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How Government Bond Prices Reflect Wartime Events.

The Case of the Stockholm Market

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Abstract

How are political events reflected in financial asset prices? Break points in sovereign debt prices are analyzed for Denmark, Norway, Finland, Sweden, Germany and Belgium during 1930-1948, using unique data from the Stockholm Stock Exchange. Unlike in countries involved in WWII, this market was unregulated.

The outbreak of World War II heavily depressed prices of government bonds. Countries which were occupied (Belgium, Denmark and Norway) or under attack (Finland) saw their debt depreciate substantially. The battle of Stalingrad turns out indeed to be a turning-point of the war.

This approach represents a complementary quantitative method to analyze the impact of political events.

Keywords: Financial Markets, Economic History, WWII, Europe, Cliometrics
JEL: F34, G15, N24, N44

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1. Introduction

This study examines how wartime events influence financial markets. Using the fact that capital market investors try to maximize the return on their portfolio given the information available, fluctuations in the prices of financial assets reflect changes in expectations about their future performance. Specifically, the fluctuations in the prices of government bonds of six countries traded at the Stockholm Stock Exchange during the period of World War II are analyzed. Government bonds of a particular country are expected to trade at higher prices when the expectations regarding debt servicing and repayment improve. This is likely to be the case when the traders at the Stockholm Stock Exchange were more optimistic about the political and military situation of that country during the War. In contrast, political and military defeats of a country during the War lower such expectations and reduce its bond prices. Bond prices should thus be expected to reflect wartime events. The relationship is, however, indirect: it works through how traders *evaluate* the effect of wartime events on the probability of a country's bonds being serviced and repaid. In the extreme case, a country completely destroyed during the War is normally neither expected to service nor to pay back its debts at maturity. If traders do not believe that a country will reemerge, the value of the bond drops to zero. But in many cases even countries defeated and occupied by enemy forces may sometimes be expected to recover, so that the bond values do not drop to zero. Our use of Swedish data is of particular relevance for the study, since the Swedish securities markets, unlike most other European markets, were allowed to function freely during the entire war. We would therefore expect that foreign government bonds might have been more accurately priced in Stockholm than on their own excessively regulated stock exchanges.[1]

Looking at wartime events through their reflections on financial markets is not intended to substitute for the time-honored historical methods. These are based on a careful selection and interpretation of facts in the light of general knowledge of the period and the particular circumstances prevalent (see, e.g., Carr, 1961 and Marwick, 1970). The economic approach pursued here may serve to complement these methods. It may help to overcome a possible bias connected with collecting, selecting and interpreting historical facts. The approach used by historians tends to be *ex post facto*, i.e., after the *consequent* developments are known. This knowledge may bias the evaluation of events, and may lead to "facts" being overlooked or overemphasized, as the case may be.

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[1] Oosterlinck (2001) shows that this was certainly the case for Belgium.

In recent years, there has been a growing literature on analyzing political and institutional change using historical financial market data. Treating financial markets primarily as markets for the dissemination and distribution of information, it is possible to derive measures of the impacts of political, economic and institutional changes on the prices of financial assets. A path-breaking analysis is that of Willard *et al.* (1996), who analyze how events during the U.S. civil war affected the market for "greenbacks", a special currency issued by the Union. Frey and Kucher (2000, 2001) analyze the prices of domestic and foreign government bonds traded on the Zurich stock exchange during the 1930s and 1940s and show that many important events before and during World War II, such as the annexation of Austria by the Germans, the outbreak of the War, the German defeat at Stalingrad and the Yalta conference, strongly affected bond prices. Oosterlinck (2001) looks at the government bond market in France during World War II. He finds that the spread between bonds issued before the War, and those issued by the collaborationist government, reflect market expectations regarding the War outcome: traders expected that if the War was won by the Allies, the new French government would neither service nor pay back the latter bonds. Mauro *et al.* (2001) show that political events had significant effects on emerging market sovereign debt yields during the late 19th century. For example, the Boxer Rebellion in China or the Russian-Japanese War in 1904 seriously depressed the value of these countries' government bonds.

We want to analyze how political events affecting a country can be traced in the secondary market prices of that country's outstanding sovereign debt, following the approach of Frey and Kucher (2000, 2001). We present a new hand-collected set of price data over bonds traded on the Stockholm Stock Exchange during 1930–1948, issued by the governments of Sweden, Norway, Denmark, Finland, Germany and Belgium. The time period is chosen because it contains a large amount of significant political shocks, ranging from sharp institutional regime switches, such as the gold standard crisis of 1931 to outright war. The countries analyzed were moreover differently affected by World War II: some were directly engaged in warfare (Germany and Finland), some were occupied nations (Belgium, Denmark and Norway) and one was a neutral state (Sweden). This diversity across nations yields variance to our sample and potentially expands the set of findings.

The study starts by sketching out the basic ideas underlying the analysis of bond market prices and their interpretation. We then describe the institutional features of the Swedish bond market during this period and provide more details about the data used. In section 4 we set up the econometric model used to identify structural breaks in the bond price indexes. Section 5 pre-

sents all breaks that were identified for each country and a discussion as to how they can be interpreted in the light of historical evidence. Section 6 concludes.

2. Politics reflected on financial markets

Fixed-interest securities, e.g., bonds, are financial assets associated with well-defined future streams of debt repayments and hence low levels of uncertainty for the investors holding them. By construction, bonds are priced on financial markets according to the size of the coupon (the interest rate), the time to maturity and the perceived repayment ability of the bond issuer. Bonds issued by national governments are rather exceptional for several reasons. They are special because their debt service obligations are unenforceable by the creditors, which practically means that the bondholders cannot take the defaulting nation to a court of law when it postpones or cancels repayments. They are also normally related with low or even zero default risk, which thereby means that sovereign default is rather a matter of lacking *willingness* to repay debt than a matter of lacking *ability* to pay (Eaton and Gersowitz, 1981). In extreme situations though, countries face heavy problems with their ability to repay. This occurs when they run the risk of ceasing to exist or of having their constitutional fundaments overthrown, scenarios that directly increase the default risk and immediately reduce prices of government bonds. These political scenarios causing governments to default on their debt have occurred throughout history: for example, after the revolutions in Mexico and Russia in the 1910s, after the collapse of the Ottoman Empire in 1923 or after the political crisis in Mexico in 1982 (Lindert and Morton, 1989). Other examples of radically increased risk of sovereign debt default exist from World War II, when Germany annexed Austria and Poland, whereas it occupied Denmark and Norway, causing substantial cuts in the value of their outstanding debt (see our analysis in section 5).

