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Tracing the transition of monetary policy in Japan and China

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From Window Guidance to Interbank Rates

Tracing the Transition of Monetary Policy in Japan and China

Stefan Angrick* Naoyuki Yoshino†

18 February 2018

Abstract

Monetary policy in most major economies has traditionally focused on control of the interbank interest rate to achieve an inflation target. Monetary policy in transition economies, in contrast, relied on a mixed system of price-based and quantity-based instruments and targets. Japanese monetary policy up to the 1990s was based on such a mix, and echoes of this system are today found in China's monetary policy set-up. We explore the transition of these two monetary policy regimes historically and quantitatively with institutional comparison and Structural Vector Autoregressive (SVAR) models. Specifically, we examine the role of the interbank rate and "window guidance," a policy by which authorities use "moral suasion" to communicate target quotas for lending growth directly to commercial banks. In Japan's case, we compile historical statistics on window guidance from newspapers and industry sources. For China, we apply Romer–Romer text analysis and computational linguistic techniques to policy reports to quantify information on window guidance.We empirically demonstrate the declining effectiveness of quantity measures and the increasing importance of price measures. We end with a policy assessment of managing the transition of monetary policy from a quantity-based system to a price-based system.

Keywords: monetary policy transition; window guidance; computational linguistics; Japan; China

JEL Classifications: E5, E52, E58

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1 Introduction

Monetary policy in most major economies has traditionally focused on control of the interbank interest rate to achieve an inflation target. Monetary policy in transition economies, in contrast, relied on a mixed system of price-based and quantity-based instruments and targets.[1] Japanese monetary policy prior to 1991 was based on a mixed system. Echoes of this system are found today in China's monetary policy set-up.

Historically, financial markets played a peripheral role in the early stages of development of both the Japanese and Chinese economies. This prevented exclusive reliance on price-based policy tools such as interest rates, so monetary authorities also emphasised quantity tools. As markets developed and the effectiveness of quantity tools waned, price measures assumed more importance. Our focus in this paper concerns the transitions from quantity-based to price-based monetary policy in Japan (1973–1991) and (China 2000–2017). We examine how the effectiveness of monetary policy tools evolves during transition, particularly regarding the role of the interbank rate and "window guidance," a policy by which authorities seek to guide lending volumes of commercial banks through "moral suasion."[2]

At a certain stage of development, many countries have had to deal with transition from a monetary policy regime based on quantities to a one based on prices. Management of this transition is a non-trivial exercise as quantities and prices interact. Elevating one usually means de-emphasising the other. Japan and China present insightful case studies in this respect, given the rapid institutional change and structural similarities of both economies. Both countries are also unique in the amount of information they publish on the application on window guidance, which, like other forms of moral suasion, is rarely observed elsewhere. In Japan, the window guidance quotas assigned to commercial banks were published in industry magazines like the Japanese Bankers Association's *Kin'yū* or the *Nihon Keizai Shimbun*, making it possible for us to hand-compile the data used in the present analysis. While we do not have as much detail on window guidance in China, the application of window guidance is reported descriptively in the People's Bank of China's (PBOC) Monetary Policy Reports. We quantify this information using Romer–Romer text analysis (Romer & Romer, 1989) and computational linguistic methods.

Drawing on our data-set, we estimate Structural Vector Autoregressive (SVAR) models to study the transmission from monetary policy tools to the amount of bank financing

[1] By necessity, this is a broad and stylised characterisation of central banking. See Bindseil (2004) and Borio & Disyatat (2010) for details on the historical evolution and relative importance of quantities and prices in monetary policymaking.

[2] 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 seems to be a common tool in transition economies (Archer, 2005; Neely, 2000).

in Japan and China.[3] Our identification schemes are based on institutional analysis and examined extensively for robustness. To trace the evolution in the effectiveness of tools over time, we estimate our models on the full sample and on sub-samples. Our break points are chosen using Chow tests for structural breaks.

The results reveal significant similarities and distinctions in the monetary policy evolution of Japan and China. In both economies, window guidance is an initially potent policy tool that loses potency over time. 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.

In light of the Japanese experience, we do not find the declining effectiveness of window guidance in China surprising. Financial market development, financial liberalisation and capital account opening all dampen the effectiveness of window guidance by broadening the range of available funding sources for the private sector. Effectively managing the transition to a system based on prices is thus a central monetary policy challenge.

In recognition of the possible positive effects the transition to a system based on prices, we provide several suggestions applicable to Chinese policymakers (and more broadly policymakers in other countries transitioning from quantities to prices in their monetary policy set-up). First, we recommend a reduction in the number of tools in favour 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 requirement ratios, such as the introduction of longer reserve maintenance periods and averaging provisions.

Our paper contributes to the literature on monetary policy transmission by quantitatively characterising the transition from a monetary policy regime based on quantities to one based on prices and providing suggestions for how to best manage it. To our knowledge, it is the first paper to provide an in-depth, quantitative 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 set-ups 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.

[3] Bank financing is understood here as all claims on the private sector held by commercial banks.

1.1 Literature review

This paper spans a variety of topics in the broad literature on monetary policy transmission (see Taylor, 1995, for an introductory exposition). For reasons of space, we therefore limit ourselves to a few selected works in this literature review.

Japanese monetary policy after the Second World War has been covered in great detail by Suzuki (1994), Brown (1994), Cargill et al. (1997), Itoh et al. (2015) and Rhodes & Yoshino (2017). Window guidance features prominently in these works, reflecting the long debate on the importance and effectiveness of the tool.[4] Horiuchi (1977a,b) argues that window guidance is ineffective, whereas a number of other authors, including, for example, Patrick (1962), Kure (1977), and Eguchi (1977), argue that the tool is effective. Later analyses of window guidance quantitatively analyse the substitutability of funding sources (Hoshi et al., 1993), or the actual window guidance quotas (Rhodes & Yoshino, 1999, 2007; Werner, 2002), and agree in their assessment that window guidance was a highly effective monetary policy tool in Japan, although some point out the possibility that its effectiveness has declined with increasing financial market development (e.g. Hoshi et al., 1993; Rhodes & Yoshino, 2007).

Chinese monetary policy has been analysed extensively in recent years, with empirical evaluations typically relying on variations of Vector Autoregressive (VAR) models. Prominent examples include Dickinson & Liu (2007), Mehrotra (2007), Laurens & Maino (2007), Koivu (2009), Sun et al. (2010), He et al. (2013) and Fernald et al. (2014). A number of early works address window guidance in China qualitatively, such as Green (2005), Lardy (2005) and Geiger (2008). Quantitative analyses of window guidance can be found in Yoshino & Angrick (2016) or Chen et al. (2017), who use Romer–Romer indicators to capture window guidance. Such indicators are often employed to capture the stance of Chinese monetary policy more generally (see e.g. He & Pauwels, 2008; Shu & Ng, 2010; Sun, 2015). In our own analysis of window guidance, 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 & Blix Grimaldi, 2012; Bholat et al., 2015; Bholat, 2015; Luangaram & Wongwachara, 2017).

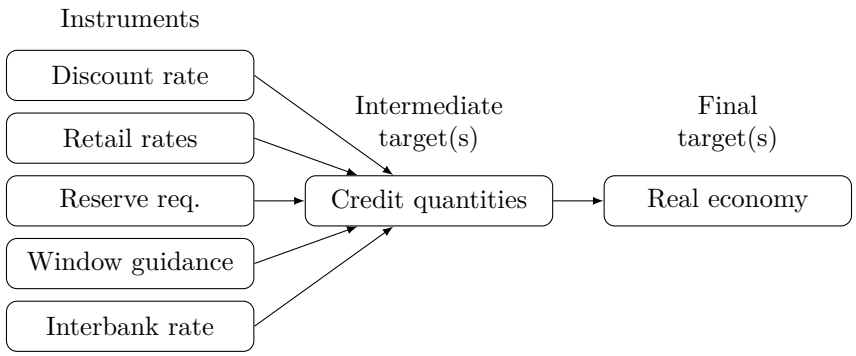
While Fukumoto et al. (2010) have conducted a detailed and insightful institutional-historical comparison of window guidance in Japan and China, a joint analysis of window guidance in both countries that combines qualitative and quantitative means has so far been lacking. We strive to close this gap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

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

2 Institutional background

Chinese monetary policy in 2000–2017 shares many similarities with Japanese monetary policy in 1973–1991 with regard to institutional set-up, policy instruments, policy targets and market structure. In both economies, banks acted as the main providers of credit to the non-financial private sector during our respective analysis periods, so monetary policy was conceptualised largely around its impact on banks. As illustrated in stylised fashion in Figure 1, monetary authorities in Japan and China have relied on a range of quantity-based and price-based tools to influence bank lending (intermediate target) and the real economy (final targets, such as economic growth or inflation). The discount rate was a major policy lever in Japan, while reserve requirements held prominence in China. Window guidance initially played a central role before monetary authorities began raising the profile of interbank rates in both Japan and China. Regulation of retail interest rates was also important early 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 et al., 2013). In our empirical analysis, we focus on the link between policy instruments and bank lending.

Figure 1: Stylised representation of monetary policy transmission in Japan (1973–1991) and China (2000–2017)

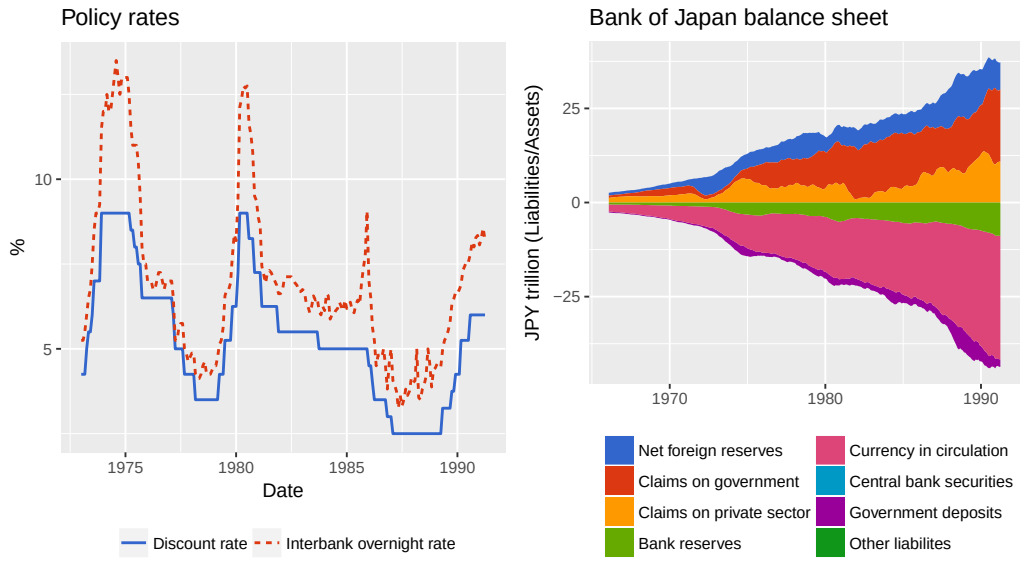


Source: Authors' work, drawing on Rhodes & Yoshino (2007, p. 26).

2.1 Monetary policy in Japan 1973–1991

In technical terms, the Japanese central bank, the Bank of Japan (BOJ), was subordinate to the Ministry of Finance (MOF) until 1997, when the revision of the Bank of Japan Act established a greater degree of central bank independence. Responsibility for monetary policymaking was shared between the BOJ and MOF during our analysis period (Flath, 2005, p. 270). Even so, Cargill et al. (1997) point out that the BOJ enjoyed considerable de facto independence after 1975.

Figure 2: Japanese central bank policy rates and balance sheet (1973–1991)



Note: JPY = Japanese yen. Before July 1985, the interbank overnight rate in Japan was the collateralised overnight call rate, and the uncollateralised overnight call rate thereafter. The balance sheet series are in 9-month moving averages
Sources: Bank of Japan and IMF International Financial Statistics, via Euromoney's CEIC database.

The discount rate, i.e. the price commercial banks pay at the discount window when obtaining liquidity from the central bank, played a major role in Japanese monetary policymaking. Lending to commercial banks was originally a major way by which the BOJ provided commercial banks with funds. This is reflected in the item "Claims on the private sector" on the asset side of the BOJ's balance sheet shown in Figure 2. 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. 109–111) 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. 73 ff.), 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, took on greater importance in the late 1980s. The uncollateralised overnight call rate was established in 1985, but did not become the main operating target until the 1990s. As Figure 2 shows, the interbank rate remained above the discount rate

throughout our analysis period. It was also relatively volatile, which, according to Hoshi et al. (1993), reflected excess demand for funds.

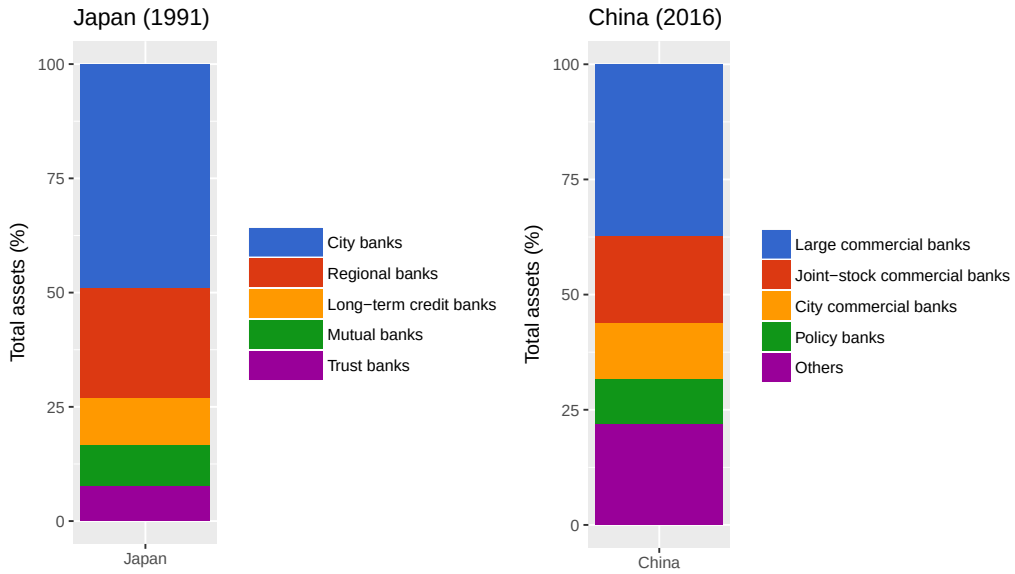
Window guidance in Japan was conducted through regular meetings between the BOJ and bank officials, with lending quotas were assigned to each bank. The Japanese financial system was (and still is) a largely bank-based one, so the amount of non-bank credit is smaller than the amount of bank credit. Up to the mid-1980s, Japanese corporations remained heavily restricted in their ability to raise funds through non-bank channels as they were effectively prohibited from issuing bonds domestically or internationally (Hoshi et al., 1993).

As shown in Figure 3, 13 "city" banks dominated banking activity in terms of assets, loans and lending during our analysis period (Fukumoto et al., 2010). City banks at the time were large commercial banks with nationwide branch networks that served large corporate customers. Regional banks and mutual banks (also known as "second-tier regional banks") were smaller banks concentrated in one prefecture. Trust banks and long-term credit banks focused on specific market segments (Flath, 2005, pp. 262–268). Towards the end of the 1980s, the distinctions among types of banks began to blur (Brown, 1994, pp. 106 ff.). The distinctions became largely irrelevant after the Japanese asset price bubble burst in the early 1990s and the banking industry went through a major consolidation. As of 2018, only five 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).

Window guidance targeted city banks (Suzuki, 1994, pp. 325 ff.; Cargill et al., 1997, pp. 27 ff.), but window guidance quotas were also assigned to regional banks, long-term credit banks, mutual banks and trust banks. After1973, window guidance was extended to foreign and smaller local financial institutions that are less relevant during our analysis period (Fukumoto et al., 2010; Hoshi et al., 1993; Suzuki, 1994, pp. 325 ff.; Brown, 1994, pp. 59 ff.).

City banks generally had a shortage of funds, while regional banks, mutual banks and other financial institutions had surpluses. City banks therefore depended on borrowing from the BOJ and other financial institutions in the interbank market to meet their liquidity needs (Fukumoto et al., 2010; Suzuki, 1994, pp. 23–25). Given that the BOJ maintained the discount rate below the interbank rate, any bank forced to obtain funding in the interbank market faced relatively higher cost of funding than its competitors (Patrick, 1965). This may be one reason city banks paid such close attention to window guidance quotas compared to other institutions. Suzuki (1994, pp. 325 ff.) further points out that qualitative restrictions were occasionally imposed on bank lending, including restrictions on lending to trading companies or securities investment. Penalties

Figure 3: Types of banks by market share (total assets) in Japan and China



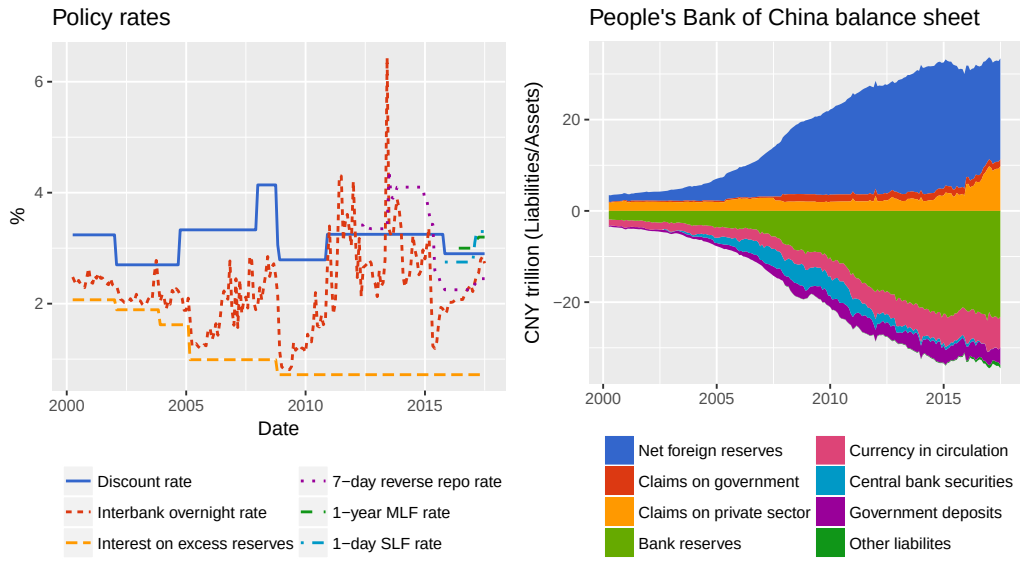
Sources: Bank of Japan and China Banking Regulatory Commission.

on banks that bank disregarded BOJ window guidance included lower future quotas and unfavourable conditions in transactions with the central bank (Werner, 2002).

Window guidance occupied a central position in early analyses of Japanese monetary policymaking. One major area of debate was the question whether window guidance was a primary or secondary monetary policy tool (see e.g. Suzuki, 1994, p. 317; Cargill et al., 1997, pp. 27 ff.; Fukumoto et al., 2010, Itoh et al., 2015, pp. 97 ff., for an overview of the positions taken by different parties involved in the debate). Another commonly discussed topic was potential asymmetry in the application of window guidance, with several authors arguing that window guidance worked better when liquidity conditions were tight (Fukumoto et al., 2010; Okina et al., 2001; Kure, 1977).[5] Finally, the central debate on the effectiveness of window guidance generally revolved around the possibility of circumventing window guidance quotas (Suzuki, 1994, pp. 189 ff.). It was argued that if firms were able to obtain funding from other sources when their main bank faced window guidance restrictions, window guidance would be rendered ineffective at the aggregate level.

[5]Many issues of the Japanese Bankers Association's Kin'yū surveyed for this project stated that the BOJ solicited and basically approved loan growth plans from banks during periods of easy monetary policy.

Figure 4: Chinese central bank policy rates and balance sheet (2000–2017)



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

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

2.2 Monetary policy in China 2000–2017

The central bank of the People's Republic of China, or PBOC. Its status as China's central bank was formalised in 1995 (Wang & Hu, 2011). Although the PBOC's autonomy in several key areas of policymaking has grown over the years (importantly, in policy implementation), ultimate authority over monetary policy lies with the State Council.

