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A mirror of history: China's bond market, 1921–42¹

By CHUN-YU HO and DAN LI*

This article provides a quantitative assessment of contemporary beliefs about historical events by econometrically identifying 'break points' in China's domestic bond market from 1921 to 1942. We find that these 'break points' usually coincided with the events highlighted by the *Shanghai Newspaper*—an influential daily newspaper produced during the time of the Republic of China. These events are also generally considered to be crucial by historians—for example, the Japanese invasion of Manchuria and the outbreak of the Second Sino-Japanese War. However, some events to which historians attach great importance, such as the conflicts between Nationalists and Communists in the 1930s, were not reflected in the bond market and did not attract much media attention. Some events, such as the Sino-Japanese ceasefire in Tanggu in 1933, were thought to be crucial by contemporaries, but have been downplayed by later observers.

Different historical schools and individual historians have identified different historical 'events' throughout the ages and have attached various levels of significance to these events. However, the work of historians is incomplete if they ignore how people living at the time viewed the events because, after all, they, rather than later observers, were the people who were directly involved. Widely circulated newspapers or periodicals are reasonably good material sources for historians to discern contemporary views of events, or at least to discover how editors and contemporary writers viewed the events. Of course, how events were perceived by the mass of contemporary people remains unknown.

In a war-torn economy, the fate of government bonds is closely tied to the destiny of the issuing government. When news arrives with negative messages about the survival of the government, investors worry about its debt service ability and try to sell bonds, and thus send bond prices spiralling down. When news arrives announcing the government's victory in a battle, bond prices rise as investors' confidence is regained. Hence, changes in bond prices reflect investors'

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perceptions about the influence of events on the probability that the government will service its debts. Newspapers and periodicals were the only source of information for most investors during the early history of many countries.² How did investors interpret the ‘facts’ carried by these publications?

Current developments in econometric techniques allow time series price data to speak for themselves, so as to allow the identification of ‘break points’. These endogenous breaks directly capture the change in beliefs among investors at a given point in history. Do these ‘break points’ reflected by the capital market echo the pivotal events as reported by newspapers at the time? Are these ‘break points’, corresponding to pivotal events highlighted in major newspapers, assigned a similar level of importance by conventional historians? This study is inspired by the work of Willard, Guinnane, and Rosen,³ who evaluate contemporary views of events through the greenback market and compare them to the significance assigned to the same events by US Civil War historians.⁴

The goal of this article is to complement conventional historical work on the Republic of China (1912–49) by quantitatively assessing the beliefs of contemporaries toward events highlighted by a major daily newspaper of the time. To be precise, we assess how investors in the bond market reacted to the events when they occurred. The price fluctuations of government bonds, unlike those of other assets, such as real estate and stocks, are a nationwide indicator of how people viewed the event. For instance, when a civil war occurs, it may only affect real estate prices in the areas involved in the war, but not the whole nation’s real estate market. Similarly, the prices of some specific stocks, which are directly affected by the war, may move alongside the progress of the war, but not all stocks will be affected. However, as for government bonds, any event which imposes a threat to the government’s survivability or its financial resources will ring alarm bells in the whole bond market, especially when the government is poor and not constrained by a powerful legal institution for investment protection.

Due to the data availability constraint, our study period is restricted from 1921 to 1942 during the time of the Republic of China (1912–49). Nevertheless, it brackets many crucial events including some widely agreed ‘turning points’ in the history of the Republic of China, such as the Northern Expedition (1926–8) which led to the establishment of the Nationalist government in Nanjing, the Japanese Invasion of Manchuria in 1931, the outbreak of the Second Sino-Japanese War in 1937, and many other events, consisting of some large-scale civil wars, important political events, and diplomatic events, whose role in history is less widely accepted among historians.⁵

We first built a novel dataset of monthly bond prices for 11 major Chinese domestic bonds issued by the central governments from July 1921 to December 1942 and then applied an endogenous structural break method proposed by Qu

² For example, Campbell, Turner, and Walker, ‘Role of the media’, p. 462, point out in Great Britain ‘newspapers and periodicals were the only source of information for most investors during the 1840s’.

³ Willard, Guinnane, and Rosen, ‘Turning points in the Civil War’.

⁴ Notable works in similar spirit include Weidenmier, ‘Turning points’, and Brown and Burdekin, ‘Turning points’, for the US Civil War; Frey and Kucher, ‘History’, Oosterlinck, ‘Bond market’, and Waldenström and Frey, ‘Nordic countries’, for the Second World War; Sussman and Yafeh, ‘Institutions, reforms, and country risk’, for Japan’s Meiji era; and Zussman, Zussman, and Orregaard Nielsen, ‘Asset market perspectives’, for the Israeli-Palestinian conflict.

⁵ See below, section IV, and nn. 37–40, for details of the history books that we consulted.

and Perron to identify break points for the bond yields derived from the price data.⁶ Second, we manually collected the headlines (the title of the main story) of a major daily newspaper, the *Shanghai Newspaper* (hereafter the *Newspaper*), during the same period.⁷ There is no doubt that the headline news covered what the editors regarded as the most important event of the day, and on most days political or military events occupied this space. Reading through the contents of the headline news, we divided the events into seven categories: civil conflicts, domestic political events, diplomatic–military events, international events, economic–fiscal events, natural disasters, and other events. Referring to history books which provide detailed accounts of historical events for the study period,⁸ we searched through the headlines and pinned down the first day that the related news arrived and the last day that it appeared. Next, we constructed a measure of the level of significance assigned to the event by the editors, compared to many parallel events happening at the time; this will be referred to as the ‘headline intensity’. The headline intensity is defined as the frequency of the event appearing as a headline between the first day and the last day of the headline coverage of the event. Third, we analysed whether the major events reported by the *Newspaper* coincided with break points in the bond market, and if so, when, and in what direction and by how much bond values changed. We also considered why some major events regarded by the *Newspaper* are not reflected as break points in bond yields. Editorials on the bond market in the *Bankers' Weekly* (hereafter *BW*),⁹ a major financial periodical, were frequently consulted to check whether the link we made was also drawn by contemporary observers. Finally, we compared the break points reflected by the capital market to the turning points identified by the historical works we have consulted.

Our time series data produce six break points, and our regression analysis indicates these break points are robust after controlling for macroeconomic variables such as inflation and interest rates. It shows that these break points were not caused by the fluctuations of macroeconomic variables but by other events such as military, political, and economic events. We find that some external military events that are generally thought to be crucial are clearly reflected in bond yields. This holds particularly true for the Japanese invasion of Manchuria in September 1931 and the outbreak of the Second Sino-Japanese War in July 1937, both of which were viewed as serious threats to Chinese sovereignty and produced significant negative market responses. Interestingly, none of the major civil wars, including the Northern Expedition in which the Nationalist Party toppled its predecessor, were influential enough to produce break points in the bond market, despite the fact that they also drew very high levels of media attention. This indicates that external conflicts were regarded by investors as more detrimental to the government's ability to service its debts than civil wars. The investors' mood was consistent with the *Newspaper's* attitude toward external and internal threats as the headline intensity for Sino-Japanese conflicts was usually stronger than that for civil conflicts.

Some economic events influenced the bond market dramatically. For example, the January 1924 break occurred right after the first bond consolidation in the early

⁶ Qu and Perron, ‘Estimating and testing structural changes’.

⁷ See below, section II, for details.

⁸ See above, n. 5.

⁹ See below, section II, for details.

1920s. In 1921–4 in the *Newspaper*, economic events appeared as headlines with a high frequency. An average of 8 per cent of the headlines in these years concerned economic events, most of which were directly related to bond issues, compared to only around 2 per cent in the following years. The bonds under study survived this consolidation process, with their yields declining by approximately 35 per cent on average. This finding implies that the bondholders were satisfied with more secure collateral for the bonds even though they had to bear the cost of lower interest rates and extended bond maturity after the consolidation. The third bond consolidation, which occurred in 1935, made the bond market halt for a while. Aside from these two events, other financial events seem to have mattered little.

Following a careful survey of historical events, we show that some events emphasized by historians are found to have disturbed the bond market only slightly and attracted little attention from the *Newspaper*. For instance, the Central Plain War in 1930—the second largest civil war before 1937, during which the Nanjing government faced the most severe threat and was nearly toppled by the allies of major warlords—received a headline intensity of as low as 9 per cent, and, correspondingly, the financial market did not respond to it seriously. Interestingly, conflicts between the Nationalist and Communist parties were, based on hindsight, assigned a very important place in the history of the Republic of China and today's China, but attracted almost no headline coverage during 1930–5. The *Newspaper* headlines rarely reported on the 'five encirclements' which were carried out by the Nationalist government to eliminate the Communist Party, following which the Communist Party was forced to start the famous 'Long March'—a turning point in the history of China—during which Mao Zedong emerged as the top leader of the Communist Party.¹⁰ Consequently, the bond market might have been barely aware of these events.

The article proceeds as follows. Section I provides an overview of the history of the domestic bond market in the Republic of China. Section II discusses the data and how the news headlines have been organized. Section III outlines the theoretical and empirical models. The empirical results are presented in section IV, and section V concludes.

I

Budget deficits accompanied the Republican governments, both Beijing (1912–27) and Nanjing (1927–49) regimes, throughout their existence, due to incessant civil wars, political tumults, and Japanese encroachments. Military spending took the lion's share of government expenditure; it had never been less than 28 per cent and reached a record high of 87 per cent from June 1927 to May 1928.¹¹ In prewar

¹⁰ Fairbank and Goldman, *China*, p. 305; Ch'en, 'Communist movement'.

