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Default Premium

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Abstract

We re-assess the view that sovereigns with a history of default are charged only a small and/or short-lived premium on the interest rate warranted by observed fundamentals. Our re-assessment uses a metric of such a "default premium" (DP) that is consistent with asymmetric information models and nests previous metrics, and applies it to a much broader dataset relative to earlier studies. We find a sizeable and persistent DP: in 1870-1938, it averaged 250 bps upon market re-entry, tapering to around 150 bps five years out; in 1970-2011 the respective estimates are about 400 and 200 bps. We also find that: (i) these estimates are robust to many controls including on actual haircuts; (ii) the DP accounts for as much as 60% of the sovereign spread within five years of market re-entry; (iii) the DP rises with market exclusion spells. These findings help reconnect theory and evidence on why sovereign defaults are infrequent and earlier debt settlements are desirable.

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1 Introduction

Do countries pay an interest rate premium for having defaulted in the past? If so, how high and for how long? These are important questions in international finance. The prevailing view is that such a premium is small and/or short-lived on average. This view is readily apparent from earlier studies by Eichengreen and Portes (1986), Lindert and Morton (1989), and Jorgenson and Sachs (1989) who find that countries that honored their debts during the 1930s Great Depression did not benefit from lower spreads in the early post-World War II period relative to those that defaulted. This finding is only mildly overturned in Ozler's (1993) classic study of emerging market loan data from 1968 to 1981. Ozler found that a default memory dummy, which differentiates between countries that defaulted in previous decades and those that did not, is statistically significant but the implied difference in interest rates is economically small (25 basis points at mean). Using a similar sample but an instrumental-variables method to decompose the spread into a backward-looking component related to credit history vs. a forward-looking default risk component driven by fundamentals, Benczur and Ilut (2015) arrive at a similarly low estimate. For the 1880-1913 period alone, Flandreau and Zumer (2004) estimate a slightly higher interest rate cost of default (up to 90 basis points) in the first year after the settlement of arrears, but one that decays significantly thereafter.

Other research estimates a more sizeable premium but which dies out even more quickly. Using JP Morgan emerging market bond index (EMBI) spreads over 1997-2004, Borenzstein and Pannizza (2009) estimate whether a default has an extra impact on the country spread upon market re-entry by adding year dummies (starting from the debt settlement date) to an otherwise standard empirical model of sovereign spreads. From the estimated coefficients and standard errors on those year dummies, they find that defaults have a very sizeable impact on the first year of market re-entry (400 basis point), falling to 250 bps in the second year, and becoming insignificant thereafter. Cruces and Trebesch (2013), also using JP Morgan EMBI data (extended to 2010) and a similar set of year dummies except that interacted with the "haircut" size for each debt settlement, obtain a more persistent effect. Yet, this is only so for defaults that involved investors' losses or "haircuts" above the sample average (37 percent). For the average emerging market defaulter, they estimate an interest rate premium of under 100 bps four to five years after settlement, but that also ceases to be statistically significant at 5 percent.

This evidence raises critical issues. First, the magnitude and persistence of such interest rate premia seem puzzlingly low given that governments often go to considerable length to avoid defaults, including through politically costly fiscal austerity and the conditionalities of multilateral financing. This puzzle is all more apparent if much touted costs of default, like market exclusion and trade and military sanctions (what Mitchener and Weidenmier, 2005, call "super-sanctions"), are frequently unimportant. As Gennaioli et al. (2014) put it: "In reality, sanctions are rarely observed and market exclusion is short-lived". Costs associated with the break-down of domestic financial intermediation could be one missing link (Boulton and Jeanne, 2011; Gennaoli et al., 2014; Kalemli-Ozcan et al., 2015), but only so for countries and periods where and when the share of sovereign bonds in domestic banks' portfolios is sufficiently high. Insofar as this deterrence mechanism is not ubiquitous, one is then back to the issue as to what sustains non-trivial levels of sovereign debt in the first place.

Second, and as stressed in a recent survey by Wright and Tomz (2013), existing empirical studies are unclear as to what mechanism(s) generate(s) such positive interest rate premia, since none of them offers a model to guide their metrics. Indeed, in the canonical sovereign debt model of Eaton and Gersovitz (1981) and subsequent extensions (Aguiar and Gopinath, 2006; Arellano, 2008; and others), sovereign credit history per se should not add a premium to country spreads. This is because those models feature full information on fundamentals and shocks as well as investors that break even at all times; hence default/repayment decisions per se do not add information to bond pricing. An alternative is to do away with the assumption that investors are risk neutral and break-even; instead, defrauded creditors could collude and impose above-market lending rates as penalties for default.[1] While this could be rationalized by "cheater of the cheater" arguments (Kletzer and Wright, 2000), this presumption seems difficult to reconcile with evidence of new lenders undercutting older ones and of overall lenders' surpluses being close to zero historically (Eichengreen and Portes, 1986; Lindert and Morton, 1989 and Klingen et al., 2004).[2] If so, such a "punishment" mechanism

[1]This is the interpretation favored by Benczur and Ilut (2015).

[2]This is not to deny the importance of lenders' market power in enforcing repayments and extracting

also seems unfit to deliver a positive default premium in competitive markets. Thus, it is unclear what the empirical literature reviewed above is trying to measure in the first place.

Third, the above studies span distinct country samples and periods and exclude many of today's advanced countries. These can also default and some of them have done so. Before one underplays the interest rate cost of default, a look at a more representative sample seems in order

This paper re-assesses the effect of sovereign credit history on country spreads on the basis of a better metric and broader data. On metrics, a first contribution is to build the latter on a theory of a positive default premium (DP henceforth) and to relate our metric to those used in the empirical studies reviewed above. We show that our metric nests those, thereby allowing for comparability; in addition, we highlight the distinction between using our metric vs. using the unconditional difference in the spread before default and after debt settlement as a gauge of the DP.

The paper's second and key contribution is to apply this metric to a much broader dataset than before. Our dataset spans the entire 1870-1938 period as well 1970-2011 for both emerging **and** advanced countries, rather than just for emerging markets post-1990. Relative to classical studies of pre-WWII spreads by Bordo and Rockoff (1997), Obstfeld and Taylor (2003), Flandreau and Zummer (2004), Mauro et al. (2006), Tomz (2007), it adds more countries, fixes issues with the data and also comprises more control variables, including for global market factors highlighted in recent work (Borri and Verdelhan, 2011; and Longstaff et al., 2011). Regarding the post-WWII period, we extend many series on sovereign spreads back to the 1970s and 1980s and – no less importantly – add advanced countries to the sample. This allows us to span major recent events in sovereign debt markets as well.

By combining the first and the second contribution, the paper yields a third contribution: it documents salient features of the empirical DPs hitherto uncovered. It does so by decomposing the spread into a vector of observable fundamentals, the DP,

surpluses from borrowers in certain circumstances, specially in the context of relationship banking and syndicated loans (see, e.g., Voth (2011), Flandreau and Flores (2012) for persuasive historical illustrations). The focus of our analysis is on competitive bond markets, where the scope for collusion is arguably more limited.

and an estimation error, as well as by allowing for distinct functional forms for memory formation, and re-evaluating the importance of the actual size of the default (the final "haircut") in shaping the evolution of the DP.

The results are: (i) once debt arrears are settled and a country re-enters international capital markets, the "impact" DP was around 250 basis points in the period 1870-1938 and 400 bps in 1970-2011. The DP then decays but slowly: by the end of the 5th year after debt settlement it averages some 150 basis points in the pre-WWII period and 200 bps post-1970, tapering off thereafter; (ii) while the DP is significant at conventional statistical levels, it also displays considerable variance, so limited sampling (as in previous studies) can greatly affect inference on the mean DP; (iii) changes in observable fundamentals account for less than half of variations in market spreads between pre-default and post-settlement spells, implying that the contribution of the DP is key; (iv) the DP rises with the number of years a sovereign stays out of the market - this being higher for serial defaulters implies that they pay a higher DP; (v) the DP is no smaller for alternative specifications on how investors' memories evolve; (vi) unlike Cruces and Trebesch (2013), direct control for the size of the **actual** haircut in spread regressions is not necessary to obtain a significant and longer lasting DP. The reason is that close to 90% of the actual haircut can be predicted by the length of the default and country-specific fundamentals; thus the informational content from the haircut "shock" to the evolution of the DP appears to be very small.

The remainder of the paper is structured as follows. Section 2 presents the theory underpinning our empirical DP metric that is then specified in Section 3. Section 4 introduces the new dataset. Section 5 reports the DP estimates, robustness tests, and spread decomposition exercises. Section 6 concludes. Specifics of the data are provided in the Appendix.

2 Theory

Our starting point is a bond market akin to that of most sovereign debt models and consistent with the empirical evidence referred to in the introduction - namely, a competitive market populated by risk-neutral lenders who are willing to subscribe to bonds at any price that, given their beliefs, allows lenders to break-even. Lenders have access to a risk-free technology in every period, which pays a risk-less gross interest rate $R_{f,t} = 1 + r_{f,t}$, which is taken as exogenous. There is a default "punishment" technology that consists of some recovery by lenders of the face value of outstanding debt obligations and a loss of output to the borrower. Regarding debt recovery, in the case of default at $t+1$, creditors expect to recover a fraction $E(c_{t+1})$ of the contractual repayment obligations D_t to be repaid at $t+1$, with $0 \leqslant E(c_{t+1}) < 1$. Hence $E(h_{t+1}) = 1 - E(c_{t+1})$ represents the expected haircut inflicted on bondholders. Regarding output, default entails a fraction κ of the sovereign's current output $\tilde{Y}_t$ being lost, where $0 < \kappa < 1$. As in most models since Cohen and Sachs (1986), we assume that there is deadweight loss: bondholders cannot appropriate any benefit from the output lost by the borrower.

If the sovereign is expected to default in $t+1$ with a probability π_t, risk-neutral investors would willingly hold its bonds if:

$$[\pi_t E(c_{t+1}) + (1 - \pi_t)]R_t = R_{f,t}. \tag{1}$$

where R_t is the contractual gross average rate of return on the bonds. Defining the spread as $s_t = R_t/R_{f,t} - 1$, the above equation yields:

$$s_t = \frac{\pi_t E(h_{t+1})}{1 - \pi_t E(h_{t+1})} \tag{2}$$

which indicates that the spread is increasing on the probability of a default and expected haircut. Whenever default occurs, the restriction $0 < h \leqslant 1$ ensures that it can be partial, as often in practice.

In the absence of pre-commitment, any rational sovereign will only repay debt if the utility of repayment (U^r) is no lower than the utility of default (U^d). It thus follows that $\pi_t = prob(U_t^r < U_t^d)$. To simplify the algebra and aid intuition, let utility be linear on net income pay-offs and debt to take the form of a one-period discount bond redeemable at face value D. Then, upon observing the realization of the stochastic income (gross of repayment) $\tilde{Y}_t$, and before knowing with certainty the effective haircut, the sovereign will decide to repay only if:

$$\begin{aligned} Y_t - D_t + \beta_t \; V^r_{t+1}(.,\epsilon_t) &\geq (1-\kappa)Y_t - E(c_{t+1})D_t + \beta_t V^d_{t+1}(.,\epsilon_t) \\ \beta_t[V^r_{t+1}(.,\epsilon_t) - V^d_{t+1}(.,\epsilon_t)] &\geq E(h_{t+1})D_t - \kappa Y_t \end{aligned} \tag{3}$$

where β_t is the discount factor and $V^{r,d}$ are the continuation values of repayment and default, respectively; these are, inter-alia, a function of the persistent component ϵ_t of innovations to income $\tilde{Y}_t$. The left-hand side of equation (3) thus measures the utility gain of repayment, whilst the right-hand side measures the utility yielded by default.

How does credit history matter in this setting? With the standard output loss assumption, the utility of default decreases with Y. To the extent that shocks to income are persistent, the utility of future defaults then also decreases with such shocks. As future default risk declines, lenders should then lower R as per equation (1). This lowers repayment costs for any given D and the attendant net income gain gives the sovereign an incentive to repay. If the income shock is publicly-knowledge (i.e. fully observable by both sovereign and lenders), default history is immaterial to the evolution of R and hence the spread.

But what if investors do not observe ϵ_t? As in Sandlieris (2008) and Catão, Fostel and Kapur (2009), suppose that lenders do not observe it, but the sovereign has direct information on it (essentially) in real time. This is realistic if the sovereign is known to have privileged access to pertinent data (including confidential data such as on tax collection patterns) and/or if the shock stems from fiscal developments that the sovereign controls. Then sovereign actions can be revealing of the evolution of D/Y and hence of default risk. Specifically, payment signals a bright growth outlook for gross sovereign income, raising V_r. Upon observing repayment, lenders then lower the demanded yield on bonds (call it R^r); as in the full information case, saving on its interest bill gives the sovereign an incentive to repay. Conversely, a bad and persistent output shock creates a negative growth outlook. This raises the likelihood of default in $t+1$, lowering the utility of repaying today (since the expected output loss in $t+1$ will be lower as default is more likely). Depending on parameters (notably on β_t and κ), it may be optimal for the sovereign to default. Lenders will then revise downward their expectations of Y, and upward those on D/Y all else constant; hence they will demand a higher yield on bonds (call it R^d). If the sovereign borrowing needs are inelastic, this will raise D/Y further, validating lenders' re-assessment of default risk going forward. This will lower the continuation value V_d, thus widening the $V_r - V_d$ gap. In equilibrium, there will be a value of the persistent shock ϵ_t^* which will make (3) hold with equality so that a positive default premium is a sufficient "penalty" to ensure repayment. Yet, as actual shocks move $V_r - V_d$ up and down, default can occur for sufficiently low realizations of ϵ_t. Higher persistence of ϵ_t, by making the future output path more known to the sovereign, strengthens this signaling effect. Further, the effect of asymmetric information on making credit history relevant need not be confined to the persistent component of income shocks. For instance, asymmetric information on β_t can also make sovereign actions signal future default risk by shifting the left-hand side of equation (3). This is the mechanism emphasized in Eaton (1996), Alfaro and Kanczuk (2005), and d'Erasmo (2011). To the extent that shocks to the discount factor are persistent as in those papers, credit history has a role to play in shifting continuation values: for a given shock profile, a government that suddenly turns more impatient may lower its threshold value ϵ_t^* below which becomes optimal to default. As will be discussed further below, our DP metric is consistent with such distinct assumptions on the source of information asymmetry.

