A Mirror of History: Chinese Bond Market from 1921 to 1942[1]

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Abstract

This article examines the Chinese bonds during the republic period (1921-1942), when China suffered from numerous conflicts. By collecting a novel dataset on the bond prices, we first calculate the bond yield, and identify the structural breaks, and the corresponding timings and magnitudes. We then match the breaks with the historical events to identify the "turning points" of the Chinese civil conflicts and the Second Sino-Japanese War (1937-1945). Our analysis suggests that 1) Sino-Japanese conflicts have stronger long-term impacts than the civil wars on bond prices, while the short-term effects are similar; 2) our turning points, identified as the endogenous breaks in the data, are consistent with those identified by historians, except the Battle of Yunnan-Burma Road.

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1. Introduction

During the nineteenth century, China was ruled by the Manchus Qing. Their leadership could be described – politely – as increasingly ineffective as the century progressed. An early harbinger of decline was China's humiliating defeat in the First Opium War (1839-42) which, among other things, illustrated the outdated state of the Chinese military.[4] Internal weakness invited later invasions, which resulted in more defeat and humiliation.[5] China's government was forced to accept unequal treaties, including opening up ports, paying large amounts for reparations, ceding lands, and making various other concessions of sovereignty to foreign "spheres of influence". Coupled with the external disasters, domestic rebellions were rampant across the nation, further weakening an already shaky regime.[6] The bond history in China starts in parallel with the aforementioned turmoil.

The aim of the paper is to, following the literature on looking for "turning points" by examining time series price data for financial assets,[7] undertake an endogenous structural break method (Qu & Perron, 2007) to search for the turning points in the weekly prices for the bonds and look for coincident events that are likely to have been responsible for them.

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[4] During the late eighteenth and early nineteenth centuries trade between Chinese and European merchants expanded, which caused hostility toward the west by the conservative Qing regime. Because of the unpopularity of European manufactured products in China and huge demand for Chinese goods such as silk, tea and ceramics in the European market, China experienced a substantial trade surplus. It is said that in order to help balance Britain's huge trade deficit with China, the British introduced opium to China; by 1838, the British were selling 1,400 tons annually to China. In the same year, the Qing regime tried to ban the opium trade and the British declared war on China, leading to the Opium War.

[5] These included the Second Opium War (1856-1860), the Sino-French War (1884-1885), the first Sino-Japanese War (1894-1895) and the Intrusion of Eight Nation Alliance in 1901 (see Elleman, 2001 for details).

[6] Among them, the most famous are the Taiping Rebellion (1851–1864) and the Boxer Rebellion (1899-1901).

[7] For example, Willard et. al., 1996; Weidenmier, 2002; Brown & Burdekin,2000 & 2002; Weidenmier & Oosterlinck, 2007; Frey & Kucher, 2000; Oosterlinck, 2003; Frey & Waldenstrom,2004&2008.

Using this methodology, we hope to determine what events were viewed by contemporaries to be turning points in China's modern history. Moreover, given the richness of our dataset, it allows us to gain insights on the perspectives of domestic and foreign investors towards the historical events (e.g. whether they viewed the same event differently (or similarly); or the event stirred the domestic market did not affect the Chinese bonds in London at all) and on the reactions of the bond holders toward the domestic and international conflicts.

Our results suggest that military, political and economic events have significant impacts on bond yields. We find that the economic events, like the first bond consolidation, caused negative drop in the bond yield, which shows that this event secure the collateral of the bonds. Among the international conflicts, the Mukden Incident in September 1931, the Marco Polo Bridge Incident in July 1937 and the Battle of Yunnan-Burma in March 1942 were the turning points perceived by investors. Furthermore, we show that the Sino-Japanese conflicts have stronger long term impacts than the civil wars on bond prices, but the short term effects are similar. Finally, our turning points obtained from the empirical results match closely with those identified by historian, except the Battle of Yunnan-Burma Road. Although historians have diverse opinions on its significance, our results suggest that the domestic investors perceived that it is as important as the Marco Polo Bridge Incident.

Our paper contributes to the literatures on identifying the turning points of conflicts through capital markets. In addition to compare the perspectives of domestic and foreign investors on significant events, we provide new insights on the reactions of investors on government and corporate bonds and compare the impacts of domestic and international conflicts on bond investors. The existing literatures focus on two historical events, namely the U.S. Civil War and World War II. Willard et al. (1996) study the currency price fluctuation of Greenback issued by the Union during the U.S. Civil War. They show that

the structural breaks in the currency price are connected to the political and war events between the Union and the Confederacy. Weidenmier (2002) examines the currency price of Grayback issued by the Confederacy to compare the winning odds on the civil war perceived by the investors across those two regions. He shows that Greenback and Grayback investors shared the view that Antietam and Gettysburg were two turning points in the civil war, but they have different opinions on other turning points and the importance of each event. Furthermore, Brown and Burdekin (2000) and Weidenmier and Oosterlinck (2007) employ the bonds issued by the Confederacy that were traded in Britain and Netherland to identify the important events, respectively. They suggest that the reactions of foreign investors were different from those of domestic investors.

Researchers also look into the changes in financial market during the World War II. Frey and Kucher (2000) examine the domestic and foreign bond prices (France, Germany, Austria, Belgium and Switzerland) in the Zurich stock exchange. Brown and Burdekin (2002) look into the German bonds traded in London, and Frey and Waldenstrom (2004) investigate the Belgian and German bonds listed in Switzerland and Sweden. Investors across countries thought that the outbreak of the World War II was a turning point, but they disagree on other turning points. Furthermore, Oosterlinck (2003) studies the price differential between pre-war French bond and Vichy bond and illustrates that investors react to the outcomes of the World War II. Frey and Waldenstrom (2008) investigate the Nordic (Denmark, Finland, Norway and Sweden) bonds listed at home and in Stockholm, and show that domestic and foreign investors act consistently in timing but foreign investors react stronger than domestic investors.

The rest of the paper is organized as follows. Section 2 provides a historical background. Section 3 discusses the data. Section 4 and 5 outline the model and empirical framework, respectively. Section 6 reports the empirical results. Section 7 contains some discussion on the bond yield and inflation rate and interest rate. We conclude in section 8.

2. Background

a. Overview of the History from Later Qing to Republic Period

During the nineteenth century, China was ruled by the Manchus Qing. Their leadership could be described – politely – as increasingly ineffective as the century progressed. An early harbinger of decline was China's humiliating defeat in the First Opium War (1839-42) which, among other things, illustrated the outdated state of the Chinese military.[8] Internal weakness invited later invasions, which resulted in more defeat and humiliation.[9] China's government was forced to accept unequal treaties, including opening up ports, paying large amounts for reparations, ceding lands, and making various other concessions of sovereignty to foreign "spheres of influence". Coupled with the external disasters, domestic rebellions were rampant across the nation, further weakening an already shaky regime.[10]

After the overthrow of the monarchy in 1911, the center of political life was lost and the republican government was not able to fill the power vacuum. From 1912 to 1927, China fell into the so-called Warlord Period. Nominally republican with a "central" government in Beijing, there were nonetheless some 1,300 warlords who, needless to say, did not get along with each other. The most comprehensive assessment concludes that 140

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[8] During the late eighteenth and early nineteenth centuries trade between Chinese and European merchants expanded, which caused hostility toward the west by the conservative Qing regime. Because of the unpopularity of European manufactured products in China and huge demand for Chinese goods such as silk, tea and ceramics in the European market, China experienced a substantial trade surplus. It is said that in order to help balance Britain's huge trade deficit with China, the British introduced opium to China; by 1838, the British were selling 1,400 tons annually to China. In the same year, the Qing regime tried to ban the opium trade and the British declared war on China, leading to the Opium War.

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noticeable conflicts occurred between warlords during this period, some crossing provincial boundaries (Ch'en 1968).

