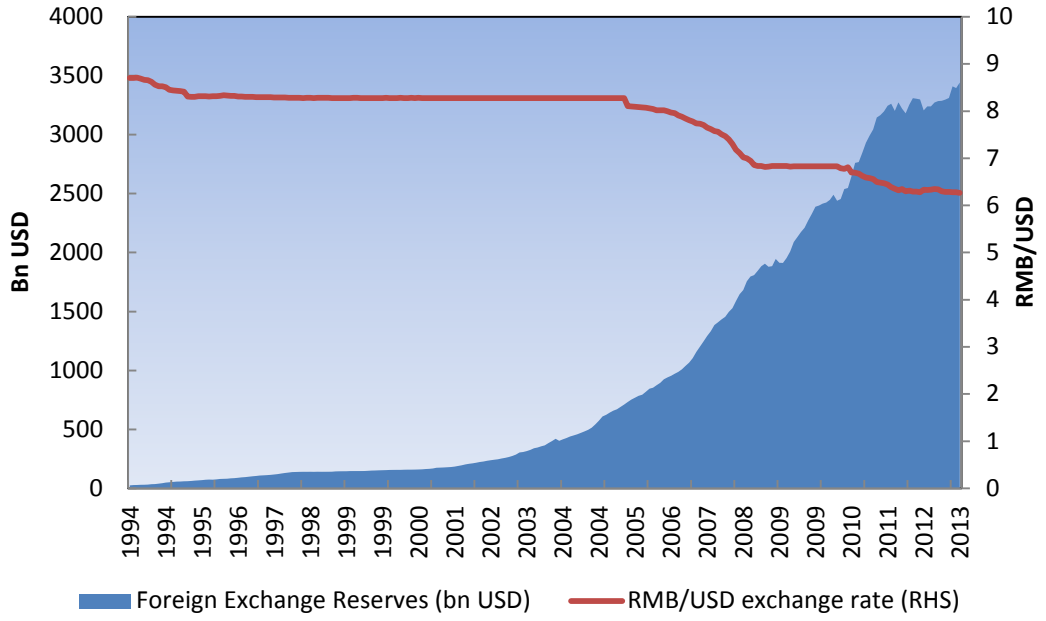
Figure 10: Required Reserve Ratio and CPI (monthly year-on-year change)



Source: CEIC Data

Ma et.al (2011) argues that there are mainly two reasons for why the PBC use the RRR as an active monetary policy instrument. First, the reserve requirements are used as a sterilization tool. As argued in box 3.1, the PBC has intervened in the foreign exchange market in order to keep the exchange rate at an undervalued level. Figure 11 below illustrates the rapid increasing foreign exchange reserves following the PBC's interventions in the foreign exchange market. By purchasing foreign exchange the PBC increases money supply in the economy, which again could lead to high inflation. To avoid increased pressure on the economy and high inflation, the PBC sterilizes the growth in money supply by the use of a mixture of monetary policy instruments, most frequently the reserve requirements and open market operations. By increasing the RRR, the PBC requires that the commercial banks place a larger share of its liquidity in the central bank, and consequently withdraws some of the liquidity growth that follows the foreign exchange purchase. The RRR is an efficient instrument because it reduces liquidity more permanently and is more cost efficient than for example the PBC bills or other open market operations, when the goal is to absorb liquidity following the foreign exchange inflows. It differs from other market operations because it is not a swap. Bell and Feng (2013) argue that if the PBC instead tried to use the domestic interest rate as a tool to reduce the liquidity pressure, it would only further fuel the liquidity inflows because a higher interest rate would mean higher expected profit from holding RMB denominated assets.

Figure 11: RMB/USD exchange rate and foreign exchange reserves 1994-2013



Source: CEIC Data

Second, the PBC uses the reserve requirements as a countercyclical instrument. The RRR works as a countercyclical tool through several channels. First, and most directly, it reduces the money growth. A hike in RRR will mean that the commercial banks have fewer funds available for new lending. Since the commercial banks remain the main source of financing, it would therefore reduce the money supply and inflation pressure in the overall economy. Second, an increase in the RRR signals tighter overall monetary policy and could in itself affect market expectations. And third, although banks earn some interest on the reserves, the RRR works as a tax on banks and then increases the cost of bank financing because they could have earned higher return by lending the money to the market. Additionally, I argue that the RRR to some extent could strengthen the structural problems of the financial sector. The large SOEs will probably be granted loans also after an RRR hike. The small and medium-sized enterprises, however, could be squeezed out of the credit market because they cannot afford the higher interest rates required.

In order for the RRR to be an efficient and useful instrument for the PBC, it should be correlated with the intermediate target of M2 growth. Ma et.al (2011) provide some empirical evidence of correlation between RRR and the M2 growth, showing that for 2010 the growth in M2 would have been 26,7 percent without RRR hikes, contrary to the realized M2-growth

of 19,7 percent. Since RRR often is used together with other tools, it is hard to isolate the effects of RRR hikes, but a simple correlation coefficient could give a hint. My calculations show that the correlation coefficient between the RRR and M2-growth for the period 2007-2013 equals –0,479. As expected, an RRR hike is negatively correlated with the M2-growth, meaning that higher reserve requirements will lead to lower M2-growth, which one should expect. However, the correlation is not too strong indicating that the growth in money supply is determined by other factors in addition to the RRR. Even so, the correlation coefficient suggests that the RRR is an efficient tool for PBC when trying to control the M2-growth.

3.2.2 Open market operations

In open market operations (OMOs) a central bank buys (sells) securities to the participants of the financial market, mainly the commercial banks, and thereby injecting (withdrawing) base money or liquidity from the financial market (Bofinger, 2001). Since introduced as a monetary policy instrument in China in 1998, OMOs have become one of the most important instruments of PBC (Bell and Feng, 2013). The monetary policy department (MPD) is responsible for managing the OMOs for the PBC, and, as a degree of independence, the PBC do not need approval from the State Council to use OMOs. Unlike most developed economies, the PBC uses OMOs not to affect the short term interest rate, but rather to affect, the monetary base, which is the primary operational target of the PBC, as argued in section 3.1.3. Similarly to the RRR, the OMOs could both be used as a countercyclical instrument and as a tool for drying up the inflows following the exchange rate regime. When used as a sterilization tool, the PBC sells domestic currency bonds to the commercial participants in the financial market, and consequently withdraw some of the liquidity. When issuing these bonds, the PBC creates a potential for losses and profits based on the differences in return on the foreign exchange reserves (mainly placed in US treasury bonds) and the bonds issued by the PBC. Elliot and Yan (2013) argue that the difference typically has produced a loss for the PBC. In order to reduce these losses the bonds issued by the PBC typically yield a below market interest rate. Elliot and Yan (2013) argue that the reason that the PBC are able to sell these bonds to an interest rate below the market rate is because the banks and other institutions are encouraged (or ordered) to buy them from the government.

There are mainly three types of OMOs that the PBC conduct: central bank bills, also called PBC bills; repurchase and reverse repurchase operations (repo and reverse repos); and what

is called short-term liquidity operations. The PBC bills have maturities from three months to three years. This is the main instrument used to sterilize foreign exchange market interventions as discussed above. The repos are transactions in which the PBC sells securities to a lender (typically commercial banks) and then repurchase it later to a price agreed upon. The reverse repos are the opposite transaction. Finally, the short-term liquidity operations are ad hoc repos, normally of less than 7-days duration (Williams and Wang, 2013). Since 2004, OMOs have been conducted twice a week, and the bidding can either be made on price or on the quantity (Geiger, 2010). The use of OMOs to fuel the economy whenever needed has become standard and expected.

3.2.3 Interest rates

Several steps have been taken to liberalize the interest rate control in China. However, Tao (2011) argues that these reforms mainly involved interest rates on the interbank market and the primary market of government bonds, while the lending rate to non-financial institutions and deposit rates still are controlled by the PBC. Formally, the PBC, like most other central banks, sets the benchmark interest rate, which most often is considered to be the one-year lending rate and the one-year deposit rate. The difference to most other economies is that the PBC also controls the interest rates offered by the commercial banks directly. Until 1997, interest rates offered by the commercial banks were not allowed to differ from the benchmark interest rates at all in either direction (Lardy, 2012). Since then, there has been a gradual liberalization of the interest rate control, but China is still far from full interest rate liberalization. The commercial banks are only allowed to set the deposit rates with an upper limit (i.e. a ceiling), and, up until recently, the lending rate with a lower limit (i.e. a floor). This interest rate policy has secured a high interest rate margin for the commercial banks and, as a consequence, high profits.[45]

The floor on the commercial bank's lending rates was removed from mid-July 2013 for all types of loans, except mortgage. Prior to the change the floor was 30 percent below the PBC rate (PBC, 2013b). In theory, the commercial banks may now offer loans as cheaply as they may want to, however, this liberalization was more of a symbolic type, since few banks offered loans close to the lower limit in the first place, in fact most loans are offered with an

[45] In 2012, the after-tax profit was 754,58 billion RMB for the five large state-owned commercial banks, and it was 252,63 billion RMB for the 12 joint-stock commercial banks (CEIC Data).

interest rate above the PBC rate. In my view, this reflects the narrow financial sector described in section 2.3. The lack of competition in the banking sector introduces the possibility for the commercial banks to set higher interest rates on loans. Nonetheless, the removal of the floor on lending rates is an important symbolic move towards a full liberalization of the interest rates in China.

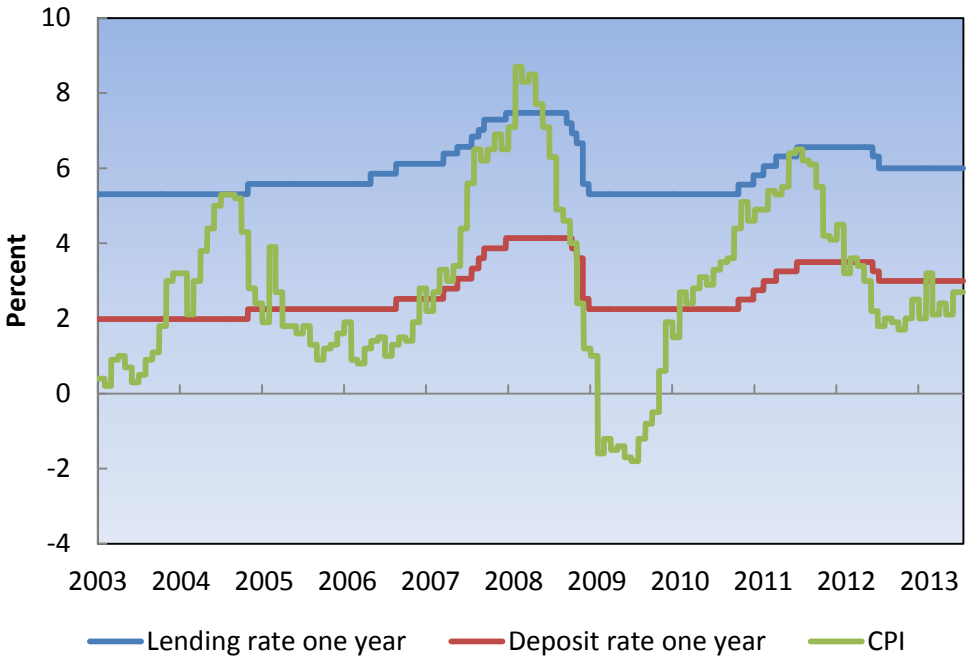
On the other side, the more important ceiling on deposit rates remains in place, and stands at 10 percent above the PBC rate (PBC, 2013b). The ceiling on deposit rates is more important because it seems to be more binding, i.e. the deposit rate offered by the commercial banks is close to 10 percent above the PBC rate. This means that if the ceiling is lifted commercial banks would offer a higher deposit rate. As discussed in section 2.3 the real interest rate on deposit has been negative and close to zero for much of the time over the last decade. When the real interest rate is negative the depositors, in reality, lose money when placed on a regular deposit account in a commercial bank. This has two consequences: first; the low deposit rate means that the commercial banks have access to a very cheap source of funding, which again leads to low lending rates for borrowers, typically the large SOEs (Lardy, 2012). Second; the low return on deposits has led investors to seek higher return in less developed and regulated parts of the financial sector, which could lead to financial instability. Some investors invest in real estate in a hope for higher return, and a possible housing bubble could then be a direct consequence of this interest rate policy in China. If, or perhaps *when*, the commercial banks are allowed to set deposit rates freely, the competition for deposits among smaller banks will most likely drive the interest rate upwards and lead to higher real interest rate; as a consequence banks' profit will fall.

There is no doubt that further liberalization of the commercial interest rates will be needed in China. Lardy (2012) states that: *"The key element of financial reform is not the introduction of ever more complex financial instruments, the accelerated liberalization of capital account restrictions, or expanded access by foreign financial services companies to the domestic market. Rather it is the elimination of remaining government controls on interest rates on both deposits and loans"* (p.78). Market-based interest rates would help China rebalance its economy from investment and export-driven into an economy fueled by domestic consumption. So why does the government not allow for a more rapid interest rate liberalization? Bell and Feng (2013) argue that there are mainly two reasons. First, the PBC is still constrained by the exchange rate regime and the undervalued RMB. Market-based

deposit rates could threaten the PBC's control over the exchange rate. If a market-based interest rate led to higher deposit rates it would increase the cost of the sterilization process, explained in section 3.2.1. The commercial banks would demand higher return on the central bank bonds, while the return on the central bank's foreign exchange reserves would remain unchanged. Also, higher domestic deposit interest rates could mean that more investors want to place their investments in RMB, leading to an upward pressure on the currency. Second, the PBC fears that the commercial banks are not solid enough to handle a market-based interest rate system. When the ceiling on the deposit rates is lifted, the commercial banks' profit will decrease as the banks will compete for depositors by higher deposit rates. Today, no official deposit insurance is at place in China, meaning that if the commercial banks are not solid enough, the reduced profit could threaten the credibility and stability of the whole Chinese financial system. Finally, I argue that a full liberalization of interest rates could mean that the large SOEs, relying on cheap capital from the large banks, could find it hard to raise capital from the market. The high profits following low costs on deposits and high return on loans have to some extent created room for funding the large SOEs with cheap capital. This has contributed to high economic growth during the reform period, but has also created large unbalances in the economy with large and inefficient SOEs.

To adjust and change the benchmark interest rates, the PBC needs approval from the State Council. Figure 12 below shows the development in the one-year PBC benchmark interest rates in the period 2003-2013. Since 2006 the lending rate has been adjusted only 20 times, compared to the 38 changes made to the RRR over the same period. Several authors have shown that the link between PBC's benchmark interest rates and M2-growth (the intermediate target) is weak or non-existing (Geiger, 2010 and Goodfriend and Prasad, 2006). Liu et.al. (2009) show that, even though there is a long-term link between the benchmark rate and inflation (the final target), this link is too weak. The weak correlation between the benchmark interest rates with both the intermediate target and the final target means that interest rates as an instrument for monetary policy in China is inefficient, if the goal is to affect these targets. However, if the target is the market-rates per se, the instrument is, of course, highly efficient. The recent step, of removing the floor on the lending rates could indicate a desire to achieve a more market-based interest rate system. Such system would most likely prove more efficient in affecting the intermediate and final targets of monetary policy.

Figure 12: Lending rate, deposit rate and CPI 2003-2013



Source: CEIC Data

3.2.4 Window guidance

The official Chinese policy is that the implementation of monetary policy should be market-based. Credit quotas were abolished in 1998 (Delatte, 2007). However, the PBC still holds monthly meetings with the commercial banks to outline its "advise and concerns" about the credit conditions across sectors, so called *window guidance*. Even though it is called window guidance, Bell and Feng (2013) argue that it is a more direct instruction from the PBC on the commercial banks' lending decisions. Window guidance must be regarded as a quantitative instrument that the PCB uses to influence the real economy through the credit channel. It is probably a legacy from the plan economy and early reform period, where the PBC conducted monetary policy in accordance with the credit plan.[46] Bell and Feng (2013) argue that the reason window guidance is such an efficient instrument in China stems from the hierarchy system, discussed in section 2, where the PBC has a higher ranking than the commercial banks. If the PBC, by using window guidance, is able to dictate the lending decisions of the large commercial banks, it would be rather easy to reach an intermediate target of growth in domestic loans. That window guidance still plays an important role as an instrument of

[46] The credit plan, worked out by the central authorities and bureaucrats, controlled and allocated credit quotas over the state budget to the commercial banks. The credit plan was the main instrument of the PBC until abolished in 1998 (Bell and Feng, 2013).

monetary policy implementation becomes clear in PBC (2013a) where it is stated that: *"The PBC further improved guidance for macro-credit policy…credit policy will continue to play an active role in promoting sustainable and healthy economic development, harmony, and stability in the society"* (p. 15).