To summarize the above discussion: i) regardless of whether the specific model focuses on output, fiscal or productivity shocks, or on shifting preference parameters, information asymmetries between borrower and lenders make the borrower's past actions informative about future default risk; ii) in such models there typically is a threshold ϵ_t^* in which equation (3) holds as an equality and equation (1) is contemporaneously satisfied; iii) realizations of ϵ_t below this threshold (i.e., "bad shocks") trigger a default, else it is optimal for the sovereign to repay; iv) there is a positive premium for default given by $R^d - R^r > 0$ which will be a function of credit history; v) the probability of default and the expected haircut are jointly determined, and what matters for default vs. repayment decisions is the expected haircut. The latter may differ from the final actual haircut, which has been shown to result from complex ex-post bargaining (Benjamin and Wright, 2009; Ghosal et al., 2010; Yue, 2011). In the event, we show empirically in Section 5 that this difference appears to matter little for the spread.

Accordingly, we can now write equation (2) as a function of D, Y as well as parameters and shocks - both observable and non-observables - contained in equations (1) and (3). As in all the empirical literature on sovereign risk, we let this function take a linear form wherein, consistent with the above theoretical setting, the critical breakdown is between fundamentals that are common-knowledge (i.e. observed by lenders and borrower alike) and those that are not. Credit history is revealing on the latter set. So, the determination of the sovereign spread evolves as:

$$s_{i,t} = \alpha_i + \mathbf{F}_{i,t}\boldsymbol{\beta} + DP_{i,t} \tag{4}$$

where $s_{i,t}$ is the spread of country i debt at time t over the risk free interest rate, $\mathbf{F}_{i,t}$ is a row vector of common knowledge observable fundamentals, and $DP_{i,t}$ is the default premium.

Relevant cross-country and time series implications follow. First, as it takes time for investors to learn about the nature of underlying shocks and parameters, and as learning is never complete, a persistent and possibly slowing decaying DP will ensue; so $\alpha_i + \mathbf{F}_{i,t}\boldsymbol{\beta}$ will often underestimate country risk. Second, insofar as some countries are more prone to such large and persistent shocks and/or their degree of impatience can go higher than others, they are likely to default more often; so, lenders will also learn from cross-country repayment patterns, potentially leading to substantial cross-country variance in the DP and hence in sovereign spreads. Third, even if the vector of commonly observable fundamentals $\mathbf{F}_{i,t}$ evolves slowly, spreads can jump if the DP jumps.

This completes the theoretical discussion of our metric. Next we turn to the specification of the DP component for estimation and how it relates to the metrics used in previous studies.

3 Empirical Specification

We let $DP_{i,t}$ take the following functional form:

$$DP_{i,t} = \gamma_1 MEM1_{i,t} + \gamma_2 MEM2_{i,t} + \sum_{j=1}^{m} \delta_j DS(j)_{i,t} \tag{5}$$

where $MEM1_{i,t}$ is defined as the ratio of the number of years that country i is in default to the total number of years in the sample up to year t. A similarly defined variable appears in Reinhart et al. (2003) as proxy for credit history in their analysis of sovereign risk ratings. We fine tune this variable by considering distinct choices for the initial year when relevant history begins: we consider 1824 as in Reinhart et al. (2003) but also experiment with other starting dates. One limitation of $MEM1$ is that it does not differentiate between, say, two countries that have the same percentave share of defaulted years in their history but one of which has defaulted more recently. To capture that, we introduce the variable $MEM2$ (featured in previous work by Eichengreen and Portes (1986), Reinhart et al. (2003), Flandreau and Zummer (2004), and Esteves (2007)), defined as the number of years since the last default. Hence, while γ_1 should be positive, γ_2 is expected to be negative, implying that the longer the time past since the last default the lower the default premium.

How do $MEM1_{i,t}$ and $MEM2_{i,t}$ relate to the theoretical setting of Section 2? First, recall from that discussion that defaults can be triggered by a large and persistent shock; and that, conditional on default, the more persistent the negative shock the longer the country will be in default. Provided that the shock is unobserved by lenders, $MEM1_{i,t}$ is summary statistic for the unobserved nature of both the size and the persistence of such a shock.[3] $MEM2_{i,t}$ complements $MEM1_{i,t}$ with further information on the timing and duration of the relevant shock.[4] Yet, MEM1 and MEM2 may also be capturing variations in unobserved parameters like β which define a country's "type" (in the sense of Eaton, 1996). It is common in sovereign debt models to treat β, as well as κ, as publicly-known parameters and empirical work to make them a linear function of time-varying fundamentals and country fixed effects. We consider the same set of controls in our regressions in Section 5. Yet, we are mindful that credit history – and hence $MEM1_{i,t}$ and $MEM2_{i,t}$ – may be proxying for some learning by investors' of these

[3]In fact, it is reasonable to presume that such infrequent shocks are not readily identifiable even by an econometrician armed with macroeconomic data spanning several years and with the benefit of hindsight. See Cochrane (1994) for a pertinent discussion of the difficulties in the ex-post identification of major macro shocks and of the role of agents' "actions" in aiding such identification. Our MEM variables are, essentially, summary statistics for these "actions"

[4]Note that upon the year of debt settlement, MEM2 is also gauging the length of the default. To the extent that longer defaults signal to investor that such countries are more subject to persistent shocks, the sign of MEM2 could, in principle, be ambiguous. Yet, because MEM1 also picks up length-of-default effects, what ultimately matters is the combined effect of MEM1 and MEM2 coefficients. Hence our focus in Section 5 on the joint significance of the two variables.

parameters too. Our DP metric may capture that learning as well.[5]

Second, a limitation of $MEM1_{i,t}$ and $MEM2_{i,t}$ is that they are slow-moving variables by construction. In a setting where discrete actions can be highly revealing of the state of fundamentals, changes in asset pricing can be rather discrete around those actions. In our case, the relevant actions are default and repayment and the relevant observation points for the computation of the DP are the pre-default and market reentry dates. The dummy sequence $\sum_{j=1}^{m}\delta_j DS(j)_{i,t}$ in equation (5) is meant to capture such a possible discontinuity. The dummy $DS(j)_{i,t}$ will equal one if t is the j^{th} year after which settlement on the defaulted debt is agreed with creditors, i.e, the year in which the country fully enters the international debt market for the first time after its last default; for all other years $DS(j)_{i,t}$ is set zero. With $0 < j \leq m$, the number of such dummies is m for all countries. If a country defaults more than once (i.e. is a serial defaulter), then each of these dummies will take a value of 1 more than once per country; if instead a country never defaulted, then $MEM1_{i,t} = MEM2_{i,t} = \sum_{j=1}^{m}\delta_j DS(j)_{i,t} = 0$, i.e., the default premium is naturally zero. The reader is referred to the Appendix for illustrations on how each component of the empirical default premium is constructed. As will be seen in Section 5, we will set $m = 5$ on empirical grounds: post-default dummies beyond a 5-year window are no longer statistically or economically significant. Regression estimates will tell us which of the dummies up to $m = 5$ have significant coefficients depending on the specification and estimation period. The coefficients on $MEM1_{i,t}$ and $MEM2_{i,t}$ will shed light on the hypothesis that investors' memories last longer than this 5-year window. By combining those two "memory' variables featuring in previous work by Reinhart et al. (2003), Eichengreen and Portes (1986), Flandreau and Zummer (2004), Esteves (2007) with the discrete post-settlement dummies used in Borenzstein and Panizza (2009) and Cruces and Trebesch (2013), our DP metric nests all those previous specifications used to gauge the effects of credit histories on spreads. Restricting credit history to be proxied only by the settlement dummies reduces not only the size (by between 60 to 100 basis points) but also the persistence of DP. Conversely, ignoring those dummies implies missing out on the significant post-settlement dynamics of the DP, as shown below. Thus, the inclusion of the three components of

[5] See Cogley and Sargent (2007) and Boz and Mendoza (2014) for a richer formalization of agents' learning on related deep parameters, which also boils down to using historical counting indicators akin to our MEM variables.

the DP is important to account for the differences between our estimates of the interest rate cost of default and those of previous work.

Combining equations (4) and (5) yields the following specification for the market spread of country i for each t in a cross-country panel with fixed effects:

$$s_{i,t} = \alpha_i + \mathbf{F}_{i,t}\boldsymbol{\beta} + \gamma_1 MEM1_{i,t} + \gamma_2 MEM2_{i,t} + \sum_{j=1}^{m} \delta_j DS(j)_{i,j} + \varepsilon_{i,t} \tag{6}$$

An important feature of the DP as defined above is that it does not necessarily move one-to-one with the (unconditional) market spread $s_{i,t}$. Indeed, measures of the interest cost of defaulting based on a difference of the market spread before default and after settlement can be misleading in light of theory. To see this, suppose that a country's (publicly-observed) fundamentals strengthen during the spell between default and market re-entry. Then, a fall in the market spread would be warranted by those fundamentals and this would not imply that the DP would be lower (or higher). Yet, equating the DP to the unconditional difference between the pre-default and post-settlement spread would suggest that the DP is lower. This point can be readily seen by re-writing (4) as:

$$\Delta DP_{i,t,T} = \Delta s_{i,t,T} - \Delta \mathbf{F}_{i,t,T}\boldsymbol{\beta} \tag{7}$$

The above equation shows that changes in the market spread equal changes in the DP if, and only if, $\Delta \mathbf{F}_{i,t,T} = \mathbf{0}$, i.e., the observable fundamentals do not move between the eve of the default at t and the year of market re-entry, T. In principle, the DP can be positive even if the spread at settlement turns out to be lower than that before the default, i.e., we can have a situation where $\Delta s_{i,t,T} < 0$ and $\Delta DP_{i,t,T} > 0$. Conversely, we can have a situation where the spread is higher and the DP is zero. In short, looking at differences between the pre-default and the post-settlement spread may be an inaccurate indicator of the "true" interest rate cost of default. We examine in Section 5 whether this has been the case.

4 Dataset

Following most studies, we use the Standard and Poor's (S&P) definition of default. The latter is either a unilateral interruption of repayment of interest and/or principal on contractual debt obligations by a sovereign government, or an event where the sovereign tenders an exchange offer to swap new for existing debt with less favorable terms than the original issue and the offer is accepted (even if contentiously) by lenders. Consistent with this definition, we also follow the S&P dating of the end of defaults. This occurs when there is a settlement between sovereign and investors on (all or most) outstanding arrears, and Standard & Poor's concludes that no further near-term resolution of creditors' claims is likely (Beers and Chambers, 2006). See Appendix Table A1 for a full list of default and settlement dates.

Unlike some previous studies, however, we treat sovereign defaults as watershed-like occurrences in the sense that re-scheduling episodes that are ramifications of the initial default are **not** counted as new defaults. As an illustration, take a country like Brazil which defaulted in 1983, but then renegotiated part of the defaulted debt in 1984, 1986, and 1988 before a full-fledged renegotiation in 1992 under the so-called Brady debt deal. In such a case, we treat 1983 as the year of default and 1993 as the year market re-entry, rather than treating 1983, 1984, 1986, 1988 as separate default/re-scheduling events.[6] This procedure is akin to that adopted by other classical sources on the chronology of sovereign defaults, such as Suter (1992) and Beim and Calomiris (2001), as well as by Reinhart and Rogoff (2009).[7] By using this definition and consistently sticking to annual data throughout the period we lower the number of observations to between 1200 to 1700 for each sub-period (pre-WWII and post-1970); the gain is a cleaner definition of credit events and a mitigation of feedback loops between debt renegotiation rounds and fundamentals which could affect consistency of the estimates.

Also unlike previous work, we consider an expanded definition of credit events that incorporates seemingly averted defaults due to last resort to multilateral financing. As in Catão and Milesi-Ferretti (2014), this broader definition of credit events adds to that of strict defaults episodes in which the country borrowed from the IMF more than 200% percent of quota. This brings to the sample some major sovereign credit events, including the Argentine and Mexico debt crises of 1995, the Asian and Russian crises of 1997-98, and the European debt crises of 2008-2011.

[6] In the case of Brazil, a final tranche of negotiations followed in 1994, so there might arguably be a case for taking 1995 as the year of full market re-entry. In their computations of haircuts, Cruces and Trebesch (2013) take Brazil 1994 as yet another credit event.

[7] see http://www.carmenreinhart.com/data/browse-by-topic/topics/7/

A main contribution of our empirical analysis to the literature is our new database on sovereign spreads. Relative to the studies on the determination of sovereign spreads spanning pre-WWII data by Bordo and Rockoff (1997), Obstfeld and Taylor (2003), Flandreau and Zulmer (2004), Mauro et al. (2006), Tomz (2007), and Catão, Fostel and Kapur (2009), we draw on a variety of new sources to add more countries and correct various data inconsistencies (as detailed in the Appendix). Relative to post-WWII studies using the J.P. Morgan EMBI database (which starts in the 1990s), we extend the data backward to 1970 for both advanced and emerging markets by combining yield data from both primary bond issuance and secondary market trading, obtained from many scattered sources (primary and secondary). In doing so, we control for the potential differential effects in spreads arising from the use of primary vs. secondary market yields, as described below. While the Reinhart and Rogoff (2009) database does not contain spread data, we also improve on their database by filling gaps in country series for key fundamentals, such as the ratio of external to total debt and monetary data (see also the Appendix). The end-product is a much more extensive annual database on sovereign spreads, totaling more than 2,900 observations (1639 in 1870-38 and 1294 in 1970-2011). This is far larger than the 131-144 observations in Ozler (1993, Table 1), 215-265 in Flandreau and Zumer (2004, Table A.7), 144-162 in Borenzstein and Pannizza (2009, Table 5), 169 in Benczur and Ilut (2015), and 310-447 annual-equivalent observations in Cruces and Trebesch's (2013) dataset. On those grounds alone, one might expect our estimates of the interest rate cost of default to be more globally representative and attendant inferences to be more robust.

