

# From Window Guidance to Interbank Rates: Tracing the Transition of Monetary Policy in Japan and China\*

Stefan Angrick<sup>a,b</sup> and Naoyuki Yoshino<sup>a,c</sup>

<sup>a</sup>Asian Development Bank Institute

<sup>b</sup>National Graduate Institute for Policy Studies

<sup>c</sup>Keio University

Japanese monetary policy up to 1991 was based on a mix of price-based and quantity-based instruments and targets. Echoes of this system are today found in Chinese monetary policy. We explore the transition of these two regimes using historical statistics, computational text analysis, and structural vector autoregressive (SVAR) models. Specifically, we examine the role of the interbank rate and “window guidance,” a policy by which authorities communicate target quotas for

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lending growth directly to commercial banks. We empirically demonstrate the declining effectiveness of quantity measures and the increasing importance of price measures and provide recommendations for managing this transition.

JEL Codes: E5, E52, E58.

## 1. Introduction

Monetary policy in most major economies has traditionally focused on control of the interbank interest rate to achieve an inflation target. By contrast, monetary policy in transition economies often relies on a mixed system of price-based and quantity-based instruments and targets. Japanese monetary policy prior to 1991 was based on such a mixed system, and echoes of this system are today found in China's monetary policy setup. Both economies have shifted toward price measures as markets developed and matured. In this paper, we study this transition in Japan 1973–91 and China 2000–17.

Monetary policy in Japan and China traditionally relied on a range of different instruments, such as the discount rate, reserve requirements, interbank rates, regulated retail interest rates, and window guidance, a policy by which authorities seek to directly guide commercial banks' lending volumes through "moral suasion."<sup>1</sup> Monetary authorities deployed these instruments to achieve specific intermediate targets for credit quantities, such as the amount of commercial bank lending or the money supply, deemed consistent with final targets for economic growth or price stability. Quantities and prices thus coexisted within monetary authorities' toolkits and in their set of target outcomes, but over time, as financial liberalization progressed, emphasis shifted toward price-based instruments and targets.

We draw on the experience of monetary policy in Japan and China to clarify how the effectiveness of monetary policy tools changed during this transition, particularly regarding the role of the

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<sup>1</sup>Geiger (2008) defines window guidance as a "policy [that] uses benevolent compulsion to persuade banks and other financial institutions to stick to official guidelines." Window guidance appears to be a common tool in transition economies (Neely 2000; Archer 2005).

interbank rate and “window guidance.” To capture window guidance, we draw on historical statistics on Japanese window guidance quotas and apply Romer–Romer text analysis (Romer and Romer 1989) and computational linguistic methods to quantify Chinese window guidance. Using our data set, we estimate structural vector autoregressive (SVAR) models to study the transmission from monetary policy tools to the amount of bank financing.<sup>2</sup> In order to trace the evolution in the effectiveness of tools over time, we estimate our models on the full sample and on subsamples.

The results reveal significant similarities and differences in the evolution of monetary policy in Japan and China. In both economies, window guidance is an initially potent policy tool that loses potency over time. We argue that declining effectiveness of window guidance in China mirrors the Japanese experience, where financial market development, financial liberalization, and capital account opening all reduced the effectiveness of window guidance by broadening the range of funding sources. Although the importance of the interbank rate increases in both countries, this development is more pronounced in China than in Japan. We attribute this to the relatively more rapid pace of institutional transformation in China and conscious efforts on the part of the authorities at promoting interest rates.

Our findings have important implications for the design of monetary policy in China and other transition economies. In recognition of the potential positive effects of a transition to a price-based system, we provide several suggestions for effectively managing this transition. First, we recommend a reduction in the number of tools in favor of transparent and market-oriented price-based tools to reduce the chance of adverse effects arising from the simultaneous application of different types of tools. Second, we recommend strengthening standing facilities to provide a well-defined and credible interest rate corridor that limits excess volatility of the interbank rate. Third, we suggest institutional adjustments to improve the application of reserve requirements, such as the introduction of longer reserve maintenance periods and averaging provisions.

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<sup>2</sup>Bank financing is understood here as all claims on the private sector held by commercial banks.

Our paper contributes to the literature on monetary policy operating procedures and monetary policy transmission by examining an issue that is of key importance in many transition economies. Our paper is one of the few analyses to draw on the actual window guidance quotas assigned in Japan (other studies often rely on proxies or indirect estimation) and the first to quantify window guidance in China using a Romer–Romer approach *and* computational linguistic methods. To our knowledge, our paper is also the first to provide an in-depth empirical comparison of window guidance in Japan and China.

The paper is structured as follows. We begin by providing a brief but comprehensive overview of the monetary policy setups in Japan and China, including institutional structures, tools, and targets used. We next present our quantitative analyses, including an overview of identification schemes, estimation results, and robustness checks. We end with a discussion of the results and policy recommendations. The final section concludes.

### 1.1 Literature Review

This paper spans a variety of topics in the broad literature on monetary policy operating procedures and monetary policy transmission. Our analysis largely follows the spirit of Bindseil (2004, 2014) and Borio and Disyatat (2010), who provide comprehensive overviews of the changing importance of quantity measures and price measures within monetary policy operations throughout history.<sup>3</sup>

The evolution of Japanese monetary policy after the Second World War is covered in great detail by Brown (1994), Suzuki (1994), Cargill, Hutchison, and Ito (1997), Itoh, Koike, and Shizume (2015), and Rhodes and Yoshino (2017). On window guidance, a number of early analyses examining the period after the Second World

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<sup>3</sup>While most central banks in advanced economies had prior to the global financial crisis come to focus on control of the interbank overnight rate to achieve an inflation target, quantities of bank reserves have once again assumed importance with the advent of unconventional monetary policies. In context of the present analysis, an important difference to note is that recent quantitative easing policies aim at *wholesale* quantities of credit, i.e., reserves commercial banks hold with the central bank, whereas window guidance aims at *retail* quantities of credit, i.e., the amount of credit banks provide to the private sector.

War, such as Patrick (1962), Eguchi (1977), and Kure (1977), have argued that the tool is effective, whereas Horiuchi (1977a, 1977b) argues that the tool is ineffective due to substitution effects.<sup>4</sup> More recent quantitative analyses of the substitutability of funding sources (Hoshi, Scharfstein, and Singleton 1993) or the actual window guidance quotas (Rhodes and Yoshino 1999, 2007; Werner 2002) overlap in their assessment that window guidance was highly effective, although some studies suggest that effectiveness may have declined with financial market development (e.g., Hoshi, Scharfstein, and Singleton 1993; Rhodes and Yoshino 2007). Japanese window guidance has further been examined in the context of macroprudential policies by Sonoda and Sudo (2016).

The transmission of Chinese monetary policy has been analyzed extensively in recent years, with empirical evaluations typically relying on variations of vector autoregressive (VAR) models to study the link between interest rates and economic outcomes, such as price developments, output, or loan demand. Examples include Dickinson and Liu (2007), Laurens and Maino (2007), Mehrotra (2007), and Koivu (2009), who find mixed results regarding the relevance of interest rates. More recent analyses by Sun, Ford, and Dickinson (2010), He, Leung, and Chong (2013), and Fernald, Spiegel, and Swanson (2014) uncover transmission channels of Chinese monetary policy similar to those found in advanced economies. Regarding reserve requirements, Fungáčová, Nuutilainen, and Weill (2016) rely on panel estimations to analyze the bank lending channel, while Wang and Sun (2013) analyze the tool in the context of macroprudential policies. Finally, window guidance has been analyzed qualitatively by Green (2005), Lardy (2005), and Geiger (2008), while Yoshino and Angrick (2016) and Chen et al. (2017) analyze the tool quantitatively using Romer–Romer indicators. We combine this approach with computational linguistic methods, which have seen increasing use in the analysis of central bank communication in recent years (see, e.g., Apel and Blix Grimaldi 2012; Bholat 2015; Bholat et al. 2015; Luangaran and Wongwachara 2017).