Monetary policy in China underwent rapid institutional change as the Chinese economy developed. Before 2000, central bank lending played an important role in monetary policymaking. The interest rate charged on central bank credit acted as a guiding rate for the broader economy (Dickinson & Liu, 2007). This was similar to the role the discount rate played in Japan before the 1990s. Over time, open market operations, repurchase agreements ("repos") and reserve requirements replaced central bank lending as the primary policy tools,[6]rendering lending rates largely symbolic (Conway et al., 2010; Geiger, 2008; Fungáčová et al., 2016). With the establishment of the PBOC's Standing Lending Facility (SLF) and Medium-Term Lending Facility (MLF) in recent years, however, central bank lending has again assumed some importance. Since central

[6]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.

bank lending rates correlate to some degree and due to data constraints, the empirical analyses rely on the discount rate, shown in Figure 4, to account for lending by the PBOC.

As in Japan, retail interest rates in China were tightly regulated around the beginning of our analysis period. Over the years, deviation from benchmark lending and deposit rates came to be tolerated. Today, retail rate benchmarks play a relatively smaller role in Chinese monetary policymaking (e.g. Garcia Herrero & Pang, 2016).[7]

A prominent feature of Chinese monetary policy is the active use of reserve requirements. 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 liability side of the PBOC's balance sheet shown in Figure 4 and, together with central bank bills, play a major role in sterilising the accumulation of foreign exchange reserves on the asset size (Angrick, 2018; Ma et al., 2013). Until recently, there were no averaging provisions for required reserves (Yao et al., 2015). 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 (IIMA, 2004).

Short-term interbank rates have assumed greater importance in Chinese monetary policymaking over time. According to Xie (2004), the PBOC maintains an interest rate corridor where the discount rate constitutes the upper limit and the interest rate on excess reserves constitutes the lower limit. This somewhat mirrors monetary policy set-ups in European economies (Angrick & Nemoto, 2017). As Figure 4 illustrates, the interbank overnight rate has shown a great degree of volatility since the Global Financial Crisis of 2007–2008. The discount window, in contrast, failed to provide an effective upper limit at times when interbank liquidity was short (Conway et al., 2010). Attempts have been made in recent years to establish new facilities and operations to provide central bank liquidity and limit the upward momentum of interbank rates. In particular, 7-day reverse repos, the 1-day SLF and the 1-year MLF have seen increasing use and now receive considerable attention from analysts (Lee, 2017; Zhao et al., 2017).

Window guidance is frequently cited by observers as one of the PBOC's most important policy tools. It is widely regarded as effective (e.g. Lardy, 2005; Green, 2005; Fukumoto et al., 2010; Chen et al., 2013). Window guidance is formulated by the PBOC, which sets lending quotas and communicates them in regular (at least once a month) meetings with commercial banks. According to the classification used by the China Banking Regulatory Commission (CBRC) shown in Figure 3, the types of banks in

[7] China's official policy rates, such as central bank lending rates, retail rates and rates on required and excess reserves earlier followed a "divisible by nine" rule. This practice frequently produced interest rates distinctly different from those in the United States and Europe (Yam, 2006), where interest rates tend to move in increments of 25 basis points.

China include large commercial banks, joint-stock commercial banks, city commercial banks, policy banks and a range of smaller institutions. 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) form much of the category "Large commercial banks" and dominate banking activity across China. Window guidance very much targets these giant state-owned banks, but also extends to joint-stock commercial banks and smaller local banks (Chen et al., 2013; Fukumoto et al., 2010).

Although window guidance is formulated mainly by the PBOC, 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. In addition to quantitative guidance, authorities on occasion try to steer lending to 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 (Fukumoto et al., 2010; Conway et al., 2010; Geiger, 2008).[8] Public information on the practice of window guidance is available primarily in the PBOC's Monetary Policy Reports. Finally, the PBOC publishes ad hoc notices and dates of window guidance meetings on the websites of its regional branches.

Window guidance is enforced through a variety of channels, such as penalty deposits or targeted transactions (e.g. bill issuance, foreign currency swaps or time deposits) with banks that disregard window guidance. Geiger (2008) and Chen et al. (2013) further call attention to the fact that the PBOC governor ranks above commercial bank officials in China's political hierarchy, so the PBOC (together with the CBRC) is in a position to influence appointments of senior personnel at commercial banks. These structural realities may explain in part the effectiveness of the PBOC's "moral suasion."

3 Empirical analysis

We empirically examine the transmission from different monetary policy tools to bank financing in Japan 1973–1991 and China 2000–2017 using Structural Vector Autoregressive (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 analyse the data over the full sample periods and sub-sample periods as indicated by a Chow test for structural breaks. The purpose of the analysis is to gain insight into the effectiveness of

[8] Chinese authorities have a broad monetary toolkit and also seek to influence lending behaviour through monetary tools other than window guidance. The authors thank Riikka Nuutilainen for making sure we are clear on this.

Figure 5: Chow tests for structural breaks
H_0: No structural break in growth rate of bank financing

Japan	**China**
Test for break point at September 1985 (Plaza Agreement)	Test for break point at November 2008 (Global Financial Crisis)
F = 73.81 p-value = 0.0000	F = 14.64 p-value = 0.0002

Note: Sample for Japan starts in 1977 to exclude extreme growth at start of sample

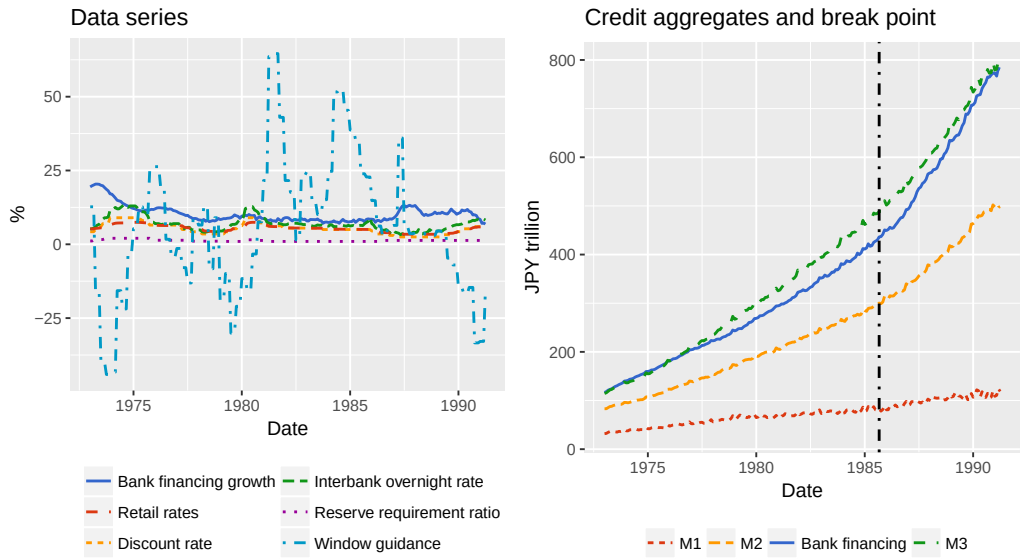
various monetary policy instruments and their evolution over time. We are particularly interested in the changing characteristics of quantitative monetary policy tools such as window guidance compared to price-based monetary policy tools such as interest rates.

3.1 Data

We obtain monthly frequency data from primary sources such as the BOJ, the PBOC, the Chinese National Bureau of Statistics (NBS) and International Monetary Fund (IMF) mainly through Euromoney's CEIC economic database. All series were subjected to Augmented Dickey-Fuller (ADF) tests and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests to ensure stationarity or trend-stationarity. Where series were found to be non-stationary, we took first differences or, when seasonality was present, calculated year-on-year percentage differences.

The data series for retail interest rates is calculated as the mean of the benchmark retail lending rate and the benchmark retail deposit rate (which, with very few exceptions, move in lockstep). The reserve requirement ratio in China is the first difference of the mean of the ratio for large depository institutions and the ratio for small and medium depository institutions, whereas the reserve requirement in Japan is expressed in level terms. Window guidance in Japan is, by convention, measured by the assigned loan growth quota as a percentage of 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 collateralised overnight call rate and the uncollateralised overnight call rate thereafter. For China, the interbank overnight rate is transaction-based China Interbank Offered Rate (CHIBOR). Bank financing growth is expressed as year-on-year percentage growth rates for both countries.

Figure 6: Japanese data series and credit aggregates (1973–1991)



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

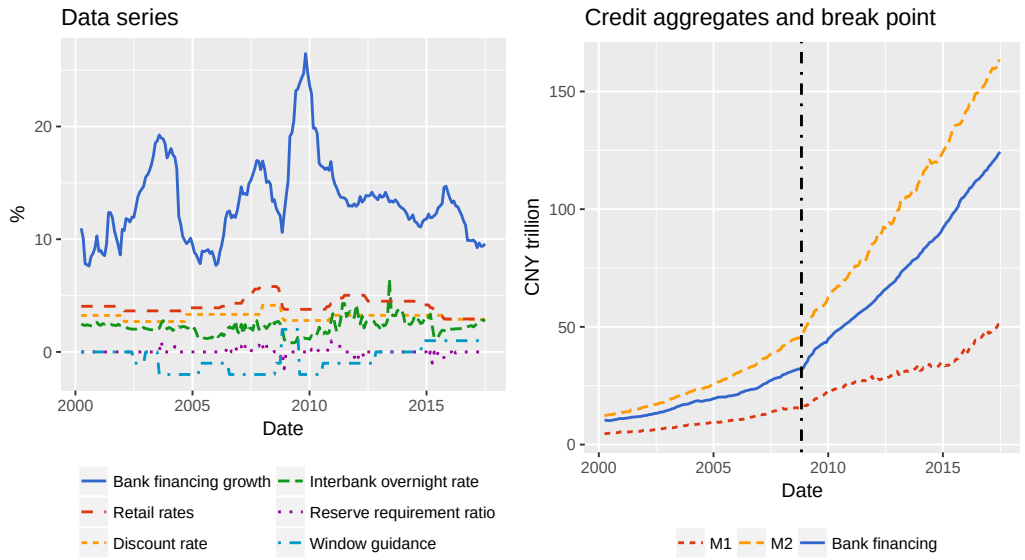
Sources: Bank of Japan and IMF International Financial Statistics, via CEIC; window guidance quotas from Japanese Bankers Association's Kin'yū, Nihon Keizai Shimbun.

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 break point. For Japan, we chose September 1985, the date of the Plaza Agreement, as the potential break point.[9] For China, we chose November 2008, when the Global Financial Crisis hit China, as the potential break point.[10] As shown in Figure 5, 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 range of different credit aggregates, as shown in As Figure 6 and Figure 7. We split our data sets at the indicated break point.

[9]The Plaza Agreement was an agreement between the governments of France, Germany, Japan, the United States, and the United Kingdom to depreciate the US dollar vis-à-vis the Japanese yen and the German mark.

[10]The Chinese government launched a large-scale stimulus programme in reaction to the Global Financial Crisis, a significant part of which was implemented through increased bank lending.

Figure 7: Chinese data series and credit aggregates (2000–2017)



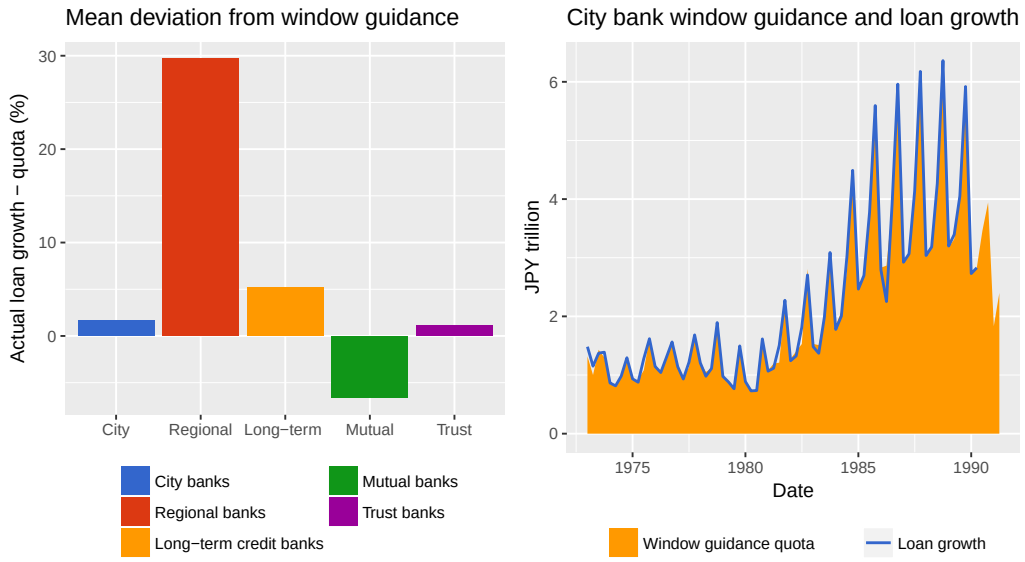
Note: CNY = Chinese yuan; reserve requirement ratio in first difference
Sources: People's Bank of China and IMF International Financial Statistics, via Euromoney's CEIC database.

3.1.1 Window guidance in Japan

Window guidance in Japan was reported in industry magazines, such as the Japanese Bankers Association's *Kin'yū* and *Nihon Keizai Shimbun*. We hand-collect data from these two publications covering the period 1973–1991 and use the growth rate of city bank window guidance quotas for our analysis. Window guidance is reported consistently and continuously only for city banks. Banks other than city banks were not subject to window guidance to the extent as city banks; they either did not receive any quota assignments for extended periods or greater deviation from target quotas was tolerated. Figure 8 clearly shows this in the close overlap of loan growth assigned ex-ante and loan growth realised ex-post for city banks. The threshold question in the case of Japan is whether window guidance of city banks was also successful at guiding the total amount of bank financing provided by all commercial banks in the Japanese economy.

It is possible that any guidance of city banks was compensated for by other types of banks, rendering the exercise of window guidance moot at an aggregate level. In a situation where city banks would be heavily restricted in the amount of loans they are allowed to grant, other types of banks could conceivably have taken on customers the city banks would have had to reject. If this is the case, the window guidance quotas for city banks should turn out insignificant in the resulting impulse responses (see Suzuki,

Figure 8: Japanese window guidance data (1973–1991)



Note: JPY = Japanese yen; only city banks continuously received window guidance quota assignments throughout the full analysis period
Sources: Japanese Bankers Association's Kin'yū, Nihon Keizai Shimbun.

1994, pp. 325 ff., or Brown, 1994, pp. 87 ff. for this argument). In this respect, our analysis parallels that of Hoshi et al. (1993), who showed that, because credit sources are not perfect substitutes, window guidance can have real effects.

To state the obvious, we can only study window guidance for the period for which we have data. Thus, these results should not be take as a general statement on window guidance in Japan – window guidance was also used during periods for which we do not have data. Cargill et al. (1997, pp. 52 ff.) provides an overview of the evolution of window guidance over time. The period prior to 1973 in particular has been covered narratively and theoretically by e.g. Kure (1977) and Eguchi (1977). In their study based on policy documents from the BOJ's archives, Itoh et al. (2015) provide in-depth analyses of BOJ statements on window guidance over time. 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 included in the PBOC's regular Monetary Policy Reports. To capture the tone of window guidance-related statements within these re-

ports quantitatively, we construct window guidance indicators using Romer–Romer text analysis (Romer & Romer, 1989) and computational linguistic methods. We apply both approaches to construct two indicators for each: a *narrow* indicator that only captures information explicitly related to window guidance (referred to as the "window guidance indicator"), and a *broad* indicator that takes into account statements on credit growth, liquidity conditions and the economy more broadly (the "credit indicator"). We employ the four indicators within our models as proxies of window guidance in China.

The "narrative approach" of Romer & Romer (1989) is a traditional method of quantifying economic information contained in bodies of text that arose from the influential work of Friedman & 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 5-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 available.

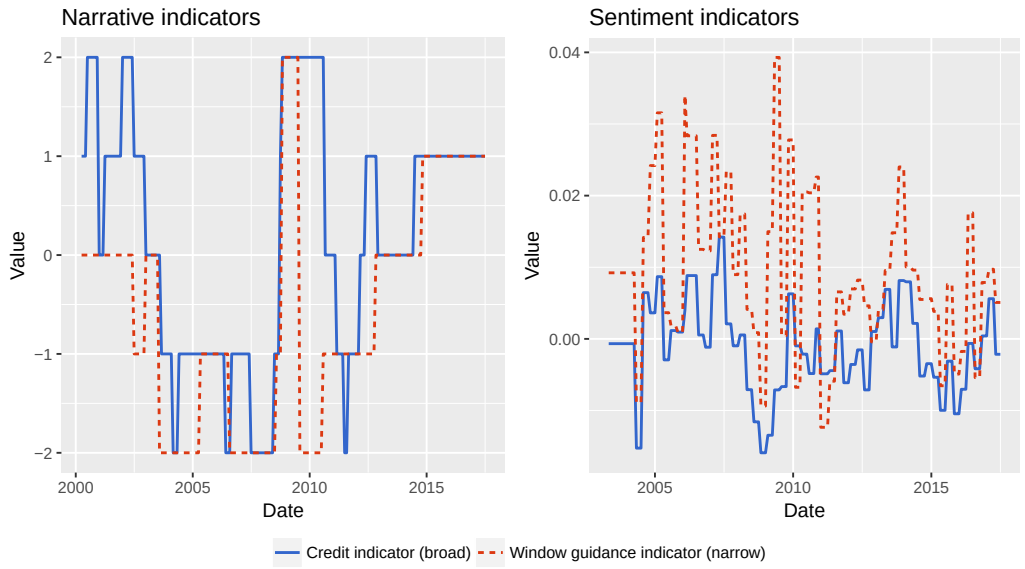
Despite the methodological similarity with other narrative indicators of Chinese monetary policy, our indicator differs in purpose and design. The coverage period is also longer. Several previous studies (e.g. Shu & Ng, 2010; Sun, 2015) have attempted to characterise the central bank's overall monetary policy stance, adopting an ex-post interpretation of reports. In 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*.[11]

To complement the traditional Romer–Romer approach,[12] we also apply *sentiment analysis*, a computational linguistic method, to classify the tone of the PBOC's English-language Monetary Policy Reports. Sentiment analysis quantifies the tone of a document by executing a number of computational processing and analytical operations. Text is first converted into plain text (formatting removed) and tokenised into single words. Next, punctuation and stopwords (words without semantic significance) are removed. Tokens are then stemmed to keep only the root or main part of a word, and converted to lower-case. This ensures that two instances of the same token are treated identically.

[11] The difference between an ex-post and an ex-ante interpretation is best illustrated by the Monetary Policy Committee meeting notes 2008 Q3 released on 10 October 2008 and the Monetary Policy Report 2008 Q3 released on 11 November 2008. While the latter document explicitly addresses the impact of the Global Financial Crisis on China, the former document is considerably more neutral, which has also been noted by Sun (2015). Since an ex-post interpretation of these reports would carry the danger of exaggerating the central bank's ability to forecast the economy and overstate the role of window guidance, the indicator constructed here records separate values for each month.

[12] For criticism of the Romer–Romer approach, see e.g. Bernanke & Mihov (1998).

Figure 9: Chinese window guidance proxies (2000–2017)



Sources: Authors' work, based on Romer–Romer text analysis and computational sentiment analysis using Loughran–McDonald dictionary.

Finally, the text is quantified using a dictionary which translates words and ultimately the whole body of text into a sentiment score (see Bholat et al., 2015, for more detail). The final score depends both on the number of positive and negative words, as well as the total number of words in the text.

Economic texts require specialised dictionaries, since economic terms often carry morality in general language which does not necessarily apply within the field. An example is the word "liability," which may carry a negative connotation in general parlance but is typically used descriptively within economics. We rely on the Loughran–McDonald dictionary (Loughran & McDonald, 2011) to score the PBOC's reports, which is suited for scoring economic and finance-related texts. It also has the attractive property of providing us with stationary time series that appear robust against structural changes. As before, we construct a narrow window guidance indicator by scoring only paragraphs on window guidance, and one broad credit indicator based on paragraphs addressing credit and liquidity conditions in addition to window guidance. Positive values of our sentiment indicators shown in Figure 9 signify positive language, e.g. optimism about economic conditions or supportive monetary policy. Conversely, negative values indicate negative language, e.g. concerns about financial stability or credit risk. Details on the construction of the Romer–Romer indicators and the sentiment indicators are provided in the Appendix.

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 process large quantities of text quickly without the risk of inadvertently missing information. Nevertheless, it is worth pointing out again that all our indicators are proxies of window guidance activity in China and by their nature less precise than our data for Japan.

3.2 Model specifications

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

$$AY_t = C_0^* + C_1^* t + A^*(L)Y_t + Be_t \tag{1}$$

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. To allow the data to "speak," we minimise 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 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; specifically, lags in the implementation of various monetary policy tools.