Finally, throughout this paper, the dependent variable in our regressions – country spreads – is generally measured as the difference between the country's sovereign bonds issued in either pounds sterling (before $WWII$) or US dollars (after $WWII$) and the UK consol or the US 10-year government bond yield, respectively. For a few country/year observations during 1970-2011 for which we had information on the maturity and currency of issuance (mostly in the context of Dealogic primary issuance data), we measured the spread viz the relevant benchmark yield curve at a similar maturity.

5 Estimation

5.1 Econometric Controls

Because of data discontinuity around World War II, as well as the far-reaching structural changes in the global financial system around those years, it is natural to break down our sample into the pre-$WWII$ (comprising 1870-1938) and the post-$WWII$ sub-sample, which starts in the early 1970s and ends in 2011.[8]

Key to a sound measurement of the default premium is the inclusion in equation (6) of variables that span the relevant set of publicly-observable fundamentals. Accordingly, we include in $F_{i,t}$ all the variables featuring in our theoretical setting, namely: i) the ratio of public debt to GDP ratio; ii) the real world (risk-free) interest rate; iii) a trend-like measure of real GDP growth (computed as a 3-year moving average); iv) classic indicators of the output cost of default, such as trade openness, foreign exchange reserves (as a ratio to imports or GDP) and a fixed exchange rate dummy.[9] In addition, it is also sensible to assume that actual investors may, at times, depart from the model assumption of risk neutrality. To this effect, we add to all regressions an indicator of global risk-aversion (proxied by indices of stock price volatility in the UK and the US). Likewise, part of the sovereign debt may change hands between national and foreigners, so an indicator of the share of external debt in total debt is also clearly warranted.

We then extensively test the robustness of the resulting DP to other controls. These include the ratio of M2/GDP – a classic indicator of financial depth and hence of the financial disruption and related output cost of default, as well as of a country's capacity to borrow in one's currency and escape "original sin" (Eichengreen, Hausmann and Pannizza, 2003). We also include an indicator of country-specific exogenous shocks and volatility, which we proxy by the log-level and rolling standard deviations of the external terms of trade from its 3-year past moving average[10], as well as the general government fiscal balance to GDP – a standard macroeconomic fundamental. In addition, in light of

[8]Not until the end of the Bretton-wood regime in 1971 did international capital flows became sufficiently free, and private markets for sovereign bonds were rebuilt, so as to make our analysis meaningful. Confining analysis of post-$WWII$ data to the post-1970 years also ensures more direct comparability with pre-$WWII$ sub-sample.

[9]See, e.g., Aizenman and Marion (2004) and Borenzstein and Pannizza (2009)

[10]Mendoza (1995), Acemoglu et al (2003), Blattman et al (2006), Catao, Fostel and Kapur (2009) all use the TOT as a gauge for the exogenous country-specific component of macro shocks.

evidence from Tomz (2007) that seasoned borrowers (as opposed to newly independent countries that are new comers to world capital markets) tend to borrow at more favored terms, we include a sovereign dummy variable, which is one for newly independent countries in the post-$WWII$ period. All variables entering the regressions are lagged one year and all robust standard errors are computed clustered at the country level. We also add to all pre-1939 regressions a World War I dummy defined as equal to 1 in 1914-18 and zero otherwise; this serves to capture the disruptive effects caused by the war on international interest spreads. Finally, it is worth noting that some of these variables can encapsulate other (and sometimes contradictory) effects, so the size and signs of the respective coefficients can differ and likely to be affected by multicollinearity.[11]

One other important choice that needs to be made in running equation (6) concerns the inclusion of years where debt was in arrears and hence market access is typically limited or non-existent. In light of the arguments and evidence presented in Bussière and Fratzscher (2006), Gourinchas and Obtsfeld (2012) and Catão and Milesi-Ferretti (2014), we eliminate those years from the sample. Among other things, this helps mitigate endogeneity biases. Yet, our results do not critically hinge on such a choice.

Finally, we address the issue of model uncertainty following Pesaran and Timmermann (2007), who recommend averaging out the respective parameter estimates across models and specifications, without requiring such models or specifications to be nested. As shown below, our inferences are robust to this procedure as well.

5.2 Regression Results

The results for the 1870-1939 period are shown in Table 1. The first two columns display estimates with country fixed effects, while the last two columns add time fixed effects. Key fundamentals like the overall public debt/GDP ratio, the ratio of external to total debt, the gold-peg dummy yield the expected signs and are statistically significant for the most part. The specification without time fixed effects in columns (1) and (2) show that world financial market conditions – proxied by the world real interest rate

[11]One example is the fixed exchange rate dummy. As in Bordo and Rockoff (1996) and Obstfeld and Taylor (2003), being pegged to the gold standard in much of the 1870-1939 was perceived by investors as a seal of good fiscal and monetary housekeeping, thus helping lower country spreads. But fixed exchange rates can also increase country risk by encouraging borrowing in foreign currency and constraining macroeconomic management of real shocks (see Obstfeld, Shambaugh, and Taylor, 2005).

and/or by a composite of stock market index volatility in the UK and the US – are important. Foreign exchange reserves, a 3-year moving average of real GDP growth yield the expected negative sign, while the trade balance yields the opposite sign, but none of them is significant. Either with or without time fixed effects, the fundamental most critically important in theory – the public debt to GDP ratio – is reassuringly significant in all specifications and with similarly sized coefficients.

Consistent with the postulated model and crucial to our hypothesis, the debt settlement dummies (as discussed, starting from the year of market re-entry through 5-years hence) yield sizeable and significant coefficients through the second or third year after settlement in all four specifications. The two memory variables are economically and statistically significant in specifications without a time effect: MEM1 (years out of market as a share of total years up to that point) is sizeable; the negative coefficient of 0.01 for MEM2 indicates that investors' memories fade away at a rate of 1 basis point per year. This suggests that re-building investors' confidence takes time. While introducing time effects robs the significance of MEM2 due to multicollinearity, MEM1 maintains significance and is also similarly sized across the four specifications.

Table 2 adds further controls to check for robustness.[12] The country's terms of trade gap (viz its past three-year moving average) is an obvious control, and so are financial deepening (M2/Y) and government balance/GDP, but neither of them are statistically significant; nor is the dummy for capturing seasoned borrower effects which historical narrative suggests to be important (Tomz, 2007). To allow for the possibility that country specific aggregate volatility is time-varying we also include the standard deviation of the country's terms of trade over over a rolling 10-year window (as in Blatmann et al, 2007), but that variable is not significant either.

Table 3 reports the baseline results for 1970-2011. The first column shows that many of the well-known determinants of country risk show up as highly significant, including the trade balance, global stock market volatility, and reserves. Because many of the observations of pre-1990 spreads refer to primary market spreads (mostly of loan

[12] We opt for the country FE only specification because it both yields a higher adjusted R^2 and explicitly identifies the common country factors that theory postulates. Yet, the inference on robustness is invariant to that choice and the respective results with time effects included is available from the authors upon request.

instruments), post-1970 regressions also include a dummy which equals 1 in case the respective spread observation refers to primary market data.

Turning to the DP variables in Table 3, the post-settlement "impact" dummies are statistically significant through only the first or second year after default. Yet, their coefficients are sizeable and higher than in the pre-WWII period and would be misleading to take this as indicative of low DP persistence. This is because at least one of the MEM variables is highly significant and sizeable too. In fact, if we remove the MEM variables from the regression, making our specification similar to those of Borenzstein and Pannizza (2009) and Cruces and Trebesch (2013), the post-settlement dummies become significant at 5% all the way through the fifth year after market re-entry.[13] This indicates both that the MEM variables play an important role in our estimates and that those authors obtained a less persistent estimate because of data limitations – notably a shorter data sample spanning the post-1993 period to before the global financial crisis of 2008-09.[14] Memory effects are thus more long-lasting than entailed by the post-settlement dummies and, as with the pre-$WWII$ regressions, loss of investors' memory is gradual. Summing the fitted values for $DS(1)$, $MEM1$ and $MEM2$, the default premium on impact is about 150 bps higher than pre-WWII (see Figure 1).

Additional tests are reported in Table 4. Neither TOT volatility, nor fiscal balances and quality of institutions (as measured by the polity index) are significant. Further robustness is shown in the sixth column of Table 4 labeled (IMF), which changes the definition of default events in the memory variables to include large IMF support programs as in Catão and Milesi-Ferretti (2014). This change implies that big debt crises such as those in Mexico and Argentina in 1994 and 1995, as well as Thailand and Korea in 1997-99 and Ireland and Portugal in 2010-11 are now treated at par with formal defaults. While debt/GDP looses significance, the default premium variables remain broadly significant, highlighting a sizeable default premium.

[13]These results are not reported to conserve on space but available from the authors upon request.

[14]While we also experimented with 1824 as the starting point for those memory variables, the fit was worse and suggestive that WWII was a major watershed in investors' memories. The results using 1824 as the start point to compute countries repayment history are reported in the third column of Table 7.

5.2.1 Controlling for Actual Haircuts

As discussed in Section 2, the probability of default and the expected haircut are jointly determined in theory. To the extent that the determinants of both the default probability and the expected haircut are already included in the spread regression, such a regression would then be correctly specified in theory. Yet, one might ask why isn't a direct measure of the *actual* haircut included too? Indeed, Cruces and Trebesch (2013) argue that such a control is key to obtain a sizeable interest rate premia on defaults.

We answer this question on a conceptual and on a practical level. Conceptually, short of a punishment mechanism, the haircut that matters in a competitive bond market with forward-looking bond pricing is *future* haircuts. As such, past haircuts are only relevant if they provide additional information on expected haircuts in the future. Another conceptual reason is econometric: the estimated coefficients in some of our regressors (including those on the debt settlement (DS) dummies) are already capturing the (panel) average haircut; so making a case for adding the actual (episode-specific) haircut is equivalent to saying that the cross-country dispersion of haircuts matters. But under the standard normality assumptions and in a large sample such as ours, the OLS estimator averages that out.

On a practical level, however, the hypothesis that the cross-country dispersion of haircuts matter for the expected average haircut is worth considering. The last column of Table 4 reports on a regression featuring the same haircut specification as in Cruces and Trebesch (2013), who interact actual haircuts with the debt settlement (DS) dummies. Because data on haircuts is not as broadly available, the number of observations is roughly halved relative to previous regressions; so inferences must be treated with extra care. That said, an F-test on the joint significance of interactive (DS*HC) dummies yields a probability value of 33 percent, reported at the bottom of the Table. In contrast, the original DS dummies remain significant at 5 percent. Memory variables are rendered insignificant both due to possible multicollinearity with haircut size, as discussed in the next paragraph, and inclusion of time fixed effects, as seen in Table 3.

This lack of additional power of actual haircuts is readily explained by regressions reported in Table 5. The dependent variable is now the actual haircut at the time of the respective debt settlement for the countries covered in Cruces and Trebesch (2013) that could be matched into our dataset (as per the last update of that dataset in Reinhart and Trebesch, 2014). The explanatory variables are, in turn, those featuring in our model and previous regressions. The first column reports results for a sample of 42 debt settlement episodes that include a few low income countries outside our sample. This regression shows that the variables already included in our baseline specification explain as much as 88 percent of actual haircuts. If this sample is limited to only emerging markets (all of which included in our sample), the respective R-square is as high as 0.91! In particular, the actual haircut is highly predictable by the length of default (here captured by MEM2) and the size of the debt. This is consistent with evidence reported in Benjamin and Wright (2009), and Ghosal et al. (2010) of a high correlation (>0.6) between actual haircuts and the length of default which, in turn, can vary with the severity of the triggering shock – as per our discussion in Section 2 (see also Edwards, 2015 for supportive empirical evidence).[15] Overall, we interpret these results as being consistent with theoretical setting of Section 2, in that what matters is the expected haircut ($=1 - E(c)$). Since the latter is highly predictable by other controls, the gain of adding the cross-country dispersion of *actual* haircuts is insignificant.

In a nutshell, we are not asserting that actual haircuts – or indeed any other measure of the effective size of investors' loss from past defaults – are necessarily irrelevant for the evolution of the DP. At this point, we are somewhat agnostic about the value added of the *unexpected* component of past haircuts to understand the evolution of sovereign bond spreads. This is not only due to the conceptual reasons mentioned earlier on, but also due to data limitations: more extensive historical haircut data seem needed to test that hypothesis with greater confidence.[16] Either way, our key and novel result is that finding a sizeable and long-lasting DP is not crucially dependent on adding past realized haircuts to country spread regressions.

[15]Such a highish correlation in turn helps explain the loss of significance of the MEM variables when actual haircuts are included in the spread regressions, since the actual haircut is highly collinear with MEM2. Both Benjamin and Wright (2009), and Ghosal et al. (2010) provide theoretical mechanisms as to why the length of default helps predict haircuts.

