IFN Working Paper No. 677, 2006

Why Does Sovereign Risk Differ for Domestic and Foreign Investors? Evidence from Scandinavia, 1938–1948

Daniel Waldenström

Research Institute of Industrial Economics
P.O. Box 55665
SE-102 15 Stockholm, Sweden
info@ifn.se
www.ifn.se

Why Does Sovereign Risk Differ for Domestic and Foreign Investors? Evidence from Scandinavia, 1938–1948[*]

Daniel Waldenström[†]

November 20, 2006

Abstract

Recent theoretical models suggest that the costs governments face when defaulting on their domestic and external debt may differ considerably. This paper examines if this proposed cost difference is reflected in sovereign risk spreads across domestic and foreign markets. Specifically, I analyze market yields on Danish government debt in both Denmark and Sweden during 1938–1948, i.e., a period full of political shocks as well as a wartime segmentation of Scandinavian capital markets. By linking the exogenous wartime shocks to changes in the costs of defaulting on domestic and external sovereign debt, it is found that these costs explain a significant part of the variation in the sovereign risk spread across markets. The result is robust to a multitude of tests and the inclusion of additional yield spread influences such as differences in macroeconomic fluctuations, portfolio allocation opportunities, local risk aversion and microstructure institutions.

JEL classification: F34, G15, G18, N20, N24, N44.
Keywords: Sovereign risk, Investor heterogeneity, Domestic debt, External debt, Market segmentation, Political economy, Cliometrics.

[*] I would like to thank Timothy Guinnane, Mariassunta Giannetti, Magnus Henrekson, Naomi Lamoreaux, Andreas Madestam, Kim Oosterlinck, Jean-Laurent Rosenthal, Jonas Vlachos, Eugene White and seminar participants at UCLA, Stockholm Institute for Financial Research, Stockholm School of Economics and Solvay Business School for comments and suggestions. Financial support from Jan Wallander's and Tom Hedelius' Research Foundation is acknowledged.
[†] Research Institute of Industrial Economics, P.O. Box 55665, SE-10215 Stockholm, Ph. +46-8-6654531, Fax +46-8-6654599, danielw@riie.se.

1 Introduction

Domestically issued domestic-currency government debt has become a major source of public finance for many emerging market economies over the last years (Reinhart et al., 2003, Table 14). Despite this development, standard models of sovereign debt only focus on external government debt, issued in foreign currency to a foreign market, when assessing the costs of default, e.g., deteriorated credit reputation on international capital markets (Eaton and Gersovitz, 1982; Kletzer and Wright, 2000), risk of triggering various forms of direct sanctions (Bulow and Rogoff, 1989a,b) and curbed trade flows (Rose, 2005).

In a more recent sovereign debt default literature, however, researchers argue that the costs of domestic defaults are both quantitatively as important as the costs of external debt defaults and different in their nature. Specifically, Drazen (1998) and Di Gioacchino et al. (2005) characterize domestic creditors as belonging to the constituency upon which the government relies for its political support. Unlike external debt holders, domestic debt holders are thereby able to credibly threaten to punish sovereigns in case of a domestic default by refusing re-election. Similarly, Gelpern and Setser (2004) argue that local elites represent another group of large domestic government bondholders and they may be expected to exert all their influence to prevent the government from repudiating its domestic debt, possibly pushing it to instead repudiate its foreign loans.[1] Taken together, these models can be seen as complementing the traditional models cited above, their main message being that if the groups holding domestic and external debt, and their means to punish a defaulting sovereign, differ the expected costs of domestic and external defaults will most likely also differ.

Past empirical studies of sovereign defaults have primarily focused on countries' external government debt, some examining the explanatory power of the standard models (e.g., Obstfeld and Taylor, 2003; Rose, 2005; Mitchener and Weidenmier, 2005) while others have searched for additional institutional or political factors to either explain changes in market-based risk assessment of external debt (e.g., Mauro et al., 2003; Hilscher and Nosbusch, 2004) or the incidence of actual external debt defaults (Kohlscheen, 2003; Bordo

[1] Furthermore, Reinhart et al. (2003) argue that another cost of a domestic default is the possibly resulting turbulence on domestic banking markets, which could hurt government finances (Reinhart et al., 2003). Roubini (2001) emphasizes moral and equity reasons for discriminating between domestic and external defaults.

and Oosterlinck, 2005). In Van Rijckeghem and Weder (2004), however, the default likelihoods of both domestic and external debt are investigated. They find a variation in the degree of influence from a collection of political institutional variables (e.g., democracy vs. dictatorship, parliamentary vs. presidential electoral systems), but primarily that they only bind in conjunction with severe macroeconomic stability (e.g., low levels of inflation). Tomz (2004) studies how individual voter preferences correspond to the expected distributional effects of a domestic debt default, finding that they are well in line with the "political default cost"-channel proposed by the model of Drazen (1998).

This paper examines how changes in the expected costs of defaulting on domestic and external debt influence the spread in sovereign risk between domestic and foreign markets. To my knowledge, this is the first time such an analysis is conducted. The study rests on a unique historical episode, World War II, when a series of exogenous political shocks both shifted the relative cost of domestic and external defaults and abruptly segmented international capital markets. While the exogeneity of the cost shocks is important for the interpretation of the measured effects, capital market segmentation is necessary for being able to contrast the different theories on external and domestic default costs, as it ensures a stable linkage between creditor nationality and debt type with no arbitrage trading or debt buybacks by borrowing governments. The empirical analysis uses newly assembled market yields on Danish government bonds traded on Danish and Swedish markets during 1938–1948 to calculate a Danish "sovereign risk spread" over debt types. This is done by separating out all non-risk related yield influences on the spread, such as market differences in macroeconomic fluctuations, portfolio diversification opportunities, risk aversion and market microstructure regulations. The resulting sovereign risk spread is regressed on the exogenous variable containing the wartime shocks that, arguably, significantly influenced the costs of defaulting on the domestic and external debt that the Danish government expected to bear.[2]

The paper proceeds as follows. Section 2 describes the institutional settings in the Danish and Swedish secondary bond markets, including details on pricing, trading and regulatory changes in the study period. Section 3 presents the basic empirical methodology and Sec-

[2] There were trading halts on the Copenhagen Stock Exchange in September 1939 and April-May 1940, but Danish financial newspapers reported the bond quotes on the curb market which were regarded as representative (see section 2). Moreover, the analysis in section 6 shows that the impact on government yields of these circuit breakers was marginal.

tion 4 discusses the data. In Section 5, the main results along with a robustness analysis are presented. Section 6 concludes.

2 Institutional setting

This section outlines the institutional framework of the Danish and Swedish secondary government bond markets in the late 1930's and 1940's. The main messages are the following. First, these markets basically functioned freely throughout this period, despite the wartime regulations that were particularly experienced by the Copenhagen Stock Exchange. Second, the amount of trading in Danish government bonds in both markets was sufficiently large to assert that there were sufficient levels of market liquidity in these loans. Third, the degree of Danish-Swedish capital market integration varied considerably during the period. During the interwar period, both markets were fully integrated with each other, but the outbreak of World War II and capital controls imposed by both countries shortly thereafter abruptly put a halt to this and instead completely segmented the markets. This implies that during the war, only domestic (Danish) investors were allowed to trade Danish domestic debt in Denmark and only foreign (Swedish) investors were allowed to trade Danish external debt in Sweden.

Table 1 presents details on the size and activity of the Danish and Swedish bond markets as well as some specific regulatory changes concerning the pricing of bonds. The Copenhagen market was considerably larger than that in Stockholm, listing more bond loans and reporting an overall larger traded volume. In particular, a large trading volume is important for there to be enough market liquidity and, in turn, roughly efficient prices (Silber, 1991; Longstaff, 2005). Judging from the statistics of the exchange-based turnover and estimates of the trading in the Swedish over the counter (OTC) market, which is a traditionally important venue for bond trading, the amounts traded were significant in both countries and, in particular, in the individual government bonds analyzed in this study.

