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Sovereign Defaults: The Price of Haircuts

Abstract

A main puzzle in the sovereign debt literature is that defaults have only minor effects on subsequent borrowing costs and access to credit. This paper comes to a different conclusion. We construct the first complete database of investor losses ("haircuts") in all restructurings with foreign banks and bondholders from 1970 until 2010, covering 180 cases in 68 countries. We then show that restructurings involving higher haircuts are associated with significantly higher subsequent bond yield spreads and longer periods of capital market exclusion. The results cast doubt on the widespread belief that credit markets "forgive and forget."

JEL-Code: F340, G150.

Keywords: sovereign debt crises, restructuring, reputation.

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1. Introduction

Theory predicts that sovereign defaults result in reputational damage and the government's exclusion from capital markets.[1] But empirical support for this proposition is weak at best, as shown by 30 years of research. According to the consensus of empirical studies, defaulting countries do not face substantially higher borrowing costs after a debt crisis, and often regain access to borrowing in just two years.[2] These findings have led many to conclude that "debts which are forgiven will be forgotten" (Bulow and Rogoff 1989b, p. 49). In this paper, we build and exploit a comprehensive dataset on creditor losses ("haircuts") in past debt restructurings and come to a different conclusion. In contrast to earlier work, we find that sovereign default *is* a main predictor of subsequent borrowing conditions, once the scope of creditor losses is taken into account.

The paper is organized around its two contributions. The first part presents a new database of haircut estimates, covering all sovereign debt restructurings with foreign banks and bondholders between 1970 and 2010, the only complete set of estimates so far. To construct this dataset we gathered and synchronized data from nearly 200 different sources, including the IMF archives, private sector research, offering memoranda and articles from the financial press. The result is the first full archive on sovereign restructuring events since the 1970s, providing not just haircut estimates, but also details on the occurrence and terms of past restructurings, as well as the characteristics of old and new instruments involved in each exchange. Like in Sturzenegger and Zettelmeyer (2008) we use the collected restructuring details to compute haircuts as the percentage difference between the present values of old and new instruments, discounted at market rates prevailing immediately after the exchange. To compute deal-specific "exit yields" for each restructuring since the

[1] See Eaton and Gersovitz (1981) or, more recently, Kletzer and Wright (2000), Kovrijnykh and Szentes (2007), Arellano (2008), D'Erasmo (2010), and Yue (2010). A different branch of the literature suggests that sovereign defaults can have adverse spillover effects beyond sovereign credit markets, e.g. on trade (Rose 2005), investment (Fuentes and Saravia 2010) or for the private sector in the debtor country (Arteta and Hale 2008, Sandleris 2008). See also Cole et al. (1995) and Cole and Kehoe (1998). Others study the possibility of direct sanctions (e.g. Bulow and Rogoff 1989a, Mitchener and Weidenmier 2005, Tomz 2007).

[2] See the surveys by Eaton and Fernandez (1995) and Panizza et al. (2009), as well as Eichengreen (1989), Jorgensen and Sachs (1989), Lindert and Morton (1989), Özler (1993), Dell'Arriccia et al. (2006), Borensztein and Panizza (2009) and Gelos et al. (2011).

1970s we also develop a new discounting approach, which takes into account both the global price of credit risk and country conditions at each point in time.

We find that the average sovereign haircut is 37%, which is significantly lower than for corporate debt restructurings in the United States (see section 3). We also find that there is a large variation in haircut size (one half of the haircuts are below 23% or above 53%) and that average haircuts have increased over the last decades. These data and stylized facts are relevant from a policy perspective, as they enable more informed judgments on debt crises outcomes and private creditor burden sharing in the past decades. In addition, the dataset sheds new light on sovereign debt as an asset class. In particular, it provides, for the first time, representative estimates on sovereign debt recovery rates.[3] These may be used for future academic research, but also as inputs for a wide range of credit risk models in the financial industry, e.g. to back out default probabilities from observable bond prices.

The second part of the paper documents the relationship between restructuring outcomes and subsequent borrowing conditions for debtor governments. Our key hypothesis is that higher haircuts are associated with (i) higher post-restructuring spreads and (ii) longer duration of exclusion from capital markets. These predictions can be derived from recent sovereign debt models which build on the seminal work by Eaton and Gersovitz (1981).[4] The intuition in these papers is straightforward. A defaulting country that aims to resolve its debt crisis negotiates with creditors not only on the size of the haircut, but also on the level of subsequent risk premia and on the possibility to access credit in the future. The debtor faces a trade-off: A high haircut implies a large degree of debt reduction now, but is punished by markets tomorrow. To our knowledge this paper is the first to bring these theoretical priors to the data.

[3] Given the lack of data, even rating agencies continue to base their recovery assumptions for sovereigns on a very small sample of restructurings. The most recent report by Moody's (2011) shows recovery rates on 15 recent cases, while Standard and Poor's (2011) relies on estimates for 5 countries.

[4] In particular Yue (2010), D'Erasmo (2010) and Asonuma (2011).

Our econometric models analyze sovereign borrowing costs after debt restructuring events. We start by running a fixed effects panel regression with monthly sovereign bond spreads as the dependent variable, using the Emerging Market Bond Index Global (EMBIG) for 47 countries, and then lag our haircut measure for up to seven years after the restructuring. In a second step, we analyze the duration of exclusion from capital markets by applying semi-parametric survival models. Our exclusion measure captures the number of years from the restructuring until the country reaccesses international capital markets. To improve on previous work on exclusion duration we construct a yearly dataset of reaccess, which combines data on more than 20.000 loans and bonds at the micro level with aggregate credit flow data at the country level.

The results can be summarized as follows: In the benchmark specification with country and year fixed effects a one standard deviation increase in haircut (22 percentage points) is associated with post-restructuring bond spreads that are 150 basis points higher in year one after the restructuring and still 70 basis points higher in years four and five. These are sizable coefficients, especially when compared to the findings of previous empirical work. In addition, we find that haircut size is highly correlated with the duration of capital market exclusion. Ceteris paribus, a one standard deviation increase in haircuts is associated with a 50% lower likelihood of re-accessing international capital markets in any year after the restructuring.

We attribute our results to more precise measurement of a country's repayment record. Previous papers attempting to gauge the effects of defaults on subsequent market access have used a binary default indicator, capturing *any* missed payment as explanatory variable for past credit history.[5] But recent models predict punishments that are proportional to the loss inflicted on investors.[6] Using binary default instead of actual losses ignores the large variation in restructuring outcomes. This may be one reason why past research concluded that punishment effects in sovereign credit

[5] This applies to all papers cited footnote 2. Relatedly, a recent paper Benczur and Ilut (2009) uses arrears as a continuous measure for repayment history.

[6] See in particular, Yue (2010) who studies debt renegotiation dynamics with endogenous recovery rates. Also Benjamin and Wright (2009) take into account the magnitude of default, and develop a model that generates a positive correlation between delays in debt renegotiation and the size of the haircut.

markets are negligible, at least in the medium run. Our analysis indicates that it is crucial to consider the magnitude of past defaults, not only the default event per se.

The rest of the paper is structured as follows. The methodology to compute haircuts and a number of stylized facts from the resulting dataset are summarized in sections 2 and 3. Section 4 discusses theoretical considerations and the two testable predictions. Section 5 assesses the link between haircuts and subsequent bond yield spreads, while section 6 focuses on capital market exclusion. The last section concludes.

2. Estimating Creditor Losses: Methodology and Data

This section summarizes the construction of our haircut database, which is presented in detail in the Appendix. We provide two main sets of haircut estimates: one following the approach used by most market participants ("market haircut") and another using the more refined approach of Sturzenegger and Zettelmeyer ("SZ haircut") who estimate haircuts rigorously for 22 recent restructurings (see Sturzenegger and Zettelmeyer 2006 and 2008, SZ hereafter). Other authors have preceded us in providing haircut estimates – albeit with a more limited scope.[7] Our contribution is that we are the first to estimate haircuts based on a present value approach for all 180 sovereign debt restructurings with foreign banks and bondholders between 1970 and 2010. In addition, we collect data on nominal debt reduction, measured as the share of debt written off to face value.

Section 2.1 defines the two main haircut measures, while section 2.2 summarizes how we compute debt service streams and briefly presents our discounting approach. Section 2.3 discusses case selection and the data sources used.

[7] Jorgensen and Sachs (1989) were the first to compute creditor losses in sovereign restructurings covering four cases during the 1930s and 1940s. Benjamin and Wright (2009) provide haircut estimates for a large sample of 90 cases since 1990, which are not computed in present value terms but rather based on aggregate face value reduction and interest forgiven. Further haircut estimates for several recent cases are provided by Cline (1995), Rieffel (2003), Bedford et al. (2005), Finger and Mecagni (2007) and Díaz-Cassou et al. (2008). In addition, some authors computed the internal rates of return on sovereign bonds historically or over longer periods of time, but without computing recovery values for specific restructurings: e.g. Eichengreen and Portes (1986, 1989), Lindert and Morton (1989), Klingen et al. (2004) and Esteves (2007).

2.1. Defining Investor Losses

Debt restructuring typically involves swapping old debt in default for a new debt contract. For a country i that exits default at time t and issues new debt in exchange for old debt, and which faces an interest rate of r_t^i at the exit from default, the market approach to calculate haircuts (H_M) is

$$H_{M}{}_t^i = 1 - \frac{\text{Present Value of } New \text{ Debt } (r_t^i)}{\text{Face Value of } Old \text{ Debt}} \qquad (1)$$

This approach thus compares the present value (PV) of the new debt instruments (plus possible cash repayments) with the full face value amount of the old outstanding debt. This simple formula is widely used by financial market participants and does not require detailed knowledge of the old debt's characteristics. One reason for using it as a benchmark is that debt payments are typically accelerated at a default event.[8] A more refined haircut measure has recently been proposed by SZ (2008):

$$H_{SZ}{}_t^i = 1 - \frac{\text{Present Value of } New \text{ Debt } (r_t^i)}{\text{Present Value of } Old \text{ Debt } (r_t^i)} \qquad (2)$$

The key difference between equations (1) and (2) is that unmatured old debt instruments are not taken at face value but computed in present value terms and discounted at the same rate as the new debt instruments. The rationale for using a common discount rate for new and old instruments is that it reflects the increased debt servicing capacity resulting from the exchange itself. Of course, when the old debt had all fallen due at the time of the restructuring, H_{SZ} uses the face value of that old debt, just like H_M, which happens in 92 of the 180 cases in the sample. Furthermore, both formulae include past due interest on the old debt at face value, but disregard penalties.

H_{SZ} will be our preferred haircut measure for several reasons. In line with SZ, we argue that equation (2) provides haircuts that better describe the "toughness" of a

[8] Acceleration clauses entitle creditors to immediate and full repayment in case the debtor defaults on interest or principal payments (see Buchheit and Gulati 2002).

successful exchange than equation (1). Intuitively, H_{SZ} compares the value of the new and the old instruments in a hypothetical scenario in which the sovereign kept servicing old bonds that are not tendered in the exchange on a pari passu basis with the new bonds (SZ 2008, p. 783). More generally, SZ interpret their measure as capturing the degree of pressure that must have been exerted on creditors to accept a given exchange offer, so as to overcome the associated free rider problem. They also argue that acceleration clauses might not always be a valid justification for taking the old debt at face value, as done in equation 2. In fact, 77 of the 180 debt exchanges were pre-emptive, that is, implemented prior to a formal default that could have triggered acceleration. Another advantage of the H_{SZ} approach is that it explicitly accounts for portions of debt that have been previously restructured. It therefore provides a better measure, compared to H_M, of the cumulative losses afforded by investors in a sequence of exchanges of the same debt.[9] This is empirically relevant, as many debtor countries restructured the same debt two or three times during the 1980s and early 1990s (see also Reinhart and Rogoff 2009 for a discussion of "serial defaults").

Equation (2) will often but not always yield a lower haircut estimate than equation (1). The difference between these two measures arises from the comparison between the face value and the present value of the old debt.[10]

2.2. Discounting Payment Streams

This section briefly summarizes our methodology to compute present values of both the new and the old debt.

[9] For example, if a country restructures old debt at time t but the new debt is renegotiated again soon after, say at time t+N, then H_M will depend on the product $\frac{PV\ New_t}{FV\ Old_t}\frac{PV\ New_{t+N}}{FV\ Old_{t+N}}$ which will tend to overestimate the cumulative loss of investors since in general $\frac{PV\ New_t}{FV\ Old_{t+N}} < 1$, especially when the debt is long term. Under H_{SZ}, this latter ratio would be $\frac{PV\ New_t}{PV\ Old_{t+N}}$ which under normal conditions is much closer to 1.

[10] When r_t^i is larger than the interest/coupon rate on the old debt, then $H_M > H_{SZ}$ (76 cases in the sample). This discrepancy will tend to increase, the longer the remaining maturity of the old debt. When r_t^i is smaller than the interest/coupon rate on the old debt, then the present value of the old debt is greater than par and $H_M < H_{SZ}$ (11 cases in the sample).