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<sup>4</sup>Early analyses of window guidance in Japanese-language literature include Horiuchi (1977a, 1977b), Kaneko (1981), Shinohara and Fukuda (1982), and Hiroe (1983).

While Fukumoto et al. (2010) have conducted a detailed and insightful institutional–historical comparison of window guidance in Japan and China, a joint analysis of window guidance in both countries that combines qualitative and quantitative means has so far been lacking. We strive to close this gap with the present paper.

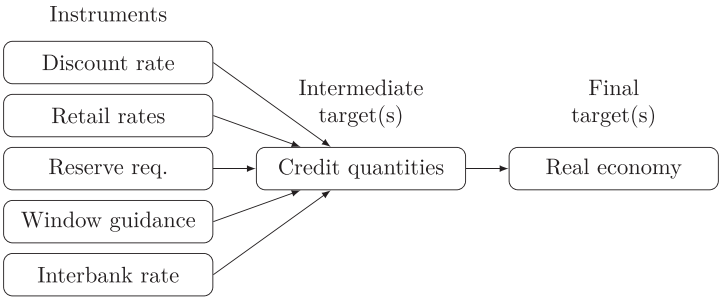
## 2. Institutional Background

In this section, we briefly describe the monetary policy frameworks in Japan 1973–91 and China 2000–17, in order to provide important background information for the identification procedures employed in section 3 below. Contemporary Chinese monetary policy shares many similarities with Japanese monetary policy prior to 1991 regarding its institutional setup, policy instruments, policy targets, and market structure. In both economies, banks acted as the main providers of credit to the nonfinancial private sector, since capital markets only played a peripheral role initially. Therefore, monetary policy was conceptualized largely around its impact on banks. As illustrated in stylized fashion in figure 1, monetary authorities in Japan and China have relied on a range of quantity-based and price-based instruments to influence credit quantities, such as the amount of bank lending or the money supply, which served as intermediate targets. The discount rate was a major policy lever in Japan, while reserve requirements held prominence in China. In both Japan and China, window guidance initially played a central role before monetary authorities began raising the profile of interbank rates. Regulation of retail interest rates was also important early on in their financial development, creating *reverse transmission* from retail interest rates to wholesale rates, the opposite of what would be expected without such limits (Chen, Chen, and Gerlach 2013). Monetary authorities aimed at achieving intermediate credit targets deemed consistent with final targets for economic growth or price stability, among others. In our empirical analysis, we focus on the first of these two links, specifically the link between policy instruments and bank lending.

### 2.1 Monetary Policy in Japan 1973–91

Responsibility for monetary policymaking in Japan was shared between the Bank of Japan (BOJ) and the Ministry of Finance

**Figure 1. Stylized Representation of Monetary Policy Transmission in Japan 1973–91 and China 2000–17**

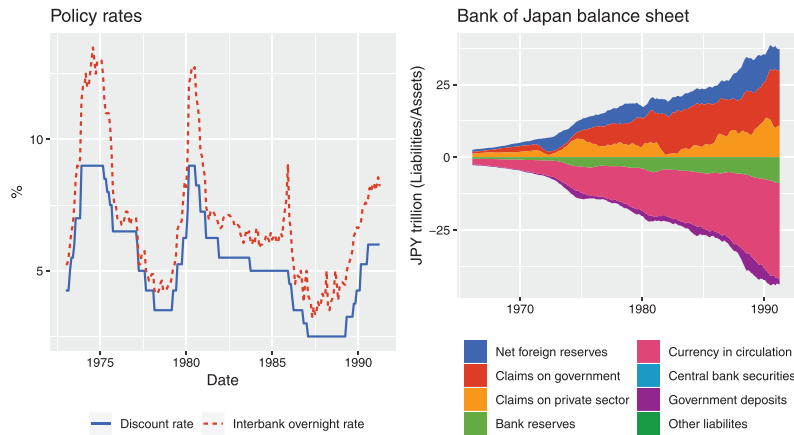


**Source:** Authors’ work, drawing on Rhodes and Yoshino (2007, p. 26).

(MOF) during our analysis period (Flath 2005, p. 270). The discount rate—i.e., the price commercial banks pay at the discount window when obtaining liquidity from the central bank—initially played a major role in Japanese monetary policymaking, as borrowing from the central bank was a major funding channel. This is reflected in the item “Claims on private sector” on the BOJ’s balance sheet shown in figure 2. (For figures in color, see the online version of the paper at <http://www.ijcb.org>.) As bond markets grew, open market operations took on greater importance, which is reflected in the growth of the balance sheet item “Claims on government.” Retail interest rates remained regulated in Japan until the mid-1980s (Brown 1994, pp. 109–11) and generally followed the discount rate fairly closely. Although the BOJ had received authority to set required reserves in the mid-1950s (Brown 1994, pp. 73ff.), the required reserve ratio was kept relatively low and adjusted much less frequently than in China today. The interbank overnight rate, the price at which commercial banks borrow or lend central bank reserves in interbank markets, took on greater importance in the late 1980s. The uncollateralized overnight call rate was established in 1985 but did not become the main operating target until the 1990s.

Window guidance in Japan was conducted through regular meetings between the BOJ and bank officials, where lending quotas were assigned to each bank. Window guidance primarily targeted city banks (Suzuki 1994, pp. 325ff.; Cargill, Hutchison, and Ito 1997,

**Figure 2. Japanese Central Bank Policy Rates and Balance Sheet 1973–91**



**Sources:** Bank of Japan and IMF International Financial Statistics, via CEIC.  
**Notes:** JPY = Japanese yen. Before July 1985, the interbank overnight rate in Japan was the collateralized overnight call rate, and the uncollateralized overnight call rate thereafter. The balance sheet series are in nine-month moving averages.

pp. 27ff.), large commercial banks with nationwide branch networks that dominated banking activity (Fukumoto et al. 2010). However, window guidance quotas were also assigned to smaller banks concentrated in one prefecture or banks which focused on specific market segments, such as regional banks, mutual banks, and long-term credit banks (Flath 2005, pp. 262–68).<sup>5</sup> City banks generally had a shortage of funds and therefore depended on borrowing from the BOJ and other financial institutions (Suzuki 1994, pp. 23–25; Fukumoto et al. 2010). Since the interbank rate was higher and more volatile than the discount rate, as figure 2 shows, a bank forced to obtain funding in the interbank market faced a higher cost of funding (Patrick 1965), which may have been a reason city banks

<sup>5</sup>After 1973, window guidance was further extended to foreign and smaller local financial institutions that are less relevant during our analysis period (Hoshi, Scharfstein, and Singleton 1993; Brown 1994, pp. 59ff; Suzuki 1994, pp. 325ff; Fukumoto et al. 2010).



paid closer attention to window guidance quotas than other institutions.<sup>6</sup> Suzuki (1994, pp. 325ff.) further points out that qualitative restrictions were occasionally imposed on bank lending, including restrictions on lending to trading companies or securities investment. Penalties on banks that disregarded window guidance included lower future quotas and unfavorable conditions in transactions with the central bank (Werner 2002).

Window guidance occupied a central position in early analyses of Japanese monetary policymaking. Questions included whether window guidance was a primary or secondary monetary policy tool (see, e.g., Suzuki 1994, p. 317; Cargill, Hutchison, and Ito 1997, pp. 27ff.; Fukumoto et al. 2010; Itoh, Koike, and Shizume 2015, pp. 97ff.), whether its effectiveness varied with liquidity conditions (Kure 1977; Okina, Shirakawa, and Shiratsuka 2001; Fukumoto et al. 2010), and whether window guidance could be circumvented by substituting sources of funding (Suzuki 1994, pp. 189ff.).