Most market microstructure regulations were the same in Copenhagen and Stockholm during most of the period. As shown in Table 1, a major exception was the practice of circuit breakers, mainly in Copenhagen. These included two trading halts, the first between September 1 and 10, 1939 and the second between April 9 and May 22, 1940. More importantly, price limits were imposed on bonds after the outbreak of the war. Between September 1 and 22, 1939, the prices of bonds (and stocks) were prohibited to move two percent-

age points under their prewar (August 30) closing price. Between September 23, 1939 and February 23, 1946, the price limits were relaxed to restrict daily price falls beyond one percentage point.[3] The Stockholm market also practiced price limits during this period, but only at the beginning of the war (September–December 1939) and with much wider bands of the allowed price changes (beyond five, and often more, percentage points). Hence, the Stockholm limits were much less restrictive than those in Copenhagen and from historical sources, they only seem to have been binding on a few occasions.[4]

The degree of capital market integration between Denmark and Sweden varied dramatically in the study period. From being fully integrated during the interwar era, capital controls imposed by the governments in both countries effectively stopped almost all cross-border capital flows between these two and all other Western countries.[5] This development is depicted in Figure 1. That the wartime segmentation of Danish and Swedish capital markets was not overridden by some third-country market is also indicated in Figure 1 by the instantaneous drops in the capital flows to and from both Great Britain and the United States.

The primary market supply of Danish domestic and external government debt may influence secondary market yields. According to standard asset pricing theory, an increased supply increases the government's debt service load on fiscal inflows which, all else equal, increases the sovereign risk. An increased supply also pushes the secondary market prices of government bonds down or, equivalently, the yields on government bonds up. In other words, increasing the relative stock of domestic to external debt hence decreases the sovereign yield spread, if the latter is beforehand perceived as more risky than the former.[6] Historically, the Danish government issued four new domestic and no new foreign loans during 1939–1945.[7] Accordingly, the isolated primary market effects on Danish sovereign

[3] On all these events, see the Danish financial weekly *Finanstidende* Sep. 6, 1939, p. 1020; Sep. 27, 1939, p. 1077 and Feb. 27, 1946, p. 430.
[4] Algott (1963, pp. 182ff) argues that the stock exchange board generally accepted daily price drops well beyond the official limit of five percentage points, especially for foreign-issued bonds. The period when the limits are said to have been the most restrictive is December 1939 and then mainly Finnish government bonds were concerned.
[5] Although the capital controls were not imposed until January 1940 (see Table 1), the drop in recorded cross-border flows to and from Sweden (Figure 1) was observed already in the last quarter of 1939. During that period, the flows were only 1.8 percent (outflows) and 3.8 percent (inflows) of the levels in the fourth quarter of 1938.
[6] The empirical literature contains ample evidence on a positive relation between debt to GDP and sovereign yield spreads (see, e.g., Hilscher and Nosbusch, 2004).
[7] Statistics Denmark (1969), pp. 205–206.

yields should have been positive (i.e., yield-increasing) in the case of domestic debt and unchanged in the case of external debt.

Politically motivated interventions in government bond markets represent another potential source of distortions of observed market returns. The most obvious case would be the government commanding the Danish central bank *Nationalbanken* to purchase government debt, whenever its price was falling more than what is wanted. Taking stock with the available statistical and anecdotal evidence, however, such non-market interference was infrequent and, in any case, not effective in the long run. The Danish bonds held by *Nationalbanken* only increased marginally between June and December 1939, and even decreased during the most critical period, December 1939 and June 1940 (Svendsen, 1968, p. 16). Furthermore, the monetary policy issues addressed by *Nationalbanken* itself in the early war years rather concerned how to prevent interest rates from falling too much in the light of the abundant liquidity levels in the Danish economy.[8] In other words, the Danish central bank worked to raise, not reduce, market interest rates during the war period.

3 Estimation methodology

The estimation approach is based on relating differences in sovereign risk between domestic and foreign markets with changes in the relative cost of defaulting on domestic versus external debt. For this purpose, one needs to separate out all influences on observed sovereign yield spreads, both nominal and real, that are not associated with default risk, e.g., macroeconomic fluctuations (expected depreciation and inflation differential), portfolio allocation (market interest rate and stock market return differentials) and differences in institutional market microstructure constraints.[9] Specifically, the variables of interest are:

Macroeconomic fluctuations: I use a set of parity relationships from international economics to define the influence from expected exchange rate depreciation (on nominal yield spreads) and expected inflation rate differences (on real spreads). The uncovered interest rate parity (UIP) states that nominal yields should be equal across markets, once expected depreciation is controlled for. The real interest rate parity (RIP) states that real yields

[8] In fact, new treasuries and long-term government bond loans were issued and higher cash reserve ratios for the banking system were imposed (Johansen, 1986, pp. 87–90; Hoffmeyer, 1968, pp. 229–231, 240–249).
[9] All *identical* yield determinants across debt types and markets, such as the term premium in this paper, cancel out entirely.

should equalize across markets (at least in the "long run").[10] While the concepts are admittedly stylized, they are widely used in studies of market integration and interest rate differentials as benchmarks for understanding the role of macroeconomic factors on these issues (see, e.g., Jackson and Lothian, 1993; Lothian, 2001; Lothian and Wu, 2005).

Portfolio allocation factors: The cost of holding fixed-income securities depends on the fluctuations in market interest rates (the interest rate risk) and the return on other investments in the market (Cuthbertson, 1996, ch. 9). These influences are accounted for by including market differentials for the market interest rate and stock market return.

Institutional differences: Changes in market microstructure constraints, e.g., price limits and trading halts (Charemza and Majerowska, 2000) and illiquidity (Silber, 1991; Longstaff, 2005), can have sizeable effects on recorded asset returns. Section 2 showed that most bond market institutions (e.g., taxes on cash flows, commission fees and market liquidity) were either the same in Denmark and Sweden or did not change during the study period, implying that they enter as constants in the empirical estimations. As for the circuit breakers in Copenhagen, a separate analysis in Section 5.1 shows that they had no lasting effect on sovereign spreads.

Costs of defaulting on domestic and external government debt: The introduction discussed two literatures on sovereign debt default, one exclusively focusing on the external default costs of deteriorated international credit reputation (e.g., Eaton and Gersovitz, 1982; Kletzer and Wright, 2000), direct sanctions (Bulow and Rogoff, 1989a,b) or curbed trade flows (Rose, 2005), and another that specified domestic default costs, mainly in the form of political punishments by deprived domestic creditors also being voter groups (Drazen, 1998; Di Gioacchino et al., 2005) or local special interests (Gelpern and Setser, 2004). In order to analyze whether these costs really influenced the market-assessed sovereign risk spread between Danish external and domestic debt during World War II, I use the fact that they shifted significantly, to different degrees, following some of the major political wartime shocks hitting Denmark and the Danish government. Specifically, by applying the theoretical sovereign debt models to the political and economic history of Denmark I deduct

[10] The RIP result draws on a combination of UIP and the relative purchasing power parity (PPP), which states that expected depreciation should correspond to the differences in expected inflation.

the shift in the relative cost of defaulting on domestic versus external debt following each of these severe shocks.[11]

Table 2 displays the result of this theory- and history-based classification. During the initial pre-war period, Denmark faced high default costs on all debt types. External default costs were high, since Denmark had a default-free credit history and hence, potentially high reputational costs in terms of more expensive future borrowing. Domestic costs were also high, since bondholding was widespread among the Danish people and, accordingly, the creditors were likely to be a large part of the government's constituency.[12] The first severe political shock came with the outbreak of World War II, when external default costs were reduced for two reasons. First, the reputational costs of a default are likely to be smaller if the default is driven by exogenous fiscal shocks, as during wars, and not purely by the will of sovereigns. Second, historians report that the Danish government disliked the fact that in early 1940, the Swedish government refused to promise to support of Denmark in case of an attack (Lidegaard, 2005, p. 150). The domestic default costs remained high, however, since the economic difficulties caused by the war made the Danish people more inclined to check that the government did not try to inflate away public debt, e.g., by printing extra money.[13]

The German occupation on April 9, 1940 profoundly changed the Danish political situation. Although the Danish government remained in charge of most fiscal and political issues, the Germans taxed the country heavily and took over the residual control of the country. However, historians emphasize that the Germans were keen on keeping the Danish people reasonably satisfied in order to prevent any disruptions in the important Danish-German trade and keep occupation costs low (Johansen, 1986, p. 72). Taken together, this

[11] The periodization largely relies on the historical descriptions of Johansen (1968, ch. 4–6) and Lidegaard (2005). Oosterlinck and Landon-Lane (2006) study how the effect of political shocks during World War I affected Russian government bond price differentials, but they use a different definition of shocks (deriving them from the time-series properties and not theoretical sovereign debt models) and focus on other questions than the ones focusing on costs of domestic and external default.