[16]Kaminsky and Vega-Garcia (2015) provide evidence that haircuts play a role in the terms of future market access in pre-WWI Latin America but do not directly compute a DP as above. Incorporating pre-WWII haircut to our DP regressions is a worthy extension of our analysis once pre-WWII hair cut data becomes available for more than a handful of countries.

5.2.2 Memory Alternatives

In Tables 6 and 7 we provide two extra tests that are novel to the literature. One is to add a variable (called "mem4r") that measures the number of defaults per country. This extra memory indicator captures the extent to which, holding constant the average duration of defaults to date (as captured by MEM1), a country that defaulted more often tends to face a higher spread relative to the country that defaulted less often (but that stayed longer in default). The result, reported in column (2) of Table 6, indicates that the difference is insignificant and, if anything, fewer but longer defaults tend to trigger higher default premia relative to more frequent but shorter defaults.

Next we report on results of distinct specifications for the decay of investors' memory. In addition to the linear discounting underlying MEM2, we also consider quasi hyperbolic discounting, fully hyperbolic discounting, exponential discounting and inverse (geometric) discounting.[17] In all cases, MEM1 is reassuringly significant, but the mileage for MEM2 varies some (note that the change in sign is consistent with the change in functional form, in all cases implying a reduction in the default premium as time goes by). The regression fits for these alternative MEM2 specifications are no better than in our linear baseline specification, so there is a case to stick to the linear functional form. If anything, the default premium is higher, rather than lower. This further supports the evidence that the size of the default premium has been typically underestimated in the literature.

5.3 Default Premium Estimates

Figures 1 and 2 summarize our DP estimates as defined in equation (5). Figure 1 plots the evolution of the cross-country (mean) DP for pre- and post-WWII sub-samples as

[17]Let T be the time since the last default. We consider the following functional forms:

a. **Quasi-Hyperbolic Discounting**: $\beta\delta^T$. In this case, again, MEM2=0 when T->infinity, which is the case of countries that never defaulted. But then, even for the mild assumption of k=1, the discounting can be quite strong, certainly stronger than exponential discounting. And again MEM2 would still be defined over (0,1).

b. **Hyperbolic discounting**: $mem2 = \gamma/(1+kT)$, where γ and k measure the strenght of memory. We set $\gamma = 1$ and $k = \beta$ defined as above. For countries that never defaulted T -> ∞, so MEM2≃0 for any positive k. Conversely, if T=0, i.e, the default took place an infinitesimal instant ago, then MEM2=1. So MEM2 is bounded, being defined over [0,1).

c. **Exponential discounting**: $mem2 = \exp(-kT)$, where k is a discount factor that we assume to equal the average real interest rate during each of our sub-samples.

d. **Inverse (geometric) discounting**: $MEM2 = 1/T$.

per our favored specification (the one that does not include the time effects and removing most statistically insignificant variables in column 2).[18] One can then appreciate not only the sizeable DP in the first few years after market re-entry, but also that it does not die out thereafter, even if it becomes very small for the bottom quartile of the distribution.

[Figure 1 about here.]

Further, Figure 2 indicates that this is robust to various changes in model specification: instead of using our preferred specification, we compute the median of the default premia obtained by all alternative specifications (eight in total for pre- and post-WWII sub-periods) in the spirit of the Pesaran and Timmermann (2007) test for model uncertainty. The resulting error bands corroborate the inference of a positive and sizeable DP.

[Figure 2 about here.]

Figures 3 to 6 show the contrast between the median DP and the median sovereign spread for each of our two sub-samples.[19] They differ non-trivially, suggesting that the "raw" comparison between pre-default and post-settlement spreads is not generally a good proxy for the DP. As discussed in Section 3 and fleshed out in equation 7, the theoretically appropriate measure of the DP must net out changes in the publicly-observable fundamentals from the market spread. If this is not done, Figures 3 to 6 show that one ends up underestimating the DP at market re-entry by as much as 150 bps in the pre-WWII era and overestimating it by over 50 bps the post-1970 era. Another misleading inference would be to assume that the "true" interest cost of default (i.e. the DP) decayed more rapidly that it does in the post-WWII sample (300bps vs. 150 bps between the first and third year after settlement).

[Figures 3-6 about here.]

[18] We oberserve a very similar pattern with time effects included, however.

[19] We base these comparisons on the median rather than the mean to mitigate the effect of large outlier observations for the unconditional spread

Finally, these Figures also highlight how the DP can jump. This is consistent with our theoretical setting emphasizing the role of asymmetric information and default as a discrete signal. We sharpen further this point below by decomposing the change in the spread into changes in (publicly-observed) fundamentals vs. changes in the DP.

5.4 Fundamentals vs. Default Premium

Combining our estimated parameters with equation (7) allows us to gauge how much of the change in the sovereign spread is accounted for changes in publicly-observable fundamentals rather than in the DP and in the estimated error term. Figure 7 shows that the default premium accounts for between 35 to 50% of the spread within five years after debt settlement in 1870-1938. For the post-1970 period (Figure 8), the contribution is even higher on impact, reaching up to 60%. In comparison to the contribution of DP to changes in the market spread, the contribution of fundamentals is strikingly stable.

[Figures 7-8 about here.]

Figures 9 to 12 offer further insight. Bearing in mind the arguments in Reinhart et al. (2003) on the distinctive features of serial defaulters, we break down this spread decomposition exercise between countries that defaulted only once and those that defaulted more than once. As before, we compute this breakdown separately for pre- and post-WWII data. Figures 9-12 show that both the spread and the DP are larger for serial defaulters. It also reassuringly shows a low estimation error (as gauged by the gap between the spread in dotted lines and the top of the vertical bars for each year) in both cases. So, serial defaulters typically face costlier borrowing, for the same set of fundamentals viz non-serial defaulters.

[Figures 9-12 about here.]

6 Concluding Remarks

This paper has argued that the interest rate cost of default has been previously underestimated. As an illustration of the economic significance of our estimates, consider the average post-1970 defaulter with a mean public debt/GDP ratio of 50 percent and which never defaulted before. Our point estimates of the DP imply an extra interest cost of 2 percent of GDP upon market re-entry, tapering to 1 percent of GDP five years hence. A serial defaulter with otherwise similar characteristics would face an even higher interest bill. These costs are hardly trivial.

Why do we get more economically significant and more persistent estimates of the interest premium than previous studies? The answer lies in the combination of a broader metric of the DP (comprising the non-linear effects of the post-settlement dummies and slowly-decaying memory variables) and a much broader cross-country panel than previous studies – in both the time-series and cross-country dimmensions. Longer time-series is important to capture for slowly decaying DP effects, while a broader cross-section is also important because - as we documented - there is considerable variance in credit histories and default premia; so picking up less representative samples can yield distinct estimates. For instance, confining estimation to available emerging market sovereign loan data between the mid-1970s and early 1980s would favor very compressed spreads and small DP by the very nature of syndicated banking lending and the high liquidity in the global inter-bank market in those years. Conversely, if one picks up emerging market bond data for a handful of countries that completed the Brady deals in the late 1980s/early 1990s, and interrupts the sample before the 2008-09 global financial crisis, will likely find larger interest premia upon market re-entry but decaying rapidly due to the very bright emerging market outlook of 2002-2007. Since we average over much longer periods and countries, we avoid such sample selection pitfalls. By having subjected our estimates to a wider variety of controls (including the actual size of haircuts) and averaging of estimates across alternative specifications, we could also readily identify anomalies and obtain DP measures that seem very robust.

Two other novel results seem worth recalling. One is that changes in publicly-observable or "common-knowledge" fundamentals typically account for less than one-half of the changes in the spread between pre-default and debt settlement. This underscores again the importance of the DP in accounting for large shifts in the spread and hence in borrowing costs around major sovereign credit events. Second, we do not find a significant difference in DPs between countries that defaulted more often but for shorter periods vs. those that defaulted less often but for longer periods: what matters for the DP is the total number of years in default and how recent was the last default. This means that a serial defaulter pays a higher DP simply because it stays in default for a higher percentage of its time as sovereign. These results hold for both the pre-WWII and the post-1970 periods, corroborating their generality.

Overall, we see this paper's findings as a step toward re-connecting theory and evidence: a positive, sizeable, and persistent default premium that rises on market exclusion spells, helps rationalize why governments typically try hard not to default and, when they do, to seek early renegotiation.

Tables and Figures

Table 1: **PRE-WWII Sample**

	(1)	(2)	(3)	(4)
DS(1)	1.34**	1.31***	1.58***	1.58***
	(0.52)	(0.34)	(0.50)	(0.37)
DS(2)	1.00**	1.17***	1.19***	1.37***
	(0.40)	(0.30)	(0.43)	(0.35)
DS(3)	0.40	0.71**	0.52*	0.87***
	(0.33)	(0.34)	(0.27)	(0.30)
DS(4)	0.31	0.56	0.50	0.75**
	(0.34)	(0.38)	(0.31)	(0.34)
DS(5)	0.26	0.25	0.35	0.46
	(0.36)	(0.37)	(0.33)	(0.34)
MEM 1 1824	3.52***	3.72***	2.80***	3.09***
	(1.03)	(1.37)	(0.94)	(1.03)
MEM 2 1824	-0.01*	-0.01**	-0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Debt/GDP	0.70**	0.78***	0.62*	0.69**
	(0.33)	(0.28)	(0.32)	(0.28)
% Ext Debt	0.51*	0.27	0.70**	0.49
	(0.29)	(0.32)	(0.29)	(0.30)
Fixed	-0.26*	-0.27**	-0.15	
	(0.14)	(0.13)	(0.17)	
i^{World}	0.01	0.02**		
	(0.01)	(0.01)		
Stock Mkt vol	0.09*			
	(0.05)			
Avg past 3y RGDP growth	-0.01		0.00	
	(0.01)		(0.01)	
TB/GDP	1.55		0.57	
	(1.67)		(1.38)	
Reserves/GDP	-3.32		-3.45*	
	(2.73)		(2.04)	
DWWI	-0.41***	-0.30**	-2.35***	-0.06
	(0.11)	(0.13)	(0.58)	(0.17)
cons	1.36**	1.42**	2.40***	-0.42
	(0.61)	(0.52)	(0.69)	(0.46)
R^2	0.45	0.44	0.44	0.40
N	1451	1639	1451	1639
All DS(.)=0	0.04	0.00	0.00	0.00
All mem=0	0.00	0.00	0.02	0.02
Time FE	No	No	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Note: Dependent variable is the sovereign spread on long maturity bonds placed in external markets. Default premium variables: DS(z) is the additional spread after return to market z years ago, "MEM 1 1824" is % of years a sovereign has been out of the market since 1824, "MEM 2 1824" is total years since the last default. All other variables are defined in Appendix A.

Table 2: **PRE-WWII Sample Robustness**

	(1)	(2)	(3)	(4)	(5)
DS(1)	1.39***	1.31***	1.05**	1.30***	1.32***
	(0.41)	(0.39)	(0.42)	(0.34)	(0.39)
DS(2)	1.21***	1.23***	0.94**	1.17***	1.19***
	(0.34)	(0.32)	(0.38)	(0.30)	(0.34)
DS(3)	0.69**	0.74**	0.65	0.71*	0.73**
	(0.31)	(0.32)	(0.39)	(0.35)	(0.34)
DS(4)	0.54	0.53	0.63	0.56	0.58
	(0.36)	(0.38)	(0.42)	(0.38)	(0.38)
DS(5)	0.18	0.30	0.33	0.25	0.27
	(0.35)	(0.36)	(0.42)	(0.37)	(0.37)
MEM 1 1824	3.11	3.35	4.83***	3.58**	3.77***
	(2.07)	(2.24)	(1.23)	(1.50)	(1.34)
MEM 2 1824	-0.01*	-0.01**	-0.01**	-0.01**	-0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Debt/GDP	0.88***	0.86***	0.81**	0.78***	0.78**
	(0.31)	(0.30)	(0.38)	(0.28)	(0.30)
% Ext Debt	0.46	0.35	0.44	0.30	0.29
	(0.31)	(0.32)	(0.30)	(0.32)	(0.32)
Fixed	-0.28*	-0.24	-0.27*	-0.29**	-0.29**
	(0.15)	(0.15)	(0.13)	(0.14)	(0.13)
i^{World}	0.03***	0.03***	0.03**	0.03**	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
TOT	0.19				
	(0.31)				
TOT vol		0.99			
		(1.23)			
M2/GDP			0.32		
			(0.68)		
New Sovereign				-0.23	
				(0.91)	
Gov. Balance/GDP					-0.89
					(2.35)
DWWI	-0.34***	-0.37***	-0.33**	-0.33**	-0.34***
	(0.12)	(0.14)	(0.12)	(0.13)	(0.12)
cons	1.14*	1.13*	0.96*	1.43**	1.36**
	(0.65)	(0.63)	(0.50)	(0.53)	(0.55)
R^2	0.45	0.45	0.46	0.44	0.45
N	1442	1486	1361	1599	1540
All DS(.)=0	0.00	0.00	0.00	0.00	0.00
All mem=0	0.03	0.04	0.00	0.00	0.00

Note: The dependent variable in all specifications is the sovereign spread on long maturity bonds placed in external markets. The variables that measure default premia are DS(z) which capture the additional spread sovereigns face when they have returned to the market z years ago, "MEM 1 1824" which measures the percentage of years a sovereign has been out of international bond markets since 1824, "MEM 2 1824" which is the total years since the last default for each sovereign. All other variables are defined in Appendix A.

