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China's Evolving Monetary Policy Framework in International Context

Bradley Jones and Joel Bowman



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Abstract

China's monetary policy framework has evolved considerably over the years. However, official descriptions provide limited detail and it generally remains less well understood than befits the world's second largest economy. This paper takes stock of the evolution of monetary policy in China and, by placing these developments in international context, also contributes to the emerging discussion about whether aspects of monetary policy in China are beginning to converge on advanced economy norms. Our main takeaways are as follows. First, on the institutional set-up, we note that the absence of instrument independence and the nature of accountability mechanisms remain substantial points of difference, reflecting China's single-party state system in which the levers of macroeconomic management remain highly coordinated under the State Council. Second, the objectives for monetary policy in China and how they find practical expression in the operational framework continue to have few parallels in advanced economies, although some implementation features (such as the corridor for policy rates) are more familiar as China continues to transition from a quantity- to price-based monetary system. Third, elements of The People's Bank of China's communication framework are broadly evolving along the lines observed elsewhere, with remaining exceptions mostly a result of China's unique institutional arrangements. Fourth, our empirical analysis of monetary policy transmission points to both similarities and differences: while policy rates now have a larger effect than monetary aggregates on output and bond yields, reflecting a Chinese financial system that is becoming more developed (as in advanced economies in the 1970s–1980s), the similar average inflation outcomes observed in China and advanced economies have been generated through different means. In sum, our analysis suggests that while some aspects of monetary policy in China are beginning to resemble those observed in advanced economies, convergence is neither likely nor even desired by the authorities given China's institutional configuration and preferred model of economic development.

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1. Introduction

Much like the broader economy, monetary policy in China continues to evolve in important ways. Yet the pace of change, China's unique institutional arrangements and the fact that the full scope of China's monetary policy framework has never been officially documented has meant that key elements of the formulation and implementation of monetary policy in China are still not widely known.¹ This seems an anomaly given China's prominent position in the world economy. As such, this paper takes stock of the evolution of monetary policy in China along several dimensions, and places these developments in international context. Such an approach also allows us to offer some broader perspectives in the context of the emerging discussion over whether the conduct of monetary policy in China is now converging on practices commonly observed in advanced economies. Our comparative focus is directed toward advanced (rather than emerging) economies as this is more relevant for an Australian audience, and also consistent with the direction of the recent literature as the Chinese financial system and economy has become larger and more developed.²

One view of the conduct of monetary policy in China has traditionally held that it bears little-to-no resemblance to that in advanced economies. A shortlist of related arguments reads as follows. First, the nature of China's institutional arrangements has meant that goal setting, accountability mechanisms and decision-making arrangements for monetary policy in China are entirely different from those in advanced economies. Second, the high-level objectives for monetary policy in China, and how they practically find expression in targets and instruments, have no parallels among advanced economies (e.g. Goodfriend and Prasad 2006; Ma 2017). Third, the communication framework has been characterised as ineffective in shaping expectations due to a contemporaneous (rather than forward-looking) orientation, and confusion has sometimes been sowed over the overall stance of monetary policy when many instruments are used to adjust monetary conditions (McMahon, Schipke and Li 2018). A fourth has related to the lack of conventional pass-through of monetary policy, attributed to any number of frictions including interest rate controls, credit quotas, window guidance, soft borrowing constraints of state-owned enterprises, and active management of the exchange rate (e.g. Geiger 2006; Laurens and Maino 2007; Koivu 2009; Mehrotra and Sánchez-Fung 2010; Chen, Chen and Gerlach 2011).

In more recent times, however, a number of researchers have started to challenge the long-standing narrative by contending that in a number of respects, the conduct of monetary policy in China is now converging on established norms in advanced economies. For instance, on the policy framework, it has been suggested that the PBC now effectively operates a price-based system (Chen, Chow and Tillmann 2017; Harjes 2017; Kamber and Mohanty 2018). Some have also asserted that the PBC has been pursuing a de facto inflation-targeting regime with a hybrid forward-looking reaction function (incorporating growth and inflation expectations), similar to that employed by a number of advanced economy central banks. Girardin, Lunven and Ma (2017) contend that the PBC has 'engaged in a regime that looks a lot like informal inflation targeting' (p 3) and that 'a comparison of the Chinese and G3 reaction functions shows some interesting similarities' (p 17). Others have

1 As later discussed, the documents closest to setting out the contours of a monetary policy framework are The People's Bank of China's (PBC's) founding legislation of 1995 (updated in 2003) and the PBC's Monetary Policy Committee Regulations of 1997 (updated in 2010).

2 As set out in the concluding remarks, we leave comparisons of monetary policy in China with other emerging market countries for future research as it would demand a separate treatment in its own right.

recently pointed to important aspects of the PBC's communication framework becoming more forward-looking, and thus effective in guiding market expectations (e.g. Garcia-Herrero and Girardin 2013; Sun 2013; McMahon *et al* 2018). Some researchers have also recently argued that the nature of monetary transmission in China is now comparable to that in advanced economies, where contractionary interest rate adjustments are associated with some combination of higher market-based interest rates, slower money growth, lower industrial output growth, lower consumption and lower inflation. For instance, Fernald, Spiegel and Swanson (2014, p 101) suggest that ongoing institutional changes in China and 'the liberalization of China's economy to date, particularly in its financial sector, has left [its] monetary transmission mechanism closer to those of Western economies than previously realized'. Kamber and Mohanty (2018, p 4) similarly conclude 'monetary transmission in China is remarkably similar to that typically found in advanced economies'.

This paper takes stock of the evolution of monetary policy in China across four dimensions: the institutional framework, operational framework, communication framework, and the empirical behaviour of monetary policy pass-through. In relation to the existing literature, this relatively broad scope allows for a clearer identification of interconnections across elements of the policy framework, and how these compare to advanced economies. We view this wide lens approach as particularly relevant as many of the unique features of monetary policy in China can be traced back to the institutional setting for macroeconomic management. It may also be useful in providing context to instances where similarities to advanced economies have been highlighted (at the possible risk of overstatement) in the recent literature. The main findings are as follows.

First, on the institutional framework, while the nature of goal dependence is not materially different in China vis-à-vis advanced economies, the absence of full instrument independence and related accountability mechanisms remain substantial points of difference. This reflects China's unique political and institutional arrangements, among them the single-party state system and the highly coordinated nature of economic policymaking, with the PBC comprising just one of 35 members on China's foremost decision-making body, the State Council. The concept of 'constrained discretion' therefore applies to the PBC in a fundamentally different context vis-à-vis advanced economy central banks, with operational autonomy restricted to more technical aspects of monetary policy implementation such as open market operations and the corridor system for interest rates. Differences in the institutional frameworks for monetary policy between China and advanced economies are not just of form, but of substance, and are highly likely to be persistent.

Second, we argue that the high-level objectives for monetary policy and the manner in which they find practical expression in targets and instruments continues to be largely unique to China. That said, we also acknowledge that a range of factors – financial market deepening, moderating current account surpluses, increased tolerance for exchange rate flexibility and the successful introduction of a price-based corridor system (broadly analogous to systems employed in advanced economies) – are according the PBC more scope to independently influence monetary conditions over time, within the context of China's interagency decision-making arrangements.

Third, we find that the PBC's communication framework has evolved considerably, with a number of elements now similar to those observed in advanced economies. Remaining differences relate to institutional constraints over forward guidance (and thus, the management of expectations), unexpected policy deliberations, and the difficulties in clearly characterising the stance of monetary policy due to the large suite of policy instruments deployed by authorities.

Fourth, as observed in many advanced economies in the 1970s and 1980s, we find policy rates in China to contain more leading information for asset prices and output than monetary aggregates, but that impediments to policy rate pass-through remain in the cases of bank lending and inflation. Moreover, we suggest that the Chinese authorities have displayed both the willingness and the ability to deliver low and stable inflation outcomes, but for different reasons and through different means than in advanced economies. One possible explanation for China achieving price stability is as follows: if the prospect of high inflation and deflation is viewed by the authorities as sufficiently politically worrisome to warrant a concerted opposing response from all the levers of government, it may be that standard incentive misalignment and commitment problems cited in the literature on central bank independence and inflation targeting may be less pressing in China's unique institutional setting.

Taken in sum, our analysis suggests that while monetary policy in China has evolved significantly over time, recent assertions that it now operates similarly to advanced economies remain narrowly based. Convergence in monetary policy is neither likely nor even desired by the authorities given China's revealed preference over institutional design and model of economic development.

The remainder of the paper is structured as follows. Section 2 outlines key features of China's institutional framework for monetary policy. Section 3 discusses objective setting and the operational framework, with emphasis on how the setting and pursuit of objectives and targets interacts with the use of various instruments. Key features of monetary policy communication in China are outlined in Section 4. Section 5 presents empirical analysis of the transmission of monetary policy. Section 6 concludes.

2. The Institutional Design Framework for Monetary Policy

2.1 Historical Background

The PBC began life as a hybrid national bank. By itself, this does not make it unique, but the circumstances of the PBC's birth were unquestionably different from other central banks. Prior to the establishment of the PBC in 1948, the Bank of China (the oldest 'living' bank in China) had served as a quasi-central bank between 1912 and 1928 based out of its Shanghai headquarters, before evolving into a commercial bank specialising in foreign exchange and trade. It was one of a number of banks that could issue banknotes on behalf of the new Republic following the fall of the Qing Dynasty (1636–1911). The Nationalist Government also created a central bank in 1924, before it relocated to Taiwan at the conclusion of the Chinese Civil War in 1949. Like the Bank of China it was also headquartered in Shanghai and represented in branches throughout the country, though it wielded more expansive monetary powers. However, the combination of grave internal disturbances and foreign occupation meant that China's thriving financial system of the 1920s³ – with Shanghai a financial centre of global repute – ground to a halt through the 1930s and 1940s.

3 In the early 20th century, the Chinese financial system was dominated by the so-called 'Four Northern Banks' and 'Three Southern Banks', located either side of the Yangtze River. In the 1920s, they had more paid-in capital than the next 24 largest private banks combined, with core business lines including securities trading, trade financing and industrial loans (Ray Chaudhuri 2018).

In the three decades following the establishment of the PBC in Beijing in 1948, deposit-taking banks in China were either shut down or nationalised and reorganised as PBC divisions.⁴ In 1978, the PBC assumed responsibility for both central banking and commercial operations in what was essentially a mono-bank financial system; in 1978 it accounted for 93 per cent of financial system assets in China (Huang, Ge and Wang forthcoming). The 'reform and opening up' era which commenced in 1978 then saw the PBC carved out of the Ministry of Finance, and four years later the State Council clarified that 'the People's Bank of China is the central bank of the People's Republic of China, and it is a government agency responsible for supervising the financial industry of the country under the leadership of the State Council' (as quoted in Yi (2018b)). In 1984, the PBC's central banking functions were separated from its industrial and commercial operations, the latter of which were transferred to the newly created Industrial and Commercial Bank of China (which now stands as the country's largest bank).

Despite operating for nearly half a century as the nation's foremost financial institution, the legal status of the PBC was not affirmed until March 1995 – a time of serious domestic monetary instability – when the Law of the People's Republic of China on the People's Bank of China (hereafter, The PBC Law) was adopted at the Eighth National People's Congress (NPC).⁵ Monetary reforms remained in focus in the years following, highlighted by the east Asian financial crisis and a wave of financial sector restructuring activity in China (as non-performing loans peaked above 30 per cent). The PBC Law was subsequently updated at the Tenth NPC in December 2003 to further clarify that '[t]he People's Bank of China shall, under the leadership of the State Council, formulate and implement monetary policy, prevent and mitigate financial risks, and maintain financial stability' (unofficial translation). This places the PBC among the more recent cohort of central banks operating under new or substantially revised primary legislation (Table 1).

Table 1: Primary Legislation Establishing Central Banking Powers

Institution	Primary legislation (ranked by oldest)
Bank of Japan (BoJ)	Bank of Japan Act (1882)
US Federal Reserve System (Fed)	Federal Reserve Act (1913)
Bank of Canada (BoC)	Bank of Canada Act (1934)
Reserve Bank of Australia (RBA)	Reserve Bank Act (1959)
Norges Bank	Norges Bank Act (1985)
Reserve Bank of New Zealand (RBNZ)	Reserve Bank of New Zealand Act (1989)
European Central Bank (ECB)	Treaty on European Union (1992)
People's Bank of China	Law of the People's Republic of China on the People's Bank of China (1995)
Bank of England (BoE)	Bank of England Act (1998)
Sveriges Riksbank (Riksbank)	Sveriges Riksbank Act (1998)
Swiss National Bank (SNB)	National Bank Act (2003)
Source: Central banks	

4 Cooperatives continued to operate in townships, and the Bank of China's foreign operations continued after 1949 albeit under a different ownership structure.

5 Unless otherwise indicated, references to The PBC Law refer to the 1995 version.

2.2 Monetary Policy Decision-making

How monetary policy-related legislation finds practical expression in China, and in particular how it differs from advanced economies, first requires discussion of the political context for decision-making responsibilities and associated institutional arrangements.

The institutional framework that underpins contemporary monetary policy frameworks in democratic multi-party advanced economies was born out of the stagflationary experience of the 1970s and the concurrent pioneering research highlighting the dangers of politically compliant central banks and 'time inconsistency' problems. A lack of credibility was shown to lead to higher average inflation with no offsetting benefits in terms of greater output or employment. The general concepts were as follows. Policymakers in a central bank subject to short-term political influence may face pressures to overstimulate the economy to achieve short-term output and employment gains that exceed the economy's underlying potential. Such gains may be popular at first – and especially attractive to politicians seeking near-term re-election – but ultimately prove unsustainable, leaving behind only inflationary pressures that worsen the economy's longer-term prospects.⁶ Empirical research through the 1980s and early 1990s appeared to confirm a clear negative relationship between inflation outcomes and central bank independence.⁷ One influential thread of the subsequent analysis suggested that the macroeconomic benefits from central bank independence stemmed principally from instrument rather than goal independence, at least in advanced economies.^{8,9} In the context of democratic multi-party political systems, the institutional design features of monetary policy frameworks in advanced economies broadly evolved to embed the following elements:

- Objectives setting – the high-level objectives for monetary policy are reflected in founding legislation passed by the government, and practically translated as set out in secondary legislation and/or subsequent refinements such as policy framework documents (Table 2);

6 For instance, Buchanan and Wagner (1977) and Sargent and Wallace (1981) emphasised the risk of politically engineered business cycles and the political pressure to finance deficits, while the seminal works of Kydland and Prescott (1977) and Barro and Gordon (1983) emphasised time inconsistency problems whereby a central bank subject to short-term political influences would likely not be credible when it promised low inflation, and the resulting impact on inflation expectations could raise average realised inflation above optimal levels and consequently result in less efficient economic outcomes. Rogoff's (1985) 'conservative central banker', who cared relatively more about inflation and less about output than wider society, was proposed as a potential solution to the time inconsistency problem, but even this approach had its shortcomings. In a principal-agent context, Walsh (1995) later sought to design a socially optimal incentive contract for central bank governors, given Rogoff's 'conservative central banker' could in fact be too inflation averse to be socially optimal.

7 This thread of analysis swelled over the years. Key early contributions included Alesina (1988); Grilli, Masciandaro and Tabellini (1991); Cukeirman (1992); Alesina and Summers (1993); Havrilesky and Granato (1993); and de Haan and van't Hag (1995).

8 Debelle and Fischer (1994) were the first to make the distinction between goal and instrument independence. Their key finding – that instrument independence matters more for inflation outcomes than goal independence – was reaffirmed in de Haan and Kooi (1997), and more recently, Balls, Howat and Stansbury (2016). An often-cited case study of the benefits of instrument independence occurred with the granting of instrument independence to the Bank of England in May 1997. That said, it remains an open question in emerging markets as to whether limiting independence just to the instrument domain is sufficient to guard against the risk of politically engineered business cycles and the political pressure to finance deficits, as legal autonomy may not prevail in practice.

9 Following Grilli *et al* (1991), an alternative distinction in the literature is that between political and economic independence, though this is a less useful way of framing the issues most relevant to this paper.

- Instrument independence – in an expression of ‘constrained discretion’ over the powers delegated to it by lawmakers, the central bank is awarded full autonomy in deploying the tools of monetary policy to best achieve the high level objectives set for it;
- Accountability and transparency – the central bank is held accountable by lawmakers for meeting these monetary policy objectives. Over time, the move toward instrument independence has been accompanied by a trend toward increased accountability and transparency.¹⁰

Table 2: Documentation of Monetary Policy Objectives

Institution	Objectives outlined in primary legislation and operationalised through targets set by:			Monetary policy framework document (current version)
	Secondary legislation passed by government	Mutual understanding between the government and the central bank	Central bank alone	
BoC		✓		Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target (2016)
BoE	✓			Remit for the Monetary Policy Committee (2018)
BoJ			✓	Conduct of Monetary Policy (2013)
ECB			✓	The Monetary Policy of the ECB (2011)
Fed			✓	Statement on Longer-Run Goals and Monetary Policy Strategy (2019)
Norges Bank	✓			Regulation on Monetary Policy (2018)
PBC		✓		na
RBA		✓		Statement on the Conduct of Monetary Policy (2016)
RBNZ	✓ ^(a)			The Remit for the Monetary Policy Committee (2019)
Riksbank			✓	Monetary Policy in Sweden (2019)
SNB			✓	Monetary Policy Strategy (2000)

Note: (a) Secondary legislation reflects a formal agreement between the Minister of Finance and the RBNZ Governor
Source: Central banks

Nested in a single-party state system, the institutional design features of China’s monetary policy framework are fundamentally different to advanced economies. Conducted largely through the State Council, the formulation of aggregate supply and demand management policies is more tightly coordinated compared with other economies. Policy levers – fiscal, monetary, macroprudential, exchange rate, sectoral – are each capable of being adjusted in a timely and reinforcing manner, in support of specific outcomes desired by the state. In the context of the three elements set out above, instrument decision-making powers and accountability mechanisms are therefore most notably different in China. We step through each in turn below.

¹⁰ In what has become a voluminous literature, see most recently, Dincer and Eichengreen (2014), Balls *et al* (2016), and Tucker (2018).