[12] All Danish loans issued in Sweden in the 1930's were fully subscribed, but not without problems. A Swedish commentator said about the 1936 loan that it was "over-subscribed to a surprisingly large degree considering the risk associated with the Danish economic and political affairs. (...) The underwriters did, however, recognize these risks by setting the effective interest rate significantly higher than would have been the case for an equivalent loan by Finland or Norway" (*Affärsvärlden*, May 14, 1936, p. 500) [*own translation*]. Interestingly, this skepticism was not present when the 1938 loan was overtaken at par (*Affärsvärlden*, Nov 10, 1938, p. 1188).

[13] See, e.g., Johansen (1986, p. 72) and *Finanstidende* Mar. 13, 1940, pp. 484f. See also the analysis by Waldenström and Frey (2006) of pre-war threat assessments in the Nordic countries during 1938–1940, which supports the notion of the war outbreak and the German occupation as large political shocks.

suggests that domestic default costs remained high. The Swedish creditors felt considerably more worried with a notorious defaulter occupying Denmark, and contemporaries seem to have expected at least a partial default triggered by the Germans.[14] The third political shock was when in August 29, 1943, the Germans dissolved the Danish government, proclaimed martial law and took control over most political and fiscal issues (Johansen, 1986, p. 87). If anything, this must have reduced the punishment ability of the Danish people vis-à-vis the German occupants, hence reducing the domestic default costs. However, the external default costs hardly changed after this and remained at their low level. Finally, the peace in May 1945 brought back the Danish debt servicing policy to the pre-war situation, evidenced by a new Danish loan placed in Sweden in 1947 (see the increased Swedish capital export to Denmark that year in Figure 1).

Adding up, the estimation using nominal yield spreads and hence, the UIP framework is:

$$NomSpread_{ED,t} = \beta_0 + \beta_1 ExpDepr_t + \beta_2 NomIntDiff_t + \beta_3 NomMarkDiff_t + \delta_j T_j + e_t, \quad (1)$$

where $NomSpread_{ED,t}$ denotes the spread between secondary market yields on nominal external (E) and domestic (D) debt at time t,[15] $ExpDepr_t$ is the *ex post* forward rate of exchange rate depreciation, $NomIntDiff_t$ is the difference between short-run interest rates on foreign and domestic markets, $NomMarkDiff_t$ is the equivalent difference between the return on stock market portfolios, and T_j are the dummy variables capturing the impact of the changes in relative default risk described above and in Table 2. The equivalent equation using real yield spreads and the RIP framework is

$$RealSpread_{ED,t} = \gamma_0 + \gamma_1 RealIntDiff_t + \gamma_2 RealMarkDiff_t + \delta_j T_j + e_t, \quad (2)$$

where $RealSpread_{ED,t}$, $RealIntDiff_t$ and $RealMarkDiff_t$ are the real variants of the market differentials defined above, with details on the variables described in Section 4. Both Eq. (1) and (2) are estimated with OLS, using Newey and West (1987) standard errors to control for the potential serial correlation in the residuals caused by overlapping observations of the *ex post* forward rates.

[14] *Affärsvärlden* May 4, 1940, p. 396.
[15] The UIP is commonly tested as $s_{t+n} - s_t = \alpha + \delta(SPREAD_{DE}) + \varepsilon_t$ (see, e.g., Lothian and Wu, 2005; Chinn, 2005), with a predicted δ of unity. Since this study defines the spread as $SPREAD_{ED}$ and puts it on the left-hand side, the predicted UIP-coefficient is negative.

4 Data

The main bond data used are yields to maturity calculated from end-of-month bid prices of Danish long-run government bonds issued in Denmark and Sweden and traded at the Copenhagen and Stockholm Stock Exchanges during 1938–1948.[16] Since Eq.'s (1) and (2) are based on cancelling out all non-risk factors explaining the Danish yield spreads across markets, I selected the Danish government bonds from each market with a similar features as possible. These are: from Copenhagen, the 4% 25-year loan of 1934 issued in Danish *kronor*, and from Strockholm, the 4% 20-year loan of 1936 issued in Swedish *kronor*. The coupons for both these loans were paid semiannually and their nominal yields are depicted in Figure 2.[17] As noted by Statistics Denmark (1967, p. 226), the 1934 loan was prematurely redeemed in July 1950 but I have not found any indications or announcements of this in the financial chronicle *Finanstidende* in the years preceding the event and hence, disregard this early call in the yield calculations. Available official documentation and financial press in both countries suggest that all bondholders, both home and abroad, received coupon payments throughout the period.[18]

A complementary dataset for analyzing the impact of the price limits and trading halts practiced in Copenhagen was collected on a daily basis from the newspaper *Berlingske Tidende* for the period July 1, 1939–June 30, 1940, i.e., the period of the most important microstructure shocks. The data cover daily prices and volumes for three different kinds of bonds: one government bond (issued in 1934, see above) and two 4% bonds issued by the local credit associations in Copenhagen and Østifterne.[19]

Data on market interest rates are based on the official central bank discount rates from both countries. Nominal market portfolio returns are monthly stock market capital gains

[16] Prices come from Statistical Yearbook of Denmark (table *Københavns Børskurs (Køber) for Obligationer*) and the Swedish financial chronicle *Affärsvärlden*. During the closure of the Copenhagen exchange in April-May 1940, prices came from the OTC market (*Finanstidende* 22 May 1940, p. 700).

[17] I also checked the results using other yield concepts (current yield, yield to average life) and bonds (Copenhagen: 3.5% consol of 1888; Stockholm: 3.5% 20-year loan of 1938) without finding any notable effect on the results.

[18] For Sweden, the Bond Catalogues of the Swedish Banker's Association as well as *Affärsvärlden* were closely searched for any information about halted or stopped debt service. But as reported by the Danish newspaper *Finanstidende* in the mid-1940, the Danish government indeed sustained its debt service to foreign creditors unlike what could be expected (*Finanstidende* 12 Jun. 1940, p. 761).

[19] These two loans were selected as they were described as the most "popular" among Danish investors and hence, an upper bound on trading volumes. In the bond lists, they were denoted as follows: *Kjøbenhavns Kreditforening* (1933–2007, 9 S.) and *Østifternes Kreditforening* (1934–2009, 14 S.)

with real returns calculated by deflating these returns with monthly inflation (see below). These two variables are shown in Figure 3.

Expected depreciation is calculated as follows. Let s_t be the log exchange rate of Swedish currency units per unit of Danish currency (based on daily buy and sell spot rates from Bank of Sweden's *Annual Reports*) and s^e_{t+n} the expected depreciation over n months at month t. The *ex post* forward rate of expected depreciation is defined as $s_{t+n} = s^e_{t+n} + \varepsilon_t$, where s_{t+n} is the actual log exchange rate at period $t + n$ and ε_t a random error (assuming rational expectations).

Expected inflation rates are based on monthly cost of living indices, *CLI*, for Denmark (Statistics Denmark) and Sweden (Statistics Sweden), with the expected annual inflation rate over the coming n months being $\pi_{t+n} = [(CLI_{t+n} - CLI_t)/CLI_t]^{12/n}$, where the ratio in the exponent annualizes the inflation rate. While most studies set $n = 12$ to get a straightforward measure of annual inflation expectation, the bond yields assume that bond are held until they mature (as in "yield to maturity"), implying a much larger n. To avoid measurement problems, I use both $n = 12$ and $n = [120, 252]$, corresponding to the period 1938–1948 during which n descended from 252 (21 years) to 120 (10 years) (see Figure 4). The *ex post* rate of the expected inflation difference between markets for debt types E and D (based on RIP underlying Eq. (2)) then equals $\pi_{E,t+n} - \pi_{D,t+n} = (\pi^e_{E,t+n} - \pi^e_{D,t+n}) + \varepsilon_t$. Using changes in *CLI* as an inflation proxy may be problematic, since both Denmark and Sweden practiced commodity price controls for most of the wartime period. But replacing the *CLI* with a nominal stock market index, which is arguably better for capturing especially high levels of "true" inflation, does not cause any significant differences in the main findings of the study.