For Japan, we analyse the discount rate ($jp.disc$), the average 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. It played a central role in Japanese monetary policy within our analysis period and was generally one of the first tools to be adjusted (Hoshi et al., 1993; Suzuki, 1994, p. 317; Patrick, 1965). 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 to zero in matrix A (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.

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

For China, we analyse 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 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 changed 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.

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

Based on these specifications, we estimate our models on the full sample and the sub-sample periods.[13] We refer to the full sample with the abbreviation "Full," the pre-break sample with "Pre" and the post-break sample with "Post."

To confirm stability of our baseline results, we also conduct a number of robustness checks. First, we include a range of indicators as exogenous variables to capture the state of the economy, including one-period lags of year-on-year changes of proxies for industry activity, percentage changes of the exchange rate against the US dollar, and the mean

[13] We maintain identical model specifications for the full sample and sub-sample periods, including lag order, to derive comparable results.

of year-on-year changes of the consumer price inflation index (CPI) and the producer price inflation index (PPI). Second, we specify models where we replace bank financing with the year-on-year growth of monetary aggregates, including M1, M2 and M3 (Japan only). Third, we put window guidance first in our ordering while maintaining the same ordering for the remaining variables (we adjust matrix A accordingly). Finally, we run the original models on quarterly frequency data instead of monthly frequency data.

The following section shows the cumulated impulse response graphs for our baseline estimations, together with 95%, 68%, and 38% 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

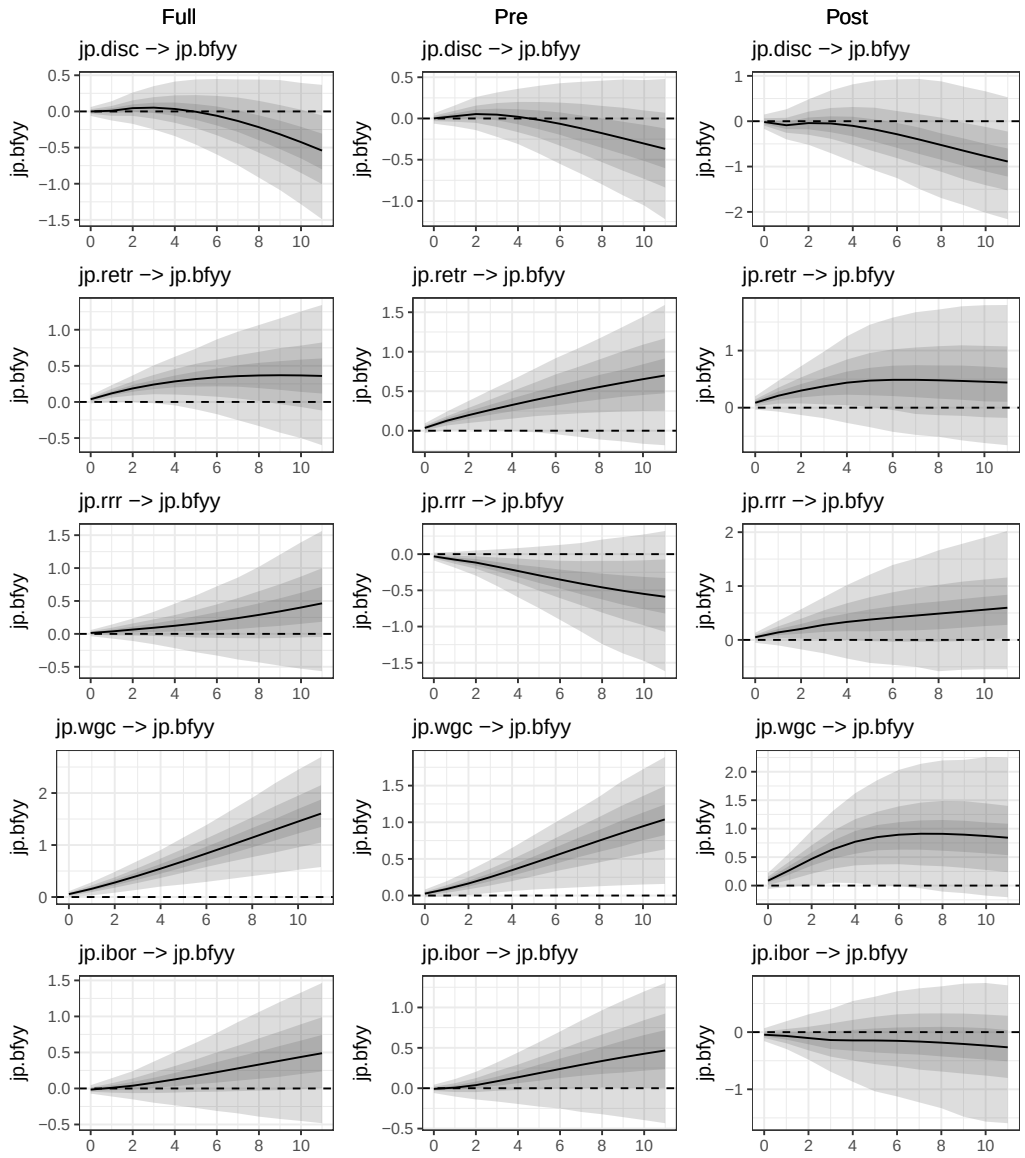
3.3.1 Results for Japan

Figure 10 shows impulse response graphs for our baseline model for Japan. The discount rate (*jp.disc*) appears negatively associated with bank financing overall, but consistency and significance of the responses varies somewhat over sub-sample periods. In the pre-break sample, the discount rate generally shows a negative association with bank financing, although the estimations with exogenous variables and those with quarterly data lack significance. In the post-break sample, the discount rate appears to gain importance; responses are generally more significant, with the exception of the responses for M2 and M3. The discount rate overall appears to have played an important and increasingly influential role in Japanese monetary policymaking, which is in line with the preceding institutional analysis.

Retail rates (*jp.retr*), by contrast, appear largely ineffective. The association between retail rate increases and bank financing lacks significance, especially in alternative estimations. In the few instances where the impulse responses exhibit a degree of significance, the association points in a positive direction, which is the opposite of the theoretically expected negative association. This suggests that retail rate increases do not constrain the growth of bank financing.

Reserve requirement ratios (*jp.rrr*) appear somewhat influential in the pre-break period, where upward adjustment of the ratio shows some significant negative association with bank financing, although this effect mostly disappears in alternative estimations, except the estimations with exogenous variables. Reserve requirements do not seem to have played a major role in the post-break period, where they show either insignificant or a theoretically inconsistent 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 period.

Figure 10: Baseline results for Japan



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

Window guidance (*jp.wgc*) overall appears influential. Higher window guidance quotas for city banks generally show a positive association with bank financing. The significance of this effect is most pronounced in the pre-break sample and only drops marginally in the estimations with exogenous variables. Notably, the positive and significant association exhibited by the impulse responses in the pre-break sample is also observable in the estimations with monetary aggregates. In contrast, window guidance appears to lose effectiveness in the post-break sample; responses generally stabilise much more quickly and exhibit lower significance and quantitative relevance than in the pre-break responses.

Finally, while the interbank overnight rate (*jp.ibor*) appears largely irrelevant in the pre-break sample and in general, post-break responses indicate that the tool is gaining influence. During the pre-break period, impulse responses either lack significance or show a theoretically inconsistent positive association with bank financing. Post-break responses generally show the theoretically expected negative association and some responses (e.g. for M1 or with quarterly frequency data) show a degree of significance. This may indicate a gradual increase of efficiency of the tool. This shift is not as clear as in the case of China below, however, which may be due to the fact that the interbank rate only became the BOJ's main policy tool in the 1990s.

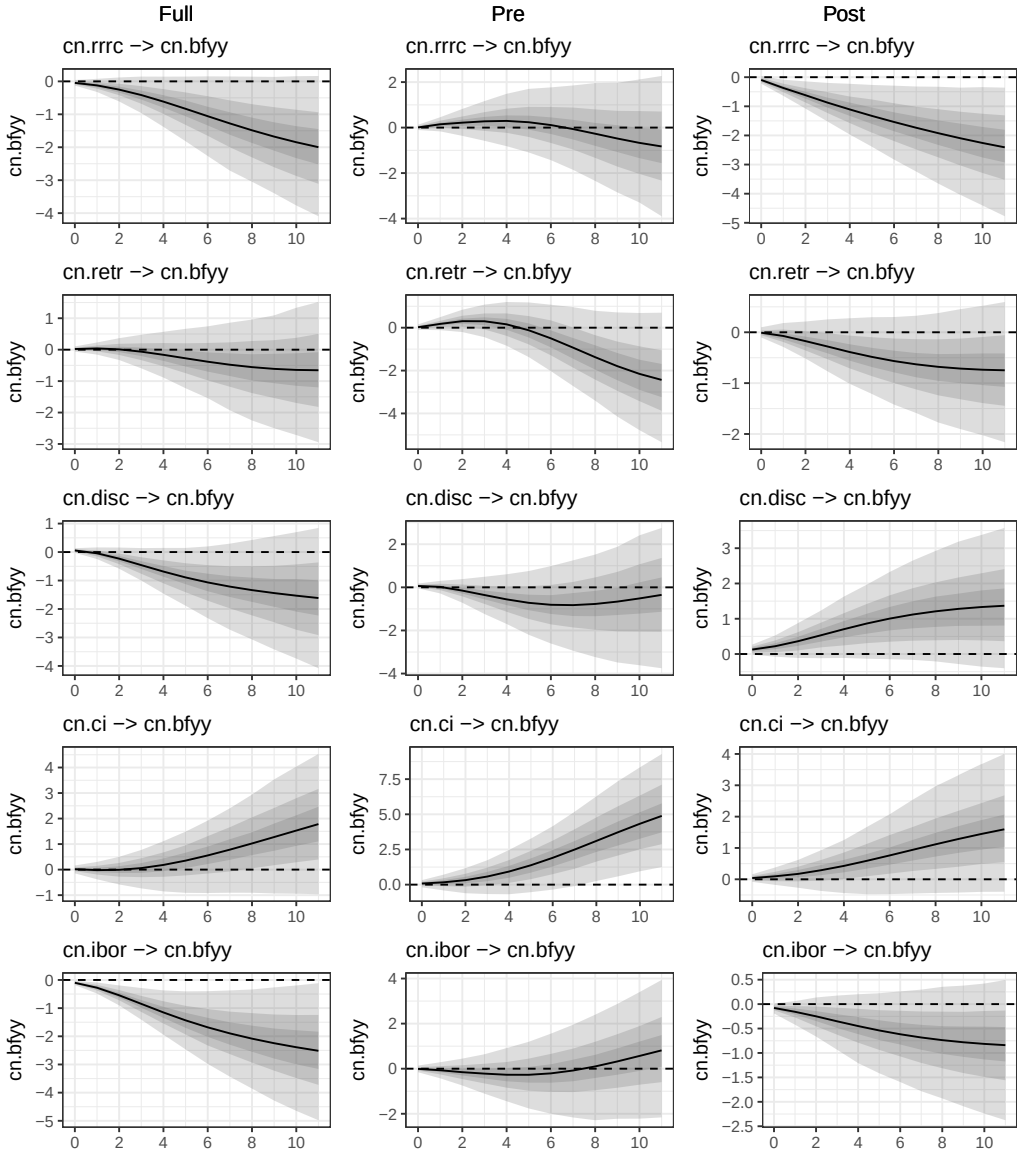
3.3.2 Results for China

Since we draw on a range of different indicators to capture window guidance in the case of China, we have a much larger number of model permutations and impulse response graphs to analyse. Figure 11 and 12 show the results for our broad (*cn.ci*) and narrow (*cn.wgi*) narrative Romer–Romer indicators. Figures 13 and 14 show the results for our broad (*cn.cil*) and narrow (*cn.wil*) sentiment indicators. For both approaches (narrative and sentiment-based), we address the credit indicators (broad) and the window guidance indicators (narrow) in turn. Our emphasis is on the credit indicators. These are based on larger information sets and so presumably somewhat more reliable.

Reserve requirement ratio adjustments (*cn.rrrc*) generally lack significance and quantitative relevance in the pre-break sample, but seem to become more effective in the post-break sample period. Post-break responses show a negative and largely significant association with bank financing, which is stable across alternative specifications. Reserve requirement ratio adjustments seem to vary somewhat in the estimations with M1, however, both for the narrative and the sentiment credit indicator, suggesting some uncertainty regarding the tool's overall impact on different credit quantities.

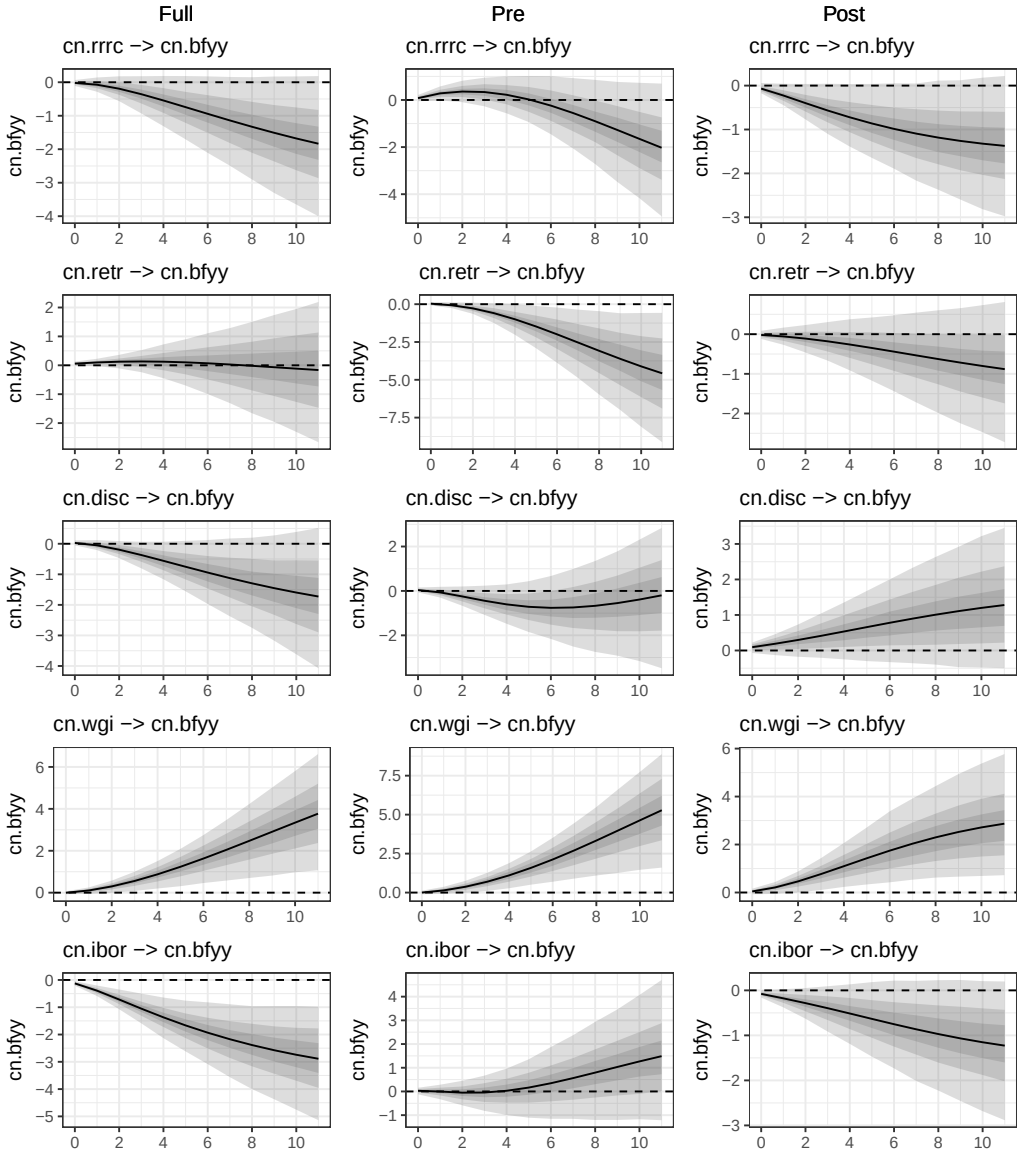
Retail rates (*cn.retr*) generally appear to have played a marginal role in Chinese monetary policy, although we observe some variation in the shape and significance of responses across different model specifications. Retail rates show a significant association in the pre-break and post-break samples with M1, as well as in the pre-break sample

Figure 11: Baseline results for China and narrative credit indicator (broad)



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

Figure 12: Baseline results for China and narrative window guidance indicator (narrow)



Note: Cumulated impulse response graphs and 95%, 68% and 38% confidence bands (bootstrapped), window guidance captured by narrative window guidance indicator (narrow) *cn.wgi*.

when including the narrative window guidance indicator. Otherwise, the responses lack significance, and in several cases tend towards positive association with bank financing rather than the theoretically expected negative association.

The discount rate (*cn.disc*) appears to have played a role, if at all, only in the pre-break sample period. While impulse responses for discount rates show a consistently negative association with bank financing during the pre-break period, these responses tend to lack significance. This may partly reflect the role that central bank lending used to play in Chinese monetary policy at the start of our pre-break sample period (Dickinson & Liu, 2007). In the post-break sample, impulse responses for discount rates tend towards a positive, and therefore theoretically inconsistent, association with bank financing.

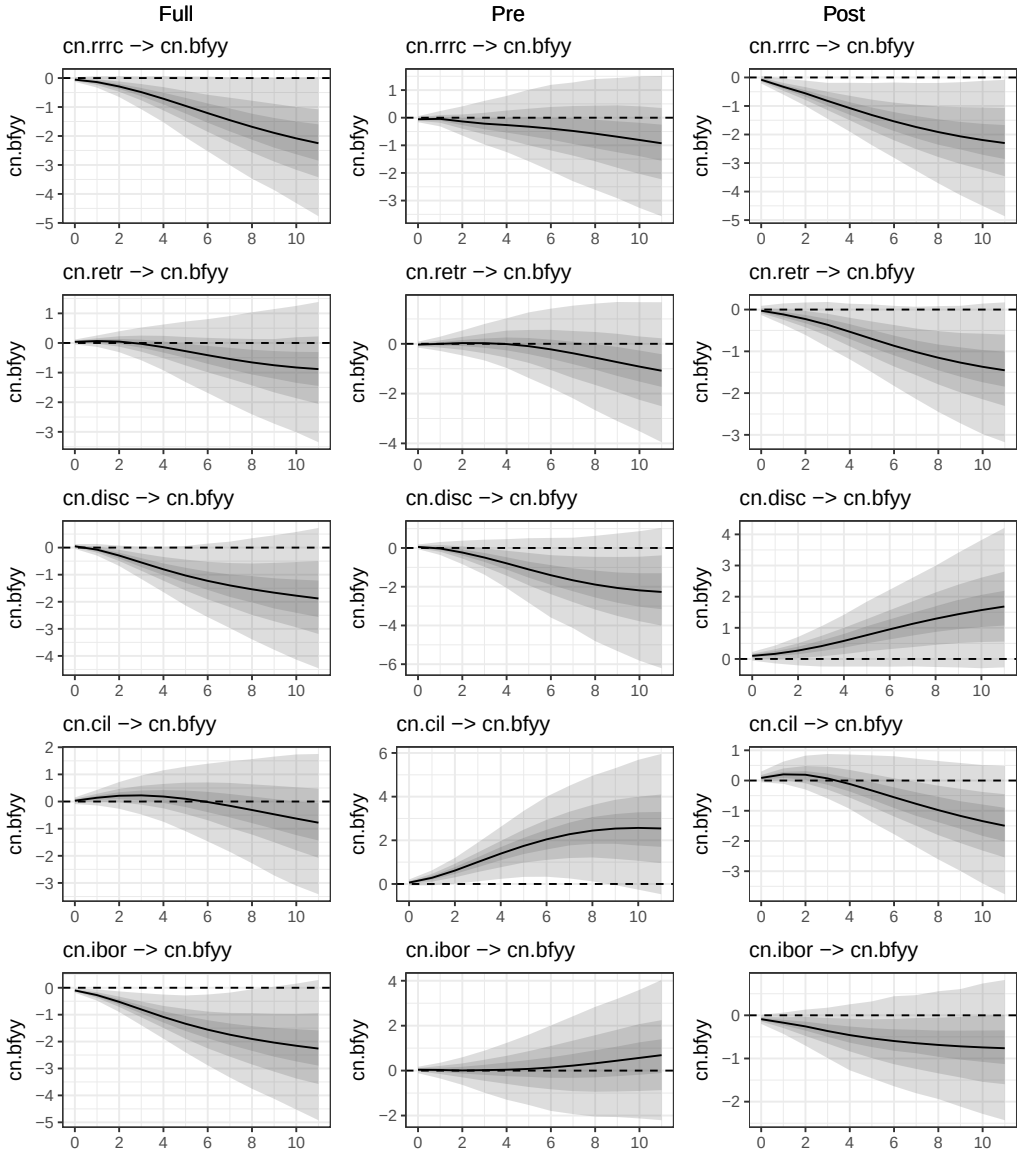
The role of window guidance, as captured by our narrative indicators and sentiment indicators, appears to have changed between the pre-break and post-break sample periods. Our narrative credit indicator (*cn.ci*) shows a positive association with bank financing pre-break. It gains significance on higher horizons, except in the model with M1. In the post-break sample, our narrative credit indicator still shows a positive association, but lacks significance overall. This change is most pronounced in the specification with exogenous variables and with M2. Our narrow narrative window guidance indicator (*cn.wgi*) partly mirrors this pattern. The pre-break responses show a strongly positive and significant association, whereas the post-break responses show a positive, but quantitatively smaller, significant association that stabilises much more quickly than the pre-break responses.