The PBC is, and has long been, goal dependent. In the narrow sense of high-level objectives setting (the first of the three elements above), there is at least one similarity between China and advanced economies: the high-level objectives of monetary policy are set out in the PBC's founding legislation, and ratified by China's national legislative body, the NPC.¹¹ The PBC Law clearly prescribes that '[t]he aim of monetary policies shall be to maintain the stability of the value of the currency and thereby promote economic growth'. Yet there is no secondary piece of legislation or publically available document that sets out how the high-level objectives for monetary policy are practically translated into a target to be achieved by the PBC. The State Council and the central bank have a mutual understanding as to how this operates, but unlike elsewhere, the details are not made public (Table 2).

More substantively, in comparing the institutional design of monetary policy in China vis-à-vis advanced economies, differences over 'constrained discretion' in the operation of monetary policy are not merely of form but of substance. The PBC does not have instrument independence, defined as the ability of the central bank to set monetary policy with full autonomy. Under The PBC Law, a modest degree of operational independence is confined to how the PBC implements technical aspects of monetary policy (discussed further in Section 3).¹² For instance, Article 23 of The PBC Law (2003) states that 'The People's Bank of China may formulate detailed conditions and procedures' in applying a wide range of monetary policy instruments in the discharging of its monetary policy responsibilities. And while the existence of multiple policy objectives, as occurs in practice in China, can necessitate more coordination between the central bank and government agencies (Bernanke 2010; Zhou 2016), the more fundamental explanation for the absence of full PBC instrument independence relates to the primacy of the State Council in Chinese policymaking. Article 5 of The PBC Law makes this clear: 'The People's Bank of China shall report its decisions to the State Council for approval concerning the annual money supply, interest rates, foreign exchange rates and other important matters specified by the State Council before they are implemented'. Befitting its specialised role as China's central bank, the PBC's recommendations carry disproportionate weight on the State Council. But with the PBC comprising one of 26 ministries (and 35 members) on the State Council, the ultimate decision on key monetary policy matters remains a collective one.¹³

The PBC's founding legislation provides for an advisory monetary policy committee (MPC), with Article 11 determining that it 'shall establish a monetary policy committee, whose functions, composition and working procedures shall be prescribed by the State Council and reported to the

11 The NPC is structured as a unicameral legislature with powers to legislate, elect major officers of state and oversee the operations of government. It is one of China's two main deliberative bodies, the other being the National Committee of the Chinese People's Political Consultative Conference, whose annual meetings are usually timed to occur alongside those of the NPC.

12 A broader concept of operational independence (beyond just instrument independence) includes considerations like whether prohibitions are in place on the central bank engaging in monetary financing of the government's deficit. This typically relates to directly bidding for government debt in the primary market, and advancing credit lines to the state at below market interest rates with few restrictions on duration or the volume of lent funds. In the case of the PBC, these aspects of operational independence are established in The PBC Law. As set out in Article 29 of The PBC Law (2003), 'The People's Bank of China shall not provide overdraft for government or directly subscribe to or underwrite treasury bonds and other government securities'. Article 30 further extends the prohibition on deficit financing to include loans to local governments and government departments. But given China's institutional context, it is not clear how practically binding these prohibitions are.

13 Ma (forthcoming) suggests that one consequence of this structure has historically been that, 'many government agencies and stakeholders will attempt to steer monetary policies in their favor through the State Council, often leading to pressures for excessive monetary expansion and a rising leverage ratio in the economy'.

Standing Committee of the National People’s Congress for the record’. Established in 2000 under this directive, and as set out in the PBC MPC Regulations established in 1997 (revised in 2010), the PBC makes monetary policy recommendations through the MPC as it determines warranted by economic and financial conditions. The MPC’s status as a purely consultative body does however mean that in order for substantive monetary policy changes to take effect, these proposals still require ratification by the State Council. Moreover, changes to monetary policy can and do take place outside of quarterly MPC meetings.

The organisational form of the PBC’s MPC appears broadly in keeping with international norms, notwithstanding that its powers are relatively constrained (Table 3). The composition of the MPC is determined by the State Council and currently consists of 14 members, 3 of which are PBC officials: the Governor (who serves as MPC chair), a Deputy Governor and Assistant Governor. External members are appointed on the basis of their *ex officio* status or are nominated by the PBC (subject to State Council approval) on the basis of their relevant professional experience.¹⁴ The MPC convenes on a quarterly basis, though interim meetings can be called by the Chair or if endorsed by more than one-third of MPC members. If approved by more than two-thirds of the members of the MPC, meeting minutes are attached as an annex to the proposed decisions of the PBC on monetary policy issues that are elevated to the State Council for approval.

Table 3: Organisational Form of Monetary Policy Decision-making

Institution	Scheduled meetings per year	Organisational form	Chair	Total members	External members	Process	Binding
BoC	8	Council	Governor	6	0	Consensus	Yes
BoE	8	Committee	Governor	9	4	Vote	Yes
BoJ	8	Board	Governor	9	6	Vote	Yes
ECB	8	Council	President	21	0	Consensus	Yes
Fed	8	Committee	Governor	12	0	Vote	Yes
Norges Bank	8	Board	Governor	8	5	Consensus	Yes
PBC–MPC	4	Committee	Governor	14	11	Consensus	No
State Council	2+	Council	Premier	35	na	Consensus	Yes
RBA	11	Board	Governor	9	7	Consensus	Yes
RBNZ	7	Committee	Governor	7	3	Consensus	Yes
Riksbank	6	Board	Governor	6	0	Vote	Yes
SNB	4	Board	Governor	3	0	Consensus	Yes

Source: Central banks

¹⁴ The eleven external members currently comprise the Deputy Secretary-General of the State Council, the Vice Minister of Finance, the Deputy Director of the National Development and Reform Commission, the Chair of the China Banking and Insurance Regulatory Commission, the Chair of the China Securities Regulatory Commission, the Administrator of the State Administration of Foreign Exchange, the Director of the National Bureau of Statistics of China, the President of the China Banking Association, and three academics. The MPC’s size and composition has evolved over time.

One important manifestation of China's unique institutional arrangements is that monetary policy settings are determined in a highly coordinated way with fiscal policy, reflecting that the overall direction of macroeconomic policy is set by the State Council. In advanced economies, monetary policy takes fiscal (and other policy) settings as given and responds accordingly, while in China, monetary, macroprudential, fiscal and industrial policies are jointly co-determined under the auspices of the State Council.

2.3 Accountability and Transparency

A more prominent role for central bank accountability and transparency emerged from the era in which central banks were awarded independence over the conduct of monetary policy by democratically elected politicians. The global financial crisis, which necessitated a more expansive role for central banks in the operation of the financial system, further accelerated this trend. Increased accountability through improved transparency has enabled the public-at-large (in a direct sense and via elected officials) to maintain oversight into the actions and record of unelected bureaucrats who, like many agencies with links to the state, are imbued with substantial independent powers. It has allowed the public to assess whether the actions of central bankers, and the outcomes generated as a result, are consistent with their mandate.¹⁵ Increased transparency has also come to be viewed as a helpful way in which central banks can manage and shape expectations, to improve the effectiveness of policy and enhance the credibility of their commitments.

As the case for increased central bank accountability and transparency has been made most vigorously in respect of democratic political systems where central banks wield discretionary powers over the setting of monetary policy, this raises the question as to whether, and how, these concepts might apply in the PBC's context. As discussed below, the mechanisms for transparency are more similar than those for accountability *per se*. Most related emphasis has been placed on increasing the visibility of the PBC's economic assessments and actions, in order to better manage the expectations of financial markets and domestic economic agents. Within the constraints of China's institutional set-up, increased focus on the management of expectations via increased transparency into the PBC's thinking represents an effort by the monetary authorities to enhance the efficacy of policy transmission (see also Section 4).

Contemporary central banking practices see that the high-level objectives of monetary policy are determined by a separate official body to which the central bank is accountable (Table 4). This said, even central banks that do not enjoy full autonomy in the setting of monetary policy are subject to some form of accountability to an organ of the state, whether its members are democratically elected or not. In the PBC's case this body is the State Council, which serves as China's highest executive organ of state administration and is formally responsible to the NPC.¹⁶ The 35-member State Council meets twice a year and is comprised of heads of each of the cabinet-level executive departments with the premier serving as Chair. Put another way, the PBC is accountable (on matters where it has at least some discretion) to a higher authority, albeit not directly to the population at large, perhaps more analogous to a senior government department in advanced economies. More in keeping with most central banks in advanced economies (the exceptions being the Bank of England, and to a

¹⁵ See Tucker (2018) for a broad-based account of these and related issues for unelected officials.

¹⁶ As to the appointment and dismissal of senior officials, the PBC Governor is nominated by the Premier of the State Council, ratified by the NPC (or its Standing Committee when the NPC is not in session), and appointed and/or dismissed by the country's President. Deputy governors are appointed and dismissed by China's Premier.

lesser extent, the Reserve Bank of New Zealand),¹⁷ there is no requirement that the PBC publicly document instances where its main intermediate target(s) deviate from the numerical value or range set for it.

Table 4: Methods of Monetary Policy Accountability and Transparency

Institution	Accountable body	Appearances before accountable body	Annual report	Monetary policy report (MPR)	Minutes for monetary policy meetings	Monetary policy meetings: televised press conferences with Q&A
BoC	Parliament	Regularly	Yes	Quarterly	No	Each MPR
BoE	Parliament	Regularly	Yes	Quarterly	Yes	Each MPR
BoJ	Parliament	Semiannually	Yes	Quarterly	Yes	Each meeting
ECB	Parliament	Regularly	Yes	Quarterly	Yes	Each meeting
Fed	Congress	Semiannually	Yes	Semiannually	Yes	Each meeting
Norges Bank	Parliament	Annually	Yes	Quarterly	No	Each MPR
PBC	State Council	Regularly	Yes	Quarterly	Not public	Not strictly
RBA	Parliament	Semiannually	Yes	Quarterly	Yes	na
RBNZ	Parliament	Quarterly	Yes	Quarterly	Yes ^(a)	Each MPR
Riksbank	Parliament	Regularly	Yes	Bimonthly	Yes	Each meeting
SNB	Parliament	Annually	Yes	Quarterly	No	Semiannually

Note: (a) Summary record
Source: Central banks

In addition to reporting to the State Council, Article 6 of The PBC Law requires the PBC to 'submit a work report to the Standing Committee of the [NPC] concerning matters relating to monetary policies and financial supervision and control'. The NPC Standing Committee includes the premier, one executive vice premier, three vice premiers, and five other state councillors. In between meetings of the State Council the NPC Standing Committee convenes weekly, and it is common at these meetings for the PBC to be called upon to deliver written and oral updates on economic, monetary and financial matters. These briefings are not made public.

More similarly to advanced economy central banks, the PBC now releases periodic and publicly accessible publications (an annual central bank report, a quarterly 'Monetary Policy Report', monetary policy press statements, etc). Speeches and press conferences delivered by high-ranking PBC officials have also become more common. The latter often allow for question and answer sessions, providing PBC officials with a forum in which to explain to the public the context for recent monetary policy actions (see also Section 4). While these mechanisms tend to serve a dual purpose for advanced economy central banks – allowing them to derive a degree of public legitimacy and also better shape agent expectations – in the PBC's case, the latter consideration is more prominent.

¹⁷ In the United Kingdom, the Remit for the Monetary Policy Committee requires an exchange of open letters between the Governor of the Bank of England and the Chancellor of the Exchequer if inflation deviates from the target by more than 1 percentage point in either direction. In the case of New Zealand, the charter for the Monetary Policy Committee requires that the *Monetary Policy Statement* provide an explanation if inflation outcomes are outside of the target range or are expected to move outside of the target range. This reporting is in addition to the usual requirements of explaining the policy action that the Committee intends to take to meet the inflation objective, and how the current decision contributes to supporting maximum sustainable employment.

3. The PBC's Objectives and Operational Framework

Monetary policy targets, and the instruments deployed in pursuit of them, are the practical expression of the high-level monetary objectives set for the central bank. Discussed in more detail below, a highly stylised outline of the major differences between China's monetary policy framework and those of advanced economy central banks is outlined in Table 5. The Chinese experience offers yet another illustration of how interagency relations and the structure of the economy and financial system have implications for how a monetary policy framework is implemented in practice.

Table 5: Stylised Comparison of the PBC's Monetary Policy Framework

	PBC	Advanced economy central banks
High-level objective(s) (Mandate)	Multiple objectives	Single, dual or triple mandate
Intermediate target(s) (Nominal anchor)	Inflation M2 Total social financing (TSF) Credit Exchange rate	Inflation
Operational target(s)	Monetary base 7-day interbank repo rate	Overnight cash rate target Reserves/asset purchases
Primary instrument(s)	PBC repo rate in corridor system Open market operations Benchmark lending/deposit rates Lending facility rates Required reserve ratio Administrative guidance	Open market operations: corridor system Administered rates: floor system

3.1 High-level Policy Objectives

The PBC attaches high priority to price stability, but this serves as just one among many objectives for monetary policy in China. As in the past, this multi-objective policy framework continues to be a distinguishing feature of monetary policy in China. As former PBC Governor Zhou (2016) set out: 'The single objective of maintaining price stability is an enviable arrangement, as it is simple, easy to measure and communicate. However, it is not yet realistic for China'. Instead, 'The [PBC] has multiple objectives, which not only include such four annual objectives as ensuring price stability, boosting economic growth, promoting employment, and broadly maintaining balance of payments, but also cover two dynamic objectives, namely, financial reform and opening up, and financial market development'. Zhou further described the motivation behind the multi-objective framework as relating to China's current status as a transition economy:

... when China was transitioning from a central-planned economy to a market-based one, if reforms were not fully implemented, there would not have been enough instruments to conduct monetary policy and the transmission would also have been difficult and if the central bank only emphasized keeping inflation low and did not tolerate price changes during price reforms, it could have blocked the overall reform and transition ... Once the PBoC's reform tasks are largely completed, the current objective function might change.

Beyond technical issues arising from an economy transitioning from a low level of economic and financial sophistication, another explanation for the multi-objective setting relates to the institutional setting for monetary policy. Ma (forthcoming) suggests that while the official mandate of monetary policy (as set out in The PBC Law) is narrowly focused on maintaining stability in the value of the currency, '[i]n reality, the central bank is obligated to support almost all economic objectives of the State Council'. Meanwhile, Zhou (2016) contends that the multi-objective framework is more naturally associated with reduced institutional independence, as accomplishing a wide range of objectives demands a higher degree of coordination and cooperation between the central bank and other government agencies.

Though no other major central bank is tasked with meeting as many monetary policy objectives as the PBC, the distinction between the PBC's multi-objective system and the narrower focus of advanced economy central banks need not be overstated. The latter are not singularly focused on price stability at the expense of all other considerations. Among the advanced economy central banks listed in this study, three (the US Federal Reserve, Reserve Bank of Australia, and most recently, Reserve Bank of New Zealand) operate under a formal mandate for monetary policy that requires more than just the maintenance of price stability. Other central banks with an official single mandate (price stability) either explicitly or implicitly have a secondary objective to minimise short-term output volatility as part of their framework, with the flexible or medium-term nature of many inflation-targeting frameworks one mechanism that allows for this. Moreover, all advanced economy central banks essentially seek to minimise output volatility in practice (e.g. Wadsworth 2017). To varying degrees, some also now recognise (explicitly or implicitly) financial stability considerations in their monetary policy frameworks.

Aside from the number of objectives, another distinguishing feature of China's policy framework is the extent to which they are interpreted through a time-varying, state-dependent reaction function. Zhou (2016) sets it out as follows:

... there are tolerance ranges for different policy objectives. Within these ranges, weights could be adjusted according to the deviation in the range interval. For example, during the crisis, China increased the weights on financial stability and soundness of financial institutions. During the period of high inflation, the weight on price stability would be increased; and when there is a large current account surplus or deficit, the weight on BOP would be commensurately increased. This is a dynamic optimization process in term of an intertemporal equilibrium model. Though this might make the objective function seem unstable, it is difficult to avoid, and would not become an obstacle for the central bank to pursue a multi-objective mechanism.

Communication by the PBC and other authorities in China over recent years appears consistent with the time-varying interpretation of the multi-objective framework. For instance, over the 2016–18 period, PBC monetary policy communication emphasised the financial stability objective more prominently, reflecting concerns over high debt levels and rising complexity in the financial system. More recently, the focus on ensuring full employment as an objective for monetary policy (and public policy more generally) appears to have sharpened, as reflected in the 2019 NPC meetings and in the 2019 'Government Work Report' in which an 'employment-first policy' was articulated. This also suggested, perhaps for the first time, that the authorities were prepared to subordinate GDP growth to employment growth as a primary policy objective. As to the issue of how trade-offs across multiple objectives are managed, Yi (2018a) characterised the PBC's response in general terms: 'China is an

open economy, so we must give consideration to both internal and external equilibrium in formulating monetary policy. When there are contradictions between internal and external equilibrium, we need to strike a balance between them’.

3.2 Intermediate Targets

Following the adoption of inflation targeting in New Zealand, the United Kingdom, Sweden and Australia in the early 1990s, monetary policy objectives in advanced economies have since found almost universal expression in a flexible inflation-targeting regime (Table 6). The precise manner in which the high-level objectives for monetary policy translate into inflation targets differs only to a degree across advanced economies. For instance, the ‘flexible’ element of a flexible inflation-targeting regime can incorporate differing time periods over which the inflation target is expected to be achieved (‘the time to target’), and for some central banks it can include target ranges (an *ex ante* concept, as in Australia and New Zealand) or tolerance ranges (an *ex post* concept, as in Canada and Sweden) around a numerical point target for inflation.

The widespread adoption of flexible inflation targeting was in no way preordained; for its part, developments in academic theory lagged behind the practical application. For most central banks, the introduction of inflation targeting followed recognition that previous monetary frameworks – where monetary aggregates or the exchange rate served as a nominal anchor – had been unsuccessful in delivering price stability or sustainable full employment. With the alternatives exhausted, inflation targeting was the next framework to be trialled. In a handful of cases – the United Kingdom, Sweden and Norway – it was a discrete event in the form of the breakdown of the European exchange rate mechanism that served as a catalyst. But for most countries the adoption of inflation targeting as a new monetary anchor was more evolutionary than revolutionary.