Computing Contractual Payment Flows*:* We start by computing the contractual cash flows in US dollars of the old and the new debt for each year from restructuring to maturity. To do this, we collect detailed data on debt amounts, maturity, repayment schedule, contractual interest/coupon rate and any further debt characteristics that might influence an instrument's value (such as the collateralization of interest payments in Brady bonds).

In computing cash flows, we take advantage of the most disaggregated information available. This means that we calculate present values on a loan-by-loan and bond-by-bond level, whenever we could collect such information. For all cases in which detailed terms were unavailable, as often happens in restructurings of the 1970s and 1980s, we simply compute an aggregated discounted cash flow stream and haircut for all of the debt. The Appendix provides further details, including the scope of data available for each restructuring.

Discounting: We next discount the cash flow streams to assess their present values. Most importantly, this requires choosing a discount rate for each restructuring. In their analysis of major deals from 1998 until 2005, SZ use the secondary market yield implicit in the price of the new debt instruments on the first trading day after the debt exchange. Unfortunately, such market-based "exit yields" are only available for a very small subsample of recent cases with liquid secondary debt markets. This lack of data has pushed other researchers to use a constant rate across restructurings[11], despite the fact that countries restructured their debts in very different conditions.[12]

[11] A popular rule of thumb is to use a flat 10% rate, as done, for example, by the Global Development Finance team of the World Bank (Dikhanov 2004), by IMF staff (see Finger and Mecagni 2007) and by researchers such as Andritzky (2006). Others have used risk free reference rates such as U.S. Treasury bond yields or Libor (e.g. Claessens et al. 1992).

[12] For example, when Nigeria restructured in 1991, its credit rating was 19.5 points on the Institutional Investor scale (a scale that goes from 0 to 100 where larger numbers imply more creditworthiness), while when South Africa restructured in 1993 its credit rating was 38.2. Hence, it is unlikely that the default-exit yield would be the same for these two debtors. It is also well known that the credit risk premium changes over time. For example, when Russia restructured in August 2000, the secondary market yield on Moody's index of speculative grade US corporate bonds was 11.43%, while it was only 8.14% when Argentina restructured in 2005. Our procedure takes into account both of these factors and gives different yields for these four cases: 9.81 for South Africa, 10.36 for Argentina, 12.48 for Russia and 18.28 for Nigeria.

We also provide an original contribution to the literature in this front: we design a procedure to impute voluntary market rates specific to each of the 180 restructurings in our sample, thus covering more than three decades. Our imputed discount rates take into account two main determinants of the cost of capital facing debt issuers at the exit from default: a) the specific country situation and b) the level of the credit risk premium at that time. In a nutshell, the procedure can be summarized as follows. We start from secondary market yields on low-grade US corporate bonds which we group by credit rating category. We then convert these corporate yields into discount rates on sovereign debt by first linking corporate and sovereign secondary market yields and then imputing yield levels for each sovereign based on its credit rating at the time of restructuring. In the spirit of SZ, we then use these imputed discount rates at the exit from default to discount the cash flows of the old and new debt. Overall, the procedure yields monthly discount rates for all countries in our sample for the period 1978 to 2010. To our knowledge, no set of estimates in the literature spans such a large number of countries and years (see the Appendix sections A4.2 and A4.3 for a detailed methodological description).

2.3. Data Sources and Sample

When starting this project there was no single standardized source providing the degree of detail and reliability necessary to set up a satisfactory database of restructuring terms since the 1970s from which to estimate haircuts. We therefore embarked into an extensive data collection exercise, for which we gathered and cross-checked data from all 29 publicly available lists on restructuring terms and more than 160 further sources, including the IMF archives, books, policy reports, offering memoranda, private sector research and articles in the financial press. The Appendix provides an overview of sources used, describes our approach to minimize coding errors and reports a data quality index for each deal. The detailed list of sources on each restructuring is available upon request.

The case sample in this paper covers the entire universe of distressed sovereign debt restructurings with foreign commercial creditors (banks and bondholders) from 1970 until 2010. To identify relevant events we apply five case selection criteria. First, we focus on sovereign restructurings, defined as restructurings of public or publicly guaranteed debt. We do not take into account private-to-private debt exchanges, even if large-scale workouts of private sector debt were coordinated by the sovereign (e.g. Korea 1997, Indonesia 1998). Second, we follow the definition and data of Standard and Poor's (2006, 2011) and include only distressed debt exchanges. Distressed restructurings occur in crisis times and typically imply new instruments with less favorable terms than the original bonds or loans. We therefore disregard market operations that are part of routine liability management, such as voluntary debt swaps. Third, we focus on sovereign debt restructurings with foreign private creditors, thus excluding debt restructurings that predominantly affected domestic creditors and those affecting official creditors, including those negotiated under the chairmanship of the Paris Club. Foreign creditors include foreign commercial banks ("London Club" creditors) as well as foreign bondholders. For recent deals, we follow the categorization into domestic and external debt exchanges of Sturzenegger and Zettelmeyer (2006, p. 263).[13] Fourth, we restrict the sample to restructurings of medium and long-term debt, thus disregarding deals involving short-term debt only, such as the maintenance of short-term credit lines, 90-day debt rollovers, or cases with short-term maturity extension of less than a year. Finally, we only include restructurings that were actually finalized. We thus drop cases in which an exchange offer or agreement was never implemented, e.g. due to the failure of an IMF program or for political reasons.

Based on these selection criteria, we identify 182 sovereign debt restructurings in 68 countries since 1978 (no restructurings occurred between 1970 and 1977). We were able to gather sufficient data to compute haircuts on all of these cases, except for the restructurings of Togo 1980 and 1983. We thus base all summary statistics on a final sample of 180 implemented restructurings by 68 countries.

[13] As a result, we do include two restructurings involving domestic currency debt instruments, but only because they mainly affected external creditors: Russia's July 1998 GKO exchange and Ukraine's August 1998 exchange of OVDP bonds.

3. Haircut Estimates: Results and Stylized Facts

The dataset and estimates of the 180 deals in our final sample reveals a series of new insights on sovereign debt restructurings.

<Figure 1 about here>

<Figure 2 about here>

A first insight is the large variability in haircut size across space and time. Figure 1 plots our estimates of H_{SZ} (eq. 2) over time and the respective, inflation-adjusted debt volumes of each restructuring, as represented by the size of the circles.[14] The graph illustrates the dispersion in haircuts, which has increased notably since the 1970s. Recent years have seen a particularly large variation, with some deals involving haircuts as high as 90% and others involving haircuts as low as 5%. Interestingly, we find that the three largest restructurings of recent years (Argentina 2005, Russia 2000 and Iraq 2006) all implied haircuts of more than 50%. But also the Brady deals of the mid 1990s show high haircuts and involved large volumes of debt. A related trend is illustrated in Figure 2, which differentiates between restructurings with some degree of face value debt reduction (57 cases) and deals that only involved a lengthening of maturities (123 cases). The figure shows that cuts in face value have become increasingly common and that they tend to imply much higher creditor losses in present value terms. Deals with outright debt write offs have an average haircut of 65%, compared to just 24% for pure debt reschedulings.

<Table 1 about here>

Table 1 provides further key insights, in the form of summary statistics for the full sample of 180 restructurings. Most notably, we find the average SZ haircut between 1970 and 2010 to be 37% (simple mean), while the volume-weighted average haircut

[14] Figure 1 shows that we estimate *negative* haircuts for a small subset of cases, most of which happened in the first half of the 1980s. Negative haircuts typically result from a restructuring in which the interest rate on the new debt exceeds the estimated discount rate prevailing at the time. In such cases, any lengthening of maturities will increase the present value of the restructured debt, instead of decreasing it (note that most deals in the 1980s involved rescheduling only). While these look like bad deals for the government, a successful agreement can buy time and avoid a disorderly default. In severe distress, these benefits can outweigh the drawback of accepting a deal at unfavorable terms.

is even lower, amounting to about 30%. This implies that, on average, investors could preserve almost two-thirds of their asset value in restructurings of the past decades. This degree of losses is surprisingly low, at least when compared to corporate debt exchanges. According to the most comprehensive set of estimates for US corporate bond and loan restructurings (Moody's 2006), the average haircut between 1982 and 2005 was 64%. This is nearly twice as high as what we find for sovereign debt. This large discrepancy is surprising, because US corporate debt, in contrast to sovereign debt, can be enforced in courts and because any corporate restructuring is subject to an orderly bankruptcy regime,

The table also shows notable differences in haircut estimates depending on the formula applied. As expected, the market haircut tends to be larger than the SZ haircut (40% vs. 37%, respectively). The difference between the two measures ranges from 0 (for those 92 deals in which the old debt had fully matured) up to 22 percentage points. More specifically, the average H_{SZ} is 6.5 percentage points lower than the average H_M for those cases in which the old debt had not fully come due. Interestingly, creditor losses appear remarkably lower when looking at face value reduction only, with an average haircut of only 16%. This low figure suggests that any estimates based on nominal debt write-offs will severely overestimate the actual recovery rates in sovereign restructurings. Also preemptive restructurings, i.e. those implemented prior to a payment default, have significantly lower mean haircuts.

Looking at different decades, we find a notable increase in haircut size over time. Average haircuts were about 25 percentage points higher during the 1990s and 2000s as compared to deals implemented during the 1970s and 1980s. One reason is that deals during the 1980s mostly implied maturity extensions only, thus postponing the day of reckoning that most debtor countries had deep-rooted solvency problems. Relatedly, we find that the Brady deals, which ultimately put an end to the 1980s debt crisis for 17 debtor countries, involved a high average haircut of 45%. This exceeds the mean investor loss for the more recent subsample of 17 sovereign bond restructurings since 1998 (38%).

The type of debtor also matters. In particular, we find average haircuts of 87% in restructurings of highly indebted poor countries (HIPCs). To show this, we categorize a subsample of restructurings as donor supported, defined as those co-financed by the World Bank's Debt Reduction Facility (see World Bank 2007).[15] The average haircut in these 23 donor supported restructurings is nearly three times as large as for restructurings in middle income countries.

Table 2 shows our haircut estimates for 17 recent restructurings and compares them to results of previous work. For the overlapping sample, our estimates are very similar to those of SZ. When comparing their average haircut (reported in SZ 2006, p. 263) to our equivalent of equation (2) we get a mean absolute deviation of 5.8 percentage points.[16] We also find our results to be roughly in line with the net present value estimates by Bank of Spain and Bank of England staff (Bedford et al. 2005 and Diaz-Cassou et al. 2008), with a mean absolute deviation of 7.9 and 8 percentage points, respectively. Our results differ more markedly from Finger and Mecagni (2007), who apply a constant 10% discount rate, and from those reported by Benjamin and Wright (2009), who do not calculate haircuts in present value terms but base their estimates on World Bank data on debt stock reduction and interest and principal forgiven.

<Table 2 about here>

4. Theoretical Considerations

Theoretically, we can refer to recent sovereign debt models that build on Eaton and Gersovitz, in particular Yue (2010), D'Erasmo (2011) and Asonuma (2011) who predict how haircut size affects subsequent access to foreign credit. Yue's (2010) and D'Erasmo's (2009) model generate endogenous exclusion from financial markets after default, where the duration of exclusion increases with the amount of debt reduced. A bad credit record and a low recovery rate of the defaulted debt imply

[15] The Debt Reduction Facility grants funds to governments to buy back their debts to external commercial creditors at a deep discount. Typically, the size of haircuts granted by commercial creditors is in the range of those accepted by official creditors in these same countries (World Bank 2007).

[16] Only two estimates differ significantly (by more than 10 percentage points), namely Pakistan 1999 and Ukraine 2000, and this is mostly because our methodology yields significantly lower discount rates for these two cases.

longer exclusion. The models can be extended so that creditors and debtors bargain not only over the size of the recovery rate, but also on the risk premium paid on debt issues after re-entry into capital markets (see e.g. Asonuma 2011). Analogously, the yield spread on new debt will be higher, the lower the implied recovery rate of the restructuring, i.e. the higher the haircut. We can therefore derive two testable hypotheses: Hypothesis 1: The larger the size of H, the higher the yield spreads after restructurings; and Hypothesis 2: The larger H, the longer the period of exclusion from capital markets.

The underlying mechanism suggested in these papers is the classic reputational one in Eaton and Gersovitz (1981): A good repayment record assures access to credit in the future, while defaulting will be punished.[17] However, there could be other channels linking the size of haircuts and subsequent borrowing conditions.

First, there is the countervailing effect of debt relief. Sovereigns imposing high haircuts will reduce their indebtedness more significantly, making them more solvent, at least in the short run. In an atomistic bond market without creditor collusion, as in Wright (2002), lenders may ultimately reward sovereigns for imposing high haircuts, as this can result in a lower debt to GDP ratio and may decrease the likelihood of future default. Higher haircuts would then imply lower post-restructuring spreads and quicker reaccess. Empirically, we control for this possibility by controlling for the debt to GDP ratio after the restructuring, as well as for the sovereign rating. Second, high haircuts could be seen as a signal of untrustworthy economic policies and expropriative practices by the government, with adverse consequences for country spreads and capital access (Cole and Kehoe 1998, Sandleris 2008). We address this possibility by including political risk indicators, which account for the perceived risk of expropriation, and by controlling for government changes.