Moving on to our sentiment indicators, we observe that our sentiment credit indicator (*cn.sil*) shows a positive and mostly significant association with bank financing pre-break. The post-break responses, however, mostly show a theoretically inconsistent negative association. The narrow sentiment window guidance indicator (*cn.wil*) also shows a positive and mostly significant association with bank financing pre-break. While the post-break responses still show a positive association, this association is quantitatively smaller and less significant than the corresponding pre-break responses.

While all our indicators signal a change between the pre-break and the post-break sample periods, there remains some uncertainty regarding the magnitude of change. Out of all four indicators, the sentiment credit indicator signals the most pronounced change and a sharp decline in the effectiveness of window guidance. In contrast, both window guidance indicators suggest a milder decline in the effectiveness of window guidance that mirrors the Japanese experience more closely.

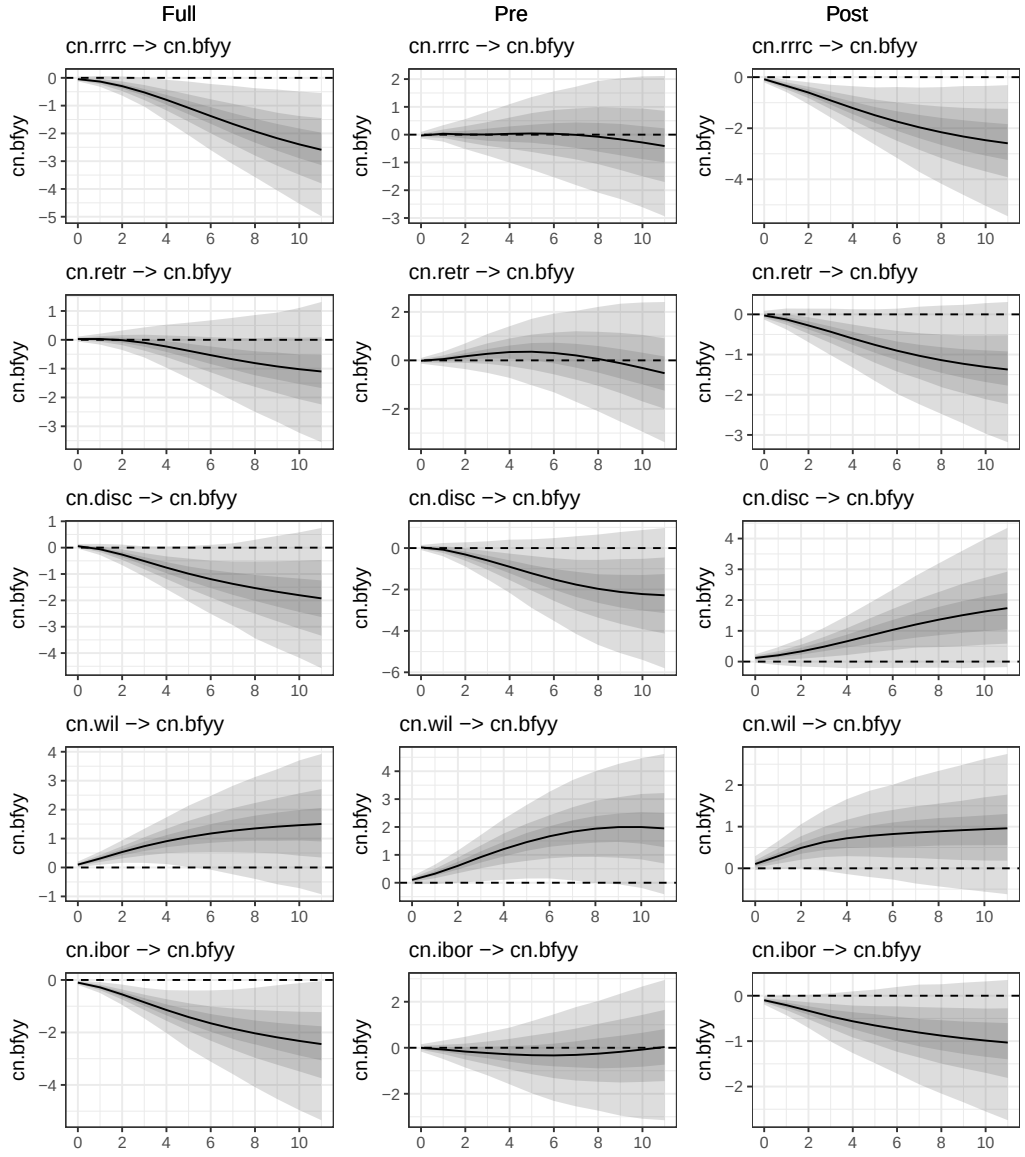
Finally, the interbank overnight rate (*cn.ibor*) shows an insignificant and on occasion inconsistent association with bank financing in the pre-break period. Responses in the post-break period are consistent in terms of direction, but significance varies somewhat

Figure 13: Baseline results for China and sentiment credit indicator (broad)



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

Figure 14: Baseline results for China and sentiment window guidance indicator (narrow)



Note: Cumulated impulse response graphs and 95%, 68% and 38% confidence bands (bootstrapped), window guidance captured by sentiment window guidance indicator (narrow) *cn.wil*.

depending on the model specification (significance is lowest in the estimations with quarterly frequency and the sentiment credit indicator). The interbank rate appears relevant only in the post-break period.

4 Discussion and policy recommendations

Our results show significant similarities and important differences within the transition of monetary policy in Japan 1973–1991 and China 2000–2017. In both economies, quantitative credit control by way of window guidance played an important role historically, particularly in the pre-break periods.[14] Over time, price measures such as interbank rates assume greater importance. This transition is 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 on the part of the authorities at promoting interest rates. Our sample period for Japan also ends before the interbank rate took centre stage in the late 1990s.

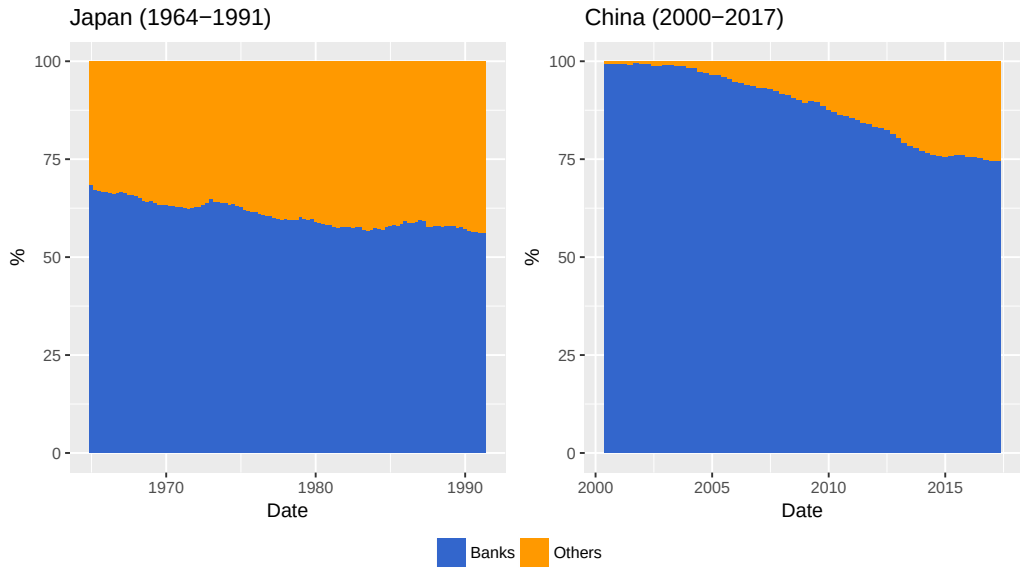
Differences between the monetary policy set-ups of Japan and China are mostly due to historical and institutional circumstance. The discount rate plays a relatively more pronounced role in Japan than in China, for example, as central bank lending served as a major policy lever throughout the analysis period. This may have partly masked the role of the interbank rate. At the same time, reserve requirement ratios played a significant and quantitatively relevant role in China, particularly in the post-break sample in which excess reserve positions tended to be lower.

Our findings correspond to those of previous studies on the role of window guidance and interbank rates in Japan and China. In the case of Japan, authors such as Fukumoto et al. (2010), Rhodes & Yoshino (2007, 1999), Suzuki (1994, pp. 325 ff.) and Hoshi et al. (1993) have suggested that the influence of window guidance has weakened within the final years of its application. For 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 et al., 2010). The Chinese experience mirrors the Japanese experience in that window guidance, once a tool of major importance, is now declining in effectiveness (Nagai & Wang, 2007; Fukumoto et al., 2010). History provides 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

[14] While our results indicate that window guidance is an influential policy tool, the nature of our data and the chosen estimation procedure do not allow us to take a position on the quantitative precision of the tool. Moreover, we cannot take a position on the qualitative effectiveness of window guidance in modifying the structure of lending.

Figure 15: Share of bank credit to total credit to the non-financial sector



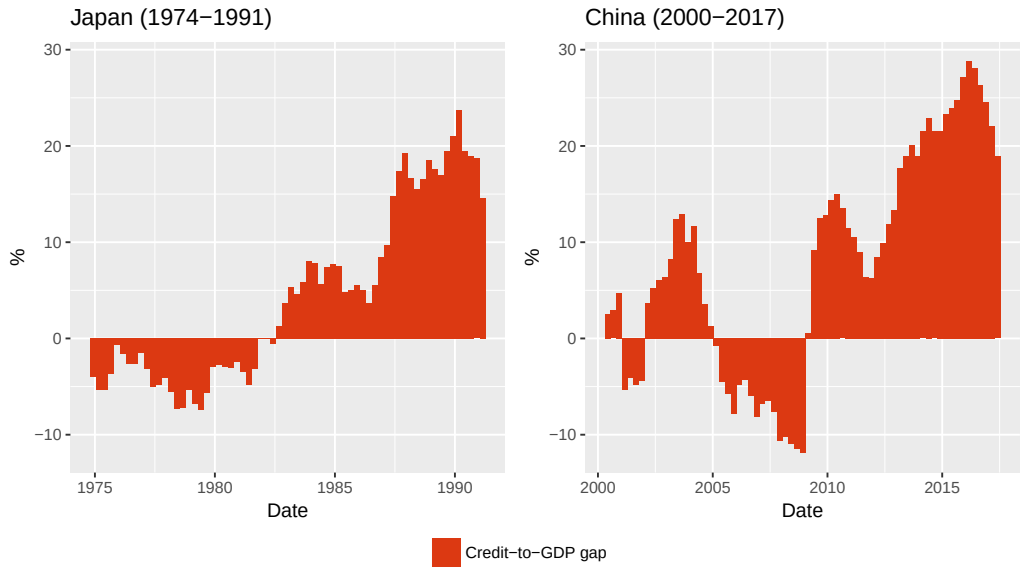
Source: Bank for International Settlements.

stands to reason that the policy is most effective in systems that are bank-dominated. This was the case for both the Japanese and the Chinese economies at the beginning of our respective analysis periods (Yoshino, 2012). As sources of non-bank financing developed, as shown in Figure 15, financing constraints for the private sector loosened. This limited the ability of banks to increase or decrease loan provision in line with official guidelines.

Second, financial liberalisation 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 US-dollar denominated loans that were mediated, guaranteed and converted into Japanese yen by Japanese banks (Fukumoto et al., 2010; Brown, 1994, pp. 32 ff.). The decompartmentalisation of Japanese financial markets and banks types also allowed for greater substitutability of funding sources (Brown, 1994, pp. 106 ff.).

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 internationalising the Japanese yen. Similarly, China made gradual steps towards capital account liberalisation when it began promoting an international role for its currency, the Chinese yuan, following the Global Financial Crisis.

Figure 16: Credit-to-GDP gaps



Note: The credit-to-GDP gap is the difference between the credit-to-GDP ratio and its long-run trend (HP filter).
Source: Bank for International Settlements.

From a historical perspective, it is striking how these trends go hand in hand with an acceleration of credit growth in both Japan and China as measured by an increasing credit-to-GDP gap (Figure 16). In both Japan and in China, window guidance tended to be more expansionary in the latter halves of our analysis periods, i.e. the periods in which window guidance loses effectiveness.

On a policy level, financial liberalisation and sophistication reinforce the case for interest rates. As the financial system moves towards a market-based system, interest rates assume greater importance for bond markets and foreign finance by summarising 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.

While window guidance may appear to be an attractive policy tool in heavily centralised economies, its application requires detailed knowledge of economic circumstances to be effective. As an economy develops and gains in complexity, negative side-effects of window guidance such as non-performing loans (Conway et al., 2010; Geiger, 2008) may emerge. The simultaneous application of quantity-based tools such as window guidance

and price-based tools such as interest rates is also likely to produce inconsistent results. It may blur monetary policy transmission and hinder the shift towards a system based exclusively on interest rates. 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 et al., 1997, pp. 52–54; Itoh et al., 2015, pp. 195–196). Again, the ongoing implementation of Basel III presents a striking historical parallel.

In terms of monetary policymaking, we offer three main policy recommendations on 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 set-up.

First, we recommend a reduction in the number of tools employed in favour of transparent and market-oriented price-based tools in order to streamline monetary policy transmission and raise the signalling value of interest rates.

Second, given the observed importance of interest rates, we believe that high interest rate volatility (as observed 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 (Woodfort, 2001; Goodhart, 2008). 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 set-up has recently attracted the interest of policymakers in China (Ma, 2017; Niu et al., 2015). Japan implemented an interest rate corridor in the 2000s (IMES, 2012).

Finally, given the growth of non-bank financing in China, the signalling 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 larger reserve maintenance periods and averaging provisions. This would provide banks with more flexibility to adjust their reserve positions in response to shocks. Indeed, recent policy initiatives appear to be moving in this direction (Yao et al., 2015).

5 Conclusions

We explored the transitions of monetary policy in Japan (1973–1991) and China (2000–2017) 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 set-ups in Japan and China, and conducted quantitative analyses of the effects of different monetary policy tools on the amount of bank financing using Structural Vector Autoregressive (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 liberalisation and capital account opening all dampen the effectiveness of window guidance by broadening the range of available funding sources to the private sector. Thus, managing effectively the transition to a system based on prices is a central challenge to policymakers.

In recognition of the potential positive effects of a transition to a price-based system, we recommend three adjustments to monetary policy operations. First, we recommend a reduction in the number of tools in favour of transparent and market-oriented price-based tools in order 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 requirement ratios such as the introduction of longer reserve maintenance periods and averaging provisions.

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Appendix

Overview of data series and characteristics

Note: Stationarity tested using Augmented Dickey-Fuller test (ADF) and Kwiatkowski-Phillips-Schmidt-Shin test (KPSS), tested with a constant and a trend (first result) and with a constant only (second result), critical values and corresponding significance level (*** 0.01, ** 0.05, * 0.1)

Table 1: Data series and their characteristics, Japan

Variable	Concept	Notes	ADF	KPSS	Unit	Source
jp.bfyy	Bank financing growth rate	Year-on-year growth rate of commercial banks'claims on the private sector	-1.914 -1.917	0.302 *** 0.573 **	Percent	IMF, via CEIC
jp.ibor	Interbank overnight rate	Collateralised overnight call rate before July 1985, then uncollateralised rate	-2.724 -3.151 **	0.067 0.449 *	Percent	BOJ, via CEIC
jp.disc	Discount rate	Interest rate on central bank's discount window	-2.684 -2.862 *	0.063 0.687 **	Percent	BOJ, via CEIC
jp.retr	Retail rates	Mean of (regulated) retail lending and deposit rates	-1.266 -2.027	0.067 0.807 ***	Percent	IMF, via CEIC
jp.rrr	Reserve requirement ratio	Commercial bank reserve requirement ratio	-2.808 -3.139 **	0.275 *** 0.546 **	Percent	BOJ
jp.wgc	City bank window guidance quota growth rate	Quota growth vis-à-vis actual loan growth in corresponding period of previous year	-2.510 -2.462	0.206 ** 0.259	Percent	Kin'yū, Nihon Keizai Shimbun
jp.indyy	Industrial activity	Month-on-month change of industrial production index	-4.197 *** -4.381 ***	0.037 0.043	Index value	IMF, via CEIC
jp.exrepc	Exchange rate percentage change	Month-on-month percentage change of exchange rate of Japanese yen per US dollar	-9.073 *** -9.102 ***	0.053 0.061	Percent	IMF, via CEIC
jp.infl	Price level change	Mean of year-on-year growth rates of CPI and PPI	-1.288 -1.678	0.090 0.793 ***	Percent	IMF, via CEIC
jp.m1yy	M1 growth rate	Year-on-year growth rate of monetary aggregate M1, analogous for M2, M3	-2.760 -2.308	0.203 ** 0.780 ***	Percent	IMF, via CEIC

Table 2: Data series and their characteristics, China

Variable	Concept	Notes	ADF	KPSS	Unit	Source
cn.bfyy	Bank financing growth rate	Year-on-year growth rate of commercial banks'claims on the private sector	-2.864 -2.791 *	0.151 ** 0.168	Percent	IMF, via CEIC
cn.ibor	Interbank overnight rate	Transaction-based China Interbank Offered Rate, CHIBOR	-4.390 *** -4.085 ***	0.112 0.264	Percent	PBOC, via CEIC
cn.disc	Discount rate	Interest rate on central bank's discount window	-2.724 -2.790 *	0.094 0.103	Percent	IMF, via CEIC
cn.retr	Retail rates	Mean of (regulated) retail lending and deposit rates	-1.631 -1.879	0.190 ** 0.189	Percent	IMF, via CEIC
cn.rrrc	Reserve requirement ratio change	Month-on-month change of the mean of ratio for large depository institutions and ratio for small and medium depository institutions	-5.430 *** -5.237 ***	0.127 * 0.217	Percent	PBOC
cn.ci	Credit and window guidance indicators	Credit (broad) and window guidance (narrow) indicators constructed from text analysis	-3.071 -2.441	0.146 * 0.194	Index value	Author
cn.indyy	Industrial activity	Year-on-year growth of value added in industry	-5.210 *** -2.124	0.258 *** 0.740 ***	Percent	NBS, via CEIC
cn.exrepc	Exchange rate percentage change	Month-on-month percentage change of exchange rate of Chinese yuan per US dollar	-3.287 * -3.154 **	0.216 ** 0.274	Percent	IMF, via CEIC
cn.infl	Price level change	Mean of year-on-year growth rates of CPI and PPI	-9.447 *** -9.470 ***	0.067 0.094	Percent	IMF, NBS, via CEIC
cn.m1yy	M1 growth rate	Year-on-year growth rate of monetary aggregate M1, analogous for M2	-2.227 -2.135	0.073 0.211	Percent	IMF, via CEIC

Notes on credit and window guidance indicators

For the present paper, we applied a Romer–Romer narrative text analysis (Romer & Romer, 1989) and sentiment analysis using the Loughran–McDonald dictionary (Loughran & McDonald, 2011) to construct indicators that capture window guidance in China. Under both approaches, we constructed a narrow indicator that only captures information explicitly related to window guidance and a broad indicator that takes into account statements on liquidity and credit growth along with window guidance. In total, we constructed four indicators.

Table 3: Overview of indicators

	Broad	Narrow
Narrative analysis	*cn.ci*	*cn.wgi*
Sentiment analysis	*cn.cil*	*cn.wil*

Narrative indicators based on Romer–Romer text analysis rely on the Chinese-language Monetary Policy Committee meeting notes and Monetary Policy Reports released by the PBOC. Sentiment indicators rely on the English-language Monetary Policy reports. The PBOC releases its reports at quarterly intervals, so our indicators use quarterly frequency data. Release dates vary somewhat for earlier reports, however, so we record different assignment values for months within a quarter with changes between the Monetary Policy Committee meeting notes and the Monetary Policy Report for a quarter (see, for example, the inconsistency noted in footnote 11).