¹¹ The fiscal system was not established until the Nanjing regime took power, and therefore the budgets were rarely reported during the Beijing regime. Moreover, the budgets published by the Beijing regime were dubious according to Young, 'China's fiscal transformation', pp. 83–5. Based on the available budgets for fiscal years 1917 and 1919 (*BW*, 12 March 1918, pp. 5–7, and 24 June 1919, pp. 53–4), the funds allocated for military purposes constituted 35% in 1917 and 28% in 1919. We suspect the actual percentage of military costs far exceeded these figures due to numerous civil conflicts, such as the Constitutional Protection Movement in 1917–22, factional wars, and riots. Military expenditure as a percentage of total expenditure for the Nanjing regime can be found in Coble, *Shanghai capitalists*, p. 67, and tab. 2, p. 68, for 1927–32, and in Rawski, *Economic growth*, tab. 1.1, p. 15, for 1932–6. Those for 1934–7 can be found in Young, *China's nation-building effort*, tab. 6, pp. 93–4, and those for the Second Sino-Japanese War period can be found in Department of Finance, *Caizheng Nianjian*, pp. 98–101.

China—that is, before the outbreak of the Second Sino-Japanese War in 1937—debt financing provided a large portion of net government receipts, and in turn, debt service became the second-largest drain (next to military spending) on the limited fiscal resources.¹²

Along with the establishment of stock exchanges in big cities and the thriving of the domestic modern banking industry, a private market for government bonds gradually came into being during the 1920s–30s. Usually, before the date of formal issue, the government deposited the bonds with banks (or other financial institutions) in exchange for cash in advance equal to a certain discount of the face value of the bonds. After the formal issue, the bonds would either be placed directly on the stock exchanges or retained by the banks, which would negotiate a final sale price based on the bonds' market value.¹³

The bonds' annual yields, derived from coupon payments of mostly 6 to 8 per cent, paid semi-annually combined with an offer price set below the bonds' face value, exceeded 10 per cent, with a record high in 1932 approaching 25 per cent.¹⁴ The interest paid on deposits with banks was no more than 6 per cent on average (for both fixed and demand deposits). Moreover, bonds could be used as collateral for bank loans. It was not only the high yields on bonds but the potential profits from speculation that made the bond market attractive for private investment. The tremendous fluctuations in bond quotations provided good opportunities for speculation, and quick profits could be made easily if one knew when to sell short and buy long. A company set up by Madame Kung, whose husband had been Minister of Finance since 1932, one of her brothers, and several financial government officials were notorious for engaging in bond and commodity speculation.¹⁵

The bankers were surely the largest bondholders, holding bonds both for investment and as a reserve to cover bank notes. For example, in 1925, the bonds issued by the Beijing government in circulation were estimated at 97 million silver yuan,¹⁶ while 27 banks (out of 141) and two trust companies held around 59 million according to a survey of these financial institutions conducted by Zhonglian.¹⁷ During the Nanjing regime, an imputed one-third to two-thirds of the bonds were held by banks.¹⁸ The banks' bonds business was so lucrative that Qian argues that 'many banks were founded for the purpose of making money from dealing with government bonds during the period of the Beijing regime',¹⁹ and Coble points out that probably one-third or more of the banks' income-earning ability was tied to the government (both bonds and loans) in the prewar Nanjing regime.²⁰

¹² Ibid.

¹³ Coble, *Shanghai capitalists*, pp. 66–85.

¹⁴ The systematic data on yields during the Beijing regime are not available. According to the *BW*, 4 Dec. 1917, pp. 8–10, the bond yields exceeded 12% per year and the periodical regarded buying bonds as a lucrative investment. Qian, *Juizhongguo Gongzhai Shiliao*, pp. 4–39, estimated a much larger yield for bonds issued by the Beijing and Nanjing regimes ranging from 12% to 36%, but no solid calculation was provided. The yearly bond yields for the Nanjing regime in prewar China can be found in Young, *China's nation-building effort*, tab. 9, p. 107.

¹⁵ Coble, *Shanghai capitalists*, p. 234.

¹⁶ The number has been calculated by the authors according to Qian, *Juizhongguo Gongzhai Shiliao*, which includes the information on size of bond issues, bond offering statements, the repayments of principals of each existing bonds, and the bond consolidation in 1921.

¹⁷ *BW*, 3 Aug. 1926, pp. 14–16.

¹⁸ Coble, *Shanghai capitalists*, pp. 74–5; Wu, *Zhongguo de Yinhang*, pp. 68–73; Zhang, *Zhongguo Huobi Jinrong Wenti*, pp. 68–9; Chang, 'Toward modernization', p. 147.

¹⁹ Qian, *Juizhongguo Gongzhai Shiliao*, pp. 12–16.

²⁰ Coble, *Shanghai capitalists*, p. 167.

The information on other bondholders was much less well documented. According to evidence from various sources, we believe this community consisted of government officials, relatives and friends of government officials, capitalists, wealthy bourgeoisie, and overseas Chinese. According to an announcement of the third reimbursement schedule for the 8 per cent Military Bond issued by the Beijing regime in 1912, it listed the name of the underwriters through whom/which the bonds were sold to the public and informed them that part of the bonds sold through them were to be reimbursed in the third lottery draw.²¹ The underwriters included two banks, namely, the Bank of China (Shanghai Branch) and Bank of Communication; nine local government officials; five individual subscribers (one of them was overseas Chinese); and five overseas Chinese institutions/companies. The overseas bondholders could collect their payments through the Hong Kong and Shanghai Banking Corporation (HSBC) branches located in their countries of residence from the Bank of China Shanghai Branch. The Shanghai Commercial and Saving Bank continued to publish investment guides on government bonds for years, and in the preface to the 1931 version, it stated that 'the previous versions of the guides were so popular that they were sold out very soon. In order to keep investors informed, we updated the information on the bond market in the current version'.²² These guides were sold at the Chinese Merchant Stock Exchange (CMSE)—the largest stock exchange for bonds located in Shanghai. The exact circulation figure is unknown, but it must have been large in order to provide enough profit for the research department of the bank to carry on this business. Nonetheless, bond investors must have been very wealthy, as at the time the minimum threshold of each transaction for bonds was 100 yuan at bond face value, assuming a bond was sold at 50 per cent of its face value and an investor needed 50 yuan. This was not a small amount when compared to the net domestic product per capita of 100 yuan in the Lower Yangzi Macro-Region, the richest region including the wealthy parts of Zhejiang and Jiangsu provinces and Shanghai during the 1930s.²³

The size of the bond market was ever increasing, and according to statistics compiled by the CMSE, the yearly trading volume of government securities increased from 0.24 billion silver yuan in 1927 to 2.34 billion in 1930 and surpassed 3.34 billion in 1931.²⁴ These are substantial figures when compared to the total amount of bond issues from 1927 to 1931 of slightly more than 1 billion²⁵ and the gross national product in 1931 of merely 38.9 billion.²⁶ The volume of trade on the CMSE would often reach staggering proportions. For the month of March 1929, for example, the trade in the Consolidated 6 per cent bond, one of the bonds studied in detail in later sections of this article, reached 38.5 million yuan,²⁷ the equivalent of approximately 65 per cent of the total

²¹ *BW*, 18 Dec. 1917, pp. 22–4.

²² Shanghai Commercial and Saving Bank, *Neiguo Gongzhai Yaolan*, preface.

²³ Ma, 'Economic growth', tab. 3, p. 367.

²⁴ Wu, *Zhongguo de Yinhang*, p. 76.

²⁵ Qian, *Juizhongguo Gongzhai Shiliao*, p. 19.

²⁶ Liu, *China's national income*, p. 13.

²⁷ *BW*, 5 Mar. 1929, pp. 3–4; 12 Mar. 1929, pp. 4–5; 19 Mar. 1929, pp. 3–4; 26 Mar. 1929, pp. 2–3; 2 Apr. 1929, pp. 2–3.

issue of this bond in 1921 and 157 per cent of the remaining unredeemed bonds in circulation.²⁸

As the debts piled up in a war-torn nation, three bond consolidations occurred in 1921, 1932, and 1936. Every bond consolidation was featured by a reduction in the principal, the interest rate, or both, and an extension of the maturity time, in exchange for more secure collateral for bond repayment. The 1921 bond reorganization led to a reduction of 131 million yuan, approximately one-quarter of the outstanding bonds.²⁹ The 1932 bond reorganization saved the government 85 to 100 million yuan on bond payments in the first year alone, a substantial figure when compared to total receipts of 683 million for the fiscal year 1932. Furthermore, Nanjing issued another 604 million in new bonds during 1934–5, bringing the total of unredeemed bonds to 1.2 billion yuan by the close of that period. The cost of servicing these debts would have been 126 million for 1936. The 1936 bond consolidation would save the government an estimated 85 million annually.³⁰ In the early years of the Second Sino-Japanese War (1937–45), the Nationalist government continued to pay the bonds, and defaults started in the spring of 1940.³¹ Later inflation during wartime and the ‘currency reform’ of 1948 wiped out almost all domestic debts.

II

Because of the large number of bonds traded in various stock exchanges across China, we restrict ourselves to 11 bonds traded on the CMSE, the largest market for trading government bonds. Consistent time series price data are available only for the period after the beginning of the first bond consolidation in 1921. The bond price data come from the *Bankers' Magazine* (hereafter *BM*) and the *BW*. The *BM* was published monthly by the Beijing Bankers' Association between January 1921 and December 1928. The *BW* was published weekly by the Shanghai Bankers' Association from May 1917 to March 1950. Unfortunately, information on bond turnover only appeared occasionally.

Table A1 contains detailed information on the 11 bonds included in this study. For the period 1921–35, we focus on five domestic bonds, namely, the 7th Year, Financial, Consolidated 7 per cent, Consolidated 6 per cent, and 8 per cent bonds, issued by the Beijing government (which we refer to as Beijing bonds). These five bonds exhibited 52 per cent capitalization of the bond market and were the most frequently traded bonds before the Nanjing government took power in 1927.³² We compile the monthly maximum and minimum price datasets for these bonds with a face value of 100 silver yuan. The number of observations ranges from 86 to 161. These bonds were inherited by the Nanjing government. The price data for four of the five bonds are not available after October 1931. The Consolidated 6 per cent bond (hereafter the 6 per cent bond) has the longest time series data available, spanning from July 1921 to November 1934. To make sure that the events that

²⁸ The size of the remaining amount of the Consolidated 6% bond was calculated according to items on the bond reimbursement in the bond offering statement in Qian, *Juizhongguo Gongzhai Shiliao*, p. 76.