[17] Another theoretical channel is linked to Grossmann and van Huyck (1988) who suggest a model in which debt-servicing obligations are implicitly contingent on the realized state of the world. Accordingly, adverse reputational effects could only occur if the size of H is "inexcusable", i.e. not justified by bad exogenous macroeconomic conditions. In an earlier version of this paper we follow this route and decompose actual H_{SZ} into its "predicted" value and a residual which we interpret as measuring the "inexcusable" haircut. For reasons of brevity we omit this extension here.

Finally, it is possible that countries imposing higher haircuts are also in a worse shape than those imposing lower haircuts. Unobservable country characteristics could influence both the size of *H* and country access conditions after the restructuring. To address this concern, we include country and time fixed effects and control for a large set of observable, time-varying fundamentals suggested by theory and the previous international finance and asset pricing literature. This mitigates, but not necessarily completely eliminates, the possibility that the coefficients of *H* pick up the effect of a confounding variable which remains omitted. However, it should be underlined that we largely replicate the models used in 30 years of previous work on the issue, which tends to reject the claim that sovereign defaults have lasting, substantial effects in credit markets. Here, we reassess this finding with more refined data, under the maintained hypothesis that the empirical models in the received literature are an adequate testing tool. The results should nevertheless be interpreted with caution.

5. Haircuts and Post-Restructuring Spreads: Data and Results

This section assesses the link between debt crisis outcomes and subsequent borrowing costs in the period 1993 to 2010. In order to identify post-crisis episodes, we focus on "final" restructurings only, which we define as those (i) that were not followed by another restructuring vis à vis private creditors within the subsequent four years and (ii) which effectively cured the default event, meaning that the country did not remain in ongoing default according to data by Standard and Poor's (2006, 2011). We thereby disregard intermediate restructurings like many deals of the 1980s that only implied short-term debt relief. One example is Peru's restructuring of 1983, which is not regarded as final, because the country continued to accumulate arrears until it finally resolved its debt crisis with a Brady deal in 1997. Similarly, we do not include Russia's 1997 restructuring of Soviet era debt as a final deal, because the country restructured that same debt only three years later.[18]

[18] An overview of the 67 final restructurings is provided in Table A2 in the Appendix. Due to a lack of EMBIG coverage, only 27 of these events, from 23 countries, are used in our analysis of bond spreads. In increasing order of haircut, these events are: Dominican Republic (05/2005), Uruguay (05/2003), Croatia (07/1996), Pakistan (12/1999), Ukraine (04/2000), South Africa (09/1993), Algeria (07/1996), Belize (02/2007), Philippines (12/1992), Brazil (04/1994), Mexico (05/1990), Argentina

5.1. Dependent Variable: EMBIG Spreads

As dependent variable, we use the monthly average secondary market bond stripped yield spread from J.P. Morgan's EMBI Global (EMBIG) for each country. EMBIG spreads have been used extensively in the academic literature to proxy foreign currency borrowing costs of both governments and the private sector in emerging market economies.[19] A main advantage of using these bond spread data is that they allow constructing a monthly panel dataset for a large number of countries whose bonds satisfy certain minimum liquidity and global visibility benchmark, so that one would expect informationally efficient pricing. The EMBIG is composed of U.S.-dollar denominated sovereign or quasi-sovereign Eurobonds and Brady Bonds that are actively traded in secondary markets, as well as a small number of traded loans.[20] While the EMBIG was only introduced in January 1998, historical yield spread data is available further back in time.[21] We take all country-month yield observations available, covering 47 countries from January 1993 until December 2010 and resulting in a panel of over 5000 observations. Among the 47 countries covered by the EMBIG, 23 are defaulters which restructured their debt, while the other 24 countries are "non-defaulters".[22]

(04/1993), Panama (05/1996), Venezuela (12/1990) –median haircut–, Ecuador (08/2000), Nigeria (12/1991), Ecuador (02/1995), Poland (10/1994), Russia (08/2000), Cote d'Ivoire (04/2010), Bulgaria (06/1994), Cote d'Ivoire (03/1998), Peru (03/1997), Ecuador (06/2009), Serbia & Montenegro (07/2004), Argentina (04/2005), and Iraq (01/2006).

[19] Eichengreen and Mody (2000) underline that sovereign secondary market spreads tend to predict actual government borrowing costs realized in primary markets. Relatedly, Durbin and Ng (2005) show that sovereign spreads determine corporate borrowing costs in emerging markets.

[20] The stripped yield spread is simply the difference between the weighted average yield to maturity of a given country's bonds included in the index and the yield of a U.S. Treasury bond of similar maturity. In line with most other researchers, we use stripped spreads which focus on the non-collateralized portion of the emerging country bonds (see J.P. Morgan 2004 for details).

[21] Morgan Markets provides EMBIG stripped bond spread data back to 1994. Furthermore, in order to maximize time coverage of our sample, we added data for 1993 from the plain EMBI index for all countries in which stripped bond spread data was available for that year (Argentina, Brazil, Mexico, Nigeria and Venezuela). The results do not change if we omit 1993.

[22] Our counterfactual is the group of 24 "non-defaulters" covered in the EMBIG. This includes countries with no external sovereign debt restructuring in the 1990s/2000s: China, Colombia, Egypt, El Salvador, Georgia, Ghana, Greece, Hungary, Indonesia, Jamaica, Kazakhstan, Lebanon, Lithuania, Malaysia, South Korea, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, and Turkey. In addition, the "non-defaulter" set includes four countries which did restructure their debt at some point since 1990, but which entered the EMBIG more than seven years after that restructuring: Chile, Gabon, Morocco and Vietnam.

5.2. Preliminary Data Analysis

We begin with a preliminary analysis of bond spreads. Figure 3 plots monthly post-restructuring spreads for the 27 debt exchanges in our EMBIG sample from 1993 until 2010. Most importantly, the figure distinguishes between cases with haircuts that are higher and lower than 36.7%, which is the median haircut in this sample. Instead of showing plain spreads, the figure plots the spread differential of defaulters over non-defaulters, computed by subtracting the average spread of the non-defaulters in the sample at each point in time from the spread of each defaulter. The advantage of showing the spread differential is that this can mitigate the impact of common shocks, such as the Mexican crisis of 1995 or the Russian default of 1998, and that it addresses the potential endogeneity of restructuring dates.[23] The resulting plot shows a notable difference between low-haircut and high-haircut cases. Restructurings with high haircuts feature much higher average post-restructurings spreads, especially from year three onwards. The differences often surpass 200 basis points (bp), which is very large given the average spread level of about 530 bp in the sample of defaulters.

<Figure 3 about here>

5.3. Estimated Model of Post-Restructuring Spreads

Since asset markets are forward looking, we need to control for current and expected future conditions which affect both the prevailing price of credit risk and expected collection. Specifically, we assess the role of credit history for sovereign borrowing costs with a bond spread equation in the vein of those by Dell'Arriccia et al. (2006), Panizza et al. (2009) or Eichengreen and Mody (2000). Our innovation is that we use a continuous measure of investor outcomes, instead of only focusing on a binary default variable. The empirical model is:

[23] We cannot rule out the possibility that low haircut countries may have restructured at times when future yields were expected to be lower than when high haircut countries restructured. Note that the figure looks similar when using plain bond spread data.

$$S_{it} = \left\{ \phi_1 I_1(i,t) + \phi_2 I_2(i,t) + \phi_3 I_3(i,t) + \phi_{4-5} I_{4-5}(i,t) + \phi_{6-7} I_{6-7}(i,t) \right\} H_i +$$

$$\beta' X_{i,t-1} + \omega_i + \eta_t + u_{it} \qquad (3)$$

$$i = 1,\ldots,N \quad t = 1,\ldots,T$$

where $I_\tau(i,t)$ is an indicator variable that equals 1 when month t belongs to year τ after country i finalized its last restructuring (τ =1,2,3,4-5,6-7) and zero otherwise, H_i is the haircut arising from that restructuring, $X_{i,t-1}$ is a vector of macroeconomic control variables known during month t, ω_i is a country fixed effect, η_t is a time fixed effect and u_{it} is an error term. The key parameters of interest are ϕ_τ, the coefficients of the lagged haircut variable.

In a second step, we estimate a fully specified model that adds the linear term R_i (that is a dummy for the existence of a restructuring) to equation (3), so that we permit that defaulting countries will have a larger spread irrespective of the haircut level. Equation (4) thereby disentangles the relevance of past restructurings from that of the haircut size in the restructuring:

$$S_{it} = \left\{ \phi_1 I_1(i,t) + \phi_2 I_2(i,t) + \phi_3 I_3(i,t) + \phi_{4-5} I_{4-5}(i,t) + \phi_{6-7} I_{6-7}(i,t) \right\} H_i +$$

$$\left\{ \gamma_1 I_1(i,t) + \gamma_2 I_2(i,t) + \gamma_3 I_3(i,t) + \gamma_{4-5} I_{4-5}(i,t) + \gamma_{6-7} I_{6-7}(i,t) \right\} R_i + \qquad (4)$$

$$\beta' X_{i,t-1} + \omega_i + \eta_t + u_{it}$$

$$i = 1,\ldots,N \quad t = 1,\ldots,T$$

As control variables, we follow the received literature in including the debtor country's level of public debt to GDP, the ratio of reserves to imports, the country's annual rate of inflation, GDP growth, the level of the current account to GDP and the government's primary budget balance, which are all lagged by one year. International credit market conditions are controlled for by including the Barclays-Lehman Brothers index of low grade US corporate spreads[24], lagged by one month. We also take into account credit ratings, by including the residual of a regression of S&P and Moody's country credit ratings on the set of other fundamentals and

[24] Results are the same when using the 10 year US Treasury yield instead.

variables in each specification. To capture a country's political situation we include the widely used ICRG political risk index[25], lagged by one month, and variables capturing government changes. Specifically, we include a variable capturing the number of years in office of the government from the Database of Political Institutions, and also construct a new government dummy which takes the value of 1 for the first two years after a new administration comes into office. The country fixed effects will pick up any unobservable and time constant country characteristics, while year effects account for the potential endogeneity of the timing of restructuring (e.g. as in countries hurrying to settle with creditors when they anticipate favorable future borrowing conditions). The definition and sources of variables are listed in Table 3.

<Table 3 about here>

5.4. Results: Haircuts and Subsequent Bond Spreads

Table 4 shows the main results of our bond spread regressions. We start by replicating the established literature and include a lagged debt crisis dummy as proxy for sovereign credit history. Like Borensztein and Panizza (2009) we only find significant effects in the first and second year after the restructuring. The coefficient of the lagged R_i drops from 260 bp in year one to about 150 bp in year two, but is clearly insignificant thereafter. Thus, with a binary measure of default, we confirm the results of the received literature that default effects appear very short-lived.

< Table 4 about here >

The results are notably different when we substitute the restructuring dummy with our continuous haircut measure, expressed in percentage points (column 2). After controlling for country and time fixed effects, we find that a one percentage point increase in haircut is associated with EMBIG spreads that are about 6.75 bp higher in year one after the restructuring and still about 3.16 bp higher in years four and five. This means that a haircut of 40%, which is roughly the mean for the EMBIG sample used here, can be associated with 270 bp higher spreads in year one and 127 basis

[25] Results are nearly identical when using the ICRG sub-indicator on government stability.

points higher in years four and five.[26] Accordingly, a one standard deviation increase in H_{SZ} (about 22 percentage points in this sample) is associated with spreads that are 149 to 70 basis points higher in years one and four and five, respectively. Even when controlling for ratings (column 3) and/or when including additional macroeconomic and financial variables, the coefficient of the lagged H_i remains significant up to year five.

The next columns (4-7) show results for the fully specified model of equation (4), which includes both the lagged haircut and the lagged restructuring dummies. F-tests indicate this to be the more complete specification, given that both groups of variables (the lagged H_i and R_i) are jointly significant.[27] When interpreting the results, it should be kept in mind that the coefficients of the constitutive terms (here, the γ coefficients of the lagged R_i) cannot be taken at face value, as they are conditional on the size of H_i (Brambor et al. 2006). We therefore calculate the expected mean incremental spread of a restructuring τ years after its occurrence, which amounts to $\phi_\tau H_i+\gamma_\tau$.