In 1928, the nationalist party, under the leadership of Chiang Kai-Shek, unified China after wining a series of wars against incumbent warlords- the famous Northern Expedition. The capital city was moved from Beijing to Nanjing (Hereafter, we call the new regime Nanjing Government.). The new born government tried to focus on the national economic re-construction. However, the recovery process was interrupted by the Sino-Japanese diplomatic-military events periodically. The outbreak of the second Sino-Japanese war in 1937 ended the nearly one decade's economic construction.

b.   **The central government's fiscal status and the bond**

In parallel with the aforementioned turmoil, the financial status of the Qing dynasty deteriorated quickly. According to Jamieson's calculation[11]- the British Ambassador in Shanghai, the average annual budget surplus for the early 1890s was only slightly 5,000 silver taels. When the First Sino-Japanese War occurred in July 1894, the royal court could not afford the huge military expenditure. The first domestic bond was issued soon after the war started. Another domestic bond was issued in 1898 to pay the fourth installment of the indemnity of the Treaty of Shimonoseki (April 17, 1895) following the Chinese defeat in March 1895. This domestic bond raised 20 million taels which were only 10% of the indemnity (Qian, 1983).[12] These two bonds were defaulted when the monarchy stepped down.

Since the establishment of the Republic of China in 1912, the following two consecutive republican governments, Nanjing and Beijing governments suffered serious

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[11] British Parliament Papers. Report on the Revenue and Expenditure of the Chinese Empire, 1895. pp. 5-20.

[12] The remaining portion of the reparation was paid by foreign debts including Franco-Russian Government Loan, Anglo-German Government Loan 1896 and 1898 (Denby 1916; Jin 2000)

financial distresses. Figure 1 shows the central government revenue and expenditure from 1912-1945. This huge deficit should be covered by various mixtures of borrowing and taxation.

Figure 1. The Real Revenue and Expense in Chinese Central Government from 1919-42
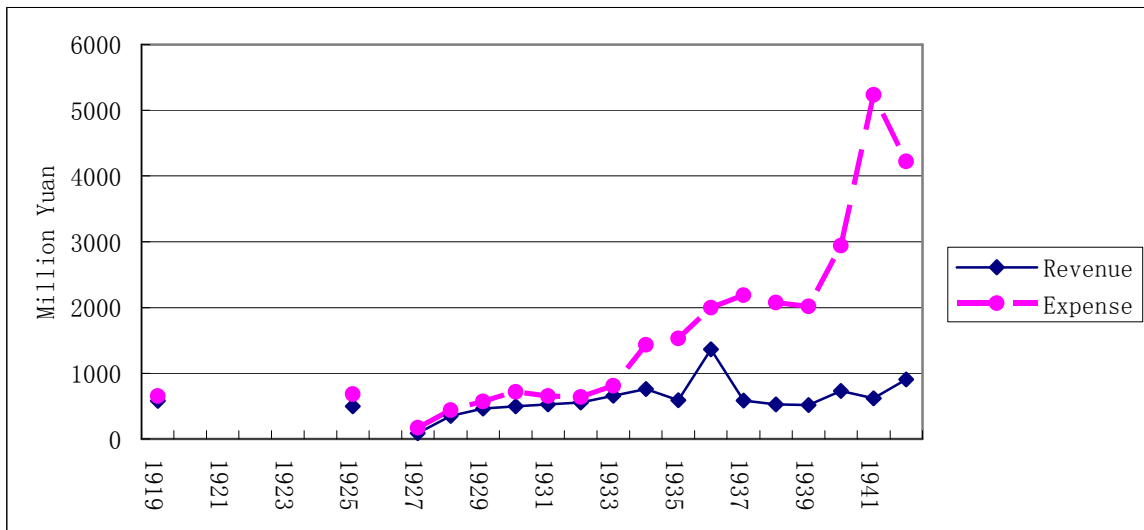
Source: The data on nominal revenue and expense are from Yang (1985), The Fiscal History of Republic China (Yang Yin-Pu, Min Guo Cai Zheng Shi), The Chinese Fiscal Economics Press, p. 3, 43, and 102. The data on inflation is from Wang Yu-Ru(2008), Urban Wholesale Price Change and Economic Growth in Modern China.

Before the World War Ⅰ, Beijing government relied on foreign debts to finance its expenditure.[13] When the funding opportunity abroad became weaker during the WWⅠ, Beijing government switched its sources of funding from foreign to domestic market. As a result, 11 new domestic bonds were issued during 1912-1921. Because of the financial difficulty of central government, the payment of the coupon was not guaranteed, which largely ruined the credibility of the government. In 1921, Beijing government conducted the first bond consolidation in order to save the credibility of the government. A Bureau of

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[13] Notable examples are the Loan from Messrs. C. Birch Crisp and Co. in 1912 and the Reorganization Loan in 1913.

Domestic Bonds was established to manage the domestic bonds markets. Old bonds were swapped by new bonds with more secure collaterals and the maturity of seven bonds was extended. Qian (1984) documents that there were 28 outstanding domestic bonds worth 612 million silver Yuan during the Beijing government period.

The Nanjing government honored the domestic bonds issued by the Beijing government. In addition, the government raised 29 types of bonds during 1927-31, which worth 1,040 million Yuan (Jin and Wang 1991). 81% of the funds were allocated to the economic activities, including support the recovery activities, infrastructure investment, consolidation of the financial industry and relief.

After the Japanese acquired Manchuria in 1931-32, the custom revenue for Nanjing government declined. An increasing debt burden coupled with declining revenue led to the Bond Consolidation in 1932, which increased the maturity and reduced the interest rate of the outstanding bonds. Nonetheless, the government resumed to issue bond in 1933 to further alleviate her fiscal burden. At the end of 1936, there were 49 bonds outstanding, worth 2,399 million Yuan (Li, 2004). The massive amount of outstanding bond payment triggered another bond consolidation in 1936. The existing bonds were consolidated into 5 series, called Series A, B… and E (see Table 1 in the data section), with a reduced value of 1,460 million Yuan.

3. Data

Due to the large number of bonds traded on the Beijing Stock Exchange and the Shanghai Stock Exchange, we restrict ourselves to 11 important bonds in terms of their capitalization and data availability. The consistent time series price data are available only after the first bond consolidation in 1921.[14]

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[14] We also tried to collect data on the prices before 1921 from major newspapers at the time, such as Shanghai Newspaper (Shen Bao). However, we found that the newspaper did not report price on all bonds and it picked up different bonds to report their prices randomly. Therefore, we can not construct a time series

The sources of our data are Banker's Magazine (BM: *Yin Hang Yue Kan*) and Bankers' Weekly (BW: *Yin Hang Zhou Bao*). The BM published by the Beijing Banking Association. The magazine was published on a monthly basis between January 1921 and December 1928. The BW started in May 1917 and ended in March 1950. The magazine was published by the Shanghai Banking Association on a weekly basis. Unfortunately, our sources do not record turnovers.

For the period 1921-27, we focus on 5 domestic bonds issued by the Beijing government (We call them Beijing bonds). As in Table 1, we have the monthly maximum and minimum prices for these 5 bonds with the numbers of observation range from 86 to 161. These bonds were carried on by the Nanjing government after 1927. Another bond called The Disband bond, issued on July, 1929 is added to analysis.

After the Bond Consolidation in 1936, all domestic bonds were consolidated into 5 series. Similarly, the monthly maximum and minimum prices from March 1936 to December 1942 (except for September and December 1937，the periods around the outbreak of the Second Sino-Japanese War) are collected. Furthermore, we have 1425 observations of daily data of those five bonds which spans from May 2, 1938 to March 26, 1942.

The maturity date for bonds was not fixed since the government paid out a fixed sum each year for interest and amortization, just as for a term loan, but instead of implicitly amortizing a part of each bond each year there was a random draw of some of the bonds to be reimbursed in full each year. Therefore, instead of the Yield to Maturity, we examine the time series property of the bond yield calculated by using the price data.

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data on a specific bond before 1921.