²⁹ The number is calculated by the authors according to *ibid.*, pp. 68–72.

³⁰ Coble, *Shanghai capitalists*, pp. 20, 108.

³¹ Chen, ‘China's bonds’, p. 130.

³² For example, the top five most frequently traded bonds in the first four months of 1923 were the Financial, Consolidated 6 per cent, 8 per cent, Consolidated 7 per cent, and 7th Year bonds; *BW*, 8 May 1923, pp. 8–9.

occurred in and after September 1931 did not produce a specific impact on just one bond, the Disband Bond, issued in July 1929 by the Nanjing government, is added to the econometric analysis.

After the 1936 bond consolidation, almost all outstanding bonds were consolidated into five series, which were called Consolidation bonds A, B, C, D, and E (hereafter CBA to CBE). China's currency left the silver standard in 1936. Therefore, these bonds were denominated in the paper currency called fabi, as one fabi yuan was exchanged for one shilling and 2.375 pennies in 1936.³³ After the outbreak of the Second Sino-Japanese War in July 1937, the government set price floors for the Consolidation bonds as follows: 76 yuan for CBA, 73.5 yuan for CBB, 71.5 yuan for CBC, and 70 yuan for CBD and E, at a face value of 100 yuan.³⁴ The CMSE was closed after the Japanese occupation of Shanghai on 13 August 1937. Despite the closure of the stock market, the black market for trading bonds began to merge and soon flourished.³⁵ Beginning in January 1938, the *BW* started to record bond price data again. The price occasionally fell below the price floors. The monthly maximum and minimum price data have been collected for these bonds with a face value of 100 fabi yuan from March 1936 to December 1942 (except from September to December 1937 when there was no price recorded).

The maturity date for bonds was not fixed. Instead of explicitly amortizing a part of a bond each year, the government held one or two lottery draws each year to reimburse some of the bonds in full, based on a fixed amount of funding allocated for this purpose. Therefore, we examine the time series property of the bond yield in lieu of the yield to maturity. The bond yield is calculated as the fixed coupon amount divided by the prevailing bond market price.

Our main source of historical 'facts' is the *Newspaper* (1872–1949), which was a Chinese daily newspaper and was the most influential, longest-lived, and most widely circulated newspaper at the time.³⁶ Its status in Shanghai was comparable to (if not higher than) that of *The Times* in London at the time because the former faced no comparable competitors. It was the first newspaper agency in China's history which sent reporters to the battlefields to report the war progress and therefore it was regarded as a reliable source for war news. We construct a serial of news events in chronological sequence by collecting the daily headlines starting from 1 January 1921 to 15 September 1942, when the *Newspaper* was taken over by the Japanese puppet government after the outbreak of Asia-Pacific war.

According to the contents of the headlines, we divided the events into seven categories: civil conflicts, political events, diplomatic–military events, international events, economic–fiscal events, natural disasters, and other events. 'Civil conflicts' refers to events involving factious confrontations and wars. 'Political events' are the political activities conducted by the incumbent government, such as congressional activities, political conferences/meetings, and the appointment or dismissal of government officials. When an event is difficult to categorize as a civil conflict or a political event, it has been assumed that this event is both a civil conflict and a

³³ Hsiao, *China's foreign trade*, tab. 9a, p. 190.

³⁴ *BW*, 10 Aug. 1937, p. 1.

³⁵ Mu, 'Zhanshi Guozhai zhi Dongtai'.

³⁶ The daily circulation exceeded 30,000 in 1920. The *Newspaper* became more and more popular as its circulation exceeded 100,000 in 1925 and 150,000 after 1932. The archive of the *Newspaper* is the most frequently used archival source for studying the history of modern China; Xiong, 'Shenbao yu Jindai Shanghai Wenhua', p. 5.

political event. For example, during the Beijing regime (1912–27), the congress was an arena for the representatives of major factions to fight for power and the rise or fall of a political tycoon was determined by the outcome of factional war. Therefore, a congress meeting was a political event full of factious confrontations. ‘Diplomatic–military events’ are the diplomatic or military interactions of the Chinese government and foreign governments. ‘International events’ are the events occurring in foreign countries in which China was not directly involved. For example, if a meeting of members of the League of Nations covered an issue affecting China, it was assigned to the group of diplomatic–military events, and if a meeting of this kind did not cover a Chinese issue, it was categorized as an international event. Any news related to the current market situation, the financial market (including the bond market), and the fiscal status of incumbent governments was attributed to the group of ‘economic–fiscal events’. ‘Natural disasters’ refers to news reports on natural disasters and disaster relief, and ‘other events’ include student and social movements, robberies, and some other non-categorized events. Civil conflicts, diplomatic–military events, and natural disasters would pose a threat to the government’s financial resources which would affect investors’ judgements on the government’s ability to service its debts, and the economic–fiscal events would directly impact the bond market.

The *Newspaper* did not publish on certain important holidays including five to seven days for the Chinese Spring Festival and one day for the western New Year. Therefore, for one year, there are around 357 daily newspapers available. After Shanghai was occupied by the Japanese after the outbreak of the Second Sino-Japanese War in 1937, in order to avoid Japanese news censorship, the *Newspaper* agency moved to Han Kou, which was lost to the Japanese in October 1938, and later moved to Hong Kong. For some time, the *Newspaper* printed in Han Kou and Hong Kong: it published from 24 January to 31 July 1938 in Han Kou and from 1 March 1938 to 10 July 1939 in Hong Kong. It resumed publishing in Shanghai from 1 September 1939 to 15 September 1942, when it was taken over by the Japanese puppet government.³⁷

Table 1 summarizes the yearly distribution of headline events according to the seven categories from 1921 to 1942. ‘No. of days’ indicates the number of days that the *Newspaper* is available in a year. The rest of the columns show the number of headline events in a specific category and the number in parentheses is the percentage of this group of events over a year. From the table, we can see that civil conflicts dominated the headlines from 1925 to 1927. Then diplomatic–military events rose to be the dominating headline events from 1931 until 1933, and regained that position from 1937 until 1941. Surprisingly, in 1942, international events occupied the majority of the headlines.

III

This section lays out the theoretical and empirical models for our analysis. Consider a bond with time to maturity of T periods that pays coupon c_t each period and principal c_0 in the last period. It is uncertain whether the government will pay the

³⁷ A Japanese puppet government was set up in Nanjing in March 1940. After the outbreak of Asia-Pacific War in Dec. 1941, the Japanese troops moved into and took control of the international enclaves in Shanghai.

Table 1. *The distribution of headline event types in the Shanghai Newspaper, 1921–42*

Year	No. of days	Civil conflicts	Political events	Diplomatic–military events	International events	Economic–fiscal events	Natural disasters	Other events
1921	357	130 (36)	52 (15)	89 (25)	9 (3)	29 (8)	3 (1)	54 (15)
1922	357	120 (34)	176 (49)	16 (4)	2 (1)	36 (10)	0	8 (2)
1923	357	83 (23)	193 (54)	22 (6)	1 (0)	25 (7)	1 (0)	42 (12)
1924	356	130 (37)	162 (46)	32 (9)	0	21 (6)	4 (1)	15 (4)
1925	357	181 (51)	78 (22)	77 (22)	2 (1)	5 (1)	1 (0)	17 (5)
1926	357	286 (80)	36 (10)	23 (6)	0	4 (1)	1 (0)	8 (2)
1927	349	209 (60)	89 (26)	47 (13)	0	6 (2)	0	4 (1)
1928	355	110 (31)	168 (47)	52 (15)	0	7 (2)	0	21 (6)
1929	353	52 (15)	165 (47)	103 (29)	1 (0)	6 (2)	0	27 (8)
1930	353	61 (17)	254 (72)	16 (5)	1 (0)	4 (1)	1 (0)	18 (5)
1931	351	39 (11)	164 (47)	124 (35)	0	7 (2)	8 (2)	13 (4)
1932	355	51 (14)	26 (7)	270 (76)	4 (1)	0	0	5 (1)
1933	355	134 (38)	20 (6)	184 (52)	0	5 (1)	10 (3)	2 (1)
1934	359	121 (34)	86 (24)	99 (28)	10 (3)	12 (3)	7 (2)	27 (8)
1935	360	50 (14)	105 (29)	101 (28)	22 (6)	8 (2)	62 (17)	18 (5)
1936	353	171 (48)	64 (18)	105 (30)	1 (0)	4 (1)	5 (1)	4 (1)
1937	338	43 (13)	94 (28)	188 (56)	0	3 (1)	6 (2)	4 (1)
1938 (Hkou)	189	0	2 (1)	186 (98)	0	1 (1)	0	0
1938 (HK)	306	2 (1)	0	304 (99)	0	0	0	0
1939 (HK)	183	2 (1)	5 (3)	174 (95)	1 (1)	1 (1)	0	0
1939	121	0	4 (3)	81 (67)	36 (30)	0	0	0
1940	354	0	9 (3)	248 (70)	95 (27)	11 (3)	0	0
1941	348	1 (0)	21 (6)	152 (44)	174 (50)	9 (3)	0	0
1942	249	0	0	40 (16)	209 (84)	0	0	0

Notes: Hkou and HK indicate the *Newspaper* published in Han Kou and Hong Kong, respectively. Otherwise, it published in Shanghai. The sum of the percentage in parentheses over a year may exceed 100% as some events are grouped into more than one category because we cannot identify them as only one specific type of event.