The key finding from column (4) is that the lagged values of H_i show high and significant coefficients up to year seven after the restructuring, although they are only significant at the 10 percent level in the first three years. The strictest model is that in column (7), which includes macroeconomic control variables, the ratio of public debt to GDP, country and year fixed effects and proxies for credit rating and political risk. In this specification, we find that the incremental spread of a restructuring, estimated at the mean value of haircuts, is 157 basis points in year 1 but is statistically indistinguishable from zero thereafter.[28] In contrast, we find significant coefficients for the lagged haircut variables in years four to seven. More specifically, a one standard deviation increase in haircuts is associated with spreads that are 112 basis point higher in years four and five, and 161 bp higher in years six and seven after the restructuring. These are sizable magnitudes, especially when compared to the findings of earlier studies. For example, the influential early studies

[26] The calculation is 40*6.75 = 270 and 40*3.15 = 126.6, respectively.
[27] The F-statistic for joint significance of the lagged H_is in column (4) is 5.46, and it is 4.54 for the joint significance of the lagged R_is (both with a lower than 1% p-value). Results are similar for columns (5-7)
[28] The calculation is 103.79+1.32*40 = 157.

by Lindert and Morton (1989) and Özler (1993) and a new paper by Benczur and Ilut (2009) suggest that past default leads to an average increase in post-crisis spreads of, at most, 50 basis points. So while defaults may seem costless when estimated at the mean haircut, larger haircuts can be clearly associated with larger subsequent spreads.

To validate our findings, section A1.1 in the Appendix provides a large number of robustness checks. Overall, the results are surprisingly robust with alternative model specifications or samples, and when controlling for government changes.

6. Haircuts and Duration of Exclusion: Data and Results

To assess the role of haircuts for exclusion duration we construct an annual dataset on access to capital from 1980 until 2010. The decision to use yearly data is in line with related research and driven by data availability, because our duration analysis goes further back in time and spans a larger number of defaulting countries, so that monthly data are often unavailable. We again focus on access conditions after all 67 final restructurings as defined above, which include all 17 Brady deals as well as all recent external bond restructurings.

6.1. Dependent Variable: Years of Exclusion

The dependent variable on exclusion duration measures the number of years between a restructuring event and the successful reaccess to international credit markets.[29] To avoid lengthy discussions on the benefits and drawbacks of alternative definitions and data sources, we construct a measure of market access that is as comprehensive as possible and which builds on the two main contributions on this issue in recent years. Specifically, we combine the approach by Gelos et al. (2011), who focus on individual syndicated loans and bonds issued in international markets, with the definition of market access by Richmond and Dias (2009), who use aggregate capital flows.

[29] If a country restructures and regains market access in the same year, we follow the literature in considering the duration of market exclusion to be one year.

Our main measure captures “partial” reaccess: it is defined as the first year with an international loan or bond placement and/or the first year with positive aggregate credit flows to the public sector. More precisely, the measure takes a value of 1 in case the country places at least one public or publicly guaranteed bond or syndicated bank loan on international markets and/or if the public sector receives net transfers from private foreign creditors. The first criterion builds on primary market issuance data in international markets from the comprehensive Dealogic database from 1980 until 2010. Specifically, we aggregate information of 8,776 individual public and publicly guaranteed bonds in 95 developing countries and 10,212 public or publicly guaranteed syndicated loans from 136 countries.[30] In line with Gelos et al. we only regard issuances that lead to an increase in public sector indebtedness, using debt stock data to private creditors from the World Bank’s GDF dataset. The second criterion is constructed from aggregate credit flow data. The dummy is 1 for years in which bank or bond transfers from foreign private creditors to the public and publicly guaranteed sector exceed 0.[31] To check the robustness of our findings we also construct (i) a measure of “full reaccess” defined as the first year in which debt flows surpass 1% of GDP[32], (ii) a measure that focuses on primary market issuance only (the original Gelos et al. definition), and (iii) a measure that takes into account flows to the public and private sector of debtor countries (the Richmond and Dias definition).

6.2. Preliminary Data Analysis

Next, we present descriptive findings on haircut size and the duration of exclusion. Table A2 in the Appenidx lists the 67 final restructuring events and the respective

[30] These samples result from a query retrieving all public and publicly guaranteed emerging market loans and bonds of developing countries, excluding issues which are placed and marketed in domestic markets only, according to the Dealogic identifier.

[31] Data is available from GDF using the following series: DT.NTR.PBND.CD (net bond transfers) and DT.NTR.PCBK.CD (net bank transfers). We do not consider arrears as a positive transfer.

[32] Specifically, we define full access when (i) bond or loan issuances in international markets exceed 1% of GDP and/or (ii) if net bank and bond transfers to the public sector exceed 1% of GDP. The 1% threshold is chosen in accordance with Richmond and Dias and represents less than one-half of the annual public sector borrowing over the entire sample of years and developing countries. GDP data is taken from the World Development Indicator dataset. The annual volume of loan and bond placements is again aggregated from Dealogic, while net transfers are from the GDF dataset.

year of reaccess using various definitions. The average duration from restructuring to partial reaccess is 5.1 years, while the median is 3 years. We find that exclusion time increases notably in haircut size. On average, partial reaccess takes just 2.3 years after cases with $H_{SZ} < 30\%$, while the duration is more than twice as long (6.1 years) for cases with $H_{SZ} > 30\%$. For the full sample, Figure A1 in the Appendix plots the relationship between H_{SZ} and years until partial reaccess, further pointing to a positive relationship between the two. The overall picture is similar when using alternative measures of exclusion duration, such as the one on full reaccess

Another way to illustrate the patterns of exclusion is to plot an empirical survival function. We apply the non-parametric Kaplan-Meier estimator, which estimates an unconditional survival function and is very popular in the survival analysis literature, also because it can take into account censored data. This statistic reports the compound probability of not having reaccessed the market for each year after the restructuring. It can be defined as

$$\hat{S}(t) = \prod_{j|t_j \leq t} \left(\frac{n_j - d_j}{n_j} \right) \qquad (5)$$

where t_j denotes the time at which reaccess occurs for country-case $j, j = 1, \ldots, 67$, d_j are the number of countries that reaccess at time t_j, and n_j is the total number that have not reaccessed just prior to t_j.

<Figure 4 about here>

Figure 4 shows the estimated survival function for partial reaccess. Unlike previous research, we estimate survival functions depending on haircut size of the restructuring. More specifically, we group cases with $H_{SZ} < 30\%$, with $H_{SZ} > 60\%$ and those in between. The graph shows that the estimated functions are markedly different for cases with higher haircuts. More than 60% of countries with $H_{SZ} < 30\%$ regain access within two years, compared to only 30% for cases with $H_{SZ} > 60\%$. The figure also shows that exceptionally high haircuts are often followed by exceptionally long periods of exclusion. Countries imposing $H_{SZ} > 60\%$ are very likely to remain excluded even after 10 years, with an unconditional probability exceeding 50%.

6.3. Estimated Model on Exclusion Duration

The univariate analysis shows a correlation between haircut size and exclusion. However, it is likely that the same factors that are causing the exclusion are also causing the large haircut in the first place. To address this, we next estimate a semi-parametric Cox proportional hazard model which allows including constant and time-varying covariates and can deal with the problems of censored observations and multiple events.

For this model, the hazard rate for the *i*th individual (or *i*th exclusion episode) can be written as

$$h_i(t) = h_0(t)\exp(\beta' z_i), \qquad (6)$$

where $h_0(t)$ is the baseline hazard function, z a set of covariates and β a vector of regression coefficients.

The key advantage of the Cox model vis-à-vis other duration models, such as the parametric Weibull model or the log logistic model, is that it is not necessary to specify a functional form of the baseline hazard rate $h_0(t)$. Instead, the shape of $h_0(t)$ is assumed to be unknown and is left unparameterized. Accordingly, we estimate reduced form models allowing the functional form of the hazard function to be explained by the data. The model is estimated via a partial likelihood function of the following form:

$$L(\beta) = \prod_{i=1}^{n} \left(\frac{\exp(\beta' z_i)}{\sum_{j \in W(t_i)} \exp(\beta' z_j)} \right)^{\delta_i}, \qquad (7)$$

where $W(t_i) = (j : t_j \geq t_i)$ denotes the risk set (i.e. the number of cases that are at risk of failure) at time t_i. The model can be extended in a simple manner once time varying covariates are included (see Lancaster 1990).

In estimating the model we rely on the variance correction method proposed by Lin and Wei (1989). This avoids misleading inference in the case of repeated events and is relevant because some countries in our dataset had multiple restructurings and reaccess episodes since 1980. Thereby potential learning effects are also taken into account.

As before, H_{SZ} is the key explanatory variable of interest, while we build on Dell'Arriccia et al. (2006), Gelos et al. (2011) and Richmond and Dias (2009) in our choice of model specification and control variables. One difference compared to the above is that we now use country ratings by Institutional Investor magazine instead of commercial rating agency ratings, simply because we cover a much larger sample of countries and years than in the monthly EMBIG dataset. We also include dummy variables for world regions as well as year fixed effects.[33]

6.4. Estimation Results: Haircuts and the Duration of Market Exclusion

Table 5 shows the results for various specifications of the Cox proportional hazard model. Here, a positive coefficient indicates that higher values of that variable are associated with quicker reaccess relative to the baseline, while negative coefficients indicate longer exclusion duration.

< Table 5 about here >

The main result is that the coefficient of H_{SZ} is negative and robustly significant in all specifications. It also has a sizable quantitative effect. To illustrate this and to allow for a more intuitive interpretation, it is necessary to exponentiate the coefficients shown in table 4. The coefficient of -0.024 in the full model of column (7) indicates that a one unit (percentage point) increase in H_{SZ} lowers the likelihood of reaccessing capital markets in a given year by 2.4%.[34] Thus, according to our most conservative estimate, a one-standard deviation increase (30 percentage points in this sample) is associated with a 51% lower likelihood of reaccess any given year.[35] This provides further indication that restructuring outcomes play an important role for borrowing conditions after settlement.

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[33] Note that the proportional hazard survival models produce biased estimates with country fixed effects (Allison 2002).

[34] The calculation is 100*($e^{-.024}$-1) = -2.37.

[35] The calculation is 100*($e^{[30*-.024]}$ -1) = -51.32.

Finally, column (8) shows that the results are similar when replicating the model in column (7) on a sample that excludes highly indebted poor countries. Regarding the other variables included, we can report only few significant coefficients. We find that population size, GDP per capita and a good credit rating can be associated with quicker reaccess times. In addition, for some specifications, the debt to GDP ratio and the fiscal balance show significant negative coefficients, suggesting that higher indebtedness and budget surpluses imply longer exclusion duration. All other variables, such as political risk, annual inflation and growth, or the ratio of reserves to imports are clearly insignificant.

Our results are very robust to changes in specification and sample, or when using alternative measures of market access. See section A1.2 in the Appendix for details.

7. Conclusion

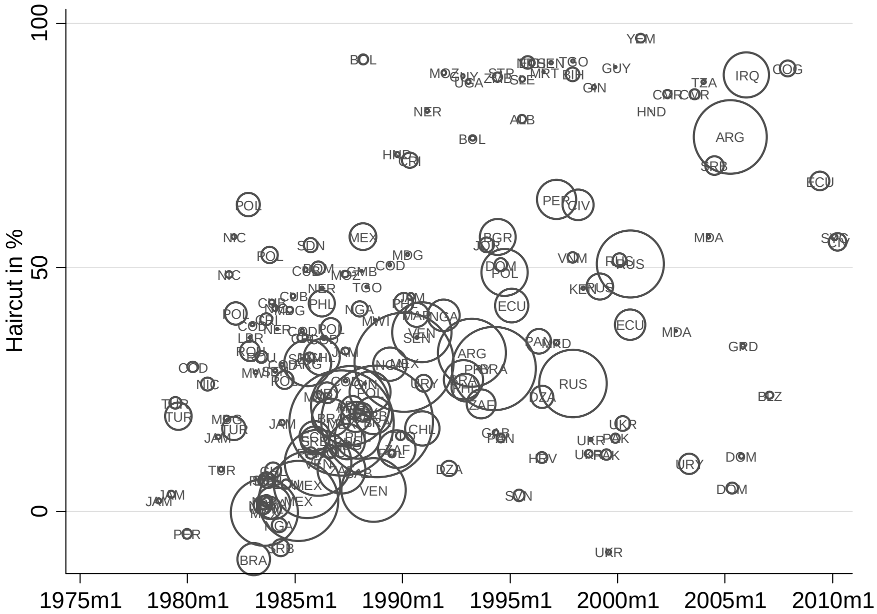
Despite three decades of research, the empirical evidence in favor of Eaton and Gersovitz's (1981) seminal reputation model is weak. Lindert and Morton (1989, p. 12) were among the first to conclude that "investors seem to pay little attention to the past repayment record of borrowing governments." Since that influential study, the empirical literature has essentially come to the same conclusion over and over again: sovereign default penalties within credit markets seem to be small or short lived, a finding that stands in contrast to standard theoretical assumptions.

This paper casts doubt on the stylized fact that the financial costs of default are negligible. Instead, our analysis provides indicative evidence that non-payments can have adverse consequences for governments in the medium run. The paper constructs a new database on haircuts implicit in debt restructurings between sovereigns and private international creditors during 1970-2010. It then documents a close relationship between haircut size in a restructuring and subsequent borrowing conditions for the sovereign. High creditor losses are associated with significantly higher post-restructuring spreads and longer periods of market exclusion. These results are more consistent with theory than earlier findings.