Table 1. Information on the Ten Chinese Government Bonds: 1921-1942

Bond	Total amount (Million)[1]	Annual Interest Rate (%)	Final Maturity Date[2]	Collaterals	Issue date	Data availability[3]	Obs.
7th Year	45	6	20	0.225 Million Yuan from the Department of Finance per year [4]	Jul 1918	Feb 1921- Oct 1931	129
Financial	60	6	7	The residual of maritime custom revenue after paying foreign debts and indemnity [5]	Mar 1920	Mar 1921- Nov 1928	93
Consolidated 7 Percent	13.6	7	10	The residual of the maritime custom revenue and the inland transaction tax revenue after paying foreign debts, indemnity and three domestic bonds [6]	Feb 1921	Jul 1921- Dec 1928	90
Consolidated 6 Percent	80	6	10	Same as the Consolidated 7 Percent Bond	Jun 1921	Jul 1921- Nov 1934	161
8 Percent	96	8	7	All other tax revenue except the Maritime Custom Revenue and the Salt tax revenue	Jan 1922	Jul 1922 - Aug 1929	86
Disband	50	8	10	Additional custom revenue from new tax item	Jul 1929	Apr 1930 – Jul 1935	64
Consolidation Bond A[7]	150	6	12	The residual of the maritime custom revenue after paying foreign debts and indemnity	Feb 1936	Mar 1936 - Dec 1942	78
Consolidation Bond B	150	6	15	Same as Consolidation bond A	Feb 1936	Mar 1936 - Dec 1942	78
Consolidation Bond C	350	6	18	Same as Consolidation Bond A	Feb 1936	Apr 1936 - Dec 1942	77
Consolidation Bond D	550	6	21	Same as Consolidation Bond A	Feb 1936	Apr 1936 - Dec 1942	77
Consolidation Bond E	260	6	24	Same as Consolidation Bond A	Feb 1936	Apr 1936 - Dec 1942	77

Source: Banker's Magazine (BM: Yin Hang Yue Kan), published on a monthly basis between January 1921 and December 1928 by the Beijing Banking Association;

Bankers' Weekly (BW: Yin Hang Zhou Bao), published on a weekly basis from May 1917 to March 1950 by the Shanghai Banking Association; Qian (1984), Historical Materials on Domestic Government Bonds of Old China 1894-1949 (Qian Jia Ju, Jiu Zhong Guo Gong Zhai Shi Liao 1894-1949), Zhonghua Shuju Press, Beijing.

Notes:

1. Before the monetary reform in 1936, all bonds issued were denominated in Silver Yuan. After 1936, all bonds were denominated in Chinese paper currency (Fabi). Fabi pegged to British pounds as 1 Yuan equal to 1 Shilling and 2.375 Pennies in 1936 (Hsiao, 1974, pp. 190 Table 9a.).

2. The government paid out a fixed sum each year for interest and amortization, just as for a term loan, but instead of implicitly amortizing a part of each bond each year there was a random draw of some of the bonds to be reimbursed in full each year. All bonds were anonymously held. Those bondholders whose bonds were drawn to be paid in full went to the branches of Bank of China and Bank of Communications to get the reimbursement.

3. For the five Beijing bonds, the monthly data start from July 1921 to August 1924 in the Banker' Magazine. Then we compute the monthly maximum and minimum using the daily data (1553 observations) from the BM for the period of Sep 1924-Dec 1928. The 7th Year, consolidated 6 Percent, and 8 Percent (also named 96 Bond) for the period 1928-34 are calculated by using the weekly data (not reported every week) in the BW. For the Consolidation Bonds, the monthly data start from March 1936 to April 1938. We compute the monthly maximum and minimum using the daily data from May 1938 to December 1942. The daily data was not available for April 1942, thus the daily sample stop at the end of March 1942. The monthly data of April 1942 are obtained from a table of monthly bond price in May 1942.

4. The tax revenue from all Bureaus of the Transaction Tax outside of the 50 Miles from Beijing served as complementary collateral.

5. The fund from the Department of Finance served as complementary collateral.

6. According to the Item 8 of the Report to the President on the Bond Consolidation on 13 March, 1921, the collaterals for these the consolidated 7 and 6 percent bonds include the residual of the maritime custom revenue and the inland transaction tax revenue after paying foreign debts, indemnity and three domestic bonds (the 3rd Year Bond, the 4th Year bond, and the 7th Year bond). If the residual is not enough for paying the debt, salt tax revenue will be used. There would be at least 14 million Yuan available for paying the debt under the aforementioned tax revenue. Another 10 million Yuan would be used under the Wine and Tobacco Tax revenue (Qian, 1984, pp. 71).

7. Bond A, B, C, D and E replaced 6, 5, 9, 8 and 5 bonds respectively.

4. Theoretical Model

Historical events are mirrored in asset prices. In contrast to assigning significance to an historical event based on hindsight, asset prices reflect how contemporaries viewed the event at the time. Willlard et al. (1996) determine the turning points of the U.S. Civil War by studying the Greenback markets. Similar analysis is conducted to investigate the important events in the World War II (Frey and Kucher, 2000), Israeli-Palestinian conflict (Zussman et al. 2008) and Iraq War (Rigobon and Sack 2005).

Consider a bond with maturity for T periods, which pays coupon payment c_t in each period and principal C_0 in the last period. However, there is uncertainty whether the government will pay the coupon and principal or not. We let the payment probability be p_t for coupon payments and p_0 for the principal. In other words, $1-p_t$ and $1-p_0$ are the default probabilities for coupon payments and principal, respectively. Suppose investors have subjective discount rate, β, the discounted cash flow model suggests that the bond price (*BPrice*) is given by

$$BPrice_t = \Sigma_{t=1,...,T}\, \beta^t p_t c_t + \beta^T p_0 c_0$$

Since the coupon payments and the principal are often pre-determined, the changes in bond price are subject to changes in interest rate and payment probability. Assume ex-ante payment probabilities are fixed over time, i.e. $p_t = p_0 = p$.[15] We derive the payment probability as follows

$$Pr(Payment) \equiv p = BPrice_t / (\Sigma_{t=1,...,T}\beta^t c_t + \beta^T c_0)$$

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[15] Weidenmier and Oosterlinck (2007) use a discounted cash flow model to estimate the default probability. Their method requires the knowledge on the timing of each coupon payment and the principal. In our case, we do not estimate the default probability directly because the government did not always have enough revenue to pay the coupons and principal according to the payment schedules of Chinese bonds were uncertain because the government did not have enough revenue to pay off the debt.

The expression suggests that the payment probability relates to bond price and interest rate. If interest rate does not change abruptly, a dramatic change in bond price indicates there is a sharp change in default probability perceived by bond investors. Since the governments in the Republic of China are often threatened by domestic rivals and foreign invasions, debt might not be honored by the new government if the incumbent government stepped down. The payment probability characterizes the survival probability for the incumbent government.

5. Empirical Model

We employ the multivariate model developed by Qu and Perron (2007) to analyze the monthly maximum and minimum bond yields. The model provides an algorithm based on quasi maximum likelihood procedure and a series of tests for determining the number of endogenous breaks in the data. It allows us to detect structural changes in a system of equations without prior knowledge on the locations of breaks.

In our context, the system of equations contains the monthly highest and lowest bond prices. The sample size is 2xT. To estimate the unknown intercepts and breakpoints, we specify the following model

$$Y_t = c_1 + u_t, \quad t = 1,..., T_1$$

$$Y_t = c_2 + u_t, \quad t = T_1+1,...,T_2$$

$$:$$

$$Y_t = c_{m+1} + u_t, \quad t = T_m+1,...,T$$

The dependent variable $Y_t = [Y_{ht}, Y_{lt}]'$ is a vector of bond prices at time t. The first equation with subscript h is the monthly maximum bond yield, whereas the second equation with l is the monthly minimum bond yield. The time series data is separated by m breaks in which the length of intercepts varies across m+1 segments. This model

restricts these two equations experience shifts simultaneously, but the magnitudes of the shifts can be different. The estimated intercepts are $c_j = [c_{jh}, c_{jl}]'$ for j=1 . . . 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 has at least two years for the monthly data. The maximum number of breaks allowed is four.