Evolution has also been a common thread in the setting of intermediate monetary policy targets in China, though these can be distinguished from intermediate targets in advanced economies by type, number and the frequency with which they are reviewed and reset. Most notably, at the present time there is some uncertainty as to whether monetary policy in China still operates with an official intermediate target.

In the period between 1984 (when the PBC’s commercial activities were carved out) and 1997, credit served as the primary intermediate target for monetary policy due to the administrative control the PBC exercised over bank credit. This was a reflection of a financial system that was dominated by a highly concentrated banking sector (Huang *et al* forthcoming). So-called ‘Mandatory Direct Credit Plans’ set out targets for the price, quantity and allocation of credit. This included strict interest rate controls on both deposits and loans, bank-by-bank credit ceilings and provincial- and industry-level credit targets. Credit plans for state banks prepared by the PBC were submitted to the State Council for approval after reconciliation by the State Planning Commission. But regulatory leakage and other frictions increasingly bedevilled monetary policymaking, culminating in two destabilising outbreaks of credit growth and inflation (in the late 1980s and early-to-mid 1990s) and downward pressure on the exchange rate. In 1994, the year prior to the establishment of the PBC’s founding legislation which declared that ‘[t]he aim of monetary policies shall be to maintain the stability of the value of the currency’, the exchange rate had depreciated by around 50 per cent (foreign exchange reserves stood at just US\$20 billion), credit growth had expanded at a 45 per cent rate and inflation peaked above 25 per cent. Soon after, a wave of regional currency instability was unleashed during the

east Asian financial crisis, an event that left a lasting impression on policymakers throughout the region.

Table 6: Monetary Policy Objectives – Translation to Intermediate Targets

Institution	Mandate	Current policy objective(s)	Initially adopted	Current numerical target ^{(a)(b)} (in per cent)	Time to target
BoC	Single	Price stability	1991	2, control target range of 1–3	Medium term
BoE	Single	Price stability	1992	2, tolerance band of 1–3	At all times
BoJ	Single	Price stability	2013	2	Medium-to-long term
ECB	Single	Price stability	1998	Below but close to 2	Medium term
Fed	Dual	Price stability Maximum sustainable employment	2012	2	Medium term
Norges Bank	Single	Low and stable inflation	2018	Close to 2	Over time
PBC	Multiple	Max sustainable growth Full employment Price stability Financial stability Exchange rate stability	na	GDP growth: 6–6.5 Unemployment: ~5.5 CPI: ~3 TSF/M2 growth: ~NGDP Capital account: balanced	Annual
RBA	Triple	Low and stable inflation Full employment Financial stability	1993	Target range of 2–3	Medium term ('on average, over time')
RBNZ	Dual	Price stability Maximum sustainable employment	2019	Target range of 1–3	Medium term
Riksbank	Single	Price stability	1993	2	~Two years
SNB	Single	Price stability	2000	Below 2	Medium term

Notes: (a) A tolerance band can be considered an *ex post* concept, vis-à-vis a target range which has an *ex ante* orientation
(b) Targets for China are based on those announced at the March 2019 National People's Congress

Sources: Central banks

Thus conditions were ripe in the mid-to-late 1990s for a substantial overhaul of China's monetary policy framework. Inflation targeting was still a bridge too far at this time, however. Given the PBC's legal powers had only just been established, it had not had time to earn credibility as an economic manager and interest rate pass-through mechanisms were absent, it is reasonable to question whether a conventional inflation-targeting regime could ever have succeeded in the prevailing conditions. Instead, M2 growth emerged as the main intermediate target of monetary policy in the mid 1990s, a position it held for around two decades. In more recent years, however, the primacy of the M2 target has been called into question. In March 2018, no target for M2 growth was announced by the authorities for the first time since at least the mid 1990s (Table 7).

Table 7: China – Annual Intermediate Targets and Reference Indicators

Year	Per cent					
	GDP growth	Unemployment rate (surveyed)	Inflation (CPI)	M2 growth	Credit growth ^(a)	Growth in total social financing
1995	8		15	23–25		
1996	8		10	25		
1997	8		6	23		
1998	8		5	16–18	12.7	
1999	7		2	14–15	15.7	
2000	7		1	14–15	11.7	
2001	7		1–2	15–16	13.1	
2002	7		1–2	13	11.6	
2003	7		1	16	13.7	
2004	7		3	17	16.4	
2005	8		4	15	14.1	
2006	8		3	16	12.8	
2007	8		3	16		
2008	8		4.8	16		
2009	8		4	17		
2010	8		3	17		
2011	8		4	16		'Reasonable growth'
2012	7.5		4	14		'Reasonable growth'
2013	7.5		3.5	13		'Reasonable growth'
2014	7.5		3.5	13		'Reasonable growth'
2015	7		3	12		'Steady growth'
2016	6.5		3	13		13
2017	~6.5		3	12		12
2018	~6.5	'Within 5.5'	~3	Similar to 2017		Similar to 2017
2019	6–6.5	~5.5	~3	'Nominal GDP growth'		'Nominal GDP growth'

Note: (a) Growth rates inferred from RMB-based annual credit targets

Sources: Geiger (2010); National People's Congress; People's Bank of China

By contrast, the role of credit as an intermediate target for monetary policy was de-emphasised much earlier. Following the emergence of M2 growth as the key target in the mid 1990s, the PBC abandoned direct controls over bank credit in 1998 in favour of an indirect system of credit management which was based on new instruments and more active management of existing instruments. Thereafter credit was often characterised merely as a 'reference indicator' for monetary policy, at least until 2012, when it was supplanted by the broader measure of total social financing (TSF)¹⁸ (Yi 2018a). This reflected recognition of the expanding role of non-bank financial institutions and the capital markets in influencing overall financial conditions in China.

Like many aspects of China's monetary policy framework, the role of the exchange rate has also changed notably over time. This partly reflects that exchange rate stability has at times appeared to

18 Total social financing includes bank credit, non-bank forms of credit intermediation (like trust and entrusted loans), and capital market issuance.

serve as both an objective and intermediate target of monetary policy. Prior to the 1994 devaluation, a de facto dual exchange rate system operated in China whereby the market-based rate deviated substantially from the official rate. The dual exchange rates were unified following the 1994 devaluation, and a crawling peg exchange rate regime began to serve as a nominal anchor for monetary policy. This was also around the time that 'currency stability' was codified as a high-level objective in the PBC's founding Law. The renminbi was then re-pegged to the US dollar in 1997 and reinforced with new capital controls. At the time of the 2.1 per cent revaluation in July 2005, the PBC announced the beginning of a managed floating exchange rate regime, where the exchange rate would trade 'at an adaptive and equilibrium level, so as to promote the basic equilibrium of the balance of payments and safeguard macroeconomic and financial stability' (PBC 2005). The authorities continued to closely manage the exchange rate, reflected in China's foreign exchange reserve holdings swelling to US\$4 trillion. Reserve sterilisation and capital controls were employed to reduce the impact of balance of payment flows on domestic monetary supply.

Greater tolerance by the Chinese authorities for the exchange rate to be determined by market forces, coupled with more balanced gross capital flows, has also allowed the PBC to step back from direct foreign exchange intervention in recent years, and the managed float regime has evolved to include a basket of exchange rates. While increased exchange rate variability and a phased reduction in capital controls should continue to see the exchange rate play a less prominent role in China's monetary policy framework, PBC officials have affirmed that exchange rate stability, assisted with capital controls, is likely to remain a focal point of monetary policy for some time. Indeed the 'trilemma' – the proposition that with free capital mobility, a self-determined monetary policy is feasible only if exchange rates are floating – continues to loom large in the operation of the monetary policy framework. As Yi (2018a) recently noted, 'By ensuring basic stability of the value of RMB, we can help promote economic growth, and ther[e]by meeting the ultimate goal of monetary policy specified in the *Law of the People's Bank of China*'.

Historically, the role of inflation in the alternating mix of intermediate targets has tended to be more subservient to monetary aggregates and the exchange rate. More recently, the role of price stability in contributing to the high level objective of stability in the value of the currency (as per The PBC Law) has been interpreted by the PBC as follows: 'To maintain currency stability has two tiers of meanings: internally it means to maintain prices stable and externally it means to keep RMB exchange rate basically stable at an adaptive and equilibrium level' (Yi 2018a). Over the past fifteen years, the inflation target has variously been set at 3, 3.5 or 4 per cent (3 per cent in the most recent five years). In practice, a tolerance band of 0 to 3 per cent has tended to prevail. Inflation outcomes in China over the past decade (in terms of both levels and volatility) have been generally sound in this context (see Section 5 for further discussion).

One final distinction in China's intermediate targets vis-à-vis those in advanced economies relates to the frequency with which they are reset. Within the context of China's five-year plans, the State Council sets annual goals for macroeconomic outcomes. Each December at the Central Economic Work Conference, inflation and other targets are reviewed and restated, and subsequently ratified at the sitting of the NPC the following March.¹⁹ Annual adjustments to targets typically reflect

19 The NPC meets annually in March to discuss and approve the government's policy agenda for the coming year. At this time, the Premier presents the 'Government Work Report', which contains the government's economic and reform priorities for the year (including various targets), and the government simultaneously releases a report from the National Development and Reform Commission and the Ministry of Finance's budget.

the State Council's assessment of what is an acceptable trade-off between growth and inflation in response to the experience of the past year. Unlike inflation targets in most inflation-targeting monetary policy frameworks, the Chinese target is not a fixed objective but rather a guide that is adjusted as conditions evolve.²⁰ By contrast, most central banks in advanced economies typically revisit their numerical inflation target sparingly and in the context of broader reviews of their monetary policy framework.²¹

3.3 Operational Targets and Instruments: Emergence of a Hybrid Price–Quantity System

The PBC has long advocated for a price-based framework (where central bank policy and market interest rates play a larger role) to help improve the efficiency of China's macroeconomic management. But much like its peers in advanced economies, the PBC was faced with considerable uncertainty over when, and how rapidly, to transition from a quantity- to a price-based operating framework. It has moved gradually in response, taking into account the nature of China's institutional arrangement and the state of financial system development. The result is that today the framework is best characterised as a hybrid price–quantity system, but one in which administrative guidance continues to feature prominently.

No single policy target or tool is used to either represent the overall stance of monetary policy in China, or facilitate its implementation: quantity-based, price-based and guidance-based targets and instruments all feature. Though generally used to reinforce the impact of one another, they can also be used for quite different objectives. Some could be considered analogous to those employed by advanced economy central banks, while others are more unique to China's implementation framework.

3.3.1 Quantity-based targets and instruments

3.3.1.1 Money base

The monetary base served as the main operational target for monetary policy in China from 1984 (when the PBC's activities began to focus solely on central banking functions) up until the early 2000s (e.g. Xie 2004; Goodfriend and Prasad 2006). For the better part of a decade thereafter, a hybrid operating target system started to emerge, with the money base (principally reserves) continuing to serve as an operational target alongside short-term repurchase (repo) rates. Over this time, instability in the traditional relationship between base money and the intermediate target, M2 growth, became notable. Factors contributing to this instability were not entirely dissimilar to those observed elsewhere (e.g. Liao and Tapsoba 2014; Sun 2015; Ma 2017): financial market deepening, particularly in the money and bond markets; the gradual liberalisation of bank lending and deposit rates (officially completed in 2015); substantial innovation in payments and wider financial system technologies; and the emergence of non-bank financial institutions (including so-called 'shadow banks'). As part of the 13th Five-Year Plan (2016–21), transitioning more fully to a market-based operational framework was identified as a policy priority, and since then, the PBC has indicated that

20 Developing economies often adjust their targets downward in steps when trying to establish inflation credibility.

21 Strictly speaking, the Bank of England and more recently the US Federal Reserve revisit their inflation targets annually, but these annual updates do not represent wholesale reviews.

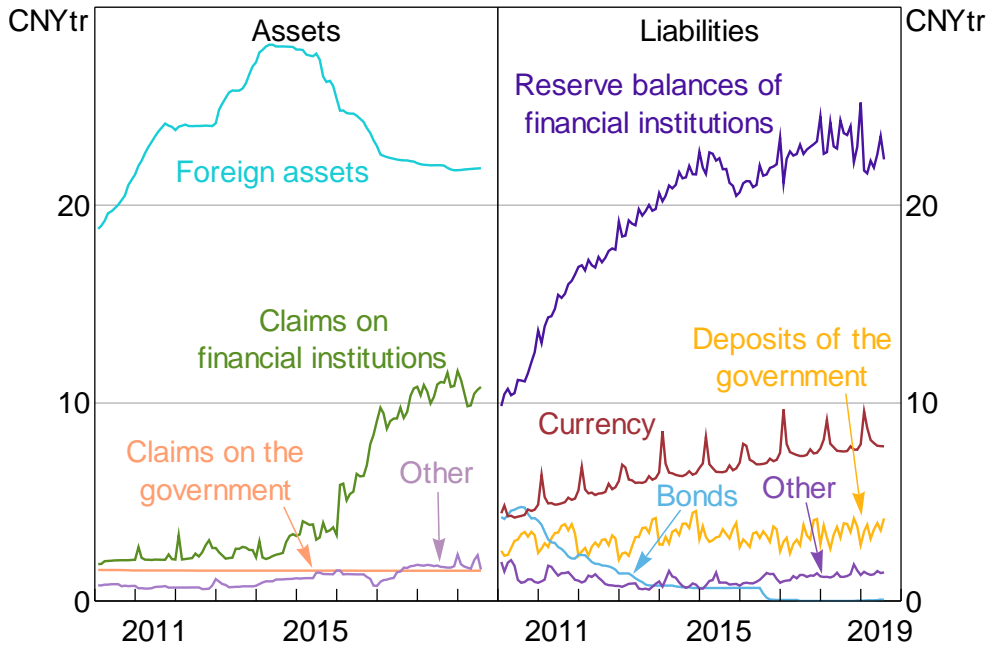
it considers the 7-day interbank repo rate (specifically the volume-weighted daily average of repo transactions between depository institutions) as the primary operating target for monetary policy.

3.3.1.2 Open market operations (OMO)

PBC repo and reverse repo agreements have emerged as the primary instrument in the PBC's OMO activity, replacing outright purchases and sales of government securities (which were dominant in the early 1990s) and central bank bills (which increased in significance from the late 1990s). Central bank bill issuance expanded particularly strongly in response to the PBC's desire to sterilise at least some of the effects of the rapid growth in China's foreign exchange reserves, but cost considerations lead to their phasing out in favour of adjustments to the required reserve ratio from the mid 2000s (Goodfriend and Prasad 2006; Ma, Yan and Liu 2011; Huang *et al* forthcoming). PBC repos (and reverse repos) range in maturity from 1 week to 1 year, and are secured against high quality collateral, principally central government and policy bank bonds. Around 50 primary dealers (mostly banks and a small number of securities companies) participate in the PBC's OMO. In 2016, the frequency of OMO activity increased from twice per week to daily, though in practice, the PBC refrains from OMO on days when it is comfortable with the overall interbank liquidity position, and to aid more generally in secondary market development. Taking both the PBC repo and 'interbank' repo market together, the largest net lenders in the financial system are the 'Big Five' state-owned banks, the three policy banks and the Postal Savings Bank of China, while other banks and securities and investment firms are typically net borrowers (Figures 1 and 2).²²

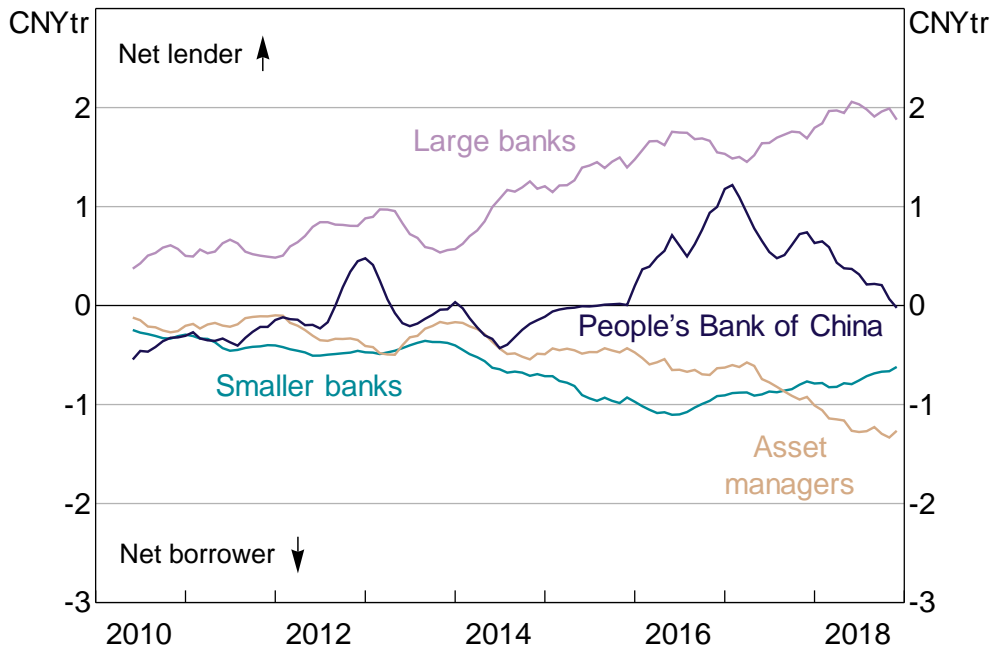
22 In the interbank repo market, central government and policy bank bonds are most commonly pledged as security, though collateral and haircuts depend on bilateral agreements between repo counterparts. China's interbank repo market is comprised of pledged repos and title-transferred repos, both of which settle $t + 0$ or $t + 1$. In the case of the former, collateral bonds are not transferred to the lenders while they are for title-transferred repos. The pledged repo market is considerably more active than its title-transferred counterpart. See also Kendall and Lees (2017).