Our results should not be misinterpreted. We did not identify a direct channel linking haircuts and sovereign borrowing conditions. Thus, we cannot be sure whether we observe punishment effects, reputational effects or neither of the two. The results also do not imply that countries in default should try to minimize their haircut. Instead, we provide indicative evidence for the existence of a trade-off: achieving a high degree of debt relief now can have benefits in the short-run, but may also imply worse borrowing conditions in the future.

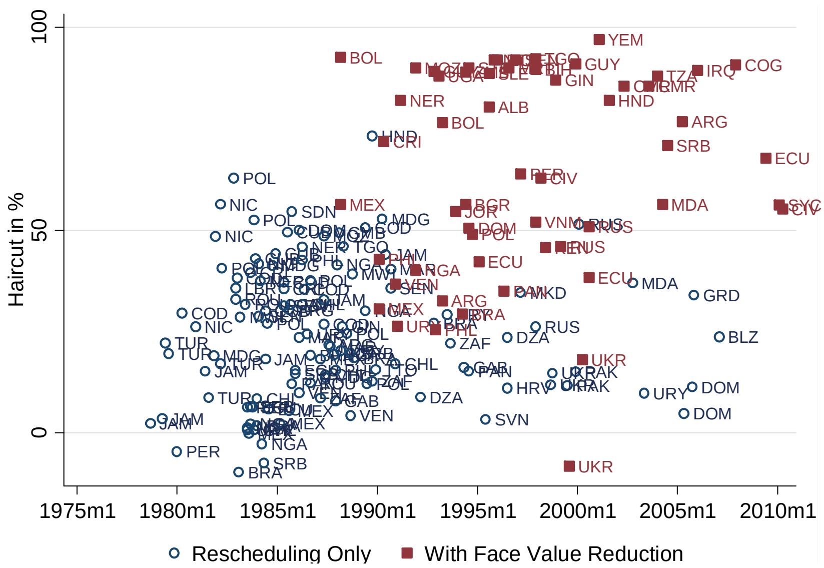
Further work could complement our findings. In particular, we see the need to study the mechanisms behind our results. Moreover, it could be insightful to assess the determinants of high or low haircuts. These questions could be addressed in future research.

Figure 1: Haircuts and Deal Volumes over Time



This figure plots the size of H_{SZ} (from eq. 2) in percentage points across countries and time. The circle size reflects the volume of debt restructured in real US$ (deflated to values of 1980). Haircuts ramge from almost nil to larger than 95%. The maximum haircut shows a secular rise, hence increasing the cross sectional dispersion of haircuts over time. See footnote 14 for a discussion of the negative haircuts.

Figure 2: Restructurings With and Without Debt Reduction

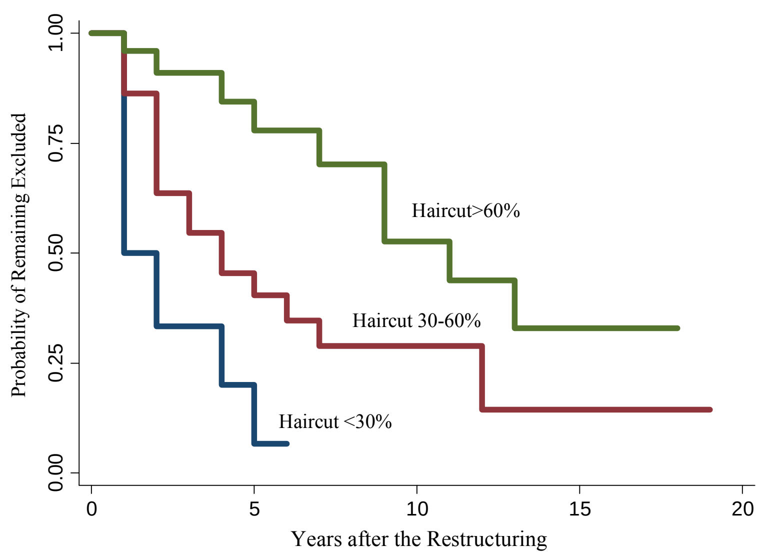


This figure plots the size of haircuts in percentage points across countries and time. The figure differentiates between restructurings that implied debt rescheduling only (i.e. which just lengthened the maturities of old instruments), and restructurings that also implied a reduction in face value. Pure reschedulings were more prevalent during the 1980s, whereas write-offs became more frequent in the 1990s and 2000s. In the full sample, there were 123 pure reschedulings, with a mean H_{SZ} of 24%, while the remaining 57 restructurings also involved face value reduction and had a much higher mean H_{SZ} of 65%. See footnote 14 for a discussion of the negative haircuts.

Figure 3: Haircut Size and Post-Restructuring Spreads

This figure shows that high-haircut countries experience post-restructuring spreads that are about 200 bp higher than low-haircut countries, especially in years three to seven after the restructuring. Specifically, the figure splits the sample in restructurings with higher and lower than median (37%) haircuts and plots the respective average post-restructuring EMBIG stripped yield spread (over US Treasury) in event time. The sample goes from 1993 until 2010. To avoid bias, we show the spread differential between defaulters and non-defaulters, as opposed to using the plain spread of defaulters. The differential is constructed by subtracting the average spread of the 23 non-defaulters at each point in time from the spread of the low- and high-haircut group (see text for details). Note, however, that the picture looks very similar when comparing the plain yield spreads of low- and high-haircut defaulters.

Figure 4: Kaplan-Meier Survival Functions for Duration of Reaccess



This figure plots three survival functions for the duration of capital market exclusion, differentiating by the size of H_{SZ} (smaller than 30%, larger than 60%, or in between). The sample consists of 65 final restructurings from 1980 until 2009. The y-axis denotes the Kaplan-Meier survival estimate for each function, which represents the unconditional, joint probability that countries remain excluded from capital markets up to each year after the restructuring on the x-axis. The figure suggests a positive correlation between haircut size and the probability of remaining excluded for all years considered.

Table 1: Haircut Estimates by Type of Restructuring and Era

	Obs.	Mean	Std. Dev.	Min	Max
By Type of Estimate					
Market Haircut (H_M eq. 1)	180	40.01	27.02	-9.80	97.00
SZ Haircut (H_{SZ}, eq. 2, "preferred")	180	37.04	27.28	-9.80	97.00
Face Value Reduction	180	16.77	30.55	0.00	97.00
By Type of Creditor					
Bank Debt Restructuring	162	37.05	27.90	-9.80	97.00
Bond Debt Restructuring	18	36.97	21.60	4.70	76.80
Rescheduling vs. Debt Reduction					
Rescheduling Only	123	24.15	16.67	-9.80	73.20
With Reduction in Face Value	57	64.84	24.94	-8.30	97.00
Preemptive vs. Post-Default					
Preemptive Restructuirng	71	24.29	21.76	-9.80	90.00
Post-Default Restructuring	109	45.34	27.40	-4.60	97.00
By Era					
1970-1989	99	25.57	18.83	-9.80	92.70
1990-1997	48	51.81	28.48	3.30	92.30
1998-2010	33	49.96	31.30	-8.30	97.00
By Type of Debtor					
HIPC or Donor Funded	23	87.03	6.97	62.80	97.00
All Other Countries	157	29.72	20.61	-9.80	92.70

This table shows summary statistics for different estimates and subsamples. The figures at the top ("By type of estimate") refer to different haircut computation formulae (section 2.1.). All other statistics are based on our preferred haircut estimate (H_{SZ} from equation (2)). As expected, H_M tends to be larger than the H_{SZ}. Haircuts were typically lower before 1990. Preemptive debt restructuring are those implemented prior to a payment default. Temporary missed payments which are negotiated with creditors, e.g. 90-day debt rollovers, are not coded as outright default. Highly Indebted Poor Countries (HIPC) or Donor Funded restructurings are supported by the World Bank. See footnote 14 for an explanation of the negative minimum estimated haircuts.

Table 2: Haircuts in Selected Recent Restructurings (1999-2010)

Restructuring Details							Haircuts: Our Estimates				Comparison with Prior Estimates					
Debtor Country	**Type of Debt**	**Date of Exchange**	**Anouncement of Restruct.**	**Default Date**	**Debt exchanged (in m USD)**	**Participation Rate**	**Preferred Haircut (SZ, eq. 2)**	Underlying Discount Rate	**Market Haircut (eq. 1)**	**Face Value Reduction**	**SZ (2006) average haircut**	**SZ (2006) haircut 10% DR**	**Benjamin & Wright (2009)**	**Finger & Mecagni (2007)**	**Bedford et al. (2005)**	**Diaz-Cassou et al (2008)**
Pakistan	Bank debt	Jul-99	Aug-98	Aug-98	777	n.a.	**11.6**	0.132	12.0	0.0						
Pakistan	Bonds	Dec-99	Aug-99	Preemptive	610	99%	**15.0**	0.146	14.0	0.0	31	0.3	29	9-27	35	30
Ukraine	Bonds	Apr-00	Dec-99	Preemptive	1,598	97%	**18.0**	0.163	17.0	0.9	28.9	2.2	1	5	40	32
Ecuador	Bonds	Aug-00	Jul-98	Aug-99	6,700	98%	**38.3**	0.173	59.8	33.9	28.6	21	34	25	40	26
Russia	Bank/Bond debt	Aug-00	Sep-98	Dec-98	31,943	99%	**50.8**	0.125	62.0	36.4	52.6	48.2	32	44	50	48
Moldova	Bonds	Oct-02	Jun-02	Preemptive	40	100%	**36.9**	0.193	37.0	0.0	33.5		42	0-6		
Uruguay	Bonds	May-03	Mar-03	Preemptive	3,127	93%	**9.8**	0.090	9.0	0.0	12.9	7.8		8-20	15	14
Serbia & Montenegro	Bank debt	Jul-04	Dec-00	since 1990s	2,700	n.a.	**73.2**	0.097	70.9	59.3			57			62
Argentina	Bonds	Apr-05	Oct-01	Jan-02	43,736	76%	**76.8**	0.104	79.0	29.4	75	77.8	63	75	70	73
Dominican Rep.	Bonds	May-05	Apr-04	Preemptive	1,100	94%	**4.7**	0.095	4.1	0.0	1.5	1.6		1	5	1
Dominican Rep.	Bank debt	Oct-05	Apr-04	Feb-05	180	n.a.	**11.3**	0.097	16.0	0.0				2		
Grenada	Bonds	Nov-05	Oct-04	Preemptive	210	97%	**33.9**	0.097	41.0	0.0						
Iraq	Bank/Com. debt	Jan-06	in 2004	since 2003	17,710	96%	**89.4**	0.123	89.4	81.5						
Belize	Bank/Bond debt	Feb-07	Aug-06	Preemptive	516	98%	**23.7**	0.096	29.0	0.0						28
Ecuador	Bonds (Buy-Back)	June/Nov-09	Jan-09	Dec-08	3,190	n.a.	**67.7**	0.130	68.6	68.6						
Seychelles	Bonds	Feb-10	Mar-09	Jul-08	320	84 - 89%	**55.6**	0.107	56.0	50.0						
Cote D'Ivoire	Bonds	Apr-10	Aug-09	Mar-00	2,940	99%	**55.2**	0.099	52.0	20.0						

This table shows details for 17 main recent restructurings. It also compares our preferred haircut estimates H_{SZ} (column highlighted in grey) to haircut estimates in previous studies. It is important to underline that the average haircuts by Sturzenegger and Zettelmeyer (2006, 2008) and those by the Bank of Spain and Bank of England staff (Bedford et al 2005, Diaz-Cassou et al. 2008) are computed in present value terms using country-specific discount rates. They can thus be directly compared to our H_{SZ} measure. In contrast, Finger and Mecagni (2007) mostly use a 10% discount rate, while Benjamin and Wright's (2009) estimates are based on nominal interest and principal forgiven, so that the results are not directly comparable.