3.2.5 Capital controls

Like window guidance, capital controls is a quantitative instrument. Capital controls means that the government prevents money from moving in and out of the country freely. The main reason for China to have capital controls follows from the "open economy trilemma" (See for example Blanchard et.al, 2010). The trilemma states that a country may not simultaneously run an independent monetary policy (control the domestic interest rate), target the exchange rate and allow full capital mobility. Although China officially has abandoned the fixed exchange rate regime and now allows the exchange rate to fluctuate more freely, the capital controls in China remains binding. In 2002, as an attempt to loosen the capital controls, the Chinese government initiated the Qualified Foreign Institutional Investor program (QFII), which controls the number of foreign investors and the amount of money invested in the domestic stock markets. The QFII is a certification system which allows the approved foreign investor to trade RMB denominated securities at the domestic stock markets. The investors are approved by the China Securities Regulatory Commission (CSRC), and the State Administration of Foreign Exchange (SAFE), a bureau of PBC, decides the size of each investor's quota.[47] By 2012, more than 200 investors were approved for investment in RMB denominated securitites (CSRC, 2013b). The capital controls means that PBC more freely can set the domestic interest rate, without causing a large degree of capital inflows, and help PBC control both the domestic price level and the exchange rate.[48]

3.2.6 Wage and price controls

Although the National Price Law states that the vast majority of prices shall be market-based, the government still remains in control of many prices. Naughton (2008), who argues that government-controlled prices are more and more used as an instrument, distinguishes between *government-set prices* and *temporary government price-control interventions*. The former

[47] Since 2006, Norway, through the Norges Bank and the Norges Bank Investment Management, hold one of the largest investment quotas (CSRC, 2013b).
[48] This is closely related to the concept of exchange rate independence, which is explained in detail in section 3.3

refers to the prices directly managed by the central government. These prices are mainly set by the National Development and Reform Commission (NDRC) and its Department of Price. Among the most important prices directly controlled by the government are the prices on natural gas, electricity, transport rates and some medicines. Temporary government price-control interventions, on the other hand, are legally mandated to be temporary. Naughton (2008) argues that the government applies such interventions in situations where price determination is dispersed among many small suppliers, typically in the agriculture sector. The government's price control is of course very important for monetary policy. In section 3.1, I concluded that the PBC, at least to some extent, operates under a main policy goal of price stability. By using its monetary policy instrument, the PBC tries to control the market-based prices. On the other side, the PBC has no control over the government-controlled prices. If these prices are important enough, one could get large changes in inflation without PBC being able to control it.

The government also controls wages, but in a more indirect way. Since 2006 the average wage of urban workers has more than doubled (National Bureau of Statistics, 2012). However, there are quite large differences within the country. For example, the average wage of an urban worker in Beijing and Shanghai is more than twice the size of the average wage of urban workers in 14 other provinces. Economic theory states that if wages are freely set in the market, a large wage gap would lead to a massive migration to the places with higher wages. Although it has been a rapid urbanization of China, and migrants constitute more than 10 percent of the population in provinces such as Shanghai (Naughton, 2007), the government increases the opportunity cost of migration by using the *hukou*-system.[49] By tying the population to the provinces where they are registered, the government efficiently reduces the numbers of migrants and then reduces the wage pressure in the urban areas. Economic theory and numerous empirical papers have shown that there is a close link between wage inflation and price inflation, and that the two form a wage-price spiral where increasing prices and wages push each other further (see for example Blanchard, 1985). This means that, even though the *hukou* system and wage controls are not in place as a monetary policy instrument per se, it clearly affects the policy goal of price stability, as the system reduces the pressure on urban wages.

[49] A *hukou*, or, household registration, officially identifies a person as a resident of a city or province. Although there has been some liberalization to the system over the last decade, it still remains difficult for a worker to benefit from social welfare, education, health care etc. without a household registration from the city or province he or she are working in (Halskov Hansen and Thøresen, 2013).

3.3 The (lack of) independence of People's Bank of China

Bofinger (2001) defines three types of central bank independence; goal independence, instrument independence and personal independence. In addition, I will consider what I call exchange rate independence. The central bank has *goal independence* if it freely chooses the goal and targets for the monetary policy, without any interference from the government. *Instrument independence* reflects the central bank's ability to freely use the instruments available when trying to reach the goals. *Personal independence* reflects the extent of personal or political pressure the governors and leaders of the central bank conduct monetary policy under. Finally, a central bank has *exchange rate independence* only if it operates under a floating exchange rate regime or can conduct monetary policy without holding the exchange rate fixed or close to a certain value or target.

In general, there are many reasons to delegate the conduction of monetary policy to an independent central bank. Most importantly, the preferences of a central bank and politicians and other institutions tend to differ. Politicians could be interested in putting higher weight on economic growth prior to an election or to secure social stability. Other institutions may want to implement a monetary policy that better suits their preferences and interests. If the lack of independence leads to a higher weight on economic growth, the result could be a positive inflation bias.[50] Delegating the conduction of monetary policy to an independent central bank may also secure a longer perspective in the monetary policy, which could reduce the volatility in both inflation and output. Empirically, many authors have showed that central bank independence is in fact negatively correlated with the level of inflation.[51] More recently, in the wake of the global financial crisis, some authors have considered the connection between central bank independence and financial stability and find more ambiguous results. Klomp and de Haan (2009) argue that there is a negative correlation between central bank independence and financial instability. Berger and Kißmer (2013) on the other side argue that such connection does not exist.

Measuring central bank independence is far from an accurate science, not the least in China where dependence is not formally stated, but of a more informal type. In this section, I will make use of the different definitions of central bank independence and argue that the PBC

[50] The economic theory behind this is explained in detail in section 4.
[51] See for example Alesina and Summers (1993) and Berger et al. (2000)

still suffers under severe shortcomings in respect to central bank independence. Although the independence has increased substantially since the monobank system under the pre-reform period, it is still clear that the PBC is a direct subordinate to the State Council, which again has close links to the China Communist Party (CCP).

3.3.1 Goal independence

From the law on PBC it is clear that the PBC does not have goal independence. Article 2 states *"The People's Bank of China shall, under leadership of the State Council, formulate and implement monetary policies…"* (PBC, 2003a). Hence, the PBC lies under the leadership of the State Council at the same level as other ministries, such as the Ministry of Finance (MOF) and the National Development and Reform Commission (NDRC), and can by definition not be viewed as an independent institution. The PBC cannot freely set its targets; not the final, intermediate or the operational. Instead, these targets are defined by the State Council as explained in section 3.1.

3.3.2 Instrument independence

In order for the PBC to have instrument independence it should be able to use its instruments freely without any interference when conducting monetary policy. Table 7 below summarizes the instruments discussed in section 3.2 above. Red color indicates lack of instruments independence, while green color goes in favor of instrument independence. From the table it is clear that only OMOs and window guidance are fully controlled by the PBC, illustrated by green color in all three columns. If the central bank wants to adjust the required reserve ratio or the benchmark interest rates, it needs approval from the State Council. Even though the State Council, of course, will take the PBC's recommendations into account when making their decisions, I find it reasonable to conclude that the PBC does not have instrument independence. In some cases, like with price and wage controls, the monetary policy instruments are not even managed by the PBC.

Table 7: Instruments of the monetary policy

Instrument	PBC managed	PBC decision	State Council approval needed
Benchmark interest rate	Yes	No	Yes
Reserve Requirements	Yes	No	Yes
Open Market operations	Yes	Yes	No
Window guidance	Yes	Yes	No
Capital controls	Yes	No	Yes
Price and wage controls	No	No	Yes

Source: Geiger (2010) and PBC (2003a)

My conclusion is further supported by the law on PBC. Article 5 below clearly states that the PBC must have the blessing of the State Council prior to making important changes:

*"The People's Bank of China **shall report its decisions to the State Council for approval** concerning the annual money supply, interest rate, foreign exchange rates and other important matters specified by the State Council before they are implemented" (PBC, 2003a, Article 5)(My emphasis)*

However, if we take article 7 in the law on PBC literally, it is only the State Council that can direct PBC decisions; no individuals or other government departments can give directives:

*"The People's Bank of China shall, **under the leadership of the State Council**, implement monetary policies, perform its functions and carry out its business operations **independently** according to law and be free from intervention by local governments, government departments at various levels, public organizations or individuals" (PBC, 2003a, Article 7)(My emphasis)*

This is important because it means that for example the MOF and the NDRC have no authority to dictate the actions of the PBC. As the indirect owner of several of the largest commercial banks, the MOF could have interest in a more bank-friendly monetary policy, but article 7 clearly states that the MOF does not have the authority to make the PBC implement such a policy. Similarly, the local governments, who traditionally have high focus on economic growth, cannot make the PBC run a looser monetary policy.

3.3.3 Personal independence

I now consider the third type of central bank independence: personal independence. The interesting aspect is whether or not the governor and the leadership of the PBC are independent, i.e. is the governor able to resist formal and informal pressure from the government? The law on PBC, in Article 10, states that the governor is nominated by the State Council and appointed by the National People's Congress (NPC), however, in practice, the NPC will always appoint the person nominated by the State Council.[52] Deputy Governors are appointed and removed by the premier of the State Council directly. Although there are no formal requirements of the leadership of the PBC, it is unlikely for the governor of PBC not to simultaneously hold a high position within the communist party. Since 1978 all governors have at least been a member of the Central Committee of Chinas Communist Party (CCP).[53] The fact that the governor is the final authority in all PBC decisions and holds a high position within the CCP indicates that the PBC does not have personal independence. It raises the possibility that the governor of the PBC will run the institution in a way that is best for his career in CCP and not in the best of the central bank and the monetary policy. However, as Bell and Feng (2013) argue, the future political career of any minister or governor is closely linked with the performance of the institution he or she is head of, which may dampen any negative consequences following the lack of personal independence.

Although the monetary policy committee (MPC) only has an advisory role in the conduction of monetary policy in China, as discussed in section 2.4.4, the fact that several of the external members have close ties to other institutions with self-interest in the way monetary policy is conducted further weakens the personal independence of the PBC. In addition to holding positions in other institutions, several of the members in the MPC simultaneously hold positions within the party system, indicating that they face the same dilemma as Governor Zhou Xiaochuan.

[52] Article 10 of the law on PBC states that whenever the NPC is not in session, the Standing Committee of the NPC shall decide the governor. The law also states that the central bank governor are appointed and removed by the President.

[53] The current Governor, Zhou Xiaochuan, is not a member of the 18th Central Committee of CCP (2012-2017), but he was a member of the 16th and 17th. The fact that he is not is a member of the current Central Committee could indicate that he will be replaced as Governor within a short time period.

3.3.4 Exchange rate independence

During the last decades, China's monetary policy must be characterized as a fixed exchange rate regime (see box 3.1). Such regimes typically impose a constraint on a country's monetary policy. If the domestic interest rates diverge much from foreign rates, the country could be subject to high levels of capital inflows, which will destabilize the economy. The reason is that investors will hold the currency that yield the highest expected return, where the expected return equals the interest rate earned on the currency plus any changes in the exchange rate. If the expected return on holding RMB is greater than the expected return on holding USD, the investors will borrow in USD and invest in RMB, creating a liquidity inflow to China.[54] Hence, when China operates a fixed exchange rate regime, they must consider the foreign interest rate when setting the domestic, i.e. China lacks exchange rate independence. However, I argue that there are mainly three reasons why China still may set the domestic interest rate quite independently. First, the theory above assumes perfect capital mobility, i.e. investors can freely decide where to invest their capital. As explained in section 3.2, China operates strict capital controls and by that limits the problem of differences in interest rates level. Second, foreign investors are risk averse, and since there is a large degree of uncertainty when investing in the Chinese market, small differences in expected return are not enough to attract investors. Third, the sterilization system in China has so far proven quite successful. Nonetheless, in section 3.2, I showed that many of the most frequently used monetary policy instruments are closely related to the exchange rate policy, such as the reserve requirements and the open market operations. Given this, I will argue that the PBC loses some of its independence, due to the exchange rate policy. By letting the exchange rate float freely, the PBC could retain this independence.

3.4 The (lack of) transparency of People's Bank of China

Central bank transparency is important for providing the public with information about the targets, instruments, data and conduction of monetary policy. If the central bank wants to affect the market expectations, transparency is essential. The more transparent the central bank is the easier it is for the general public to have accurate and consistent expectations. According to The European Central Bank (ECB): *"Transparency means providing the public*

[54] See for example Obstfeld and Rogoff (1996) or Rødseth (2000) for more on exchange rate mechanisms.

with all relevant information on the ECB's strategy, assessment, and policy decisions as well as on its procedures in an open, clear and timely manner" (ECB, 2013). Geraats (2002), who defines central bank transparency as the absence of asymmetric information between the policy makers and the economic agents, takes it one step further and distinguishes between five aspects of central bank transparency: political, economic, procedural, policy and operational transparency. *Political transparency* refers to the openness about policy targets, objectives and institutional arrangements. *Economic transparency* focuses on the data, statistics and economics used for monetary policy. *Procedural transparency* refers to clarity about how policy decisions are taken. *Policy transparency* refers to clarity with respect to the current stance of monetary policy and the outlook for the future. And, finally, *operational transparency* concerns the clarity on monetary policy implementation.

Crowe and Meade (2007) construct an index for central bank transparency where China and the PBC receive the lowest score.[55] Since then, the PBC has taken steps to increase the transparency of monetary policy. Despite these efforts, there is no doubt that the PBC lacks behind when considering transparency, creating a large degree of uncertainty about the conduction of monetary policy in China. The result may be that the PBC finds it hard to control the market expectations and actions, as a recent example shows, see box 3.2. Below, I further discuss the transparency of the PBC, making use of the five definitions of central bank transparency.

3.4.1 Political transparency

The discussion of targets and goals in section 3.1 makes it clear that the PBC lacks political transparency. There is still a great level of uncertainty regarding the actual goals and targets of Chinese monetary policy. Although the policy goal of monetary policy is stated in the law of PBC, it is not clear how this article shall be interpreted. Also, despite much effort and many comments from PBC officials, it is still unclear what weight the authorities put on price stability and economic growth when conducting monetary policy. However, the many comments made in favor of price stability (see section 3.1), must be interpreted as the PBC acknowledging this problem and try to clarify the targets of the monetary policy for the general public.

[55] The United Kingdom and the Bank of England receive the highest score.

3.4.2 Economic transparency

The field of transparency where the PBC has taken the largest step in recent years is economic transparency. Table 8 shows some of the information provided regularly by the PBC, and it is clear that most of the information reported regards data and statistics. Especially the three reports (Monetary Policy Report, Annual Report and Financial Stability Report) are comprehensive reports with lots of information. A problem with the information presented by the PBC, however, concerns the credibility of the statistics. Several authors argue that this official statistics at best are inaccurate and at worst misleading (See for example Huang et.al, 2013b). This is a general issue of official data and statistics from China, and I will return to this discussion when considering inflation data in section 5.1 below. However, if not the data that the PBC presents are credible, one could hardly argue that the central bank is economic transparent, even though the data is published.

Table 8: Publications of the PBC

What	Frequency	Type of transparency
Monetary Policy Report: Normally consists of the five parts: 1. Monetary and Credit Performance, 2. Monetary Policy Operations, 3. Financial Market Analysis, 4. Macroeconomic Analysis and 5. Monetary Policy Stance to be Adopted in the Next Stage	Quarterly	Mainly economic transparency. Some policy transparency.
Annual Report: Covers more than 140 pages and consists of reports from most of the departments and bureaus of PBC. Statistical Annex.	Annually	Economic transparency
Financial Stability Report: A detailed analysis of the development and stability of financial sector in the previous year.	Annually	Economic transparency
Summary Financial Market Performance: Short summary of the resent development of the financial markets.	Monthly	Economic transparency
Statistics: Financial statistics published monthly more general statistics published quarterly[56]	Monthly and quarterly	Economic transparency

Source: People's Bank of China

[56] Latest general statistics published on the English version of PBC's homepage are from 2010. On the Chinese version however the statistics are updated quarterly.