Figure 1: PBC Balance Sheet
Outstanding balance



Source: CEIC Data

Figure 2: Net Outstanding Repo Lending Balance
Interbank, pledged collateral by type of institution

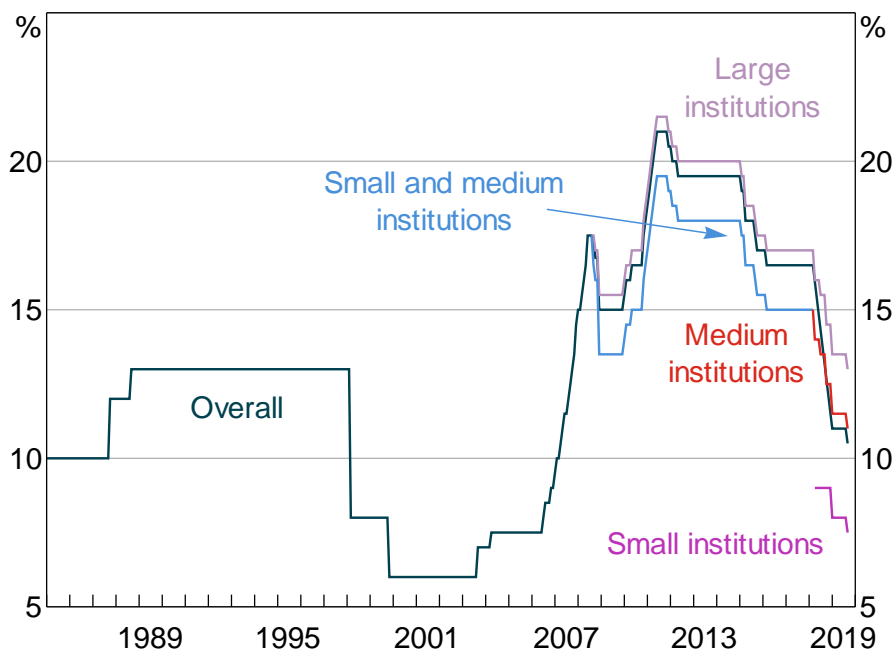


Notes: Six-month rolling average; 'Large banks' includes national commercial banks and policy banks
Sources: CEIC Data; China Central Depository & Clearing; RBA

3.3.1.3 Reserve requirement ratio (RRR)

The RRR, whose usage is still not uncommon in emerging market economies but has long since been phased out in advanced economies, determines the proportion of deposit liabilities the PBC requires banks to hold with it. By varying RRRs, the PBC is able to affect interbank liquidity and the supply of funds available for lending by deposit-taking institutions.²³ Although first introduced in 1984, RRRs were actively used to manage liquidity conditions only from the mid-to-late 2000s (in place of central bank bill issuance), principally as a lower-cost method of sterilising foreign exchange reserve accumulation. Since 2008, the PBC has adopted a formal tiering RRR system based on bank size (smaller banks have since been subjected to lower RRRs). Since 2011, the tiering was further refined to take into account other factors including the composition of individual bank loans and financial stability considerations. Since foreign exchange reserve holdings peaked in 2014, the PBC has substantially reduced RRRs, though there remains some uncertainty as to whether RRRs will be phased out altogether (assuming no further growth in foreign exchange reserves) or used to actively manage financial conditions in the banking system (Figure 3).²⁴

Figure 3: Reserve Requirement Ratios



Source: CEIC Data

²³ The precise impact on lending behaviour depends in part on the extent to which excess reserves are plentiful.

²⁴ The interplay between the PBC's foreign exchange intervention and its use of RRR adjustments attracted considerable attention in 2015, when in an effort to slow the depreciation of the exchange rate without slowing the economy, the PBC's withdrawal of renminbi from domestic money markets was initially coupled with RRR cuts. Some market participants viewed this as a form of monetary easing, which appeared to support expectations for further exchange rate depreciation and capital outflows. Supplementary lending facilities were subsequently introduced, partly as a means of injecting domestic liquidity to offset the PBC's exchange rate smoothing operations without creating the impression of monetary easing.

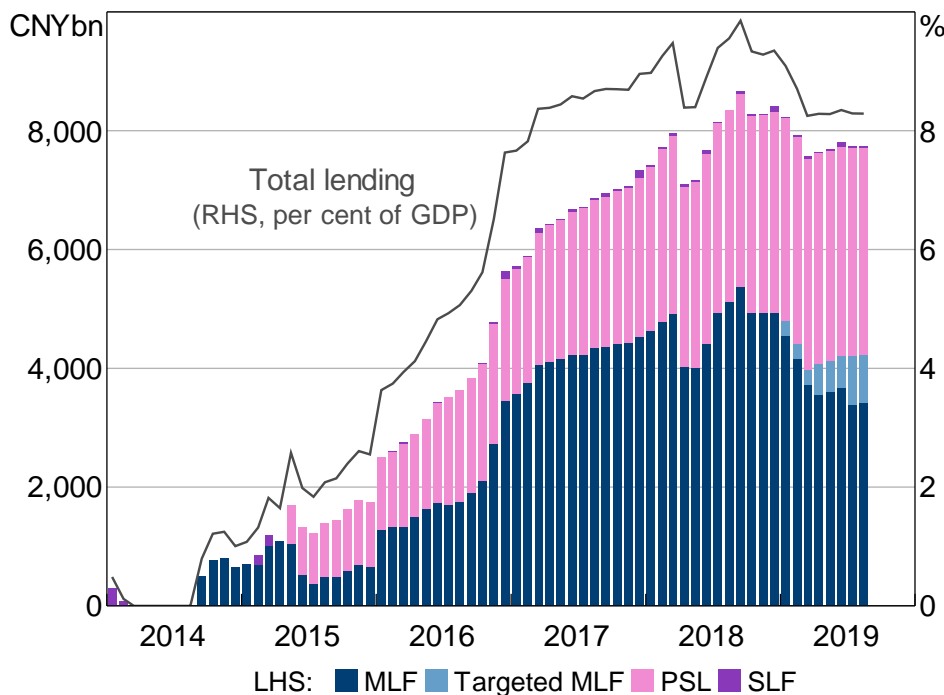
3.3.1.4 Supplementary lending facilities

Over recent years the PBC has expanded its range of bank lending facilities, for the purposes of fine-tuning liquidity operations and supporting national credit and fiscal priorities (Figure 4).²⁵ Access to these supplementary facilities, which unlike OMO are infrequently used, requires domestic banks to post high-quality collateral²⁶ and meet the PBC's macroprudential requirements. These facilities include the following:

- The medium-term lending facility (MLF) was introduced in 2014 to supply banks with funding over periods of 3 to 12 months in support of their lending to priority sectors, such as small private enterprises. Borrowing is conducted at interest rates slightly above the PBC's repo rate. A 'targeted' variant of the MLF was introduced in January 2019, with a longer duration (renewable for up to three years) and a slightly lower interest rate than the standard MLF.
- The pledged supplementary lending facility (PSL) was introduced in 2014 but for the purpose of providing the three policy banks with longer-term funding (three to five years) to support the government's housing redevelopment projects and other initiatives. The costs associated with this facility are not disclosed in a standardised fashion.
- As described below, banks may also have access to the PBC's standing-lending facility (SLF), which was introduced in 2013 to form the ceiling of the defacto interest rate corridor. Unlike the MLF and PSL, which have functioned to provide longer duration financing to support lending to the real economy, the SLF is designed more to satisfy unexpected short-term liquidity shortfalls. However, as is the case with ceiling facilities maintained by advanced economy central banks, take up of the SLF has been minimal and likely constrained by 'stigma'-related concerns on the part of potential borrowers.

25 As noted earlier, Article 23 of The PBC Law (2003) provides for some degree of discretion the tools used by the PBC when implementing monetary policy.

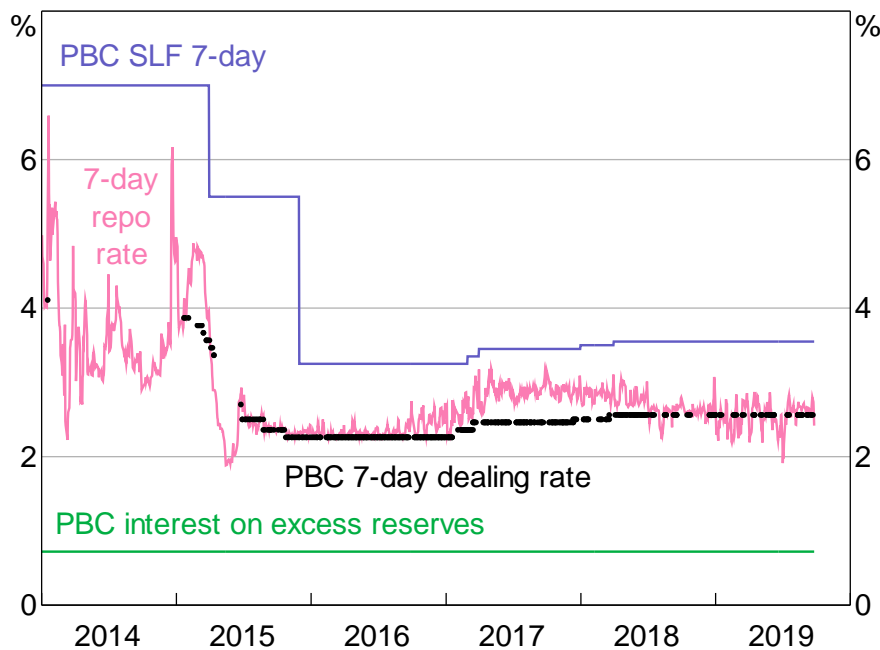
26 Eligible collateral includes central bank bills, bonds of the central government, policy banks and high-grade corporates, and high quality loans.

Figure 4: PBC Lending Facilities

Sources: CEIC Data; RBA

3.3.2 Price-based targets and instruments

To help guide the repo rate as an operational target, the PBC introduced an interest rate corridor system in 2015 that is somewhat wider, but otherwise similar, to those in use by advanced economy central banks. The upper limit of the corridor is represented by the interest rate on the PBC's SLF, which since late 2015 has made cash available to qualified borrowers (on a secured basis) at interest rates of around 3.5 per cent, about 1 percentage point above the PBC's repo rate. The lower bound of the corridor is represented by the interest rate paid on excess reserves (IOER), which has remained at 0.72 per cent. Within this range, the PBC lends cash to eligible banks at the 7-day PBC repo rate, which is currently a little above the midpoint of the upper and lower corridor bounds. The 7-day interbank repo rate – a key operating target – reflects the (weighted-average) cost of short-term secured borrowing for financial institutions. Eligible financial institutions have no real incentive to borrow at a higher rate than the SLF, or invest at a lower rate than the IOER. Indeed in practice, the 7-day interbank rate has remained well inside the corridor bounds since its introduction (Figure 5). In the period from mid 2015 to mid 2018, when Chinese authorities were particularly concerned with excessive leverage and growing opacity in the financial system, the PBC tended to maintain a slight structural liquidity deficit in money markets as reflected in the interbank repo rate trading above the PBC's repo rate. But as monetary policy settings have eased somewhat since mid 2018, the PBC has supplied an increasing quantity of funds, allowing the interbank repo rate to drift lower.

Figure 5: Interest Rate Corridor

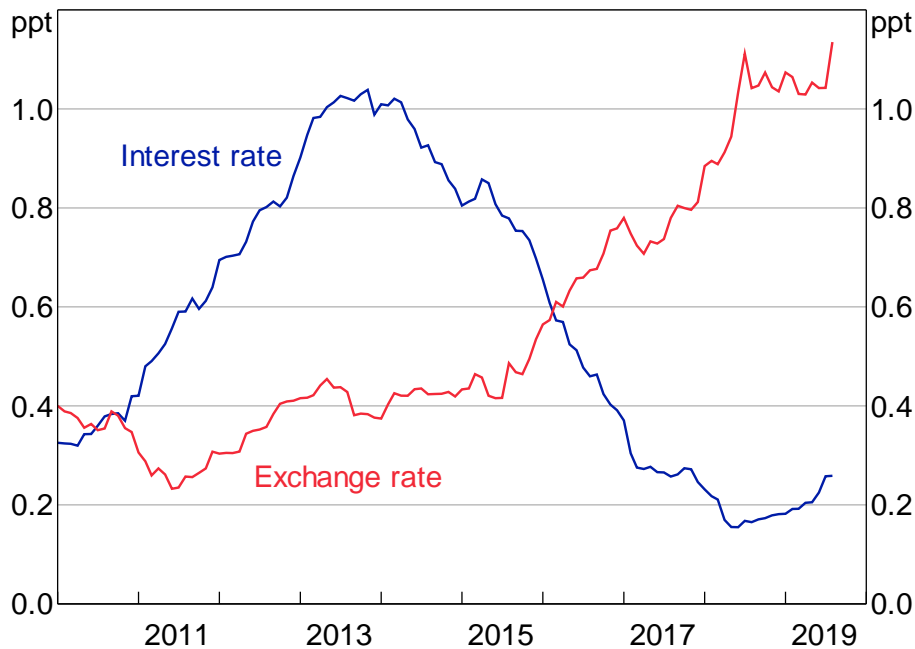
Note: 7-day repo rate reflects volume-weighted daily average repo transactions between depository and non-depository institutions
 Sources: Bloomberg; CEIC Data

Since the introduction of the interest rate corridor system and more active management of liquidity conditions in the Chinese money market, volatility in short-term interest rates has fallen (Figure 6). Short-term interest rate volatility in China is now similar to that observed in advanced economies (Ma forthcoming). At the same time, foreign asset holdings have declined relative to domestic assets (partly reflecting moderating current account surpluses), and volatility in the exchange rate has increased as the authorities have retreated from direct intervention (Figure 6). These divergent trends in interest rate and exchange rate volatility are broadly consistent with the pattern observed in advanced economies as the monetary policy framework transitioned from exchange rate to interest rate targeting.²⁷ Nevertheless, as acknowledged by the PBC and described in detail below, the transition toward a fully price-based operational framework is far from complete.²⁸

²⁷ For instance, see Stevens (2013) for a review of the Australian experience.

²⁸ As Yi (2018a) recently observed: 'Price control has been more important than it used to be, but at the same time ... quantity control is not yet discarded and remains very important. Hence at present, both quantity and price controls are playing their part'.

Figure 6: Interest Rate and Exchange Rate Volatility
Absolute monthly change, three-year rolling average

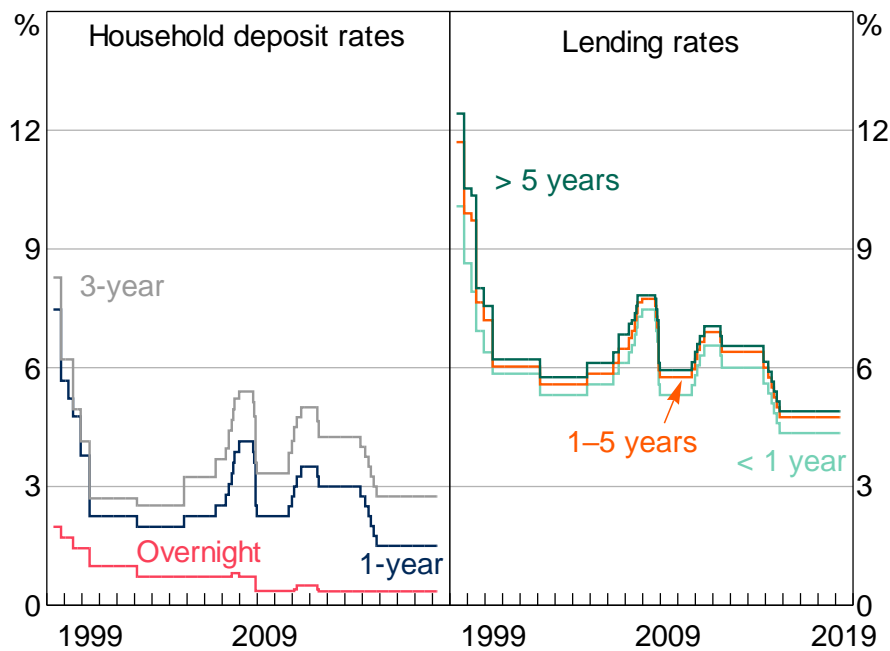


Notes: 'Interest rate' is based on the weighted average overnight interbank rate; 'Exchange rate' is relative to the US dollar
Sources: Authors' calculations; Bloomberg; CEIC Data

Though the PBC has long sought for interest rate (price) adjustments to have a larger role in the implementation of monetary policy, the task of interest rate liberalisation in China over the past 25 years has proven complex. Progress has been gradual. The intensity of prudential regulation and other financial stability-related policy measures (such as deposit insurance in 2015) has progressively stepped up to help ensure the process of interest rate deregulation has not given rise to risks associated with excessive price competition among banks as seen in advanced economies in the 1970s and 1980s. Key elements of this progress have included the liberalisation of money and bond market rates ahead of bank lending and deposit rates (so-called 'dual track liberalisation'),²⁹ while lending rates have been officially liberalised ahead of deposit rates (with remaining restrictions officially lifted in 2012 and 2015 respectively). Up until recently at least, bank deposit and lending rates have continued to be anchored by benchmark rates, which fall under the purview of the State Council, with the PBC afforded discretion mainly over changes to the floating bands around the benchmarks (Figure 7). The most recent example of the PBC's efforts to improve the transmission of interbank rates to bank lending rates can be seen with the introduction of the loan prime rate (LPR) in late 2019, in place of the benchmark loan rate which had been unchanged since 2015. The LPR reflects the lending rates that banks offer to their best clients and are set with reference to rates on MLF operations, which are under the PBC's direct control.³⁰ Nevertheless, the process of unifying heavily guided bank loan and deposit interest rates with liberalised financial market rates is a work in progress.

²⁹ Liberalisation of market rates has been important in creating momentum for bank rate liberalisation, as the yields on fixed income securities introduced an element of competition for banks seeking deposit funding.

³⁰ Under the new arrangements, the LPR is based on quoted submissions from a panel of 18 banks reflecting the lending rate they offer their best customers, quoted as a spread to the MLF. See Reserve Bank of Australia (2019).