Table 3: **POST-WWII Sample**

	(1)	(2)	(3)	(4)
DS(1)	1.96***	2.00**	1.59**	2.07***
	(0.73)	(0.76)	(0.65)	(0.70)
DS(2)	0.75	0.81	0.44	0.87*
	(0.50)	(0.50)	(0.53)	(0.52)
DS(3)	0.82	0.83	0.35	0.81
	(0.66)	(0.63)	(0.55)	(0.55)
DS(4)	0.90*	0.89*	0.54	0.79*
	(0.53)	(0.50)	(0.39)	(0.41)
DS(5)	0.70	0.71	0.35	0.49
	(0.59)	(0.57)	(0.44)	(0.47)
MEM 1 1950	5.16**	5.99**	3.34*	3.60
	(2.35)	(2.46)	(1.85)	(2.30)
MEM 2 1950	-0.02	-0.02**	-0.04**	-0.05***
	(0.01)	(0.01)	(0.02)	(0.02)
Debt/GDP	1.89**	1.67**	2.31***	1.52*
	(0.90)	(0.75)	(0.81)	(0.80)
% Ext Debt	-0.34		0.03	
	(0.78)		(0.78)	
fixed	-0.49*	-0.40**	-0.33	
	(0.27)	(0.19)	(0.25)	
i^{World}	0.05	0.05		
	(0.04)	(0.03)		
Stock Mkt vol	0.05***	0.05***		
	(0.01)	(0.01)		
Avg past 3y RGDP growth	-0.16***	-0.15***	-0.17***	-0.16***
	(0.03)	(0.02)	(0.03)	(0.03)
TB/GDP	-4.27***	-3.87***	-3.41**	-3.75***
	(1.48)	(1.22)	(1.44)	(1.35)
Reserves/GDP	-3.14**	-1.74	-3.80**	
	(1.54)	(1.29)	(1.58)	
Primary Mkt	-1.52***	-1.09***	-0.80***	-0.76***
	(0.30)	(0.24)	(0.29)	(0.23)
cons	2.13**	1.62***	2.31**	2.66***
	(0.81)	(0.56)	(0.95)	(0.64)
R^2	0.30	0.32	0.41	0.42
N	1036	1293	1036	1296
All DS(.)=0	0.01	0.01	0.05	0.01
All mem=0	0.00	0.00	0.00	0.00
Time FE	No	No	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Note: The dependent variable in all specifications is the sovereign spread on long maturity bonds placed in external markets. The variables that measure default premia are DS(z) which capture the additional spread sovereigns face when they have returned to the market z years ago, "MEM 1 1950" which measures the percentage of years a sovereign has been out of international bond markets since 1950 and "MEM 2 1950" which is the total years since the last default for each sovereign. All other variables are defined in Appendix A.

Table 4: **POST-WWII Sample Robustness**

	(1)	(2)	(3)	(4)	(5)	(IMF)	(HC)
DS(1)	2.04**	1.99**	2.03**	1.92**	1.99**	1.74**	2.60*
	(0.79)	(0.77)	(0.79)	(0.79)	(0.81)	(0.69)	(1.51)
DS(2)	0.88	0.82	0.87*	0.61	0.83	0.65	-1.63*
	(0.53)	(0.50)	(0.52)	(0.51)	(0.53)	(0.48)	(0.91)
DS(3)	0.89	0.85	0.88	0.60	0.86	0.63	-1.79
	(0.62)	(0.63)	(0.63)	(0.62)	(0.63)	(0.48)	(1.26)
DS(4)	0.91*	0.88*	0.91*	0.82*	0.89*	0.88**	-0.94
	(0.49)	(0.49)	(0.49)	(0.48)	(0.48)	(0.43)	(1.15)
DS(5)	0.70	0.69	0.70	0.62	0.68	0.09	-1.04
	(0.58)	(0.56)	(0.57)	(0.60)	(0.57)	(0.32)	(1.22)
DS(1)x HC							-0.03
							(0.03)
DS(2)x HC							0.05
							(0.03)
DS(3)x HC							0.05*
							(0.03)
DS(4)x HC							0.04
							(0.02)
DS(5)x HC							0.04
							(0.03)
MEM 1 (1950)	6.62***	6.83***	6.47**	7.19*	6.79**	5.80***	2.56
	(2.38)	(2.35)	(2.51)	(4.22)	(2.65)	(1.96)	(2.92)
MEM 2 (1950)	-0.02*	-0.02**	-0.02*	-0.01	-0.02*	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)
Debt/GDP	1.56**	1.56**	1.54**	1.59*	1.50*	1.18	4.71***
	(0.75)	(0.74)	(0.75)	(0.92)	(0.76)	(0.83)	(1.13)
i^{World}	0.06*	0.06*	0.06*	0.08**	0.07**	0.10**	
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	
Stock Mkt vol	0.05***	0.05***	0.05***	0.05***	0.05***	0.04***	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Avg past 3y RGDP growth	-0.16***	-0.16***	-0.16***	-0.17***	-0.16***	-0.15***	-0.21***
	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.04)
TB/GDP	-3.69***	-3.80***	-3.68***	-2.97	-3.60***	-2.24*	-9.08***
	(1.24)	(1.16)	(1.21)	(1.98)	(1.28)	(1.24)	(2.89)
Reserves/GDP	-1.57	-1.47	-1.67	-2.24	-1.83	-3.03**	-4.65**
	(1.29)	(1.25)	(1.33)	(1.36)	(1.25)	(1.36)	(1.89)
TOT	0.14						
	(0.75)						
TOT vol		1.62					
		(1.66)					
M2/GDP			0.25				
			(0.42)				
Gov. Balance				0.61			
				(2.80)			
Polity					-0.01		
					(0.03)		
Primary Mkt	-1.07***	-1.12***	-1.03***	-0.91***	-1.12***	-0.75***	
	(0.25)	(0.24)	(0.27)	(0.25)	(0.28)	(0.26)	
cons	1.31**	1.20**	1.25**	0.95	1.47***	1.04**	3.66**
	(0.54)	(0.54)	(0.53)	(0.77)	(0.54)	(0.50)	(1.67)
R^2	0.30	0.32	0.30	0.29	0.31	0.24	0.19
N	1294	1296	1293	1186	1271	1198	595
All DS(.)=0	0.01	0.01	0.01	0.01	0.02	0.02	0.03
All mem=0	0.00	0.00	0.00	0.02	0.00	0.01	0.68
All DS(.)xHC=0							0.33
Time FE	No	No	No	No	No	No	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable in all specifications is the sovereign spread on long maturity bonds placed in external markets. The variables that measure default premia are DS(z) which capture the additional spread sovereigns face when they have returned to the market z years ago, "MEM 1 1950" which measures the percentage of years a sovereign has been out of international bond markets since 1950 and "MEM 2 1950" which is the total years since the last default for each sovereign. All other variables are defined in Appendix A. Column (IMF) reports results for a specification where we use a different definition of default based on credit from the IMF, check paper for details.

Table 5: **Haircut Estimation**

	(1)	(2)
DS	6.57	-12.66
	(9.10)	(11.85)
MEM 1 (1950)	8.75	14.06
	(14.68)	(16.84)
MEM 2 (1950)	2.21***	3.32***
	(0.53)	(0.64)
Debt/GDP	26.63**	35.39***
	(10.34)	(11.03)
Avg past 3y RGDP growth	1.27	1.83
	(0.96)	(1.09)
TB/GDP	-27.06	51.14
	(32.27)	(39.48)
Reserves/GDP	-86.63	-89.00
	(58.50)	(56.69)
R^2	0.88	0.91
N	42	29

Note: The dependent variable in all specifications is the haircut as calculated in Reinhart and Trebesch (2015). Cross sectional regressions of haircuts on the fundamentals that we use in spread regressions.

Table 6: **PRE-WWII Memory Specification Robustness**

	(4)	(mem4r)	(qhyp)	(hyp)	(exp)	(inv)
Debt/GDP	0.78***	0.80***	0.70**	0.69**	0.69**	0.72**
	(0.28)	(0.28)	(0.27)	(0.29)	(0.30)	(0.27)
% Ext Debt	0.27	0.28	0.55*	0.44	0.48	0.57*
	(0.32)	(0.30)	(0.32)	(0.33)	(0.33)	(0.31)
Fixed	-0.27**	-0.30**	-0.18	-0.20	-0.19	-0.18
	(0.13)	(0.13)	(0.14)	(0.14)	(0.14)	(0.14)
i^{World}	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
DS(1)	1.31***	1.61***	1.07	1.21***	1.29***	1.16**
	(0.34)	(0.48)	(0.65)	(0.43)	(0.42)	(0.57)
DS(2)	1.17***	1.37***	1.07**	1.08***	1.15***	1.17***
	(0.30)	(0.40)	(0.51)	(0.39)	(0.38)	(0.41)
DS(3)	0.71**	0.93***	0.67	0.64*	0.70**	0.76
	(0.34)	(0.32)	(0.48)	(0.35)	(0.34)	(0.45)
DS(4)	0.56	0.73**	0.57	0.51	0.56	0.65
	(0.38)	(0.36)	(0.46)	(0.39)	(0.38)	(0.45)
DS(5)	0.25	0.39	0.30	0.22	0.26	0.36
	(0.37)	(0.38)	(0.44)	(0.38)	(0.37)	(0.42)
MEM 1 1824	3.72***	7.03***	4.58***	3.93***	3.92***	4.56***
	(1.37)	(2.10)	(1.30)	(1.34)	(1.34)	(1.28)
MEM 2 1824	-0.01**	-0.02***	3.38	1.55	0.96	1.81
	(0.01)	(0.01)	(3.45)	(1.32)	(1.00)	(1.81)
MEM 4 1824		-51.91				
		(40.05)				
DWWI	-0.30**	-0.30**	-0.32**	-0.33**	-0.34**	-0.33**
	(0.13)	(0.13)	(0.13)	(0.12)	(0.13)	(0.13)
cons	1.42**	1.75***	0.28	-0.13	0.24	0.30
	(0.52)	(0.56)	(0.29)	(0.52)	(0.31)	(0.28)
R^2	0.44	0.38	0.40	0.43	0.42	0.39
N	1639	1639	1639	1639	1639	1639

Table 7: **POST-WWII Memory Specification Robustness**

	(4)	(mem4r)	(1824)	(qhyp)	(hyp)	(exp)	(inv)
Debt/GDP	1.68**	1.72**	1.71**	1.38*	1.61**	1.64**	1.40*
	(0.77)	(0.79)	(0.71)	(0.74)	(0.75)	(0.75)	(0.75)
Fixed	-0.37**	-0.37**	-0.41**	-0.31*	-0.37**	-0.38**	-0.30
	(0.18)	(0.18)	(0.17)	(0.18)	(0.18)	(0.18)	(0.18)
RGDP 3y	-0.15***	-0.15***	-0.16***	-0.15***	-0.15***	-0.15***	-0.15***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
TB/GDP	-4.11***	-4.20***	-4.62***	-4.30***	-4.12***	-4.10***	-4.30***
	(1.22)	(1.26)	(1.63)	(1.24)	(1.23)	(1.23)	(1.23)
i^{World}	0.06*	0.06	0.09**	0.08**	0.07*	0.07*	0.08**
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)
Stock Mkt vol	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Primary Mkt	-1.06***	-1.07***	-1.06***	-0.89***	-1.03***	-1.03***	-0.87***
	(0.23)	(0.24)	(0.21)	(0.22)	(0.22)	(0.22)	(0.22)
DS(1)	2.12***	2.13***	2.64***	1.81***	1.80**	1.83**	1.98***
	(0.76)	(0.75)	(0.75)	(0.66)	(0.70)	(0.71)	(0.70)
DS(2)	0.92*	0.92*	1.37***	0.75	0.65	0.67	0.91*
	(0.50)	(0.49)	(0.51)	(0.47)	(0.45)	(0.45)	(0.49)
DS(3)	0.89	0.90	1.26*	0.80	0.63	0.64	0.94
	(0.62)	(0.62)	(0.66)	(0.61)	(0.59)	(0.59)	(0.61)
DS(4)	0.93*	0.95*	1.26**	0.89	0.70	0.71	1.00*
	(0.50)	(0.51)	(0.52)	(0.58)	(0.51)	(0.51)	(0.55)
DS(5)	0.76	0.77	1.03*	0.75	0.56	0.56	0.84
	(0.58)	(0.57)	(0.57)	(0.59)	(0.56)	(0.56)	(0.59)
MEM 1 1950	5.56**	6.46	0.77	6.81***	5.29**	5.18**	7.06***
	(2.46)	(3.88)	(2.53)	(2.48)	(2.50)	(2.49)	(2.45)
MEM 2 1950	-0.03**	-0.03**	-0.02*	5.56	3.72**	2.76***	2.37
	(0.01)	(0.01)	(0.01)	(5.31)	(1.41)	(1.00)	(3.42)
MEM 4 1950		-7.23					
		(21.59)					
cons	1.49***	1.46**	2.36**	0.27	-1.29	-0.45	0.32
	(0.55)	(0.56)	(1.10)	(0.48)	(0.86)	(0.60)	(0.47)
R^2	0.33	0.32	0.37	0.29	0.34	0.34	0.28
N	1293	1293	1293	1293	1293	1293	1293

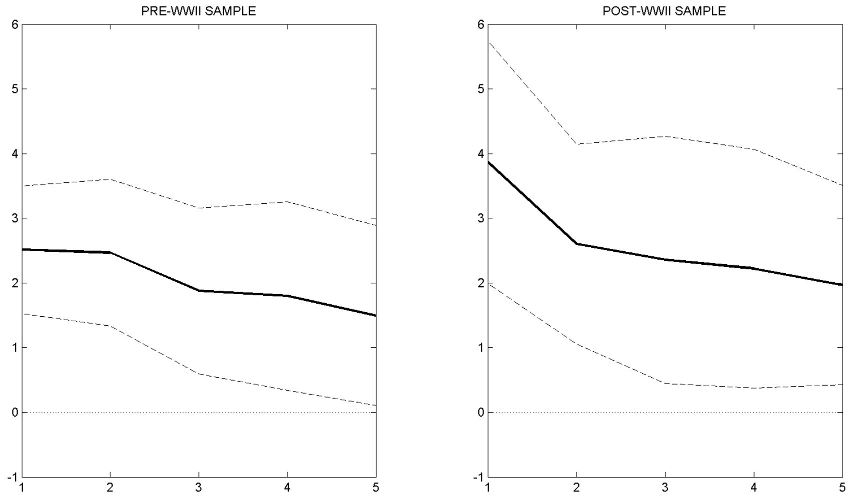

Figure 1: **Average Default Premium** for (2) of Table 1 (Left Panel) and Table 3 (Right Panel). Solid line is average default premium for sub-sample. Dashed lines are bands for 1.96 standard errors of the mean default premium.