Table 3: Description of Data and Variables used in Estimations

Variable	Description	Frequency	Source
Dependent Variables			
EMBIG Stripped Spread	Monthly average EMBIG stripped spread	Monthly	JP Morgan (MorganMarkets)
Reaccess	Dummy capturing the first of the following two events: (i) foreign syndicated loan or bond issuance (public or publicly guranteed) that leads to an increase in indebtedness, (ii) net transfer from private foreign creditors to the public sector	Yearly	Dealogic (primary market data of individual loans and bonds); Global Development Finance (aggregate data, series DT.NTR.PNGB.CD and DT.NTR.PNGC.CD)
Main Haircut Measures			
Haircut (M)	Market haircut (comparing par value of old debt with present value of new debt, see eq. 1)	Monthly/Yearly	Own Calculations
Haircut (SZ)	Haircuts computed in analogy to Sturzenegger and Zettelmeyer (comparing present value of old and new debt, see eq. 2)	Monthly/Yearly	Own Calculations
Control Variables			
High-yield bond spread	Barclays US Corporate High Yield spread (formerly Lehman Brothers)	Monthly/Yearly	Barclays Capital
US 10-year Treasury Yield	Yield on 10-year US Treasury bonds	Monthly/Yearly	US Treasury
Political Risk (ICRG)	Political Risk Index (lagged)	Monthly/Yearly	ICRG (Political Risk Group)
New Government	Dummy which takes the value of 1 for the first two years after a new government comes into power.	Yearly	Database of Political Institutions 2010 (see Beck et al. 2001), Variable "yrsoffc".
Credit Rating	Rating average of available ratings or only available rating.	Monthly (S&P, Moody's), Yearly (IIR)	S&P, Moody's (in EMBIG analysis), and Institutional Investor Magazine (in duration analysis)
Rating Residual	Residual from regression of ratings on fundamentals and credit history, lagged	Monthly/Yearly	Own Calculations, based on ratings data
Public Debt / GDP (in %)	Gross government debt to GDP (in %, lagged)	Yearly	Abbas et al. (2010)
GDP real growth (in %)	GDP real growth (yoy in %, lagged)	Yearly	World Development Indicators
Current Account to GDP (in %)	Current account to GDP, four-year moving average (in%, lagged)	Yearly	World Development Indicators
Primary Balance to GDP (in %)	Central government primary fiscal balance to GDP (in %, lagged)	Yearly	Economist Intelligence Unit
Reserves to Imports (in %)	Reserves (incl. gold) to Imports (in %, lagged)	Yearly	World Development Indicators
Inflation (in %)	Consumer price inflation (yoy in %, lagged)	Yearly	World Development Indicators
Population (log)	log of population size	Yearly	World Development Indicators
GDP per capita (PPP, log)	log of per capita GDP in purchasing power parity, lagged	Yearly	World Development Indicators

Table 4: Regression Results: Haircuts and Bond Spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	With lagged Restructuring Dummies (Previous Literature)	With lagged Haircuts ("preferred" haircut, SZ), Fixed Effects	With lagged Haircuts, controlling for Rating	With lagged Dummies and lagged Haircuts	With lagged Dummies and lagged Haircuts, with Rating	With Main Fundamentals (Eichengreen and Mody)	Full Model (Dell'Arriccia et al.)
Haircut (SZ), 1 year lag		6.75***	5.67***	6.46*	2.57	2.28	1.32
		(2.15)	(1.35)	(3.74)	(3.88)	(3.13)	(3.94)
Haircut (SZ), 2 year lag		4.73***	3.18***	6.18*	1.10	0.50	-0.96
		(1.79)	(1.07)	(3.24)	(2.66)	(3.60)	(3.24)
Haircut (SZ), 3 year lag		3.89**	3.10**	6.25*	4.15	3.84	3.11
		(1.87)	(1.48)	(3.29)	(2.97)	(3.27)	(2.67)
Haircut (SZ), 4 & 5		3.16**	2.86**	7.44***	5.50***	5.08***	5.08***
year lag		(1.38)	(1.29)	(2.11)	(1.48)	(1.50)	(1.27)
Haircut (SZ), 6 & 7		0.80	0.86	9.01***	6.08***	7.36***	7.34***
year lag		(1.41)	(1.03)	(1.96)	(1.54)	(1.85)	(1.65)
Restructuring Dummy,	262.54***			9.00	135.88	-32.31	103.79
1 year lag	(99.99)			(172.59)	(200.04)	(183.07)	(227.33)
Restructuring Dummy,	151.23**			-80.79	73.30	-32.59	100.57
2 year lag	(72.25)			(115.03)	(122.52)	(143.40)	(159.46)
Restructuring Dummy,	103.69			-124.10	-66.92	-198.99	-115.96
3 year lag	(82.07)			(121.89)	(116.34)	(125.40)	(105.87)
Restructuring Dummy,	51.91			-217.19**	-128.33*	-229.77***	-186.53**
4 & 5 year lag	(63.68)			(86.32)	(67.26)	(89.14)	(72.91)
Restructuring Dummy,	-56.24			-367.05***	-218.41***	-365.68***	-281.61***
6 & 7 year lag	(58.88)			(84.45)	(74.20)	(88.02)	(74.92)
Rating (Residual)			-55.60***		-51.67***		-36.38***
			(12.44)		(11.21)		(10.44)
Public Debt to GDP						5.44***	3.17***
						(0.73)	(1.08)
GDP real growth						-6.26**	-5.43**
						(2.67)	(2.67)
Reserves to Imports							-1.01
							(1.22)
Inflation							0.12*
							(0.07)
Primary Balance to GDP							-9.03*
							(5.05)
Current Account to GDP							-13.25***
							(4.50)
Political Risk (ICRG)						-8.04***	-7.95***
						(2.99)	(2.82)
High-yield bond spread	60.26***	60.19***	58.30***	60.69***	58.55***	57.19***	54.82***
	(6.69)	(6.68)	(6.82)	(6.68)	(6.82)	(7.00)	(7.23)
Constant	-128.19	-115.54	-320.99***	-87.70	-274.90**	243.63	248.89
	(131.94)	(107.25)	(117.92)	(115.24)	(113.70)	(258.13)	(250.42)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,369	5,369	4,969	5,369	4,969	4,808	4,269
R2	0.42	0.42	0.46	0.44	0.47	0.52	0.51
Adjusted R2	0.42	0.42	0.45	0.44	0.47	0.52	0.51

This table shows coefficients of an unbalanced panel data regression with robust, country-clustered standard errors. The dependent variable is the monthly average country yield spread over US Treasury bonds (EMBI Global stripped spread) measured in basis points (bp), while the key explanatory variables are the lagged values of H_{SZ} and D both taken up to seven years after each final restructuring. Note that the coefficients of the lagged restructuring dummies in specifications (4) to (7) cannot be interpreted as unconditional marginal effects, but only conditional on H_{SZ}. The results of column (2) indicate that a one standard deviation increase in H_{SZ} (22 percentage points in this sample), is associated with a spread that is 149bp larger in year one, 104bp in year two, 85bp in year three and 70bp larger in years four and five after the restructuring. See text for further details.

Table 5: Regression Results: Haircuts and Years of Exclusion

	Plain	With Sovereign Rating	With Political Risk	Population and GDP	External Financing Conditions	Country Funda-mentals	Full Model	Full Model without HIPCs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Haircut (SZ, in %)	-0.037***	-0.034***	-0.031***	-0.027***	-0.032***	-0.034***	-0.024***	-0.038***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.010)
Credit Rating		0.068***						
(Residual)		(0.024)						
Political Risk			0.037					
(ICRG)			(0.028)					
GDP per capita				0.774***			0.826***	0.501
(log)				(0.206)			(0.281)	(0.424)
Population				0.414***			0.159	0.326
(log)				(0.102)			(0.189)	(0.240)
High-yield					-0.132*			
bond spread					(0.080)			
US Treasury					0.136			
10-year Bond Yield					(0.143)			
Primary Balance						-0.094**	-0.071*	-0.065*
(in % to GDP)						(0.044)	(0.038)	(0.038)
Public Debt						-0.031***	-0.021*	-0.007
(in % to GDP)						(0.010)	(0.012)	(0.015)
Growth						-0.064	-0.050	0.017
(real, p.a.)						(0.072)	(0.070)	(0.094)
Inflation						0.002	0.002	0.001
(real, p.a.)						(0.001)	(0.002)	(0.001)
Reserves to Imports						0.002	-0.003	-0.007
(in %)						(0.005)	(0.006)	(0.008)
Time Fixed Effects (year dummies)	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Observations (Time at Risk)	322	272	276	322	321	237	237	133
# of Subjects (Episodes)	65	61	54	65	64	52	52	37
Log-Likelihood	-109.24	-98.12	-87.96	-100.80	-120.71	-75.89	-72.67	-57.84
BIC	339.750	353.202	327.679	334.406	276.057	310.356	309.385	228.162

This table shows coefficients (not hazard rates) of a Cox proportional hazard model using partial reaccess to capital markets as dependent variable (see text for its definition). The estimated effect of H_{SZ} on exclusion is surprisingly robust across specifications. Here, a negative coefficient sign indicates that higher values of that variable are associated with longer duration of exclusion, but coefficients need to be exponentiated for easier interpretation. For example, the coefficient of H_{SZ} in column (7) suggests that a one percentage point increase in haircut is associated with a 2.4 percentage point lower probability of accessing the market in any given year (100*($e^{-.024}$-1) = -2.37). Column (8) excludes highly indebted poor countries from the sample.

References

Abbas, Ali, Belhocine, Nazim, ElGanainy, Asmaa and Mark Horton, 2010. "A Historical Public Debt Database," IMF Working Paper 10/245.

Allison, Paul. 2002. "Bias in Fixed-effects Cox regression with Dummy Variables." Unpublished Paper, University of Pennsylvania.

Andritzky, Jochen. 2006. *Sovereign Default Risk Valuation: Implications of Debt Crises and Bond Restructurings*. New York: Springer.

Arellano, Cristina. 2008. "Default Risk and Income Fluctuations in Emerging Economies." *American Economic Review*, 98(3): 690-712.

Arteta, Carlos, and Galina Hale. 2008. "Sovereign Debt Crises and Credit to the Private Sector." *Journal of International Economics,* 74(1): 53–69.

Asonuma, Tamon. 2011. "Serial Default and Debt Renegotiation." Unpublished Paper, Boston University.

Benczur, Peter, and Cosmin Ilut. 2009. "Evidence for Relational Contracts in Sovereign Bank Lending." Unpublished Paper, Duke University.

Benjamin, David, and Mark L.J. Wright. 2009. "Recovery Before Redemption? A Theory of Delays in Sovereign Debt Renegotiations." Unpublished Paper, University of California at Los Angeles.

Brambor, Thomas, William Roberts Clark, and Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis*, 14 (1):63-82.

Borensztein, Eduardo and Ugo Panizza. 2009. *IMF Staff Papers*, 56(4): 683-741.

Buchheit, Lee, and Mitu Gulati. 2002. "Sovereign Bonds and the Collective Will." *Emory Law Journal*, 51:1317.

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

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

Claessens, Stijn, Ishac Diwan and Eduardo Fernandez-Arias. 1992. "Recent Experience with Commercial Bank Debt Reduction." World Bank Policy Research Working Paper 995.

Cline, William R. 1995. *International Debt Reexamined.* Washington, D.C.: Institute for International Economics.

Cole, Harold L., James Dow, and William B. English. 1995. "Default, Settlement, and Signaling: Lending Resumption in a Reputational Model of Sovereign Debt." *International Economic Review*, 36(2): 365–385.

Cole, Harold L., and Patrick Kehoe. 1998. "Models of Sovereign Debt: Partial versus General Reputations." *International Economic Review*, 39(1): 55–70.

D'Erasmo, Pablo. 2011. "Government Reputation and Debt Repayment." Unpublished Paper, University of Maryland.

Dell'Ariccia, Giovanni, Isabel Schnabel, and Jeromin Zettelmeyer. 2006. "How Do Official Bailouts Affect the Risk of Investing in Emerging Markets?." *Journal of Money, Credit, and Banking*, 38(7): 1689–1714.

Dikhanov, Yuri. 2004. "Historical Present Value of Debt in Developing Countries." Unpublished Paper, The World Bank.

Durbin, Erik and David Ng. 2005. "The Sovereign Ceiling and Emerging Market Corporate Bond Spreads," *Journal of International Money and Finance*, 24(4): 631-649.

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

Eaton, Jonathan, and Raquel Fernandez. 1995. "Sovereign Debt." In *Handbook of International Economics,* ed. Grossman G.M., and Kenneth Rogoff, 3: 2031-2077. Amsterdam: Elsevier, North-Holland.

Eichengreen, Barry. 1989. "The U.S. Capital Market and Foreign Lending, 1920-1955." In *Developing Country Debt and Economic Performance. Volume 1: The International Financial System*, ed. Jeffrey Sachs, 107-155. Chicago and London: University of Chicago Press.

Eichengreen, Barry, and Ashoka Mody. 2000. "What Explains Changing Spreads on Emerging-Market Debt? " In *Capital Flows and the Emerging Economies: Theory, Evidence and Controversies*, ed. Sebastian Edwards, 107–134. Chicago and London: The University of Chicago Press.

Eichengreen, B., and R. Portes. 1986. "Debt and Default in the 1930s: Causes and consequences." *European Economic Review*, 30(3): 599-640.

Eichengreen, B., and R. Portes. 1989. “After the Deluge: Default, Negotiation, and Readjustment during the Interwar Years.” In *The International Debt Crisis in Historical Perspective*, ed. Eichengreen, B. and Lindert, P.H., 12-47. Cambridge, MA: MIT Press.

Esteves, Rui P. 2007. “Quis custodiet quem? Sovereign Debt and Bondholders' Protection Before 1914.” University of Oxford Economics Series Working Papers 323.

Finger, Harald, and Mauro Mecagni. 2007. “Sovereign Debt Restructuring and Debt Sustainability. An Analysis of Recent Cross-country Experience.” International Monetary Fund Occasional Paper 255.

Fuentes, Miguel and Diego Saravia. 2010. “Sovereign Defaulters: Do International Capital Markets Punish Them?" *Journal of Development Economics*, 91(2): 336–347.

Gelos, Gaston R., Ratna Sahay, and Guido Sandleris. 2011. "Sovereign Borrowing by Developing Countries: What Determines Market Access?" *Journal of International Economics*, 83(2): 243-254.