Figure 7: Benchmark Interest Rates

Source: CEIC Data

3.3.3 Administrative ('window') guidance

Administrative ('window') guidance – directives delivered to the financial sector by the PBC of its own accord or reflecting the wish of the State Council – offers a particularly notable difference in how monetary policy is currently implemented in China vis-à-vis advanced economies. Window guidance allows the PBC to maintain a strong degree of influence over both the volume of credit extended by the banking system, and the sectors that can obtain loan financing. Although formal credit quotas were abolished in 1998, and non-banks have accounted for a rising share of credit over time, the PBC's macroprudential assessment (MPA) process gives its window guidance activities additional substance.³¹ For instance, compliance with national credit initiatives is one of the criteria that feed into the overall MPA score that can determine the eligibility and cost of accessing the PBC's liquidity facilities. Window guidance continues to serve macroeconomic policy objectives and aids in reinforcing microeconomic industry policy initiatives, which in recent times have centred on supporting micro- and small-sized enterprises.³²

4. Communication

Communication has become a primary lever of monetary policy in modern day central banking. But this is a relatively recent phenomena. In 1987, the year he was appointed Chair of the Board of Governors of the Federal Reserve System, Alan Greenspan observed: 'Since I've become a central banker, I've learned to mumble with great incoherence. If I seem unduly clear to you, you must have misunderstood what I said'.³³ Though not an isolated view at the time, clear communication

31 At the beginning of 2016, the PBC introduced the MPA to help address macroprudential risks in the financial system. The assessment uses a scoring system (0–100) for 16 indicators across 7 categories to assess the soundness of banking institutions and their compliance with national directives.

32 It is an open question as to the extent to which the sheer size of China complicates the transmission of guidance down to the local level, notwithstanding the PBC's cross-country branch structure.

33 As quoted in the *Wall Street Journal* (Murray 1987).

now features prominently in monetary policy strategy and implementation. Long gone are the days of 'never explain, never excuse', as put by the Governor of the Bank of England, Montagu Norman (1920–44).³⁴ Contemporary approaches are wideranging, including low-frequency communication over policy frameworks and objectives, and higher-frequency communication over current macroeconomic conditions, forecasts, risks and the rationale for policy decisions. They take place across a variety of mediums, not limited to press conferences, speeches, periodic publications and social media.

As with many elements of its monetary policy framework, the PBC's communication framework has evolved significantly over the past decade or so. Like advanced economy central banks, the PBC has emphasised a commitment to continuously improving its communication, in part recognising the importance of guiding market expectations as a conduit of monetary policy transmission (PBC 2018).

Some of the similarities in the PBC's approach to communication vis-à-vis advanced economy central banks (Table 8) can be characterised as follows:

- *Monetary Policy Report* – publication of the PBC's quarterly 'Monetary Policy Report' commenced in 2001 and provides context for recent monetary policy decisions. It covers analysis of output, prices, and money supply developments and presents information about important sectors of the economy. More forward-looking and technical content is gradually being introduced.
- *MPC meeting press releases* – MPC meetings take place around the end of each quarter. Since 2009 they have generally been followed by short press releases, and can stylistically take the form of meeting minutes on occasion.
- *Speeches and press conferences* – PBC officials now regularly give speeches at public conferences and international central bank fora. Governors and senior PBC staff are available to speak to journalists. The Governor and Deputy Governor gave an annual average of eight speeches between them in the period 2007–17, around two-thirds of which were delivered by the Governor. Of the 140 press conferences during the same period (on average, 13 per year), the Governor fielded questions or gave interviews in about one-fifth of them (McMahon *et al* 2018). Oral communication picked up noticeably in 2015–16, when important policy changes took place in response to a period of heightened financial market volatility.
- *OMO notices* – to better explain the rationale for OMO, daily notices have become standard since January 2016. Increasingly, these notices provide contextual information.
- *Upgraded communication functionality* – the PBC has also enhanced the functionality of its multi-lingual website and increased use of a social media platform (Weibo, China's Twitter equivalent)

34 As Bernanke (2007) noted:

Norman's aphorism exemplified how he and many of his contemporaries viewed the making of monetary policy – as an arcane and esoteric art, best practiced out of public view. Many central bankers of Norman's time (and, indeed, well into the postwar period) believed that a certain mystique attached to their activities and that allowing the public a glimpse of the inner workings would only usurp the prerogatives of insiders and reduce, if not grievously damage, the effectiveness of policy. Norman's perspective on central banking now seems decidedly quaint.

to convey information. There are now six times more social media followers of the PBC than either the US Federal Reserve or European Central Bank (McMahon *et al*/2018).

Table 8: Methods of Monetary Policy Communication

Institution	Monetary policy report (MPR) (publication frequency)	Monetary policy press conferences (number per year)	Monetary policy meeting minutes (publication lag)
BoC	Quarterly	4 (post MPR)	na
BoE	Quarterly	4 (post MPR)	Immediate
BoJ	Quarterly	8 (post meeting)	8 weeks
ECB	Quarterly	8 (post meeting)	4 weeks
Fed	Semiannually	8 (post meeting)	3 weeks
Norges Bank	Quarterly	4 (post MPR)	na
PBC	Quarterly	4 (post meeting)	Not public
RBA	Quarterly	na	2 weeks
RBNZ	Quarterly	4 (post MPR)	Immediate
Riksbank	Bimonthly	6 (post meeting/MPR)	2 weeks
SNB	Quarterly	2	na

Source: Central banks

Nevertheless, PBC communication also retains some important differences compared to advanced economy central banks. These result largely from the PBC's position in the broader sweep of China's political and policymaking bodies, which constrain its communication in several ways:

- *Forecasts* – while all major central banks publish quarterly forecasts over horizons of two to four years, the PBC does not.³⁵ Instead, the targets for monetary policy, which are not set solely by the PBC, are sometimes interpreted as quasi-forecasts.
- *Forward guidance* – the PBC is constrained in offering forward guidance (either calendar- or threshold-based) as it does not have full autonomy over monetary policy decisions. The State Council also regularly approves the wording of the monetary policy stance. Moreover, communication generally still has a contemporaneous or backward-looking orientation.
- *Unexpected monetary policy deliberations* – monetary policy discussion dates (outside of quarterly MPC meetings) are not announced ahead of time, but rather are posted to the PBC's website *ex post*. This can impede the efficient pricing of financial market securities.
- *Intermediate target* – there is no publicly announced intermediate target, in the form of a widely known nominal anchor that is operationalised with a consistent numerical value.
- *Reaction function* – as per forward guidance, it is difficult for the PBC to communicate with clarity over its reaction function, reflecting the absence of instrument independence in addition to the

35 The PBC's research bureau briefly experimented with publishing GDP forecasts in the mid 2010s but this practice was discontinued shortly thereafter.

changing emphasis on intermediate targets and the multiple objectives set for monetary policy (including how they interact in times of trade-offs).

- *Instruments* – the plethora of interest rate instruments can make it difficult to clearly communicate to the public the overall stance of monetary policy.
- *Window guidance* – in addition to written and oral communication disseminated publicly, the PBC frequently avails of (non-public) window guidance to financial institutions, which can relate to credit growth, lending to priority sectors, and so on.
- *Timely information* – the release of timely information has improved but some challenges remain. Uncertainty surrounds the dates of key monetary policy decisions, and press releases for quarterly MPC meetings occur one or two days after the meeting. Meeting minutes are not released to the public. The release of timely information can be especially delayed when it comes to communication in English.
- *Public testimony* – while a key component of public accountability for advanced economy central banks involves senior officials publically testifying before elected officials, this does not occur in China.

As China's monetary policy framework seeks to more actively guide public expectations, effective central bank communication is becoming more important. The PBC's communication strategy has been significantly upgraded over recent years, but there are institutional constraints on it operating with the full potency enjoyed by central banks elsewhere.

5. Monetary Policy Transmission

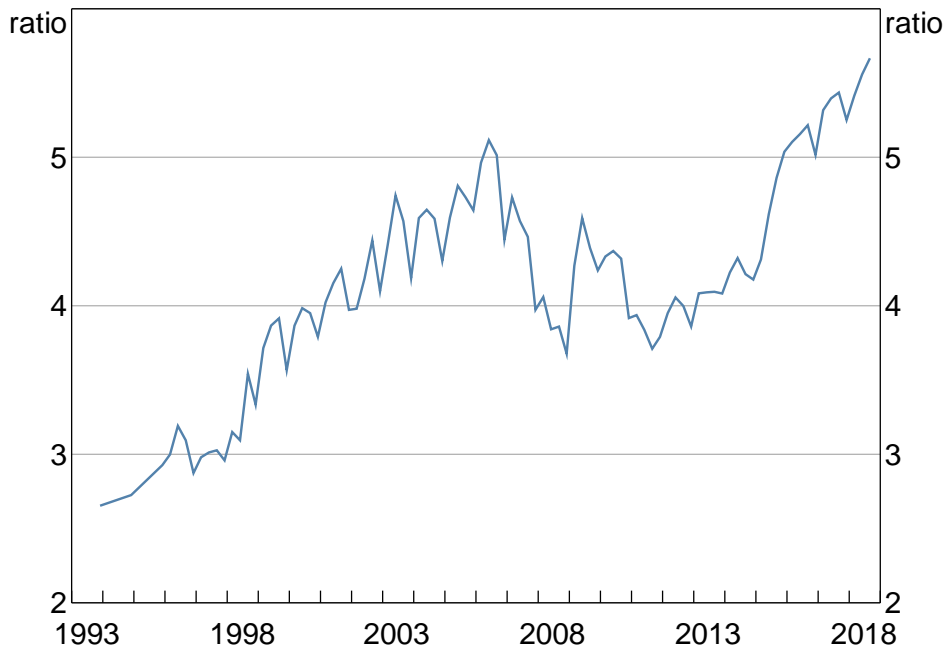
The transmission of monetary policy is heavily influenced by the structure of the economy, the stage of development of the financial system, and as earlier discussed, the nature of institutional arrangements. Empirical analysis of the transmission of monetary policy in China is made difficult by various issues. Included among them are changes in the use and emphasis of targets and instruments; the framework comprising elements of both a quantity- and a price-based system and the associated difficulties in capturing the suite of monetary policy shocks; and short sample periods in which to assess their impact. With these limitations in mind, the analysis below seeks to take stock of the main features of the transmission of China's key price and quantity target variables (principally interbank repo rates and M2 respectively) through to macroeconomic and financial outcomes. We begin by highlighting some simple statistical features of the data before turning to a more formal treatment of monetary policy transmission in a structural vector autoregression (SVAR) framework. To the extent possible, emphasis is placed on how transmission channels have evolved over time.

5.1 Transmission of Money Supply and Interest Rate Shocks: Preliminary Analysis

To be effective, the operational targets of a central bank need to be controllable and display a reliable relationship with intermediate targets. Money base targeting in China was first employed in 1984, but started to raise concerns in the mid 2000s as the relationship between it and broader monetary aggregates started to become more unpredictable (Figure 8). It was also around this time – when financial liberalisation accelerated and the hard US dollar peg was abandoned in favour of a managed float – that the relationship between money supply and both activity and inflation outcomes started to be called into question (Figure 9).

In contrast, cursory correlation analysis suggests that the relationship between the price-based operational target – 7-day interbank repo rates (hereafter repo rates) – and economic and financial outcomes may have strengthened somewhat over time. Higher repo rates now generally appear to be associated with lower subsequent GDP growth, lower CPI, higher bond yields and higher bank lending rates (Figure 10).

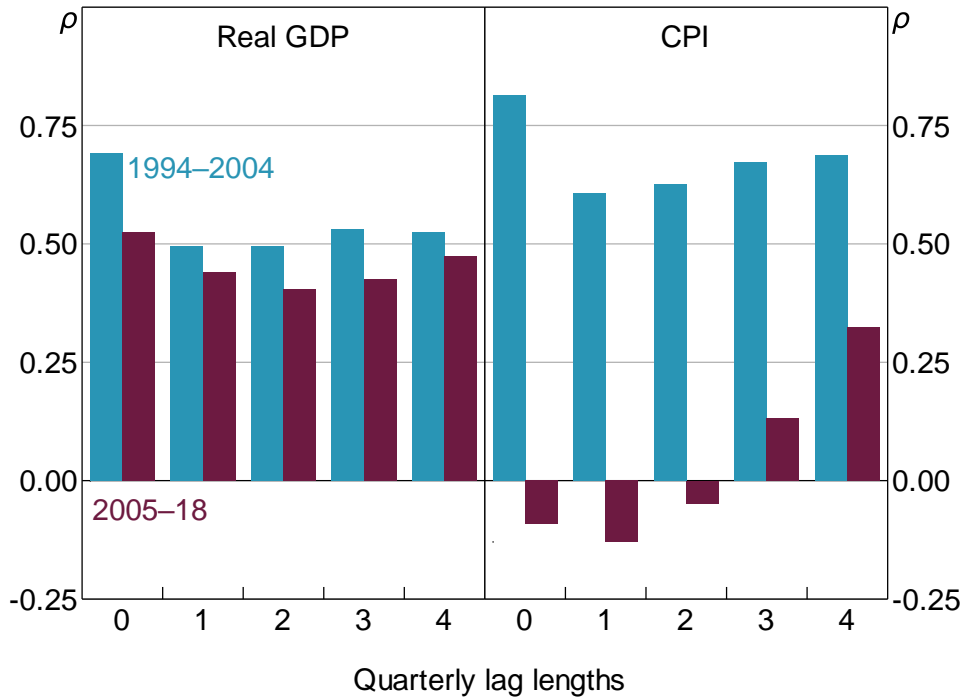
Figure 8: M2 Multiplier



Note: M2 multiplier is calculated as M2 divided by reserve money

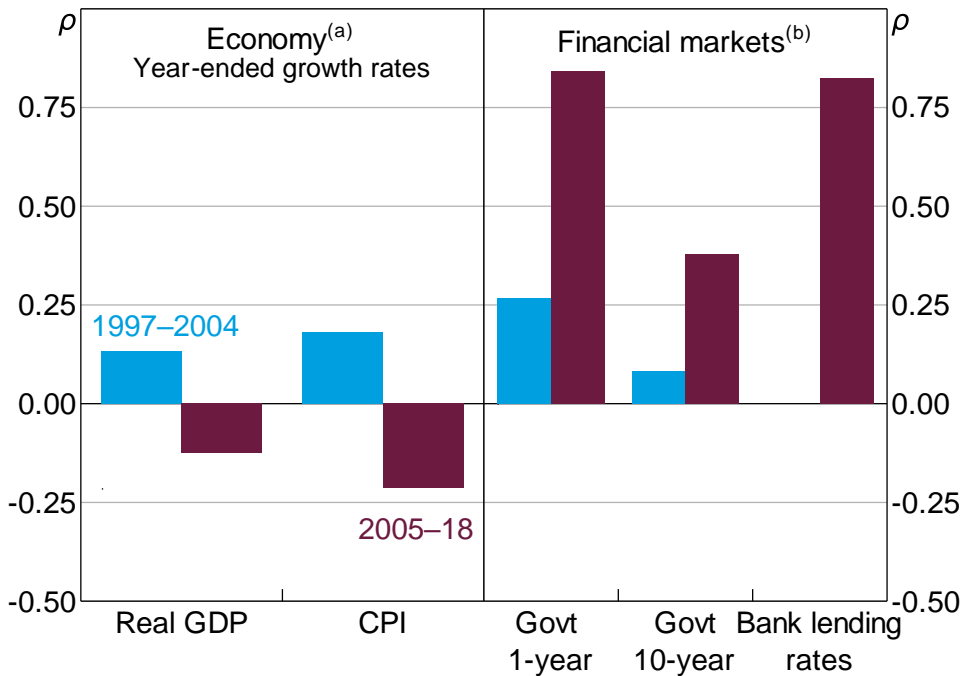
Sources: Authors' calculations; CEIC Data

Figure 9: M2 Growth – Correlation Analysis
Year-ended growth rates



Sources: Authors' calculations; CEIC Data

Figure 10: Interbank Rates – Correlation Analysis
Quarterly

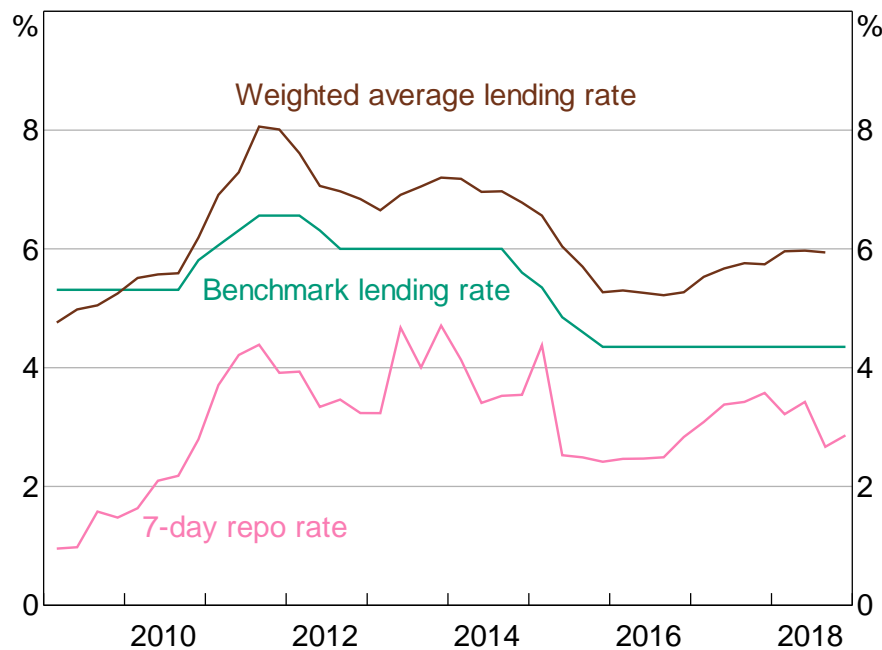


Notes: (a) Economic variables are lagged by six quarters
 (b) Correlation analysis with government bond yields is estimated from 2002, and bank lending rates from 2008, due to data availability

Sources: Authors' calculations; Bloomberg; CEIC Data

Nevertheless, simple regression analysis suggests that the transmission of changes in the repo rate through to bank lending rates remains constrained (Figure 11; Table 9). Only around one-quarter of the change in repo rates is passed through, and this reduces by half (and becomes marginally statistically significant) after controlling for the impact of benchmark lending rates.³⁶ Discussed in more detail below, this tentatively suggests that while repo rates have become a more important component of the Chinese financial system, interest rate pass-through remains a work in progress. Indeed, the PBC announcement that it was replacing benchmark loan rates with the LPR as the reference rate for new bank loans in late 2019 was motivated in part to improve the transmission of repo rates to bank lending rates.

Figure 11: Bank-related Interest Rates



Note: Based on the 1-year benchmark lending rates and quarterly average 7-day repo rate
Sources: CEIC Data; RBA

³⁶ This is broadly in line with the results in Chen *et al* (2011) and Chen *et al* (2017).