Although financial markets are the arena where politics is reflected, it is still the investors and traders, active on these markets, that make it all happen. The actual transmission of political events into asset prices rests on the information dissemination by actors. According to the traditional theories about informational efficiency of capital markets (Fama, 1970), the price of a financial security should at any given point in time reflect all information available to the market actors. Any sudden price change should hence reflect new, previously unknown, information that has been supplied to the actors, which has shifted their expectations regarding the asset. In this framework, the actors never find it profitable to deviate from their own ex-

pectations, which means that the prices correspond to their actual beliefs about the future. More recent theory rather emphasizes that financial markets also demonstrate major inefficiencies, such as herding behavior among investors, noise trading or that market actors simply overreact to new information (e.g., De Bondt and Thaler, 1985; Schleifer, 2000). Mauro *et al.* (2001), however, suggest that some of these elements might have become influential primarily on modern markets rather than historical ones because of the fact that today's large investment funds mimic each other's strategies rather than their own. Although we do not provide any new insights on these issues, we are fairly confident that the World War II markets contain few structural biases in their pricing mechanisms.

3. The Swedish market for sovereign debt

Most Western bond markets experienced profound government interference during World War II. They were partially closed down and severely impeded by extensive restrictions on price movements, listing requirements or on trading infrastructure.[2] Only in neutral states, such as Sweden and Switzerland, did governments not have to worry about whether their own financial markets serviced the debt of enemies or the equity of corporations collaborating with enemy states. What is of primordial importance for our study is that the government essentially did not restrict the market during the war. Investors' reactions to wartime events can only be adequately captured if the price formation process is free from outside intervention. The Swedish neutral position was one of the reasons why the Swedish government let its stock and bond markets function as normally as possible. They never stopped the trading at the Stockholm Stock Exchange or changed the listing requirements or any important market microstructures due to artime events.

The main reasons why Swedish politicians kept a low profile regarding the financial markets during the war was because of their neutrality and the negative experiences from World War I as well as the 1931 and 1932 crises, when far-reaching market restrictions had caused extensive confusion and shirking behavior.[3] Although this laissez-faire picture is the dominant in-

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[2] For example, both the Copenhagen and Oslo Stock Exchanges were temporarily closed due to wartime events. Moreover, they practiced severe price restrictions throughout the war. The Helsinki Stock Exchange stopped its secondary bond market during the entire war. Regarding Belgium, Osterlinck (2000) is not able to identify a clear link between specific wartime events and government bond prices in Nazi occupied Belgium during World War II. As the authors note, the reason may be that the Brussels stock exchange was controlled during the war.

[3] During World War I, a parallel stock market, managed by the commercial banks, evolved when the organized market was closed (Algott, 1963, p. 181).

stitutional feature at the time, there were a few examples of political presence on the market. One was a short-lived regime of securities price restrictions, intended to prevent excessive market volatility from causing economic instabilities, but without having any great effect.[4] Another policy interference was that Sweden in 1940, for reasons of neutrality, restricted Swedes in their right to purchase securities from foreigners. Since these trades had already vanished of their own accord at the outbreak of the war (see Figure 1), this restriction hardly had any effect on actual market behavior. The introduction of new government bond issues was potentially more influential. By their mere size, they could affect the market rate of interest. The Swedish government was doubtlessly aware of this fact but, aside from exceptional cases (the spring of 1940 treated in section 5.2), it was bound by the market mechanism in pricing its debt.

The bond loans analyzed in this study are only government bonds, issued mainly in the 1920s and 30s. Sweden became an arena for international bond issues because Sweden had escaped being drawn into World War I. As a result, many of its export industries remained intact and made large profits on their sales to the continent. As shown in Figure 1, the Swedish institutions and households were net purchasers of foreign securities during most of the years preceding World War II, mainly directing their interest towards Germany, and only later towards the other Scandinavian countries. The international recession of the early 1930s brought an end to this development. When U.S. president Hoover in June 1931 proposed a one-year moratorium on all intergovernmental repayments of war debts and repayments, international investors panicked and triggered the gold standard crisis in 1931–33. Swedish net purchases of foreign debt instruments turned negative and they never again reached the volumes of the late 1920s. This event became the largest international default wave of sovereign debt in history, when essentially all of Latin America, Eastern Europe, Turkey and China defaulted (Lindert and Morton, 1989). The outbreak of World War II gave rise to a similar uncertainty shock, when Swedes sold off German bonds on a large scale. This is also evident in Figure 1.

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[4] Between September 1, 1939 and January 2, 1940, the Stockholm Stock Exchange price control disallowed bond prices to fluctuate beyond ±10% on one day. Since this study uses monthly data, this short distorted period should not seriously affect our results. According to Ohlin (1941, p. 140) moreover, prices primarily became truly inefficient in December 1939, when the Soviet Union invaded Finland and the trade in Finnish government bonds was temporarily discontinued.