3.4.3 Policy transparency

The monetary policy reports, published by the PBC, discuss to some degree the current stance and the outlook of monetary policy in China, and are clearly an attempt to increase the policy transparency of the PBC. The reports are comprehensive works and the information provided gives some transparency about how monetary policy is conducted.

3.4.4 Procedural transparency

In my view, of the five aspects of transparency defined by Geraats (2002), procedural transparency is the most problematic for the PBC. This is clearly caused by the lack of independence: The fact that it is unclear *how*, by *who* and even *why* the PBC takes policy decisions indicates that decisions, in reality, are being taken outside of the PBC, or at least with clear guidance from individuals outside the PBC. The decision making process was discussed in section 2.6 and as concluded there, issues of important matters could be taken all the way at the top in the Communist Party.

3.4.5 Operational transparency

Unlike many other central banks, like the FED and the BoE, the PBC does not release minutes or hold press conferences after policy meetings. After the meetings in the monetary policy committee, it happens occasionally, that short meeting records are made public.

Box 3.2 The lack of transparency and the "credit crunch"

A recent and illuminating example of the lack of transparency of the PBC is the "credit crunch". In June 2013, worrying statistics and data appeared indicating a possible slowdown or hard landing of the Chinese economy. Normally, such data are met by looser credit from the PBC, but this time the PBC did not react. Rumors about banks defaulting on loans and a frozen inter-bank market started to spread. During mid-June the panic started to show on the interest rates, the seven-day repo rate jumped from 2,78 percent in May to over 10 percent in mid-June, and on 20 June, the overnight repo rate peaked at 25 percent. In the inter-bank market, interest rates hit record high 13 percent (see figure 13). During all this, the PBC kept silent; no comments or announcements. Then, suddenly, on 23 June, the PBC published an announcement, dated to 17 June, at the homepage, indicating some injection of capital into the money market. The market reacted immediately and interest rates started to decline once again. The example illustrates how the financial market lacks information about how and why the authorities conduct monetary policy.

Figure 13: Interbank interest rates May - July 2013

Source: CEIC Data

4 The Barro Gordon Model

The discussion so far has made it clear that the People's Bank of China (PBC) has several shortcomings regarding independence and transparency when conducting monetary policy. Formally, article 2 of the law on PBC, discussed in section 3.3, makes it clear that the PBC cannot be considered independent of the rest of the government and the party. This lack of independence and the uncertainty concerning goals and targets may reduce the PBC's credibility in its conduction of monetary policy. Reduced credibility for the PBC could mean that the central bank finds it hard to control the inflation expectations, and consequently, it could mean that the PBC are unable to reach the policy goal of price stability. In this section, I will set up a theoretical model that shows what the consequences of such lack of credibility may be. In section 5, I will search for such consequences in the Chinese economy.

The theory underlying the importance of central bank independence and transparency builds on Kydland and Prescott (1977) and Barro and Gordon (1983).[57] Barro and Gordon (1983) showed that when the central bank operates under discretion, i.e. re-optimizing monetary policy in every period in time, the central bank will have incentives to create higher inflation than expected and by that push output above its natural level. This will be optimal for the central bank if the socially optimal output level exceeds the natural level of output. However, if the agents in the economy understand the central bank's incentives and preferences, such surprise inflation will not be possible. The agents will adjust their inflation expectations according to the knowledge about the central bank incentives, and, as a consequence, it will evolve a consistent positive inflation bias without any effect on output. In section 5.1, I shortly present the central bank preferences and the set-up of the economy, and discuss the model's relevance for the Chinese economy. In Section 5.2, I present optimal monetary policy under discretion and explain why a positive inflation bias will evolve.

4.1 Model set-up

There are two participants in the model; the monetary authority, which I call *the central bank*, and the private sector, which I call *the general public*. The economy is assumed to be supply-driven and aggregate output is described by the Lucas supply curve:

[57] The model I use in my thesis draws on Walsh (2010), which presents a more comprehensive discussion of the Barro Gordon Model and possible solutions to the inflation bias problem.

$$y_t = y_t^{natural} + \gamma(\pi_t - \pi_t^e) + \varepsilon_t, \qquad \gamma > 0, E_{t-1}(\varepsilon_t) = 0 \qquad (1)$$

Here, y_t is the realized output in period t, $y_t^{natural}$ is the natural level of output in period t, π_t is the realized inflation in period t, π_t^e is the general public's inflation expectation for period t, and ε_t is a supply shock, which on average equals zero. The natural level of output is the level of output that would be produced in general equilibrium in the absence of any market failures, like monopolistic competition, tax distortions or other distortions. From equation (1) it is evident that the realized output will differ from the natural level only if the realized inflation differs from what the general public expects, or if there is any supply shock present in the economy. The size of the parameter γ decides how much unexpected inflation will affect output; higher γ will give larger effect. It is important to notice that the aggregate output is supply-driven, so that higher realized inflation than expected will create incentives to produce more and, as a consequence, increase output. Walsh (2010) motivates equation (1) with a one-period nominal wage contract, set at the beginning of period t, based on what the general public expect the inflation to be in period t. If then the realized inflation exceeds the expected inflation, the real price of the produced good will increase (or the real costs decrease), and lead the producers to increase the output to take advantage of the increased marginal profit (or decreased marginal cost). If, on the other side, the general public perfectly expects what level of inflation there will be in period t, the aggregate output will equal the natural level plus any supply shock. A positive supply shock will increase output above its natural level, however, the effect following a supply shock is assumed to die out after one period. The presence of the supply shock creates room for stabilizing monetary policy for the central bank.

The supply-driven economy, described by equation (1), differs from what has become the standard way of thinking in modern macroeconomics, where aggregate output most commonly is decided from the demand side of the economy. However, I will argue that the supply-driven economy actually fits the Chinese reality quite well, since the Chinese economy still is dominated by the large public sector and a powerful state. Households' consumption accounts for only about 36 percent of China's GDP in 2012, while fixed investment accounts for more than 45 percent, where a large share of the investment comes from the government directly or indirectly through the large SOEs (IMF, 2013).

As inflation is the driving force in the economy, the next equation needed for the setup of the model is a link between the actions of the central bank and inflation. This is given by:

$$\pi_t = \Delta m_t + v_t, \qquad E_{t-1}(v_t) = 0 \tag{2}$$

Here Δm_t is the growth rate of money supply and v_t is a monetary policy shock that is assumed to be uncorrelated with the supply shock. The instrument of the central bank is then the money supply which it is assumed that the central bank controls directly.

Equation (2) corresponds well with the practice of the PBC. In section 3.2, I argued that the PBC still relies on quantitative instruments, and in section 3.1.2, I showed that the growth rate of M2 still remains the official intermediate target for monetary policy in China. However, in the same section, I showed that there is not a perfect correlation between M2-growth and inflation. To capture this fact I add the monetary policy shock, v_t, to equation (2). It appears after the central bank has adjusted the money supply, meaning that the central bank cannot fully control what the realized inflation will be in period t. All other factors that affects realized inflation are captured in the monetary policy shock. It is assumed that these factors cannot be controlled by the central bank.

The central bank wants to maximize welfare and do so by adjusting its instruments in order to minimize the following one-period loss function:[58]

$$L_t = \frac{1}{2}[(\pi_t - \pi^*)^2 + \lambda(y_t - y^*)^2], \qquad \lambda, y^* > 0, \pi^* \geq 0 \tag{3}$$

$$y^* > y^{natural}$$

Here π^* and y^* is the socially optimal inflation and output target respectively, and λ is the relative weight the central bank put on output. The higher λ, the more the central bank care about output growth deviations from y^* relative to inflation. It is assumed that the social optimal level of output, which the central bank targets when conducting monetary policy, exceeds the natural level of output. This is crucial for the model, and there may be several reasons why this is the case. First, the natural output level may be "too low", due to market

[58] I assume that the society as a whole and the central bank have the same preferences, i.e. the central bank is maximizing the social welfare by minimizing equation (3). Moreover, I will restrict my analysis to one period, however, the model could easily be modified to an model of an infinite number of periods, where the central bank minimize an intertemporal loss function. Such modification would not add any interesting points to the model, since the central bank re-optimizes in every period.

failures such as monopolistic competition or tax distortions. Or, it may be that the central bank tries to stabilize output around a "too high" level, due to political pressure.

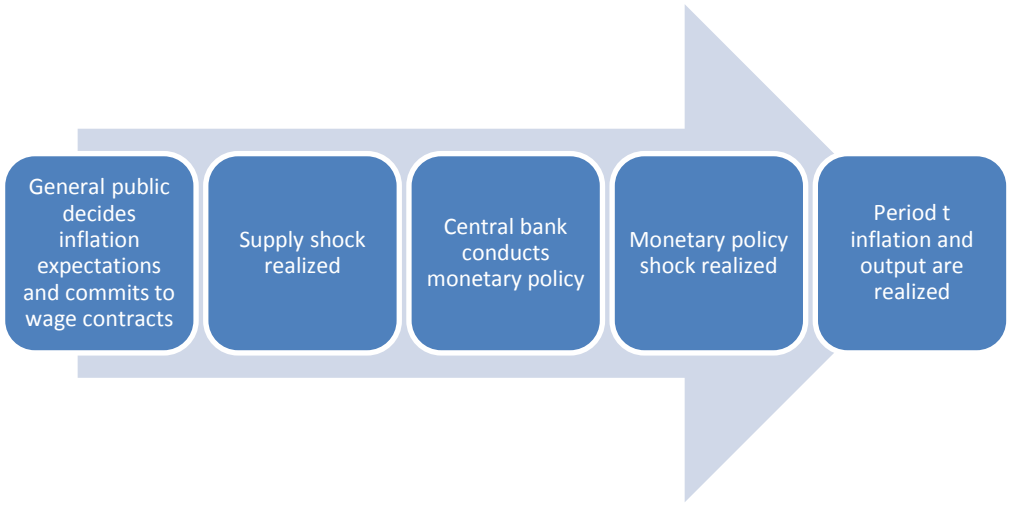
Is it likely that the PBC tries to stabilize output around an output level that exceeds the natural level? In section 3.1.1, I discussed the possibility that the leaders of the PBC puts too much weight on economic growth because of their personal interests and careers. If the wish for future promotion, within the state and the party, makes the leaders of the PBC aiming for a higher output than the natural level, the model describes the Chinese situation well. In addition, I will argue that the Chinese exchange rate policy may justify why the social optimal policy is targeted. In box 3.1, I showed that the exchange rate has been pegged to the USD and kept undervalued for most of the reform period. This policy has created high demand for Chinese-produced goods and consequently higher growth. In other words, the undervalued currency has created output growth above the natural level. As a consequence, I argue that PBC have targeted a socially optimal output target which exceeds the natural level that would have evolved if the exchange rate had been floating freely.

As long as $\lambda > 0$ in equation (3), the central bank operates under a flexible inflation target where deviations from both the inflation target and output target create losses. In this way equation (3) represents, in a good way, the two-fold goal of monetary policy in China presented in section 3.1.1. Notice, however, that in equation (3) deviations in both directions create equally large losses for the central bank, meaning that realized inflation above target is just as bad as realized inflation below target. In section 3.1.1, I argued that the inflation target and output target for the Chinese monetary policy must be seen as maximum and minimum limits respectively; inflation below the target is perfectly acceptable for the PBC. Nevertheless, I will argue that the central bank loss function in this model still represents the situation in China quite well. First, although the annual inflation targets are maximum levels, I will argue that deflation will create losses for the PBC. So as long as the annual inflation targets are sat relatively low, inflation too far below the target will create a loss. Second, a too high economic growth would not be sustainable over time, and indicates serious distortions to the economy. The PBC knows that growth that exceeds the annual target only is possible by further building up under distortions in the economy such as the undervalued exchange rate, the narrow financial sector and the investment-driven growth. In a comment to Financial Times on 08.09.13, Premier Li Keqiang wrote: *"We can no longer afford to continue with the old model of high consumption and high investment. Instead, we must take a holistic*

approach in pursuing steady growth, structural readjustment and further reform" (Financial Times, 2013). In other words; growth that heavily exceeds the annual targets creates a loss for the society because it harms the desired rebalancing of the economy. In sum, I therefore argue that the central bank's loss function in equation (3) is relevant for China and the PBC.

Finally, the sequence and timing of the model is crucial for the results and is illustrated in figure 14 below. First, the general public decides their inflation expectations, π_t^e, and set the wages according to these. Next, the supply shock, ε_t, is realized and the central bank sets the money growth, Δm_t. Finally the monetary policy shock, v_t, is realized and actual inflation and output follows directly from the model solutions. That the general public commits to a wage contract prior to the central bank sets money growth is a key assumption of the model. This means that the central bank may surprise the general public with an inflation that differs from the expected one, and by that create higher output.

Figure 14 : The sequential timing of the Barro Gordon Model



In what follows, I will assume that the central bank conducts monetary policy under *discretion*. That is, the central bank re-optimizes its monetary policy in every period. This is probably the most realistic scenario, and lies closest to what most central banks do today, not the least the PBC. However, as will be evident in next section, the consequence of conducting monetary policy under discretion could be that a positive inflation bias evolves. The literature suggests several possible solutions to the inflation bias problem.[59] However, as I argue that

[59] In the appendix, I discuss three possible solutions to the inflation bias problem: i) committing to a policy rule, ii) delegating the conduction of monetary policy and iii) changing the inflation target. Developed economies

none of the suggested solutions to the inflation bias problem are relevant for China today, I will consequently restrict the discussion of the Barro Gordon model in this section to the optimal monetary policy conducted under discretion.

4.2 Optimal monetary policy under discretion

Under discretion, the central bank will try to maximize social welfare by minimizing the loss function in every period, subject to the Lucas supply curve, and the link between monetary policy and inflation, taking the inflation expectations, π_t^e, as given. By substituting for equations (1) and (2) in equation (3), the central bank solves the following minimization problem in every period t:

$$min_{\Delta m_t} L_t = \frac{1}{2}[(\Delta m_t + v_t - \pi^*)^2 + \lambda\{y_t^{natural} + \gamma(\Delta m_t + v_t - \pi_t^e) + \varepsilon_t - y^*\}^2] \qquad (4)$$

The first-order-condition of the minimization problem, solved for Δm_t, then gives the optimal monetary policy as:

$$\Delta m_t^{optimal} = \frac{1}{1+\lambda\gamma^2}\pi^* + \frac{\lambda\gamma}{1+\lambda\gamma^2}\left(y^* - y_t^{natural}\right) + \frac{\lambda\gamma^2}{1+\lambda\gamma^2}\pi_t^e - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t - v_t \qquad (5)$$

First, notice that it is optimal for the central bank to react to the two shocks in the economy. If the central bank could observer the monetary policy shock, it would have been optimal to react one to one with it, and by that neutralize it.[60] However, as explained in section 4.1, the monetary policy shock is first realized after the central bank has conducted monetary policy and cannot be controlled by the central bank. Since the central bank not are able to control the monetary policy shock it may be dropped from equation (6) which give the optimal monetary policy as in equation 6 below:

$$\Delta m_t^{optimal} = \frac{1}{1+\lambda\gamma^2}\pi^* + \frac{\lambda\gamma}{1+\lambda\gamma^2}\left(y^* - y_t^{natural}\right) + \frac{\lambda\gamma^2}{1+\lambda\gamma^2}\pi_t^e - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t \qquad (6)$$

The supply shock, on the other side, is realized before the central bank conducts monetary policy, and we see from equations (5) and (6) that it is optimal for the central bank to react to

have combined several of these solutions to create a modern central bank that has a greater probability of avoiding an inflation bias.

[60] A positive monetary policy shock means higher inflation and the central bank would then set lower money growth.

such shocks. A negative supply shock will mean lower output. It will then be optimal for the central bank to create higher inflation to boost output again as a stabilizing policy. This seems to correspond well to the practice of the PBC. Under the global financial crisis, the PBC reduced both the reserve requirement ratio (RRR) and the interest rate several times to face the weakened economic growth outlook. Figure 1, in section 2.3, shows that the result indeed was higher M2-growth. As showed by equation (6) that the more the central bank care about output, i.e. the higher λ, the more will the central bank react to supply shocks. It will, however, never be optimal for the central bank to fully neutralize the supply shock because stabilizing growth comes at the cost of inflation deviations as the central bank can only affect output through inflation.