Table 9: Regression Analysis – What Determines Bank Lending Interest Rates?

Quarterly changes, 2009:Q2–2018:Q4

	Baseline	With benchmark rates
7-day interbank repo rates	0.24*** (0.07)	0.12* (0.06)
Benchmark lending rates		1.03*** (0.22)
Bank lending rates ($t - 1$)	0.39*** (0.07)	0.13 (0.11)
Constant	0.01 (0.04)	0.04 (0.03)
Adjusted R squared	0.39	0.62

Notes: ***, ** and * denote statistical significance at the 1, 5 and 10 per cent level, respectively; standard errors are in parentheses
Sources: Authors' calculations; CEIC Data

5.2 Transmission of Money Supply and Interest Rate Shocks: A SVAR Approach

Our analysis uses the SVAR framework as it can account for some endogenous relationships and summarise empirical relationships without requiring an extensive set of restrictions to be imposed on the structure of the model. Impulse responses are assessed to draw out the relationships implied by the large number of estimated coefficients in the SVAR, and more specifically, to identify how shocks to key monetary policy variables transmit through to macroeconomic and financial outcomes in China.

In relation to the existing literature, our methodology is most similar to Kim and Chen (2019), who examine interaction effects of different monetary policy instruments and their effect on the broader economy. But our analysis differs in a number of ways: our sample is longer and includes more recent data, the empirical results are tied back to the earlier analysis of China's institutional arrangements, our model focuses on the key PBC price- and quantity-based target variables (making identification more straightforward), and we also add a larger range of controls (including for commodity prices, the exchange rate and the US federal funds rate). These controls speak to the value that the PBC places on 'keep[ing the] RMB exchange rate basically stable at an adaptive and equilibrium level' (Yi 2018a). Reflecting that model results can be sensitive to assumptions, we also perform a range of robustness checks and extend the baseline model in various ways.

The topic of monetary policy pass-through in China has attracted growing interest from researchers in recent times, but differences in methodology and/or emphasis limits the applicability of some of this analysis to the present paper. For instance, other studies consider the effect of various types of monetary policy instruments on the economy, but do not allow for interactions between them (Harjes 2017). Fernald *et al* (2014) employ latent factors to represent estimates of activity and inflation, reflecting some of the difficulties in dealing with smoothed and missing Chinese data. However, their shorter sample (2000–13) precludes analysis of how transmission has evolved over time and they focus much attention on reserve requirements as a policy tool which have instead been viewed by the authorities principally as a foreign exchange sterilisation instrument (reflected in their sustained uptrend in the decade from 2003, when reserves were growing rapidly, and

sustained downtrend since, following the peak in reserve holdings).³⁷ Kamber and Mohanty (2018) examine monetary policy transmission in China through an event study by constructing a monetary surprise series using changes in China's interest rate swap (IRS) market in order to focus on the impact of certain types of monetary policy shocks. However, by its construction, this approach is focused exclusively on interest rate movements (just one element of monetary policy in China) and the results pertain to a shorter sample period (2004–16) as a result of the IRS market only commencing in 2004 (it was not until late in this period that trading activity in these instruments accelerated). Others create synthetic indices in an effort to aggregate various aspects of monetary conditions into a single measure (Sun 2015; Girardin *et al* 2017). This acknowledges that changes to the stance of monetary policy in China can take different forms. However, it also requires significant assumptions to be made when translating policy changes of various forms and magnitudes into comparable standardised units (interest rate basis points), and in any case is less relevant to the present analysis given we are most interested in comparing the impact of price (interest rate) and quantity (money supply) shocks on macroeconomic and financial outcomes over time.

5.2.1 Data

Monthly data spanning the October 1997 to December 2018 period are used in the SVAR model. Data limitations restrict a longer time horizon, with the repo rate only available from 1997. The following variables are included in the baseline set-up:

- *Domestic economic activity* – this is proxied by real industrial production (*IND*, as it tracks real GDP data closely while the latter are only available on a quarterly basis), headline inflation (*CPI*), and bank credit (*CRED*, as it provides an important conduit between fiscal policy, banking conditions and the domestic economy). Industrial production, inflation and bank credit are standard inclusions in macroeconomic SVAR models, and all are included in seasonally adjusted terms.
- *Target variables* – the price-based operational target is proxied by the daily average of the 7-day interbank repo rate (which includes bank and non-bank transactions using a variety of collateral) measured over one month (*R007*).³⁸ The primary quantity-based target is represented by M2 growth in line with the existing literature, but in robustness checks, base money is also included.³⁹ The inclusion of bank credit can also be considered analogous to a target variable ('reference indicator') in China's monetary policy context.
- *External sector* – the nominal trade-weighted exchange rate index (*TWI*) is included to capture the interaction of the exchange rate and domestic monetary policy. The exchange rate has served as a nominal anchor in China and continues to feature prominently in the characterisation of

37 Our robustness checks also incorporate a different measure of inflation than the CPI (one of the intermediate targets for monetary policy), and issues with the construction of China's CPI (and how these might impact transmission) are discussed in Section 5.3.

38 The 7-day interbank repo rate, which captures bank and non-bank repo activity ('interbank' is something of a misnomer), is considered highly informative in terms of reflecting the monetary policy stance of the PBC. This series is used in this study despite the PBC more recently targeting the repo rate exclusively between banks (where only risk-free collateral is used), as the former has a much longer sample.

39 See Sims (1992) for the difficulties in econometrically disentangling the impact of shocks to money supply and money demand.

overall monetary conditions. International commodity prices are also included (*COMM*), captured by the well-known CRB index, as they can contain information about the global business cycle (to which China is linked) and can have implications for Chinese inflation given China's role as a significant importer of commodities. The inclusion of international commodity prices has also been found to help solve the 'price puzzle' in SVARs, in that the price level tends to increase in response to a contractionary monetary policy shock (e.g. Christiano, Eichenbaum and Evans 1998).

Discussed in more detail below, this baseline set-up is subsequently augmented or extended with other variables, including: total social financing (in place of bank credit), fiscal expenditure, house prices, the GDP deflator (in place of the CPI), base money, benchmark lending rates, and the US federal funds rate.⁴⁰

5.2.2 Model set-up

Structural shocks in a SVAR can be identified by placing restrictions on contemporaneous relationships. Previous studies and stylised facts are used to determine the identification restrictions outlined in this section. The restrictions placed on the contemporaneous relationships among the variables included are shown in Equation (1), which is the left-hand side of the standard SVAR representation.

$$BX_t \equiv \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 & b_{35} & 0 & 0 \\ b_{41} & b_{42} & b_{43} & 1 & b_{45} & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & b_{56} & b_{57} \\ b_{61} & b_{62} & b_{63} & b_{64} & b_{65} & 1 & 0 \\ b_{71} & b_{72} & b_{73} & b_{74} & b_{75} & b_{76} & 1 \end{bmatrix} \begin{bmatrix} IND_t \\ CPI_t \\ CRED_t \\ M2_t \\ R007_t \\ COMM_t \\ TWI_t \end{bmatrix} \quad (1)$$

The non-zero coefficients b_{ij} indicate the variable j affects variable i instantaneously. For example, b_{21} captures the contemporaneous impact of industrial production shocks on the consumer price index. The coefficients on the diagonal are normalised to one, while the zero coefficients indicate that those entries in the matrix are constrained to be zero.

The main features of the restrictions are as follows. Industrial production and inflation are assumed to respond to monetary policy variables and the exchange rate with a lag, reflecting that firms do not instantaneously change their output and price in response to unexpected changes in monetary policy due to inertia and adjustment costs (e.g. Sims and Zha 2006). Credit is assumed to respond to industrial production, inflation and the repo rate contemporaneously. As the repo rate reflects the opportunity cost of holding money, economic agents are assumed to respond quickly to changes in this cost. Credit does not respond contemporaneously to M2 as shocks driven by say changes in the reserve requirement ratio will likely take longer than one month to filter into increased credit supply. The factors that are assumed to contemporaneously impact credit are also assumed to apply to M2, as money is created through a rise in credit in a fractional reserve banking system. Conversely, the 7-day repo rate is assumed to only respond to changes in domestic financial variables as

⁴⁰ See Online Appendix A for a list of the variables included in the baseline, augmented and extended models.

policymakers don't have access to information on industrial production, inflation, credit or money supply within a given month. International commodity prices are assumed to respond to Chinese economic data given China's role as a significant source of demand and importer of worldwide commodities. Finally, the exchange rate is assumed to respond contemporaneously to all variables, as is common in SVAR models.⁴¹

The remaining elements of the estimation approach are as follows. The model is estimated using two lags and a constant term, as guided by lag length criteria tests.⁴² Unit root tests suggest that most of the variables included in the model are integrated of order 1.⁴³ We transform variables into log differences and multiply them by 100 to produce growth rates, with the exception of interest rates which are entered into the model in levels, as these transformations can help reduce the possibility of spurious relationships and are more aligned with the targets set by authorities (which are typically expressed in growth rate terms).⁴⁴ Standard errors for the impulse response functions are calculated using the Monte Carlo method.

5.2.3 Impact of monetary policy shocks on macroeconomic outcomes: full sample results

Figure 12 displays the cumulative impulse responses to a one standard deviation shock to the repo rate and money supply growth. The monthly units approximate the cumulative percentage impact on the growth of each variable, with the exception of the repo rate which shows the percentage point deviation from the baseline. The results are as follows:

- Repo rate – a one standard deviation (upward) shock to the repo rate (equivalent to around 50 basis points) is shown to generate directionally intuitive results: it is associated with lower subsequent growth in industrial production, lower inflation (but only with a lag of two years), lower credit growth (with most of the impact felt in two years), lower money supply growth and a persistent appreciation of the exchange rate. In numerical terms, industrial production and money supply are 0.5 and 0.4 percentage points lower after two years and the impact is statistically significant.⁴⁵
- Money supply – the macroeconomic effects stemming from a one standard deviation shock to money supply growth (equivalent to 0.55 percentage points) are generally more mild (smaller and/or less persistent) relative to repo rates. Positive money supply shocks appear to have no impact on inflation, the exchange rate or repo rates, and a positive but statistically insignificant impact on industrial production and credit in the medium-to-long run.

41 The degree to which China's exchange rate has been determined by market forces has varied over time.

42 Lag length is selected using Akaike information criteria (AIC).

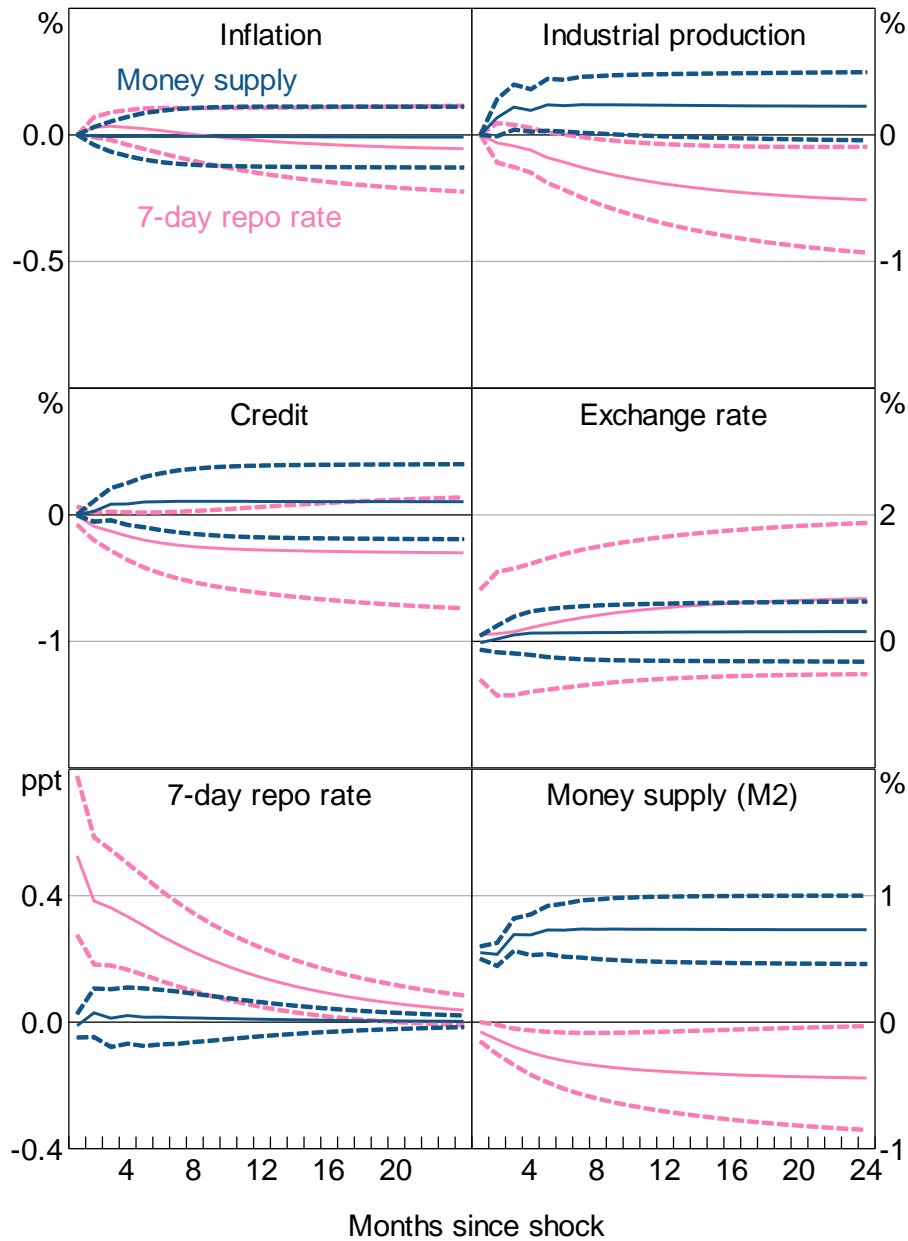
43 Kim and Chen (2019) estimate their SVAR model in log levels and found similar results.

44 While estimating SVARs in log differences may increase the possibility of incorrect restrictions being imposed on the model, we account for this by conducting a number of robustness checks.

45 A permanent response of industrial production to a temporary repo rate shock is somewhat surprising, albeit similar results were found by Harjes (2017) and Kim and Chen (2019).

Figure 12: Impact of Interest Rate and Monetary Shocks

One standard deviation shock, cumulative impulse responses



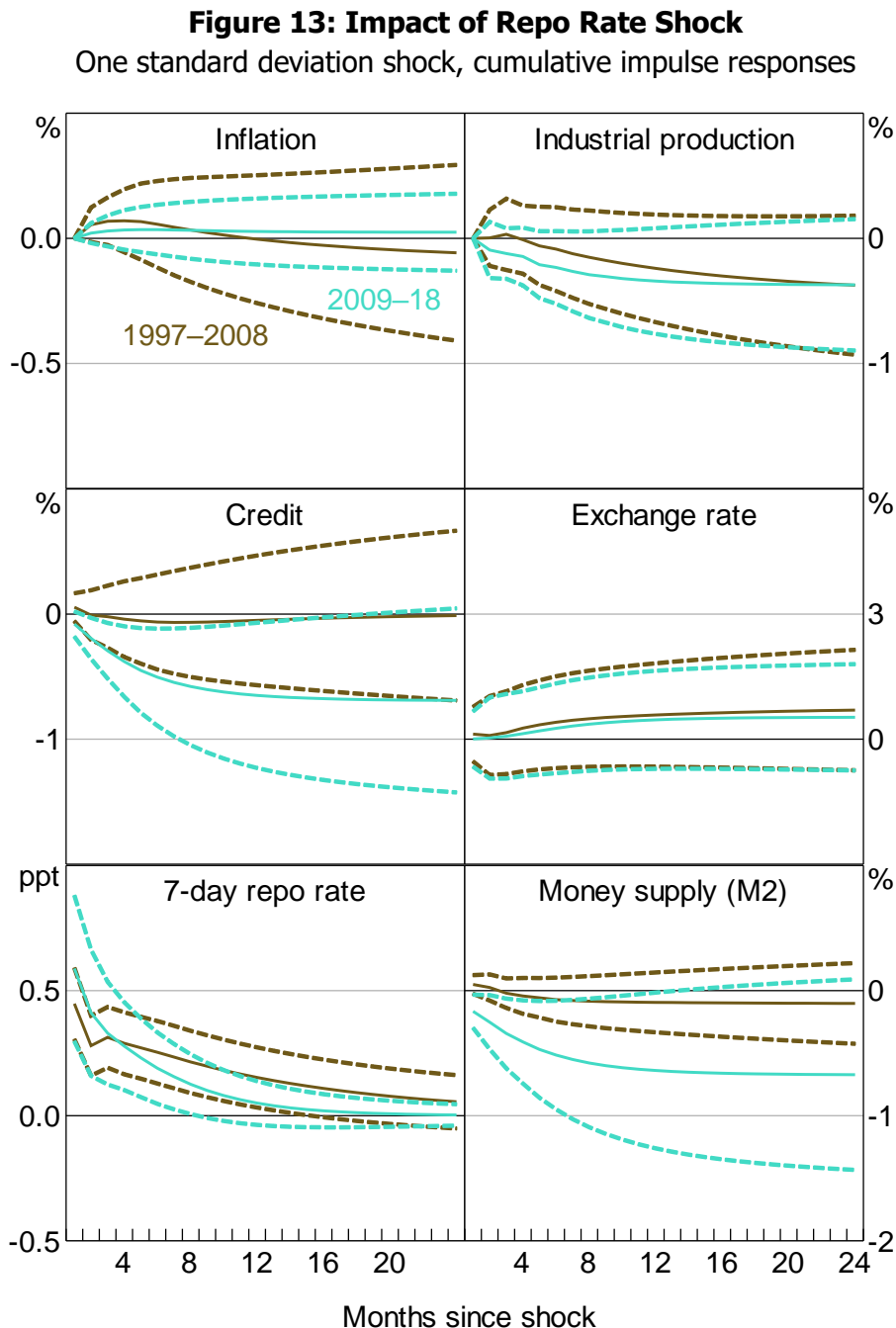
Notes: Dashed lines show respective 95 per cent confidence intervals; impulse response shown for the 7-day repo rate

5.2.4 How the impact of monetary policy shocks has evolved: split sample results

To examine whether the transmission of shocks has changed over time, the data are split into two sub-periods of equal length: 1997 to 2008 and 2009 to 2018 (Figures 13 to 15). Alongside repo rate and money supply growth shocks, we also report the impact of credit growth shocks given the more expansive role of credit in the economy since the global financial crisis and the attention that the release of credit growth figures has since attracted from market participants partly as a proxy for fiscal policy in China.