## 2.2 *Monetary Policy in China 2000–17*

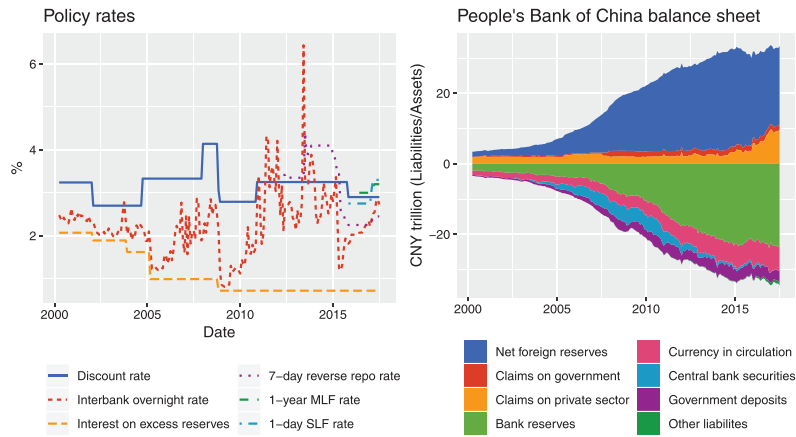
Authority over monetary policy in China lies with the State Council, but the People's Bank of China's (PBOC) authority has grown in several key areas of policymaking over the years (importantly, in policy implementation). Before 2000, central bank lending and the interest rate charged on central bank credit played an important role (Dickinson and Liu 2007), similar to Japan. Over time, open market operations, repurchase agreements ("repos"), and reserve requirements replaced central bank lending as the primary policy tool,<sup>7</sup> rendering lending rates largely symbolic (Geiger 2008; Conway, Herd, and Chalaux 2010; Fungáčová, Nuutilainen, and Weill 2016). However, with the establishment of the PBOC's Standing Lending

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<sup>6</sup>Distinctions among types of banks began to blur toward the end of the 1980s (Brown 1994, pp. 106ff.) and became largely irrelevant after the Japanese asset price bubble in the early 1990s. As of 2018, only 5 of originally 13 city banks remain: Bank of Tokyo-Mitsubishi UFJ, Mizuho Bank, Sumitomo Mitsui Banking Corporation, and two banks that are part of Resona Holdings (Resona Bank and Saitama Resona Bank).

<sup>7</sup>The PBOC uses "reverse repos" to inject central bank liquidity and "repos" to drain liquidity. The usage of these terms is the inverse of the terms commonly used in the United States and Europe, where "repo" is shorthand for injecting liquidity. The authors thank Hongyi Chen for pointing out this difference.

**Figure 3. Chinese Central Bank Policy Rates and Balance Sheet 2000–17**



**Sources:** People’s Bank of China and IMF International Financial Statistics, via CEIC.

**Note:** CNY = Chinese yuan; MLF = Medium-Term Lending Facility, SLF = Standing Lending Facility.

Facility (SLF) and Medium-Term Lending Facility (MLF), central bank lending has in recent years again assumed greater importance. Since central bank lending rates correlate to some degree and also due to data constraints, the empirical analyses in section 3 rely on the discount rate to account for lending by the PBOC. Retail interest rates were initially tightly regulated, but over time deviation from benchmark lending and deposit rates came to be tolerated (Porter and Xu 2016). Today, retail rate benchmarks play a relatively minor role (Garcia Herrero and Pang 2016).

While reserve requirements are low or non-existent in most major advanced economies, reserve requirement ratios in China are relatively high and adjusted frequently. Required reserves make up the bulk of the item “Bank reserves” on the PBOC’s balance sheet shown in figure 3 and, together with central bank bills, play a major role in sterilizing the accumulation of foreign exchange reserves (Ma, Xiandong, and Xi 2013; Angrick 2018). Until recently, there were no averaging provisions for required reserves (Yao et al. 2015), so when a commercial bank failed to meet its required reserve target at the

end of a business day, it received an overdraft from the central bank subject to a penalty interest rate (Institute for International Monetary Affairs 2004). Reserve requirements have lately also attracted attention as a macroprudential policy tool to contain systemic risk (Wang and Sun 2013).

Short-term interbank rates have assumed greater importance in Chinese monetary policymaking over time. Although Xie (2004) argues that the PBOC maintains an interest rate corridor limited by the discount rate and interest on excess reserves (similar to monetary policy setups in European economies; see Angrick and Nemoto 2017), figure 3 shows that the interbank overnight rate has been relatively volatile since the global financial crisis of 2007–08 and frequently exceeded the discount rate when interbank liquidity was short (Conway, Herd, and Chalaux 2010). New facilities and operations have been introduced in recent years to improve the provision of central bank liquidity and limit the volatility of interbank rates, such as the one-day SLF, the one-year MLF, and seven-day reverse repos (Lee 2017; Zhao, Xie, and Wu 2017).

Window guidance is formulated mainly by the PBOC, which sets lending quotas and communicates them in regular (at least monthly) meetings with commercial banks. In addition, the China Banking Regulatory Commission (CBRC) is involved in those aspects of commercial bank lending related to credit risk, including lending details and the pace of lending. Window guidance targets large state-owned banks<sup>8</sup> as well as joint-stock commercial banks and smaller local banks (Fukumoto et al. 2010; Chen, Chen, and Gerlach 2013; Fungáčová, Pessarossi, and Weill 2013). Along with quantitative guidance, authorities on occasion try to steer lending toward particular sectors of the economy, for example by imposing limits on property-related loans or by promoting lending to preferred sectors such as small and medium-sized enterprises or the green economy (Geiger 2008; Conway, Herd, and Chalaux 2010; Fukumoto et al. 2010). Window guidance is enforced through a variety of channels, such as penalty deposits, targeted transactions with banks that disregard window guidance (e.g., bill issuance, foreign currency swaps,

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<sup>8</sup>The CBRC classifies the “Big Four” state-owned banks (the Industrial and Commercial Bank of China, the China Construction Bank, the Agricultural Bank of China, and the Bank of China) as “large commercial banks.”

or time deposits), or political channels (Geiger 2008; Chen, Chen, and Gerlach 2013). Window guidance is frequently cited by observers as one of the PBOC's most important policy tools and widely regarded as effective (e.g., Green 2005; Lardy 2005; Fukumoto et al. 2010; Chen, Chen, and Gerlach 2013).

### 3. Empirical Analysis

We empirically examine the transmission from different monetary policy tools to bank financing in Japan 1973–91 and China 2000–17 using SVAR models. The length of our samples is determined by the available window guidance data for each economy. In line with the institutional analysis set out in section 2, we consider the discount rate, (benchmark) retail interest rates, reserve requirement ratios, window guidance, and the interbank overnight rate. We analyze the data over the full-sample periods and subsample periods as indicated by a Chow test for structural breaks. The purpose of the analysis is to gain insight into the effectiveness of various monetary policy instruments and their evolution over time. We are particularly interested in the changing characteristics of quantitative monetary policy tools such as window guidance compared with price-based monetary policy tools such as interest rates.

#### 3.1 Data

We obtain monthly frequency data from the BOJ, the PBOC, the Chinese National Bureau of Statistics (NBS), and the International Monetary Fund (IMF) mainly through the CEIC economic database. All series are subjected to unit-root tests to ensure stationarity or trend stationarity. Where series are found to be nonstationary, we take first differences or, when seasonality is a concern, calculate year-on-year percentage changes.