Source: Categorized and calculated by the authors according to the content of headline news in the *Newspaper*.

coupons and principal or not. We let the payment probability be p_t for the coupons and p_0 for the principal. In other words, $1-p_t$ and $1-p_0$ are the default probabilities for the payment of the coupons and principal, respectively. Suppose that investors have a subjective discount rate, β . The discounted cash flow model suggests that the bond price ($BPrice$) is given by:

$$BPrice_t = \sum_{t=1, T} \beta^t p_t c_t + \beta^T p_0 c_0 \quad (1)$$

Because the coupon and the principal are pre-determined, the changes in the bond price are influenced by changes in the payment probability and the real discount rate. Assume that the *ex ante* payment probabilities are fixed over time: that is, $p_t = p_0 = p$. We derive the payment probability as follows:

$$\Pr(\text{Payment}) = p = BPrice_t / (\sum_{t=1, T} \beta^t c_t + \beta^T c_0) \quad (2)$$

The equation suggests that the payment probability influences the bond price. Therefore, in theory, if the real discount rate does not change abruptly, a dramatic change in bond price indicates a sharp change in the probability of default as perceived by bond investors.

We employ the multivariate model developed by Qu and Perron to analyse the time series data for maximum and minimum bond yields, defined as the fixed

bond coupon amount divided by the minimum and maximum bond prices.³⁸ The model provides an algorithm based on quasi maximum likelihood estimation and a series of tests used to determine the number of endogenous breaks in the data. The model allows us to detect structural changes in a system of equations without prior knowledge of the locations of the breaks (see appendix I for details).

IV

The structural breaks identified by the empirical model are listed in table A2. As the bonds during the same period exhibit a similar performance, we use the yields of the 6 per cent bond and CBA as an example of the bonds issued by the Beijing government from 1921 to 1935 and by the Nanjing government from 1936 to 1942, respectively. The price data are not available during the interval from 1935 to 1936 due to the third bond consolidation in 1935. Figure 1 plots the monthly maximum and minimum yields of the 6 per cent bond and CBA and the fitted values as obtained using the multivariate model as well as major events that possibly impacted on the bond market during the study period.

As can be seen in figure 1, there exist five endogenous breaks, in 1924, 1931, 1933, 1940, and 1942. However, bond yield can also be affected by macroeconomic variables such as inflation and interest rates. Bond demand is weaker when inflation is high because the real return on bonds decreases. Therefore, bond prices decrease, and their yields increase. Similarly, a rising interest rate makes bonds less attractive and causes demand for them to fall, which leads to lower prices and higher yields. The opposite also holds. In order to confirm that these breaks are not caused by fluctuations of the macroeconomic variables, we run a regression of bond yields on inflation rate, interest rate, and break points. Due to the lack of reliable data on the monthly series of inflation rates, we restrict the test to a yearly base. Each bond's yearly maximum and minimum yields are the averages of the 12 months' corresponding yields. Such aggregation will reduce our sample size dramatically. We run the following regression:

$$\text{Yield}_{jt} = \alpha_j + x\beta + \varepsilon_{jt} \quad (3)$$

where Yield_{jt} denotes the yield of bond j in year t . In total, there are 11 bonds. The set of explanatory variables x includes lagged inflation and interest rates as Inflation_{t-1} and Interest_{t-1} , and five dummies for break years and the following years; namely, the dummy will take value 1 in the break year and the years after. Since we have the maximum and minimum yields of each bond, we use both series and include a dummy variable, Max , for the yearly series of maximum yields of each bond. The inflation rates are calculated according to the yearly wholesale price index in the Jiang-Zhe region (including Shanghai) provided by Wang,³⁹ and the interest rates are the yearly interest rate for the Shanghai inter-bank loan.⁴⁰

Table 2 shows the regression results with fixed effects for bonds. As we can see, after controlling for macroeconomic variables, all break-year dummies are statistically significant with expected signs consistent with figure 1. After adding a time

³⁸ Qu and Perron, 'Estimating and testing structural changes'.

³⁹ Wang, 'Urban wholesale price change', pp. 4–5.

⁴⁰ People's Bank of China (Shanghai Branch), *Shanghai Qianzhuang Shiliao*, p. 630.

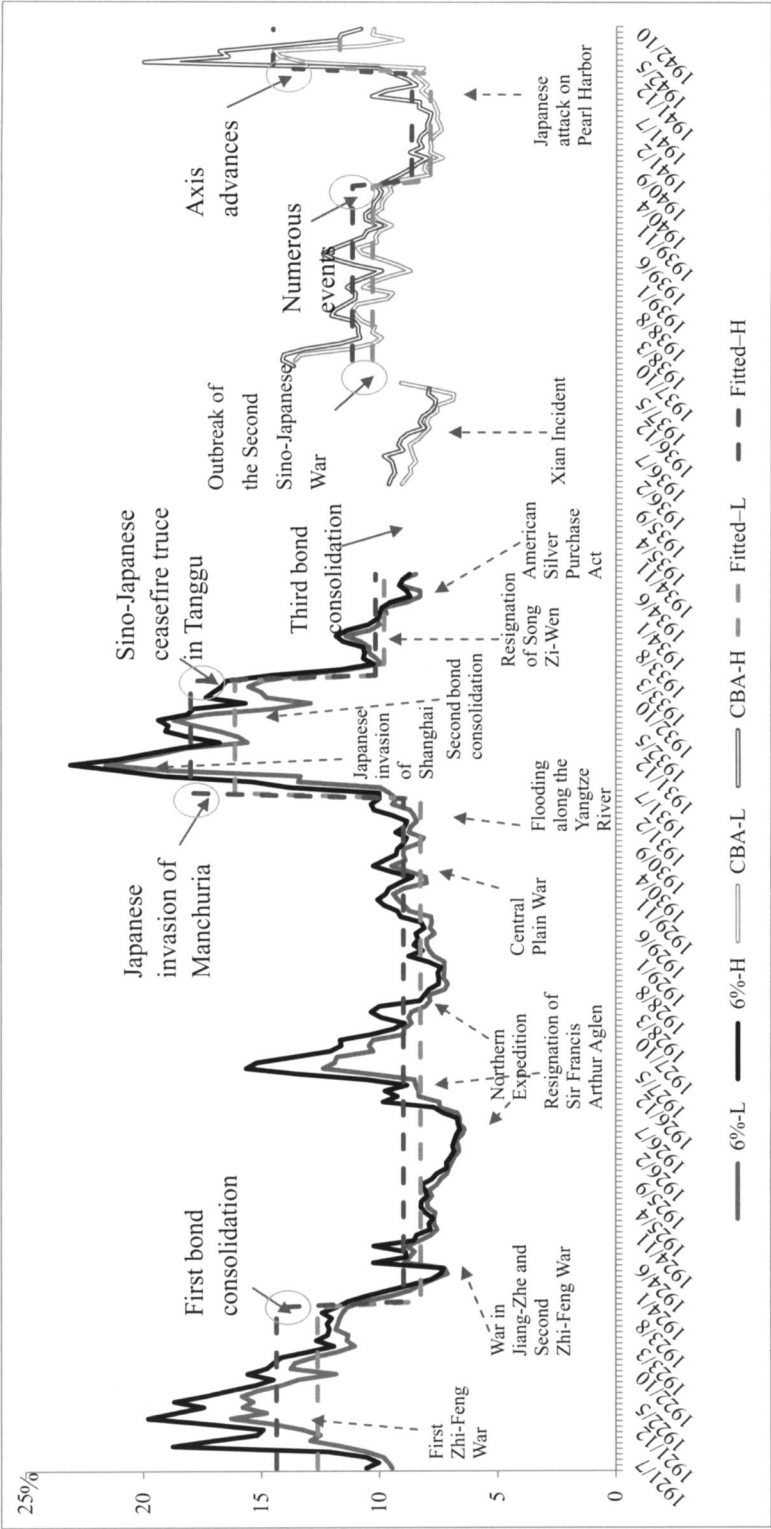


Figure 1. The yields of the Consolidated 6 per cent bond and CBA, July 1921–December 1942

Note: H and L indicate the maximum and minimum bond yields, respectively.

Sources: BM; BW; Newspaper.

Table 2. *Ordinary least squares regressions of bond yields on macroeconomic variables and breaks*

	<i>Bond yield</i>	<i>Bond yield</i>	<i>Bond yield</i>
Variables	(1)	(2)	(3)
Inflation _{t-1}	0.02 [0.04]	0.06 [0.04]	0.04 [0.04]
Interest _{t-1}	0.35 [0.18]**	0.16 [0.18]	0.31 [0.19]*
Max	-1.44 [0.56]**	-1.43 [0.51]***	-1.40 [0.50]***
D1924		-4.19 [0.97]***	-5.88 [1.18]***
D1931		5.18 [1.44]***	2.99 [1.67]*
D1933		-2.48 [1.50]*	-3.75 [1.56]**
D1940		-1.62 [0.96]*	-3.04 [1.11]***
D1942		2.85 [1.68]*	2.03 [1.68]
Time trend			0.56 [0.23]***
Constant	11.02 [0.86]***	14.03 [1.70]***	11.43 [1.97]***
Observations	148	148	148
R ²	0.08	0.28	0.31

Note: All regressions include bond fixed effects for 11 bonds. Standard errors are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Sources: Data on bonds are from the *BM* and the *BW*. The inflation rates are calculated according to the yearly wholesale price index in Wang, 'Urban wholesale price change', pp. 4–5, and the interest rates are the yearly interest rate for the Shanghai interbank loan in the People's Bank of China (Shanghai Branch), *Shanghai Qianzhuang Shiliao*, p. 630.

trend, most breaks are still statistically significant and the fitness increases as the R-square rises from 0.28 (column 2) to 0.31 (column 3). As noted, the regression model is more conservative than the structural break model in detecting the break points in bond yields: first, it controls for macroeconomic conditions; second, it requires the identified events to have a permanent effect on bond yields instead of having an effect on bond yields lasting for at least 12 months as the structural break model requires; finally, due to the data limitation of macroeconomic variables, it uses the data at annual frequency which reduces the degrees of freedom for statistical testing. Despite this, the statistically significant results on break points confirm that it was not fluctuations in macroeconomic variables but other events that caused the structural breaks in bond yields.