The main results are as follows:

- Repo rate (Figure 13) – in the most recent sub-period, upward shocks to the repo rate are associated with a stronger (contractionary) impact on credit and money supply growth, with most of the impact occurring in the first two years. The repo rate itself reverts faster to the baseline in the most recent sub-period. The impact of repo rate shocks on inflation,⁴⁶ industrial production and the exchange rate appear little changed over the two sub-periods.⁴⁶ The impact on industrial production remains negative, though not statistically significantly so.

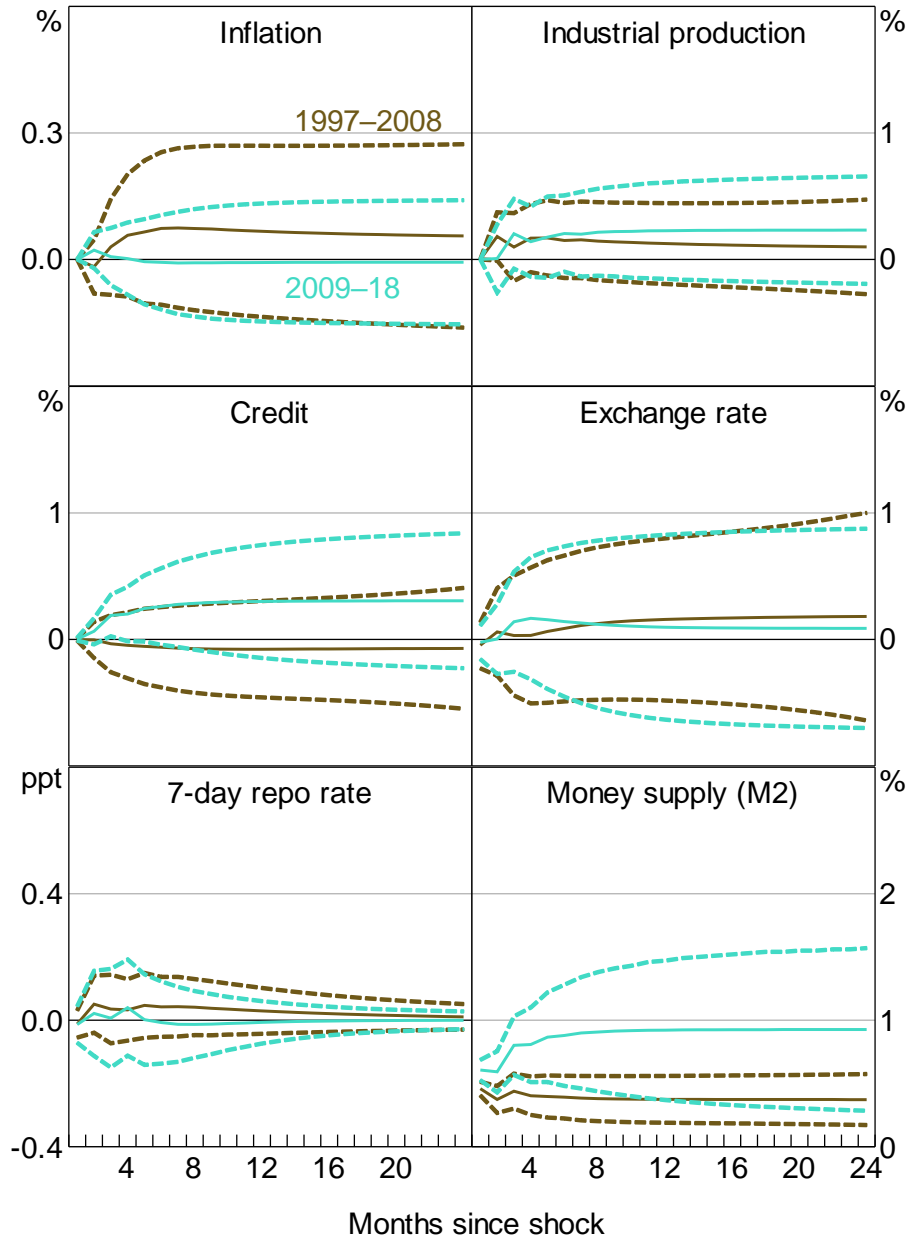


Notes: Dashed lines show respective 95 per cent confidence intervals; impulse response shown for the 7-day repo rate

⁴⁶ Cross-period comparisons on the exchange rate impact are complicated by the fact that the renminbi was pegged to the US dollar for much of the first sub-period.

- Money supply (Figure 14) – there appears to be little impact from money supply shocks on inflation, industrial production, the exchange rate and the repo rate in either period. The impact on bank credit has strengthened somewhat, with most of the effect felt in the first six quarters.

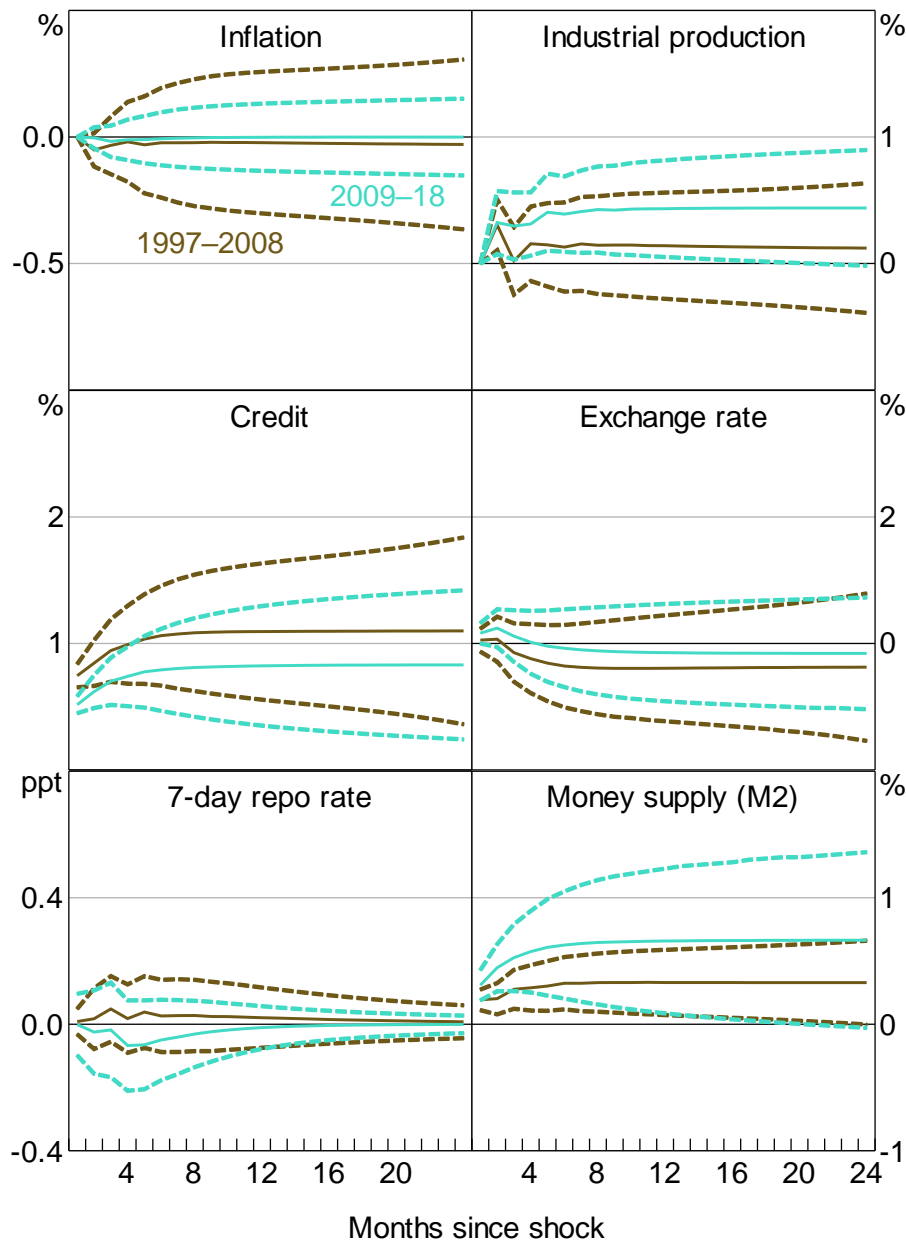
Figure 14: Impact of Money Supply Shock
 One standard deviation shock, cumulative impulse responses



Notes: Dashed lines show respective 95 per cent confidence intervals; impulse response shown for the 7-day repo rate

- Credit growth (Figure 15) – as with repo rate and money supply shocks, the impact of shocks to credit growth on inflation appears economically and statistically insignificant. The transmission through to industrial production and money supply has however picked up over time, possibly reflecting the significant increase in leverage in the Chinese economy since the global financial crisis.

Figure 15: Impact of Credit Growth Shock
One standard deviation shock, cumulative impulse responses



Notes: Dashed lines show respective 95 per cent confidence intervals; impulse response shown for the 7-day repo rate

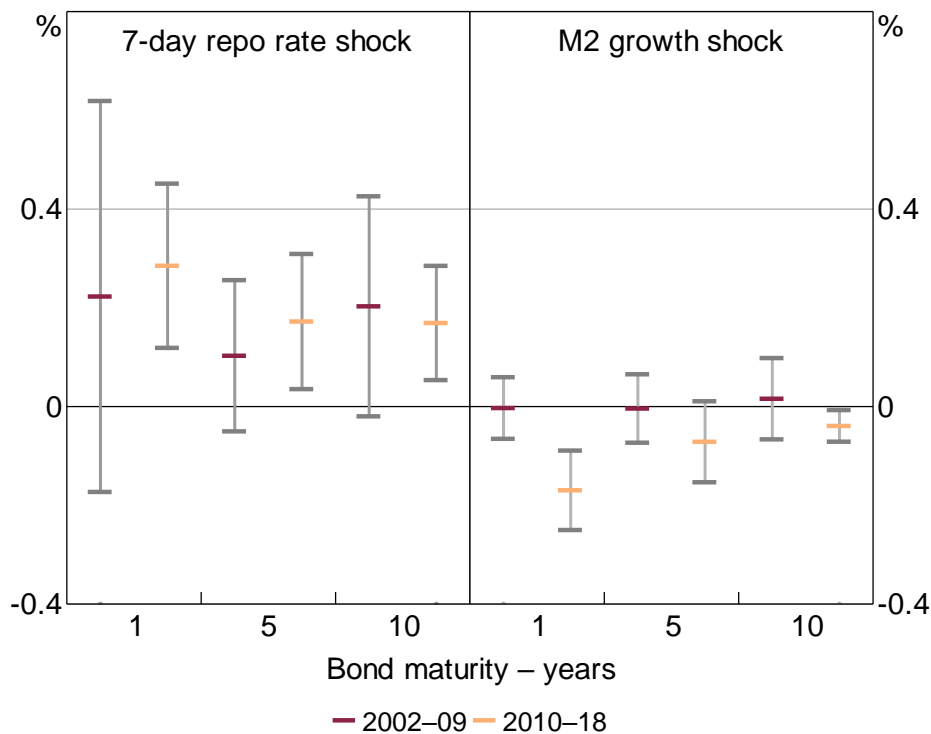
5.2.5 Impact of monetary policy shocks on the bond market

The experience in advanced economies has generally demonstrated that a well-developed bond market provides an important conduit through which changes in monetary policy can flow through to financial markets, and ultimately, the broader economy. We examine how this transmission

channel has evolved over time in China by extending the baseline SVAR model to assess the impact of changes in repo rates and money supply (M2) growth on 1-year, 5-year and 10-year maturity central government bond yields (expressed as the monthly average of daily yields).⁴⁷

The main results are four-fold. First, the pass-through of repo rates to bond yields is larger compared with money supply shocks (Figure 16). Second, in terms of magnitude, the impact has become more pronounced in the most recent sub-period. Third, in economic terms, the degree of pass-through is still modest compared to industrial countries (Ma 2017). Fourth, as in Kamber and Mohanty (2018), the impact of repo rate shocks is strongest at the front end of the yield curve, consistent with standard term structure theories of interest rates which provide for larger term premia in longer-maturity bonds.

Figure 16: Government Bond Yields
Response to 1 percentage point monetary policy shock



Note: Grey bars show 95 per cent confidence intervals

5.2.6 Impact of monetary policy shocks on house prices

As in all countries, developments in the residential housing market attract close scrutiny from Chinese policymakers owing to their potential implications for the macroeconomy and financial stability. While a thorough treatment of this issue is beyond the scope of the paper, we undertake a brief assessment of the impact of monetary policy changes on house prices by extending the

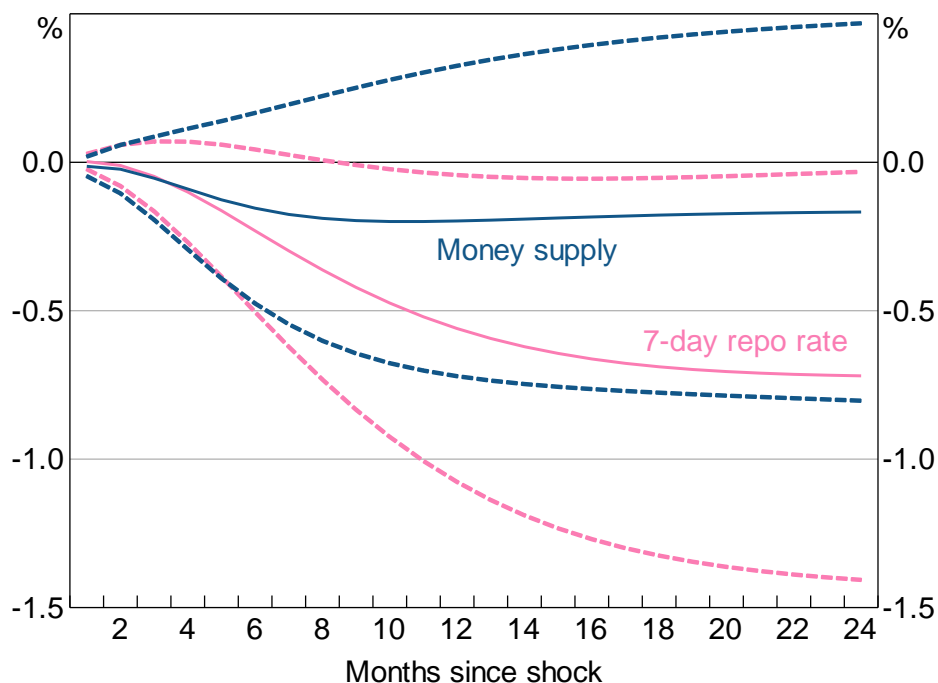
⁴⁷ Consistent with the related literature, we assume that all domestic economic and monetary variables contemporaneously affect government bond yields but not the other way around. See Online Appendix B for details.

baseline SVAR model to include a new residential price index over the June 2005 to December 2018 period (this relatively short sample precludes splitting the data into sub-periods).⁴⁸

The results suggest that a one standard deviation shock in the repo rate (equivalent to a 0.6 percentage point increase) has an impact on house price growth that is statistically significantly negative from two to four years, while money supply shocks of the same size have virtually no impact (Figure 17). In economic terms, the impact of a repo rate shock is equivalent to less than 1 percentage point on housing price growth. These findings, which are broadly consistent with those reported in Kim and Chen (2019) despite differences in methodology, imply that repo rate adjustments (along with other measures) may have a countercyclical role to play in stabilising swings in the housing market, consistent with the PBC's recently strengthened financial stability mandate.

Figure 17: House Price Growth

Cumulative response to one standard deviation monetary policy shock



Note: Dashed lines shows respective 95 per cent confidence intervals

5.2.7 Robustness checks, extensions and limitations

We next consider a range of robustness checks and extensions in assessing the role of repo rate and money supply changes in the transmission of monetary policy in China. Broadly speaking, the original results reported above were little changed. Identification assumptions and detailed results arising from the robustness checks and extensions are presented in Online Appendices B and C.

To gauge the sensitivity of the initial results to the baseline model set-up, a range of robustness checks were performed including alternative identification assumptions,⁴⁹ the use of an additional

⁴⁸ We assume that all domestic economic and monetary variables contemporaneously affect house prices but not the other way around. See Online Appendix B for details.

⁴⁹ We consider an alternative identifying assumption so that identification follows a lower triangular matrix (a simple Cholesky decomposition).

lag and the addition of a global financial crisis dummy spanning the September 2008 to August 2009 period. None of these checks yielded a material change to the results reported for the baseline model.⁵⁰

The baseline model was then augmented with different variables, with bank credit replaced with a broader measure of financial conditions represented by total social financing (*TSF*), and CPI inflation replaced with the implicit GDP deflator.⁵¹ The initial results are qualitatively unchanged when *TSF* takes the place of bank credit. In the case of the GDP deflator replacing the CPI, money supply shocks continue to have few implications for activity or asset prices, but a repo rate shock now appears to be associated with a negative impact on the deflator (this was not the case for the CPI).⁵² We caution, however, against overstating the latter result. First, it could be impacted by measurement issues beyond just that the volatility of the deflator is depressed and is much lower than the CPI (partly due to it being linearly interpolated into a monthly series for our purposes).⁵³ Second, and of more relevance, to the extent that the authorities care about inflation as a monetary policy objective, it is the CPI, not the implicit GDP deflator measure that serves as the operational target and therefore matters most in terms of monetary policy transmission.

The baseline model is also extended in several ways. In recognition of the difficulty associated with accurately capturing the stance of monetary policy in China, we assess whether the initial results reported for the repo rate and M2 growth are materially altered after incorporating additional quantity- and price-based measures in the baseline SVAR. This is achieved through the inclusion of base money (over which the PBC has more direct control than M2 and may reflect RRR adjustments) and benchmark lending rates (which our preliminary analysis suggests still has a significant impact on bank lending rates). In short, the earlier described transmission of shocks from the repo rate or M2 growth to asset prices, activity and inflation does not appear to be affected by the inclusion of bank reserves or benchmark lending rates in the expanded SVAR, and these variables themselves do not appear to have an effect on industrial production or inflation (see Figure 18 and Online Appendix C for more details).