Grossman, Herschel I., and John B. Van Huyck. 1988. “Sovereign Debt as a Contingent Claim: Excusable Default, Repudiation, and Reputation.” *American Economic Review*, 78(5): 1088-1097.

JP Morgan. 2004. “EMBI Global and EMBI Global Diversified: Rules and Methodology.” December 2004.

Jorgensen, Erika, and Jeffrey Sachs. 1989. “Default and Renegotiation of Latin American Foreign Bonds in the Interwar Period.” In *The International Debt Crisis in Historical Perspective*, ed. Barry Eichengreen and Peter H. Lindert, 48–85. Cambridge, MA. and London: MIT Press.

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

Klingen, Christoph, Beatrice Weder, and Jeromin Zettelmeyer. 2004. “How Private Creditors Fared in Emerging Debt Markets, 1970-2000.” International Monetary Fund Working Paper 04/13.

Kovrijnykh, Natalia, and Balazs Szentes. 2007. "Equilibrium Default Cycles," Journal of Political Economy, 90(3): 621-639.

Lancaster, Tony. 1990. *The Econometric Analysis of Transition Data*. Cambridge; New York: Cambridge University Press.

Lin, D.Y. and Wei L.J. 1989. “The Robust Inference for the Cox Proportional Hazards Model.” *Journal of the American Statistical Association*, 84(408): 1074-1078.

Lindert, Peter H., and Peter J. Morton. 1989. “How Sovereign Debt Has Worked.” In *Developing Country Debt and Economic Performance*, *Volume 1: The International Financial System*, ed. Jeffrey Sachs, 39–106. Chicago and London: University of Chicago Press.

Mitchener, Kris James, and Marc D. Weidenmier. 2005. “Supersanctions and Sovereign Debt Repayment.” NBER Working Paper 11472.

Moody’s. 2006. “Default and Recovery Rates of Corporate Bond Issuers, 1920-2005.” Special Comment.

Moody’s. 2011. “Sovereign Default and Recovery Rates, 1983-2010.” Special Comment. May 10, 2011.

Özler, Sule. 1993. “Have Commercial Banks Ignored History?” *American Economic Review*, 83(3): 608–620.

Panizza, Ugo, Sturzenegger, Federico, and Jeromin Zettelmeyer. 2009. “The Economics and Law of Sovereign Debt and Default.” *Journal of Economic Literature*, 47(3): 651-98.

Reinhart, Carmen and Kenneth Rogoff. 2009. *This Time is Different. Eight Centuries of Financial Folly*. Princeton: Princeton University Press.

Richmond, Christine, and Daniel A. Dias. 2009. “Duration of Capital Market Exclusion: An Empirical Investigation.” Unpublished Paper, UCLA.

Rieffel, Lex. 2003. *Restructuring Sovereign Debt: The Case for Ad Hoc Machinery*. Washington, D.C.: Brookings Institution Press.

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

Sandleris, Guido. 2008. “Sovereign Defaults: Information, Investment and Credit.” *Journal of International Economics*, 76(2): 267–275.

Standard and Poor's. 2006. “Default Study: Sovereign Defaults At 26-Year Low, To Show Little Change In 2007.” September 18. 2006.

Standard and Poor’s. 2011. Sovereign Defaults and Rating Transition Data: 2010 Update. Standard and Poor’s, RatingsDirect. 23. February 2011.

Sturzenegger, Federico and Jeromin Zettelmeyer. 2006. *Debt Defaults and Lessons from a Decade of Crises*. Cambridge, MA: MIT Press.

Sturzenegger, Federico and Jeromin Zettelmeyer. 2008. "Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings, 1998-2005." *Journal of International Money and Finance*, 27(5): 780-805.

Tomz, Michael. 2007. *Reputation and International Cooperation: Sovereign Debt across Three Centuries*. Princeton and Oxford: Princeton University Press.

World Bank. 2007. "Debt Reduction Facility for IDA-Only Countries: Progress Update and Proposed Extension," Board Report 39310, Washington, D.C.

Wright, Mark L. J. 2002. "Reputations and Sovereign Debt." Working paper, University of California at Los Angeles.

Yue, Vivian Z. 2010. "Sovereign Default and Debt Renegotiation." *Journal of International Economics*, 80(2): 176-187.

APPENDIX

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A1. Robustness Analysis of Sections 5 and 6

A1.1 Robustness – Bond Spread Analysis (Section 5)

This section complements our findings on haircuts and subsequent bond spreads in section 5 of the main paper. In Table A1, we implement several extensions and robustness checks, building on a parsimonious specification of equation (4) above, which only includes control variables that are widely used in the related literature and which are weakly correlated among each other.[36] As before, we include country and time fixed effects.

We start by selecting various sub-samples and find results to be very robust throughout. In a first step, we restrict the time frame to 1998-2010, thus dropping all Brady-era observations of 1993-1997 (column (2)). Next, we focus on the subsample of defaulters, defined here as countries that restructured sovereign debt at least once after 1985. In both cases we find the results to be very similar to the benchmark specification in column (1). We find even stronger results for the marginal effect of haircuts when dropping three outlier countries, namely Argentina, Iraq and Russia, which all defaulted unilaterally on large volumes of debt and which imposed exceptionally high haircuts of 50% or higher. Without these outliers, the coefficient for the lagged haircut variable turns significant in year 3, and is much higher than in the benchmark equation (column 4). The same is true when implementing an even more demanding robustness check, which excludes all countries that imposed haircuts higher than 37%. Column (5) shows that the ϕ_{τ}, coefficients are nearly twice as high in this subsample compared to the benchmark.

We next assess the results for alternative haircut measures. Column (6) shows estimates using the "market haircut" (H_M in equation (1)), while column (7) takes the face value reduction measure, which ignores changes in the debt's present value. In addition, column (7) shows results with lagged values of an "effective haircut" measure, which results from multiplying H_{SZ} by the fraction of total foreign debt owed to private international creditors in the year just before the restructuring (with data on debt to private creditors taken from the World Bank's GDF database). This last measure thus takes into account the percentage of debt affected by the haircut. Overall, the results are robust, and even somewhat more pronounced, when including H_M or the "effective haircut" measure (columns (6) and (7)). In contrast, we find only small and weakly significant coefficients when using the face value reduction measure. This non-finding may be due to the fact that this measure does not capture the true loss suffered by investors.

[36] See column (1) for this benchmark specification. Throughout, the results are only marginally affected by our choice of control variables.

Table A1: Robustness Checks for Haircuts and Bond Spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	SUBSAMPLES (Using SZ Haircut)					**OTHER HAIRCUT MEASURES**		
	Main Model	Post-1998 Only	Without Argentina, Iraq, Russia	Defaulters Only	Excluding High H cases (H>0.37)	With Market Haircut	With Effective Haircut	With Face Value Haircut
Haircut, 1 year lag	0.95	1.66	-0.26	1.02	17.81*	1.37	-0.86	-0.41
	(3.75)	(4.05)	(4.59)	(3.79)	(9.78)	(4.01)	(2.74)	(3.80)
Haircut, 2 year lag	-1.15	-1.84	3.25	-1.11	14.27	0.18	1.20	0.58
	(3.36)	(3.56)	(3.27)	(2.84)	(9.25)	(3.17)	(1.49)	(4.25)
Haircut, 3 year lag	3.30	2.16	8.11***	3.18	16.89**	5.06*	4.57**	7.18*
	(2.66)	(2.34)	(2.33)	(2.18)	(6.92)	(2.76)	(2.00)	(3.87)
Haircut, 4 & 5 year lag	4.44***	4.73***	5.36***	3.70***	16.06**	5.38***	4.04**	0.04*
	(1.40)	(1.73)	(1.98)	(1.27)	(6.72)	(1.74)	(1.71)	(0.02)
Haircut, 6 & 7 year lag	6.31***	6.71***	7.21***	5.77***	16.65***	6.39***	4.35***	0.07***
	(1.53)	(1.52)	(1.69)	(1.31)	(5.57)	(1.66)	(1.68)	(0.02)
Restructuring Dummy, 1 year lag	61.76	51.39	111.16	5.79	-223.92	50.25	132.68	112.38
	(212.52)	(258.47)	(244.30)	(207.98)	(275.55)	(240.04)	(163.28)	(155.11)
Restructuring Dummy, 2 year lag	38.53	64.75	-67.70	-3.66	-275.05	-2.56	-9.24	-10.55
	(151.30)	(176.54)	(145.93)	(133.16)	(224.89)	(154.09)	(98.63)	(104.26)
Restructuring Dummy, 3 year lag	-188.33*	-182.45*	-302.14***	-216.54***	-488.41***	-268.36***	-207.56***	-178.42***
	(103.85)	(104.52)	(82.96)	(83.60)	(166.84)	(100.61)	(77.01)	(68.31)
Restructuring Dummy, 4 & 5 year lag	-182.60**	-224.38**	-189.62**	-179.63**	-414.05**	-242.56**	-140.63*	-88.82
	(80.33)	(100.81)	(92.79)	(69.96)	(163.47)	(94.21)	(74.18)	(73.17)
Restructuring Dummy, 6 & 7 year lag	-287.12***	-323.77***	-307.95***	-295.55***	-509.54***	-331.84***	-201.47***	-167.83***
	(81.46)	(75.62)	(84.89)	(63.87)	(113.19)	(82.66)	(74.37)	(62.49)
Rating (Residual)	-38.14***	-40.17**	-37.82***	-50.57***	-45.90***	-37.25***	-46.48***	-38.16***
	(11.10)	(16.34)	(12.11)	(14.57)	(14.03)	(10.43)	(11.84)	(11.90)
Public Debt to GDP	4.32***	4.92***	4.20***	4.33***	4.14***	4.33***	4.67***	4.55***
	(0.97)	(1.24)	(1.18)	(1.20)	(1.40)	(0.94)	(0.87)	(1.01)
GDP real growth	-8.74***	-7.92***	-7.91***	-12.44***	-7.70***	-8.01***	-8.40***	-8.82***
	(2.51)	(2.84)	(2.71)	(2.73)	(2.52)	(2.50)	(2.39)	(2.44)
Political Risk (ICRG)	-7.19**	-7.86***	-7.16**	-9.76***	-5.94**	-7.41***	-5.47**	-6.83**
	(2.81)	(2.97)	(2.91)	(3.78)	(2.93)	(2.67)	(2.76)	(2.92)
High-yield bond spread	56.98***	57.26***	54.92***	62.68***	55.04***	56.92***	57.29***	56.80***
	(7.03)	(7.02)	(7.17)	(9.43)	(7.35)	(7.01)	(7.02)	(7.00)
Constant	87.76	-61.12	83.70	257.50	-149.87	99.34	-92.25	46.79
	(235.23)	(201.43)	(235.67)	(330.57)	(230.07)	(216.19)	(212.06)	(240.94)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,562	4,041	4,290	3,023	3,870	4,562	4,354	4,562
R2	0.50	0.51	0.52	0.55	0.52	0.50	0.51	0.50
Adjusted R2	0.50	0.51	0.52	0.54	0.51	0.50	0.51	0.49

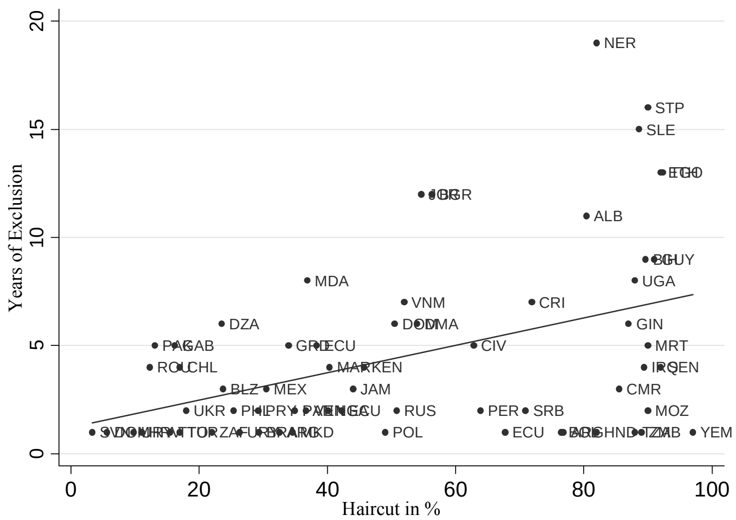
This table shows variations of the same regression in Table 4 in the main paper. The market haircut is H_M in equation (1). The face value haircut captures the percent of debt written off, but ignores changes in the debt's present value. The effective haircut multiplies H_{SZ} by the fraction of total debt owed to private creditors that is affected by the restructuring (see text for details). Note that the coefficients of the lagged restructuring dummies cannot be interpreted as unconditional marginal effects, but only conditional on the size of haircut in the respective restructuring. The key message from Table 4 is largely unchanged when performing these robustness checks.