To select the number of breaks, we follow the two-step procedure recommended by Qu and Perron (2007). First, we detect whether any structural change exists in the model. In particular, we evaluate the supF(m|0) to test the null hypothesis of no break (m=0) against the alternative that there is at least one break (m=k where k is unknown). If structural break is detected, we then determine the number of breaks by a sequential testing procedure on evaluating the SEQ(m+1|m) until the test statistic is no longer significant.[16]

As we argued before, the changes in bond prices capture the changes in default probability of the bonds. In the empirical analysis, we compute the changes and the percentage changes in bond yields across two consecutive segments, i.e. $[c_{hj}-c_{hj-1}, c_{lj}-c_{lj-1}]$ and $[(c_{hj}-c_{hj-1})/c_{hj-1}, (c_{lj}-c_{lj-1})/c_{lj-1}]$, to examine the changes in default probability.[17]

6. Empirical Results

16 For example, if SEQ(2|1) is significant, we infer that there are two breaks instead of one. If we find the test SEQ (3|2) is insignificant, then we conclude that there are only two breaks. Additionally, we decide there are two breaks if the there is no more space for inserting the third break given the trimming parameter, k.

17 Our measure is close to that used in Weidenmier and Frey (2008). They employ the univariate model of Bai and Perron (1998, 2003) to estimate the changes in bond yield, and hence to examine the changes in probability of war from the prices of domestic and foreign bonds.

In this section, we report the estimated timings and magnitudes of the structural changes. We start with the results from the Beijing bonds during 1921-35 in addition to the Disband Bond in 1929. Then we continue the analysis for the consolidated bonds during 1936-42.

Beijing Bonds and the Disband Bond, 1921-35

We borrow the terminology for the changes in bond yield from Willard et. al (1996), as a "break" meaning the change that persists for a long period of time (at least more than one year) and a "blip" meaning the change that persist not more than a couple of months. The structural breaks for these bonds are listed in the Appendix Table A. Since these bonds have very similar performance,[18] we take the 6 Percent Bond as an example to show the possible explanations for breaks and blips. Figure 1 plots the monthly maximum and minimum yield of the 6 Percent Bond and their fitted values from the multivariate model. In addition, we also collect the very important events, include the military events, natural disasters and financial news from the Shanghai Newspaper, the Bankers' Magazine and the Bankers' Weekly at the time.

The First Bond Consolidation: 1920-1923

Looking into the timing of the structural breaks in Figure 1, the first break located at January 1924. The first break of the bond yield is the negative shift of 35% for the minimum price and 38% for the maximum price as a response to the end of the fist Bond Consolidation. After the establishment of the Beijing government, there

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[18] Note that the structural breaks obtained from the 96 Bond are different from those from the other 4 bonds. The collateral of the 96 Bond was neither guaranteed by the Beijing government nor Nanjing government. It was not covered in the Bond Consolidation 1921. The 6 Percent, 7th Year, Financial and 7 Percent were supported by the fund established in the Bond Consolidation 1921, but the 96 Bond was only supported by the residual of salt tax (without a secured repayment fund supported by the custom or government revenues). Therefore, the bond price reacted to idiosyncratic news rather than news about political and war events because changes in government regime had less impact on the debt repayment. Furthermore, the bond price did not recover after the Nanjing government had come into power because the government did not honor the 96 Bond.

Figure 1: The Yields of 6 Percent Bond: July 1921- November 1934
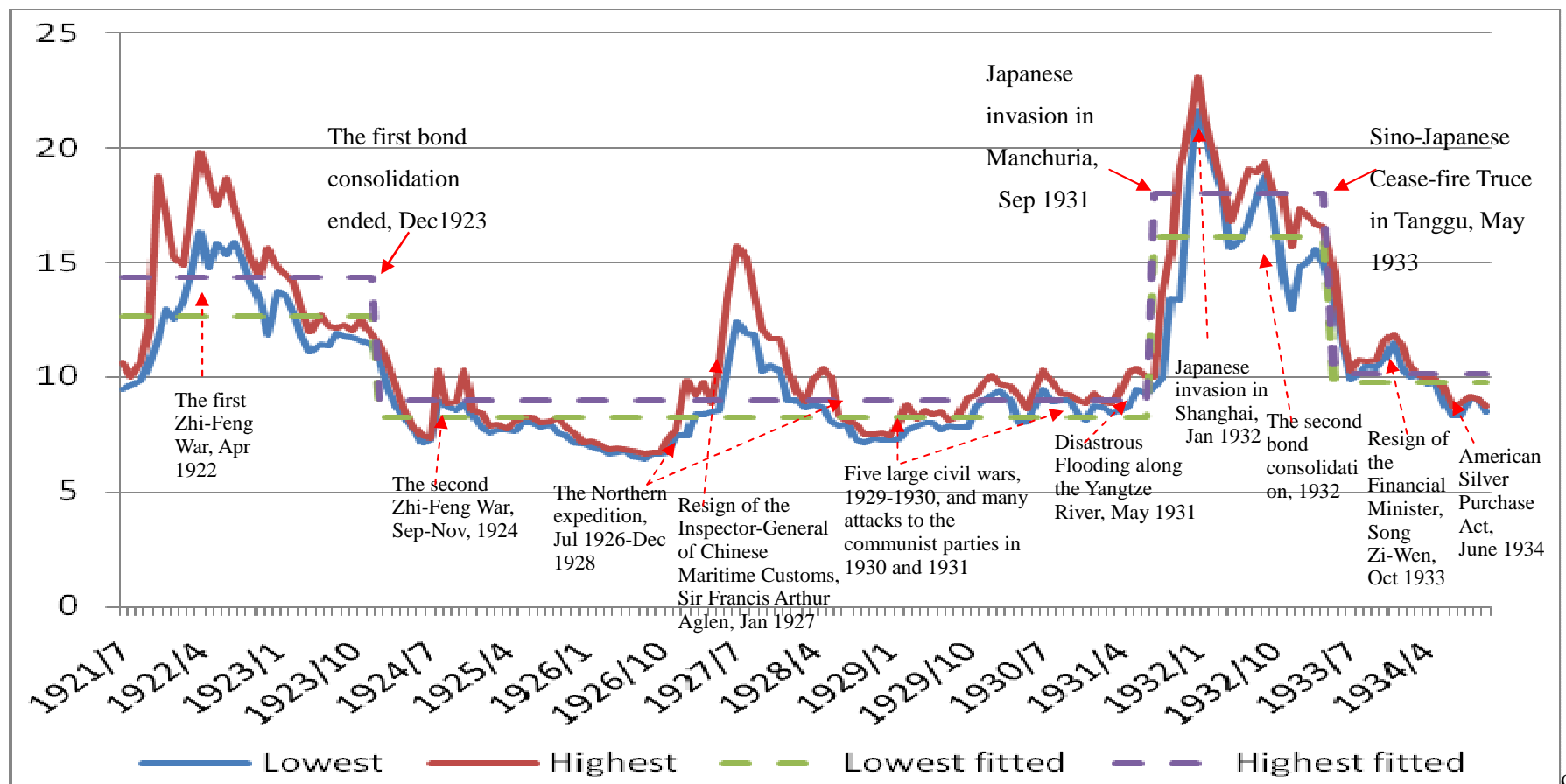
Source: Banker's Magazine (*Yin Hang Yue Kan*), Bankers' Weekly (*Yin Hang Zhou Bao*), Shanghai Newspaper (Shen Bao)

were many bond issues. As the budget deficit deteriorated even more as a war between the incumbent government and the Wan Faction occurred in July, 1920 and serious floods struck the Zhili Province (Where Beijing was located in) and Hunan Province for a couple of years around 1920. The government started frequently defaulting on the coupon payment and did not hold the random draw of some of the bonds to be reimbursed in full. Facing the dishonorable behavior of the government, the National Bankers' Association proposed to the government conduct the bond consolidation to restore fiscal and monetary order.