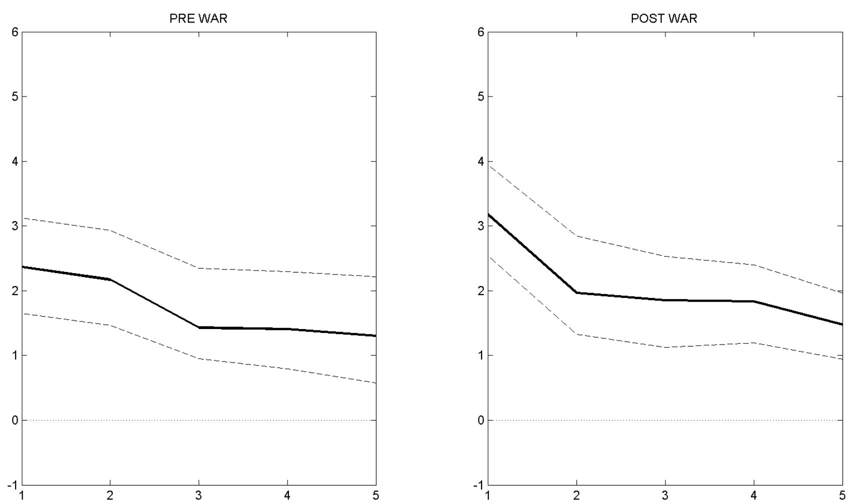

Figure 2: **Median Default Premium estimates across all Specifications.** Note: Solid line is median default premium for all specifications for each of our samples: "PRE WAR" and "POST WAR". Dashed lines are percentiles 75th and 25th.

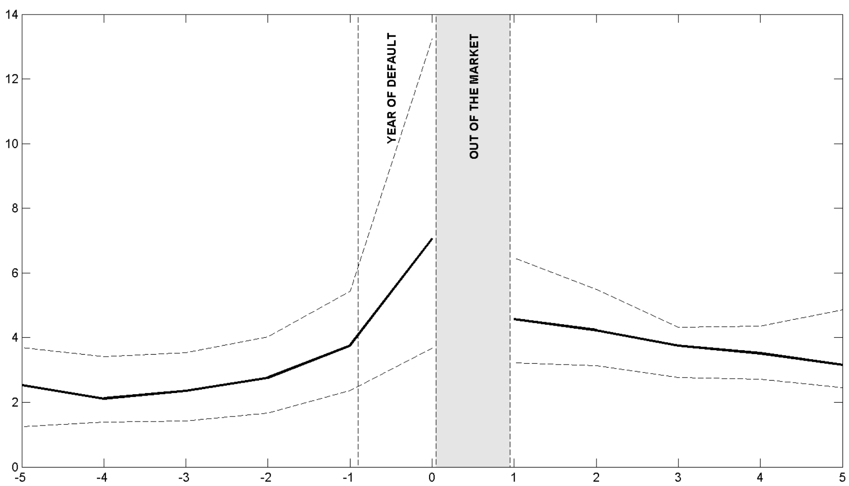

Figure 3: **Market Spreads around Default Episodes in the Pre-WWII sample.** Median (solid) and 25 and 75 percentiles (dashed) market spread in the run-up to default and after market return.

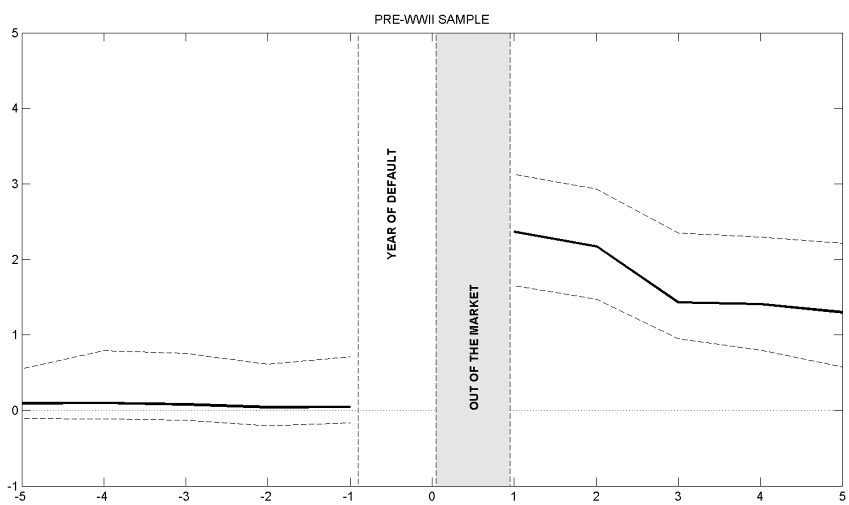

Figure 4: **Default Premia around Default Episodes in the Pre-WWII sample.** Median (solid) and 25 and 75 percentiles (dashed) default premium for all specifications in the run-up to default and after market return.

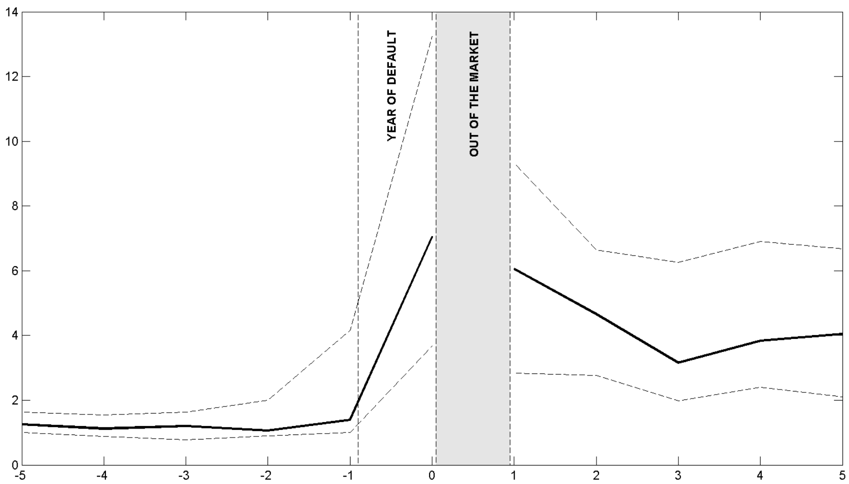

Figure 5: **Market Spreads around Default Episodes in the Post-WWII sample.** Median (solid) and 25 and 75 percentiles (dashed) market spread in the run-up to default and after market return.

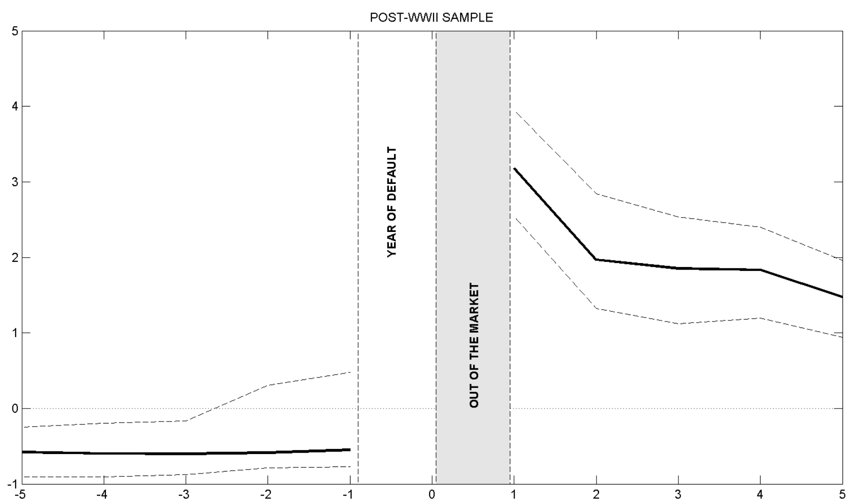

Figure 6: **Default Premia around Default Episodes in the Post-WWII sample.** Median (solid) and 25 and 75 percentiles (dashed) default premium for all specifications in the run-up to default and after market return.

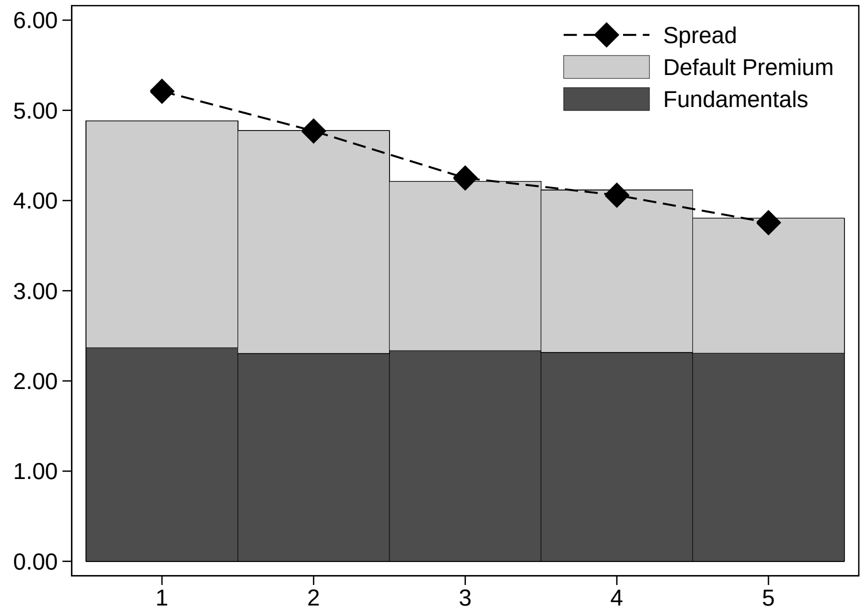

Figure 7: **Decomposing the Mean Market Spread in the Pre-WWII sample.** Cross-country mean fitted values of Fundamentals, $\mathbf{F}\boldsymbol{\beta}$, and DP for (2) of Table 1.

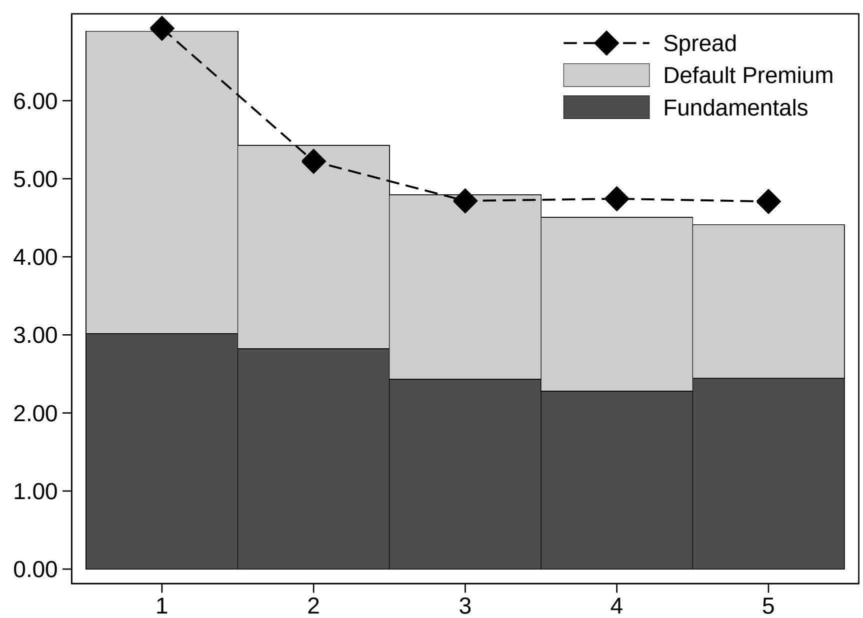

Figure 8: **Decomposing the Mean Market Spread in the Post-WWII sample.** Cross-country mean fitted values of Fundamentals, $\mathbf{F}\boldsymbol{\beta}$, and DP for (2) of Table 3.

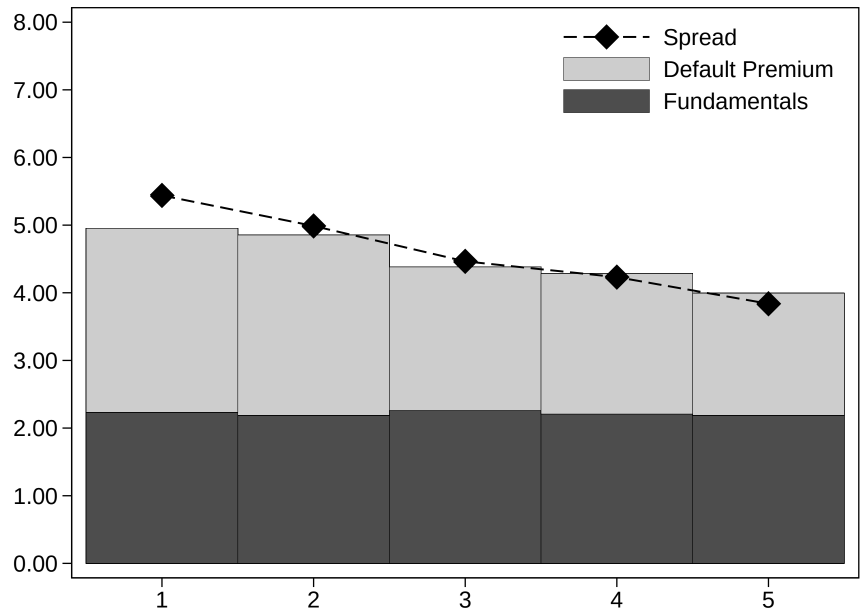

Figure 9: **Decomposing the Mean Market Spread in the Pre-WWII sample, Serial Defaulters.** Same as Figure 7 focusing on countries with more than one default since 1824.