The data series for retail interest rates is calculated as the mean of the benchmark retail lending rate and the benchmark retail deposit rate. The reserve requirement ratio in China is the mean of the ratio for large institutions and the ratio for small and medium institutions, expressed in first differences (to ensure stationarity), while the reserve requirement ratio in Japan is expressed in level terms. Window guidance in Japan is by convention expressed as the

**Table 1. Chow Tests for Structural Breaks ( $H_0$ : no structural break in growth rate of bank financing)**

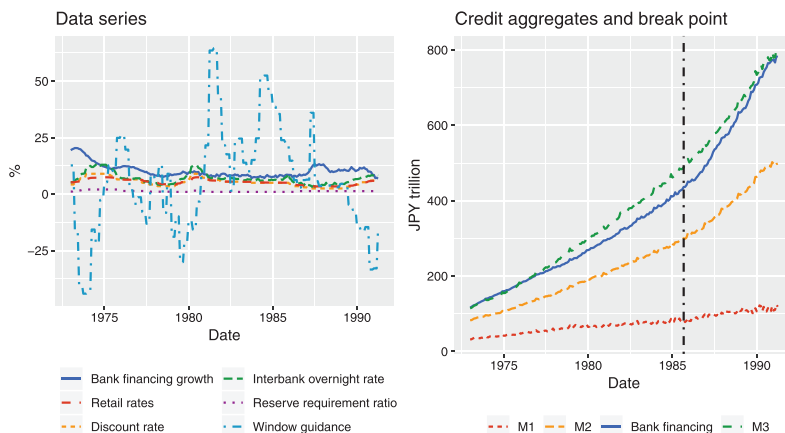
| Japan  | China  |
|--|--|
| Test for Breakpoint at September 1985 (Plaza Agreement)  | Test for Breakpoint at November 2008 (Global Financial Crisis) |
| F = 73.81<br>p-value = 0.0000  | F = 14.64<br>p-value = 0.0002                                  |
| <b>Note:</b> The sample for Japan starts in 1977 to exclude extreme growth at the start of the sample. |  |

percentage increase over actual loan growth in the corresponding period in the previous year. For China, window guidance is captured by a stationary index of the window guidance stance expressed in the PBOC’s reports, explained in more detail in section 3.1.2 below. The interbank overnight rate in Japan before July 1985 is the collateralized overnight call rate and the uncollateralized overnight call rate thereafter. For China, the interbank overnight rate is the transaction-based China Interbank Offered Rate (CHIBOR). Bank financing growth is expressed as year-on-year percentage growth rates for both countries.

We examined the series for bank financing growth rates in Japan and China using a Chow test for structural breaks, where the null hypothesis is the absence of a structural break, and the alternative is the presence of a break at a hypothetical breakpoint. For Japan, we chose September 1985, the date of the Plaza Agreement, as the potential breakpoint. For China, we chose November 2008, when the global financial crisis hit China, as the potential breakpoint.<sup>9</sup> As shown in table 1, the structural break tests reject the null hypothesis in both cases quite clearly. Credit growth in level terms indeed appears to have accelerated after the dates we specify, with the effect being somewhat more pronounced in China across a

<sup>9</sup>The data limit which subsample periods can be examined. Japanese monetary authorities did not adjust reserve requirements from July 1986 to the end of our sample, for example, so the respective variable turns into a constant within this period. We therefore limit ourselves to exogenously specified breakpoints.

**Figure 4. Japanese Data Series and Credit Aggregates 1973–91**



**Sources:** Bank of Japan and IMF International Financial Statistics, via CEIC; window guidance quotas from Japanese Bankers Association's *Kin'yū* and *Nihon Keizai Shimbun*.

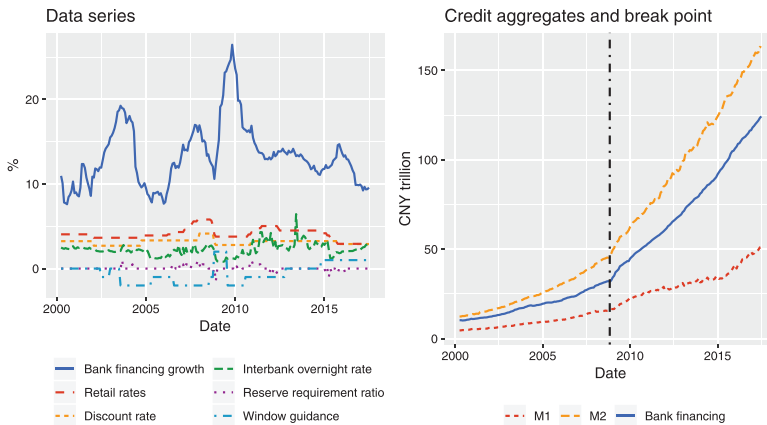
**Note:** JPY = Japanese yen; window guidance is the loan growth assigned to city banks, measured relative to actual loan growth in the corresponding period in the previous year.

range of different credit aggregates, as shown in figure 4 and figure 5. We split our data sets at the indicated breakpoints.

### 3.1.1 Window Guidance in Japan

Window guidance quotas assigned to banks in Japan 1973–91 were reported in industry magazines, such as the Japanese Bankers Association's *Kin'yū* and *Nihon Keizai Shimbun*. We hand-collect data from these sources and use city bank window guidance quotas for our analysis. As pointed out in section 2.1, banks other than city banks did not receive quota assignments for extended periods or greater deviation from target quotas was tolerated. The key question in the case of Japan is whether window guidance of city banks was successful at guiding the total amount of bank financing provided by all commercial banks. If guidance of city banks was compensated for by other types of banks, the exercise of window guidance would be rendered moot at an aggregate level and the corresponding

**Figure 5. Chinese Data Series and Credit Aggregates 2000–17**



**Sources:** People's Bank of China and IMF International Financial Statistics, via CEIC.

**Note:** CNY = Chinese yuan; reserve requirement ratio in first difference.

impulse responses should turn out insignificant (Brown 1994, pp. 87ff.; Suzuki 1994, pp. 325ff.). In this respect, our analysis parallels that of Hoshi, Scharfstein, and Singleton (1993), who showed that window guidance can have real effects since credit sources are not perfect substitutes.

It is important to point out that our results should not be taken as a general statement on window guidance in Japan, as window guidance was also applied during periods for which we do not have data. Cargill, Hutchison, and Ito (1997, pp. 52ff.) and Itoh, Koike, and Shizume (2015) provide overviews of the evolution of window guidance and the BOJ's communication policy over time. The period prior to 1973 in particular has been covered by Eguchi (1977), Horiuchi (1977a, 1977b), and Kure (1977), for example. Finally, window guidance prior to 1973 was also reported on in major newspapers such as the *Asahi Shimbun*, but not in sufficient detail to complement the data used here.

### 3.1.2 Window Guidance in China

While there is generally less detail available on window guidance in China than for Japan, information on the policy is available in the

PBOC's regular Monetary Policy Reports. To capture the tone of window-guidance-related statements within these reports quantitatively, we construct window guidance indicators using Romer–Romer text analysis (Romer and Romer 1989) and computational linguistic methods. We apply both approaches to construct two indicators each: a *narrow* indicator that only captures information explicitly related to window guidance (referred to as “window guidance indicator”), and a *broad* indicator that takes into account statements on credit growth, liquidity conditions, and the economy more broadly (“credit indicator”). This gives us four indicators in total, which we include within our models as proxies of window guidance in China.

The “narrative approach” of Romer and Romer (1989) is a traditional method of quantifying economic information contained in bodies of text that arose from the influential work of Friedman and Schwartz (1963). In line with this approach, we conduct a careful and iterative reading of the PBOC's Chinese-language Monetary Policy Committee meeting notes and Monetary Policy Reports and assign a score to classify the window guidance stance at each point in time. The score is based on a five-step scale, where 2 represents strong encouragement of credit growth, 1 represents weak encouragement,  $-1$  represents weak discouragement, and  $-2$  represents strong discouragement; we set the score to 0 when the window guidance stance is neutral or when no information on window guidance is provided. Despite the methodological similarity with other narrative indicators of Chinese monetary policy, our indicator differs in purpose and design, as well as its longer coverage period. Several previous studies (e.g., He and Pauwels 2008; Shu and Ng 2010; Sun 2015) have attempted to characterize the central bank's overall monetary policy stance, adopting an *ex post* interpretation of reports; by contrast, we focus only on window guidance and interpret documents as “as-is” (*ex ante*) assessments of the situation, i.e., the authorities' reading of the situation *at that point in time*.