With all four indicators, positive values signal expansionary window guidance and negative values signal contractionary window guidance. Given that both the sentiment indicators and the window guidance assignments for Japan follow the same logic, the narrative indicator is constructed to correspond to this pattern. This assignment scheme is the inverse of that used for most narrative indicators mentioned in the literature that try to mirror interest rates and follow a scale where negative values represent an expansionary policy stance.

All documents were downloaded from the PBOC's homepage. For sentiment analysis, documents were converted from their original formats to plain text using LibreOffice, Lynx, pdftotext, Calibre and Perl scripts (the actual tool used depends on the source format). Sentiment analysis was conducted in R using the package "SentimentAnalysis" (https://github.com/sfeuerriegel/SentimentAnalysis). A detailed table listing assignment dates and scores for the narrative indicators is included below, starting from Table 4. To save space, we only list instances where the value of the credit indicator or the window guidance indicator changes.

Overview of narrative indicators and value assignments

Abbreviations: ci = Credit indicator, wgi = Window guidance indicator,
MPC = Monetary Policy Committee meeting notes,
MPR = Monetary Policy Report

Assigned values: 2 = strongly encouraging credit growth,
1 = weakly encouraging credit growth, 0 = neutral/no information,
-1 = weakly discouraging credit growth, -2 = strongly discouraging credit growth

Table 4: Overview of narrative indicators

Document	Issue	ci	wgi	Notes
MPC	2000 Q2	1	0	First meeting, support for growth
MPC	2000 Q3	2	0	Re-deploy support
MPC	2001 Q1	0	0	Stable monetary policy, avoid inflation/deflation
MPC	2001 Q2	1	0	Support demand
MPR	2002 Q1	2	0	Prevent economic slowdown
MPR	2002 Q2	2	-1	Need to improve credit structure
MPC	2002 Q3	1	-1	Maintain stable monetary policy
MPR	2002 Q4	1	0	Neutral credit policy stance
MPC	2003 Q1	0	0	Need to improve credit quality
MPR	2003 Q2	0	-2	Financial risks, improve credit structure
MPC	2003 Q3	-1	-2	Relatively fast credit growth, inflation risk
MPC	2004 Q1	-2	-2	Prevent inflation and financial instability
MPC	2004 Q2	-1	-2	Measures taking effect, avoid stifling growth
MPR	2005 Q1	-1	-1	Improve credit structure
MPC	2006 Q2	-2	-1	Stability-oriented policy, curb excess credit growth
MPR	2006 Q2	-2	-2	Excess credit growth and risk
MPC	2006 Q3	-1	-2	Stable monetary policy, expand domestic demand
MPC	2007 Q2	-2	-2	Irrational developments, prevent overheating
MPC	2008 Q2	-1	-2	Inflation and growth declining, uncertainty
MPR	2008 Q2	-1	-1	Strengthen window guidance, less emphasis of risks

Table 5: Overview of narrative indicators (continued)

Document	Issue	ci	wgi	Notes
MPC	2008 Q3	1	-1	US crisis becoming global crisis, support demand
MPR	2008 Q3	2	2	See footnote 11; abolished bank credit constraints
MPR	2009 Q2	2	-2	Improve credit structure, prevent risks
MPR	2010 Q2	2	-1	Balanced credit provision, targeted lending
MPC	2010 Q3	0	-1	Recovery, but problems and risks remain
MPC	2011 Q1	-1	-1	Environment complex, improve credit structure
MPC	2011 Q2	-2	-1	Inflationary pressure, control credit
MPC	2011 Q3	-1	-1	Inflationary pressure, need for structural change
MPC	2012 Q1	0	-1	Economy generally in line with macro measures
MPC	2012 Q2	1	-1	Economy stable, global shocks and uncertainty
MPR	2012 Q3	1	0	Strengthen window guidance, support real economy
MPC	2012 Q4	0	0	Economy stable, but uncertainties remain
MPC	2014 Q2	1	0	Realise rational credit growth and financing
MPR	2014 Q3	1	1	Encourage innovation, support for various policies

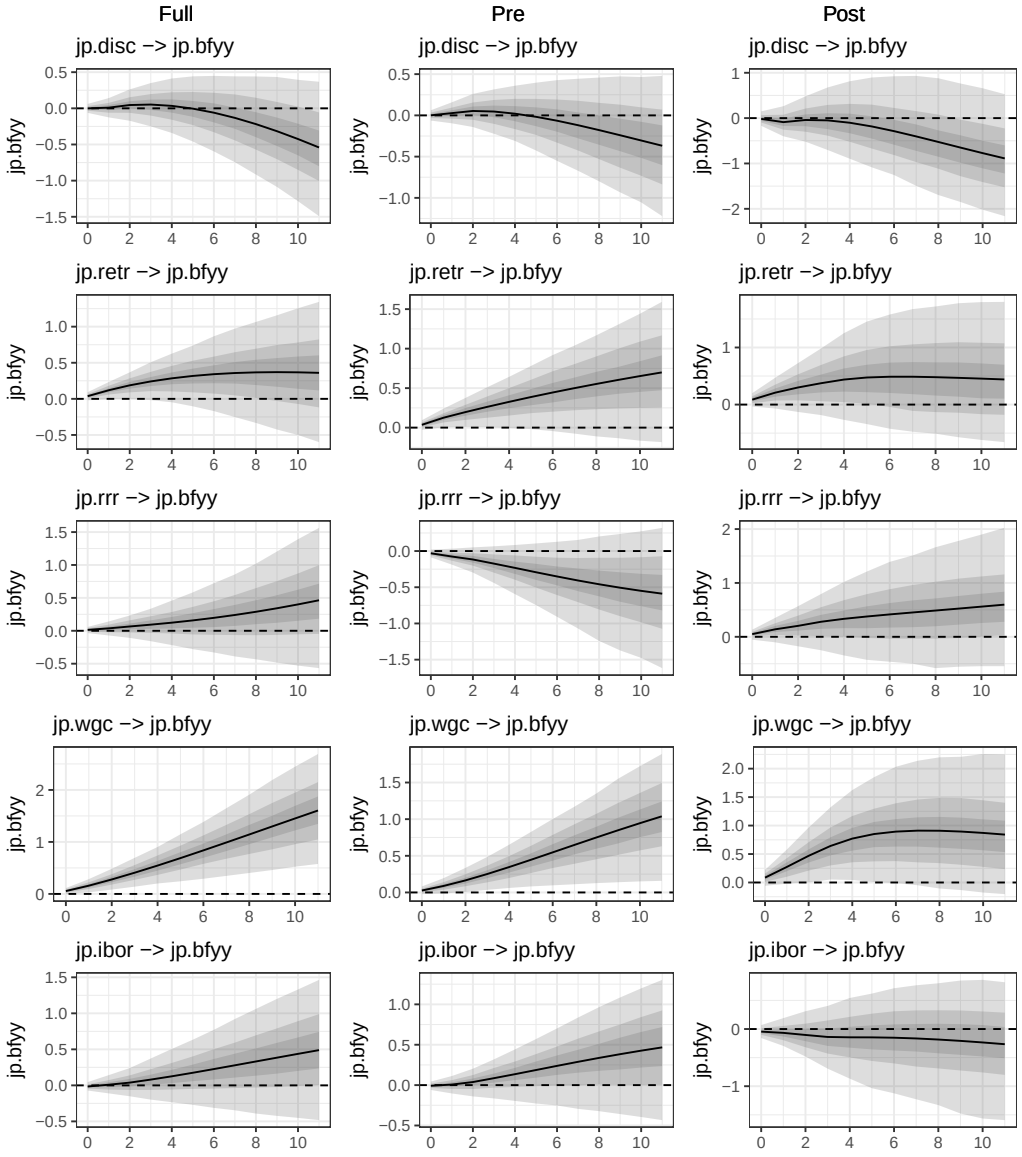
Extended statistical appendix

Appendix to paper "From Window Guidance to Interbank Rates"

1 Impulse responses for Japan

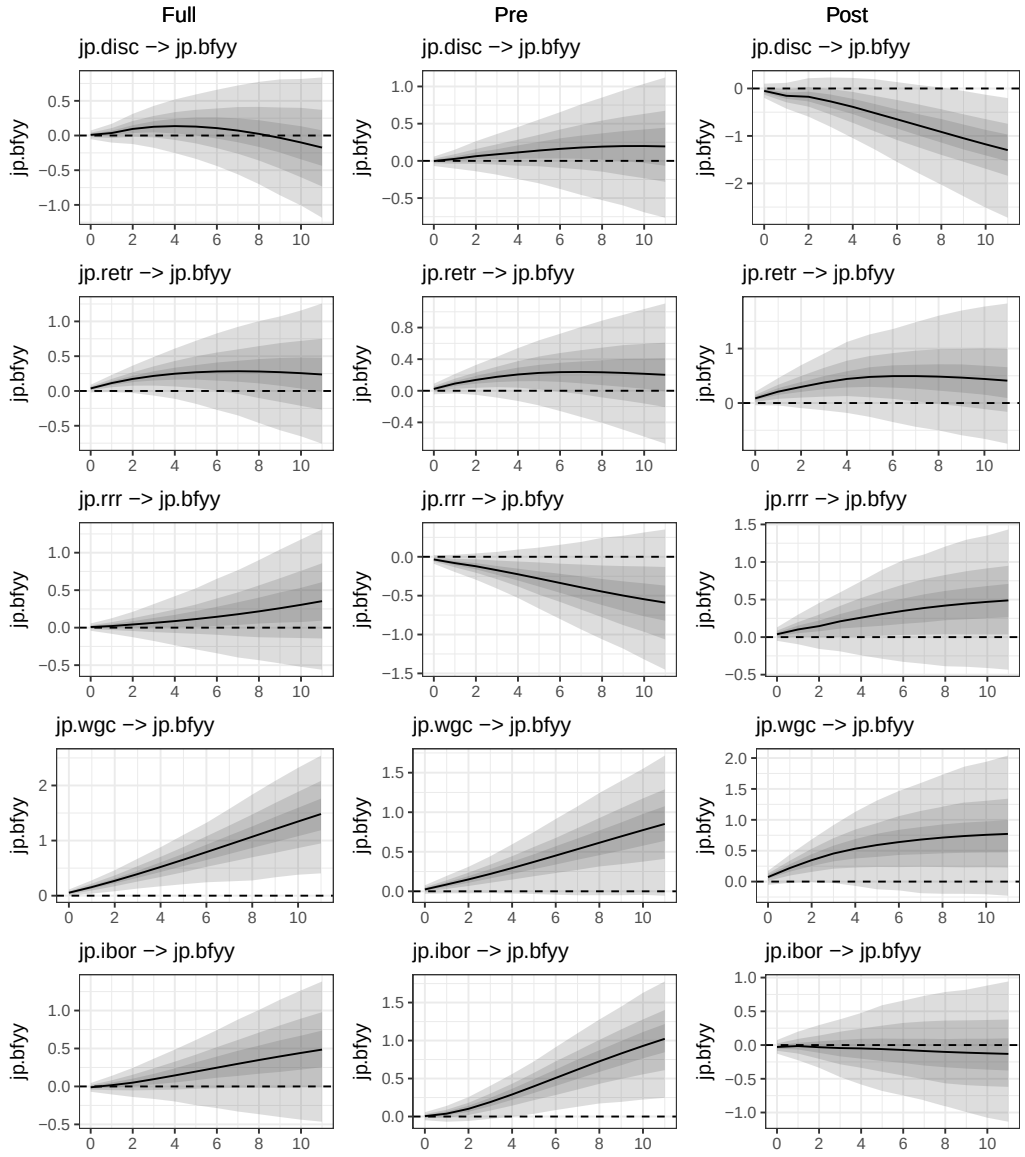
1.1 Baseline model

Figure 1: Japan baseline model



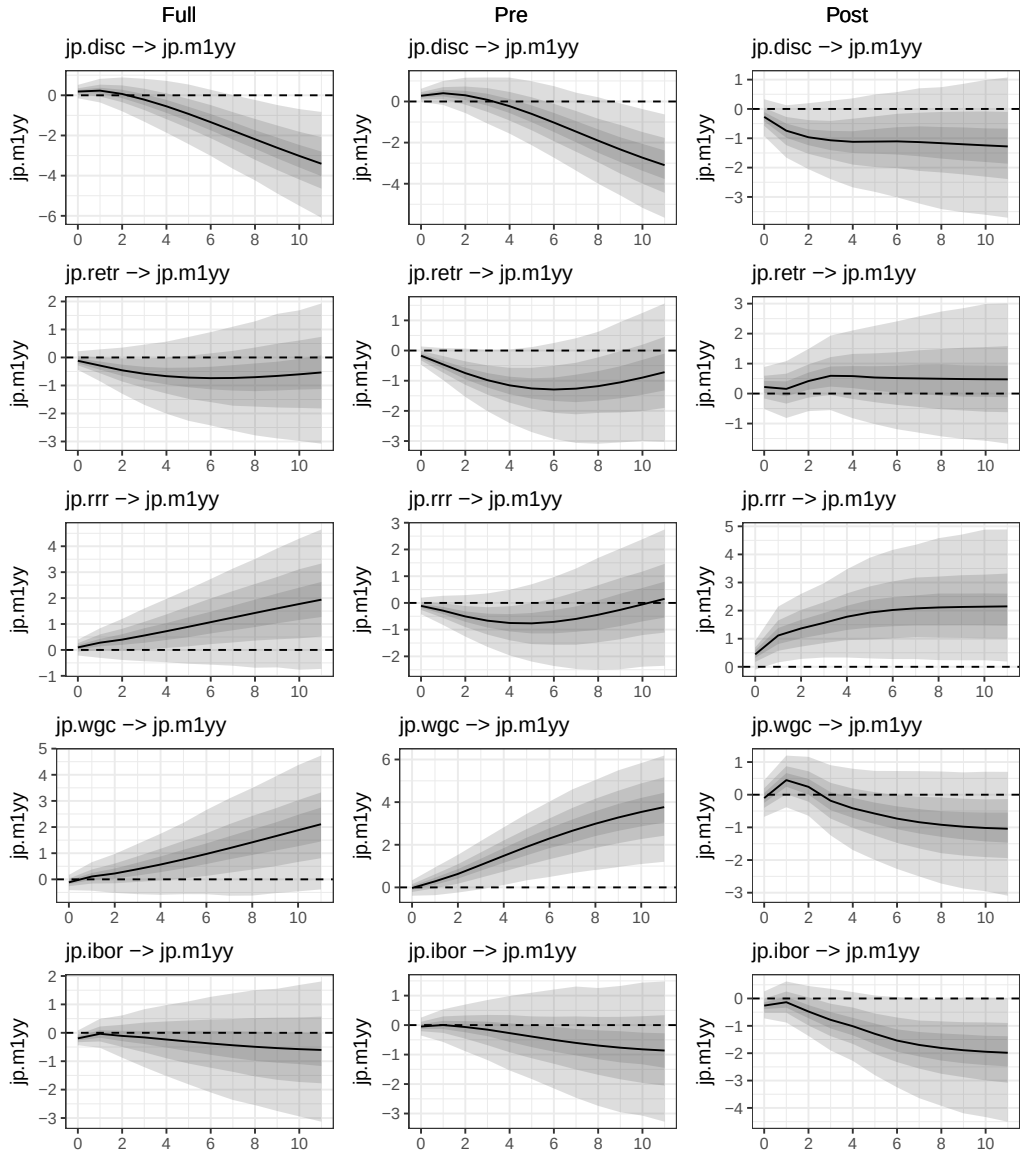
1.2 Model with exogenous variables

Figure 2: Japan model with exogenous variables



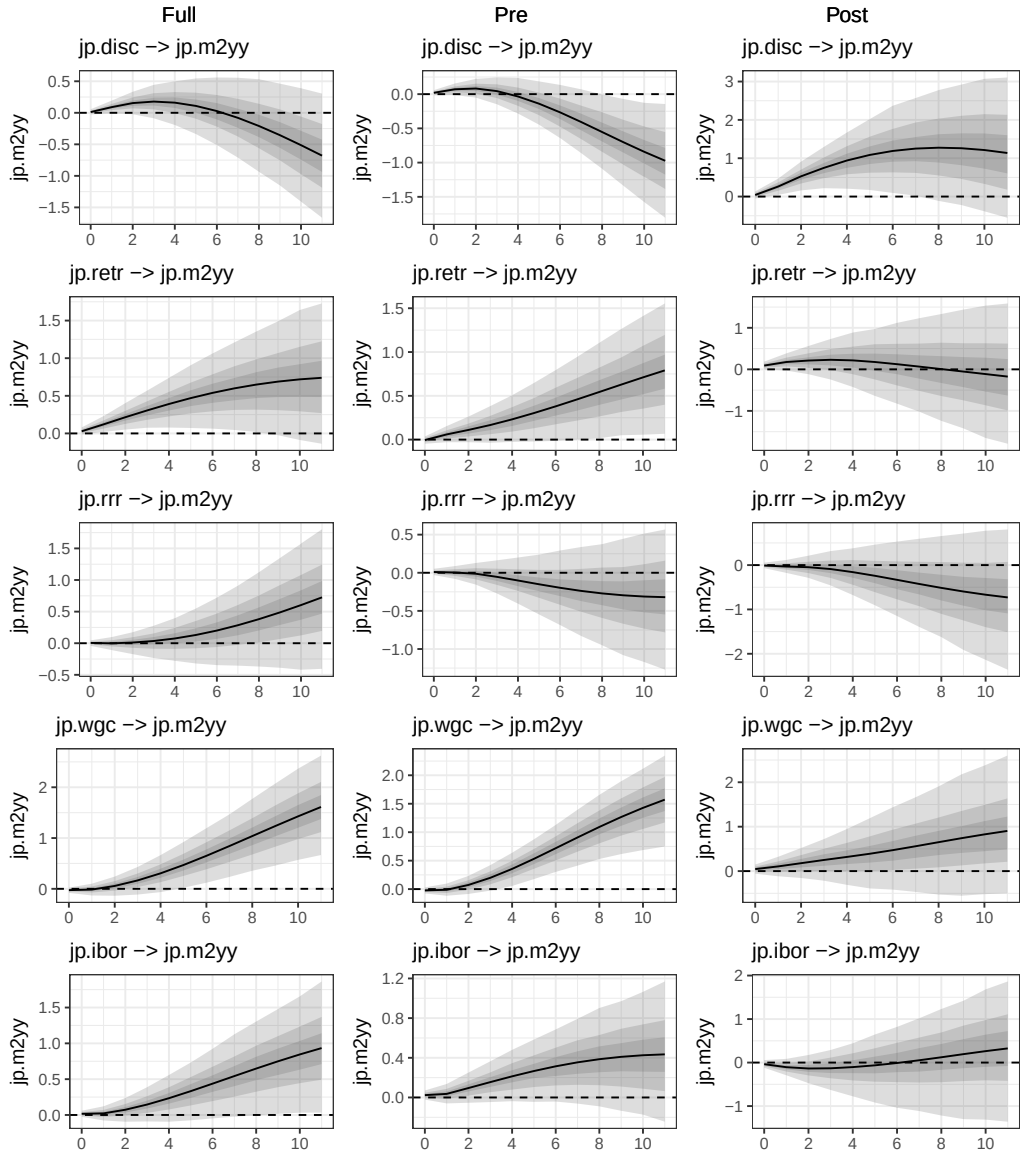
1.3 Model with M1 growth as main response variable