In March 1921, the bill of Bond Consolidation was passed by the President Yuan. The bill extended the maturity and reduced the face value of the outstanding domestic bonds. In July 1922, the government passed another bill to secure the collaterals of the consolidated bonds. After the bill was implemented in the late 1923, the domestic investors became more confident in the sources of funding for repayment and positive shifts in bond prices in the early 1924 followed (Shanghai Commercial and Saving Bank 1931; Bai 2000). Consequently, the yield decreased by more than 30% with the declining default risk.

The Japanese Invasion in Manchuria, September 1931

The second break lies in the August 1931 for the 6 Percent Bond with the confidence interval between a month before and four months later (Appendix Table A). From the table 1, the time series price data of three bonds (the Financial Bond, the Consolidated 7 Percent Bond and the 8 Percent Bond) ends before 1930 and price data of the 7th Year Bond ends one month after this event. The possible impact of an important event on these four bonds could not be able to found during this period. The Disband Bond was found to experience the same structural break in September 1931.

After Japan won the Russo- Japanese war in 1905, Japan became the only influential empire over Manchuria. She regarded Manchuria as a limitless supply of

raw materials, a market for her manufactured goods, and as a protective buffer state against the Soviet Union in Siberia. Japan invaded Manchuria after the Mukden Incident in September 1931. The loss of Manchuria reduced the government tax revenue from this area as well as the transaction tax on trade between Manchuria and the rest of the nation, which largely weakened the collateral of government bonds. The loss of custom revenue and tax revenue on goods transaction was estimated as 50 million per year, about one tenth of the national revenue on these two tax items.

Moreover, the weak military performance of Chinese army made people lose confidence in the government. They became worried about the default risks on bond. Therefore, the bond price dropped profoundly and the yield increased to more than 20% to compensate for the growing default risk. In fact, the bond holders' worry became true when the Central Committee of the Political Bureau of Nationalist Party had an emergent meeting in Shanghai and enacted a bill on stopping paying the coupon and amortizing the bond for six months in January 1st, 1932. This bill was strongly against by Shanghai Bankers' Association and appealed in January 17th.

Sino-Japanese Cease-fire Truce in Tanggu, May 1933

The third break in the 6 Percent Bond occurred in May 1933, which coincided with the Sino-Japanese Cease-fire Truce in Tanggu in Tianjin City. Following the loss of Manchuria, the weakness of Chinese military boosted the Japanese ambition to further her goal in China. Japanese troops attacked Shanghai in January 28th, 1932, resulting in the demilitarization of Shanghai. They occupied Rehe province in March 1933 and attacked Great Wall later which threatened Beijing and Tianjin area. In May 1933, the two governments reached the cease-fire Truce in Tanggu in Tianjin, which led to a temporary stop in Japanese invasion in China. The bond yield decreased sharply as the market realized the danger of losing the nation was relieved.

Events which caused blips

In addion to the structural breaks, there were numrous blips in bond yield which peristed for a couple of months. The first Zhili-Fengtian War in April 1922 caused a large increase in bond yield to compensate for the increasing risk of the survibility of the incumbent government. However, the yield gradually declined after the incumbent government won the war. Similarly, the second Zhili-Fengtian War in August-October 1924 had similar temporary impacts on bond yield.

The yield was experiencing ups and downs during the Northern Expedition from July 1926 to Dec 1928. The fluctuations correspond to the process of the Northern Expedition. As the Beijing government (the incumbent government) lost the war step by step, the bond holders felt pessimistic about the payment probability of their bonds. During the same period, the Inspector-General of Chinese Maritime Customs, Sir Francis Arthur Aglen, resigned in January 1927. Since the officer had strong influence on the use of custom revenue - the major collateral of most bonds, it created an uncertainty on the payment of bond interest and principal. This economic event made the yield increase further. Only after the Nationalist party declared that she would carry on the Beijing bonds, the investors regained their confidence in Beijing bonds and bond price went up.

After the formation of Nanjing Government, the government tried to focus on the nation building effort. However, factious wars against the incumbent government were still going, which include five large scale wars against the Warlords Tang Shengzhi，Feng Yuxiang, Yan Xishan and Li Zhongren during 1929-1930. Moreover, from 1930 to 1931, the Nanjing government was also busy in depleting the Communist party in inland China. The bond price experienced ups and downs responding to war news.

A serious flooding happened along the Yangtze Rive from May 1931 and lasted for a couple of months. One important industrial city, Wuhan in Hubei Province, was

damaged heavily. According to the Report on Wuhan in the Banker's in August1931,

"There is a very close relationship between Shanghai and Wuhan in the financial and commercial relationship. The loan in Wuhan from Shanghai was estimated at around five to six million Yuan. This flooding made Wuhan suffer huge damage. Therefore, it would have been very grateful if half of the loan could be repaid to Shanghai loaners."

Hence, the financial industry in Shanghai was seriously affected by the flooding, which would cause the recession in the market and sell bonds. From Figure 1, we can see that the yield is increasing during the period of 1929-1930 as the increasing default risk due to the military risks and the natural disasters. The fundamental and dramatic structural break was induced by the further added disaster, the Japanese Invasion in Manchuria in September 1931. The drop of bond price was exacerbated by the military conflicts due to the Shanghai Incident during January-March 1932. The consecutive wars and the serious floods depleted the financial resources of Nanjing Government, which led to the second bond consolidation by extending the maturity and reducing interest rate.

After the Tang-gu treaty, the yield was decreasing as the national risks was not a problem temporarily. The resign of the financial minister, Song Ziwen, caused panic in the bond market. The market recovered soon as the new financial minister carried similar financial policies as his predecessor. In June 1934, the US congress passed the American Silver Purchase Act which caused a huge outflow of silver in China. Since China is silver standard, the silver outflow caused deflation which makes the bond price go up and, hence, the yield go down.

Compare the investors' reaction toward domestic and international conflicts

6 Percent Bond has the longest time series price data among our available sample bonds, which covers both eras of the Beijing and Nanjing governments. Therefore, we utilize it to compare how investors respond to the impacts of civil conflicts and

Sino-Japanese conflicts. From our previous analysis, we have known that the bond yields experienced huge increase at the beginning of the Northern Expedition as the investors' expected that the Beijing government would lose the war and the default probability of the Beijing bonds increased. However, after the Nationalist party declared to carry on the Beijing bonds in order to win the support of bond holders, the yield decreased. There is no endogenous structural break identified.

However, the Japanese invasion in Manchuria in November 1931 caused a structural break with around 100% increase in bond yield, which show that the investors were very panic about the threat from a foreign nation. Compared with the around 50% increase in bond yield at the beginning of the Northern Expedition, we can tell that investors recognized the bond default risk would be larger if China were occupied by Japanese than the regime shifted among different Chinese political powers.

The Nanjing Consolidation Bonds: 1936-1942

Table 1 shows that the five Nanjing Consolidation bonds have very close characteristics in terms of collaterals and interest rate. A careful econometrics analysis of these five bonds, we find that prices of these five bonds are high correlated. So we take the Consolidation Bond A as an illustration. Figure 2 depicts the yield of bond A.

Macro Polo Bridge Incident in July 1937

After the third bond consolidation in 1936, the bond yield has a trend of declining as the collaterals of these bonds were secured. After the Macro Polo Bridge Incident in July 1937, the bond market stopped trading in September 1937 and re-opened until January 1938. The yield of consolidated bonds in February 1938 was about 95% higher than those before the market was closed in September 1937. The significance of the Macro Polo Bridge Incident suggests that investors revised their beliefs on the default risk of sovereign bonds when the Second Sino-Japanese War out

broke. The potential lose of the nation, if the Nanjing government failed, increased the default risk of the consolidated bonds. Even if the Nanjing government survived from the war, investors worried about its ability for the debt repayment after the intense warfare. The detail on changes of the yield of these five bonds is listed in Appendix Table B.