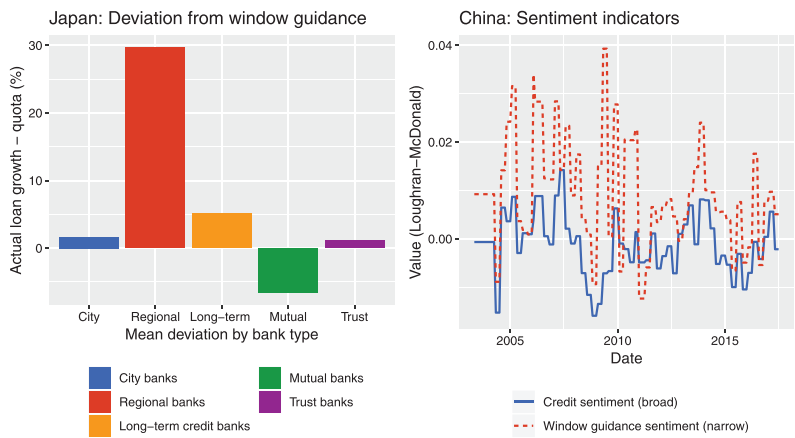
To complement the traditional Romer–Romer approach,<sup>10</sup> we also apply *sentiment analysis* to classify the tone of the PBOC's English-language Monetary Policy Reports. Sentiment analysis is a

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<sup>10</sup>For criticism of the Romer–Romer approach, see, e.g., Bernanke and Mihov (1998).



Figure 6. Window Guidance Data



**Sources:** Japanese Bankers Association’s *Kin’yū* and *Nihon Keizai Shimbun*; authors’ work, based on computational sentiment analysis using Loughran–McDonald dictionary.

computational linguistic technique which quantifies the tone of a document by executing a number of processing and analytical operations. Text is quantified using a dictionary which translates words and ultimately the whole text into a sentiment score (see Bholat et al. 2015 for more detail). We rely on the Loughran–McDonald dictionary (Loughran and McDonald 2011) to score the PBOC’s reports. The dictionary is suited for scoring economic and finance-related texts and has the attractive property of providing us with stationary time series. Positive values of our sentiment indicators shown in figure 6 signify positive language—e.g., optimism about economic conditions or supportive monetary policy—while negative values indicate negative language—e.g., concerns about financial stability or credit risk. Sentiment analysis provides a greater degree of objectivity and precision to value assignments than Romer–Romer indicators, since the underlying principles make it possible to track the classification of text more directly and capture sentiment on a continuous rather than a discrete scale. Such computational linguistic methods can further process large quantities of text quickly without the risk of inadvertently missing information.

### 3.2 Model Specifications

To study the effects of different monetary policy tools on bank financing in Japan and China, we rely on standard SVAR models of the general form shown in equation (1).

$$AY_t = C_0^* + C_1^*t + A^*(L)Y_t + C_2^*X_{t-1} + Be_t \quad (1)$$

All models include a constant and a trend term ( $t$ ), to account for the presence of trend-stationary series in the data sets for both countries. The order of the lag polynomial  $A^*(L)$  is chosen automatically on the basis of the Hannan-Quinn criterion (HQC), which indicates a lag order of 2 in the majority of cases. We also include one-period lags of exogenous variables  $X$  to capture the state of the economy; specifically, year-on-year changes of proxies for industry activity, percentage changes of the exchange rate against the U.S. dollar, and consumer price inflation. To allow the data to “speak,” we minimize assumptions and impose a very light structure based on short-term  $A/B$  restrictions. We start from a simple Cholesky-type causal ordering of the variables, on top of which we add minimal restrictions on the contemporaneous association among variables in  $A$ . Correspondingly, we leave matrix  $B$  unrestricted along the diagonal and zero otherwise. The restrictions are based on institutional features of monetary policy in Japan and China outlined in section 2; specifically, lags in the implementation of various monetary policy tools. We further test our restrictions extensively for robustness.

For Japan, we analyze the discount rate (*jp.disc*), the average (regulated) retail interest rate (*jp.retr*), the reserve requirement ratio (*jp.rrr*), the growth rate of the city bank window guidance quota (*jp.wgc*), the interbank overnight rate (*jp.ibor*), and the year-on-year percentage growth rate of bank financing (*jp.bfyy*). We put the discount rate first in our ordering, as it played a central role in Japanese monetary policy within our analysis period and was generally one of the first tools to be adjusted (Patrick 1965; Hoshi, Scharfstein, and Singleton 1993; Suzuki 1994, p. 317). Other policy tools were typically adjusted later and less frequently. In particular, window guidance quotas were set only in quarterly intervals and often independently of the discount rate and retail interest rates, so we restrict the contemporaneous association among these instruments

in matrix  $A$  to zero (note that this does not rule out lagged association). The reserve requirement ratio, while only rarely adjusted in general, was occasionally adjusted at the same time as window guidance, so we leave the corresponding matrix element unrestricted.

$$Y_{t,jp} = \begin{bmatrix} jp.disc \\ jp.retr \\ jp.rrr \\ jp.wgc \\ jp.ibor \\ jp.bfyy \end{bmatrix} \quad A_{jp} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ 0 & 0 & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \quad (2)$$

For China, we analyze changes of the average reserve requirement ratio (*cn.rrrc*), the average benchmark retail interest rate (*cn.retr*), the discount rate (*cn.disc*), our respective window guidance proxy (*cn.ci* is the credit indicator based on narrative analysis), the interbank overnight rate (*cn.ibor*), and the year-on-year percentage growth rate of bank financing (*cn.bfyy*). Again, variables are sorted in the same order in which they are typically adjusted. In China, the reserve requirement ratio plays a much more central role in policymaking than in Japan, whereas the discount rate is typically only adjusted later and less frequently. Again, window guidance is generally only adjusted quarterly and independently of the reserve requirement and the discount rate, so we restrict the contemporaneous association among these instruments to zero in matrix  $A$ . Retail rates, by contrast, are often adjusted simultaneously with window guidance, so we leave the respective matrix element unrestricted.

$$Y_{t,cn} = \begin{bmatrix} cn.rrrc \\ cn.retr \\ cn.disc \\ cn.ci \\ cn.ibor \\ cn.bfyy \end{bmatrix} \quad A_{cn} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ 0 & a_{42} & 0 & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \quad (3)$$

Based on these specifications, we estimate our models on the full-sample and subsample periods.<sup>11</sup> We refer to the full sample with

<sup>11</sup>We maintain identical model specifications for the full-sample and subsample periods, including lag order, to derive comparable results.

the abbreviation “Full,” the pre-break sample with “Pre,” and the post-break sample with “Post.”

To confirm stability of our baseline results, we conduct a number of robustness checks: First, we specify a model where we omit exogenous variables to examine sensitivity of our baseline results. Second, we reorder our variables by putting window guidance first and leaving the order of the remaining variables unchanged (we adjust matrix  $A$  accordingly) to account for the possibility that window guidance may have served as the primary policy tool. Third, we test a specification which combines the first and second robustness test. Fourth, we raise the lag order on our baseline models to 3, higher than that indicated by the HQC. Fifth, we estimate simple VAR models and obtain impulse responses based on a standard Cholesky decomposition (keeping the same ordering as in our baseline models). Finally, we specify country-specific robustness tests: For Japan we specify a model that uses the *collateralized* overnight call rate (*jp.iborc*), and for China we specify a model that uses the reserve requirement ratio for large institutions in first differences (*cn.rrrlc*).