Figure 3: Japan model with M1 growth as main response variable



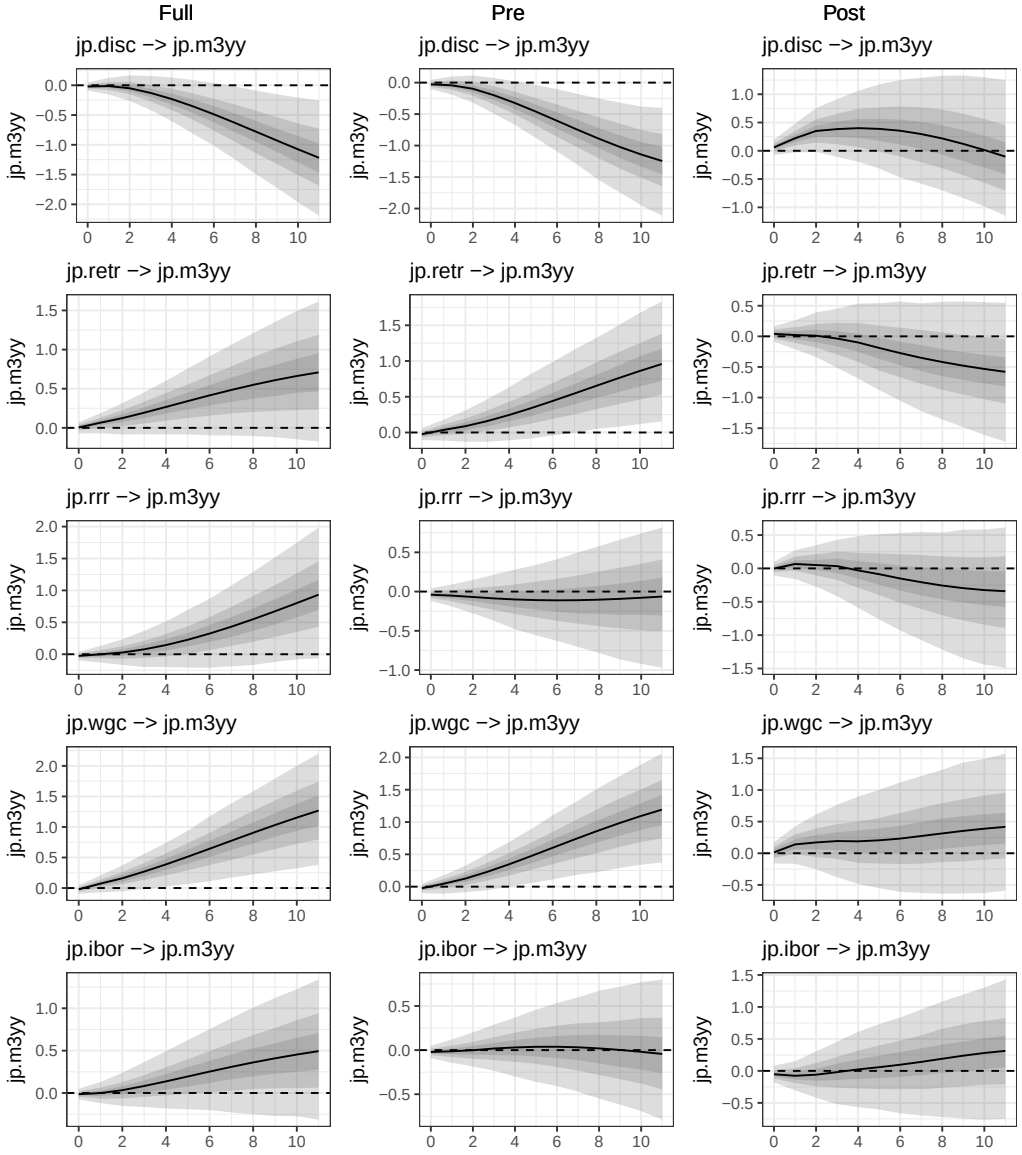
1.4 Model with M2 growth as main response variable

Figure 4: Japan model with M2 growth as main response variable



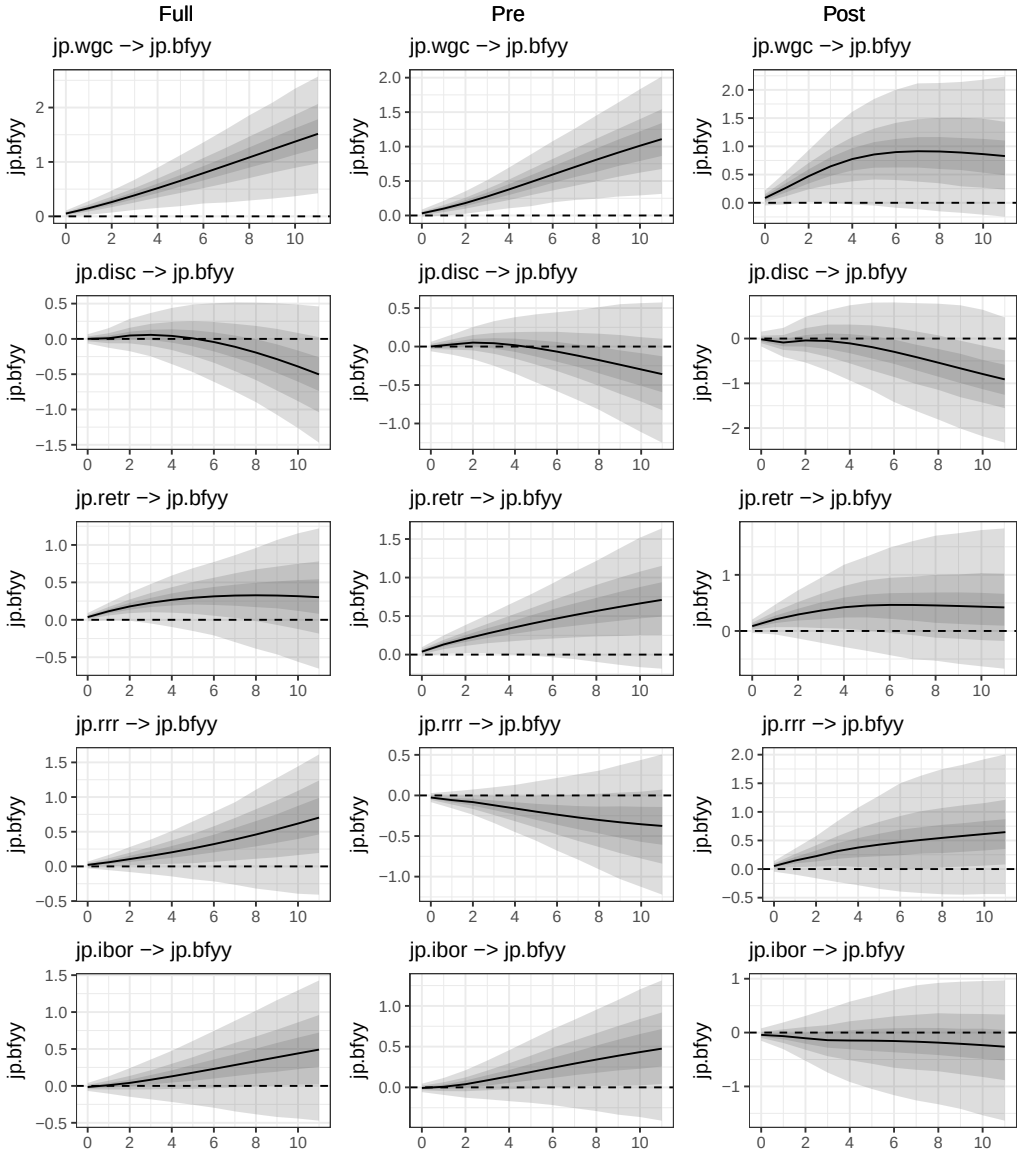
1.5 Model with M3 growth as main response variable

Figure 5: Japan model with M3 growth as main response variable



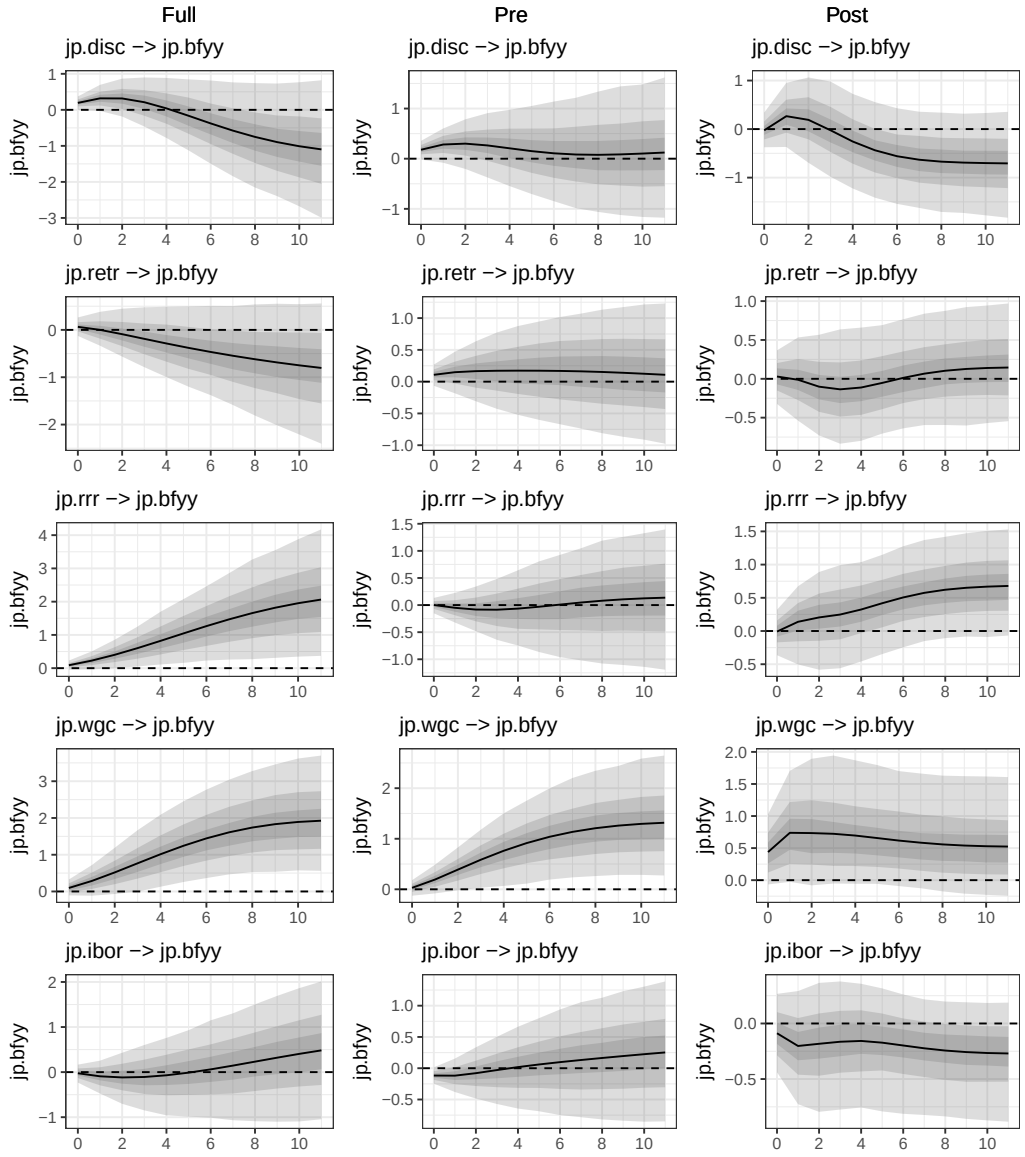
1.6 Model with variables reordered

Figure 6: Japan model with variables reordered



1.7 Model estimated on quarterly frequency data

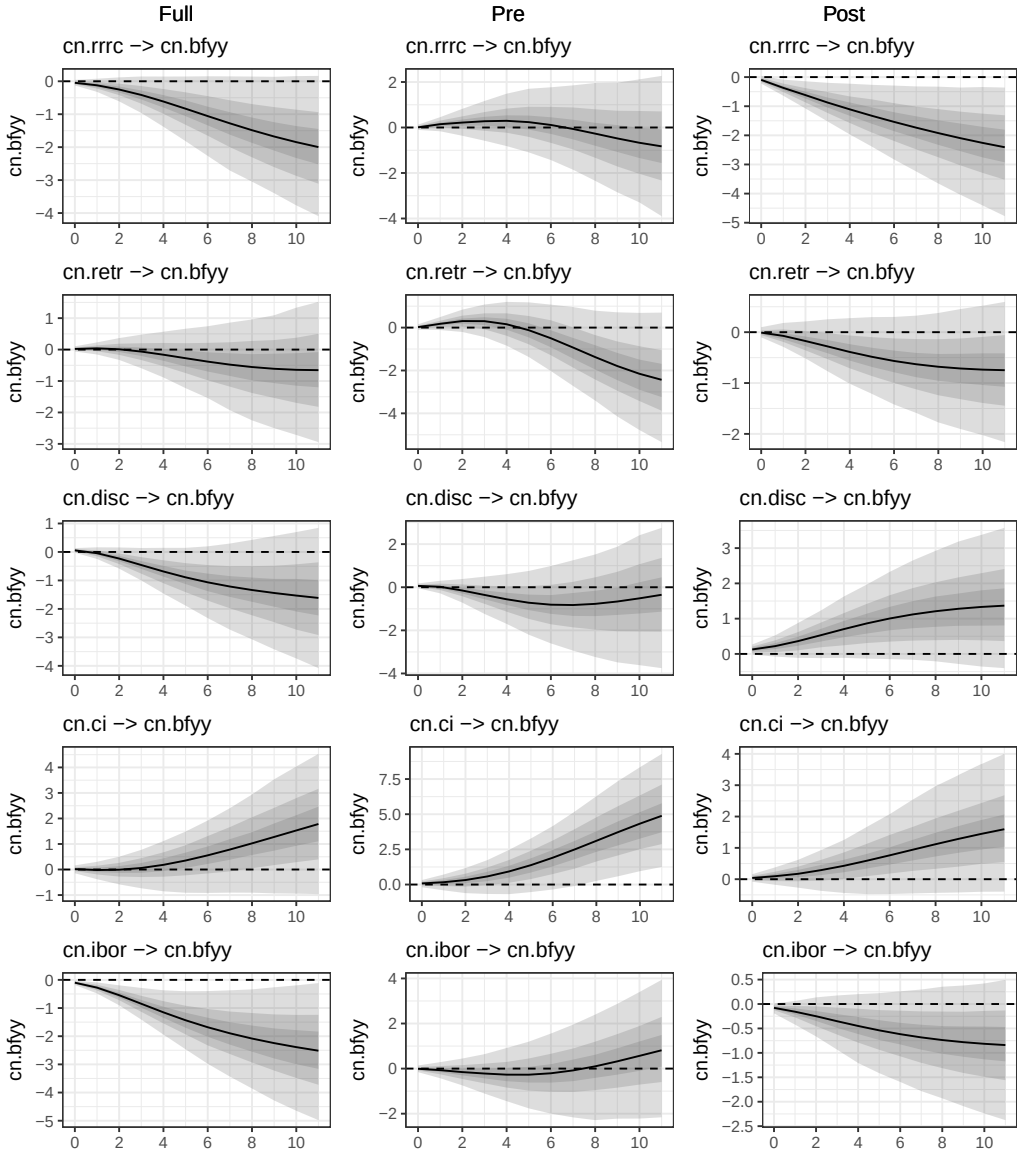
Figure 7: Japan model estimated on quarterly frequency data



2 Impulse responses for China

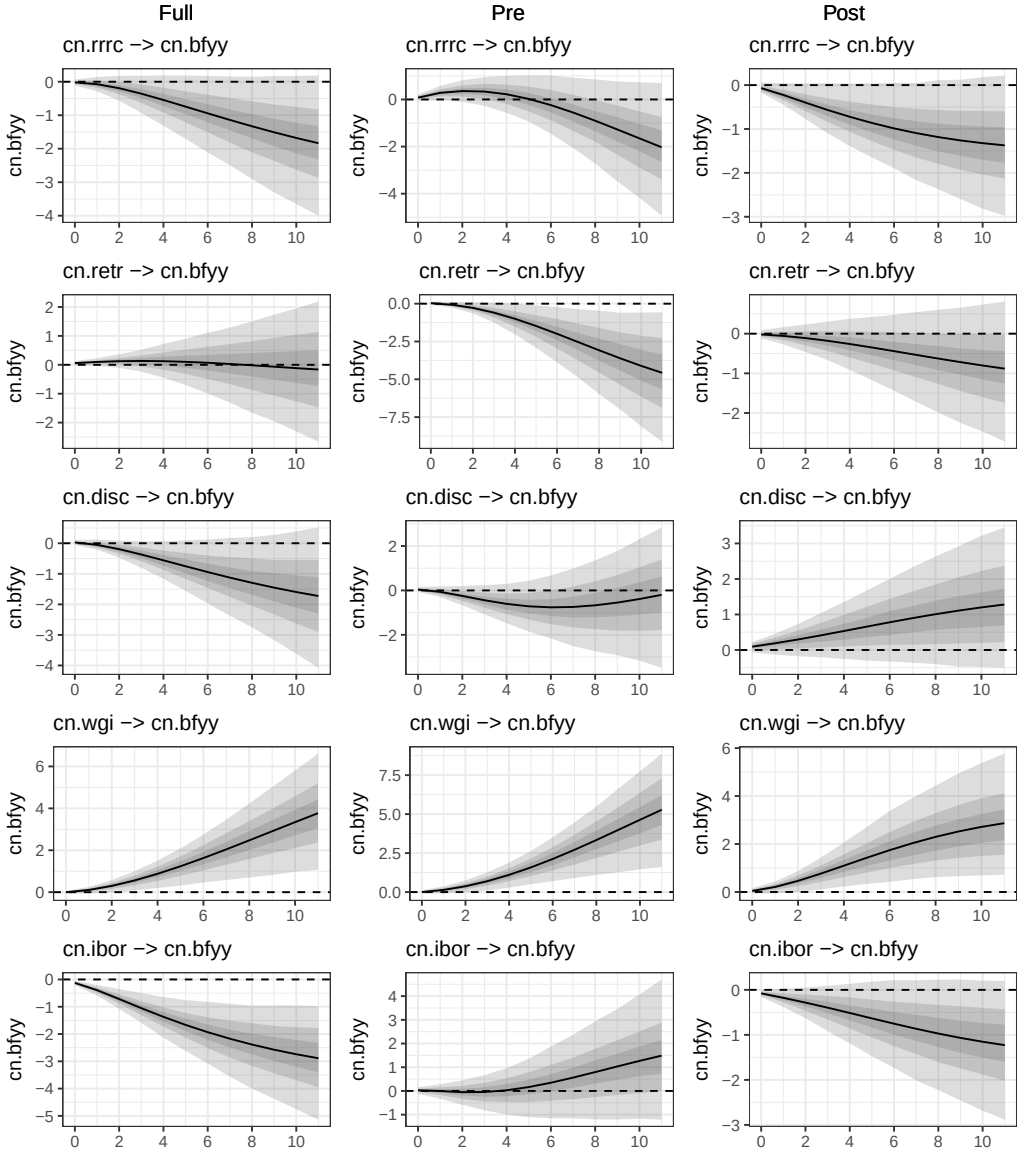
2.1 Narrative credit indicator: Baseline model

Figure 8: China baseline model with narrative credit indicator (broad)



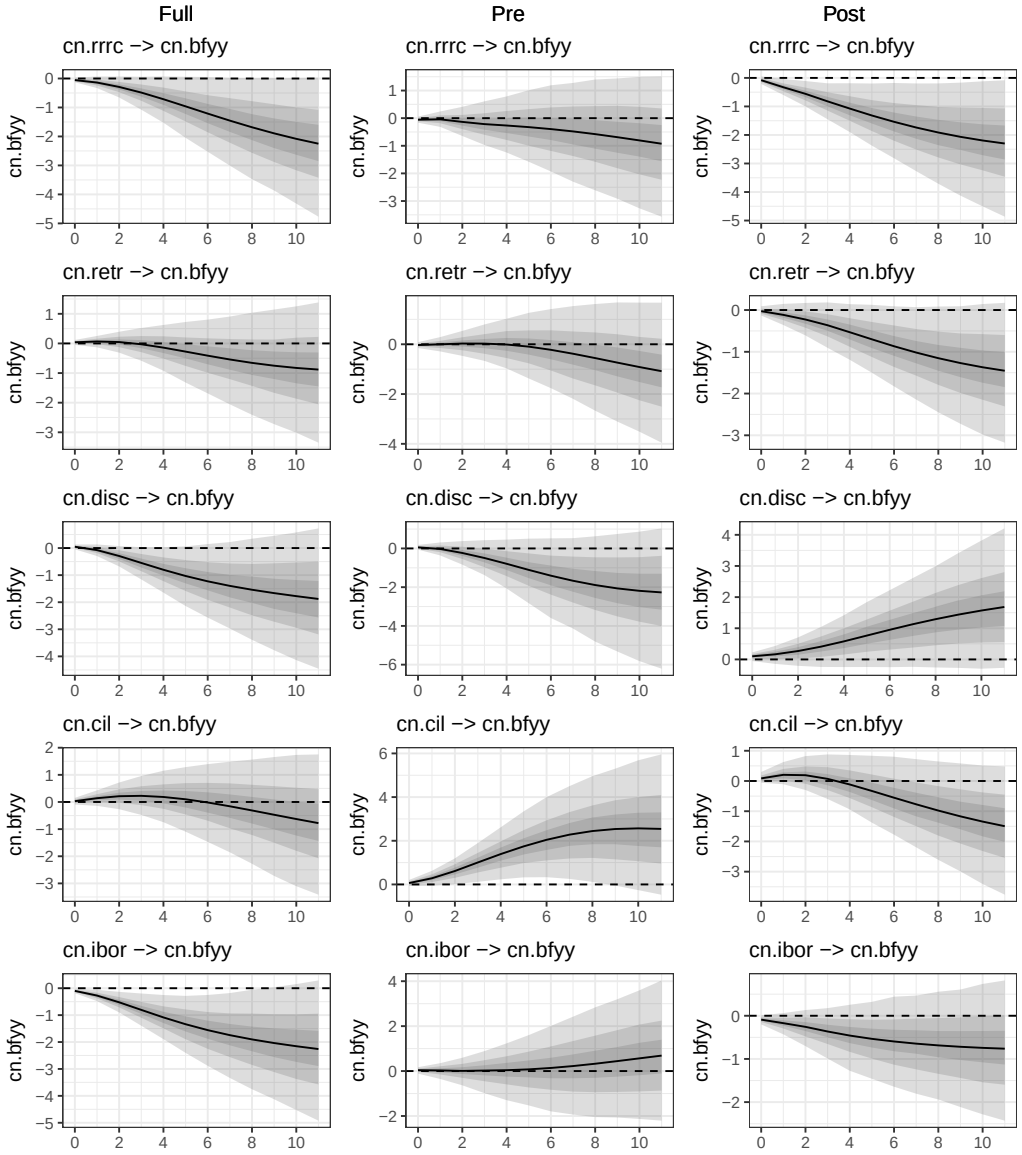
2.2 Narrative window guidance indicator

Figure 9: China model with narrative window guidance indicator (narrow)