Figure 1: Swedish net cross-border flows of securities, 1928–1948 (SEK millions)
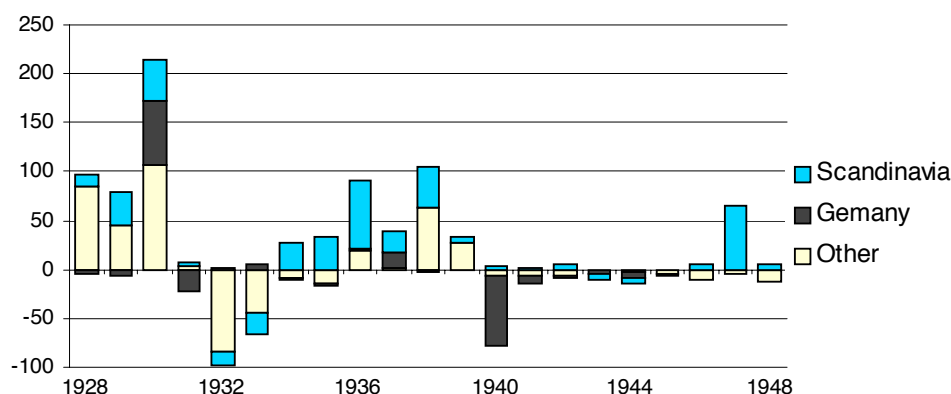
Note: Before 1939, there is no data separating foreign bonds and stocks. During the war, however, bonds (both government and corporate) completely dominated these flows. Denmark, Finland and Norway represent "Scandinavia" in the diagram.
Source: Swedish Bankers' Association, *Ekonomiska meddelanden*, various years.

Unfortunately, data on trading volumes in government bonds on the Stockholm Stock Exchange is incomplete. What we do know is that total bond turnover increased its share of total securities trading from about 25% in the 1930s to about 50% in the 1940s.[5] We have, however, manually collected a sample of turnover figures to get a reasonable estimate of total turnover that constituted trade in government bonds, both domestic and foreign. By calculating exact volumes during March, June, September and December of every second year, we have found that the foreign government bonds represented about 20% of the trading in government bonds during the 1930s, whereas it constituted only about 2% during the 1940s. Hence, the war induced investors to either sell their bonds to actors outside Sweden (as would be suggested by Figure 1) or merely not want to sell off their holdings at a substantially lower price.

Since our analysis focuses on how contemporary *actors* made conjectures about actual and expected events, it is of great interest to identify who these actors were. For obvious reasons, we neither know the identity of traders nor of investors. However, we know that in 1939, 50% of the outstanding Swedish government bonds were held by public institutions (e.g., the Riksbank and municipalities), 34% by financial institutions (banks, insurance companies, thrifts) and about 5% by individuals.[6] When these investors wanted to adjust their portfolios, they most likely turned to the stock exchange, and there is plenty of evidence suggesting that commercial banks and insurance companies were active speculators on the bond market dur-

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[5] Algott (1963, pp. 246f).
[6] Nygren (1979, p. 206).

ing the war years.[7] Foreign investors were probably also active on the Stockholm Stock Exchange, but from 1940 blocked accounts were introduced, where foreigners had to deposit their funds for some time. In 1944, all currency inflows were stopped in order to prevent war criminals from hiding away their (potentially stolen) assets.[8]

All government bonds analyzed in this study were issued and traded in Swedish kronors, which means that bondholders were protected from debased payments. Hence any inflation or exchange-rate shocks affect all bond yields in the same way, so that no corrections are required.[9] The bond data used are end of month quotes from the Stockholm Stock Exchange collected in the official stock exchange price lists (*Stockholms Fondbörs kurslista*) and the weekly business chronicle *Affärsvärlden*. The country indexes are calculated from loan size-weighted yields and the over market index is a loan-size weighted index of all countries.[10]

4. Econometric methodology

To detect the relation between politics and financial markets, we use a moving-windows technique to search for structural breaks in the bond price series. This is not an event study where a list of existing interesting dates are proposed and tested. Instead, we want the data to speak for itself and not reflect our prior knowledge of historical events. The basic idea of the method is to estimate linear regressions within small time windows and then statistically check for differences in the means of the bond prices between them. To find all turning points in the series, we employ a four-step procedure, which is based on Banerjee *et al*. (1992) and has been employed in several studies (e.g., Willard *et al*., 1996; Frey and Kucher, 2000, 2001). The appropriate length of the time window is subject to a trade-off between windows long enough to avoid irrelevant short-term price variations and short enough to capture persistent structural breaks. Following Frey and Kucher (2001), we choose a 36-month (3-year) window.

In step 1, we place the 36-month window so that it starts from the first observation (January 1930, except for Germany and Norway) and then we estimate equation (1) based on it:

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[7] Nygren (1979, p. 50, 87).

[8] Algott (1963, p. 186).

[9] There is one exception, though: the Finnish 1928 loan of 1 million U.S. dollars, traded on the exchange until November 1934. Hence it is only included during the first four years of the study.

[10] In the market index, Sweden represented between 50 and 80 percent. For a more detailed description of the country indexes and the bond data used, see Waldenström (2002).

$$\ln P_t = \beta_0 + \sum_{i=1}^{k} \beta_i \ln P_{t-i} + \beta_{k+1} \ln \overline{P}_{t-1} + \varepsilon_t. \tag{1}$$

P_t is a country's bond price index at period t, $\overline{P}_t$ is the weighted bond market index and ε_t is a white noise error term.[11] The lag length k used in this study is 1, which has been decided on according to the backward selection approach suggested by Perron (1989).[12] We make a Wald test for a structural break (change in the constant) in the middle of the window and record the F-statistic.

In step 2, we move the window one month forward (now starting on February 1930) and re-peat the estimation of (1) and the break test. This is repeated until each country's entire price index has been covered by time windows and the tests pursued in the first two steps.

In step 3, we take the sequence of F-statistics achieved and, for each country separately, plot it on a time line in order to see which dates have the highest F-statistics. As an example, Figure 2 depicts the F-statistics from all the Wald tests for Sweden. The peaks in these F-diagrams are selected as potential candidates for windows within which a structural break has taken place.