50 See Online Appendix C, Figures C4, C5 and C6.

51 The use of *TSF* in place of bank credit restricts our estimated sample to start from 2002. The quarterly implicit GDP deflator is converted into a monthly series using a simple linear interpolation.

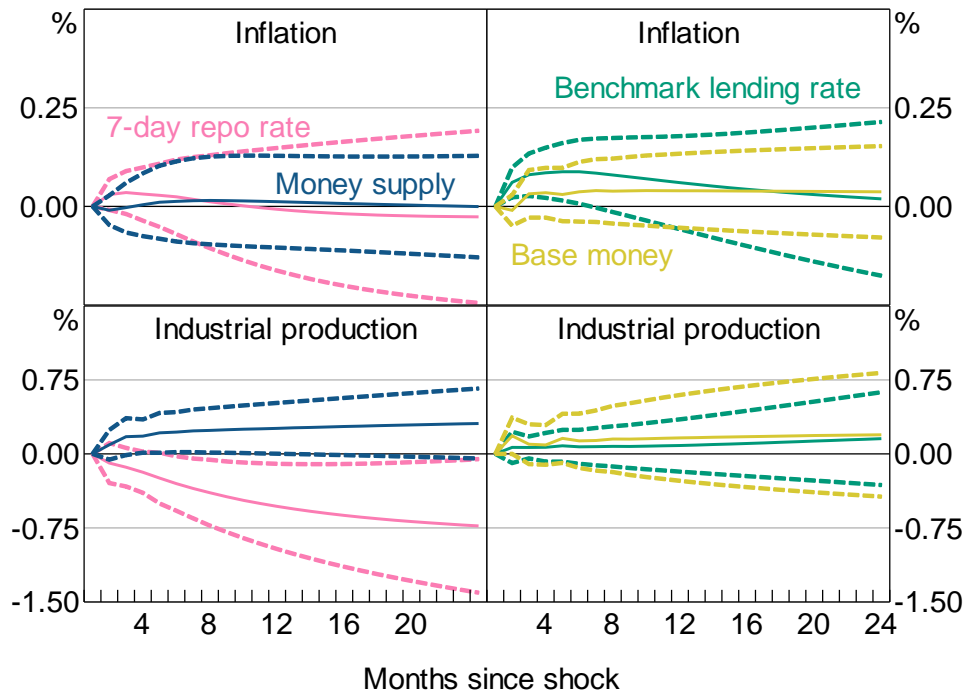
52 See Online Appendix C, Figures C7 and C8.

53 The forensic analysis in Holz (2014) raises doubts over the accuracy and interpretation of the GDP deflator measure in China. For instance, Holz (p 325) finds some evidence of material divergences of alternative deflator measures versus the official implicit measure, and that

the implicit deflator bear[s] the brunt of the revisions to nominal data. But revisions to implicit deflators are not plausible. [Given that p]rice indices are final in the year in which they are published ... as are deflators derived from the data on directly reporting enterprises.

Figure 18: Inflation and Industrial Production Growth

Cumulative impulse response to one standard deviation monetary policy shock



Note: Dashed lines show respective 95 per cent confidence intervals

We also extend the baseline model via the inclusion of monthly government expenditure (to allow for fiscal developments to be captured at a timely frequency), and separately include the US federal funds rate to account for international monetary conditions and the evolution in the exchange rate regime over the sample. The earlier reported results were again little changed with the addition of these variables to the baseline SVAR.⁵⁴

Nevertheless, we suggest a degree of caution is warranted when interpreting the econometric results given numerous data challenges in the Chinese monetary policy context. These challenges are not limited to the short sample period under review, the inherent difficulties in accurately capturing and disentangling changes in the stance of monetary and fiscal policy in China, and the near-constant state of change in the structure of the Chinese financial markets and wider economy.

5.3 Summary Discussion and Implications of the Empirical Findings

Observation 1: The pass-through of short-term repo rate shocks to asset prices and real activity appears stronger compared to money supply shocks

Changes to repo rates appear to be associated with stronger macroeconomic and financial transmission properties than changes to money supply. This is irrespective of whether the latter is measured as broad money (M2) or bank reserves, or whether the sample is broken into sub-periods. Repo rate pass-through appears strongest for the bond markets, followed by real activity and house prices. Money supply shocks seem mainly to affect the path of credit growth in our model.

⁵⁴ See Online Appendix C, Figures C10 and C11.

A diminished role for money supply pass-through relative to short-term interest rates is consistent with the experience in advanced economies.⁵⁵ Indeed PBC officials have acknowledged that the decline in transmission between money supply and growth and inflation outcomes is not unique to China (e.g. Yi 2018a; Ma forthcoming). This is likely to reflect a confluence of factors, not limited to ongoing financial market development, increased flexibility in the exchange rate (affording the authorities more autonomy over the setting of interest rates) and refinements in the PBC's toolkit, including the introduction of an interest rate corridor system. These factors may also help to explain why in 2018, the authorities refrained from setting clear M2 growth targets for the first time in more than two decades. Despite differences in methodology and the sample period under review, these results for the repo rate are broadly consistent with those reported in Fernald *et al* (2014), Chen *et al* (2017), Harjes (2017) and Kamber and Mohanty (2018), who find that monetary policy is generally becoming more effective under an interest rate-based framework vis-à-vis the earlier emphasis on quantities.

Observation 2: While the transmission of short-term repo rates through bank credit channels has improved, impediments to pass-through remain

Despite the official liberalisation of bank lending and deposit rates in 2012 and 2015 respectively, the transmission of repo rate adjustments through bank credit channels remains a work in progress. Our analysis points to pass-through of less than one-quarter. By comparison, Gambacorta, Illes and Lombardi (2015) estimate that the pass-through of policy rates to bank lending rates in the United States is around 80 per cent. While a thorough treatment of this issue is beyond the scope of our analysis, there are a number of possible reasons for the modest degree of pass-through (see also Chen *et al* (2011); He and Wang (2012, 2013); Chen *et al* (2017); Chen and Kang (2018); Kamber and Mohanty (2018); Ma (forthcoming)):

- In China's 'dual-track' interest rate system, financial market-based interest rates still diverge from bank deposit and lending rates as the latter have been anchored by official benchmarks set by the State Council (albeit this may diminish going forward as benchmark rates were replaced with the LPR as the reference rate for bank loans in late 2019).
- Borrowing rates for state-owned enterprises and local governments may not be particularly sensitive to bank-based or financial market-based interest rates. That is, implicit guarantees introduce a soft borrowing constraint for the two largest sets of borrowers in China.
- The mortgage market was only introduced in 1997 and remains in the early stages of development. This means that a standard component of the monetary transmission mechanism in advanced economies has not yet had a significant effect in China.
- The flow of credit in China continues to be strongly influenced by the authorities' use of administrative guidance.

⁵⁵ For a summary of the advanced economy experience, see most recently, Liao and Tapsoba (2014). The lack of a substantive effect of innovations in M2 on activity and inflation is also consistent with typical findings for the United States, where much of the variation in quantity aggregates reflects idiosyncratic shocks to money demand rather than fundamental changes in monetary policy (e.g. Bernanke and Blinder 1992).

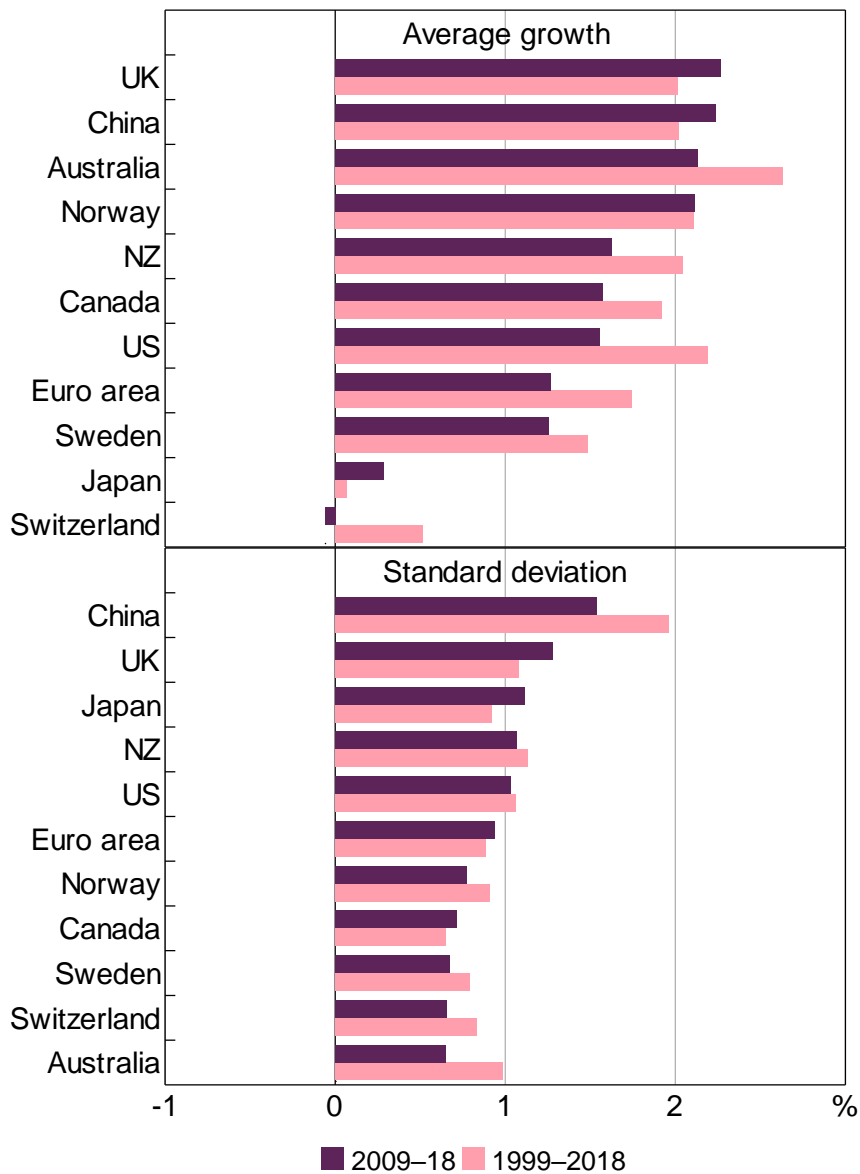
While some of these factors are likely to abate over time, it is reasonable to expect others will be more persistent owing to political economy considerations and the nascent stage of financial system development in China.

Observation 3: Recent inflation performance in China has been similar to advanced economies, while its monetary policy framework remains substantially different

While it remains difficult to disentangle how much of the improved inflation and growth performance recorded in advanced economies since the early 1990s can be attributed to instrument independence vis-à-vis the adoption of inflation targeting as a clear and ultimately effective nominal anchor, it is broadly accepted that both elements played a part. Furthermore, it is widely recognised that inflation outcomes are determined, at least in part, via the transmission of monetary policy. It is interesting to observe that while average inflation outcomes in China have been similar to a number of advanced economies (Figure 19), these outcomes have been generated in very different institutional contexts. For instance, the PBC does not have instrument independence, has not established a clear nominal anchor, and encounters material impediments to monetary policy transmission. The finding that CPI inflation is not significantly correlated with repo rates or money supply in China is broadly consistent with most of the related literature (see most recently, Kim and Chen (2019)), with the possible exception of Kamber and Mohanty (2018) who find stronger evidence of repo rate pass-through to the CPI excluding food series based on a shorter (post-2004) sample period.⁵⁶ Moreover, the recent Chinese experience might offer another example that price stability is possible in a variety of institutional set-ups, at least for a period of time where circumstances are most conducive.⁵⁷

56 Guo (2013) argues that interest rates may only be effective in dampening high inflation, but not in arresting low inflation.

57 For instance, gold and silver standards, and in some countries, fixed exchange rates, have proven capable of delivering price stability (in the absence of instrument independence) over periods of time where prevailing economic, financial and political conditions were most propitious.

Figure 19: Annual Inflation

Note: Based on the average annual change in consumer prices

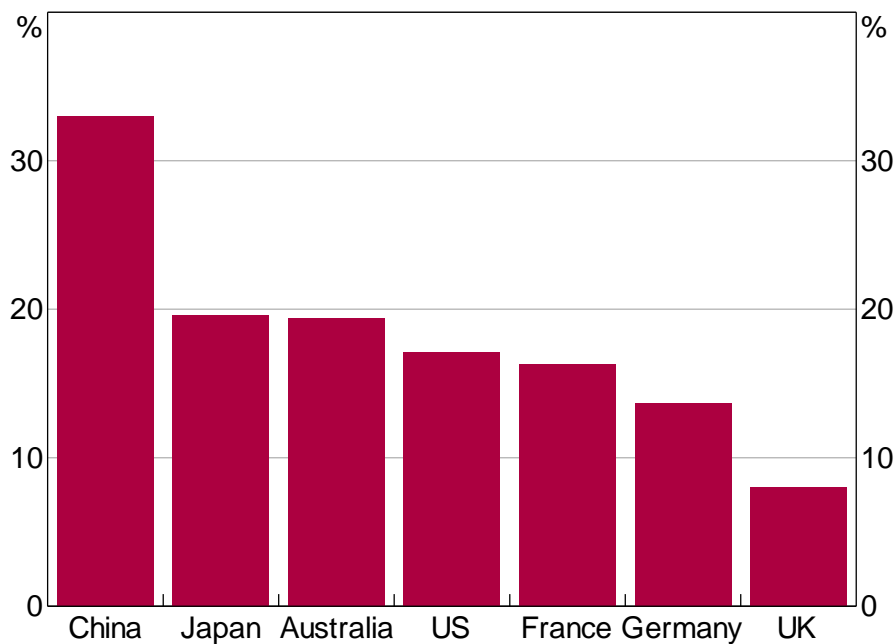
Sources: Authors' calculations; IMF

A forensic examination of this issue is beyond the scope of this paper, but to help stimulate further research, we offer two tentative explanations for China's ability to generate low and stable inflation outcomes. The first relates to the measurement of inflation in China, and in particular, the composition of China's CPI basket. Around one-third of the weight in China's CPI headline basket is comprised of administered prices. This is more than double the average weight (15.7 per cent) of administered prices reported across select advanced countries (Figure 20). As the government retains substantial powers over the setting of goods and services prices in China,⁵⁸ and can implement desired changes at relatively short notice, it may be possible to influence reported inflation outcomes in either direction. For instance, during the inflationary outbreaks of 2003–04 and

58 Broadly, there are three types of prices in China: (i) market determined, which have little-to-no government input; (ii) government guided, which are based off published (typically central) government benchmarks and/or administrative guidance, and (iii) government controlled, which are fixed prices set by the responsible government authorities which can include the central government as well as provinces and municipalities.

2007–08, the National Development and Reform Commission adopted temporary price controls on a range of agricultural products. More generally, the Chinese authorities have frequently responded to inflationary pressures by increasing their use of discretionary price controls (e.g. Geiger 2010). This might be effective in keeping inflation expectations anchored when the authorities use temporary controls to ‘buy time’ until an effective supply-side response can be initiated. This said, the international experience with price controls in the 1970s casts some doubt as to the amount of control that authorities can wield over the medium term, unless effective supply responses can be mobilised while price controls are in place.

Figure 20: Weighting of Administered Prices in National CPI Basket



Sources: Eurostat; RBA; Shintani *et al* (2016)

A second (and possibly more plausible) explanation relates to the coordinated whole-of-government response that can be efficiently mobilised in response to concerns over high inflation or deflation. Conducted largely through the State Council, the formulation of aggregate supply and demand management policies is more tightly coordinated compared with other economies. Fiscal, monetary, macroprudential, exchange rate, sectoral (including real estate) and national development policies can each be adjusted in a timely, reinforcing manner in support of desired inflation outcomes. If the prospect of high inflation and deflation is viewed by the authorities as sufficiently grave to warrant a swift countercyclical mobilisation of all the arms of government (including supply-side policies), it may be that standard incentive misalignment and commitment problems cited in the literature on central bank independence and inflation targeting may be less pressing in China’s unique institutional setting. The Chinese authorities appear to have displayed both the willingness and the ability to deliver on the objective of low and stable inflation, albeit through different means than observed in advanced economies.

6. Conclusion

A traditional view of monetary policy in China has been that it bears virtually no resemblance to that in advanced economies. But in recent years this assessment has been challenged, partly following indications that the policy framework is becoming more price- than quantity-based. In conducting a holistic appraisal of the monetary policy framework and empirical features of monetary policy transmission, we strike out a middle ground in arguing that the traditional view is indeed becoming obsolete in many respects, but equally, the basis for the proposition that key aspects of monetary policy in China now resemble those in advanced economies remains narrowly focused. This overall assessment holds along each dimension examined in this paper – the institutional framework, the operational framework, the communication framework, and at the empirical level. Moreover, China's preferred model of institutional and economic development is likely to preclude convergence of its policy framework with advanced economy central banks even in the longer term.

There are a number of promising avenues for related future research, four of which we conclude with here. First, analysis of how macroprudential policy in China will be integrated into the monetary policy framework (including how trade-offs are managed) is likely to be of broad-based interest given that in 2017, China's macroprudential policy framework was overhauled, and as part of this realignment the PBC was given a more expansive (lead) role. It now serves as secretariat in the newly established Financial Stability and Development Committee (on which the PBC Governor serves as Vice Chair), and the PBC also recently established a new internal Macroprudential Policy Bureau to monitor and manage financial systemic risks. A second useful avenue for research might relate to the PBC's evolving monetary policy reaction function in light of substantial changes to the economy, current account and interest and exchange rate regimes over recent years. A third possible line of enquiry pertains to explaining China's inflation performance. China's run of generally sound inflation outcomes over the past decade has come about in a very different institutional context, with broad-based policy coordination the centrepiece. Analysis of the underlying causes and wider implications of China's recent period of price stability should offer fertile terrain for researchers. Finally, we also leave comparisons of China's evolving monetary policy framework with other emerging market countries for future research.

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