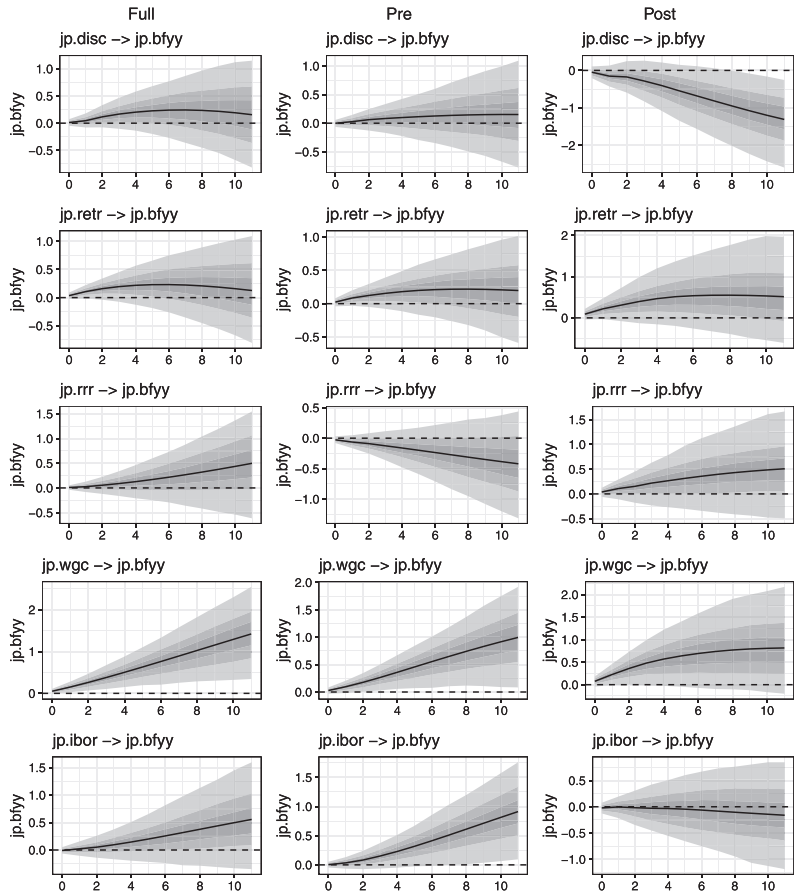
The following section shows the cumulated impulse response graphs for our baseline estimations, together with 95 percent, 68 percent, and 38 percent confidence bands. While our summary addresses the results from our baseline estimations and our robustness checks jointly, we only present the graphs for our baseline estimations for the sake of brevity.

### 3.3 Results

#### 3.3.1 Results for Japan

Figure 7 shows impulse response graphs for our baseline model for Japan. The discount rate (*jp.disc*) overall does not appear significantly associated with bank financing, but impulse responses for subsample periods or alternative model specifications indicate a tendency toward a negative association with bank financing. In the pre-break sample, responses generally tend to lack significance. In the post-break sample, the discount rate appears to gain importance; responses are relatively more significant. Responses based on models excluding exogenous variables further show a mild negative association with bank financing on higher impulse response horizons

Figure 7. Baseline Results for Japan



**Note:** Cumulated impulse response graphs and 95 percent, 68 percent, and 38 percent confidence bands (bootstrapped).

which is consistent across sample periods. The discount rate overall appears to have played a role in Japanese monetary policy, although its influence appears relatively more pronounced in the post-break sample.

Retail rates (*jp.retr*) overall seem largely ineffective. The association between retail rates and bank financing lacks significance or

points in a positive direction, which is the opposite of the theoretically expected negative association. This is the case particularly with models that omit exogenous variables. This suggests that retail rate increases did not constrain the growth of bank financing in Japan.

Responses for reserve requirement ratios (*jp.rrr*) overall lack significance and consistency. Reserve requirement ratios appear somewhat influential in the pre-break period, where upward adjustment of the ratio shows some negative association with bank financing. By contrast, reserve requirements do not seem to have played a major role in the post-break period, where they show a theoretically inconsistent and largely insignificant positive association with bank financing. This decline in relevance might be explained by the relatively less frequent adjustment of reserve requirements in Japan in our post-break sample.

Window guidance (*jp.wgc*) overall appears highly influential. Higher window guidance quotas generally show a positive association with bank financing. The significance of this effect is most pronounced in the pre-break sample. By contrast, window guidance appears to lose effectiveness in the post-break sample; responses generally stabilize much more quickly and exhibit lower significance and quantitative relevance than pre-break responses. These results suggest that window guidance was a highly effective policy tool, but that its effectiveness declined during the post-break sample period.

Finally, although the interbank overnight rate (*jp.ibor*) appears largely irrelevant in the pre-break sample and over the entire sample, post-break responses indicate that the tool is gaining influence. While impulse responses for the pre-break period either lack significance or show a theoretically inconsistent positive association with bank financing, responses for the post-break period show the expected negative if still insignificant association. Although a negative association is not present in the case of the collateralized overnight call rate (*jp.iborc*), a marked downward shift is observable here as well. These results suggest that the interbank overnight rate gradually became more relevant.

### 3.3.2 Results for China

Since we draw on a range of different indicators to capture window guidance in China, we have a much larger number of model

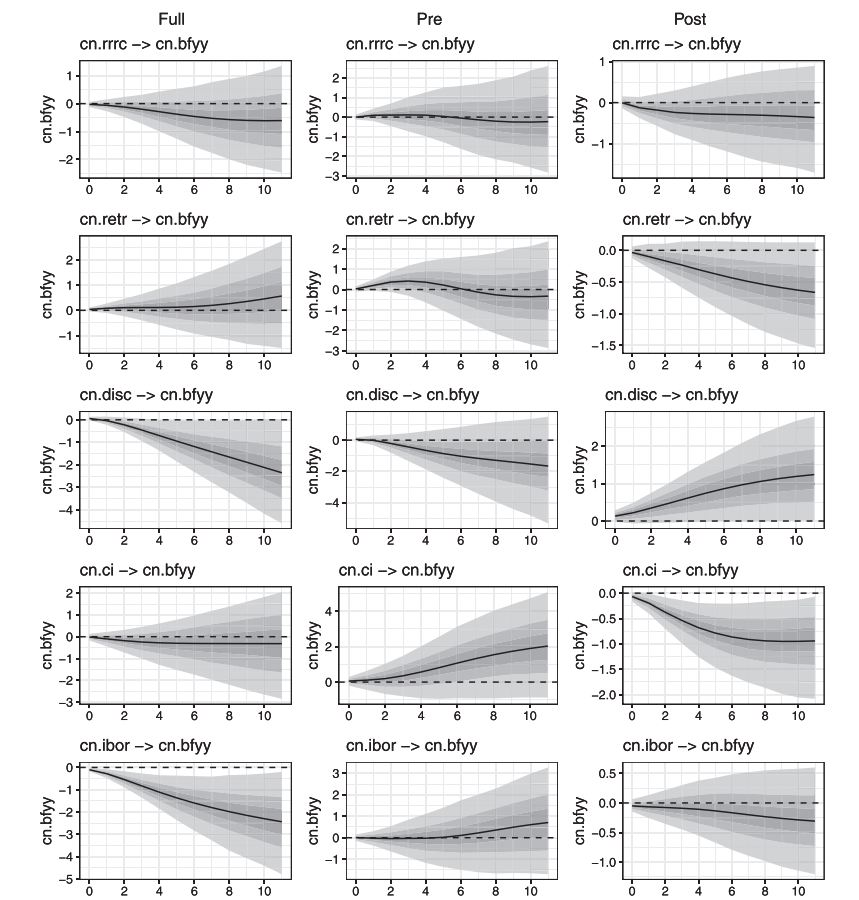
permutations and impulse response graphs. We thus focus on the results for our broader credit indicators, as these are based on larger information sets and so can be considered more reliable. The narrower window guidance indicators and our robustness checks serve as comparison cases. Figure 8 shows results for our narrative credit indicator (*cn.ci*) and figure 9 shows results for our sentiment credit indicator (*cn.cil*).

Reserve requirement ratio adjustments (*cn.rrrc*) generally show a mild negative association with bank financing, but consistency and significance of impulse responses vary across subsample periods and model specifications. In the pre-break sample, responses generally lack significance and occasionally show a tendency toward an inconsistent positive association. Post-break responses show a consistently negative association with bank financing, although significance still varies. The most pronounced (consistent) impact of reserve requirement ratio adjustments is observable within the set of impulse responses for models without exogenous variables. The reserve requirement ratio hence appears to have played a larger role within the post-break sample, possibly owing to the more active adjustment of the tool during this period. Overall, the quantitative impact of reserve requirement adjustments seems subject to a degree of uncertainty.

Retail rates (*cn.retr*) generally appear to have played only a marginal role over the sample as a whole. Significance is low and responses generally show a mild tendency toward a positive association with bank financing rather than the theoretically expected negative association. Although responses for post-break periods and models without exogenous variables show a greater tendency toward a negative association, significance varies markedly. Given that retail rate benchmarks were less stringently enforced during the post-break sample period, uncertainty regarding their ultimate impact on bank financing might be expected. Overall, the results suggest that retail rates have by themselves not played a central role.