Next, it can be seen directly from equation (6) that optimal monetary policy and therefore also realized inflation and output, depends on how the general public forms their expectations, i.e. the value of π_t^e. In the following, I will distinguish between two cases: one where the general public believes in the inflation target, π^*, and one where the general public have rational expectations.

4.2.1 Inflation expectations equals the inflation target

If the general public expects the realized inflation to equal the inflation target communicated by the central bank (i.e. π^*) it means that the inflation expectations are given by:

$$\pi_t^e = \pi^* \tag{7}$$

When inserting this into equation (6) and solving for optimal money growth, the solution simplifies to:

$$\Delta m_t = \pi^* + \frac{\lambda\gamma}{1+\lambda\gamma^2}\left(y^* - y_t^{natural}\right) - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t \tag{8}$$

Realized inflation and output for period t is then found by inserting equation (8) back into equations (2) and (1):

$$\pi_t^{surprise} = \pi^* + \boxed{\frac{\lambda\gamma}{1+\lambda\gamma^2}\left(y^* - y_t^{natural}\right)} - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t + v_t \qquad > \pi^* \tag{9}$$

$$y_t^{surprise} = y_t^{natural} + \boxed{\frac{\lambda\gamma^2}{1+\lambda\gamma^2}\left(y^* - y_t^{natural}\right)} + \frac{1}{1+\lambda\gamma^2}\varepsilon_t + \gamma v_t \qquad > y_t^{natural} \tag{10}$$

From equation (9) it is evident that it is optimal for the central bank, on average, to create inflation above the inflation target! The inflation bias equals the difference between realized inflation, absent any shocks, and the inflation target (indicated by the red box in equation (9)). Why it is optimal for the central bank to create surprise inflation above the expected level is evident from equation (10). By creating surprise inflation the central bank manages to push aggregate output above its natural level (elevated output indicated by the red box in equation (10)). How much the central pushes output above the natural level is increasing in both how much weight the central bank places on output, λ, and, the effect an inflation surprise has on aggregate output, γ. At the same time, the inflation bias is increasing in λ and decreasing in γ.[61] The central bank faces a trade-off between pushing aggregate output above its natural level, i.e. closer to the social optimal level, and avoid too large inflation deviation between realized inflation and the social optimal target, as the central bank can only affect output through inflation. Higher λ means that the central bank cares more about output deviations from the social optimal target, and consequently accepts a higher inflation bias. Likewise, higher γ means that more is gained in terms of higher output for each unit increase inflation above expectation, and less inflation deviations are necessary to push output above its natural level.

It is important to notice, however, that realized inflation and output could also depend on the realized value of the two shocks. As mentioned above, the central bank will try to stabilize any effect following supply shocks, but the central bank cannot control for the monetary policy shock. Consequently, in equation (9), the monetary policy shock affects realized inflation one to one; a positive monetary policy shock will give higher inflation. A positive supply shock, on the other hand, will mean lower realized inflation in period t, since the central bank take account of it when conducting monetary policy and need to increase inflation less to achieve the desired output above the natural level. Similarly, it is evident from equation (11) that both the supply shock and the monetary policy shock will affect the realized output in period t, where both a positive supply shock and monetary policy shock will lead to increased output. The supply shock will create higher output directly through the Lucas supply curve (equation (1)) and the fact that the central bank does not fully neutralize the shock. The monetary policy shock will create higher realized inflation, which will mean higher real price for the producers who will increase their output.

[61] As long as one assumes that $\frac{1}{\gamma^2} < \lambda$, which is a plausible assumption.

4.2.2 Rational expectations

As described above, the central bank succeeds in boosting aggregate output above its natural level. The reason is that the general public expects that the central bank will aim for the inflation target. But is it likely that the general public will keep on believing in the inflation target when a higher inflation rates realized in every period? It does not sound realistic. When the general public instead has *rational expectations* it is assumed to know the loss function of the central bank and understand what the optimal policy for the central bank is, i.e. the general public knows equation (6) and forms expectations thereafter. With rational expectations the general public will know that it is optimal for the central bank to always deviate from the communicated target when inflation expectations equal the target, hence π^* is no longer credible. However, since the general public commits to a wage contract prior to the realization of the supply shock, they do not have perfect information about the central bank's choice of money growth.[62] The general public solves the following equation when forming their expectations:

$$\pi_t^e = E_{t-1}\left(\Delta m_t^{optimal}\right) = \frac{1}{1+\lambda\gamma^2}\pi^* + \frac{\lambda\gamma}{1+\lambda\gamma^2}\left(y^* - y_t^{natural}\right) + \frac{\lambda\gamma^2}{1+\lambda\gamma^2}\pi_t^e - \frac{\lambda\gamma}{1+\lambda\gamma^2}E_{t-1}(\varepsilon_t) - E_{t-1}(v_t) \quad (11)$$

Given that both the supply shock and the monetary policy shock equals zero on average, equation (11) is solved for inflation expectations, π_t^e, to equal:

$$\pi_t^e = \pi^* + \lambda\gamma\left(y^* - y_t^{natural}\right) \quad (12)$$

Using equation (12) in equation (6) now yields optimal money growth equal to:

$$\Delta m_t^{optimal} = \pi^* + \lambda\gamma\left(y^* - y_t^{natural}\right) - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t \quad (13)$$

which is higher than when expectations where equal to the inflation target. This means that when the general public has rational expectations, the central bank must create higher money growth to follow the optimal monetary policy, i.e. the one that maximizes social welfare. The solutions for actual inflation and output in period t under rational expectations become:

[62] Recall the sequential timing described in figure 14. The supply shock, ε_t, is observed by the central bank, but the monetary policy shock, v_t, is not.

$$\pi_t^{rational} = \pi^* + \lambda\gamma\left(y^* - y_t^{natural}\right) - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t + v_t \quad \Leftrightarrow \pi_t^{rational} = \pi_t^e - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t + v_t \tag{14}$$

$$y_t^{rational} = y_t^{natural} + \frac{1}{1+\lambda\gamma^2}\varepsilon_t + \gamma v_t \tag{15}$$

As when the general public believed that the central bank aimed for the inflation target, it is evident from equation (15) that it will be optimal for the central bank still to create inflation above the target. Again, the inflation bias is illustrated by the red box. The realized aggregate output, on the other hand, will on average equal the natural rate. By simple comparison of equations (9), (10), (14) and (15) it is clear that:

$$\pi_t^{rational} > \pi_t^{surprise} \quad and \quad y_t^{rational} < y_t^{surprise}$$

When expectations are rational, the central bank creates an even larger inflation bias, without being able to boost the output. Why? Because, the general public fully expects the elevated inflation and takes account for it when deciding on the wage contracts. From the Lucas supply curve (equation (1)) it is evident that when the general public perfectly foresees what the realized inflation will be, output will equal the natural rate on average and the result is therefore a larger inflation bias, with no effect on output.

As already mentioned, the timing of the model is essential. Once the general public has committed to inflation expectations and wage contracts, the central bank will have an incentive to inflate. As soon as the general public expects inflation to be at the target, π^*, the optimal policy for the central bank will be to again create higher inflation and boost the output above its natural level, because the central bank re-optimizes monetary policy in every period. This is what Kydland and Prescott (1977) call the *time-inconsistency* problem: What is optimal prior to the inflation expectations are formed is no longer optimal after they have resulted in wage contracts. As a consequence, the inflation target is not credible, even though the central bank and the authorities believe in it, and find it optimal, a priori.

This section has showed that how the general public forms their inflation expectations matters for a possible inflation bias. If the expectations not are rational the central bank may succeed in boosting aggregate output above the natural level. If, on the other hand, rational expectations exist, the possible inflation bias will have no effect on output. In the next section,

I will turn to the empirical analysis of Chinese monetary policy, and search for the existence of rational expectations and a possible inflation bias in China.

5 Chinese Monetary Policy – An Empirical Analysis

Section 4 clearly showed that under certain circumstances it will be optimal for the central bank to create a consistent inflation bias without being able to push aggregate output above its natural level. I also argued that the set-up of the Barro Gordon model with monetary policy conduction under discretion matched quite well with the Chinese reality, although the model of course simplifies the reality in many aspects. In this section, I test this hypothesis by empirically search for rational expectations, which are crucial for the outcome of the Barro Gordon model, and a possible inflation bias in the Chinese economy. It is not straightforward what measure of inflation one should use, and different measures could give different results regarding a possible inflation bias. In section 5.1, I therefore present two different inflation measures. Section 5.2 discusses how rational Chinese households are when they form their inflation expectations, and, consequently, the credibility of the People's Bank of China (PBC). In section 5.3, I make use of available data on Chinese inflation, expectations and economic growth to search for a possible inflation bias in the Chinese economy. Finally, section 5.4 presents some policy implications and sketches possible steps forward for the PBC and the conduction of monetary policy in China.

5.1 The Chinese inflation rate

Given the important role inflation plays as a target and goal for the conduction of monetary policy, it is crucial which measure that is being used and how this measure is calculated. In the discussion of economic transparency in section 3.4, I touched upon the problem of reliability of Chinese official statistics. This is of course also highly relevant when discussing inflation. Huang et al (2013b) argue that there are two problems concerning the official data in China: one technical and one political. The technical aspect reflects the difficulty in providing accurate and reliable data on prices and consumption in a fast-growing and emerging market with large regional differences. Both the actual price increase and a typical consumption basket will vary between provinces. Most importantly, food will take up a larger share of a consumption basket in a poor province relative to a richer province. These differences are problematic for the construction of a national consumer price index (CPI), which should reflect a typical consumption basket. As a consequence, there are large

varieties in the reported inflation rates between provinces and regions. The political aspect of lack of reliability in the official statistics reflects the incentives authorities have to report a low inflation in line with the target. As argued in section 3.1, high inflation could lead to social instability. However, under-reporting inflation would probably have limited effect on the stability since it, most likely, is households' perceived inflation that matters for stability, not the reported number. Nonetheless, one should not underestimate the incentives the officials have to report inflation statistics in line with the inflation target.[63] In sum, Huang et al (2013b) conclude that the official CPI may be underestimated by as much as 2 percentage points.

Since 2011, the State Council has reported the annual inflation targets, discussed in section 3.1.1, in terms of the CPI.[64] In this section, I show how the CPI has developed over the reform period, further elaborate on how the Chinese CPI is calculated and illustrate the problems regarding choosing one basket of goods to represent the consumption patterns of the whole economy. Given the problems in measuring inflation in China, I also present an additional type of inflation measure, the GDP deflator, as a comparison to the CPI.

5.1.1 The Consumer price index

The consumer price index (CPI) reflects the overall price change for a certain basket of goods and services bought by households. Like China, most other countries use some kind of CPI when measuring the inflation rate.[65] Figure 15 below shows the evolution in the CPI since 1985 and further illustrates that, in a historical perspective, the current level of the CPI is not particularly high. Since 1985, there are two clear peaks in the CPI: one in 1989 (28.4 percent); and one in 1994 (27.7 percent). In light of this, one could argue that the financial reforms since the late 1990s have been successful in stabilizing the inflation rate, and the volatility of the CPI has indeed fallen considerably over the period. The variance of the CPI for the period

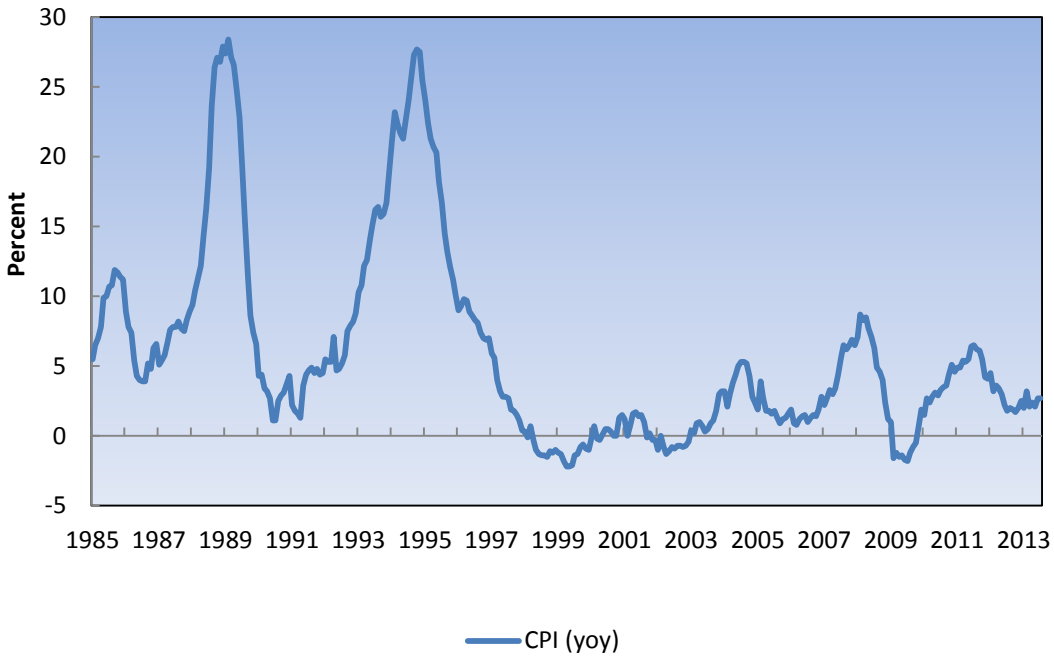
[63] As an example, high income growth has allowed a large share of the middle-class in Beijing to switch from public transport to taxies, resulting in a rapid increase in the demand for taxies. Nonetheless, when the taxi fares in Beijing finally increased in 2013, it was the first time since 2006. Some sources argue that this is directly linked up to the government wanting to avoid a rapid increase in CPI (Economist, 2012 and Chovanec, 2012). If true, it illustrates that the government controls prices included in the CPI basket to avoid a too large increase in the inflation rate.

[64] Prior to 2011, the State Council used a more vague formulation saying that the *consumer prices* should not increase more than the target, without stating how this change should be measured.

[65] I.e. the ECB targets the Harmonised Index of Consumer Prices, Norges Bank targets CPIXE (CPI adjusted for tax changes and excluding temporarily changes in energy prices), and the BoE and the Swedish Riksbank target CPI.

1985-2013 is 49.9, while the period 1997-2013 yields a variance of just 6.06. Nonetheless, the CPI in China is still much more volatile than in the EU, the US and in Norway where the corresponding numbers since 1997 are 0.61, 1.48 and 1.27 respectively.[6667] Even though far below the peak values from 1989 and 1994, the CPI has showed relatively high values also in more recent years, with two peaks: in 2008 (8.5 percent) and 2011 (6.5 percent).