5 Empirical results

Table 3 displays the results from the estimations using nominal (Eq. 1) and real (Eq. 2) sovereign spreads. The main finding is that the spread between Danish external and domestic government yields responded significantly to the default cost shocks displayed in Table 2 and, importantly, in a way consistent with the predictions of the domestic default cost models of Drazen (1998) and others. In particular, the outbreak of World War II significantly increased sovereign risk spreads from pre-war levels by between 250 and 370 basis points (*T(War)*), depending on the specification. This effect is in line with the reduc-

tion of the relative external default cost as explained in Section 4 and Table 2. The second severe political shock was the German invasion of Denmark in April 1940, which was followed by three years of German occupation. As stated in Table 2, the domestic political situation was largely unchanged and domestic default costs hence remained high. By contrast, expected external default costs dropped further as a result of the new political and fiscal influence of the notorious defaulter Germany. Fully in line with this prediction, the estimated change in sovereign risk spread, i.e., *T(Occupation) – T(War)*, showed an increase by between 150 and 340 basis points.

The third wartime shock to relative sovereign default costs was when Germany dissolved the Danish government and proclaimed martial law in late August 1943. According to Table 2, this event reduced domestic default costs, while it did not affect the already low external default costs. Hence, the relative cost of a domestic default decreased, which is precisely what the point estimate *T(Martial) – T(Occupation)* indicates, namely a decrease in sovereign risk spread by 270–370 basis points. The last wartime shock according to Table 2 was the end of the war in May 1945, which basically restored Danish pre-war debt servicing policies and thereby, roughly equalized expected default costs across debt types. The estimates in Table 3 fully reinforce this picture by reporting a decrease in the sovereign risk spread, *T(Martial) – T(Peace)*, by between 260 and 360 basis points. This drop eliminated the remaining wartime spread and hence, supports the theoretical and historical predictions of Table 2.

As for the sovereign spread-effect from expected depreciation *ExpDepr*, it turns out to have a negative sign, which is in accordance with the predictions of UIP.[20] Furthermore, the regression constants are all small and, expect in one case, insignificantly different from zero. This mainly signals that the sovereign spread was actually zero, as expected, during the periods of full market integration. In the case of the real spread estimations, moreover, the zero intercept provides support for the theoretical predictions of RIP. As for market interest rate differentials, they are positively related to the real spreads estimations and largely insignificant (though with a positive sign) in the case of the nominal spread. The difference between market portfolio returns, finally, seems to have no effect at all on gov-

[20] This confirms the basic findings of Lothian and Wu (2005) who show that UIP is typically rejected over relatively short time horizons but is increasingly accepted the longer the time horizons get. Most holding periods of this study are relatively long term.

ernment bond spreads. While somewhat surprising, this may simply reflect the relatively high variation in market returns as indicated in Figure 3.

5.1 Robustness check I: Controlling for microstructure differences

If the wartime bond price limits on the Copenhagen Stock Exchange (see Section 2) were binding, they might have had an own effect on the sovereign yield spreads. To examine whether this was the case, I analyze the daily price movements and trading volumes of three individual bond loans, one issued by the government (Figure 5a) and two issued by local credit associations (Figures 5b and 5c) that were traded in Copenhagen between July 1939 and June 1940 (see further Section 4). Under the second price limit regime starting on September 23, 1939, when daily falls beyond one percentage point were prohibited, the expected effect of a large negative shock to bond values would be that trading disappeared instantly and bond prices gradually adjusted at the maximum allowed rate, until they reached a level at which trading returned. However, this is not at all what is shown in the data. Except the first three weeks in September, when a price floor made trading vanish entirely, the only instance at which price limits seem to have been binding was the four consecutive days after the change of price limit regime, September 23–26. During these four days, prices of all the examined bonds fell by one percentage point and no trades were recorded. After that, however, trading resumed and prices began fluctuating both up and down. In fact, for the rest of the period, the data in Figures 5a-c clearly suggest lively trading and seemingly free pricing, which is also indicated by contemporary sources.[21] In other words, this analysis shows that the wartime price limits in Copenhagen had little significant effect on recorded price levels, and hence yields, of either government or non-government Danish bonds traded in secondary markets.

5.2 Robustness check II: Controlling for risk aversion

Another explanation for large sovereign spreads that does not involve default risk differentials is changes in risk aversion among different groups of investors. This explanation was proposed by Roubini (2001) after observing the recent spikes in sovereign spreads (over the U.S. yield) for countries with default-free histories and otherwise well-behaved fundamentals. I evaluate this alternative hypothesis by estimating risk premiums of the investors on both domestic (Danish) and foreign (Swedish) markets using different variants of a

[21] Contemporary sources confirm this picture, i.e., that volumes vanished during the initial price limit regime (see *Finanstidende* 20 Sep. 1939, p. 1058; *Obligationstidende* 27 Sep. 1939) and that they returned after the limits were relaxed to constrain daily fluctuations (*Obligationstidende* 5 Jun. 1940, p. 17).

single-asset time series CAPM. Since government bonds are not often treated as the *risky* asset in CAPM, I employ two concepts of bond returns to avoid any measurement problems: monthly yields and monthly holding period returns.[22] The wartime segmentation of Scandinavian bond markets necessitates the use of two different types of market portfolios. When markets were segmented, I use a local stock market portfolio which means estimating a standard CAPM. When markets were integrated, however, I calculate a "Scandinavian" stock market portfolio using equal weights for the Copenhagen and Stockholm market, and fit an international CAPM following Karolyi and Stulz (2003). Returns are throughout converted into home currencies, i.e., DKK (SEK) for Danish (Swedish) investors:

$$z_t = \alpha_k + z^L{}_t \beta_k + v_t, \qquad k = \text{Full, Prewar, War, Postwar,} \tag{3}$$

$$z_t = \alpha_k + z^S{}_t \beta_k + v_t, \qquad k = \text{Full, Prewar, War, Postwar,} \tag{4}$$

where $z_t \equiv h_t - r_t$ is the excess return on Danish government bonds, $z^L{}_t \equiv R^m{}_t - r_t$ the excess return on the local portfolio, $z^S{}_{it} \equiv R^{mS}{}_t - r_t$ the excess Scandinavian market return, α_k constants, β_k beta for periods k = "Full" (1938:1–1948:12), "Prewar" (1938:1–1939:8), "War" (1939:9–1945:5) and "Postwar" (1945:6–1948:12) and v_t a random error. The sample sizes are arguably small and to handle this, I use bootstrapped standard errors with 2000 replications for each sub-period. Moreover, outliers cause heteroskedastic and non-normal residuals, and to account for this, I fit robust CAPM regressions throughout.[23] Finally, it should be noted that single-asset CAPM regressions are inherently noisy, and the overall goodness of fit is therefore expected to be relatively low.

The results in Table 4 clearly show that the variation in the estimated betas across time periods and countries is small, with the Danish betas being slightly larger than the Swedish ones. In other words, the recorded asset returns do not indicate any spikes in risk aversion among either Danish or Swedish investors during this time period, hence rejecting Roubini's (2001) alternative explanation. The result holds across all specifications of the

[22] Monthly holding period returns, $h_t = (C_t + P_t - P_{t-1})/P_{t-1}$ for monthly accrued coupon C_t and bond price P_t, may better correspond to stock returns.
[23] Robust regressions basically eliminate gross outliers by computing Huber-biweight iterations that allow observations to be weighted more evenly in the loss function.

CAPM model ("Local" or "Scandinavian") and the concept of bond returns (yield or holding period return).

6 Concluding remarks

This paper examines how sovereign risk depends on the location of trade and the nationality of investors, as suggested by a recent strand of sovereign debt research. Specifically, I analyze market yields on Danish government debt, continuously traded in Denmark and Sweden during 1938–1948, a period full of political shocks and also a wartime segmentation of capital markets in Scandinavia. By linking the exogenous wartime shocks to changes in the costs of domestic and external sovereign defaults, I find that these costs explain a significant part of the variation in the sovereign risk spread across markets. This finding is robust to a multitude of tests and the inclusion of additional yield spread influences such as differences in macroeconomic fluctuations, portfolio allocation opportunities, local risk aversion and microstructure institutions.

Altogether, this study is one of the first that provides an empirical backing to the recent sovereign debt literature of, e.g., Drazen (1998) and Reinhart et al. (2003), emphasizing the distinction between domestic and external government debt and that sovereigns strategically choose on which of these to default depending on what political and economic costs that would give rise to.

References

Affärsvärlden (various issues), Stockholm.

Algott, Stig (1963) *Stockholms Fondbörs 100 år*, AB Nordiska Bokhandeln, Stockholm.

Berlingske Tidende (various issues), Copenhagen.