Figure 2: *F*-tests for structural breaks in the Swedish government bond price index.
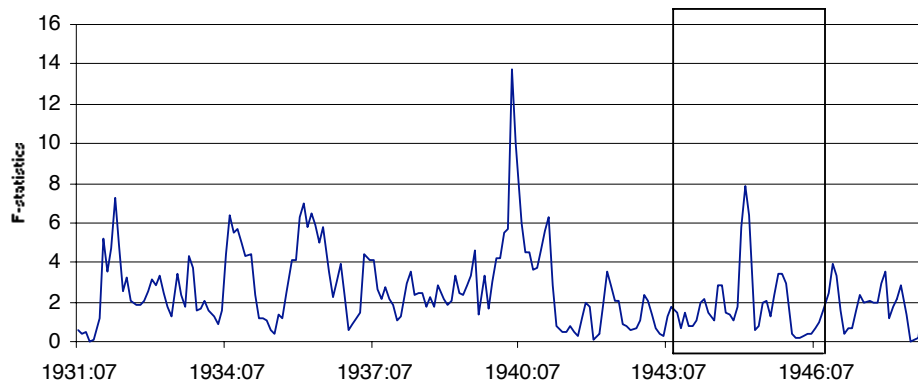
[11] Equation (1) contains no deterministic time trend because of the short time periods of the windows we have used.

[12] Perron (1989) decided k such that the t-statistic for β_k was above 1.6 (in absolute number) and the t-statistics for $\beta_j, j > k$ below 1.6. The same procedure was used by Willard *et al.* (1996).

Finally, in step 4, all selected break candidates are tested for statistically significant structural breaks within them. For this, we use a new equation that includes a dummy variable allowing us to get explicit estimates for date and sign of the break. Since all dates within the selected 36-month period might be the break candidate driving the high *F*-statistic, we add six observations before and after the window to allow testing of the first and last dates as well.

$$\ln P_t = \beta_0 + \beta_1 \ln P_{t-1} + \beta_2 \ln \overline{P}_{t-1} + \gamma_s D_{L,st} + u_t, \ s = 7,8,...,42. \tag{2}$$

Although equation (2) is similar to (1), we here also include a level-dummy variable $D_{L,st}$, taking the value 0 for dates up to the shift-date *s* and value 1 thereafter. The parameter of interest, γ_s, measures the change in the conditional mean and hence the timing and sign of the break. It can be interpreted as the *conditional* price change of the bond index given the change in the weighted bond market portfolio. We estimate equation (2) repeatedly, each time moving *s* one month forward. Each time we also test whether γ_s is different from zero with a standard *F*-test. The month corresponding to the highest *F*-statistic is determined to be the shift-date. To exemplify step 4, Figure 3 shows the result of the *F*-tests for the case of Sweden in which the time window between September 1943 and September 1946 was selected.

Figure 3: *F*-test for Swedish bonds in the selected time window between September 1943 and September 1946.
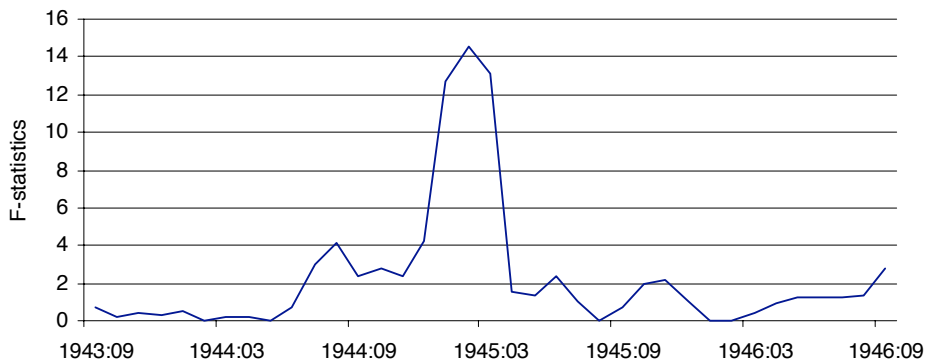
Some issues regarding the econometric approach call for special attention. The level-dummy variable in equation (2) is in principal only suitable when the bond price index is I(0) stationary and does not contain a unit root. If it would, a one-time shock (a "blip") to the price index would not die out and hence cause a structural break. Mauro *et al.* (2001) suggest a switching procedure between level- and point-dummies, determined by the existence of a unit root in a series. We have tested all our series for the existence of unit roots, using the Perron (1989) procedure and adjusting for visible breaks that might erroneously give rise to unit roots. The results are that for all series we can reject the hypothesis of a unit root, which hence lets us use level-dummies in (2).[13]

Naturally, we cannot capture all factors that affect the prices quoted on the capital markets. Unlike many other previous structural break studies, we therefore include a market variable in order to correct for exogenous shocks to the data that would affect all countries similarly. This variable takes care of the potential bias due to omitted variables that occur in these slim model specifications. As a rough measure of the accuracy of the model, the repeated window estimations of (1) on each country produced average R^2 between 0.57 (Belgium) and 0.90 (Sweden).

A potential problem with our algorithm is that it does poorly in capturing gradual changes in bond prices. These might arise if market actors gradually anticipate an upcoming event and capitalize on the prices, which might make it hard both to trace and to correctly date the break. We hope to mitigate some of these problems by our explicit use of historical literature.

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[13] We test the price series as a whole, because testing each time window would be too complicated. Besides the time-inefficiency of such a project, we would each time need to adjust for the eventuality of a structural break somewhere in the window that could otherwise bias our results. The test is the traditional one suggested by Perron (1989) which is to estimate:

$$y_t = a_0 + a_1 y_{t-1} + a_2 t + \sum_1^m D_{L,j} + \sum_i^k \Delta y_{t-i} + u_t \qquad (3)$$

where $\{y_t\}$ is the bond price index, t a time trend, D_L level-dummies determined by various war periods. The unit root null hypothesis is $\hat{a}_1 = 1$ against the alternative $\hat{a}_1 \neq 1$, where we also use Perron's critical values. The resulting *t*-statistics were: Sweden –4.73, Denmark –4.09, Norway –8.64, Finland –4.93, Germany –5.17, Belgium, –5.22 and Market –5.87. Test results are available from the authors upon request.

5. Empirical results

5.1 Common threats, 1930–1948

The overall bond index for all countries represented at the Stockholm Exchange is shown in Figure 4. The overall market for government bonds reveals a positive price trend over the whole period. However, the trend is interrupted by a cut during the gold standard crisis of late 1931 and the deep fall in the price series following the outbreak of war in September 1939.