Econometric analysis identifies five break points. Soon after the outbreak of the Second Sino-Japanese War in July 1937, the CMSE shut down, and when the bondholders began to trade in the underground market in January 1938, the price plummeted. We add this 'break' as another break point. Next, we try to identify the major events responsible for these breaks. Our study period can be characterized as a politically, militarily, and economically chaotic period as countless civil wars occurred;⁴¹ Sino-Japanese economic, diplomatic, and military conflicts cropped up constantly; and new financial institutions (such as the bond market) were coming into being but were disturbed occasionally. We believe economic events that directly involved bonds (such as bond consolidations) would no doubt have

⁴¹ According to Ch'en, 'Defining Chinese warlords', during the so-called 'Warlord period' (1912–28), there were some 1,300 warlords. He concludes that 140 conflicts occurred between these warlords, some crossing provincial boundaries. According to Jiang, *Minguo Shushishi*, in 1928–37, the Nationalist government fought six factious wars against major warlords and five 'encirclements' against the Communist Party which was forced to conduct the famous 'long march'. Apart from the wars involving the incumbent government, there were about nine well-recorded factious wars between the remaining warlords.

Table 3. *Break points, major events, and related headline news*

Date	Bound	Change in max. yield	Major events (categories)	News first arrived	News last appeared	Headline intensity
Jan. 1924	(-3,2)	-38%	First bond consolidation (E)	8 Jan. 1922	14 Nov. 1923	8.5%
Aug. 1931	(-1,4)	100%	Japanese invasion of Manchuria (D)	20 Sept. 1931	30 May 1933	83.7%
May 1933	(-1,1)	-43%	Sino-Japanese ceasefire (D)	24 May 1933	15 June 1933	73%
Aug. 1937		95%	Second Sino-Japanese War (D)	9 July 1937	21 Aug. 1942	70.5%
Sept. 1940	(-1,2)	-24%	Unknown			
May 1942	(-2,0)	49%	Axis advance (I)	15 Dec. 1941	15 Sept. 1942	85%

Notes: The bound is the 90% confidence interval of the break date as the negative and positive signs indicating months before and after the break date. E, D, and I represent the headline event categories of economic-fiscal events (E), diplomatic-military events (D), and international events (I). The headline intensity is calculated as the frequency of the event appearing as a headline between the first day and the last day of the headline coverage of the event.

Source: The data on bonds are from the *BM* and the *BW*. Information on news headlines is from the *Newspaper*.

impacted on the bond market. Military actions and disaster relief would have drained government financial resources and their impact on the bond market would have depended on investors' beliefs about how and to what extent the event would impair the government's debt service ability. Other events that would alter investors' confidence in the government's debt service capacity would also be reflected in the bond market.

As for military events, with the help of detailed accounts of the military history of the Republic of China,⁴² we searched through the *Newspaper* headlines to pin down the first day that the related news arrived and the last day that this news appeared. Next, we constructed a measure of the significance level that the editors assigned to this event among so many parallel events happening at the time ('headline intensity'). The headline intensity is defined as the frequency of an event appearing as a headline between the first day and the last day of the headline coverage of the event. For economic events, we relied on economic history books of the same period⁴³ to get a general picture of the economic events happening at the time and then, similarly, searched through the headlines and editorials on the bond market in the *BW* to figure out how these economic events may have affected the bond market. As for other events, we mainly relied on newspaper headline intensity, as we assumed that if an event was emphasized again and again in the *Newspaper*, it would be likely to impact on investors' views. Additionally, the *BW* was used as a source of contemporary observers' views on how these events had affected the bond market, and some popular history books on more general history of the Republic of China were referred to for the views of conventional historians on the same event reflected as a break point in the capital market.⁴⁴ Table 3 gives a survey of the resulting six break points, their confidence intervals, the corresponding percentage changes in the bond yield, the major events and the related information on newspaper headline coverage of these events.

⁴² Ch'en, 'Defining Chinese warlords'; Ch'i, *Warlord politics*; Jiang, *Minguo Shushishi*.

⁴³ Rawski, *Economic growth*; Coble, *Shanghai capitalists*; Young, *China's nation-building effort*; Qian, *Juizhongguo Gongzhai Shiliao*, on China's bond history.

⁴⁴ For example, Hsü, *Rise of modern China*; Fairbank and Feuerwerker, eds., *Cambridge history of China*; Fairbank and Goldman, *China*.

Table 4. *Major civil wars involving the incumbent government, 1921–42*

<i>Events</i>	<i>Winner</i>	<i>Duration of war</i>	<i>News first arrived</i>	<i>News last appeared</i>	<i>Headline intensity</i>
First Zhi-Feng War	Zhi Faction	28 April–5 May 1922	6 Jan. 1922	25 July 1922	41.7%
War in Jiang-Zhe	Zhi Faction	4 Sept.–13 Oct. 1924	23 Aug. 1924	15 Sept. 1924	39.1%
Second Zhi-Feng War	Feng Faction	15 Sept.–23 Oct. 1924	13 Sept. 1924	11 Nov. 1924	85.0%
Feng Yuxiang versus Feng and Zhi Factions	Feng and Zhi Factions	April–Aug. 1926	23 Oct. 1925	30 Aug. 1926	69.6%
North Expedition	Nationalist Party	9 July 1926–29 Dec. 1928	2 Aug. 1926	30 Dec. 1928	40.7%
Central Plain War	Nationalist Party	11 May–4 Nov. 1930	12 May 1930	28 Nov. 1930	9.0%

Notes and sources: The duration of war is obtained from Ch'en, 'Defining Chinese warlords'; Ch'i, *Warlord politics*; Jiang, *Military history*. The headline intensity is calculated as the frequency of the event appearing as a headline between the first day and the last day of the headline coverage of the event. Information on news headlines is from the *Newspaper*.

The first structural break shown in figure 1 took place in January 1924. Many bonds were issued after the establishment of the Beijing government. Unfortunately, several large-scale factional wars between the incumbent government, which was controlled by the Zhi Faction during the early 1920s, and other major warlords (see table 4 for details) drained the already limited financial resources of the government.⁴⁵ The headline on 12 November 1921 was 'The destitute Beijing government: the crucial job for government officials is to go on strike and ask for back pay'. Simultaneously, the government defaulted on coupon payments and did not hold the draws intended to determine which bonds would be repaid in full. Facing this discreditable behaviour by the government, the National Bankers' Association proposed that the government should conduct a bond consolidation to restore fiscal and monetary order. In March 1921, the bill providing for bond consolidation was passed by President Yuan, which extended the time to maturity and reduced the interest rates of the outstanding bonds in exchange for a more secure funding source for bond repayment. The remains of the custom revenue and certain stipulated tax revenue after paying foreign debts and indemnity were directly allocated to the so-called 'domestic bond funds', which were in the charge of the Inspector-General of the Maritime Customs, Sir Francis Arthur Aglen. In July 1922, the government passed another bill to secure the 'funds'. This arrangement, in theory, prohibited incumbent governments from embezzling the 'funds' and secured bond payments in the future.

As shown in table 1, the early 1920s newspaper headlines were characterized by a higher proportion of economic events compared to later years, around 8 per cent in 1921–4 versus 2 per cent in the following years. The headline intensity for this bond consolidation reached as high as 8.5 per cent (table 3). Such a high proportion of economic event-related headlines in a politically unstable period indicates that the editors did assign high levels of significance to this event. When the reimbursement and coupon payment resumed (even though delays still occasionally happened), investors became more confident in the funding sources for bond repayment and positive shifts in bond prices followed in early 1924.⁴⁶

⁴⁵ See Rawski, *Economic growth*, pp. 1–64, for a detailed description of the central government's weak control over the financial resources in prewar China.

⁴⁶ *BW*, 1 Jan. 1924, pp. 21–30; Shanghai Commercial and Saving Bank, *Neiguo Gongzhai Yaolan*; Bai, 'Jindai Zhongguo Zhaiquan', pp. 72–4.

Consequently, a break with a negative shift of 38 per cent in the maximum yield (and 35 per cent in the minimum yield) showed up in response to the perceived declining default risk.

The second break occurred in August 1931 with a confidence interval of a month before and four months after the break date (table 3); the causal event is the Japanese invasion of Manchuria in September 1931. After Japan won the Russo-Japanese war in 1905, it became the only influential empire in Manchuria. Japan regarded Manchuria as a source of raw materials, a market for its manufactured goods, and a buffer state that could protect it against the Soviet Union in Siberia. On 18 September 1931, Japan attacked Manchuria and the news of the war arrived in the headlines two days later. After that, the headlines of the *Newspaper* were fully occupied by the progress of the war, and were full of bad news about successful Japanese encroachments in northern China as well as the failures of the League of Nations in solving Sino-Japanese conflicts. The headlines switched to report on the progress of the war on the second front opened by the Japanese army in Shanghai on 28 January 1932. After a ceasefire on the Shanghai incident was reached one month later, the headlines were largely occupied with the progress of the war in northern China until 30 May 1933. The headline intensity of this event reached as high as 83.7 per cent within a period of more than one-and-a-half years, which is higher than that of any other event that occurred before, except for the second Zhi-Feng factious war in 1924 which lasted for less than two months (table 4).

The weak military performance of the Chinese army caused people to lose confidence in their government. People became worried that they would soon be embroiled in a large-scale war that would significantly increase military expenditures and would therefore also increase the chance that the government would default on its debts. In fact, bondholders' fears were soon realized: right after the Shanghai incident, an agreement on the second bond consolidation was reached between the government and the bondholders' association on 18 February 1932.⁴⁷ Without this consolidation, the defaults on future bond payment were doomed because the concession of Manchuria to Japan led to an estimated annual loss of 50 million taels (1 tael = 36.8 grammes) in customs revenue and transaction tax revenue—approximately one-tenth of the government revenue from these two tax items, which served as the major source of funding for bond repayment. There is no doubt that the dramatic decline in these tax revenues would have seriously damaged the government's ability to service its debts. In addition, the cost of the Shanghai incident was estimated at 1.56 billion yuan, more than 16,000 civilians were killed or missing, and one-quarter of the factories were destroyed and many were damaged, leading to 80 per cent of industrial workers being unemployed.⁴⁸ The war damage to the richest part of China implied a momentous fall in government tax revenue in that year and perhaps for many years thereafter.