Figure 15: CPI (monthly year-on-year change) 1985-2013



Source: CEIC Data

As mentioned above, in a country with such large differences and inequalities the chosen commodity basket and the relative weights on the goods will be crucial for the CPI. The current Chinese CPI basket consists of commodities divided into eight groups: food; residence (rent, water, electricity etc.); tobacco and liquors; clothing; household facilities and services; healthcare and personal articles; transportation and communication; and recreation, education and culture (Huang et al, 2013b). Notice that housing is not included in the CPI, meaning that the rapid price increase in real estate in China in recent years will not show in the CPI statistics.[68] The relative weights placed on each of the categories in the national CPI are not

[66] All calculations are based on monthly year-on-year data from CEIC Data. Statistics on the CPI in the EU is only available since 1998.
[67] Conway et al (2010) finds similar results when comparing the Chinese GDP deflator to OECD countries' GDP deflator, and concludes that: *"…Chinese inflation remains more volatile than in most OECD countries"* (p.41).
[68] It is common practice to not include housing and property prices in the CPI basket. The reason is that buying an apartment or a house is more like an investment than actual consumption and as long as the rent prices are included in the CPI basket this should incorporate changes in cost of living following changes in prices on residence expenditures. However, in a Chinese context, I question whether the rent prices are a good enough

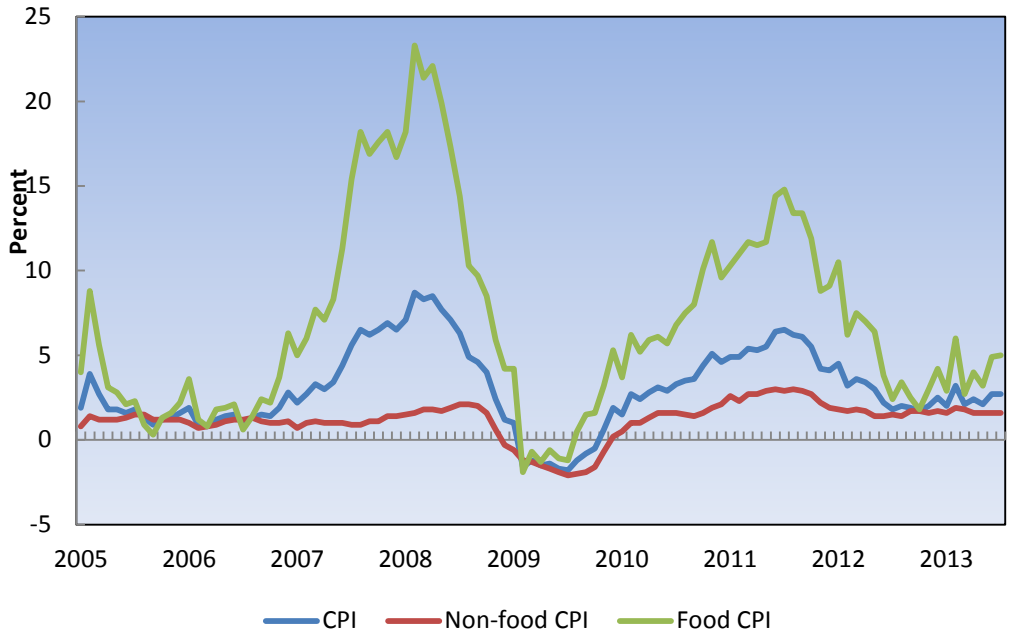
clear since the National Bureau of Statistics of China (NBSC) provides little information about these.[69] What is clear is that food is the most important component, taking up almost one third of the whole basket (Funke et al, 2011). The problems of constructing the national CPI are further illustrated in figure 16 and 17 below. Figure 16 illustrates the problem of placing weight on the different commodities in the national CPI basket. As shown in the figure, the price increase in food has been much higher than the national CPI in China.[70] From the figure it could also seem like changes in prices on food lead the overall price changes somewhat. When removing all food commodities from the CPI basket, the data is much more stable, as shown by the non-food CPI in figure 16. The problem for the NBSC is that food takes up a much larger share of the typical household's budget in a poor province, like Guizhou, than it does in a typical rich province like Shanghai. By increasing the share of food in the national CPI basket it would better represent the typical budget for a household in Guizhou, but represent Shanghai's households worse. Since the NBSC does not provide data from the household survey on which they build the CPI basket, it is hard to say whether the current basket represents the typical national household's budget or not. Nonetheless, one could conclude from the findings in figure 16 that the more weight placed on food in the CPI basket, the more volatile the CPI will be, and the harder it will be for the PBC to reach the policy target of stable prices. It must also be noted that food prices in many cases are driven by forces that the PBC are unable to control such as weather conditions, floods and droughts, and will be more volatile due to these reasons.

proxy on such changes in cost of living. Huang et al (2013b) argues that the current share of residence expenditures in the CPI basket (about 18 percent) is too low to fully incorporate changes in cost in residence for the Chinese households.

[69] The Chinese CPI is calculated and presented by the NBSC. The NBSC revises the composition of the CPI basket every five years, on the basis of surveys made among both urban and rural households.

[70] One of the main components driving up the volatility in food prices are pork prices. In 2007-2008 the pork price increased more than 50 percent for 11 months in a row and peaked at 80.9 percent. The average price change over the whole period is 9.26 percent, with a variance of 725..

Figure 16: CPI, food and non-food CPI (monthly year-on-year change) 2005-2013



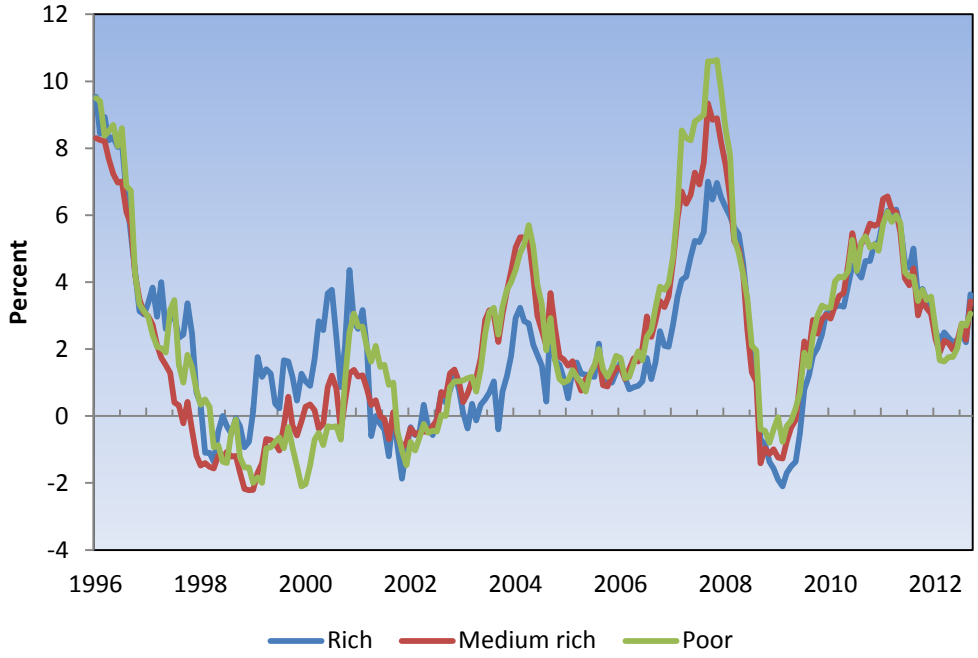
Source: CEIC Data

To further illustrate the problem in constructing one national CPI basket, I have divided the 31 provinces into three groups: The three richest (Tianjin, Beijing and Shanghai) are placed in the group labeled "Rich", the three poorest (Yunnan, Gansu and Guizhou) are placed in the group labeled "Poor", and finally the remaining provinces are all placed in the group labeled "Medium rich".[71] In figure 17, I show the average CPI from these three groups. From the figure it is evident that there are large differences between the reported CPI in the three categories, even though the trends are closely related. Observe especially that the average CPI in the poor and medium rich provinces in general lies above the average CPI in the rich provinces. During the inflation peak in 2008, the poor and medium rich provinces reported an average CPI at 10.6 and 9.3 percent respectively, while the rich provinces only reported an average CPI at 7 percent, i.e. more than 3 percentage points in difference. It is also evident from the figure that the inflation rates in the poor- and medium rich provinces follow each other more closely. I argue that this reflects the fact that even though the category is "medium rich" in Chinese standards, the GDP per capita is still quite low, meaning that the medium rich provinces in reality are medium poor, and therefore more similar to the poor than the rich

[71] I have constructed GDP per capita in all 31 provinces based on the reported provincial GDP and population in 2011 in National Bureau of Statistics (2012). I have excluded the poorest province, Shaanxi, from the "poor"-group because the per capita GDP only is one fifth of the next province on the list. This means that the group "Medium rich" consists of in total 24 provinces (There is no data available on the CPI in Tibet before 1999, i.e. until 1999 the Medium rich group consists of 23 provinces).

provinces.[72] The relatively large difference in inflation rates could reflect a larger share of food in the CPI basket in the poor- and medium rich provinces than in the rich ones. Notice, however, that from the figure it seems like the differences are diminishing, and during the inflation peak in 2011 there were only marginal differences in the reported average CPI in the three categories.

Figure 17: The CPI in rich-, medium rich- and poor provinces



Source: CEIC Data

5.1.2 The GDP deflator

The last section showed that the CPI data could vary depending on choice of consumption basket and the weight placed on the commodities within the basket. Given these problems it is interesting to compare the CPI with another inflation measure, the *GDP deflator*.

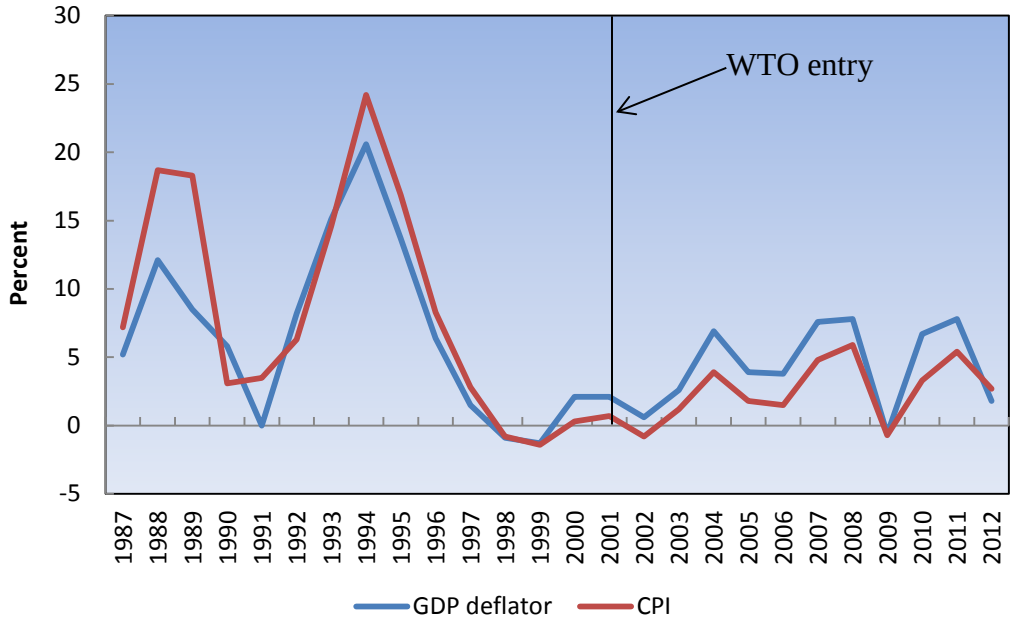
Unlike the CPI, the GDP deflator targets all goods that are produced in China and therefore reflects general price changes in the economy. It is measured as the difference between nominal and real GDP.[73] Figure 18 below shows the evolution in the GDP deflator since 1987. There is no doubt that it follows the trend in CPI very closely, but since the late 1990s,

[72] The average GDP per capita in 2011 in the three groups, measured by international PPP dollars, are 19 882, 8 928 and 4 468 respectively.

[73] Formally the GDP deflator is calculated as: $GDP\ deflator = \left(\frac{Nominal\ GDP}{Real\ GDP}\right) \times 100.$

the GDP deflator has been higher than the CPI, and during both inflation peaks in the 2000s the GDP deflator peaked at two percentage points higher than the CPI.[74]

Figure 18: GDP deflator and CPI (annual end of year change) 1987-2012



Source: World Bank Data

There may be several reasons why the GDP deflator has exceeded the CPI since the beginning of the 2000s. The most important reason is most likely China's entry into the World Trade Organization (WTO) in 2001, making China a huge new participant in the international trade market. While the CPI measures the changes in prices of a fixed basket of goods that Chinese consumers typically buy, including some imported goods, the GDP deflator measures price changes of all domestically produced goods. As shown in figure 18, some prices on goods excluded from the CPI basket have increased more than the prices included in the CPI basket and the main suspect is exported goods. *Exported goods*, are not included in the CPI basket but will show in the GDP deflator as long as it is produced domestically. This explains why there is a clear shift in the trend around China's entry into WTO in 2011.[75] For example, the change in export prices peaked at 11.8 in 2008 compared to 5.9 for the CPI (end of year change, CEIC Data). All else equal, the GDP deflator is likely to exceed the CPI if the prices

[74] The fact that the GDP deflator has exceeded the CPI in China since 1999 stands in contrast to what is the case in the USA, Germany and India where the CPI typically turned out above the GDP deflator. In Norway, however, the positive difference between the GDP deflator and the CPI has been even greater than in China. This probably reflects the positive development in terms of trade for the Norwegian economy (Martinsen and Stensland, 2012).

[75] Export of goods and services as percentage of GDP increased from 20 percent in 1999 to 35 percent in 2008 (World Bank Data).

on exported goods increase more than the prices on imported goods that are included in the CPI basket. A closer look at the actual statistics on exported and imported goods, based on the exported price index and imported price index (Macrobond), shows that the prices on imported goods have increased more than the prices on exported goods. However, I will still argue the validity of my argument, since the imported price index is likely to be driven by prices on natural resources and capital which make out the majority of Chinese import. Prices on such type of goods are most likely not included in the CPI basket that reflects the consumption matter of the households. Consequently it is the prices on final imported goods that matter for my argument and I argue that the price increase on this type of goods is likely to have been lower. Hence, I argue that it is likely that the GDP deflator exceeds the CPI because the prices on exported goods have increased more than the prices on imported goods that are included in the CPI basket.

5.1.3 Choice of inflation measure

To sum up, it matters for the conduction of monetary policy what measure is used for inflation and how it is calculated. This conclusion raises the question why the PBC targets the CPI, and not the GDP deflator? The main advantage of the CPI is that it measures the "cost of living" for the households and then measures the most relevant prices in the economy. Since it measures the prices observed by the general public it also lays a good foundation for the household to form their inflation expectations. The disadvantage is that it is impossible for the CPI to capture all price changes in the economy and it is crucial how the CPI basket is formed. As discussed above, the CPI may change dramatically if the weighting in the basket is changed. It is absolutely necessary to create a CPI basket that in the best way possible represents the typical budget of a typical household in China for the CPI to be credible and in line of the perceived inflation of the agents in the economy. In my view, the lack of transparency in the calculation process and the weighting of the commodity basket limit the credibility of the CPI as an inflation measure in China. The GDP deflator is a broader measure on price changes than the CPI since it captures all price changes on domestically produced goods. However, as argued by He and Liu (2011), it is difficult for the households to form their inflation expectations on the basis of the GDP deflator since the public often have little information and knowledge about the difference in nominal and real GDP. In addition, as I argue above, the difference could be driven by prices on exported goods, which not affect households too much, while imported goods, which do matter for the households,

are excluded. In sum, I find the choice by the State Council to report realized inflation and targets in terms of CPI when conducting monetary policy in China reasonable. However, I will stress that it is important for the NBSC and the PBC to increase the transparency around the calculation process and to pursue a best possible CPI basket that represents a typical Chinese household's budget.

5.2 Inflation expectations and central bank credibility in China

Blinder (1999) conducts a survey among 127 central banks, where he asks questions on a series of issues related to central bank credibility. The results of the survey show that central banks regard independence and transparency among the top four determinants of central bank credibility. Waller and de Haan (2004) conduct the same type of survey among private sector economists, and find the similar result. In sections 3.3 and 3.4, I showed that People's Bank of China (PBC) has several shortcomings both with respect to independence and transparency. It is, therefore, reasonable to think that the lack of independence and transparency could lead to lower credibility of the PBC.

Bofinger (2001) defines central bank credibility as *"A central bank is generally described as credible if its declared policy of pursuing price stability (or, more precisely, the concrete numerical value of its inflation target) is taken by private individuals to be the basis of their expectation formation"* (p.200). In the Barro Gordon model presented in section 4, it is no doubt that, due to rational expectations, lack of credibility would lead to an efficiency loss of monetary policy as the result will be a too high inflation but output at the natural level.[76] The more rational the private agents are when forming their expectations, the larger could the loss be when the central bank faces limited credibility. In this section, I will make use of the definition on central bank credibility in Bofinger (2001) and discuss credibility of the PBC as well as to what extent Chinese inflation expectations could be considered rational.

5.2.1 How rational are Chinese inflation expectations?

As shown in section 4, the way the private agents form their expectations will be crucial for the importance of central bank credibility. If the agents are rational and the central bank

[76] See also Box A.1 in the appendix for a discussion of efficiency in the Barro Gordon model.