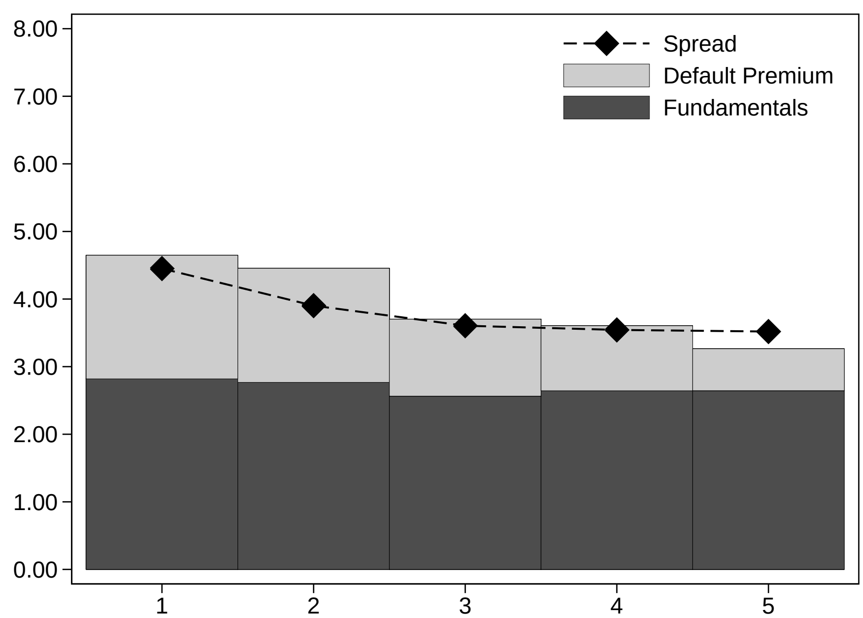

Figure 10: **Decomposing the Mean Market Spread in the Pre-WWII sample, Non-Serial Defaulters.** Same as Figure 7 focusing on countries defaulting for the first time since 1824.

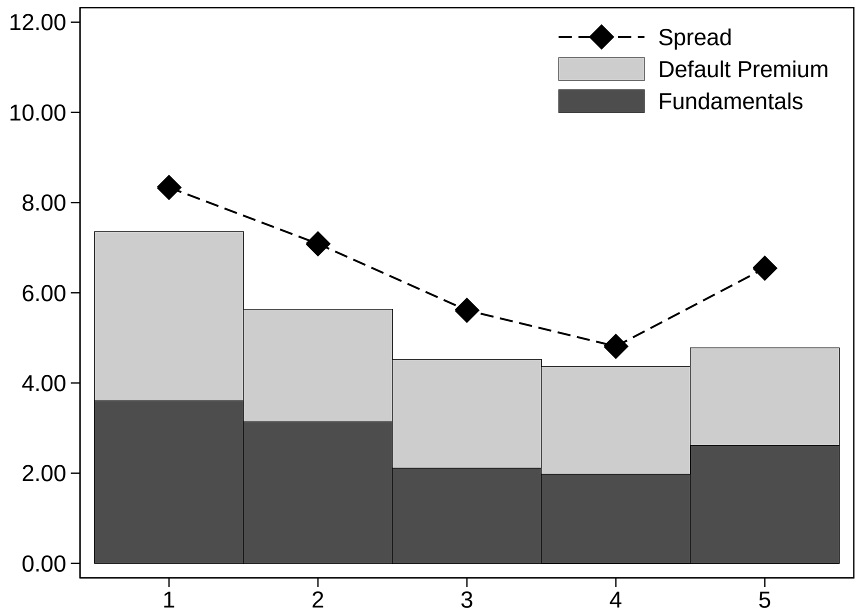

Figure 11: **Decomposing the Mean Market Spread in the Post-WWII sample, Serial Defaulters.** Same as Figure 8 focusing on countries with more than one default since 1950.

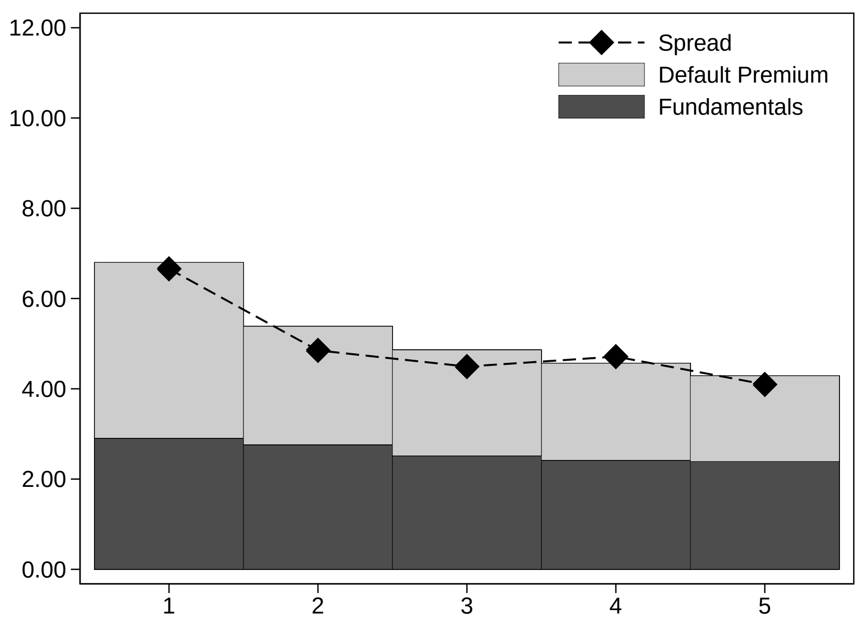

Figure 12: **Decomposing the Mean Market Spread in the Post-WWII sample, Non-Serial Defaulters.** Same as Figure 8 focusing on countries defaulting for the first time since 1950.

A Appendix I

Here we present sources for each of the variables used in the empirical analysis.

A.1 Spreads on Foreign Currency Debt

In the pre-WWII period we used secondary market yields data alone. The post-World War series on spreads combine primary market yields (yields at issuance), mostly for the 1970s and 1980s, and yields on secondary markets – largely from 1991. The reason to resort to primary market yield data in the post-WWII period is due to the much greater resort by sovereigns to syndicated bank loans and the eurodollar bond market, for which yield data on secondary trading is hard to obtain. Further specifics are provided next.

A.1.1 Pre-WWII

Our main data sources for sovereign bond yields up to World War II is the Global Financial Data (GFD), downloaded in April 2014. All spreads are computed against the British consol yield listed in GFD. Over time, GFD has improved the quality of historical data on government bond yields, addressing of the some of the criticisms to older vintages of the database (see,e.g., Obstfeld and Taylor, 2003 and Mauro et al., 2006). However, we found several inconsistencies between GFD data and other sources and a few data entries that appear to be mistaken. Thus, we complement GFD data and replace those seemingly mistaken entries based on information available in the sources specified next.

First, we replace GFD for Argentina, Canada, Chile, China, Greece, Japan, Mexico, Portugal, Russia and Sweden before 1917, by those provided in Mauro et al. (2006), where the methodology and ultimate sources are clearly specified and data is also available at shorter frequencies if needed. In the majority of cases for these countries, differences between the two sources were small.

Regarding inter-war bond yields for European countries, we adjusted GFD's yield for Bulgaria in 1933 for a reduction of coupon that GFD didn't account for based on information from the League of Nations yearbooks. We also used data from the League of Nations Yearbooks for Germany, Bulgaria, Hungary, and Poland (after 1930 and The *Economist* for 1928-29). These correspond to bonds traded in the London market so making the British consol bond the obvious risk-free reference rate counterpart (as discussed in Obstfeld and Taylor, 2003). For Turkey, GFD data after 1919 implies an unrealistically highly negative sovereign spread, so we opted instead to use the value provided in Obstfeld and Taylor (2003) for that year. In the case of Romania, none of these sources provided yield data, so our spread series is the yield differential between Romania's 4% consol and the French 5% consol reported in Oosterlinck and Ureche-Rangau (2012) and kindly supplied by the authors.

Regarding Latin American countries, the following adjustments were made. First, we excluded GFD bond yields for Peru (1890-1910) and Honduras (before 1930) in the absence of historical information corroborating their excessively elevated levels (in excess of 3000 basis points) reported in the GFD over those years. We filled gaps for Colombia yields in 1927-32 (except 1929) based on Marichal (1989). In the case of Venezuela in 1915-1929, the GFD assumes the underlying bond was a perpetuity where in fact it was not. We recompute the yield adjusting for this effect. For Uruguay, we compute the yield by hand picking data from the *Economist* for 1879-83. GFD and Mauro et al (2006) do not account for a change in the coupon rate in the settlement of 1878, which we do based on that source.

A.1.2 Post-WWII

The main source for emerging market spreads in the post-war sample was JP Morgan's EMBI spreads, from MorganMarkets, Datastream and Global Financial Data. We excluded Morocco data after 2007 and also annual observations for which the respective EMBI index was based on less than a month of daily observations.

For Euro area countries, the relevant spread was obtained by subtracting the respective country yield on its 10-year

bond from that of the German 10-year Bund yield. In other cases, as specified below, we used the US 10-year yield as a benchmark rate.

For Argentina in 1983-1993 we used the bond yield from the database underlying Arellano (2008) – as kindly supplied to the authors – subtracted from US 10-year bond from IFS. The 1982 yield was based on that reported in Folkerts-Landau (1985, Table 7) on German Mark denominated bonds, having spread calculated against the corresponding maturity German Bund yield. Also from Folkerts Landau (1985, Table 8) comes the spread on Brazil in 1982-3 calculated against a 5 year maturity US bond.

For Peru in 1991-96, we applied the correlation between the EMBI Latin American index and Peru after 1997 to back-out an estimate of the EMBI spread for Peru. The same procedure was followed to derived the annual spread figures for Uruguay during 1991-93. For Venezuela 1982-3, we used Folkerts Landau's (1985, Table 7) German Mark denominated bond yields, having spread calculated against the corresponding matured German Bund yield.

Thailand 1996 is from IMF (2007) and Russia 1996 from GFD, which is consistent with the Russian EMBI spread series for subsequent years.

Data from primary market issuance was sourced from the World Bank's (WB) publication "Borrowing in International Capital Markets", 1973 to 1981 1st half and Dialogic Bondware and Loanware. We excluded from the WB dataset Pakistan 1981 which was an extreme outlier, and from Dialogic data Egypt in 1997, Tunisia, Pakistan and Lithuania all together. Spreads were computed for each bond separately, depending on currency and maturity and then averaged weighting by amount issued and maturity. Currencies of denomination used were US dollar, Japanese yen, german mark, sterling, guilden, australian dollar, canadian dollar and swiss franc in the case of the WB data and additionally euro in the case of Dialogic.

A.2 Definition of Credit Events, and Default and Settlement dates

Our chief source of information on sovereign credit events throughout 1870-2011 is the set of Standard and Poor's rating agency reports, as compiled by Borensztein and Panizza (2008) for the pre-2007 years and updated in http://www.standardandpoors.com/ratings/articles/en/us/?articleType=HTML&assetID=1245350156739. As discussed in Section 4, partial re-scheduling and debt negotiation attempts following the original default decision which, nevertheless, do not result in a complete or near complete settlement of arrears, are not classified as new default or a final settlement of the debt. In short, as in Sutter (1992), Beim and Calomiris (2001), and Reinhart and Rogoff (2009), we take the years between the initial default and full (or near full) settlement of arrears as per the S&P definition as the length of the default. Unlike Lindert and Morton (1987) but in line with much of the subsequent literature, we do not distinguish between "voluntary" and "involuntary" defaults or "market-friendly" vs. "market-unfriendly" reschedulings, focusing on the common denominator of all such events – namely, a breach in the original contractual terms of the debt agreement.

As also discussed in Section 4, we complement the definition of sovereign credit events centered on defaults on sovereign bonds with that based on large resort to multilateral financing. As in Catão and Milesi-Ferretti (2014), this is defined as events that imply resort to 200% or more the respective country's quota at the IMF. We compute the share of IMF's credit to country members from the IMF's International Financial Statistics (IFS) database which is publicly available online.

Table A1 reports the exact country/year dates of all the credit events in our series.