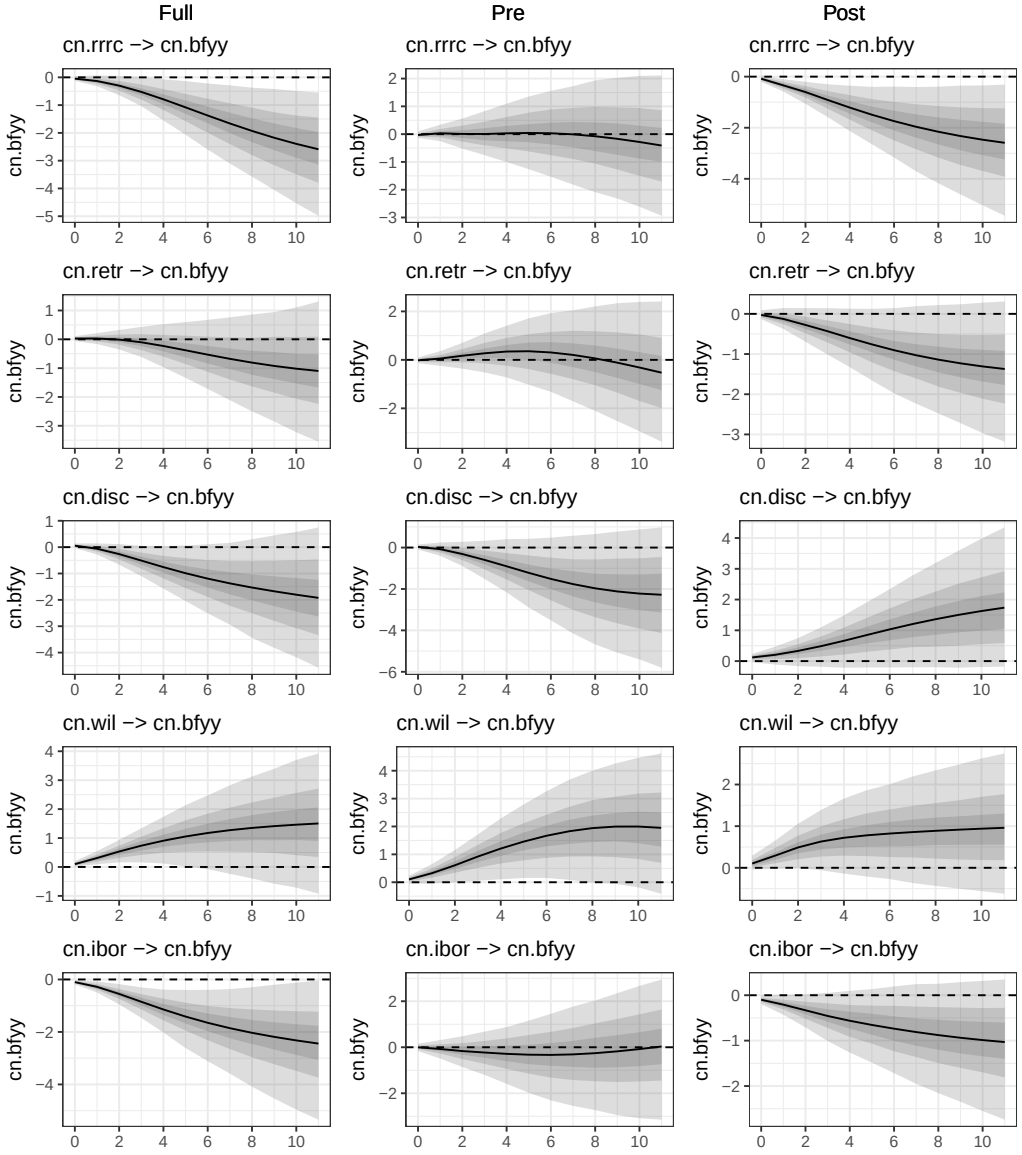
2.3 Sentiment credit indicator: Baseline model

Figure 10: China baseline model with sentiment credit indicator (broad)



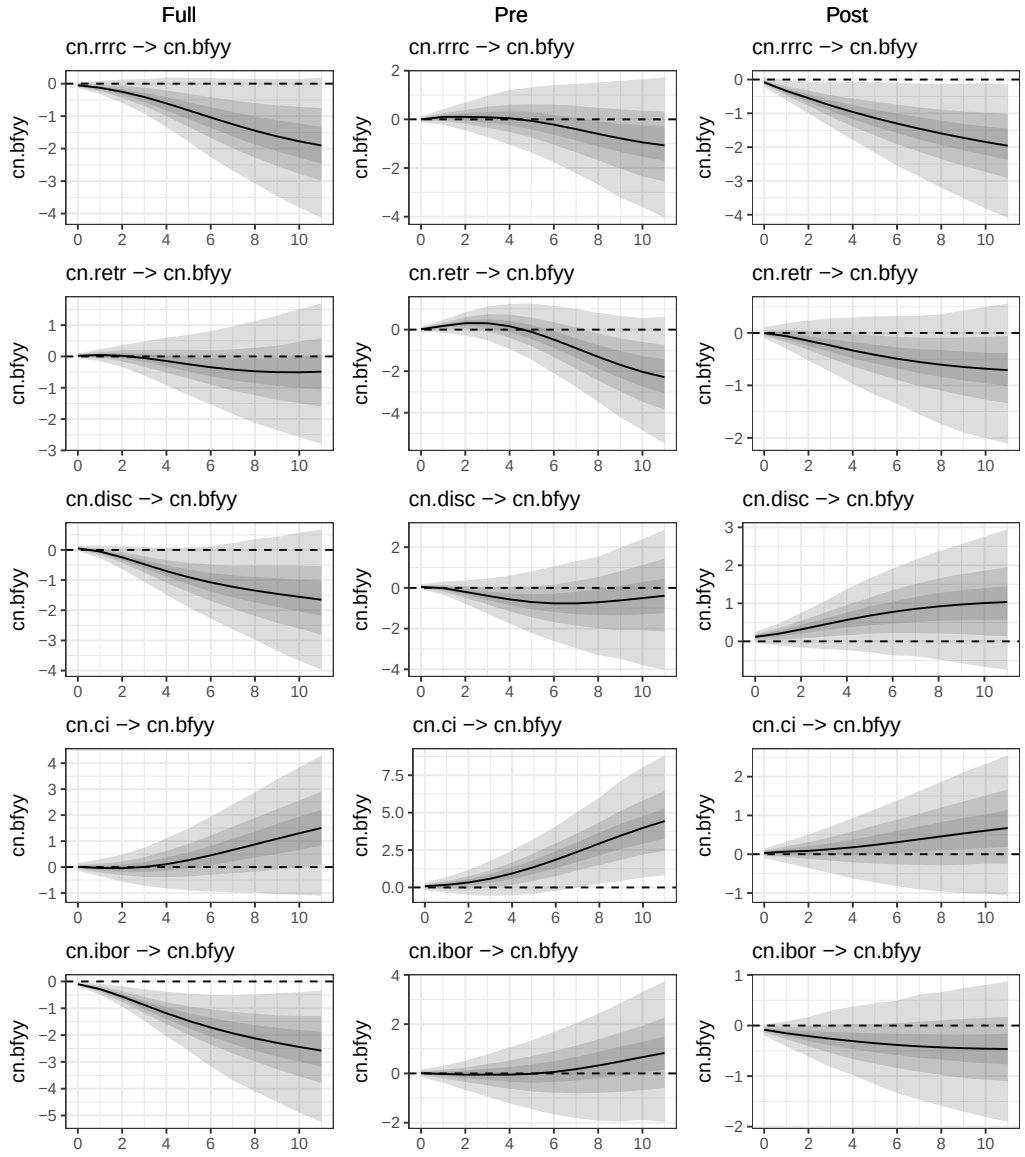
2.4 Sentiment window guidance indicator

Figure 11: China model with sentiment window guidance indicator (narrow)



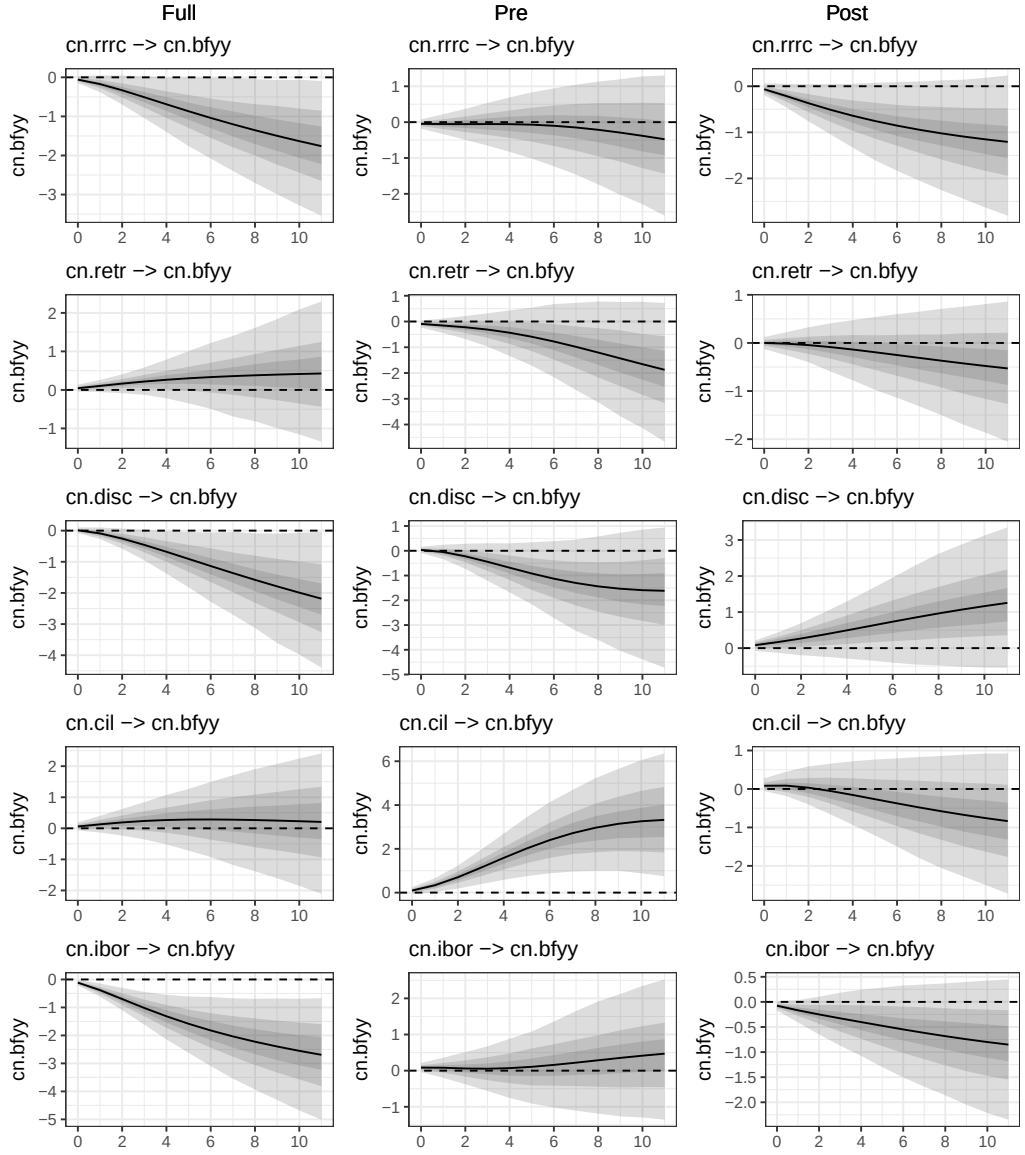
2.5 Narrative credit indicator: Model with exogenous variables

Figure 12: China narrative credit indicator model with exogenous variables (broad)



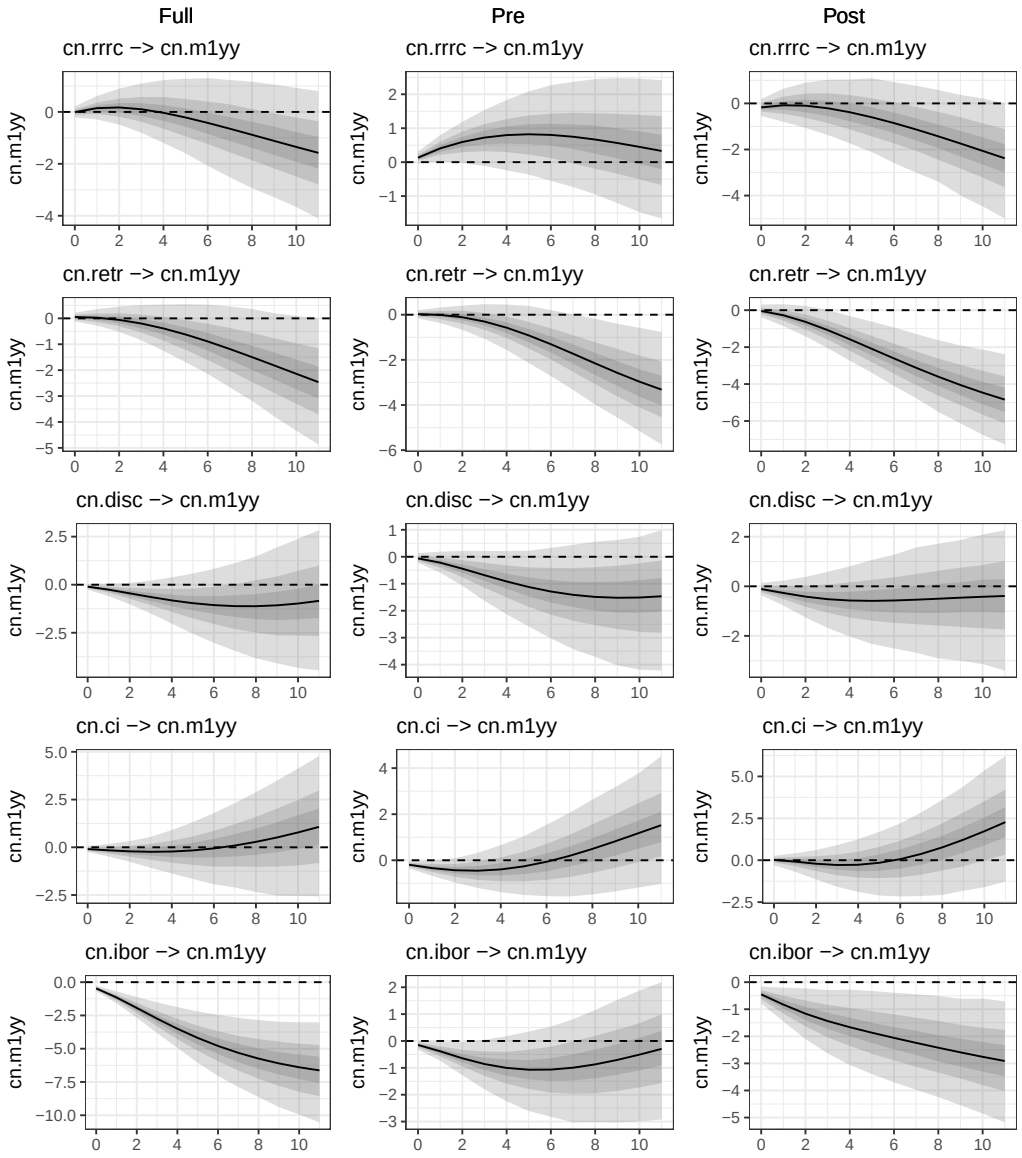
2.6 Sentiment credit indicator: Model with exogenous variables

Figure 13: China sentiment credit indicator model with exogenous variables (broad)



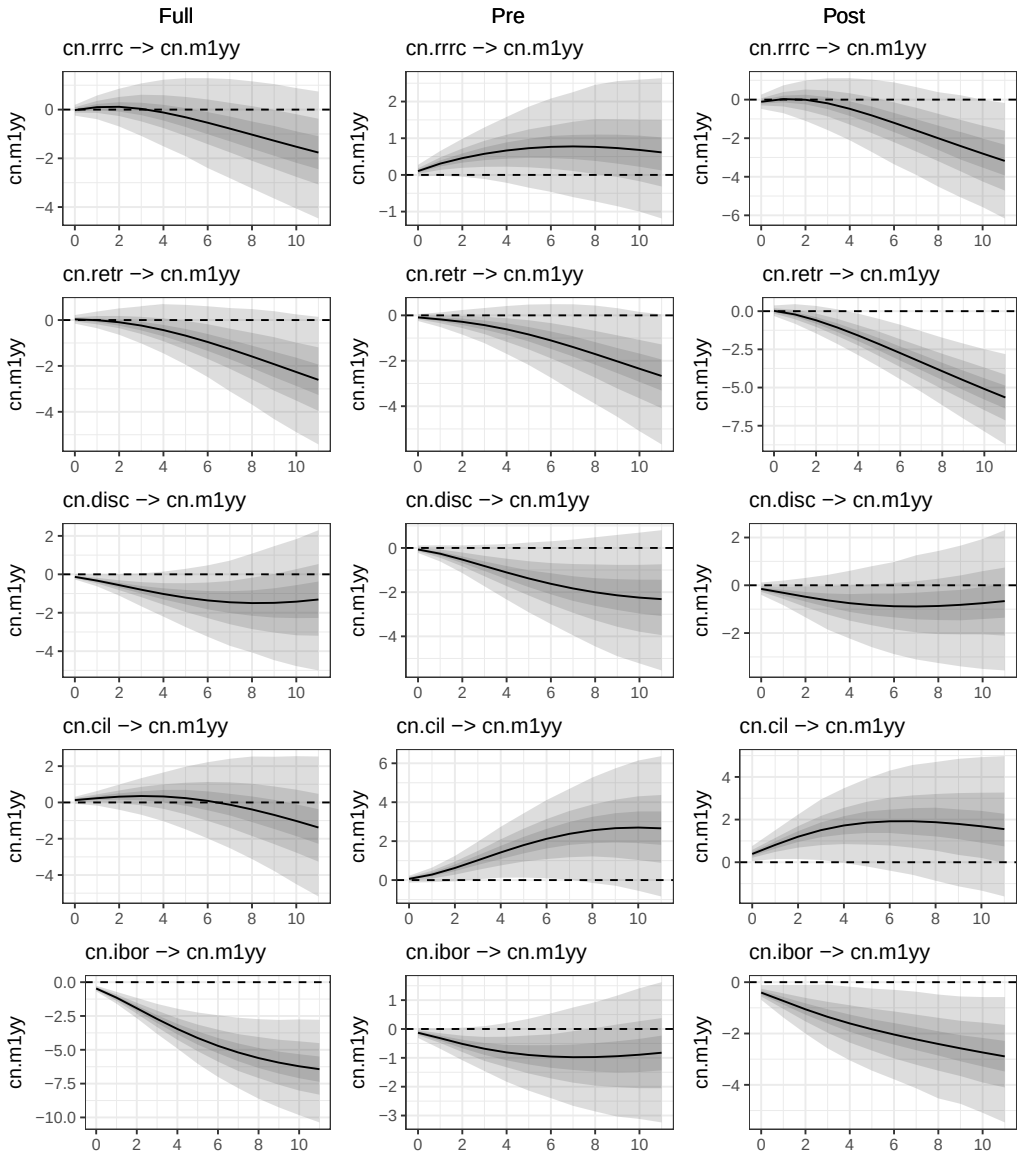
2.7 Narrative credit indicator: Model with M1 growth as main response variable