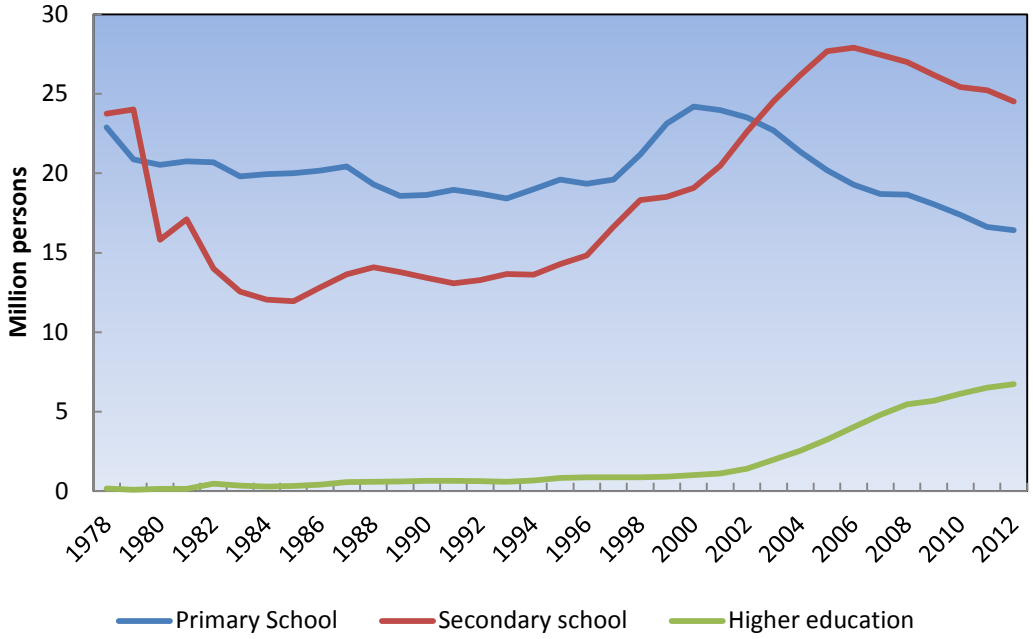
conducts monetary policy as in the Barro Gordon model, they will know that the central bank has an incentive to create higher inflation in order to boost output above its natural level, and consequently know if the central bank's inflation target is credible or not. In order to conclude on the People's Bank of China's (PBC) credibility, I will in this section say something about how rational private agents' inflation expectations are.

Blanchard et al (2010) define rational expectations as *"The formation of expectations based on rational forecasts, rather than on simple extrapolations of the past"* (p.569). The idea is that households, when taking economic decisions, look into the future and try to predict it by making use of all available information and knowledge. There is no standard way to measure the level of rationality among the agents in an economy. However, it is reasonable to argue that it is closely related to the level of education. In the context of monetary policy this means that the more educated agents are the better knowledge and information about the process of monetary policy conduction and targets they possess, and the more rational expectations about future inflation they form. Hence, I find it reasonable to argue that the higher educational level, the closer the inflation expectations will be to the realized inflation.[77]

Figure 19 below shows the evolution of the number of graduates per year from primary, secondary and higher education through the reform period.[78] There is a nine-year compulsory education in China (primary and junior secondary school), and the completion rate is about 100 percent (World Bank Data). Hence, the number of graduates from these levels every year will in general only follow the demographic population development in China.[79] More interestingly, figure 19 illustrates that the number of graduates from higher education have been increasing rapidly since 2000. In 2012, more than 6,7 million students graduated from higher education, more than six times as many as in 2001, and, in 2012, 27 percent of the population in the relevant age group were enrolled in higher education. On the other hand, the share of the population that holds a higher education degree is still below 10 percent, but this share is increasing rapidly. By 2020 the gross enrolment rate in higher education should have increased to above 40 percent (Ministry of Education, 2010).

[77] This does not necessarily mean that higher education is a necessary condition for rational expectations. A person could of course form rational expectations without any educational background.
[78] Under The Culture Revolution (1966-1976) the education system more or less collapsed in China as millions of teenagers and students organized into Red Guards and marched to the streets. During 1966-1972 almost all institutions providing higher education were closed and many professors and intellectuals were accused of being revisionist and sent to the countryside to work in labor camps (See for example Deng and Treiman (1997)).
[79] Even though not compulsory, I assume that the completion rate is close to 100 percent also in the case of senior secondary education.

Figure 19: Number of graduates (annually) from the Chinese educational system since 1978



Source: World Bank Data

Given the increasing educational level in China, I argue that the private agents are increasingly rational when forming their inflation expectations. I also argue that it becomes easier to be rational when forming expectations as a consequence of the increasing availability of information in the Chinese society. By the end of 2012, China had more than 560 million internet users, meaning that about 40 percent of the population has access to internet as a source of information (China Internet Network Information Center, 2013). As late as in 2005, the share was only 8.5 percent. On the other side, the discussion in section 3.4 and 5.1 made it clear that access to information still is limited by the lack of transparency of the PBC and the official statistics. A higher degree of transparency would without doubt make it easier for all agents to make better forecast on inflation expectations.

5.2.2 Credibility and inflation expectations

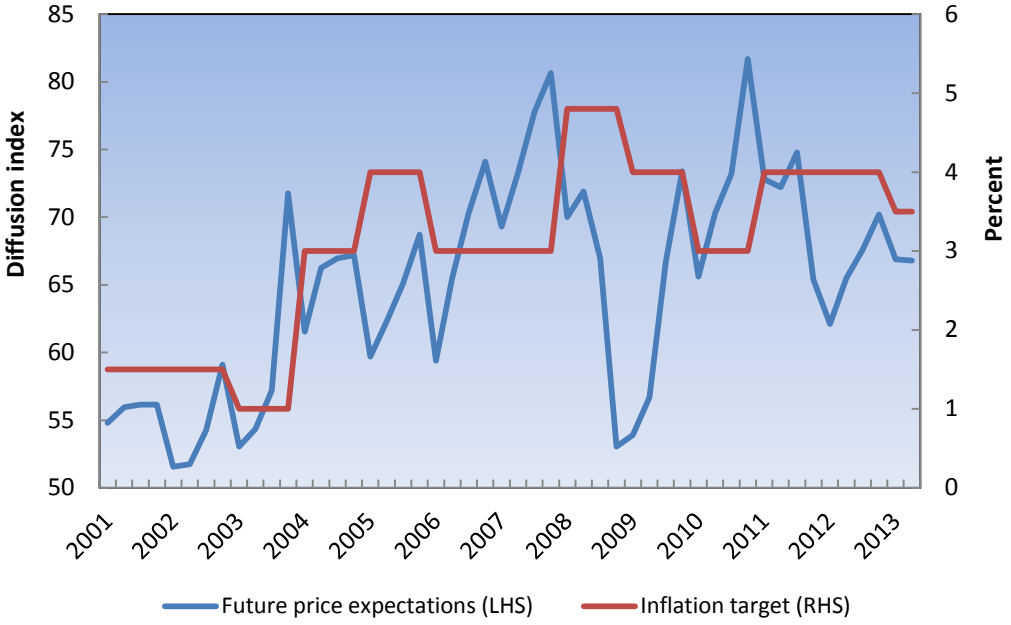
The definition of central bank credibility in Bofinger (2001) closely relates credibility to inflation expectations. Taken literally, the definition says that if the central bank is perfectly credible and the households are perfectly rational when forming their expectations, all inflation expectations should be perfectly anchored. In this section, I will make use of the annual targets for inflation described in section 3.1.1. However, since the PBC does not

operate under one long-run inflation target, but has changed the target rapidly over the last two decades, it is not reasonable to demand stable and well-anchored inflation expectations around one constant rate. Instead, I will look at two measures of inflation expectations in China: PBC's household survey and IMF's consumer price expectations, and argue that the households find the PBC credible if the inflation expectations either follow the trend in the annual targets, or stay below the target rate.

THE PBC HOUSEHOLD SURVEY:

Since 2001, the PBC has published data on households' inflation expectations. The survey is conducted once every quarter on 20 000 depositors in 50 cities. The survey outcome is a diffusion index ranging from 0 to 100 where a reading above 50 indicates positive price expectations on average among the depositors. Figure 20 below illustrates the evolution in the price expectations since 2001 together with the annual inflation targets. First, notice that there has been an increasing trend in the annual inflation targets from 2001 (1.2 percent) to 2012 (4 percent). If the inflation target is credible it should be a corresponding increasing trend in inflation expectations. From figure 20 such increasing trend is indeed evident. This could mean that the depositors find the central bank's annual inflation target credible, which further strengthens the hypothesis of rational inflation expectations in the Chinese economy. On the other hand, the inflation expectations cannot be considered to be anchored around one stable level, but as long as the target itself changes so rapidly it is only natural that also the expectations change. Furthermore, expectations tend to lead the change in the inflation target, which could indicate that the Chinese households possess good knowledge about how the State Council and the PBC set the annual inflation target. It is of course also possible that the State Council views the household's inflation expectations and adjusts the target thereafter.

Figure 20 The PBC's household price expectation survey (quarterly) and the inflation target



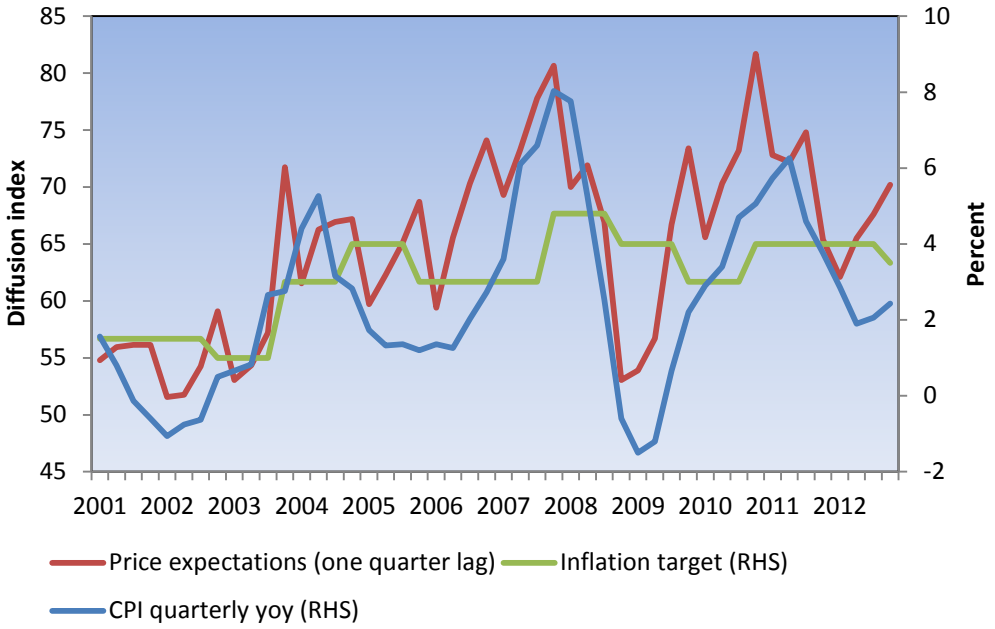
Source: CEIC Data, Central People's Government of the People's Republic of China (2000-2013) and Geiger (2010)

It is of course a weakness of the survey that it does not correspond to an expected percentage change in the CPI. This makes it hard to compare these inflation expectations with both realized inflation and annual targets. The PBC does not provide information about the actual questions asked in the survey, so it is hard to say how long into the future the depositors are asked to forecast inflation. However, some sources indicate that the depositors are asked about the inflation expectations for the next quarter (see for example PBC, 2012). Consequently, in figure 21 below, I compare the results from the PBC's survey to realized inflation 4 months later. As evident from the figure, the inflation expectations correspond remarkably well with actual trends in price changes.[80] This result shows that although the CPI is very volatile, the Chinese households seem to be successful in forecasting the actual development in domestic prices.[81] The fact that the Chinese households seems to be able to both forecast future changes in the inflation target as well as the actual price changes further strengthens the view of the Chinese private agents being rational when forming expectations.

[80] The correlation coefficient over the period equals 0,8.

[81] In order to land on this conclusion one must assume that the depositors included in the survey represent a representative sample of the whole population. The little information available about the sample indicates that the depositors all are urban, meaning that the survey only represents about half of the Chinese population. Also, I must assume that the statistics is provided in real time and could be trusted.

Figure 21: The PBC's household price expectation survey, the inflaiton target and CPI (quarterly)



Source: CEIC Data, Economic Research Federal Reserve Bank of St. Louis, Central People's Government of the People's Republic of China (2000-2013) and Geiger (2010)

IMF CONSUMER PRICE EXPECTATIONS:

The International Monetary Fund (IMF) publishes forecasts on changes in consumer prices in the World Economic Outlook (WEO). The IMF must be regarded rational when forming inflation expectations. Therefore, comparing the IMF expectations with PBC's annual targets should provide information about the credibility of the central bank. In figures 22a and 22b below, I have combined IMF's projections with PBC's annual inflation targets and realized CPI. As is evident from the figure, the IMF inflation expectations for same year inflation are lower than the PBC annual targets.[82] As emphasized in section 3.1.1, the annual PBC targets must be considered as maximum levels for inflation, leading to the conclusion that the IMF finds the PBC credible. Furthermore, the last year inflation expectation follows the same pattern.[83] However, it is impossible that these projections are based on the PBC's annual targets, because these targets are not yet published at the time the IMF presents their projections. On one hand, this strengthens the view of the IMF as rational when forming their expectations, and to some extent manages to predict how the State Council changes the target.

[82] The IMF WEO is published in April and October every year with forecasts on the average price change in consumer prices for the whole year and the next. In figure 22, the April versions from the years 2001-2013 are used.

[83] Last year's inflation expectations are the expectations for year *t* made at *t-1*, for t=2002-2014.

On the other hand, it could be problematic for the credibility of the PBC if it means that the State Council sets the annual inflation targets in such way that it only follows the general development in the economy, and not tries to find the socially optimal inflation level. Nonetheless, the fact that the IMF projections for future inflation and the annual targets coincide in the way such as evident from figures 22b, indicates that the market is good at forecasting the future development in the inflation targets. It is also evident from the two figures that the IMF succeeds in forecasting the development in actual CPI rather well, although less accurate one year ahead.

Figure 22a: IMF same year inflation expectations, realized CPI and inflation target (annually)

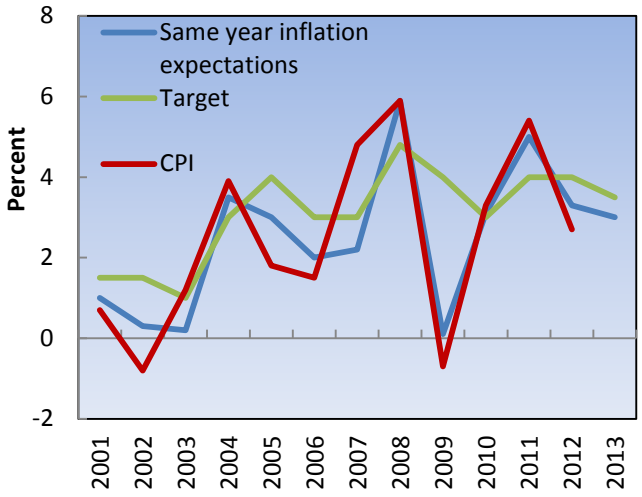
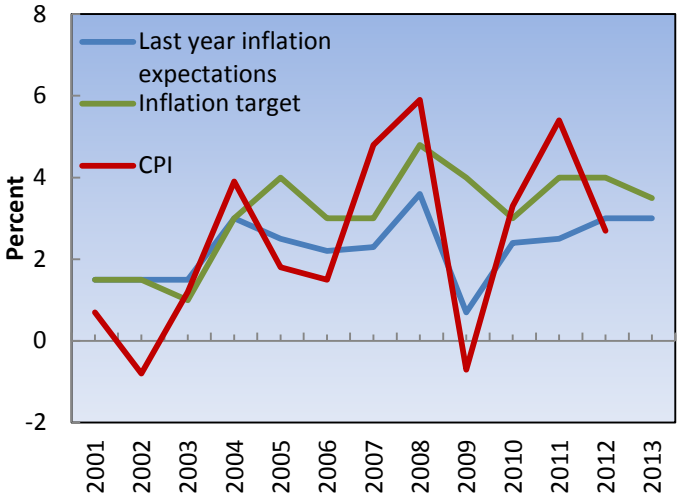


Figure 22b: IMF last year inflation expectations, realized CPI and inflation target (annually)



Source: IMF (2001-2013), Central People's Government of the Perople's Republic of China (2000-2013) and Geiger (2010), World Bank Data

Based on the two measures of inflation expectations discussed above and the definition in Bofinger (2001) on central bank credibility, I have to conclude that the expectations seems rational and that the PBC's credibility seems quite high. However, both the PBC's household survey on price expectations and the IMF projections one year ahead opens for the possibility that the annual targets are sat in a way that matches the markets expectations, and not the other way around. Or perhaps more likely; the annual inflation target is changed to match the development in the economy. If this is the case, the PBC's annual inflation targets should rather be understood as the government's price expectations and not a target for the price change.