Table A1: **List of Defaults and Settlements in Sample**

1870-1938			1970-2011		
country	default	settle	country	default	settle
Argentina	1890	1893	Argentina	1982	1992
Austria	1868	1870	Argentina	2001	?
Austria	1914	1915			
Austria	1932	1933	Brazil	1983	1992
Austria	1938	1938	Bulgaria	1990	1994
Brazil	1898	1901	Chile	1971	1975
Brazil	1914	1919	Chile	1983	1990
Brazil	1931	1933	Costa Rica	1981	1990
Brazil	1937	1943	Croatia	1992	1996
Bulgaria	1916	1925	Dominican Rep.	1982	1994
Bulgaria	1932	1932	Dominican Rep.	2003	2004
Chile	1880	1883	Ecuador	1983	1995
Chile	1931	1947	Ecuador	1999	2000
Colombia	1900	1904	Ecuador	2008	2014
Colombia	1932	1944	Indonesia	1998	2002
Czechoslovakia	1938	1946	Jamaica	1978	1979
Egypt	1876	1880	Jamaica	1981	1985
El Salvador	1921	1922	Jamaica	1987	1993
El Salvador	1932	1935	Jamaica	2010	?
El Salvador	1938	1946	Mexico	1982	1990
Germany	1932	1949	Morocco	1983	1983
Greece	1894	1897	Morocco	1986	1990
Greece	1932	1964	Pakistan	1998	2000
Hungary	1932	1937	Panama	1983	1996
Mexico	1866	1885	Peru	1976	1976
Mexico	1914	1922	Peru	1978	1992
Mexico	1928	1942	Philippines	1983	1992
Peru	1931	1951	Romania	1982	1994
Poland	1936	1937	Russia	1917	1995
Portugal	1892	1901	Russia	1998	2000
Romania	1933	1958			
Russia	1918	1995	Serbia	2000	2004
Spain	1837	1867	Slovenia	1992	1996
Spain	1873	1882	South Africa	1985	1993
Turkey	1876	1881	South Korea	1982	1986
Turkey	1915	1928	Turkey	1978	1982
Uruguay	1876	1878	Uruguay	1983	1991
Uruguay	1891	1891	Uruguay	2003	2003
Uruguay	1915	1921	Ukraine	1998	2000
Uruguay	1933	1938	Venezuela	1983	1997
Venezuela	1865	1881			
Venezuela	1892	1895			
Venezuela	1898	1904			
Yugoslavia/Serbia	1895	1896			
Yugoslavia/Serbia	1932	1950			

A.3 Construction of Credit History Indicators

Illustration Case 1: Single Default

Suppose that the relevant sovereign history starts in 1850 for country i.[20] In 1898 the country defaults and it settles its debt with creditors in 1902. There is no default thereafter. First, $MEM1_{i,t} = 0$ for all $t < 1898$, $MEM1_{i,t} = \frac{t-1898}{t-1850}$ for $1898 \leq t \leq 1902$, and $MEM1_{i,t} = \frac{1902-1898}{t-1850}$ for all $t > 1902$. Second, $MEM2_{i,t} = 0$ for all t<1898 and $MEM2_{i,t} = t - 1898$ for all $t > 1898$.Let's now turn to the debt settlement dummies, DS. Consider a window of $m = 2$. The two $DS(j)_{i,t}$ dummies are defined as: $DS(1)_{i,t} = 1$ for $t = 1903$ and $DS(1)_{i,t} = 0$ for $t \neq 1903$, and $DS(2)_{i,t} = 1$or $t = 1904$ and $DS(2)_{i,t} = 0$ for $t \neq 1904$.

Illustration Case 2: Serial default

Consider the same information as in Case 1 but now suppose that the country defaults again 1928 and re-enters the markets after settlement in 1935. So in this example country i defaults twice. In this case the variables are defined as follows.

First, $MEM1_{i,t} = 0$ for all $t < 1898$, $MEM1_{i,t} = \frac{t-1898}{t-1850}$ for $1898 \leq t \leq 1902$, and $MEM1_{i,t} = \frac{1902-1898}{t-1850}$ for $1902 < t \leq 1928$; then $MEM1_{i,t} = \frac{1902-1898+t-1928}{t-1850}$ for all $1928 < t \leq 1935$ and $MEM1_{i,t} = \frac{1902-1898+1935-1928}{t-1850} for$ all $t > 1935$.

Second, $MEM2_{i,t} = 0$ for all $t < 1898$ and $MEM2_{i,t} = t - 1898$ for $1898 \leq t \leq 1902$; then, $MEM2_{i,t} = t - 1928$ for $t \geqslant 1928$. Thus, serial default implies that $MEM2_{i,t}$ is reset: upon the year country i defaults for the second time, $MEM2_{i,t}$ is reset to zero (in 1928 in this example) and keeps growing from $t > 1928$ as per $MEM2_{i,t} = t - 1928$.

Finally, turning to how the debt settlement dummies, DS, are defined in this example, they become: $DS(1)_{i,t} = 1$ for $t = 1903, 1936$ and $DS(1)_{i,t} = 0$, otherwise. $DS(2)_{i,t} = 1$ for $t = 1904, 1937$ and $DS(2)_{i,t} = 0$ otherwise.

[20]We thank Guido Sandlieris for suggestions on these illustrations.

A.4 GDP data

A.4.1 1870-39

Nominal and Real GDP data are Mitchell (2013) and Maddison (2003), complemented with the dataset from Barro and Urzua (2008), with exception of the following cases:

Argentina, Brazil, Chile and Mexico: from Aiolfi, Catão, and Timmermann (2011), available at: http://rady.ucsd.edu/faculty/directory/timmermann/LAC-4_database_Aiolfi-Catao-Timmermann_1870-2004. The authors present a variety of robustness tests to show that their estimates are superior to those provided by Maddison.

Greece: new estimates kindly provided by George Kostelenos, based on his earlier research (Money and Output in Modern Greece, 1858-1938, Athens, 1995).

Russia: the net national product estimate from Paul Gregory, Russian National Income, 1885-1913 (Cambridge: Cambridge University Press, 1983), Table 3.1, pp. 56-7, ("variant 1").

Spain: Prados de la Escosura, Leandro 2003, El Progreso Economico de España, 1850-2000 (Madrid: Fundacion BBVA), Table A. 9.1 and A.13.5, pp. 517-22 and 681-82.

Venezuela: Baptista, Asdrœbal, 1997, Bases Cuantitativas de la Economia Venezolana, 1830-1995, Caracas.

Nominal GDP from Obsfeld and Taylor (2003) except for the above countries (which are provided in the respective sources), as well as for New Zealand (which is from Rankin, Keith, 1992, "New Zealand's Gross National Product", Review of Income and Wealth, 38(1), pp.49-6, Table 4, p.60/61), and for Hungary and Yugoslavia which are taken from Mitchell, Brian, 2003, International Historical Statistics: Europe, New York.

A.4.2 1970-2011

IMF's International Financial Statistics database.

A.5 Total Government Debt

A.5.1 1870-39

Our chief source was Obstfeld and Taylor (2003), except for:

Argentina, Brazil, Chile and Mexico: from Aiolfi, Catão, and Timmermann (2011), see above;

Bulgaria: Dimitrova and Ivanov (2014);

Greece: Lazaretou, Sophia, 1993, "Monetary and Fiscal Policies in Greece: 1833-1914", Journal of European Economic History, vol.22, no.2, as kindly supplied by the author.

Peru: Kelly (1998) and League of Nations, op. cit., several issues;

Romania: Stoenescu et al. (2014);

Serbia/Yugoslavia: Hinic, Durdevic, and Sojic (2014);

Venezuela: Baptista, Asdrœbal, 1997, Bases Cuantitativas de la Economia Venezolana, 1830-1995, Caracas; Kelly, Trish,1998, Ability and Willigness to Pay in the Age of Pax Britannica, Explorations in Economic History 35, pp.31-58, as kindly provided by the author; and League of Nations, op. cit., several issues.

For the remaining countries, the sources were the League of Nations Yearbooks, several issues, and Reinhart and Rogoff (2009).

A.5.2 1970-2011

IMF's World Economic Outlook and World Bank's World Development Finance databases. In cases of conflict or missing information in either databases, we used Abbas et al (2010), "A Historical Public Debt database", IMF working paper 10/245.

A.6 External Government Debt

A.6.1 1870-39

The chief sources were Flandreau, M. and F. Zulmer, 2004, The Making of Global Finance, 1880-1913, Paris, Table DB3, for the period 1880-1913 and the League of Nations Yearbooks for 1919-1939. In addition we used the following country-specific sources:

Argentina: della Paolera and Taylor (2003), Straining the Anchor, Chicago;

Austria: From Jobst and Scheiber (2014), with pre-1880 separately and kindly communicated by Clemens Jobst;

Brazil: IBGE, 1987, Estatisticas Historicas do Brasil, Rio de Janeiro;

Chile: Braun et al., 1997, Economia Chilena: Estatisticas Historicas, 1810-1995, Santiago;

Colombia, Mexico, India, and Venezuela: Kelly Trish, op cit., kindly provided by the author.

Egypt and Turkey: Tuncer and Pamuk (2014), kindly provided by Ali C. Tuncer;

Greece: Lazaretou, Sophia, 1993, "Monetary and Fiscal Policies in Greece: 1833-1914", Journal of European Economic History, vol.22, no.2, as kindly supplied by the author;

Uruguay: Nahum, B., 2007, Estadisticas Historicas de Uruguay, 1900-1950, Vol III, Montevideo

A.6.2 1970-2011

World Bank's Global Development Finance database. For advanced countries, it was assumed that externally issued debt was zero except for countries/periods under which some of those countries were under IMF program, in which case, debt to the IMF was deemed to represented all external debt.

A.7 Fixed Exchange Rate Regime (*Fixed*)

A.7.1 1870-2013

Defined as dummy variable, taking the value of 1 when the country was on the gold standard. The information source for gold standard membership is Catão and Solomou (2005) for the sub-period 1870-1913 and Obstfeld and Taylor (2003) and Officer, Lawrence, "Gold Standard", available at: http://eh.net/encyclopedia/gold-standard/.

A.7.2 1970-2011

The fixed exchange rate dummy was constructed based on the IMF classification (categories "1" and "2"), as compiled in Reinhart,C., K. Rogoff and Ethan O. Ilzetzki, 2009 "Exchange Rate Arrangements Entering the 21st Century: Which Anchor Will Hold?" (available at: http://www.carmenreinhart.com/research/publications-by-topic/exchange-rates-and-dollarization/, to 2007 and updated by the authors, based on IMF information, for the remaining years.

A.8 Nominal interest rate in the world (i_{t-1}^{WORLD})

A.8.1 1870-1939

GDP weighted average of the (short-term) money market interest in the UK and the US (the latter from 1920) deflated by CPI inflation. The source for the nominal interest is Holmer, Sidney and Richard Silla, A History of Interest Rates, New Jersey, 1996. The source for CPI inflation data in 1870-1913 is Catão and Solomou (2005). For post-1914 data is Obstfeld and Taylor (2003) and the Global Financial Data database. GDP data is from Maddison (1995).

A.8.2 1970-2011

Computed the same was as for 1870-1939, but including all G-7 economies plus Australia. Money market rates, CPI and inflation and US dollar GDP data for all countries are from the IMF's International Financial Statistics.

A.9 Stock Market Volatility

A.9.1 1870-1939

Computed as the standard deviation of the month to month change over the 12-month annual window for the London stock market index from Global Financial Data for the period 1870-1918. For 1919-1939, the US stock market index provided in Global Financial database was used.

A.9.2 1970-2011

Stock market volatility is measured by the VIX/VOX index compiled in Philips, Steve and al. "External Balance Assessment Methodologies", IMF working paper 13/296 from 1986. For the pre-1986 the index was spliced based on the S & P 500 index actual volatility, calculated standard deviations of monthly changes as for 1870-1939.

A.10 Exports and Imports

A.10.1 1870-1939

Mitchell, B.R. International Historical Statistics, all four volumes, from different editions.

A.10.2 1970-2011

IMF's International Financial Statistics.

A.11 Terms of Trade

A.11.1 1870-1939

For most countries, the source was Blattman, C. J. Hwang and JWilliamson (2007), kindly supplied by the authors, and Catao and Solomou (2005), online appendix, available at https://www.aeaweb.org/aer/data/sept05_app_catao.pdf. For some Latin American countries that are not covered by those studies, data was taken from the Base de Datos de Historia Económica de América Latina Montevideo-Oxford, available at http://moxlad.fcs.edu.uy/es/basededatos.html.

A.11.2 1970-2011

IMF's International Financial Statistics and World Economic Outlook databases, various vintages, as compiled in Catão and Milesi-Ferretti (2014).

A.12 Foreign Exchange Reserves

A.12.1 1870-1939

Data for advanced countries was mostly from Flandreau and Zummer (2004), complemented with data from della Paolera and Taylor (2004), Dimitrova and Ivanov (2014), Jobst and Scheiber (2014), Lazaretou (2014), Mata and Valerio (1993), Prados (1988), Tuncer and Pamuk (2014), Nahum (2009), and the database underlying Aiolfi et al. (2011), cited above.

A.12.2 1970-2011

IMF's International Financial Statistics.

A.13 Broad Money (M2)

A.13.1 1870-1939

Mitchell (2013) and Flandreau and Zummer (2004), complemented with data from della Paolera and Taylor (2004), Dimitrova and Ivanov (2014), Jobst and Scheiber (2014), Lazaretou (2014), Mata and Valerio (1993), Prados (1988), Tuncer and Pamuk (2014), Román and Willebald (2011), and the database underlying Aiolfi et al. (2011).

A.13.2 1970-2011

IMF's International Financial Statistics, World Economic Outlook, and the World Bank's Global Development Finance databases, as revised and combined by Catão and Milesi-Ferretti (2014).

A.14 Government Expenditures and Revenues

A.14.1 1870-1939

Mitchell (2013) and Flandreau and Zummer (2004), complemented with data from della Paolera and Taylor (2004), Dimitrova and Ivanov (2014), Jobst and Scheiber (2014), Lazaretou (2014), Mata and Valerio (1993), Prados (1988), Tuncer and Pamuk (2014), Nahum (2009), and the database underlying Aiolfi et al. (2011).

A.14.2 1970-2011

IMF's International Financial Statistics, World Economic Outlook, and the World Bank's Global Development Finance databases, as revised and combined by Catão and Milesi-Ferretti (2014).

A.15 Polity index (***Polity***)

Available at: http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/6695 and http://www.systemicpeace.org/polity/polity4.htm.

A.16 haircuts on Foreign Debt

Cruces and Trebesch (2013), updated to 2014 as available from https://sites.google.com/site/christophtrebesch/, and Reinhart and Trebesch (2014).

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