Bordo and Oosterlinck (2005) "Do political changes trigger debt default? And do defaults lead to political changes?", Paper presented at the *Conference on the Political Economy of International Finance* (PEIF), October 2005.

Bulow, Jeremy and Kenneth Rogoff (1989a) "A Constant Recontracting Model of Sovereign Debt" *Journal of Political Economy* 97(1): 155–178.

Bulow, Jeremy and Kenneth Rogoff (1989b) "Sovereign Debt: Is to Forgive to Forget?" *American Economic Review* 79(1): 43–50.

Charemza, Wojciech W. and Ewa Majerowska (2000) "Regulation of the Warsaw Stock Exchange: The Portfolio Allocation Problem", *Journal of Banking and Finance* 24(4): 555–576.

Chinn, Menzie D. (2005) "The (Partial) Rehabilitation of Interest Rate Parity in the Floating Era: Longer Horizons, Alternative Explanations, and Emerging Markets", *Journal of International Money and Finance* 25(1): 7–21.

Cuthbertson, Keith (1996) *Quantiative Financial Economics. Stocks, Bonds and Foreign Exchange*, Wiley, Chichester.

Di Gioacchino, Debora, Sergio Ginebri and Laura Sabani (2005) "Public Debt Repudiation in a Monetary Union: The Role of the Geographical Allocation of Domestic Debt", Working Paper No. 81, Università Degli Studi Di Roma "La Sapienza"

Drazen, Allan (1998) "Towards a Political-Economic Theory of Domestic Debt" in G. Calvo and M. King (Eds.) *The Debt Burden and its Consequences for Monetary Policy: Proceedings of a Conference held by the International Economic Association at the Deutsche Bundesbank, Frankfurt, Germany*, New York: St. Martin's Press.

Eaton, Jonathan and Mark Gersovitz (1981) "Debt with Potential Repudiation: Theoretical and Empirical Analysis", *Review of Economic Studies* 48(2): 289–309.

Finanstidende (various issues), Copenhagen.

Gelpern, Anna and Brad Setser (2004) "Domestic and External Debt: The Doomed Quest for Equal Treatment", *Georgetown Journal of International Law* 35(4): 795–814.

Hilscher, Jens and Yves Nosbusch (2004) "Determinants of Sovereign Risk", mimeo, Harvard University.

Hoffmeyer, Erik (1968) "Perioden 1931–1960" in Svendsen, Knud Erik, Svend Aage Hansen, Erling Olsen and Erik Hoffmeyer (eds.) *Dansk pengehistorie 1700–1960. Bind 2: 1914–1960*, Odense: Danmarks Nationalbank.

Jackson, Paul S. and James R. Lothian (1993) "The Behavior of Bond Yields across Exchange–Rate Regimes and the Integration of Capital Markets", *Greek Economic Review* 15(2): 1–28.

Johansen, Hans Chr. (1986) *The Danish Economy in the Twentieth Century*, Croom Helm, London.

Karolyi, Andrew G. and René M. Stulz (2003) "Are Financial Assets Priced Locally or Globally?" in: G. Constantidines, M. Harris and R. M. Stulz (Eds.) *Handbook of the Economics of Finance*, North-Holland.

Kletzer, Kenneth M. and Brian D. Wright (2000) "Sovereign Debt as Intertemporal Barter", *American Economic Review* 90(3): 621–639.

Kohlscheen, Emanuel (2003) "Constitutions Rule", Mimeo, University of Warwick.

Longstaff, Francis A. (2005) "Asset Pricing in Illiquid Markets", Mimeo, UCLA Anderson School of Management.

Lothian, James R. (2002) "The Internationalization of Money and Finance and the Globalization of Financial Markets" *Journal of International Money and Finance* 21(6): 699–724.

Lothian, James R. and Liuren Wu (2005) "Uncovered Interest Rate Parity over the Past Two Centuries", Mimeo, GSB Fordham University.

Mauro, Paolo, Nathan Sussman and Yishay Yafeh (2002) "Emerging Market Spreads: Then versus Now" *Quarterly Journal of Economics* 117(2): 695–733.

Mitchener, Kris and Mark Weidenmier (2005), "Supersanctions and Sovereign Debt Repayament", NBER WP #11472.

Newey, Whitney K. and Kenneth D. West (1987) "A Simple Positive Semi–Definite, Heteroscedasticity and Autocorrelation Consistent Covariance Matrix", *Econometrica* 55(3): 703–708.

Obligationstidende (various issues), Copenhagen.

Obstfeld, Maurice and Alan M. Taylor (2003) "Sovereign risk, credibility and the gold standard: 1870–1913 versus 1925–31", *Economic Journal* 113(487): 1–35.

Oosterlinck, Kim and John S. Landon-Lane (2006) "Hope Springs Eternal – French Bondholders and the Soviet Repudiation (1915–1919)", *Review of Finance* 10(4): 1–29.

Reinhart, Carmen, Kenneth S. Rogoff and Miguel A. Savastano (2003) "Debt Intolerance", *Brookings Papers on Economic Activity* 1: 1–74.

Roubini, Nouriel (2001) "Why Should the Foreign Creditors of Argentina Take a Greater Hit/Haircut than the Domestic Ones: On the Economic Logic, Efficiency, Fairness and Legality of 'Discriminating' Between Domestic and Foreign Debt in Sovereign Debt Restructurings", Stern School of Business, New York University.

Rose, Andrew K. (2005) "One Reason Countries Pay Their Debts: Renegotiation and International Trade", *Journal of Development Economics* 77(1): 189–206.

Silber, William L. (1991) "Discounts on Restricted Stock: The Impact of Illiquidity on Stock Prices" *Financial Analysts Journal* 47(4), 60–64.

Skandinaviska Bankens Kvartalstidsskrift, Stockholm, various issues.

Statistics Denmark (1969) *Kreditmarkedsstatistik. Statistiske undersøgelser Nr. 24*, Copenhagen.

Svendsen, Knud Erik, Svend Aage Hansen, Erling Olsen and Erik Hoffmeyer (1968) *Dansk pengehistorie 1700–1960. Bind 3: Bilag*, Odense: Danmarks Nationalbank.

Tomz, Michael (2004) "Voter Sophistication and Domestic Preferences Regarding Debt Default", Mimeo, Stanford University.

Van Rijckeghem, Caroline and Beatrice Weder (2004) "The Politics of Debt Crises", CEPR Discussion Paper #4683.

Valutakommittén (1980) *Valutareglering och ekonomisk politik. Expertrapporter från Valutakommittén,* SOU 1980:51, Stockholm: Allmänna förlaget.

Waldenström, Daniel and Bruno S. Frey (2006) "Using Markets to Measure Pre-War Threat Assessments: The Nordic Countries Facing World War II", Working Paper No. 676, Research Institute of Industrial Economics.

Table 1: Danish and Swedish bond market microstructure around World War II

	Copenhagen/Denmark	*Stockholm/Sweden*
Bond market facts:		
Main venue	Copenhagen Stock Exchange	Stockholm Stock Exchange
Number and types of bonds listed	≈250 bonds, 20 governmental. All domestic and DKK-denominated.	≈60 bonds, 15 governmental, 10 foreign. All SEK-denominated.
Reporting frequency	Daily	Biweekly (domestic), weekly (foreign)
Monthly average trading volume on Exchange, 1938–1948.	All bonds: 470 million DKK (DKKm) All stocks: 62 DKKm Danish government bond in the study: 0.14 DKKm (≈ 0.03% of total bond trading)	All bonds: 164 million SEK (SEKm) All stocks: 205 SEKm Danish government bond in the study: 0.04 SEKm (≈ 0.02% of total bond trading)
Monthly average trading volume, total (OTC + Exchange), 1926, 1948–1952.	No information on OTC volumes.	1926: 179.1 SEKm, of which OTC 134.1 SEKm (75%) and Exchange 45 SEKm (25%). 1948: 1,714 SEKm, of which OTC 1,356 SEKm (79%) and Exchange 358 SEKm (21%). 1949–1952 (average): 7,421.1 SEKm, with OTC 6,934.4 SEKm (93%) and Exchange 486.7 SEKm (7%).
Rules and regulations:		
Price limits	1. 9/1/39–9/22/39: Min. 2% below prices of 8/31/39. 2. 9/23/39–2/23/46: ≥ –1% per day.	9/1/39–1/2/40: ≥ –5% (in practice down to –10%) per day.
Trading halts	1. 9/1/39–9/11/39 2. 4/9/40–5/27/40 3. 5/8/45–5/18/45	No trading halts.
Capital controls	Currency transfers restricted from Jan. 1940. Capital in- and outflows stopped from Apr. 1940.	All capital and currency in- and outflows without approval of the Bank of Sweden stopped from Feb. 1940.