After this incident, the bond market was declining in Shanghai. In November 1937, Shanghai was occupied by Japanese. Since the World War II did not start yet, Japanese had to be friendly toward other great powers, the warfare did not disturb the foreign concession districts in Shanghai, where the Shanghai Stock Exchange was located. Moreover, capital from all over the nation flooded into Shanghai since investors regarded Shanghai as the safe heaven for their wealth. Therefore, the Shanghai Stock Exchange thrived. However, we suspect that trading on the government bonds should be thin since there is no reason for us to believe that the investors would be interest in the bonds of a nation which was in the middle of a serious warfare. Unfortunately, we do not have the record on turnover and if our suspicion is true, the fluctuations in bond price will not be representative for the market. The power of the econometric estimation of the bond yield will be reduced. Therefore, we will not emphasize the estimation results for the bond yield during the war period.

The Break in September/October in 1940

Our second break occurred in September 1940. For Bonds B, C and D, the break happened in October in the same year (see Appendix table C). The break indicated a decrease of around 25% in the bond yield, which is theoretically interpreted as the investors at the time had gained some positive belief on the bond payment probability.

During this period, the situation in China was very complex. The Japanese were intended to finish the war in China within three months. However, the war proved to

Figure 2. The Yields of Consolidation Bond A: Mar 1936 - Dec 1942
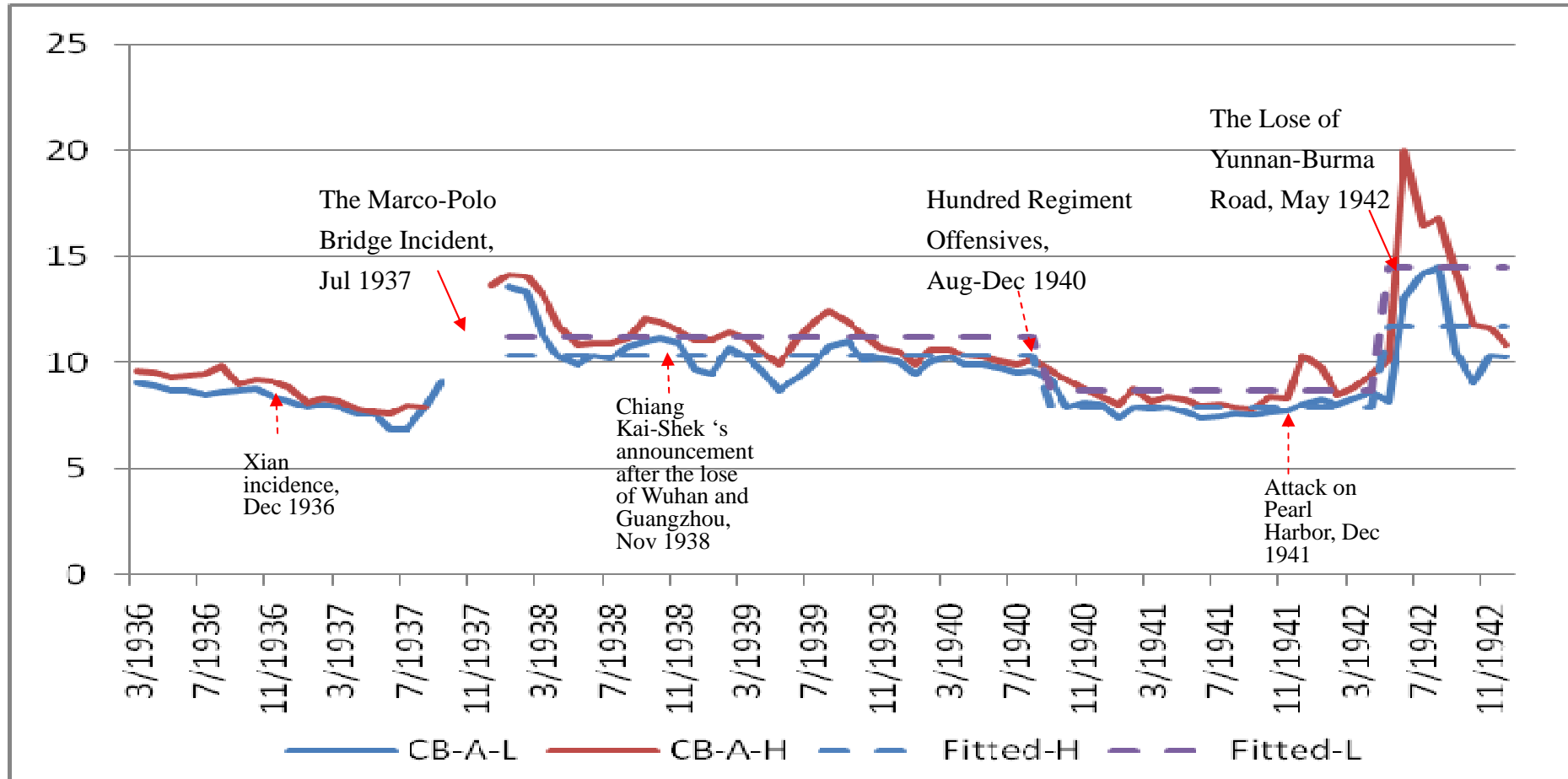
Source: Bankers' Weekly (*Yin Hang Zhou Bao*), Shanghai Newspaper (Shen Bao)

be lasting much longer than they expected. Then due to the financial and military resource constraint as Japanese occupied larger and larger Chinese territory, they changed their strategy as they switched to luring the Chinese government to surrender. Moreover, the German's consecutive successes in the European battle field made many Chinese feel very pessimistic about the War. In March 1940, a high-ranking government official, the second powerful second in the Nationalist Party, Wang Jinwei established a Japanese puppet government in Nanjing. On the other side, the temporary nationalist government in Chongqing led by Chiang Kai-Shek (the Nanjing government fleet to Chongqing after Nanjing was lost) insisted on the anti-Japanese War. The decrease in bond yield could be due to the investors' expectation that there was a sign of peace or the investors might be encouraged by patriotic enthusiasms of the incumbent government's determinacy to win the war.

During the same period, the communist party fought the so-called "Hundred Regiment Offensives" against the Japanese from August to December, 1940. This campaign killed more than 20,000 Japanese soldiers. It was regarded as the one of the most important victories for Chinese since the War started. Moreover, before this campaign, there was rumor that communist party never fought the war even though they claimed that the nationalist party and communist party should stop the civil war and fight against the Japanese invasion. This campaign stopped the rumor and proved the joint effort of these two parties protecting the country from being invaded. The major newspapers in China at the moment followed the progress of the campaign almost every day. Every single victory appeared as the headline. Therefore, another possible explanation for this structural break of negative drop in Bond yield could be explained that the investors responded positively to the joint effort against Japanese of the two parties.

The lose of Yunnan-Burma Road, May 1942

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After the Japanese attack on Pearl Harbor in Dec 1941, the Sino-Japanese war became one part of the WWⅡ. Therefore, the Chinese army was supported by the Allies, especially, U.S. The Yunnan- Burma Road was the major transportation line for the U.S. to transport military resources from Burma to Mainland China since the ocean transportation was cut by the Japanese. The Japanese recognized the strategic importance of the Yunnan-Burma road and attacked the British army in Burma. The Chinese army was sent to Burma to support the British army. However, they lost the war and the Yunnan-Burma road was occupied by Japanese.

The lose of Yunnan-Burma Road not only cut the supply to Chinese army, which made the situation of Chinese army more difficult. Moreover, the British army joint with the Chinese army failed the war to Japanese. This war news made the investors become more pessimistic about future destiny of the nation. Therefore, it is not surprise for us to observe an increase in the yield.

Events which could have possibly caused blips

After the outbreak of the second Sino-Japanese war, the fluctuations of the bond yield could have been affected by many war and political events. However, as we mentioned before, since the trade might be thin, the results from the endogenous structural break test could not be as reliable as for the bonds before the war. Moreover, during the war period, there were numerous war news and other political events, which all could have affected the bond market. Therefore, we could not make sure which event could possibly caused blips.