Figure 4: Market index of all government bonds traded in Sweden, 1930–1948.
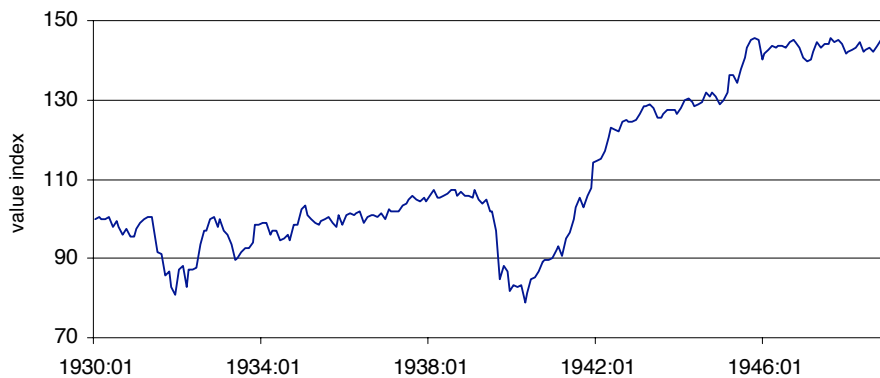
There are four structural breaks in the overall bond market statistically significant at tha 1%–level. The largest price reduction occurred right at, or even slightly before, the outbreak of World War II, in August 1939. Historians normally date the outbreak of the War to September 1, when Germany invaded Poland. Of course, there were earlier signs that a war was imminent, which induced investors in Stockholm to sell government bonds and to keep their assets in other forms, probably cash. This downward shift in demand is reflected by a price fall of 8.5% in government bond prices. The other three structural breaks in the overall market cannot be attributed to any wartime events. This is not surprising, since the six countries included were affected by the wartime events in quite different ways, as we will show in the following sections.

5.2 Sweden, 1930–1948

Figure 5 shows the price index for Swedish government bonds during the period, which reveals an increasing trend over the period as a whole. Measured in yields, this represents a decrease from about 4.4% to about 3.0%.

Figure 5: Index of the Swedish government bonds traded in Sweden, 1930–1948.
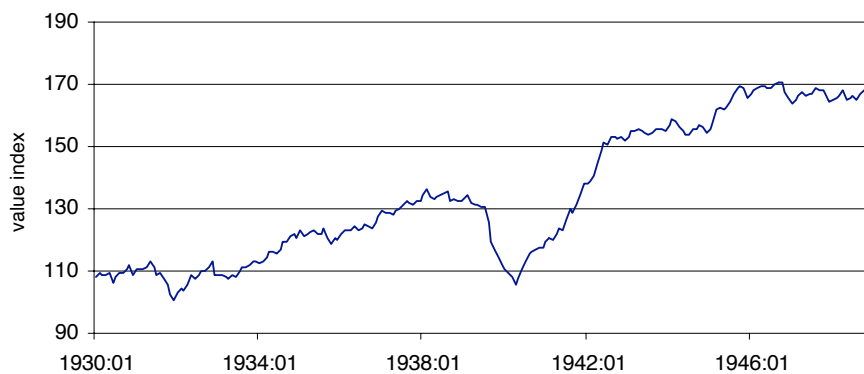

Table 1 reports the statistically significant structural breaks recorded using our method. The first two breaks are mainly related to domestic political events. The first break in June 1933 followed upon the well-known log-rolling (*kohandeln*) agreement between the two largest Swedish political parties regarding how to solve the deep economic crisis at the time. The second recorded break occurred in November 1936, right after a parliamentary resolution about initiating a large-scale Swedish armament program in order to respond to the increasing political turbulence in Europe. This policy hence signaled a firm attitude towards the political actors on the Continent, which was interpreted positively by investors.

A third upward price shift of 2.6% occurred in May 1940. This might at first glance appear puzzling since it coincides in time with the military occupation of Denmark and Norway. However, as a reaction to these events, investors fled the bonds issued by these two countries and invested instead in Swedish government bonds. Moreover, the shift corresponds to a period of intense Swedish mobilization against the new threats, including the issue of a new large government bond loan. The government wanted to drive down the market rates and therefore decided to set a lower interest rate on the new loan than the prevailing market rate. The government convinced several large institutional actors on the financial market to under-

write the loan at par and thereby support their nation in need. The new low yield government bond induced investors to buy the older high coupon bonds, the prices of which accordingly went up until the yield corresponded to the new loan.[14] This conclusion regarding the positive effect of the new loan on general Swedish bond prices was also drawn by the contemporary press.[15]

The fourth significant break was the 1.8% conditional price increase coinciding with the Yalta conference between the 4th and 11th of February 1945. At this conference, the three large nations in the alliance, Great Britain, the U.S. and the Soviet Union, met to sort out the policies regarding postwar Europe. It was also decided that the allied forces would only accept an unconditional surrender by Germany with the goal of establishing beyond doubt Germany's defeat. In Sweden, this conference was highlighted because it represented an important step towards an ending of the war and also possibly resolving many of the trade-related credits Sweden had given to many of the countries at war, including Germany. Another domestic event that attracted considerable attention at the same time was the 0.5% cut in the discount rate made by the Riksbank, which caused bond prices to rise.[16]

Table 1: Structural break points and corresponding historical events: Sweden

Date	Change in index[a]	Major event
1933.06	+1.9%***	Economic crisis resolution (*kohandeln*).
1936.11	+2.1%**	Swedish large scale armament.
1940.05	+3.3%***	Large scale mobilization behind new bond loan.
1945.02	+1.8%***	Yalta conference. Discount rate cut.

[a] Change in conditional price γ from equation (2).
, * represent significance at the 5%- and 1%-levels, respectively.

5.3 Denmark, 1930–1948

The Danish government bond price index is presented in Figure 6 and in Table 2 we report statistically significant structural breaks occurring during this period. The market pessimism was transmitted to all government bonds, including Danish bonds.