The discount rate (*cn.disc*) overall shows a negative association with bank financing. This relationship is also clearly observable within the pre-break sample, although significance and quantitative relevance of the effect is lower in models omitting exogenous variables. In the post-break sample, impulse responses for discount

**Figure 8. Baseline Results for China and Narrative Credit Indicator (broad)**



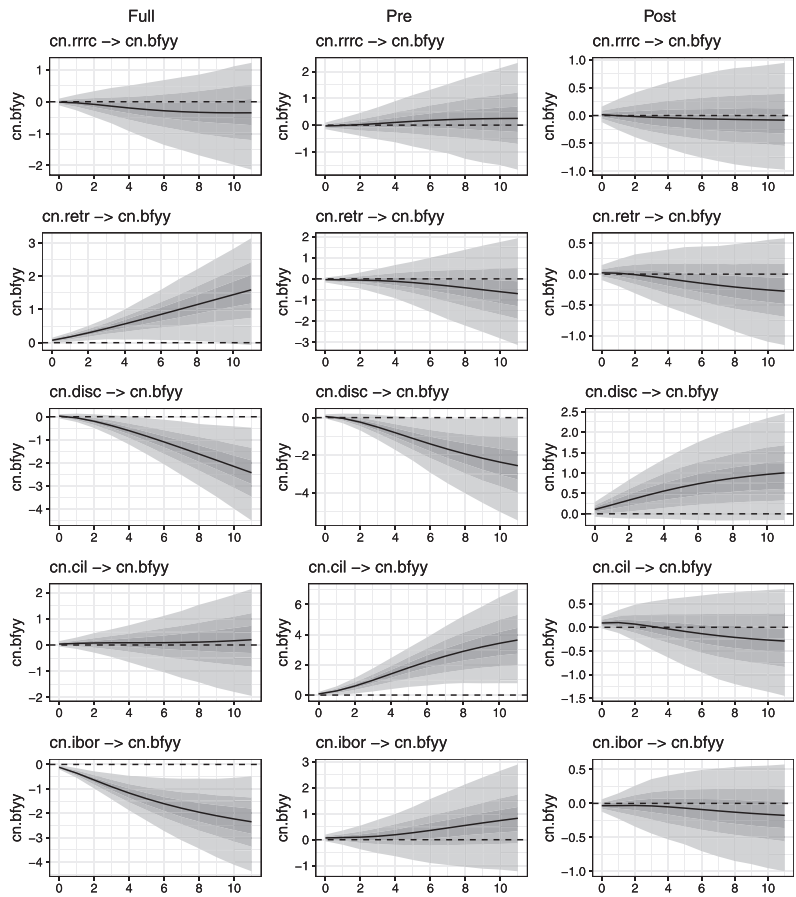
**Note:** Cumulated impulse response graphs and 95 percent, 68 percent, and 38 percent confidence bands (bootstrapped); window guidance captured by narrative credit indicator (broad) *cn.ci*.

rates tend toward a positive, and therefore theoretically inconsistent, association with bank financing. This change may reflect the more prominent role that central bank lending used to play at the start of our pre-break sample period (Dickinson and Liu 2007).

The role of window guidance, as captured by our narrative indicators and sentiment indicators, appears to have changed between the



**Figure 9. Baseline Results for China and Sentiment Credit Indicator (broad)**



**Note:** Cumulated impulse response graphs and 95 percent, 68 percent, and 38 percent confidence bands (bootstrapped); window guidance captured by sentiment credit indicator (broad) *cn.cil*.

pre-break and post-break sample periods. In the pre-break sample, all our indicators show a positive association with bank financing that is generally significant, suggesting that the tool was very effective within this period. By contrast, post-break responses show a marked downward shift, with the size of this shift depending on the

indicator and model specification. In the case of our narrative credit indicator (*cn.ci*), post-break responses generally show a strong and theoretically inconsistent negative association with bank financing. In the case of our sentiment credit indicator (*cn.cil*), post-break responses show a milder negative association but overall lack significance. In the case of our narrative window guidance indicator (*cn.wgi*) and our sentiment window guidance indicator (*cn.wil*), post-break responses are still positive but considerably less significant and quantitatively relevant than before. While our narrow window guidance indicators thus suggest a relatively mild decline in the effectiveness of window guidance (mirroring the Japanese experience), our broader credit indicators suggest a more pronounced loss of effectiveness of the tool. These results in part reflect the different size of the underlying information sets (the relatively smaller amount of information on window guidance, for example), but may also indicate greater concern about credit growth on part of the authorities. While data constraints do not allow us to quantify the magnitude of the change between our subsamples, all four of our indicators do suggest a decline in the effectiveness of window guidance.

Finally, the interbank overnight rate (*cn.ibor*) shows a strong negative association with bank financing overall. While pre-break responses are largely insignificant and occasionally inconsistent, post-break responses show a greater degree of significance and, generally, a negative association. It therefore appears that the interbank rate became more relevant in the post-break period compared with the pre-break period.

### 3.3.3 Interpretation and Economic Significance

Our results show significant similarities and important differences in the transition of monetary policy in Japan 1973–91 and China 2000–17, respectively. In both economies, quantitative credit control by way of window guidance played an important role historically, particularly in the pre-break periods.<sup>12</sup> Over time, price measures such as interbank rates assumed greater importance. This transition is

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<sup>12</sup>Unfortunately, the nature of our data does not allow us to draw conclusions regarding the qualitative effectiveness of window guidance at modifying the structure of lending or asymmetric impacts of the tool that vary by economic circumstances or overall policy stance.

more pronounced in our estimations for China than for Japan. We attribute this to the relatively quicker pace of institutional transformation in China and conscious efforts by Chinese authorities at promoting interest rates. Our sample period for Japan also ends before the interbank rate took center stage in the late 1990s.

Differences between the results for Japan and China are mostly due to historical and institutional factors. The discount rate played a relatively more pronounced role in Japan post-break than in China, for example, which may have partly masked the role of the interbank rate. At the same time, reserve requirement ratios played a relatively more pronounced role in China, particularly in the post-break sample period, where reserve requirements were adjusted more frequently and where excess reserve positions tended to be lower. By contrast, Japanese authorities did not adjust reserve requirement ratios from July 1986 to the end of our sample period, so the tool has a relatively more subdued impact in our post-break sample.

Finally, differences in our empirical results also partly reflect different variable definitions, most notably in the case of the interbank overnight rate. Our estimations for Japan are based on the collateralized interbank overnight rate within the pre-break sample but mostly on the uncollateralized interbank overnight rate within the post-break sample. While the difference between both variables is small (their correlation coefficient is 0.99) and although our robustness check confirms that the quantitative difference for impulse responses in the post-break sample is negligible, the underlying economic concepts are distinct and thus not entirely comparable.

The experiences of Japan and China overlap in the observed loss of effectiveness of window guidance and the simultaneous elevation of interbank rates. In both economies, this shift coincided with the development of capital markets and an acceleration of credit growth. As such, our results indicate that monetary policy transmission changed in a structural way, epitomized by the loss of potency of quantitative control. This has important implications for policymaking, which we shall explore in section 4.

#### **4. Discussion and Policy Recommendations**

Our findings correspond to those of previous studies on the role of window guidance in Japan, as authors such as Hoshi, Scharfstein,

and Singleton (1993), Suzuki (1994, pp. 325ff.), Rhodes and Yoshino (1999, 2007), and Fukumoto et al. (2010) have suggested that the influence of window guidance has weakened during its final years. In the case of the Chinese economy, the pre-crisis consensus used to be that interest rates are simply not as effective as quantities and administrative tools (see, e.g., Geiger 2008), whereas studies conducted after the crisis have found signs that interest rates are becoming more effective (see, e.g., Conway, Herd, and Chalaux 2010). The Chinese experience mirrors the Japanese experience in that window guidance, once a tool of major importance, is now declining in effectiveness (Nagai and Wang 2007; Fukumoto et al. 2010). History suggests several possible reasons for this development.