Sources: For Copenhagen: data on issues come from stock exchange price lists published in *Finanstidende*; trading volumes come from Statistics Denmark and the daily data of the study; rules and regulations are collected from articles in *Finanstidende*, 10 Apr. 1940, p. 589. For Stockholm: data on issues come from stock exchange price lists; trading volumes come from the stock exchange and a newly collected sample of trading in foreign bonds on the exchange collected every third month during 1938–1948; OTC data for Jan.-Jun. 1926 come from a Banking Inspection survey published in a government proposal (Prop. 1927:56 p. 13) and for 1948 onwards from the Banking Inspection recurrent official publication *Uppgifter om bankerna samt uppgifter om fondkommissionärerna och fondbörs*; rules and regulation data come from Algott (1962) and Valutakommittén (1980), SOU 1980:51, ch. 1.

Table 2: Explaining the yield differentials across markets, 1938–1948.

Period	C_D	C_E	$\frac{C_D}{C_E}$	$\Delta\frac{C_D}{C_E}$	Political events driving the costs of sovereign default.
Prewar: 1938:1–1939:8	High	High	1		Denmark had no past defaults and integrated capital markets made it impossible to discriminate between bondholder nationalities, which is the reason why default costs were equally high for all parties and debt types.
War: 1939:9–1940:3	High	Med	>1	+	*Event: Outbreak of World War II (Sept. 1, 1939).* The war reduced external default costs, partly since reputational costs are lower for wartime defaults and partly as historians report how the Danish government disliked a Swedish refusal in the early 1940 to assist Denmark in case of war. Domestic default costs remained high as contemporary sources report that the Danish people were aware of the risk of the government trying to deflate away its domestic debt.
Occupation: 1940:4–1943:8	High	Low	>>1	+	*Event: German occupation (April 9, 1940).* Despite the occupation, historians report that the Danish government remained in place to govern local politics and fiscal matters and that the German occupant, wanting undisrupted trade flows and small occupation costs, wanted the support and compliance of the Danish people. Swedish creditors felt considerably more worried and seem to have expected at least a partial default triggered by the Germans.
Martial: 1943:9–1945:5	Med	Low	>1	–	*Event: Germany dissolves the Danish government and introduces martial law (Aug. 29, 1943)*. Germany takes political and fiscal control over Denmark, which clearly signals a reduced concern about the Danish people and reduced costs of a domestic default. The cost of external default was arguably unchanged and low.
Peace: 1945:6–1948:12	High	High	1	–	*Event: Peace (May 8, 1945).* Back to pre-war Scandinavian relations.

Note: C_E and C_D denote costs of external debt default, C_D = cost of a domestic debt default. The periodization largely relies on the historical descriptions of Johansen (1968, ch. 4–6) and Lidegaard (2005).

Table 3: Sovereign spreads and relative default costs, 1938–1948.

Dependent variable:	$NomSpread_{ED}$		$RealSpread_{ED}$			
T(War)	0.031***	0.027***	0.039***	0.039***	0.131***	0.031***
	(0.009)	(0.004)	(0.005)	(0.006)	(0.024)	(0.004)
T(Occupation)	0.058***	0.063***	0.056***	0.058***	0.041	0.069***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.027)	(0.007)
T(Martial)	0.036***	0.037***	0.034***	0.036***	0.021	0.042***
	(0.005)	(0.004)	(0.003)	(0.004)	(0.025)	(0.004)
T(Peace)	0.006	0.003	0.007***	0.010**	–0.021	0.017***
	(0.004)	(0.006)	(0.002)	(0.004)	(0.025)	(0.002)
ExpDepr	–0.027	–0.055				
	(0.035)	(0.046)				
NomIntDiff	0.180					
	(0.545)					
NomMarkDiff	0.012					
	(0.026)					
RealIntDiff			1.004***	0.666*		
			(0.046)	(0.342)		
RealMarkDiff			0.028	0.017		
			(0.020)	(0.026)		
Constant	0.004	0.006	0.011***	0.007	0.021	–0.003
	(0.005)	(0.007)	(0.001)	(0.005)	(0.024)	(0.002)
n (inflation)			12	(120,252)	12	(120,252)
# obs.	129	132	129	129	132	132
F-statistic	71.0	33.8	459.2	102.3	60.0	53.9
R^2	0.87	0.75	0.96	0.87	0.56	0.75

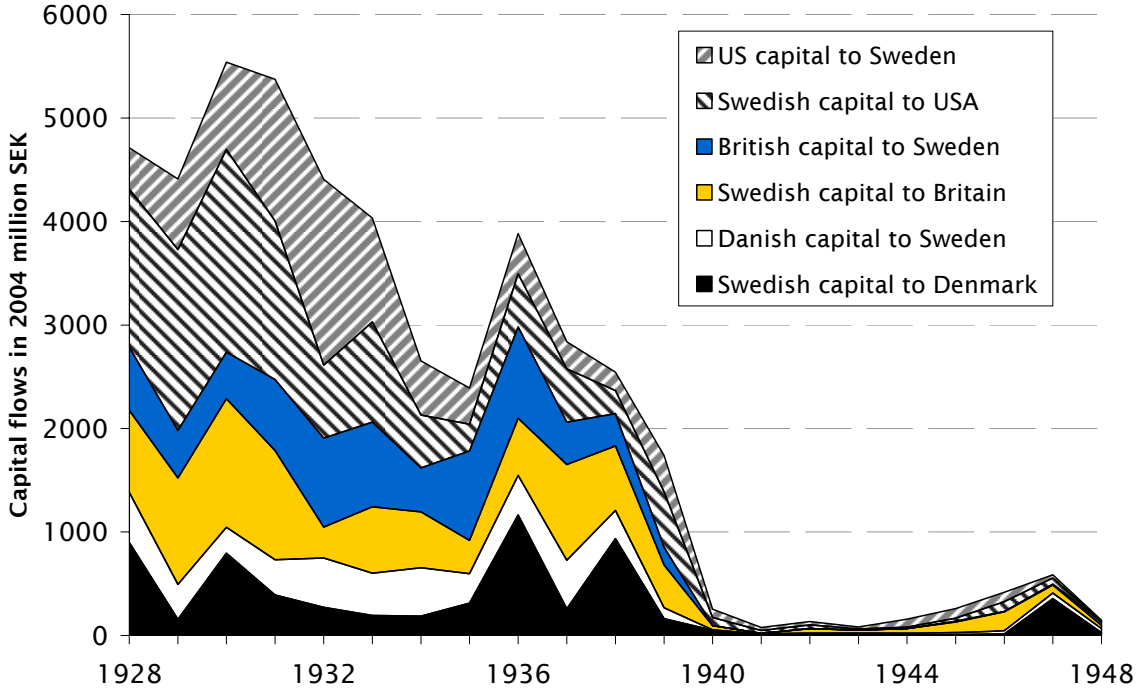
Note: Dependent variables are nominal ($NomSpread_{ED}$) and real ($NomSpread_{ED}$) spreads between Danish long-term external and domestic government bonds based on market prices in Stockholm and Copenhagen. *T* denotes time dummies following Table 2, $ExpDepr = s_{t+n} - s_t$ is the *ex post* rate of depreciation between Danish and Swedish currencies (s = SEK/DKK), *NomIntDiff* and *RealIntDiff* are the nominal and real differentials between Swedish and Danish central bank discount rates, and *NomMarkDiff* and *RealMarkDiff* the same for stock market returns. *n* is the inflation horizon in numbers of months, either 12 (annual) or between 120 and 252 (10–21 years) as described in Section 4. ***, ** and * denote statistical significance at the 1%-, 5%- and 10%-levels, respectively. Newey and West (1987) heteroskedasticity and autocorrelation consistent standard errors with maximum 6 lags are in parentheses.

Table 4: Risk aversion of Danish and Swedish bond investors, 1938–1948.