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[14] Nygren (1979, pp. 178f).
[15] *Affärsvärlden*, Apr. 25, 1940, p. 374, "The New 4% Loan Causes Bond Prices to Increase"
[16] On the Yalta conference, see *Affärsvärlden*, Febr. 15, 1945, p. 124 and Febr. 22, 1945, p. 137. On the discount rate cut, see Kock (1962, p. 263).

Figure 6: Index of the Danish government bonds traded in Sweden, 1930–1948.
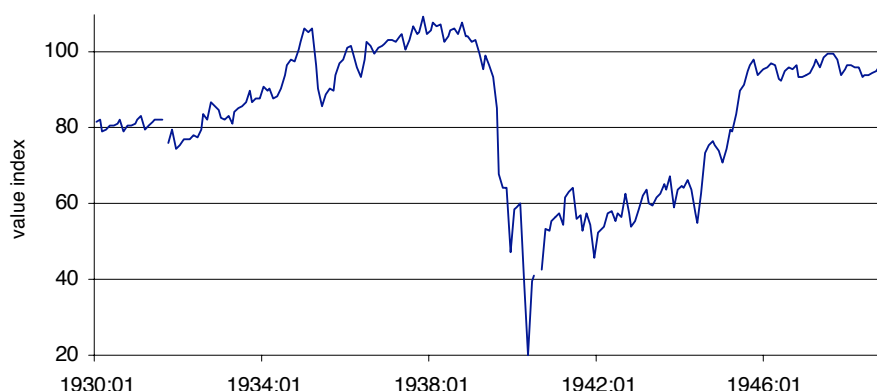
Immediately after the outbreak of the war in September 1939, Danish government bond prices fell precipitously. On April 9 1940, Germany invaded both Denmark and Norway in what was called *Operation Weserübung*. Danish troops surrendered without resistance. Again, we record a large downward shift in the price of Danish bonds, clearly associated with expectations about reduced debt service of Danish bonds. The upturn in the index occurred after events strongly correlated to Allied advancements, the start of Operation Overlord (the invasion in Normandy) and the Yalta conference.

Table 2: Structural break points and corresponding historical events: Denmark

| Date	Change in index[a]	Major event
1939.09	–32.4%***	Outbreak of World War II.
1940.07	–28.0%***	Germany occupies Denmark and Norway.
1944.07	+8.9%***	Allied invasion in Normandy
1945.02	+7.0%**	Yalta conference

[a] Change in conditional price γ from equation (2).
, * represent significance at the 5%- and 1%-levels, respectively.

5.4 Norway, 1936–1948

Figure 7 shows the bond price index of Norwegian government bonds. Their value clearly slumped throughout the war. After the war, prices returned to the level they had been before September 1939. The discontinuity of the index illustrates the temporarily thin market in Norwegian government debt.

Figure 7: Index of the Norwegian government bonds traded in Sweden, 1936–1948.
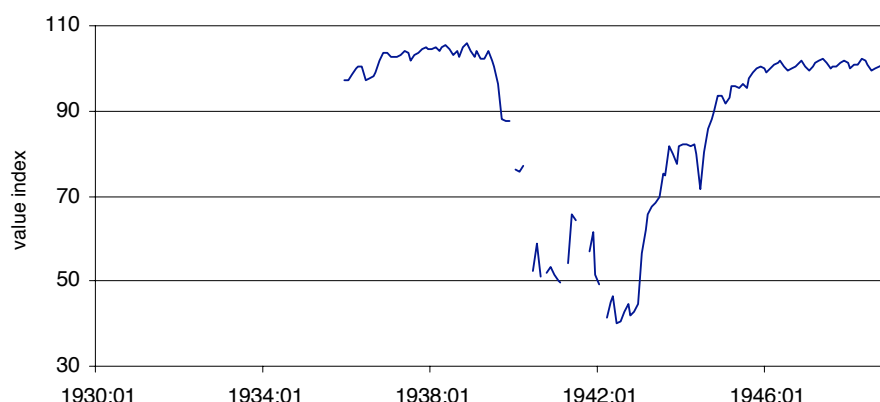
The first significant break in the Norwegian series, displayed in Table 3, occurred with the outbreak of World War II, when Germany invaded Poland. Similar to Denmark, investors' beliefs regarding the repayment ability of the Norwegian government was low during the entire war. However, the magnitude is smaller than in Denmark, which might possibly reflect a divergence of perceived war risk in the two countries. When Germany eventually occupied Norway in 1940, it met with somewhat harder resistance in Norway than in Denmark. Despite initial support by some British troops positioned in the area, the Germans obtained control in early June and installed a new government loyal to them. The negative price shift is not recorded on the Stockholm Exchange until August 1940, which again primarily reflects the poor liquidity in Norwegian bonds right after the occupation.

The German defeat in early 1943 at Stalingrad had a strong positive effect on the valuation of Norwegian debt. Another positive thrust in Norwegian bond prices occurred in July 1944, directly reflecting the Allied invasion in Normandy. These two breaks are of particular interest because they support the idea that the repayment ability of an occupied nation is positively correlated with the military setbacks of the enemy.

Table 3: Structural break points and corresponding historical events: Norway

| Date	Change in index[a]	Major event
1939.09	–9.0%**	Outbreak of World War II.
1940.08	–13.4%**	Germany invades Norway
1943.01	+19.5%***	German defeat at Stalingrad
1944.07	+4.0%**	Allied invasion in Normandy

[a] Change in conditional price γ from equation (2).
, * represent significance at the 5%- and 1%-levels, respectively.

5.5 Finland, 1930–1947

In Figure 8, the Finnish government bond price index is shown. This index shows little, if any, resemblance to the bond prices of the other Nordic countries. There are many reasons for this, but the most important one is that Finland faced a different enemy, namely the Soviet Union. This conflict turned out to be devastating for Finland both during and after the war. The war ended in bitter defeat and the postwar period was associated with large war debts and persistent territorial conflicts with the Soviet Union.