We proposed two events which could be possibly caused some blips in the bond yield. Chiang Kai-Shek made an announcement to the nation about his determinacy to win the war after the lose of Wuhan and Guangzhou in November 1938. This announcement was regarded as a turning point in the Nationalist party's policy toward Japanese. So the possible decline in the yield could be due to the encouragement of

the national leaders' determinacy to win the war.

The other important event is the attack on the Pearl Harbor in December 1941. This event indicated China would not be the only nation who fought again Japanese alone. China would be one part of the WWⅡ and get help from the Allies. If the investors were forward looking, the attack on the Pearl Harbor would indicate that the possibility for the Japanese to win the war became weak. The yield should decrease. Nonetheless, the Figure 2 shows the opposite that there was an increase in the bond yield. The market was either not forward looking or short sighted as the investors were shocked by the Japanese ambition and power over U.S. Therefore, there is an increase in the bond yield.

7. Discussions

Our empirical results suggest that the dramatic shifts in bond prices match with the important war, political and economic events. Moreover, some events are regarded as important events, but did not stir the financial markets. However, the bond yield could be affected by other macro economic variables like interest rate and inflation rate. Bond yield positively correlated with inflation rate and interest rate. When interest rate increases, demand of bonds decreases because investors reallocate their funds to assets with higher return, therefore the bond price goes down and the yield goes up. Investors also demand fewer bonds when inflation is high because the real return of bond becomes lower. Therefore, the price goes down and the yield goes up.

The Figure 4 shows the inflation Rate in China during our study period. We also got the information on the interest rate in U.K. as a comparison. We are surprisingly to know that compared to the U.K. inflation rate, the Chinese inflation rate was not so bad. During the beginning years, the U.K. inflation rate exceeded the Chinese one. During the years from 1920 to 1934, U.K. experienced deflation. In China, there were two periods of deflation, namely 1925-26 and 1932-34. The poor economic prospect

in 1925-26 was due to the civil wars among warlords before the Nationalists united China in 1927. The Gold Standard collapsed in 1931 which made Chinese currency appreciating relative to other currencies; in turn the weak export induced the recession during 1932-35. These inflation rate fluctuations were no more than 10%. Therefore, we do not believe that the small fluctuations in the inflation could cause dramatic structural breaks in the Bond price.

Figure 4: Inflation Rate in China and U.K.
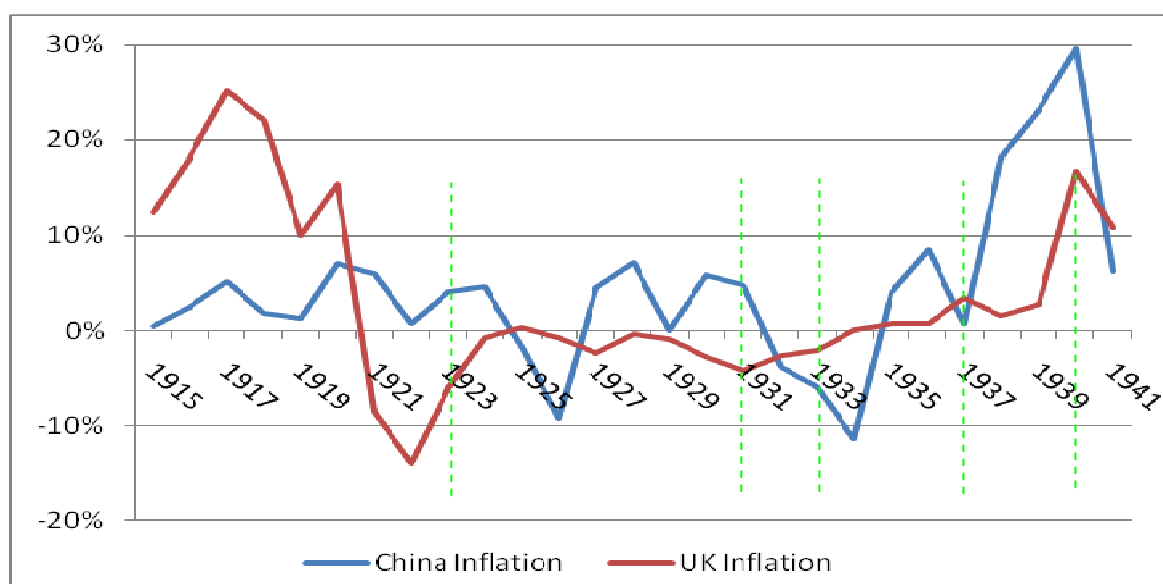
Note: China: Wholesale Price Index in Wang (2008); The U.K: Consumer Price Index in O'Donoghue et. al. (2004).

Second, as we mentioned before that the correlation between the yield and the inflation should be positive theoretically. Since we do not have the monthly inflation rate, we are not able to test the relationship between the bond yield and the inflation rate empirically. However, just from looking at the Figure 4, if the inflation caused the break but not the important historical event in 1931, there should be a decrease in bond yield due to a decrease in the inflation rate. Another example is the negative shift in September or October 1940, when there was huge increase in inflation from less than 5% to around 15% from 1939 to 1940.

Turning to the interest rate in Figure 5, we can see that the interest rate in China

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was usually higher than that in U.K. The Chinese interest rate was around 5%. Compared to the bond yield which had yield around 10% to 20% plus a discount at issue, we should know why there was an active bond market if there was a peaceful period. The small magnitude of the changes in the interest rate was less likely to cause the dramatic changes in the bond yield. Moreover, there were always fluctuations in the interest rate. If the fluctuations in the interest rate could have caused the structural breaks in bond, there should be more breaks in the bond yield.

Figure 5: Interest Rates in China and U.K.

Note: Shanghai interbank interest rate for daily loan, Source: Shanghai Qianzhuang Shi Liao (1961); The U.K: Bank rate set by the Bank of England, Source: Bankers' Almanac (1980).

8. Conclusion

This paper examines the impacts of military, political and economic events on the Chinese bonds during 1921-42. Our results suggest that the international conflicts have stronger long term impacts than the domestic conflicts on the investors, but the short term effects of those two types of conflicts are similar. Finally, the turning points estimated from the bond prices are close to those identified by historian, except the

Battle of Yunnan-Burma Road. Domestic investors thought it was as important as the Marco Polo Bridge Incident, but historians do not completely agree on its significance.

References

Andrews, Donald W K, 1993. "Tests for Parameter Instability and Structural Change with Unknown Change Point," Econometrica, 61:4, 821-56.

Bai, Jushan and Pierre Perron, 1998. "Estimating and Testing Linear Models with Multiple Structural Changes," Econometrica, 66:1, 47-78.

Bai, Jushan and Pierre Perron, 2003. "Computation and analysis of multiple structural change models," Journal of Applied Econometrics, 18:1, 1-22.

Brown, W.O., Burdekin, R.C.K., 2000. Turning points in the U S. Civil War: A British perspective. Journal of Economic History 60 (1),655–669.

Denby, Charles (1916) "The National Debt of China-Its Origin and Its Security" Annals of the American Academy of Political and Social Science: America's Changing Investment Market", 68, 55-70

Frey, B.S., Kucher, M., 2000. History as reflected in capital markets. The case of World War II. Journal of Economic History 60 (3), 468–496.

Fukao, Kyoji, Debin Ma and Tangjun Yuan, 2007. Real GDP in Pre-War East Asia: A 1934–36 Benchmark Purchasing Power Parity Comparison with the U.S. Review of Income and Wealth, 53:3, 503-37

Goetzmann, William, Andrey Ukhov and Ning Zhu (2007) China and the world financial markets 1870–1939: Modern lessons from historical globalization. Economic History Review, 60:2, 267–312

Jones, Matthew and Maurice Obstfeld, 2000, "Saving, Investment, and Gold: A Reassessment of Historical Current Account Data", in Calvo, Guillermo A., Rudiger Dornbusch, and Maurice Obstfeld, eds., Money, Capital Mobility, and Trade: Essays in Honor of Robert A. Mundell, Cambridge: MIT Press.

Kuhlmann, Wilhelm. 1983. *China's Foreign Debt 1865-1982*. Freiberg Druck, Hannover, West Germany.