	Returns concept:	Sovereign yields			Holding period returns			
Period (*k*), Market (*i*)	**CAPM**	α_{ik}	β_{ik}	***Pr.>F***	α_{ik}	β_{ik}	***Pr.>F***	**Obs.**
k = Full (1938:1-1948:12)								
i = Copenhagen	Local	0.001***	0.024***	0.004	0.001**	0.082***	0.000	129
		(0.000)	(0.008)		(0.000)	(0.022)		
	Scandinavian	0.001*	0.015*	0.064	0.001*	0.074***	0.001	129
		(0.000)	(0.021)		(0.000)	(0.021)		
i = Stockholm	Local	0.002***	0.005	0.319	0.006*	0.062	0.475	132
		(0.000)	(0.005)		(0.003)	(0.086)		
	Scandinavian	0.002*	0.019	0.0153	0.005*	0.012	0.926	129
		(0.000)	(0.132)		(0.003)	(0.132)		
k = Prewar (1938:1-1939:8)								
i = Copenhagen	Local	0.000	0.002	0.214	0.002	0.128	0.167	20
		(0.000)	(0.007)		(0.002)	(0.110)		
	Scandinavian	0.001***	0.000	0.680	0.002	0.114	0.064	20
		(0.000)	(0.007)		(0.002)	(0.099)		
i = Stockholm	Local	0.001***	0.000	0.903	0.004	0.161	0.176	20
		(0.000)	(0.003)		(0.006)	(0.378)		
	Scandinavian	0.001***	0.000	0.969	0.002	0.313	0.077	20
		(0.000)	(0.004)		(0.002)	(0.531)		
k = War (1939:9-1945:5)								
i = Copenhagen	Local	0.003***	0.009	0.233	0.002***	0.086***	0.016	66
		(0.000)	(0.010)		(0.001)	(0.036)		
	Scandinavian	0.003***	0.008	0.303	0.002**	0.073	0.046	66
		(0.000)	(0.009)		(0.001)	(0.047)		
i = Stockholm	Local	0.004***	0.002	0.630	0.020*	0.025	0.909	69
		(0.012)	(0.007)		(0.012)	(0.445)		
	Scandinavian	0.004***	0.007	0.303	0.020*	0.090	0.795	66
		(0.000)	(0.007)		(0.011)	(0.635)		
k = Postwar (1945:5-1948:12)								
i = Copenhagen	Local	0.000***	0.002	0.294	0.000	0.029	0.387	43
		(0.000)	(0.002)		(0.000)	(0.039)		
	Scandinavian	0.000***	0.001	0.286	0.000**	0.015	0.597	43
		(0.001)	(0.001)		(0.001)	(0.050)		
i = Stockholm	Local	0.001*	0.001	0.162	0.002	0.067	0.212	43
		(0.001)	(0.001)		(0.001)	(0.043)		
	Scandinavian	0.001***	0.002	0.202	0.001	0.008	0.922	43
		(0.000)	(0.001)		(0.001)	(0.065)		

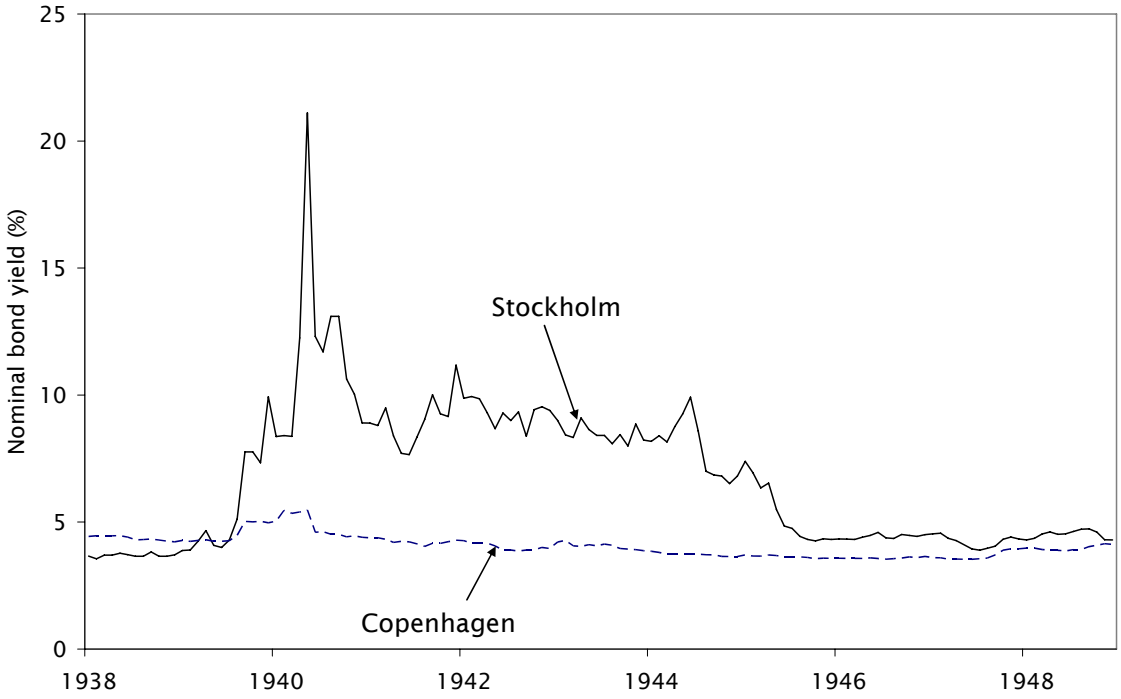
Note: Huber-Biweight robust CAPM regressions (6a) and (6b) with bootstrapped standard errors (with 2000 replications) for all sub-periods. Dependent variable is excess return (either sovereign yields or holding period returns) on Danish sovereign debt over the risk-free rate. "Local" and "Scandinavian" CAPM refer to the use of either a local portfolio or an equally-weighted Copenhagen-Stockholm portfolio. Subscript *i* is market place and *k* is periods "Full", "Prewar", "War" and "Postwar". [a], [b] and [c] denote significance at the 1%-, 5%- and 10%-levels, respectively.

Figure 1: Cross-border portfolio flows intermediated by Swedish financial intermediaries, 1928–1948.



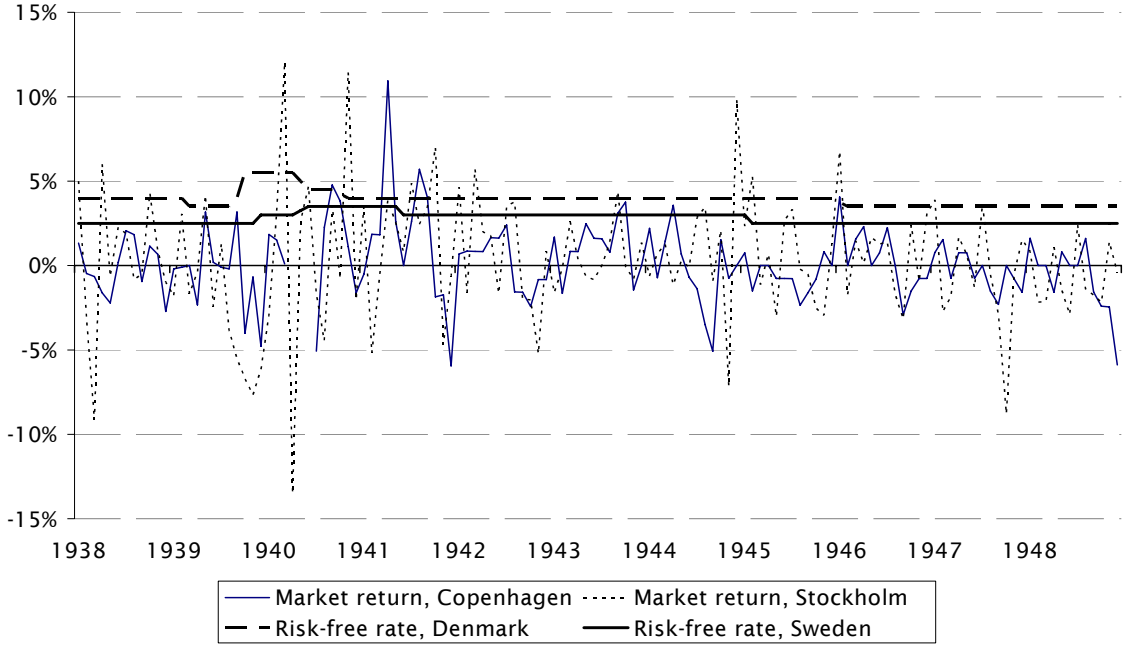
Notes and sources: "Swedish financial intermediaries" are the 40-50 commercial banks and stock brokers reporting to the Swedish Banking Inspection. The source is the Banking Inspection's "Bankbolags och vissa fondmäklares värdepappersaffärer med utlandet" in *Ekonomiska Meddelanden*.