Figure 8: Index of the Finnish government bonds traded in Sweden, 1930–1947.
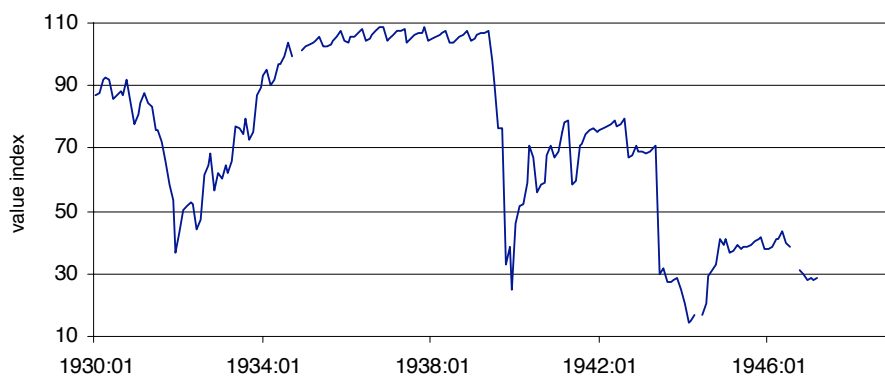
As is evident in Figure 8, the gold standard turbulence in the early 1930s was transmitted to the value of Finnish dollar denominated bonds traded in Stockholm. The volatile prices (i.e., varying default risk) reflect both the country risk and currency risk. The break recorded on July 1933 can be attributed to new positive statistics on the growing Finnish economy and specifically a large surplus in the balance of trade, which was highly appreciated by the investors in Sweden.[17]

On November 30, 1939, the Soviet Union unexpectedly attacked Finland and thereby started what has been called the *Winter War*. According to Table 4, this event caused a break of –19%. Already in March 1940, however, there was a cease-fire in this conflict. When Germany launched *Operation Barbarossa*, i.e., the attack on the Soviet Union, Finland allowed German troops to use Finnish territory and thereby became involved in a second war with the Russians. Bond prices did not shift downwards after this event (except for a short-term cut and

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[17] *Affärsvärlden*, Sept. 21, 1933, p. 306.

quick reversal), which indicates that investors, and most likely most of the public, had discounted such increased war risk in the Finnish bonds. The next structural break was recorded on August 1943, right after the Finnish government unexpectedly launched a moratorium of its debt, implying postponed coupon payments to bondholders.[18]

A first positive break occurred in September 1944 when Finland ended the war with the Soviet Union in an interim peace, causing a 15% increase in Finnish bond prices. At first sight, it might seem puzzling that the end of the war was not reflected in the bond prices. However, this has a natural explanation in that the final Finnish-Soviet peace agreement was not signed until February 1948. The postwar period was rather associated with uncertainty about the Finnish war debts to the victorious countries. In October 1946, the Soviet Union also tightened its claims on the Finnish debts, to which investors responded negatively.

Table 4: Structural break points and corresponding historical events: Finland

Date	Change in index[a]	Major event
1933.07	+11.1%	Economic boom and large trade surplus.
1939.12	–18.8%**	Soviet Union invades Finland. Outbreak of the Winter War.
1943.08	–39.8%***	General moratorium postponing debt repayment.
1944.09	+15.2%***	Interim peace with Soviet Union. Finland switches sides in the war.
1946.10	–8.4%***	Worsened terms of war indemnity to Soviet Union.

[a] Change in conditional price γ from equation (2).
, * represent significance at the 5%- and 1%-levels, respectively.

5.6 Germany, 1930–1947

Figure 9 shows the price index for German government bonds traded on the Stockholm Stock Exchange. The bond prices on German bond loans (compared to the overall market) was constantly below par value and even fell throughout the period, representing an increased uncertainty about Germany's capacity to win the War and to service and repay its loans. In the 1930s, the status of the German war debt from World War I was perhaps the most highlighted issue in international finance all over the world, including Sweden. A journalist in *Affärs-*

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[18] *Affärsvärlden*, Nov. 4, 1943, p. 832.

världen even described the Young loan as "the barometer of the political state of the market in Europe".[19]

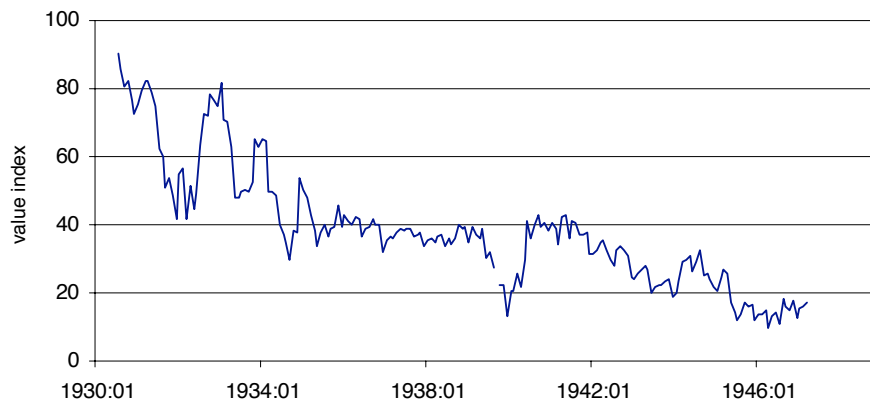**Figure 9: Index of the German government bonds traded in Sweden, 1930–1947.**

Table 5 reports the statistically significant structural breaks of German bonds. The first major structural break was the market reaction to a threat from the president of the German Reichsbank, Hjalmar Schacht, in March 1934, to unilaterally write off the value of the German sovereign debt. This moratorium was also put in place in July that year, but the investors interpreted the threat as serious enough and immediately capitalized on it in their bond holdings.

The invasion of Poland and the outbreak of the Second World War was received pessimistically by the investors trading in Stockholm. German government bonds fell by more than 17% compared to the overall market, suggesting that the traders were skeptical about Germany's fate in the war and its capacity to service and repay its debt.