5.3 Does China have an inflation bias?

In section 4, I showed, by the use of the Barro Gordon model, that when a central bank conducts monetary policy under discretion and targets an output level above the natural rate, a positive inflation bias will evolve. In addition, if the private agents have rational expectations, as I have argued that the Chinese private agents do, the inflation bias will be even larger and there will be no effect on aggregate output. Section 5.2 gave room for a possible positive inflation bias as the People's Bank of China (PBC) is credible and there are rational inflation expectations. In this section, I will make use of both the official Chinese data on inflation and the market's inflation expectations to search for an inflation bias. However, it will not be possible to conclude on the basis of the data available, partly because of the possible incorrect reporting of official data, discussed in section 5.1, but more importantly because inflation could be different from the target because of external shocks, as explained in section 4. As a consequence, based on the information about the Chinese monetary policy provided in this thesis, I will in the following summarize the arguments both in favor of and against the possibility of an inflation bias in China.

In section 4, I defined the positive inflation bias as the difference between realized inflation and the socially optimal inflation target, excluding any effects from shocks. As noted several times, China lacks an explicit long run inflation target. Instead the State Council sets the target for inflation annually. Assuming that these annual targets equal the socially optimal inflation level at each point in time, I have calculated the possible inflation bias as the difference between realized inflation and targeted inflation, see table 9. A positive (negative) number in the column labeled "bias" indicates that realized inflation turned out to be greater (smaller) than the annual target.

Table 9: Inflation bias

Year	Target (%)	Realized (%)	Bias (realized – target)
1996	10	8,3	-1,7
1997	6	2,8	-3,2
1998	5	-0,8	-5,8
1999	2	-1,4	-3,4
2000	1	0,3	-0,7
2001	1-2	0,7	-0,8*
2002	1-2	-0,8	-2,3*
2003	1	1,2	0,2

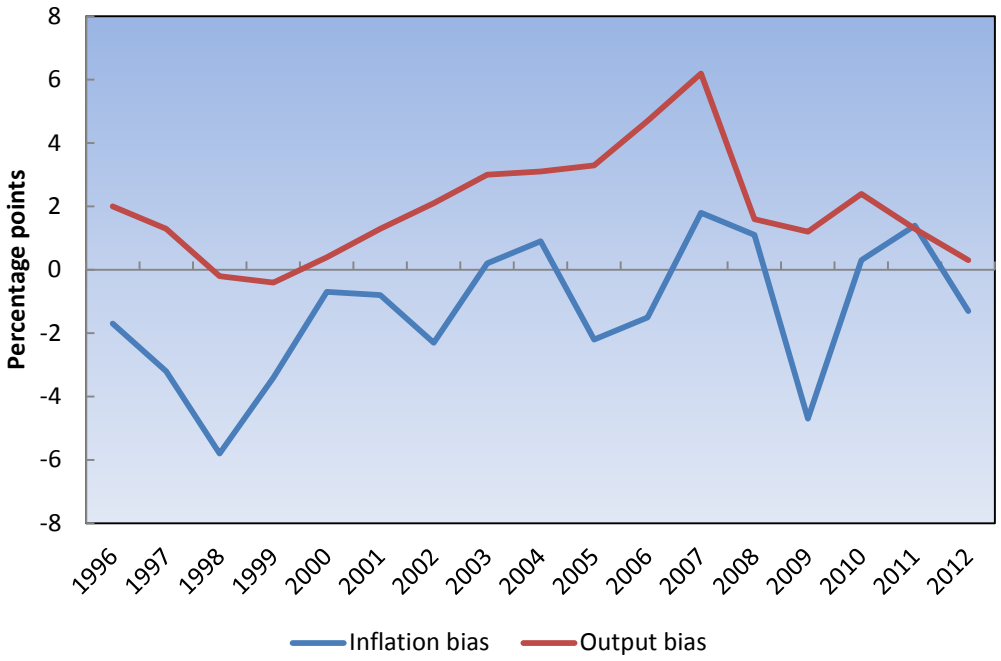
2004	3	3,9	0,9
2005	4	1,8	-2,2
2006	3	1,5	-1,5
2007	3	4,8	1,8
2008	4,8	5,9	1,1
2009	4	-0,7	-4,7
2010	3	3,3	0,3
2011	4	5,4	1,4
2012	4	2,7	-1,3

Source: World Bank Data, Central People's Government of the People's Republic of China (2000-2013) and Geiger (2010)
* The difference between realized and target inflation for 2001 and 2002 is measured using 1,5 percent as inflation target.

The difference between realized and targeted inflation is further illustrated in figure 23 below. The figure also displays deviations in realized output from the output target.[84] It is evident that since 1996 the Chinese CPI has been above the maximum inflation target for just 35 percent of the time.[85] Considering economic growth targets, on the other hand, the government has missed the minimum growth targets only twice since 1996: In year 1998 and 1999. Using the terminology from the Barro Gordon model in section 4, these results indicate a high value of λ, the relative weight placed on aggregate output in the central bank loss function (see equation (3) in section 4.1). A higher relative weight placed on output would increase the size of the inflation bias if present, but also inflation volatility relative to output volatility. The variance in realized inflation is 41.3, compared to 3.4 for the realized output, indicating a higher λ.[86] Although these volatility calculations indicate a higher relative weight placed on output, I will argue that 35 percent is a too low share to conclude that a positive inflation bias is present in the Chinese economy.

[84] See section 3.1.1 and table 3 for more on the economic growth target.
[85] In a worst-case scenario, the official CPI data is underestimated by as much as two percentage points, according to Huang et al (2013b). When adding two percentage points to the realized inflation in table 10, realized inflation instead *exceeds* the annual targets 65 percent of the time since 1996, and as much as 77 percent since 2000.
[86] These calculations are based on end-of-year inflation compared to a year before and annual percentage growth in GDP (World Bank).

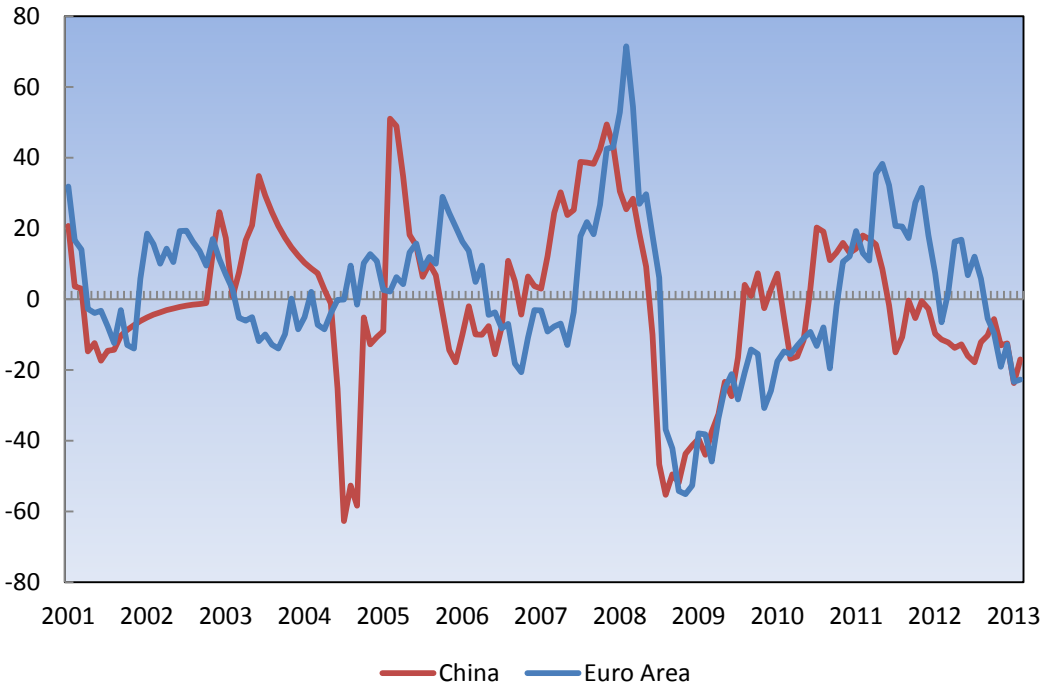
Figure 23: The possible inflation and output bias



Source: World Bank Data, Central People's Government of the People's Republic of China (2000-2013) and Geiger (2010)

To further search for a possible inflation bias in the Chinese economy, I make use of the Citigroup Inflation Surprise Index. This index measures monthly realized inflation against the consensus of the market expectations. A positive number means that actual inflation turned out to be larger than what the market expected. If the market perfectly forecasts actual inflation, the index will show a value of zero. If the index shows a negative number, the realized inflation turned out below expectations. Figure 24 below shows the surprise inflation index for China, and as a comparison the euro area, since 2001. At first glance, it may seem like the market is doing a poor job in forecasting inflation expectations and the figure illustrates a very volatile index. However, by comparing it to the inflation surprise index for the euro area there are similar trends, with the index for the euro area almost as volatile as the index for China.

Figure 24: Citigroup Inflation Surprise Index (monthly)



Source: Macrobond

The foundation for the inflation bias is the central bank's desire to boost output above the natural level by creating surprise inflation above the household's expectations. I argue that, if assuming that the PBC tries to create surprise inflation above expectations, whether or not they succeed would be evident from the surprise index. If no positive inflation is present, one should, on average, expect that the index turns out negative (positive) about fifty percent of the time. Hence, if the index turns out positive for a large share of the time, it indicates that the PBC succeeds in surprising the market. Table 10 summarizes the share of the time since 2001 that the surprise index has turned out positive for five different countries/group of countries. As is evident from the table, China's surprise inflation index has been positive 45 percent of the time since 2001. This is below the same share in both the EU and Norway, and only marginally above the one in the US. I argue that the Chinese share is too low to conclude that the PBC creates surprise inflation. Quite the contrary, I argue that this is only what one should expect: In the long run, the market fails to predict realized inflation upwards (downwards) about fifty percent of the time.

Table 10: Surprise Inflation Index

Country	China	EU	USA	Norway	Emerging Markets
Positive (%)	45	50	42	51	34

Source: Macrobond

So does China have an inflation bias? Based on the calculations above, I argue that one cannot conclude that there is an inflation bias in China. Nonetheless, the simple calculations and illustrations do not fully reject the possibility for a bias. In addition, several aspects of the setup and conduction of Chinese monetary policy further strengthen the possibility of an inflation bias. First, I argue that the PBC target for the output level exceeds the natural level, which is a necessary condition for an inflation bias to evolve. There is no doubt that the currency has been under-valued in the past, which has created high foreign demand for Chinese goods and large current account surpluses. This development has created distortions and contributed to high economic growth. The annual growth targets are sat in this economic environment, and therefore most likely exceed the natural level for output growth that would evolve if the exchange rate had fluctuated freely. Second, there are incentives for the responsible authorities to put high relative weight on output. As argued in section 3.1, Chinese leaders at all levels and in all institutions are first of all measured by their ability to contribute to further economic growth. Third, the PBC cannot be regarded as an independent central bank. There are many empirical results showing a negative relationship between the level of independence and inflation, although none considering China in particular. Nonetheless, it is very much likely that the many other institutions and individuals that matter for the conduction of monetary policy in China place higher weight on output, or target an even higher output than the PBC. If so, it increases the possibility that an inflation bias will evolve. Fourth, the narrow and state-dominated financial sector, described in section 2.3, gives incentives for high credit growth and, consequently, an expansive monetary policy. Finally, the lack of transparency around the conduction of monetary policy could mean that it is easier for the PBC to create surprise inflation.

Given the arguments summarized above, it may seem like a puzzle why my calculations do not show any actual evidence of an inflation bias. However, this thesis has also presented several arguments for why an inflation bias is unlikely to evolve in China. First, and most importantly, high inflation is politically sensitive in China. Ultimately, high inflation could lead to unrest and social instability and there is no doubt that this increases the relative weight placed on inflation in the central bank loss function. Second, a central bank without independence does not in itself mean that an inflation bias will evolve. Bofinger (2001) states that *"… In countries with low unemployment, a high preferences for price stability among the population, and a very stable political environment, an inflation bias is not very likely even with a completely dependent central bank"* (p.220). The political environment must be said to

be rather stable in China, and the Communist Party need not to worry about being re-elected. Third, despite the lack of transparency, the discussion in section 5.2, and the calculation above related to the Citigroup Inflation Surprise Index, showed that the Chinese households are quite good at forecasting future inflation and are increasingly rational when forming their inflation expectations, meaning that creating an elevated inflation would be less preferable for the PBC.

Based on the argumentation above, I conclude that there is no consistent inflation bias present in China. However, even if an inflation bias is not present, it seems evident that more weight is put on stabilizing output than inflation, resulting in higher inflation volatility. In the next section, I will present several steps that may be taken to create a more stable inflation and prevent a possible inflation bias to evolve in the future.

5.4 Policy implications: How to create stable inflation in China and steps forward for monetary policy

Section 5.3 showed that realized inflation has exceeded the annual maximum targets for 35 percent of the time since 1996, and perhaps more if one takes the underreported CPI into account. In addition, inflation has been much more volatile than output, indicating an high weight placed on reaching the policy goal of output relative to reaching the policy goal of price stability. High and volatile inflation makes it harder for the general public to form their inflation expectations and, consequently, creates an uncertain economic environment. However, one may ask the question whether it is fair to require a stable and low inflation in China? After all, China is an emerging market and the economy is still growing at high levels. Consequently, the prices must increase as the economy develops. In Caixin (2012), Governor Zhou Xiaochuan of the PBC considers this issue and states that: *"…, if the central bank overly emphasized the low inflation objective, this might hinder the government's price reform… monetary policy should leave room for price hikes caused by reform which helps optimize resource allocation* (p.3). Nonetheless, price stability is considered a policy goal of the monetary policy in the law on PBC and the State Council sets explicit maximum levels for price changes. In section 5.3, I showed that there are several aspects of the setup and conduction of monetary policy in China that build up under a highly volatile inflation and the possibility that an inflation bias could evolve. In this section, I present some steps that may be

taken by the government to avoid that an inflation bias evolves and at the same time reduce inflation volatility.

The most important step forward for monetary policy is, in my view, to replace the constantly shifting annual inflation target by a medium- or long term constant target rate. This would solve any inflation bias problem entirely, as showed by Svensson (1995).[87] At the same time it would make the Chinese monetary policy more predictable and remove the possibility that the targets are adjusted just to match the expected development in the economy, as discussed in section 5.2. It is important that such target is flexible, to incorporate the current two-fold policy goal of monetary policy; price stability and economic growth. This means that the PBC will still care about stabilizing output around some level, although the weight placed on output should be reduced. The cost of this will be a somewhat higher volatility in output growth. On the other side, the gain will be a much more stable inflation in the long-run, which in itself could lead to higher growth as it makes it easier for the general public to form their expectations about future inflation. In addition, a new mandate of a flexible inflation target, if communicated the right way, would in itself increase transparency, as it is hard to interpret the current mandate of the PBC.