First, financial market development, particularly bond market development, may limit the effectiveness of window guidance. As window guidance operates through banks, it stands to reason that the policy is most effective in systems that are bank dominated (Yoshino 2012). Up to the mid-1980s, Japanese corporations remained heavily restricted in their ability to raise funds through nonbank channels, as they were effectively prohibited from issuing bonds domestically or internationally (Hoshi, Scharfstein, and Singleton 1993). Similarly, capital market development remained heavily restricted in China up to the early 2000s. As sources of nonbank financing developed, financial constraints loosened. This in turn limited the ability of banks to increase or decrease loan provision in line with official guidelines.

Second, financial liberalization more broadly creates room for financial innovation, which again loosens financing constraints. For example, Japanese banks throughout the 1980s increasingly sought to bypass window guidance limits by soliciting “impact loans” from foreign financial institutions for their corporate customers, i.e., medium-term U.S.-dollar-denominated loans that were mediated, guaranteed, and converted into Japanese yen by Japanese banks (Brown 1994, pp. 32ff.; Fukumoto et al. 2010). The decompartmentalization of Japanese financial markets and bank types also allowed for greater substitutability of funding sources (Brown 1994, pp. 106ff.). Similar developments underpin the expansion of the Chinese shadow banking system (see Ehlers, Kong, and Zhu 2018 for an attempt to map the system and its linkages).

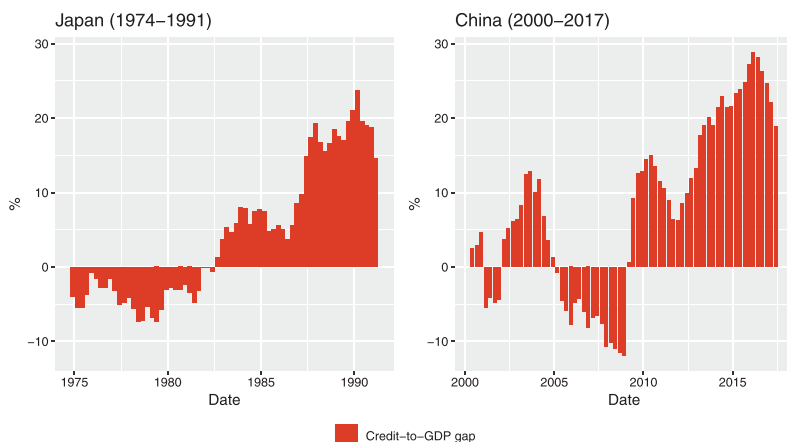
Third, capital account opening further broadens the range of funding sources by giving the private sector the ability to tap foreign markets. Japan gradually opened the capital account following the 1984 Yen–Dollar Accord, when it embarked upon internationalizing the Japanese yen. Similarly, China made gradual steps toward capital account liberalization when it began promoting an international role for its currency, the Chinese yuan, following the global financial crisis.

On a policy level, financial liberalization and sophistication reinforce the case for interest rates. As the financial system moves toward a market-based system, interest rates assume greater importance for bond markets and foreign finance by summarizing the policy stance of authorities in a single price signal. Interest rates thus contribute to raising the efficiency of the financial system in allocating resources (and, conversely, in reducing resource misallocation). In the case of China, a firm establishment of interest rates may contribute positively to ongoing efforts at rebalancing of the Chinese economy and help reduce overcapacity in certain industrial sectors. Conversely, the simultaneous application of quantity-based tools like window guidance and price-based tools like interest rates is likely to produce inconsistent results. It may blur monetary policy transmission and hinder the shift toward a system based exclusively on interest rates (Geiger 2008).

A key question, then, revolves around the relationship of window guidance with financial stability. Monetary policy and macroprudential policy interact. While window guidance may appear an attractive policy tool in heavily centralized economies, its application requires detailed knowledge of the economy. As an economy develops and becomes more complex, negative side effects of window guidance such as nonperforming loans may increase (Conway, Herd, and Chalaux 2010; Sonoda and Sudo 2016). From a historical perspective, it is striking how expansionary window guidance toward the start of our post-break samples went hand in hand with an increasing credit-to-GDP gap in both Japan and China (figure 10).<sup>13</sup>

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<sup>13</sup>The BOJ chose to abolish window guidance following the adoption of Basel I (1988 Basel Capital Accord), since officials felt that Basel capital requirements would prevent banks from lending excessively (Cargill, Hutchison, and Ito 1997, pp. 52–54; Itoh, Koike, and Shizume 2015, pp. 195–96).

**Figure 10. Credit-to GDP Gaps**

**Source:** Bank for International Settlements.

**Note:** The credit-to-GDP gap is the difference between the credit-to-GDP ratio and its long-run trend (HP filter).

In recognition of the potential positive effects of strengthening price measures, we offer three main policy recommendations for improving the stability and functioning of the interbank rate as the central macroeconomic price variable. These apply to the case of China and other countries transitioning from quantities to prices in their monetary policy setup.

First, we recommend a reduction in the number of tools employed in favor of transparent and market-oriented price-based tools in order to streamline monetary policy transmission, raise the signaling value of interest rates, and reduce the chance of adverse effects arising from the simultaneous application of different types of tools.

Second, given the observed importance of interest rates, we believe that high interest rate volatility, as seen in China, is problematic. To limit the variability of short-term interbank rates, we recommend strengthening standing facilities to provide a well-defined and credible interest rate corridor (Woodford 2001; Goodhart 2008; Bindseil and Jablecki 2011). The upper limit of such a corridor would be made up of a penalty rate at which the central bank provides the market with emergency liquidity. The lower limit could be made

up of a deposit rate or interest on excess reserves paid outright on current account deposits. Such a setup has recently attracted the interest of policymakers in China (Niu et al. 2015; Ma 2017). Japan implemented an interest rate corridor in the 2000s (Institute for Monetary and Economic Studies 2012).

Finally, given the growth of nonbank financing in China, the signaling value of one central interest rate anchor, and the importance of well-functioning reserve requirements at ensuring the smooth operation of interest rates, we suggest improvements to the application of reserve requirements. Such improvements could take the form of longer reserve maintenance periods and averaging provisions. This would provide banks with more flexibility to adjust their reserve positions in response to shocks and allow authorities to strengthen the use of reserve requirement adjustments for macroprudential purposes (Wang and Sun 2013). Indeed, recent policy initiatives appear to be moving in this direction (Yao et al. 2015).

## 5. Conclusions

We explored the transition of monetary policy in Japan 1973–91 and China 2000–17 from quantity-based systems to price-based systems, focusing on the role of window guidance and the interbank overnight rate. We provided an in-depth institutional examination of monetary policy setups in Japan and China, and conducted quantitative analyses of the effects of different monetary policy tools on the amount of bank financing using SVAR models based on institutional identification schemes. Our estimations incorporated historical statistics on window guidance in Japan from industry sources, and quantitative information on window guidance in China from text analysis based on the Romer–Romer narrative approach and sentiment analysis, a computational linguistic method.

Our results indicate that there are significant similarities in the transition of monetary policy in Japan and in China. In both economies, window guidance starts out as a potent monetary policy tool that declines in importance over time. Interbank rates, conversely, assume a larger role. This transition is more pronounced in China than in Japan, which we attribute to the relatively brisk pace of institutional transformation in China and conscious efforts on the part of the authorities at promoting interest rates.

In light of the Japanese experience, we argue that the declining effectiveness of window guidance in China should not be surprising. Financial market development, financial liberalization, and capital account opening all reduce the effectiveness of window guidance by broadening the range of available funding sources to the private sector. Thus, effectively managing the transition to a system based on prices is of central importance for policymakers.

Given these findings, we recommend three adjustments to monetary policy operations. First, we recommend a reduction in the number of tools in favor of transparent and market-oriented price-based tools to reduce the chance of adverse effects arising from the simultaneous application of different types of tools. Second, we recommend strengthening standing facilities to provide a well-defined and credible interest rate corridor to limit excess volatility of the interbank rate. Third, we suggest institutional adjustments to improve the application of reserve requirements such as the introduction of longer reserve maintenance periods and averaging provisions.

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