The *Blitzkrieg* successes during April–June 1940 significantly appreciated German bonds by 22%. After that, there are no long-term changes in the German prices until the Soviet offensive at Stalingrad, which turned out to be the turn of the war. Finally, when Germany surrendered in May 1945, investors considerably lowered their expectations of the probability that Germany would repay its debt. The magnitude of the break suggests that the traders in Stockholm did not foresee an unconditional German surrender and hence did not capitalize on that event in the bond prices before. This may sound surprising but a possible explanation is that the investors in Sweden were not convinced that the allies would really stick to an uncondi-

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[19] *Affärsvärlden*, Oct. 6, 1932, p. 382.

tional surrender. Some may have speculated that the war would continue, with Germany now fighting with the Americans, British and French against the Soviet Union.

Table 5: Structural break points and corresponding historical events: Germany

| Date	Change in index[a]	Major event
1934.03	–24.9%***	Reichsbank declares imminent sovereign debt moratorium.
1939.09	–17.4%***	Outbreak of World War II.
1940.06	+22.0%**	Successful military occupations of Denmark, Norway, Belgium, the Netherlands and France.
1942.12	–11.2%***	German defeat at Stalingrad.
1945.05	–53.3%***	Germany surrenders unconditionally.

[a] Change in conditional price γ from equation (2).
, * represent significance at the 5%- and 1%-levels, respectively.

5.7 Belgium, 1930–1947

Figure 10 shows the price index of the Belgian government bonds traded in Stockholm. According to the results in Table 6, the index dropped sharply at the outbreak of the War but bounced back again when German troops started to face heavy resistance from late 1942 onwards.

Figure 10: Index of the Belgian government bonds traded in Sweden, 1930–1947.
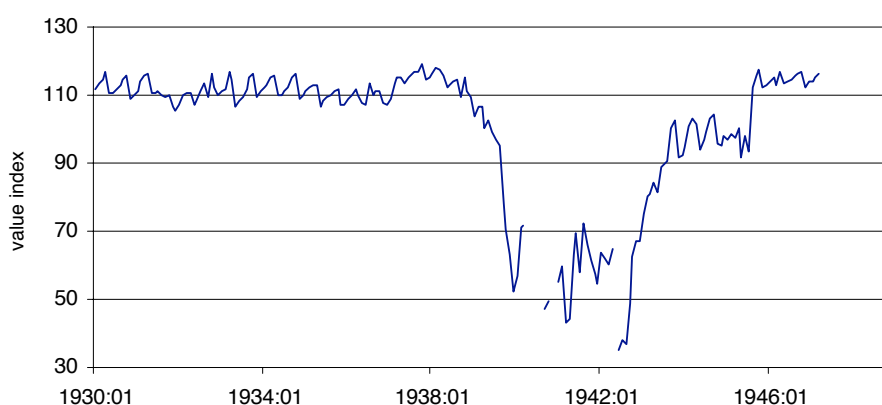
The outbreak of World War II depressed prices on Belgian bonds by a fourth and the German occupation of Belgium in May 1940 by almost another third. These radical events seem to have made investors highly uncertain about whether the debtor's repayment ability would

ever be restored. The two subsequent breaks are associated with hikes in the price level of Belgian bonds. When the Battle of Stalingrad began in October 1942, the price of Belgian government bonds increased significantly. The Potsdam conference (where the three victorious nations decided about the demilitarization of Germany), war indemnity and trials against war criminals also strongly increased the price of bonds issued by Belgium.

Table 6: Structural break points and corresponding historical events: Belgium

Date	Change in index[a]	Major event
1939.09	–26.4%***	Outbreak of World War II.
1940.04-10	–30.0%***	Germany invades Belgium and the Netherlands.
1942.10	+26.7%***	Battle of Stalingrad
1945.08	+16.4%***	Potsdam conference

[a] Change in conditional price γ from equation (2).
*** represent significance at the 1%-level.

6. Conclusions

In this study, we analyze whether geopolitical events affecting a whole nation can be traced in the secondary market price of that nation's outstanding government debt. Understanding this linkage gives useful hints to those preoccupied with analyzing the effects of domestic or international politics, both today and in bygone times. Theory tells us that, since investors have no incentives to systematically deviate from rationally trading on new information, there should not be any lasting pricing anomalies in the bond market, given that it is working unrestrictedly. We therefore exploit financial market data to investigate how political events during World War II affected six industrialized countries: Germany, Belgium, Denmark, Norway, Finland and Sweden. Using new secondary bond market price evidence from the Stockholm Stock Exchange during 1930–1948, we construct bond price indexes for each country and the market as a whole. The Swedish data is particularly advantageous, since it comes from a financial market that was not specifically regulated due to the war. Hence, we expect these prices to be more efficient than those quoted on many other European markets, if they were open for trading at all. Using this data, we conduct a quantitative search for structural breaks in these country indexes, without using any *a priori* notions about where to look.

Our prime finding is that many of the structural breaks found in our search clearly reflect some of the most distinct political events before and during the Second World War. For ex-

ample, the outbreak of the war depressed bond prices beyond the overall market index for all countries but Sweden and Finland. The Finnish price cut occurred when it was unexpectedly attacked by the Soviet Union three months later. The investors also reacted strongly to the German occupation of Denmark, Norway and Belgium during the spring of 1940. In sharp contrast, German bond prices increased during the same time, indicating the positive impact on war successes. Although Sweden was put under increasing political pressure by these events, the market actors in Stockholm did not oversee the investment opportunities they created.

The financial data also strongly suggest that the major turning point of World War II was the Battle of Stalingrad, which is completely in accordance with the consensus view among historians. At that juncture, German bond prices fell significantly, while those of the nations Germany occupied increased. The allied invasion of June 1944 in Normandy had a much weaker effect. We believe that the reason for this was that the invasion was expected among market actors, although the exact time (and place) was unknown.

Our data also confirm the heterogeneity in war experiences across the countries. In Finland's case, this was due to its partnership with Germany throughout most of the war. The peace in 1945 then implied war debts and a continued dependency on the Soviet Union, which was negative for the Finnish economy. Sweden also differed from the others, being the only neutral state in our sample. Swedish bond prices therefore primarily reflected domestic political events, related to fiscal policy making and the general economic status of the country.

Altogether, our analysis suggests that financial market actors successfully identified the relevant political events and even attributed them a magnitude that levels with today's consensus in the historical profession.

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