The third break coincides with the Sino-Japanese ceasefire truce in Tanggu, Tianjin, in May 1933. The *Newspaper* started to report on a peace negotiation from 24 May and stopped reporting on 15 June on 'The Japanese retreat from the Great Wall'. With the benefit of hindsight, the 'peace' treaty negotiations were a stalling tactic used by the Japanese and a large-scale war would become unavoidable.

⁴⁷ *BW*, 23 Feb. 1932, p. 1; 1 March 1932, pp. 1–2; 8 March 1932, pp. 1–5.

⁴⁸ *Newspaper*, 20 March 1932.

Hence, this event is not assigned an important place in the history according to the history books that we have consulted.⁴⁹ Modern observers cannot fully imagine the thoughts of people living at the time. However, given the significant drop in the bond yield, it seems that people at the time believed that the danger to their nation's sovereignty had passed: if not permanently, at least temporarily. Such belief was re-emphasized by the Nanjing government's enthusiasm for improving relations with Japan by dismissing anti-Japanese high-ranking officials and promoting Japanese-educated bureaucrats.⁵⁰

After the third bond consolidation in 1936, bond yields exhibited a decreasing trend as the funding for bond repayment was secured. After the outbreak of the Second Sino-Japanese War in July 1937, the bond price dropped immediately, and in order to keep the price stable, the government set price floors for the Consolidation bonds.⁵¹ The CMSE shut down after the Japanese occupation of Shanghai on 13 August. Four months after the closure of the CMSE, the *BW* started to report on the bond price on the black market where 'individual investors sold their bonds with great discounts and some small traditional banks bought them'.⁵² The bond yields on the black market jumped by approximately 95 per cent compared to the time before the closure of the CMSE (see table A3 for details). The increase in bond yields shows the fears of bondholders regarding sovereignty: a failed nation could not pay back its debts. In addition, even if the Nanjing government survived the war, it seemed uncertain whether it would be able to repay its debts after a period of internecine warfare.

The fifth break is identified in September/October 1940.⁵³ The break involved a decrease in bond maximum yields of 24 per cent, which theoretically indicates that investors gained confidence in the government's capacity to repay the bonds. The identification of the major causal event of this break is complicated by the ambiguity of the relationship between complex political situations and investor sentiment. The Japanese had planned to finish the war in China within three months, but the war clearly lasted much longer than they had expected. The financial and military constraints grew as Japan occupied an ever-increasing territory and they changed their strategy to lure the Chinese government to surrender. In March 1940, a high-ranking government official named Wang Jinwei, one of the most powerful men in the Nationalist Party, established a Japanese puppet government in Nanjing. Rumours of peace negotiations between China and Japan prevailed.⁵⁴ In particular, after Japan, Germany, and Italy formed the Axis on 27 September 1940, the foreign minister Wang Qionghui, of the Nationalist government in Chongqing,⁵⁵ led by Chiang Kai-Shek, had to declare that 'Japan's joining the Axis

⁴⁹ Hsü, *Rise of modern China*, p. 552; Iriye, 'Japanese aggression', pp. 507–8.

⁵⁰ Iriye, 'Japanese aggression', pp. 512–13.

⁵¹ See above, section II.

⁵² *BW*, 21 Dec. 1937, pp. 3–4. The payment to bondholders was made through domestic banks located in foreign enclaves in Shanghai; *ibid.*, 25 Jan. 1938, pp. 1–4. Before the Asia-Pacific War, Japan was not hostile toward other powers, and the military events did not disturb the foreign enclaves in Shanghai, where the Chinese part was occupied by the Japanese.

⁵³ For the CBB, CBC, and CBD, the break occurred in Oct. in the same year (see tab. A2).

⁵⁴ On 26 July 1940, the *Newspaper* headline stated that 'China's government will continue the war against Japan' to fight the rumour.

⁵⁵ The Nationalist government fled to Chongqing after Nanjing was lost.

will not change the Nationalist Government attitude toward it' to assure people that the Nationalist government would not surrender.⁵⁶ On the other hand, the US and other western powers agreed to provide more support to the Nationalist government and enforced oil, steel, and iron ore embargos on Japan (the headlines for 20 days of October concerned the US and other western powers' foreign policies toward China and Japan). In addition, the British government decided to re-open the Yunnan-Burma road—the only logistic route left through which foreign aid could be transported from Burma to China, as maritime transportation had been blocked by the Japanese at the beginning of the war.⁵⁷ The decreasing bond yield may reflect the investors' expectation of peace, or the very opposite, their patriotism, as encouraged by the Nationalist government's determination to win the war as well as the promise of future international aid.

The last break is identified in May 1942, with a confidence interval of two months before and none after. The break is associated with a jump in yield of 49 per cent, showing the bondholders' pessimistic mood. The US was formally pulled into the Second World War after the Japanese attack on Pearl Harbor on 7 December 1941. Frey and Kucher found the Japanese attack on Pearl Harbor and the consequent war declaration of the US (and Great Britain) on Japan, and of Germany (and Italy) on the US (8 and 11 December, respectively), caused a break point of a 5 per cent decrease in the monthly price index of 31 German government bond issues traded on the Swiss bourse.⁵⁸ It was also a turning point in the Second Sino-Japanese War as the Nationalist government finally declared 'war' on Japan, when large-scale military and financial support from the western powers arrived. If investors had been forward-looking, the event would have been regarded as good news for China as more powerful nations were to join China in fighting against Japan. Hence, bond yields would have declined, but instead, as figure 1 shows, the opposite occurred. Either the investors believed that the odds of the Japanese winning the war had increased due to the success of the Japanese in targeting the US, or they expected that the Japanese would now exploit the Chinese economy more severely to support their escalating war. However, this increase in bond yields did not last long and is not significant. An editorial in the *BW* stated: 'I am surprised to see that the bond price did not drop significantly right after the outbreak of the Asia-Pacific War . . . Investors are still confident in their government'.⁵⁹ It indicates that people at the time did not think that the US entry into the war was good news for China, but rather a proof of the increasing military strength of their enemy.

The aforementioned prevailing mood was also evident from the headlines of the *Newspaper*. Starting from 15 December 1941,⁶⁰ the headlines were occupied by news of the Axis armies' successes in foreign battlefields, mainly the Japanese and German advances. The headline intensity on the Axis advance reached as high as

⁵⁶ The *Newspaper*, 1 Oct. 1940 (headline). Another headline about the rumour of peace negotiations (27 Oct. 1940) stated: 'Great Britain, the US and Soviet Union will continue to support China. The US people do not believe the peace negotiation between China and Japan is going on and believe the Chinese people will continue to fight against the Japanese until they are expelled from China's territory'.

⁵⁷ The *Newspaper*, 9 and 17–20 Oct. 1940.

⁵⁸ Frey and Kucher, 'History', p. 479.

⁵⁹ *BW*, 31 May 1942, pp. 11–16.

⁶⁰ The *Newspaper* did not publish during 9–14 Dec. 1941.

85 per cent (table 3) from 15 December 1941 to 15 September 1942. The shifting of the *Newspaper's* focus from the domestic war progress to the advances of Axis armies in foreign battlefields shows, first, that the editors believed the Axis advances in foreign battlefields were more crucial in determining the fate of the Second Sino-Japanese War than wars on China's territory; and second, that the Japanese attack on Pearl Harbor was regarded as a dreadful turning point in China's anti-Japanese cause as Japan and its allies grew more and more powerful in the military arena. The *Newspaper's* change in its headline focus reflected the old Chinese saying: 'Boost your enemy's morale and reduce your own courage'. Consequently, the break in May 1942 echoed an outburst of the investors' accumulated pessimism toward the fate of their country after the Japanese attack on Pearl Harbor.

So far, except for the first bond consolidation, it seems that only external threats stirred the capital market significantly. Did major domestic events such as large-scale civil wars affect the bond market? Did the editors place less emphasis on domestic conflicts than diplomatic-military conflicts? If so, does this explain why the bond market reacted to external threats more dramatically than to internal threats? As mentioned before, there were so many civil wars occurring during our study period, it was unlikely that the bond market would respond to each one of them. We think that, first, only the entry into war by the incumbent government—more precisely, the faction/party that was currently in charge of the incumbent government—would impact on the bond market because this was the faction/party that could manipulate central government financial resources. Second, in order to have an impact, the incumbent faction/party should be directly involved in the war, rather than backing one side of a factional war, because the outcome of a factional war without the direct involvement of the incumbent government would not cause a regime shift, and hence may not affect the bond market. Third, the war should be large-scale in terms of the size of the participating armies (exceeding 200,000, approximately one-seventh of the overall existing troops at the time)⁶¹ and important enough to feature in headlines in the *Newspaper* for consecutive days. Table 4 lists seven major civil wars during our study period and related information on newspaper headline coverage of these events.⁶²

As seen in table 4 and figure 1, except for the Central Plain War, the other five major wars received very high levels of headline coverage and coincided with positive 'blips', a term borrowed from Willard et al. to describe a jump in yield that persists for no more than a few months.⁶³ However, compared to the Sino-Japanese Wars, the civil wars were smaller in scale, were shorter in duration, and received less newspaper attention (that is, a lower headline intensity). Moreover, the civil wars were more predictable as war rumours usually preceded the war, while the outbreak of the Sino-Japanese Wars came as a shock. For example, the

⁶¹ The overall number of soldiers during late Qing and prewar China is available in Rawski, *Economic growth*, tab. 1.7, p. 35.

⁶² Ibid., tab. 1.8, p. 37, does not include the War in Jiang(Su)-Zhe(Jiang) provinces as one of the major wars during the time of the Republic of China, but according to Jiang, *Minguo Shushishi*, p. 163, the size of the participating army was about 211,000, slightly less than the size of the army in the first Zhi-Feng War (225,000).

⁶³ Willard et al., 'Turning points in the Civil War', p. 1006.

conflicts between the Zhi and Feng Factions appeared as headlines as early as 6 January 1922, more than three months before the first Zhi-Feng War actually occurred, after which they featured frequently in headlines before and during the war.⁶⁴ As seen from figure 1, the yield began to rise in January, though the war actually started three months later. Rumours preceding the war allowed the market to prepare for it and smoothed out the tremendous fluctuation that would have occurred had the war news come as a shock. All these differences could contribute to the fact that the bond market reacted more dramatically to external threats than internal ones.