Figure 2: Danish long-term government bond yields as quoted in Copenhagen and Stockholm, 1938–1948.



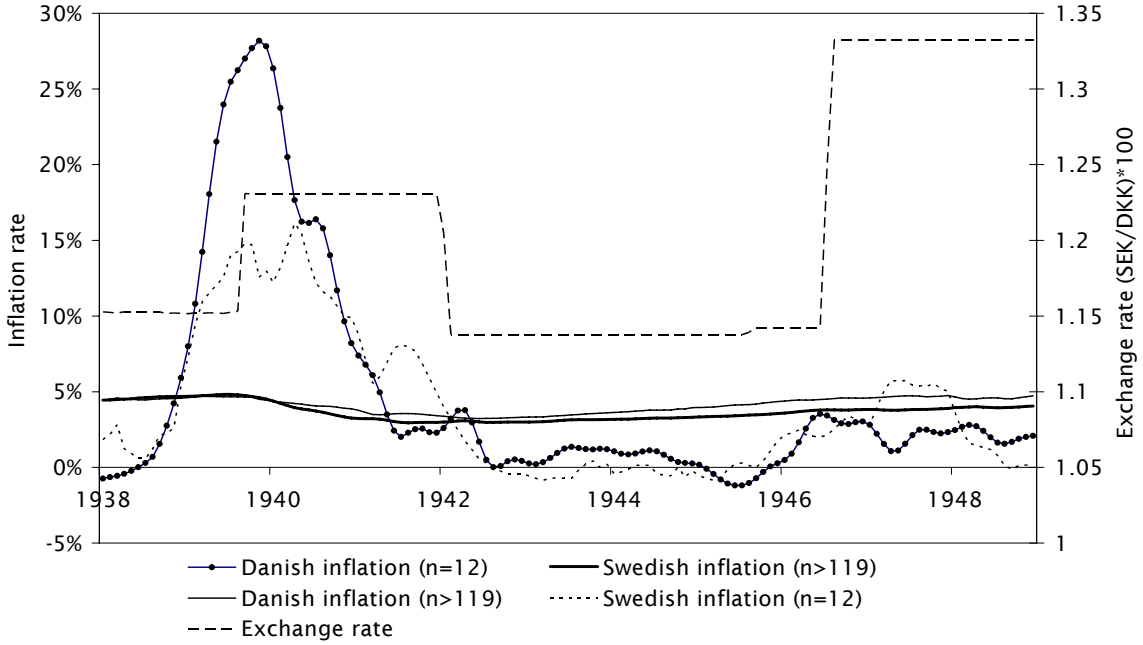
Sources: See text.

Figure 3: Returns on the risk-free rate and stock market portfolio in Copenhagen and Stockholm, 1938–1948.



Notes: Market portfolio returns are nominal capital gains on the composite stock price indexes recorded on the Copenhagen and Stockholm Stock Exchanges. Risk-free rates are the discount rates of each country's central bank. For sources, see text.

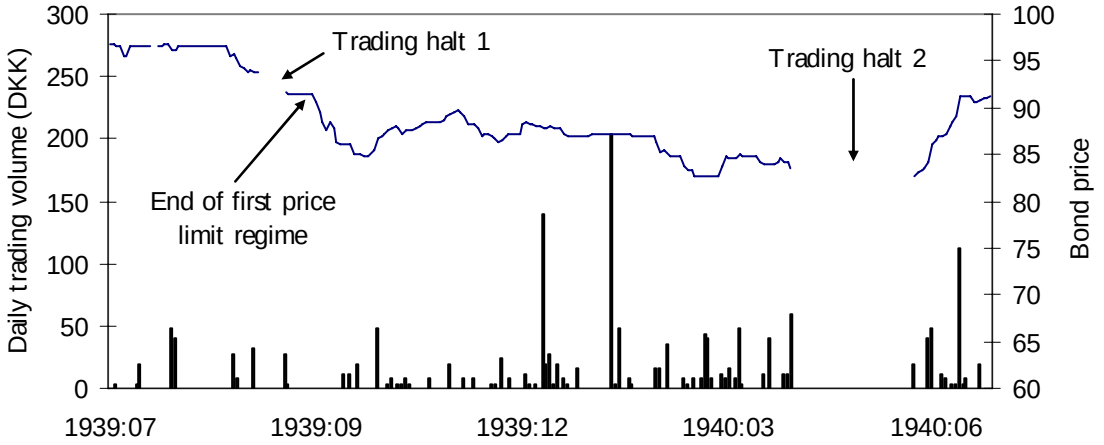
Figure 4: Inflation and exchange rates in Sweden and Denmark, 1938–1948.



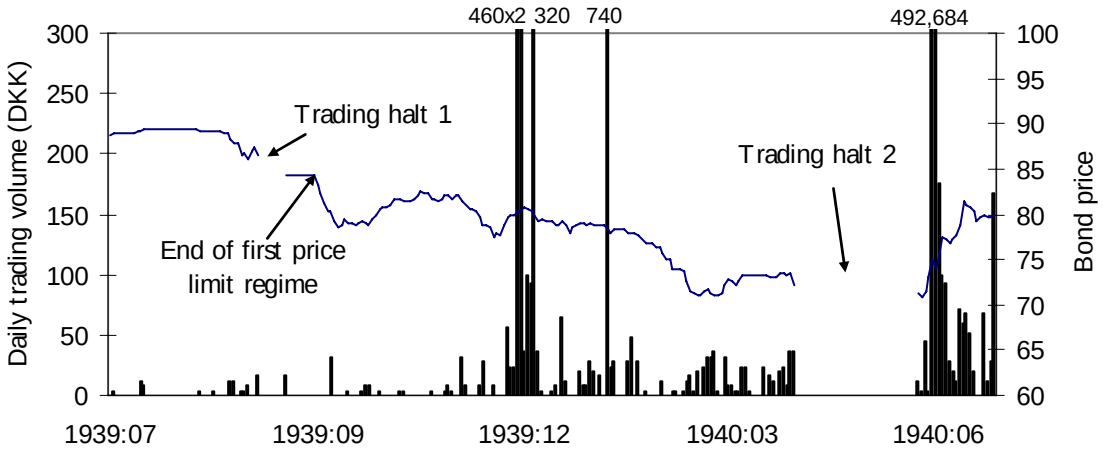
Sources: See text.

Figure 5: Daily prices and volumes at the Copenhagen Stock Exchange, 1939–1940.

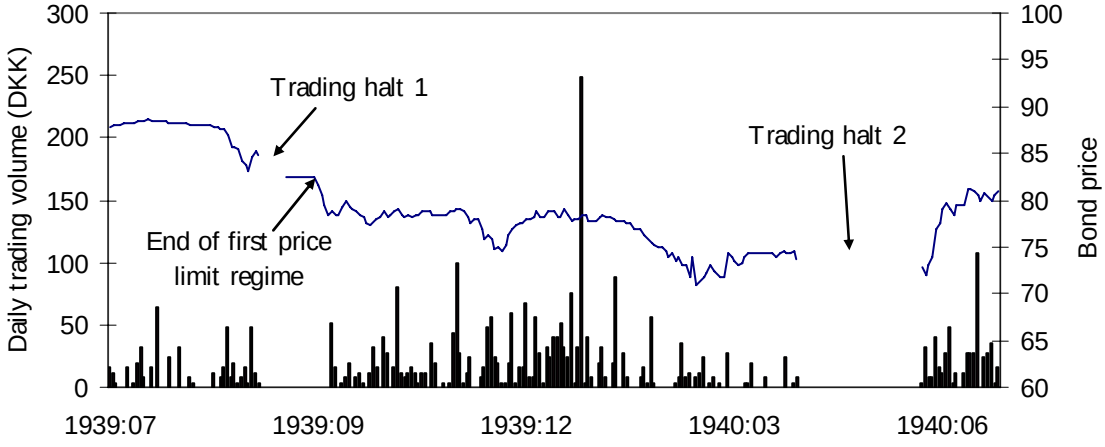
a) Government loan of 1934, 4% coupon.



b) Copenhagen Credit Association, 4% coupon.



b) Østifternes Credit Association, 4% coupon.



Source: Daily market reports in the newspaper *Berlingske Tidende*.