In sum, I argue that combining a credible and flexible inflation target with a transparent monetary policy would help the PBC control household's inflation expectations. In addition, I argue that by granting a new mandate for monetary policy to the PBC, several of the other problematic issues will also be solved. First, in order for the PBC to credibly follow a long-run inflation target, it is crucial that it freely can adjust the monetary policy instruments. This means that the instrumental independence of the PBC must increase. On the other side, it does not mean that the goal independence needs to increase. It is perfectly possible that a new flexible inflation target is decided by the State Council, as long as it is time-consistent and has a medium- or long-term perspective. Second, if the PBC is granted a new mandate to control prices in the long-run around an explicit target, it will no longer be possible for other institutions, such as the National Development and Reform Commission, to directly control important prices in the economy. And similarly, it will not be possible to conduct an expansive monetary policy so that the large state-owned banks could continue to fuel the economy with cheap credit. Third, if the inflation target manages to anchor the medium-term inflation expectations, it could mean that China over time could move closer to a fully

[87] See the appendix for further discussion of this, and other, solutions to the inflation bias problem.

floating exchange rate, which again would help the economy re-balance from an export and investment driven economy towards a more equally balance between the GDP components. Finally, in a longer perspective, I argue that the PBC will find it easier to control prices by market-based instruments, such as the interest rate. This would of course, require that the current ceiling on commercial banks' deposit rates is removed.

6 Concluding remarks

The content of this thesis is two-fold. First, I give an overview of the setup and conduction of monetary policy in China, and second, by the use of an empirical analysis, I search for a positive inflation bias in the Chinese economy. In the Barro Gordon model, a positive inflation bias, combined with rational expectations, will result in higher inflation without any effect on aggregate output. By the use of the Barro Gordon model, I find that, in theory, such inflation bias could likely evolve in China as many of the necessary conditions for an inflation bias to evolve is fulfilled. Formally, the People's Bank of China (PBC) is the responsible institution for conducting monetary policy in China. However, the PBC's power is limited by the lack of independence of the State Council and the China Communist Party (CCP), and I argue that the CCP is the final decision-making authority in all important cases related to monetary policy. In addition, the PBC is hurt by the lack of transparency that surrounds the setup and conduction of monetary policy. There is a high degree of uncertainty regarding the actual mandate of the PBC and how monetary policy is conducted. The lack of independence and transparency could hurt the PBC's credibility and consequently make it harder for the PBC to control the private agents' inflation expectations. The legacy from the planned-economy is still strong, with a deep, but narrow financial market dominated by state-owned enterprises with close ties to the decision-making authorities. Combined with an undervalued currency, I argue that it is likely that the output level targeted by the PBC exceed its natural level.

However, although the institutional foundation for monetary policy and my theoretical analysis suggest that a positive inflation bias may exist in China, my empirical analysis lacks evidence of bias. Realized inflation exceeded target about one third of the time since 1996, and I argue that this is a too little share to conclude that an inflation bias is present. However, the inflation rate has been highly volatile, both compared to inflation in other economies and to domestic economic growth. This result indicates that the PBC places a majority of the weight on output when conducting monetary policy. I argue that it seems like the PBC is willing to accept a more volatile inflation in change of a more stable and higher economic growth, as long as the inflation stays below reasonable levels that secure continued social stability. Although the conduction of monetary policy in China has come a long way since the reform-period started, I argue that several steps remain to be taken. Most importantly, I argue

that the State Council should replace the constantly shifting annual inflation target by a medium-or long term constant inflation rate.

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Appendix

A.1 Solutions to the inflation bias

The Barro Gordon model, discussed in section 4, showed that when the central bank conducts monetary policy under discretion, an inflation bias will evolve, and, if the general public has rational expectations, the elevated inflation has no effect on aggregate output. Clearly this cannot be optimal. Several possible solutions to the inflation bias problem have been suggested in the literature. In this appendix, I present three of these possible solutions.

A.1.1 Commitment to a rule

One possible solution to the inflation bias problem is to let the central bank commit to a policy rule *prior* to the inflation expectations are formed. This theory builds on Kydland and Prescott (1977), and, as this section will show, commitment to a rule will remove the inflation bias entirely without harming the aggregate output. Formally, I assume that the central bank commits to a rule of the type:

$$\Delta m_t = b_0 + b_1 \varepsilon_t \qquad (A.1)$$

A policy rule of the type in equation (A.1) will allow the central bank to conduct stabilizing policy, i.e. react to the supply shock. The general public will believe in this rule, and form the inflation expectations thereafter, as long as the commitment to this rule is credible. If the rule is credible, inflation expectations will equal:

$$E_{t-1}(\Delta m_t) = \pi_t^e = b_0, \qquad (A.2)$$

since the supply shock equal zero in expectations. By inserting for equation (A.1) and (A.2) in the central bank loss function, equation (3), the minimization problem for the central bank becomes:

$$\min_{b_0, b_1} L_t = \frac{1}{2}[(b_0 + b_1\varepsilon_t + v_t - \pi^*)^2 + \lambda\{y_t^{natural} + (1 + \gamma b_1)\varepsilon_t - y^* + \gamma v_t\}^2] \quad (A.3)$$

Since the central bank commits to the rule prior to the general public forms the inflation expectations, b_0 and b_1 are chosen to minimize the unconditional expectation of the loss

function. The unconditional expectation of the loss function is found by taking the expectation of equation (19):

$$E_{t-1}(L_t) = \frac{1}{2}[(b_0 - \pi^*)^2 + b_1^2\sigma_\varepsilon^2 + \sigma_v^2] + \lambda\frac{1}{2}\left[\left(y_t^{natural} - y^*\right)^2 + (1 + \gamma b_1)^2\sigma_\varepsilon^2 + \gamma^2\sigma_v^2\right] \quad (A.4)$$

Where σ_ε^2 and σ_v^2 are the variance of the supply and monetary policy shock respectively.[88] The first order conditions to this minimization problem, solved for b_0 and b_1, equals:

$$b_0 = \pi^* \quad and \quad b_1 = -\frac{\lambda\gamma}{1 + \lambda\gamma^2}$$

Inserting the optimal values of b_0 and b_1 into the policy rule, equation (A.1), yields the new optimal money growth for central bank:

$$\Delta m_t = \pi^* - \frac{\lambda\gamma}{1 + \lambda\gamma^2}\varepsilon_t \quad (A.5)$$

The realized inflation and output under commitment to the policy rule are found by inserting for equation (A.5) in equations (1) and (2) when using equation (A.2):

$$\pi_t^{commitment} = \pi^* - \frac{\lambda\gamma}{1 + \lambda\gamma^2}\varepsilon_t + v_t \quad < \pi_t^{surprise} < \pi_t^{rational} \quad (A.6)$$

$$y_t^{commitment} = y_t^{natural} + \frac{1}{1 + \lambda\gamma^2}\varepsilon^t + \gamma v_t = y_t^{rational} < y_t^{surprise} \quad (A.7)$$

As is evident from equation (A.6), under commitment to a policy rule, the inflation bias will disappear and, as evident from equation (A.7), aggregate output will be equal to its natural level in the absence of shocks. Since inflation is reduced without harming aggregate output, commitment to a policy rule is superior to discretion under rational expectations, as shown formally in Box A.1. It is, however, crucial that the general public finds the policy rule, and the central bank's commitment to it, credible.

[88] $\sigma_x^2 = Var(x_t) = E_{t-1}(x_t^2) - [E_{t-1}(x_t)]^2 = E_{t-1}(x_t^2)$, where $x = \varepsilon, v$

Box A.1 The welfare losses: Discretion vs. Rules

What way of conducting monetary policy is preferable for the society? That is, what regime maximizes social welfare? In this model, the most preferable monetary policy is the one that minimizes the losses for the central bank. If the general public's inflation expectations equal the inflation target, π^*, as discussed in section 4.2.1, the expected loss is found by inserting equation (10) and (11) into equation (3) and taking the expectations, the expected loss is then:

$$E_{t-1}\left(L^{surpirse}\right) = \frac{1}{2}\left\{\frac{\lambda}{1+\lambda\gamma^2}\left[\left(y^* - y_t^{natural}\right)^2 + \sigma_\varepsilon^2\right] + (1+\lambda\gamma^2)\sigma_v^2\right\} \quad \text{(A. 8)}$$

Where σ_ε^2 and σ_v^2 are the variances of the supply shock and monetary policy shock. Similarly, the expected loss under discretion with rational expectations, as discussed in section 4.2.2, and under commitment to a policy rule equals:

$$E_{t-1}\left(L^{rational}\right) = \frac{1}{2}\left\{\lambda(1+\lambda\gamma^2)\left[\left(y^* - y_t^{natural}\right)^2 + \sigma_v^2\right] + \frac{\lambda}{1+\lambda\gamma^2}\sigma_\varepsilon^2\right\} \quad \text{(A. 9)}$$

$$E_{t-1}\left(L^{commitment}\right) = \frac{1}{2}\left\{\lambda\left(y^* - y_t^{natural}\right)^2 + \frac{\lambda}{1+\lambda\gamma^2}\sigma_\varepsilon^2 + (1+\lambda\gamma^2)\sigma_v^2\right\} \quad \text{(A. 10)}$$

Simple comparison of equations (A.8), (A.9) and (A.10) show that:

$$L_t^{surprise} < L_t^{rule} < L_t^{rational}$$

This means that discretion is superior to commitment as long as the general public not has rational expectations. The reason is that under surprise inflation the central bank succeeds in boosting output above its natural level, at a low cost in terms of higher inflation. If, on the other side, the general public have rational expectations, it is preferable for the society to make the central bank commit to a policy rule when conducting monetary policy.

The policy rule described above must be characterized as a *flexible* policy rule in the sense that it allows the central bank to react to supply shocks. If, on the other side, the policy rule was strict, i.e. $\Delta m_t = \pi^*$, the expected loss would equal:

$$E_{t-1}\left(L^{strict\_rule}\right) = \frac{1}{2}\left\{\lambda\left(y^* - y_t^{natural}\right)^2 + \lambda\sigma_\varepsilon^2 + (1+\lambda\gamma^2)\sigma_v^2\right\} \quad (A.11)$$

From equation (A.11) it is evident that the central bank, and the society, would be hurt by loss of flexibility and the commitment to a policy rule would only be superior to discretion (with rational expectations) if the volatility of the supply shock is small enough or if $y^* - y_t^{natural}$ is large enough. However, if the volatility of the supply shock is small enough, a policy rule that removes all flexibility for the central bank could be preferable for the society, since the inflation bias is removed. The cost of a policy rule of this type is of course that the central bank cannot take part in stabilizing activities.

A.1.2 Delegating the conduction of monetary policy

Another solution to the inflation bias problem, related to central bank independence, is to delegate the conduction of monetary policy to an independent and *conservative* central banker, first suggested by Rogoff (1985). As mentioned above, the inflation bias is increasing in the relative weight the central bank puts on output, λ. Rogoff (1985) suggests that the size of the inflation bias and the cost of it may be reduced by appointing a central banker that puts lower weight on output relative to inflation when conducting monetary policy. A conservative central banker is then one with some $\delta > 0$ such that[89]:

$$\lambda^{cons.} = \lambda - \delta < \lambda \quad (A.12)$$

The corresponding loss function for the conservative central banker then becomes:

$$L_t = \frac{1}{2}[(\pi_t - \pi^*)^2 + \lambda^{cons.}(y_t - y^*)^2] \quad (A.13)$$

And the realized inflation and output in period t with rational expectations and a conservative central banker equals:

[89] Notice that another possible solution is to hire a conservative central banker that targets $y_t^{natural}$ rather than the social optimal y^* in the loss function. This would remove the inflation bias entirely.

$$\pi_t^{conservative} = \pi^* + \lambda^{cons.}\gamma\left(y^* - y_t^{natural}\right) - \frac{\lambda^{cons.}\gamma}{1+\lambda^{cons.}\gamma^2}\varepsilon_t + v_t \quad (A.14)$$

$$y_t^{conservaitve} = y_t^{natural} + \frac{1}{1+\lambda^{cons.}\gamma^2}\varepsilon_t + \gamma v_t \quad (A.15)$$

Since $\lambda^{conservative} < \lambda$, the size of the inflation bias has been reduced compared to the scenario described in 4.2.2. The size of the inflation bias goes towards zero as δ goes towards λ, i.e. when the monetary policy goes towards strict inflation targeting. However, from equation (A.15) it is evident that under a conservative central banker the central bank will react less to supply shocks leading to a more volatile output. Hence, appointing a super-conservative central banker will be inferior to a flexible policy rule of the type described above. There is a trade-off between reducing the inflation bias and remaining ability to stabilize output. This means that there exist some optimal level of conservatism, i.e. an optimal value of the relative weight placed on output, $\lambda^{cons.}$, within the range $[0, \lambda]$.

Bofinger (2001) argues that the main gain from delegating the conduction of monetary policy to an independent and conservative central bank is to assure a longer time-horizon. The government may have a too short time-horizon due to election or other interests. By delegating the conduction of monetary policy, one secures that the weight put on output does not increase when an election is approaching.

A.1.3 Changing the inflation target

The third, and final, possible solution to the inflation bias problem I will consider in this appendix is to assign the central bank with an explicit, conservative, inflation target, first suggested by Svensson (1995). By setting a lower and more conservative target for inflation, the inflation bias will be reduced. I call the new inflation target π^{gov} which is assumed to be less than the social optimal π^*. The central bank loss function then becomes:

$$L_t = \frac{1}{2}[(\pi_t - \pi^{gov})^2 + \lambda(y_t - y^*)^2] \quad (A.16)$$

The realized inflation and output in period t with rational expectations equal:

$$\pi_t^{gov} = \pi^{gov} + \lambda\gamma\left(y^* - y_t^{natural}\right) - \frac{\lambda\gamma}{1+\lambda\gamma^2}\varepsilon_t + v_t \quad (A.17)$$

$$y_t^{gov} = y_t^{natural} + \frac{1}{1+\lambda\gamma^2}\varepsilon_t + \gamma v_t \qquad (A.18)$$

Then it is clear that the inflation bias will be entirely removed if the conservative inflation target is chosen so as to fulfill:

$$\pi^{gov} = \pi^* - \lambda\gamma\left(y^* - y_t^{natural}\right) \qquad (A.19)$$

It is also evident from equation (A.18) that by delegating a more conservative inflation target to the central bank the inflation bias is removed without affecting the average aggregate output in the economy. Contrary to the case with conservative preferences, discussed above, the ability for the central bank to stabilize any supply shock is not affected either. It is obvious from equation (35) that the conservative inflation target must be sat lower the larger the inflation bias is, and the inflation bias is, as already mentioned, increasing in λ, γ, and $\left(y^* - y_t^{natural}\right)$. By setting the inflation target as shown in equation (A.19) the total loss for the society will equal:

$$E_{t-1}(L^{gov}) = \frac{1}{2}\left\{\lambda\left(y^* - y_t^{natural}\right)^2 + \frac{\lambda}{1+\lambda\gamma^2}\sigma_\varepsilon^2 + (1+\lambda\gamma^2)\sigma_v^2\right\} \qquad (A.20)$$

By comparing equation (A.20) with equation (A.9) presented in Box A.1, it is evident that a monetary policy regime that targets a conservative inflation target, π^{gov}, is superior to one where the social optimal inflation is the target for the central bank.

A.2 List of abbreviations

ABC	Agriculture Bank of China
AMC	Asset Management Companies
BOC	Bank of China
BOCOM	Bank of Communications
BoE	Bank of England
CBRC	China Banking Regulatory Commission
CCB	China Construction Bank
CCP	Chinese Communist Party
CGFE	The Central Group for Finance and Economics
CIC	China Investment Corporation

CIRC	China Insurance Regulatory Commission
CSRC	China Securities Regulatory Commission
CPI	Consumer Price Index
ECB	European Central Bank
FED	Federal Reserve Bank
FMD	Financial Market Department
FSB	Financial Stability Bureau
GDP	Gross Domestic Product
ICBC	Industrial Commercial Bank of China
IMF	International Monetary Fund
MOF	Ministry of Finance
MPC	Monetary Policy Committee
MPD	Monetary Policy Department
NBSC	National Bureau of Statistics
NDRC	National Development and Reform Commission
NPC	National People's Congress
NPLs	Non-Performing Loans
OMOs	Open Market Operations
PBC	People's Bank of China
PPI	Producer Price Index
PRC	People's Republic of China
QFII	Qualified Foreign Institutional Investor
RMB	Renminbi
RRR	Reserve Requirements Ratio
SAFE	State Administration of Foreign Exchange
SASAC	State Asset Supervision and Administration Commission
SOE	State-owned Enterprise
TIC	Trust and Investment Companies
TSF	Total Social Financing
USD	United States Dollar
WEO	World Economic Outlook
WTO	World Trade Organization