However, the fundamental reason why the external threats caused breaks while the internal threats only caused blips is, we believe, that the investors interpreted the default risk as substantially larger (even the default was doomed) if China was conquered by the Japanese than if China experienced a regime shift among various factions or political parties. For example, the Northern Expedition was the largest civil war at the time with an unprecedented size of more than one million soldiers mobilized, and it toppled the Beijing regime and established a Nationalist government in Nanjing in April 1927.⁶⁵ From the very beginning of the war in July 1926, the yield started to rise and reached its peak in July 1927 (for example, for the 6 per cent bond, a 50 per cent jump in yield from trough to peak caused by the Northern Expedition, compared to a 100 per cent jump in yield due to the Japanese invasion of Manchuria).⁶⁶ On 15 June 1927, the Bankers' Association together with the Traditional Bankers' Association telegraphed the Department of Finance in Nanjing to urge the government to acknowledge the domestic bonds and resume debt service.⁶⁷ The Nanjing government agreed to do so and the yield began to decline immediately.⁶⁸ The Nanjing government's attitude was much appreciated by investors as the Northern Expedition was still going on and money was desperately needed. By contrast, the chance of resuming debt service if a country lost sovereignty was nil, as the CMSE was forced to close after Shanghai was occupied by the Japanese in September 1937.

Interestingly, some major conflicts drew little media attention. For instance, the Central Plain War in 1930 between the Nanjing government and the allies of major warlords, the second largest civil war after the Northern Expedition in prewar China, mobilized more than one million soldiers. The allies' troops far outnumbered those of the Nanjing government, which faced the most severe threat since its establishment and was nearly toppled. Despite this, the war received a headline intensity of as low as 9 per cent. A similar example (though not comparable in terms

⁶⁴ Similar patterns can be found for other civil wars. For example, right after the first Zhi-Feng war ended, the headline on 31 May 1922 predicted 'There will be another war between Zhi and Feng Factions'. Similar patterns could be found for the second Zhi-Feng war, which was closely intertwined with the War in Jiang-Zhe, and the Central Plain War which was a continuation of the four smaller civil wars before it.

⁶⁵ For the bonds which have shorter time series data (stopping before and immediately after the Japanese invasion in Sept. 1931), the Northern Expedition is identified as a major event causing a break.

⁶⁶ In Jan. 1927, the Inspector-General of the Maritime Customs, Sir Francis Arthur Aglen, who was in charge of the 'funds' for the 1921 bond consolidation, resigned. This created uncertainty regarding bond payments and pushed the rise in yield further; *BW*, 27 Dec. 1927.

⁶⁷ *BW*, 21 June 1927, p. 5.

⁶⁸ *BW*, 2 Aug. 1927, p. 5.

of the scale of the war) is the conflicts between the Nationalist and Communist Parties that, based on hindsight, no doubt played a very important role in the history of the Republic of China and today's China, but attracted little headline coverage during 1930–5. The *Newspaper* headlines rarely reported on the 'five encirclements' which were carried out by the Nationalist government to eliminate the Communist Party, following which the Communist Party was forced to start the famous 'Long March'—a turning point in the history of China—during which Mao Zedong emerged as the top leader of the Communist Party.⁶⁹ Consequently, the bond market was either not disturbed significantly or was barely aware of these events. To put it another way, it seems that people at the time did not regard these civil conflicts as being as important as they appeared to later observers.

VI

This study complements conventional historical works on the Republic of China by providing an assessment of the beliefs of contemporaries based on a combination of quantitative evidence from the capital market and qualitative evidence from a highly influential newspaper of the time. We follow two different tracks: from the break points in the bond market determined by econometric methods, to major historical events identified by historians, to newspaper headline coverage of these events; and from major events, to newspaper headline coverage, to the bond market. The breaks in the capital market clearly reflect diplomatic–military events that have been assigned an important place in history, and were intensively reported by the *Newspaper*. Examples include the Japanese invasion of Manchuria in September 1931 and the outbreak of the Second Sino-Japanese War in July 1937. Some major civil wars which attracted considerably high levels of media attention are found to have affected the bond market to a lesser extent, causing no breaks but only blips, such as the first and second Zhi-Feng Wars in 1922 and 1924. Some 'major' civil wars regarded by historians as important are found to have attracted little attention from contemporary media and did not affect the bond market significantly, such as the conflicts between the Nationalists and Communists in 1930–5. In contrast, some events, such as the Sino-Japanese ceasefire in Tanggu in 1933, were thought to be crucial by contemporaries, attracting high levels of media attention and producing significant financial consequences, but have been downplayed by later observers.

Our study has further implications for the general history of prewar China. Our findings show that civil conflicts did not matter a lot to the financial market, which lends support to Rawski's view that civil conflicts were not as disastrous as many historians, such as Sheridan, have believed.⁷⁰ However, why did investors respond to civil conflicts passively? Did the investors' insensitivity toward civil conflicts make the bond market an easy channel for incumbent governments to raise funds for military purposes? Would this have contributed to the government's overuse of military action toward its opponents? Seeking answers to these questions should be

⁶⁹ Fairbank and Goldman, *China*, p. 305; Ch'en, 'Communist movement'.

⁷⁰ Rawski, *Economic growth*, pp. 32–48; Sheridan, *China in disintegration*.

part of future research exploring how financial market development played a role in the general history of the Republic of China.

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APPENDIX I: DETECTING STRUCTURAL BREAKS IN MULTIPLE VARIABLES⁷¹

In the context of this article, the system of equations contains the monthly highest and lowest bond yields. To estimate the unknown intercepts and break points, we specify the following model:

$$\begin{aligned} Y_t &= c_1 + u_t, & t = 1, \dots, T_1 \\ Y_t &= c_2 + u_t, & t = T_1 + 1, \dots, T_2 \\ &\dots \\ Y_t &= c_{m+1} + u_t, & t = T_m + 1, \dots, T \end{aligned} \tag{A1}$$

The dependent variable $Y_t = [Y_{ht}, Y_{lt}]'$ is a vector of bond yields at time t . The first Y with subscript h is the monthly maximum bond yield, whereas the second one with l is the monthly minimum yield. The time series data are separated by m breaks in which the length of intercepts varies across $m+1$ segments. This model requires that Y_{ht} and Y_{lt} should experience shifts simultaneously, but the magnitudes of the shifts can be different. The estimated intercepts are $c_j = [c_{hj}, c_{lj}]'$ for $j = 1 \dots m+1$. The vector of disturbance at time t is $u_t = [u_{ht}, u_{lt}]'$, which is allowed to be autocorrelated and heteroskedastic. In this model, there is a trimming parameter, k , which controls the minimum distance between two consecutive breaks relative to the sample size in an equation T . We set the trimming parameter to allow each segment to have at least 12 months.

To select the number of breaks, we followed the two-step procedure: first, we detected whether any structural change exists in the model. In particular, we evaluated the $\text{sup}F(m|0)$ to test the null hypothesis of no break ($m = 0$) against the alternative that there is at least one break ($m = 1$). If a structural break was detected, we then determined the number of breaks ($m = k$ where k is unknown) by a sequential testing procedure on evaluating the $\text{SEQ}(m+1|m)$ until the test statistic was no longer significant.⁷²

As argued earlier, a change in bond yields captures the change in the beliefs of investors about the bond default probability. We compute the changes and the percentage changes in bond yields across two consecutive segments, that is, $[c_{hj} - c_{hj-1}, c_{lj} - c_{lj-1}]$ and $[(c_{hj} - c_{hj-1})/c_{hj-1}, (c_{lj} - c_{lj-1})/c_{lj-1}]$, to examine the magnitude of bondholders' reactions to an event.

⁷¹ Qu and Perron, 'Estimating and testing structural changes'.

⁷² For example, if $\text{SEQ}(2|1)$ is significant, we infer that there are two breaks instead of one. If we find the test $\text{SEQ}(3|2)$ is insignificant, then we conclude that there are only two breaks. Additionally, we decide there are two breaks if there is no more space to insert the third break given the trimming parameter, k .

Table A1. *Information on 11 major Chinese domestic government bonds, 1921–42*

Name	Purpose	Issue date	Amount ^c (millions)	Face value ^a	Interest rate	Collaterals	Price data availability ^b
7th Year	To pay loans to Bank of China and Bank of Communications	July 1918	45	10,000; 1,000; 100; 10	6%	Funds from the Dept. of Finance; after 1921, for interest payment, the 'domestic bond funds'; ^c for principal payment, the remainder of the collateral funds after paying the 5th Year bond	Feb. 1921–Oct. 1931
Financial	To support the financial market	Sept. 1920	60	10,000; 1,000; 100; 10; 5; 1	6%	The residual of maritime customs revenue and the funds from the Dept. of Finance; after 1921, the 'domestic bond funds'	March 1921–Nov. 1928
Consolidated 7%	To swap the 8th Year bond	Feb. 1921	14	1,000; 100; 10; 5; 1	7%	The 'domestic bond funds' in 1921	July 1921–Dec. 1928
Consolidated 6%	To swap the 1st year 6% bond	June 1921	54	10,000; 1,000; 100; 10; 1	6%	The 'domestic bond funds' in 1921	July 1921–Nov. 1934
8%	To pay short-term loans	July 1922	96	1,000; 100; 10	8%; after 1932, 6%	Salt tax revenue	July 1922–Aug. 1929
Disband	To raise funds for disbanding armies	Feb. 1929	50	10,000; 1,000; 100; 10; 5	8%	Additional customs revenue from new tax items	April 1930–July 1935
CBA	To swap six bonds and loan certificates	March 1936	150	5,000; 1,000; 100; 10	6%	The residual of the maritime customs revenue after paying foreign debts and indemnities	March 1936–Dec. 1942
CBB	To swap five bonds and loan certificates	March 1936	150	Same as above	6%	Same as above	March 1936–Dec. 1942
CBC	To swap nine bonds and loan certificates	April 1936	350	Same as above	6%	Same as above	April 1936–Dec. 1942
CBD	To swap eight bonds and loan certificates	April 1936	550	Same as above	6%	Same as above	April 1936–Dec. 1942
CBE	To swap five bonds and loan certificates	April 1936	260	Same as above	6%	Same as above	April 1936–Dec. 1942