Figure 14: China narrative credit indicator model with M1 growth as main response variable (broad)



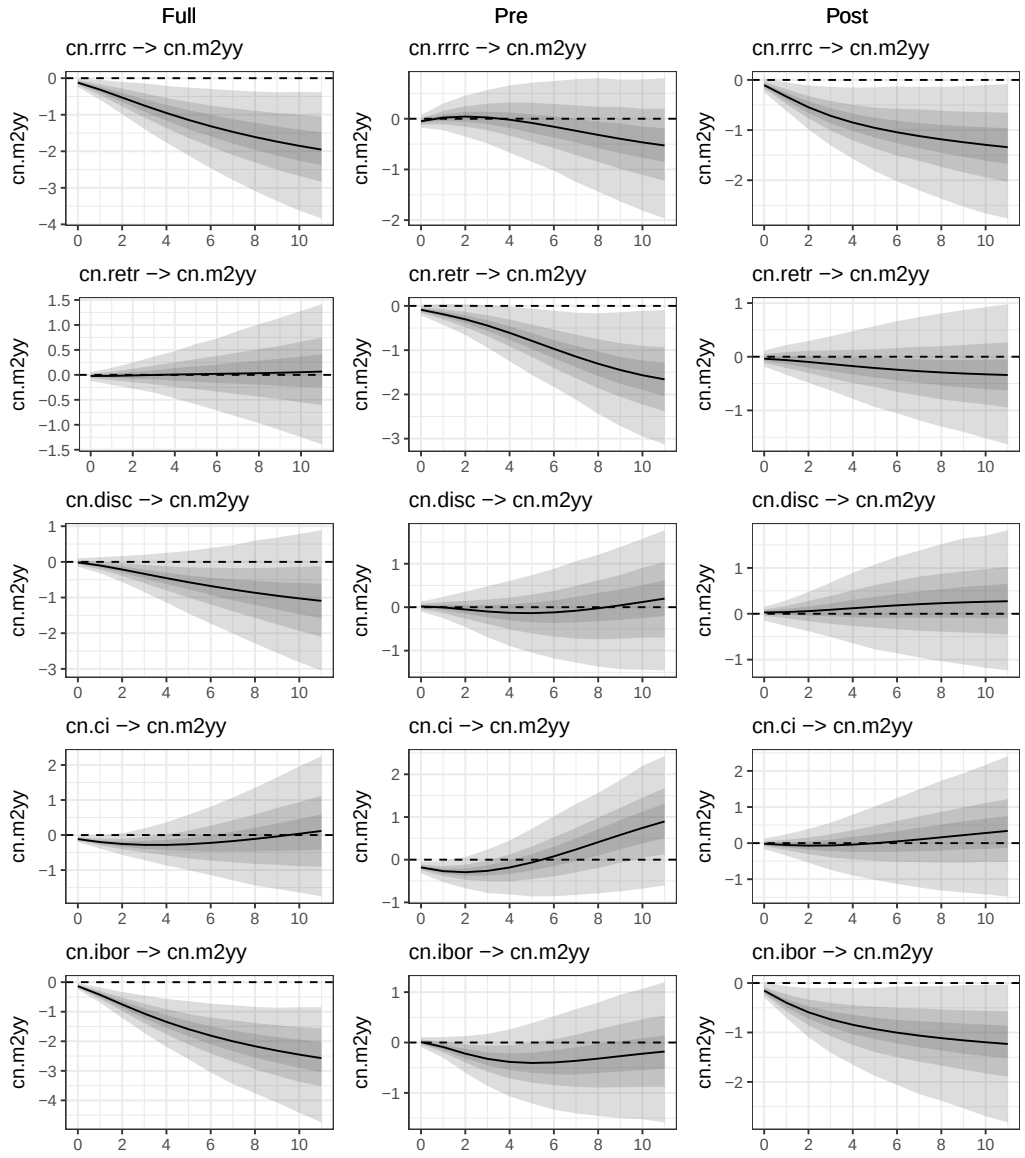
2.8 Sentiment credit indicator: Model with M1 growth as main response variable

Figure 15: China sentiment credit indicator model with M1 as main response variable (broad)



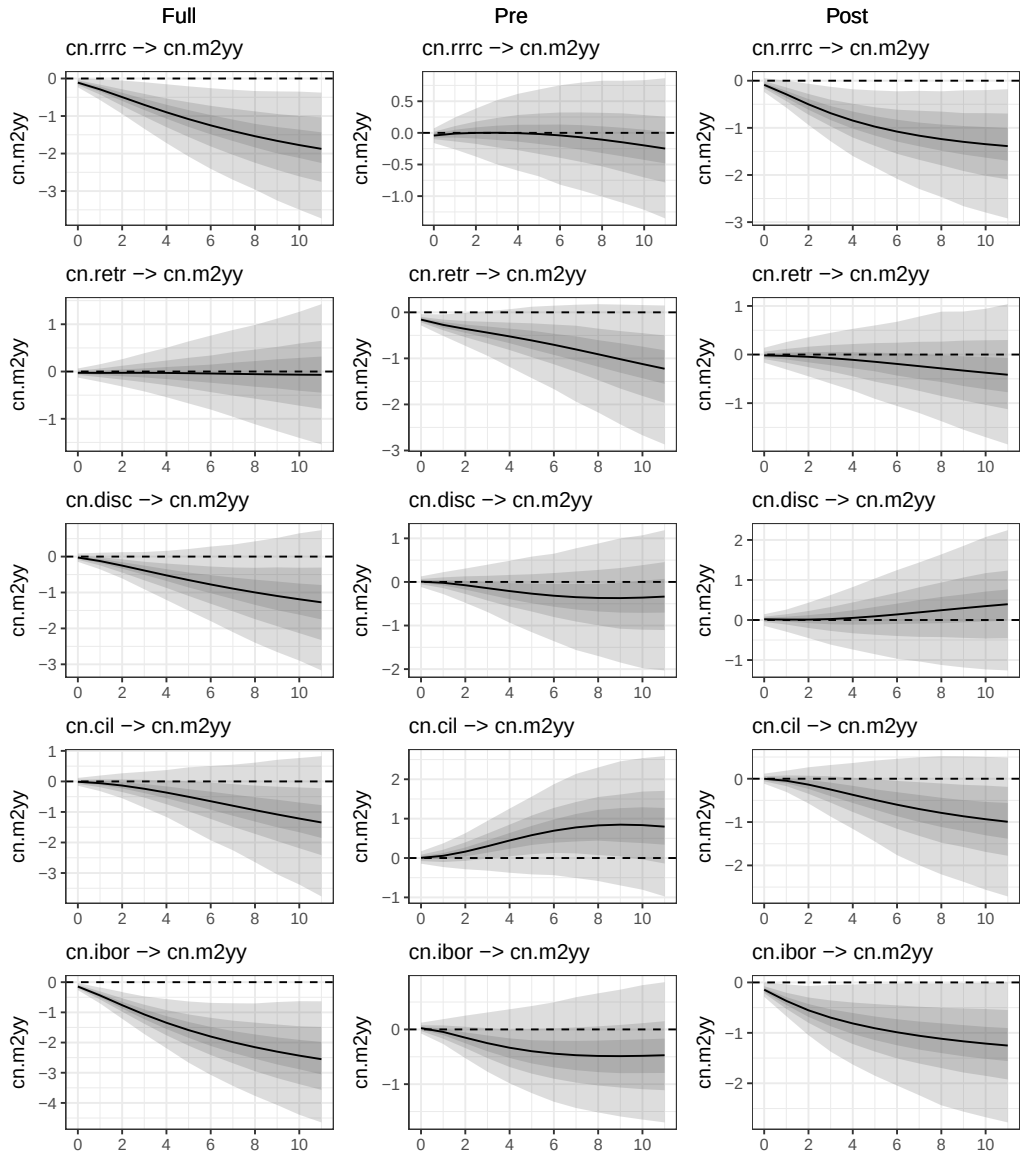
2.9 Narrative credit indicator: Model with M2 growth as main response variable

Figure 16: China narrative credit indicator model with M2 growth as main response variable (broad)



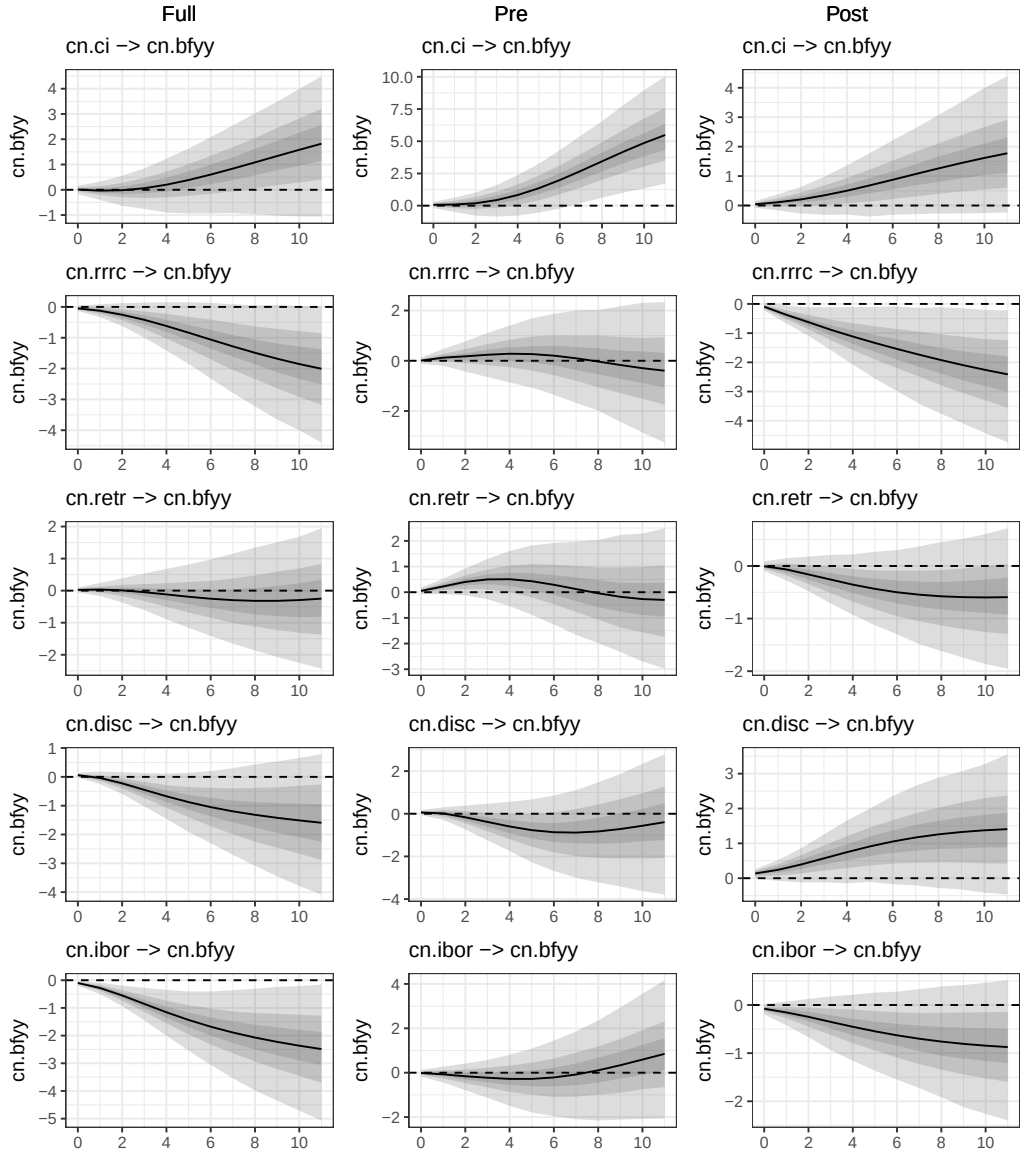
2.10 Sentiment credit indicator: Model with M2 growth as main response variable

Figure 17: China sentiment credit indicator model with M2 growth as main response variable (broad)



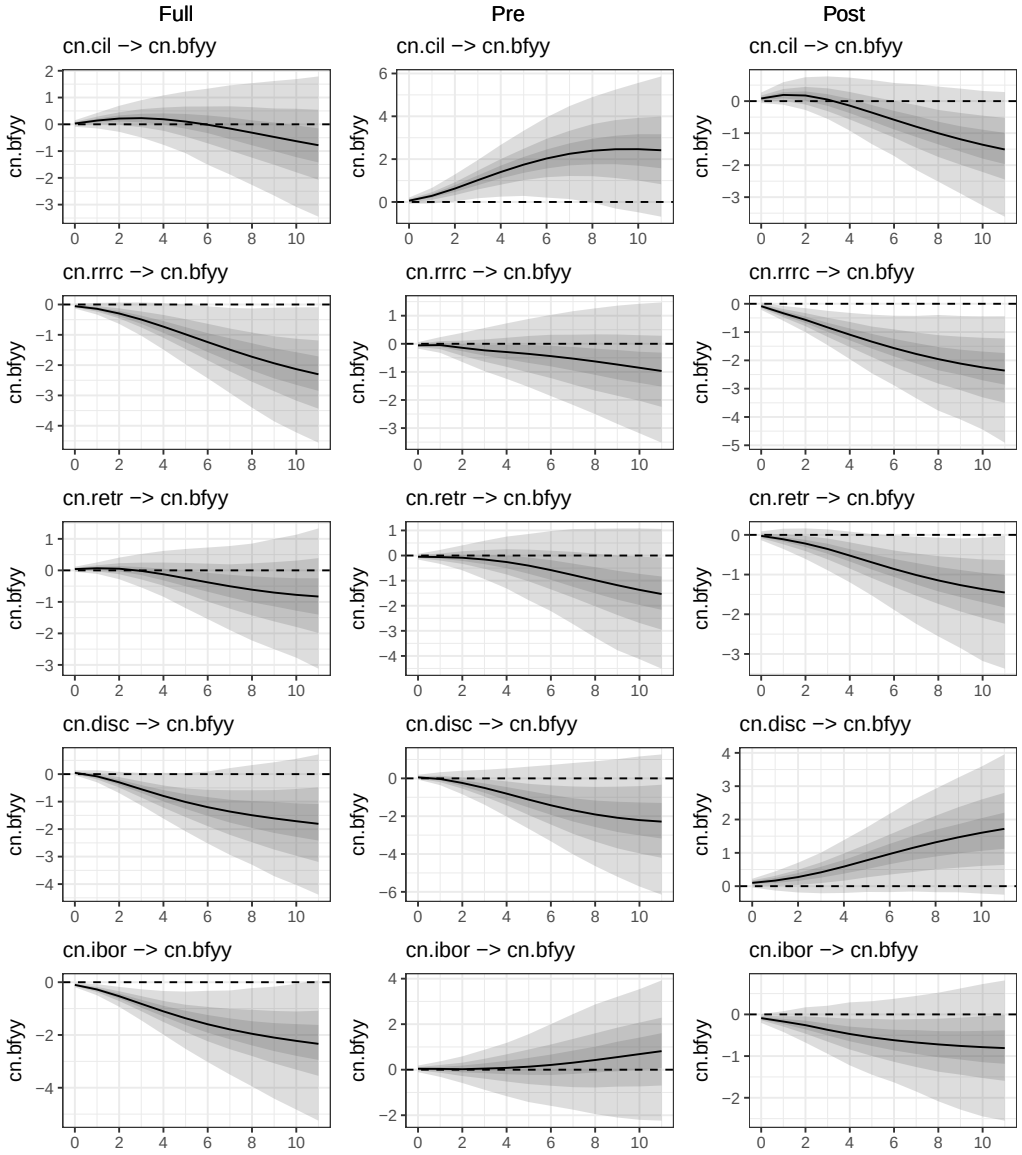
2.11 Narrative credit indicator: Model with variables reordered

Figure 18: China narrative credit indicator model with variables reordered (broad)



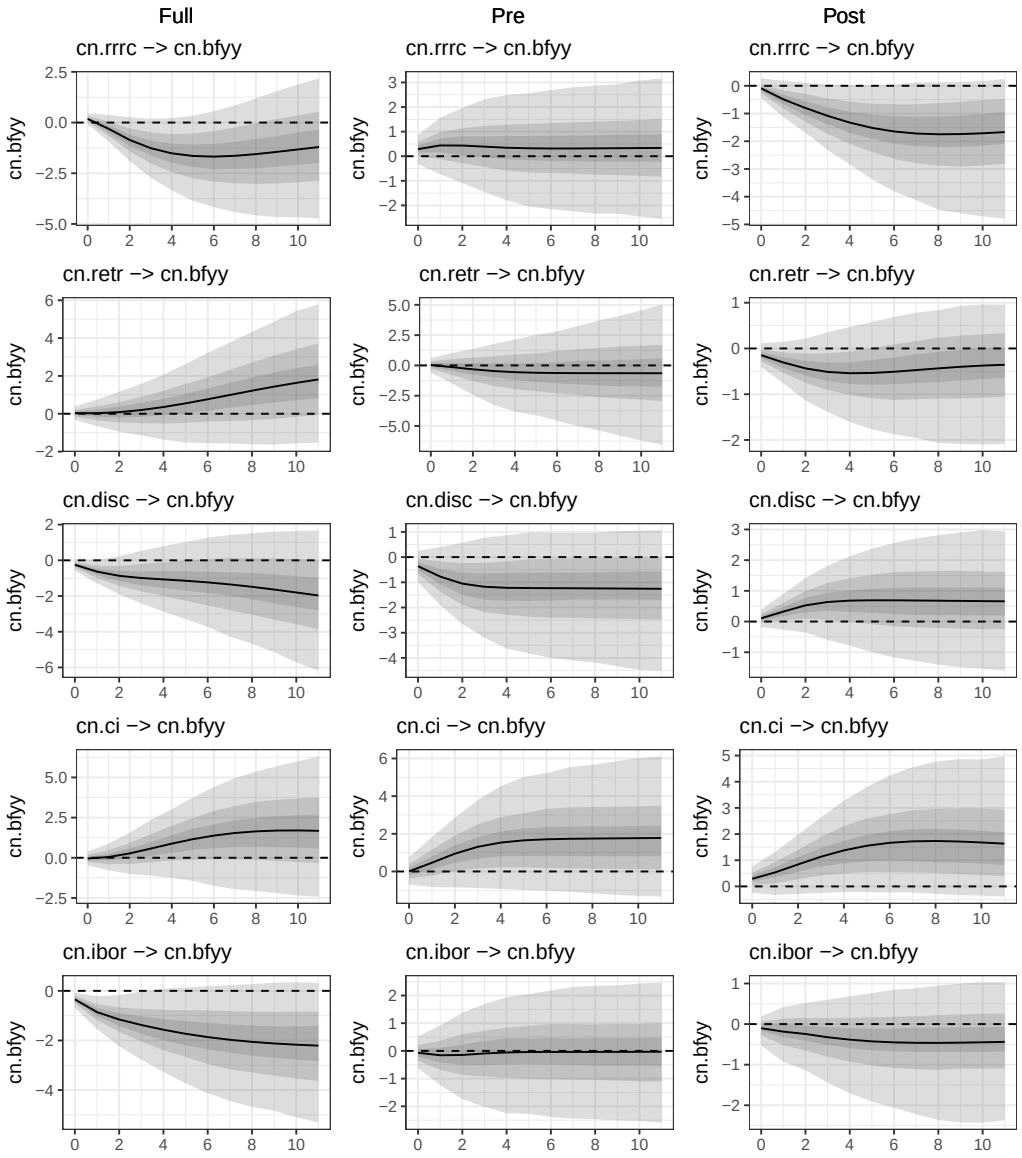
2.12 Sentiment credit indicator: Model with variables reordered

Figure 19: China sentiment credit indicator model with variables reordered (broad)



2.13 Narrative credit indicator: Model estimated on quarterly frequency data

Figure 20: China narrative credit indicator model estimated on quarterly frequency data (broad)



2.14 Sentiment credit indicator: Model estimated on quarterly frequency data

Figure 21: China sentiment credit indicator model estimated on quarterly frequency data (broad)