League of Nations, 1933-34, Chapter: Currency Statistics, Prices and Public Finance, Economic and Financial Section in *Statistical Yearbook of the League of Nations*, Geneva. Downloaded at:
http://www.library.northwestern.edu/govinfo/collections/league/stat.html

Maddison, Angus, 2008. Statistics on World Population, GDP and Per Capita GDP, 1-2006 AD; Version: September 2008. Download at http://www.ggdc.net/Maddison/

Oosterlinck, Kim, 2003. The bond market and the legitimacy of Vichy France. Explorations in Economic History 40 (3), 326–344.

Oosterlinck, Kim, Weidenmier, Marc, 2007, Did Johnny Reb Have a Fighting Chance? A Probabilistic Assessment from European Financial Markets. Mimeo, Claremont McKenna College.

O'Donoghue, Jim, Louise Goulding and Grahame Allen. 2004. Consumer Price Inflation since 1750. *Economic Trends* 604, March 2004:38-46.

Qu, Zhongjun and Pierre Perron, 2007. "Estimating and Testing Structural Changes in Multivariate Regressions," Econometrica, 75:2, 459-502.

Rigobon, R., Sack, B., 2005. The effect of war risk on U S. Financial Markets. Journal of Banking and Finance 29 (7), 1769–1789.

Shen, L. Y., 1941. *China's Currency Reform: A Historical Survey*. Mercury press, Shanghai.

Waldenstrom, Daniel and Bruno Frey (2008) Did nordic countries recognize the gathering storm of World War II? Evidence from the bond markets. Explorations in Economic History 45,107–126

Wang, Yuru (2008). Urban Wholesale Price Change and Economic Growth in Modern China, Working Paper, Nankai University, China.

Weidenmier, Marc (2002). Turning points during the US civil war: views from the Grayback Market. Southern Economic Journal, 68, 875–90.

Willard, Kristen, Timothy Guinnane, Harvey Rosen, 1996. Turning points in the Civil War: views from the greenback market. American Economic Review 86 (4), 1001–1018.

Young, Arthur N., 1971. China's nation building effort - 1927-1937, the financial and economic record, Hoover Institution Press, Stanford University, Stanford, California.

Zussman, Asaf, Noam Zussman and Morten Orregaard-Nielse (2008) Asset Market Perspectives on the Israeli–Palestinian Conflict, Economica, 75, 84–115

References in Chinese

Bai, (2000) "Determinants of changes in prices in the Modern Chinese Bond Market" Nankai Economic Studies, 2, 72-77.

Jin, Pusen 金普森 (2000) "The 1894 Sino-Japanese War and Foreign Debts of China" Southeastern Academy, 1, 107-111.

Jin, Pusen and GuohuaWang 金普森 "Domestic debt of Nanjing Nationalist Government, 1927-1931" (南京国民政府 1927－1931 年之内债), Chinese Social and Economic History Research 4, 96-106.

Pan, Guoqi 潘国旗 (2003) "On the Chinese Government Bonds Regulation Measures in 1936" (国民政府 1936 年公债整理案述评), Journal of Guizhou Normal University (Social Science), 120:1, 72-76.

Pan, Guoqi 潘国旗 (2007) "An Analysis of Domestic Debts and Their Role during the Beiyang Government Period" (北洋政府时期国内公债总额及其作用评析) Modern Chinese History Studies, 1, 76-94.

Li, Guojun (2004) "To Reappraise the Bonds Issued by Nanking Nationalist Government from 1927 to 1937- Mainly Take Reunion Bonds for Example" (对 1927-1937 年南京国民政府发行公债的再认识－以统一公债为核心), Hexi College Xuebao, 20: 3, 82-85.

Qian, Jiaqu (1983) "On the issue of Domestic debt and its economic effects in old

China" (论旧中国的公债发行及其经济影响), Wen Shi Zhe, 6, 45-61.

Qian, Jiaqu (1984) Data of Internal Public Debt of Old China, Beijing, Zhonghua Book Company (千家驹:编，旧中国公债史料 1894-1949，北京：中华书局).

Zhu, Yingui 朱荫贵 (2006) "Chinese Stock Market from 1918 to 1937" Fudan University (Social Science) (复旦学报:社会科学版), 2.

Appendix Table A: Structural Breaks of Beijing Bonds, 1921-34

Bond	Break	Year/Month	Bound	Jump in Min	Jump in Max	Events
6 Percent	1	1924/1	[-3,2]	-4.4 (-35%)	-5.4 (-38%)	Bond Consolidation 1921
	2	1931/8	[-1,4]	7.9 (95%)	9.0 (100%)	Invasion of Manchuria
	3	1933/5	[-1,1]	-6.3 (-39%)	-7.8 (-43%)	Tanggu Truce Cease-fire
7th Year	1	1924/1	[-1,2]	-6.2 (-41%)	-6.6 (-40%)	Bond Consolidation 1921
	2	1927/12	[-1,1]	-1.3 (-14%)	-1.8 (-19%)	Northern Expedition
Financial	1	1924/11	[-1,1]	-2.3 (-26%)	-2.8 (-30%)	Bond Consolidation 1921
	2	1927/2	[-1,1]	1.0 (16%)	1.7 (25%)	Northern Expedition
7 Percent	1	1923/12	[-1,1]	-5.2 (-38%)	-6.6 (-43%)	Bond Consolidation 1921
	2	1926/12	[-1,2]	1.9 (23%)	2.9 (33%)	Northern Expedition
8 Percent	1	1925/6	[-1,6]	-14 (-48%)	-15 (-44%)	Idiosyncratic news
	2	1927/3	[-2,2]	18 (116%)	23 (118%)	Idiosyncratic news
Disband	1	1931/9	[-1,2]	4.5 (40%)	5.2 (40%)	Invasion of Manchuria
	2	1933/5	[-1,1]	-4.5 (-29%)	-6.7 (-37%)	Tanggu Truce Cease-fire

Note: The choice of number of breaks needs to fulfill the following two criteria: 1) the minimum duration of each segment is one and half years and 2) the jumps of all jumps are larger than 10%. Bound is 90% confidence interval of the break date.

Appendix Table B: Macro Polo Bridge Incident, 1937/7

	CB-A		CB-B		CB-C		CB-D		CB-E	
Month/Year	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
7/1937	6.8	7.9	7.0	8.1	7.2	8.4	7.2	8.5	7.3	8.5
2/1938	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%

Appendix Table C: Structural Breaks of Consolidated Bonds, 1938/3-1942/12

Bond	Break	Year/Month	Bound	Jump in Max	Jump in Min	Events
CB-A	1	1940/9	[-1,2]	-2.4 (-24%)	-2.5 (-22%)	Hundred Regiment Offensives
	2	1942/5	[-2,0]	3.8 (49%)	5.9 (68%)	Yunnan Burma Road
CB-B	1	1940/10	[-1,1]	-3.0 (-26%)	-3.4 (-27%)	Hundred Regiment Offensives
	2	1942/4	[-1,2]	3.0 (36%)	5.4 (59%)	Yunnan Burma Road
CB-C	1	1940/10	[-1,1]	-2.9 (-25%)	-3.3 (-26%)	Hundred Regiment Offensives
	2	1942/4	[-1,1]	2.7 (31%)	4.9 (52%)	Yunnan Burma Road
CB-D	1	1940/9	[-1,1]	-2.9 (-24%)	-3.3 (-26%)	Hundred Regiment Offensives
	2	1941/11	[-1,0]	2.0 (22%)	4.2 (43%)	Yunnan Burma Road
CB-E	1	1940/10	[-1,1]	-3.1 (-26%)	-3.3 (-25%)	Hundred Regiment Offensives
	2	1942/3	[-2,1]	2.9 (33%)	5.0 (51%)	Yunnan Burma Road

Note: The choice of number of breaks needs to fulfill the following two criteria: 1) the minimum duration of each segment is half years and 2) the jumps of all jumps are larger than 10%. Bound is 90% confidence interval of the break date.