Table A1. *Continued*

<i>Name</i>	<i>Payment terms</i>	<i>Underwriters</i>	<i>Outcome</i>
7th Year	To be repaid within 20 years. Only interest would be paid in the first 10 years. During the next 10 years, the government would pay interest and hold a lottery draw twice a year (every 30 June and 31 Dec.) to repay one-twentieth of the bonds in full each time.	Bank of China, Bank of Communications	The Nanjing government resumed payment after 1927. In 1932, the bond was consolidated. ^d In 1936, the bond was swapped for CBD.
Financial	To be repaid within seven years. Only interest would be paid in the first year. During the next six years, the government would pay interest and hold a lottery draw twice per year (every 31 March and 30 Sept.) to repay one-twelfth of the bonds in full each time.	Bank of China, Bank of Communications	Postponed payment for several years. The Nanjing government resumed payment after 1927. It was fully reimbursed in Dec. 1928.
Consolidated 7%	To be repaid within 10 years. The interest would be paid twice a year on 28 Feb. and 31 Aug. The government would hold a lottery draw once a year. During the first four years, 5% of the bonds were repaid in full each time, with the figure increasing to 8% in the fifth year and 12% in the sixth year. In the last three years, 15% was paid each year.	Bank of China, Bank of Communications	The Nanjing government resumed the payment after 1927. In 1932, the bond was consolidated. In 1936, the bond was swapped for CBE.
Consolidated 6%	To be repaid within 10 years. The interest would be paid twice a year on 1 June and 1 Dec. The government would hold a lottery draw once a year. In the first four years, 5% of the bonds were repaid in full each time, with the figure increasing to 8% in the fifth year and 12% in the sixth year. In the last three years, 15% would be paid each year.	Bank of China, Bank of Communications	The majority of the bonds were reimbursed in full before 1928 (Jia, <i>Guozhai yu jinrong</i>). In 1932, the bond was consolidated. In 1936, the bond was swapped for CBE.
8%	To be repaid within seven years. In the first half-year, only interest would be paid. During the next six-and-a-half years, the government would pay interest and hold lottery draws twice a year (every 31 Jan. and 31 July). In the first draw, 4% of the bonds were repaid in full, with the figure increasing to 7% for each draw from the 2nd to 5th draw. From the 6th to the 9th draw, 8% were repaid each time. From the 10th to 13th, 9% were repaid each time.	None	According to the <i>BW</i> (8 Aug. 1922, pp. 7-10; 26 Dec. 1922, pp. 5-6; 16 Jan. 1923, pp. 10-11; 27 Feb. 1923, p. 11), the payments were stopped several times. By April 1933, 11 lottery draws had been held.
Disband	To be repaid within 10 years. Beginning in July 1929, the government would pay interest and hold a lottery draw twice a year (every 31 Jan. and 31 July) to reimburse one-twentieth of the bonds in full each time.	None	In 1932, the bond was consolidated. In the 1936 consolidation, this bond was swapped for CBC.
Consolidation bonds A-E	To be repaid within 12 years. The government would pay interest and hold a lottery draw twice a year to reimburse some of the bonds in full on 31 Jan. and 31 July.	Central Bank, Bank of China, Bank of Communications	Reimbursed in Sept. 1948. ^e

Notes: a Before the monetary reform in 1936, bonds were denominated in silver yuan. After 1936, bonds were denominated in the paper currency fabi, for which one yuan was exchanged at one shilling and 2.375 pennies in 1936; Hsiao, *China's foreign trade*, tab. 9a, p. 190.

b The price data are for bonds with a face value of 100 yuan. The first five bonds on the list were issued by the Beijing government and the other six bonds were issued by the Nanjing government. For the five Beijing bonds, monthly price data are available in the *BM* from July 1921 to Aug. 1924. We computed the monthly data by using the daily data (1,553 observations) in the *BM* from Sept. 1924 to Dec. 1928. The monthly prices for the 7th Year, Consolidated 6%, and 8% bonds for the period 1929-34 were taken from the *BW*. For the Consolidation bonds, monthly data are available from March 1936 to April 1938. We computed the monthly data using the daily data from May 1938 to Dec. 1942. The daily sample stops at the end of March 1942. The monthly data for the remaining months of 1942 are from the *BW*.

c According to Article 8 in the Report to the President on Bond Consolidation on 13 March 1921, the domestic bond funds 'included the remainder of the maritime customs and inland transaction tax revenues after paying foreign debts and indemnities, and three domestic bonds (the 3rd Year, 4th Year, and 7th Year bonds). If this amount was not sufficient to pay the debt, salt tax revenue would be used. There were at least 14 million yuan available for paying the debt under the aforementioned tax revenue categories. Another 10 million yuan from wine and tobacco tax revenue would be used if the 'funds' were insufficient; cited in Qian, *Juizhongguo Gongzhai Shiliao*, p. 71.

d The interest rates for the bonds consolidated in 1932 changed to 6%. The clause on payment terms changed to the following: 'The bonds will be repaid within 16 years after 1932. Only interest is paid in the first four years. During the next 12 years, the government will pay interest and hold a lottery draw to reimburse some of the bonds in full each time'; Qian, *Juizhongguo Gongzhai Shiliao*, pp. 213-17.

e Due to wartime inflation and the 'currency reform' of 1948, the reimbursement was equivalent to wiping out all domestic debts.

Sources: *BW* (various issues); Qian, *Juizhongguo Gongzhai Shiliao*; Jia, *Guozhai yu jinrong*.

Table A2. *Structural breaks of the Beijing and Nanjing bonds, 1921–42*

<i>Bond</i>	<i>Data range</i>	<i>Break</i>	<i>Date</i>	<i>Bound</i>	<i>Jump in min.</i>	<i>Jump in max.</i>
7th Year	Feb. 1921–Oct. 1931	1	Jan. 1924	[−1,2]	−6.2 (−41%)	−6.6 (−40%)
		2	Dec. 1927	[−1,1]	−1.3 (−14%)	−1.8 (−19%)
Financial	March 1921–Nov. 1928	1	Nov. 1924	[−1,1]	−2.3 (−26%)	−2.8 (−30%)
		2	Feb. 1927	[−1,1]	1.0 (16%)	1.7 (25%)
7%	July 1921–Dec. 1928	1	Dec. 1923	[−1,1]	−5.2 (−38%)	−6.6 (−43%)
		2	Dec. 1926	[−1,2]	1.9 (23%)	2.9 (33%)
6%	July 1921–Nov. 1934	1	Jan. 1924	[−3,2]	−4.4 (−35%)	−5.4 (−38%)
		2	Aug. 1931	[−1,4]	7.9 (95%)	9.0 (100%)
		3	May 1933	[−1,1]	−6.3 (−39%)	−7.8 (−43%)
8%	July 1922–Aug. 1929	1	June 1925	[−1,6]	−14 (−48%)	−15 (−44%)
		2	March 1927	[−2,2]	18 (116%)	23 (118%)
Disband	April 1930–July 1935	1	Sept. 1931	[−1,2]	4.5 (40%)	5.2 (40%)
		2	May 1933	[−1,1]	−4.5 (−29%)	−6.7 (−37%)
CBA	March 1936–Dec. 1942	1	Sept. 1940	[−1,2]	−2.4 (−24%)	−2.5 (−22%)
		2	May 1942	[−2,0]	3.8 (49%)	5.9 (68%)
CBB	March 1936–Dec. 1942	1	Oct. 1940	[−1,1]	−3.0 (−26%)	−3.4 (−27%)
		2	April 1942	[−1,2]	3.0 (36%)	5.4 (59%)
CBC	April 1936–Dec. 1942	1	Oct. 1940	[−1,1]	−2.9 (−25%)	−3.3 (−26%)
		2	April 1942	[−1,1]	2.7 (31%)	4.9 (52%)
CBD	April 1936–Dec. 1942	1	Sept. 1940	[−1,1]	−2.9 (−24%)	−3.3 (−26%)
		2	Nov. 1941	[−1,0]	2.0 (22%)	4.2 (43%)
CBE	April 1936–Dec. 1942	1	Oct. 1940	[−1,1]	−3.1 (−26%)	−3.3 (−25%)
		2	March 1942	[−2,1]	2.9 (33%)	5.0 (51%)

Notes: The choice of number of breaks needs to fulfil two criteria: (1) the minimum duration of each segment is 12 months; (2) the magnitude of all jumps is larger than 10%. The bound is the 90% confidence interval of the break date. Max. and Min. indicate the maximum and minimum yields of the bonds.

Sources: For the data source, please refer to section II. The results were calculated by the authors.

Table A3: *The impact of the outbreak of the Second Sino-Japanese War in July 1937 on the yields of the consolidation bonds*

<i>Month/year</i>	<i>CBA</i>		<i>CBB</i>		<i>CBC</i>		<i>CBD</i>		<i>CBE</i>	
	<i>Max.</i>	<i>Min.</i>	<i>Max.</i>	<i>Min.</i>	<i>Max.</i>	<i>Min.</i>	<i>Max.</i>	<i>Min.</i>	<i>Max.</i>	<i>Min.</i>
July 1937	6.8	7.9	7.0	8.1	7.2	8.4	7.2	8.5	7.3	8.5
Feb. 1938	13.3	14.1	14.2	15.9	14.9	15.9	14.9	16.2	14.9	16.1
Changes	6.5	6.1	7.2	7.8	7.8	7.6	7.7	7.8	7.6	7.6
% change	95%	77%	102%	97%	109%	90%	107%	92%	104%	90%

Notes: Max. and Min. indicate the maximum and minimum yields of the bonds.