Finally, we implement a series of robustness checks for which results are available upon request. First, we assess the role of government changes. The binary "new government" variable is clearly insignificant and including it does not affect the results, not even when interacting it with lagged haircuts. The same is true when using a variable on the government's years in office. We therefore conclude that government changes play no role for the relationship between haircuts and subsequent borrowing costs. Next, we include a dummy variable for ongoing holdout and litigation events using data from Trebesch (2008). We thereby take into account instances like in Argentina post-2005 or Peru post-1997 in which countries did come to a final restructuring but continued in disputes with holdout creditors. We find that the dummy variable for litigation is insignificant and the haircut coefficients are largely unchanged. Lastly, we split our sample in countries with high and low income. Specifically, we estimate an equation which only includes countries with a 1993 GDP per capita that is higher than 4000 US$ in purchasing power parity terms (sample median). Again, the results remain little affected.

A1.2 Robustness – Exclusion Duration (Section 6)

This section builds on section 6 above and reports additional data, as well as a series of robustness checks on our analysis of exclusion duration. We start by showing a scatter plot of H_{SZ} and exclusion time (Figure A1), as well as detailed data on reaccess years after all 67 final restructuring events listed in Table A2.

Figure A1: Haircut Size and the Duration of Exclusion



This figure plots the relationship between H_{SZ} and the years of exclusion from capital markets after the respective restructurings. The sample goes from 1980 until 2009, see Table A2 for the list of cases. Reaccess here is defined as the first of the following two events: (i) issuance of a syndicated loan or bond on international markets that leads to an increase in indebtedness and/or (ii) a positive net transfer of foreign bond or bank credit to the public sector. The figure shows that restructurings resulting in higher haircuts tend to be associated with longer times until reaccess.

Table A2: Overview of Restructuring Cases and Reaccess Years

				Main Definition (Flows to PUBLIC sector)		**Robustess Check** (Flows to PUBLIC or PRIVATE sector)
				Partial Reaccess (Flows > 0)	Full Reaccess (Flows > 1% of GDP)	Partial (> 0), including flows to private sector
Nr	Country	HIPC	Year of Restructuring	Year of Reaccess	Year of Reaccess	Year of Reaccess
1	Albania		1995	2006	2008	2004
2	Argentina		1993	1994	1994	1994
3	Argentina		2005	2006		2006
4	Bulgaria		1994	2006	2006	1996
5	Bosnia & Herzegov.		1997	2006	2006	2001
6	Belize		2007			
7	Bolivia	1	1993	1994		1994
8	Brazil		1994	1995	2000	1995
9	Chile		1990	1994	1998	1991
10	Cote d'Ivoire	1	1998	2003	2003	2003
11	Cote d'Ivoire	1	2010			
12	Cameroon	1	2003	2006		2006
13	Costa Rica		1990	1997	1998	1992
14	Dominica		2004			
15	Dominican Rep.		1994	2000	2001	2000
16	Dominican Rep.		2005	2006	2006	2006
17	Algeria		1996	2002		2002
18	Ecuador		1995	1997	1997	1997
19	Ecuador		2000	2005	2005	2001
20	Ecuador		2009			
21	Ethiopia	1	1996	2009	2009	2009
22	Gabon		1994	1999	2007	1999
23	Guinea	1	1998	2004		2004
24	Gambia	1	1988			
25	Grenada		2005			
26	Guyana	1	1999	2008	2009	2008
27	Honduras	1	2001	2002	2004	2002
28	Croatia		1996	1997	1997	1997
29	Iraq		2006			
30	Jamaica		1990	1993	1998	1993
31	Jordan		1993	2005	2005	2005
32	Kenya		1998	2002	2009	2002
33	Morocco		1990	1994	2003	1993
34	Moldova		2002			2003
35	Mexico		1990	1993	1993	1991
36	Macedonia		1997	1998	2003	1998
37	Mozambique	1	1991	1993		1992
38	Mauritania	1	1996	2001		2001
39	Malawi	1	1988			1989
40	Niger	1	1991			
41	Nigeria		1991	1993	2008	1993
42	Pakistan		1999	2004	2006	2004
43	Panama		1996	1998	1998	1997
44	Peru		1997	1999	1999	1998
45	Philippines		1992	1994	1994	1993
46	Poland		1994	1995	1995	1995
47	Paraguay		1993	1995	1999	1994
48	Romania		1986	1990	1992	1990
49	Russia		2000	2002	2002	2002
50	Senegal	1	1996	2000	2009	1997
51	Sierra Leone	1	1995			
52	Serbia and Monten.		2004	2006		2005
53	Sao Tome & Principe	1	1994			
54	Slovenia		1995	1996	1996	1996
55	Togo	1	1997			
56	Trinidad & Tobago		1989	1990	1992	1990
57	Turkey		1982	1983	1983	1983
58	Tanzania	1	2004	2005		2005
59	Uganda	1	1993	2001		2001
60	Ukraine		2000	2002	2002	2001
61	Uruguay		1991	1992	1994	1992
62	Uruguay		2003	2004	2004	2004
63	Venezuela		1990	1992	1992	1992
64	Vietnam		1997	2004	2005	2004
65	Yemen		2001	2002		2002
66	South Africa		1993	1994	1994	1994
67	Zambia	1	1994	1995		1995

This table shows all 67 final restructurings in our sample. These are the basis for the capital market exclusion tests. HIPC stands for highly indebted poor country. Partial reaccess is defined as the first year with an international loan or bond placement resulting in an increase in indebtedness and/or if the public sector receives net transfers from private foreign creditors, so that new borrowing minus debt service is positive. The measure of full reaccess is based on the same data, but imposes a threshold of 1% to GDP on the volume of flows. The last column is the same as the partial reaccess column but also takes into account capital flows to the private sector. See text for further details.

Next, we assess the robustness of our findings from the survival models estimated in section 6. To do so, we settle on a baseline specification which strikes a balance between parsimony and performance of the model (see column (1) in Table A3). The most important robustness check is to alter the definition of market access, with results being surprisingly stable. Column (2) shows that the coefficient on H_{SZ} is very similar when using the full reaccess measure. Likewise, in column (3), we find H_{SZ} to remain significant when we follow the narrower access definition by Gelos et al. (2011), which focuses on primary market issuance only. In line with Richmond and Dias (2009), we also extend the definition to include capital flows to the private sector, which translates into significantly shorter periods of exclusion, as illustrated in column (4). Even for this specification the coefficient on haircut remains at about -0.02, although it is only significant at the 10% level.

We conduct a further series of robustness checks, most of which are not directly reported but available upon request. Column (5) shows that there is no major change when including H_M instead of H_{SZ}. However, the coefficient on haircut is clearly statistically insignificant when considering the face value reduction measure (in column (6)). This is in line with the findings on EMBIG spreads and may be attributed to the imprecision of this loss estimate. As before, we also get similar results when dropping outlier cases like Argentina, Iraq and Russia, or when focusing on the post-Brady period since 1997. Furthermore, to assess the potential bias due to right-censoring, we drop the last 5 years in our sample, without any notable effect on the results. We also check the role of government changes, as in section A1.1, and also include a measure of government stability from the ICRG dataset. Again, we find no significant effects, while our main result remains the same. Finally, we checked our main results by applying a flexible parametric alternative to the Cox model, the Royston-Parmar survival model, fitted on the log cumulative hazard scale. The results were robust to this change in model choice.

Table A3: Robustness Analysis of Exclusion Duration

	Benchmark	Different Definitions of Market Access			Different Haircut Measures	
	SZ haircut, Partial access	Full Access (flows > 1% of GDP)	Primary Market Access only (Gelos et al.)	Incl. Access by Private (Richmond and Dias)	With Market Haircut	With Face Value Haircut
	(1)	(2)	(3)	(4)	(5)	(6)
Haircut (in %)	-0.025***	-0.022***	-0.019**	-0.021*	-0.026***	-0.013
	(0.009)	(0.007)	(0.009)	(0.012)	(0.008)	(0.009)
Rating (Residual)	0.012	0.000	0.044**	0.095***	0.009	0.022
	(0.031)	(0.024)	(0.022)	(0.032)	(0.031)	(0.031)
Population	0.361**	0.210**	0.588***	0.275*	0.389**	0.338**
(log)	(0.155)	(0.096)	(0.182)	(0.152)	(0.163)	(0.171)
GDP per capita	0.928***	1.089***	0.956***	0.245	0.988***	1.016***
(log)	(0.246)	(0.293)	(0.302)	(0.254)	(0.251)	(0.249)
Public Debt	-0.004	-0.021***	-0.006	-0.005	-0.003	-0.008
(in % to GDP)	(0.008)	(0.008)	(0.011)	(0.010)	(0.009)	(0.010)
Growth	0.025	-0.015	0.024	-0.058	0.022	0.024
(real, p.a.)	(0.053)	(0.057)	(0.063)	(0.051)	(0.053)	(0.056)
Inflation	0.002	0.000	0.002	0.010	0.002*	0.003*
(real, p.a.)	(0.001)	(0.002)	(0.002)	(0.016)	(0.001)	(0.001)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
# of Observations (Time at Risk)	249	403	338	187	249	249
# of Subjects (Episodes)	57	60	58	56	57	57
Log-Likelihood	-83.22	-86.60	-84.41	-99.42	-83.14	-84.95
BIC	315.41	341.18	326.04	350.54	315.25	318.87

This table shows variations of the analysis in Table 5 using different measures of market access and different haircut estimates. The alternative access measures are reviewed in the caption to Table A2 while the alternative haircut measures are discussed in the main paper (and in the caption to Table A1). The main message of this table is that the link between haircut size and exclusion is quite robust across specifications.

A2. Case Selection and Sample

We analyze the entire universe of sovereign debt restructurings with foreign commercial creditors (banks/bondholders) in the period 1970 to 2010. Five key criteria define our selection of cases:

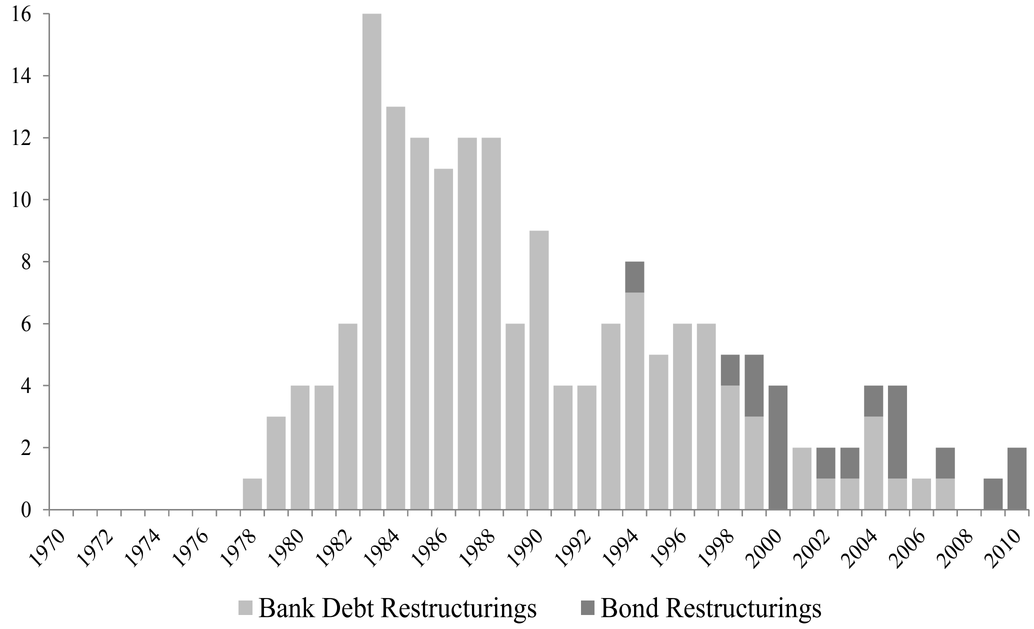
- We focus on sovereign debt restructurings, defined as restructurings of public or publicly guaranteed debt. Restructurings of private-to-private debt are not taken into account even when large-scale workouts of private sector debt were coordinated by governments, such as in Korea 1997 or Indonesia 1998.
- We include restructurings with foreign private creditors only, thus excluding debt restructurings that predominantly affected domestic creditors and those affecting official creditors, including those negotiated under the chairmanship of the Paris Club. Foreign creditors include foreign commercial banks (i.e. "London Club"[37] creditors) as well as foreign bondholders. For recent deals, we follow the categorization into domestic and external debt exchanges of Sturzenegger and Zettelmeyer (2006, p. 263). We therefore explicitly include two domestic debt restructurings but only because they mainly involved external creditors: Russia's July 1998 GKO exchange and Ukraine's August 1998 exchange of OVDP bonds.
- We focus on distressed debt exchanges, defined as restructurings of bonds (bank loans) at less favorable terms than the original bond (loan). We thereby follow the definition and data provided by Standard and Poor's (2006, 2011). Restructurings that are part of routine sovereign liability management such as debt swaps and buy backs in normal times are disregarded.
- We restrict the sample to medium and long-term debt restructurings only. We thus disregard short-term agreements, such as 90-day debt rollovers or the maintenance of short-term credit lines (e.g. trade credit). We also exclude agreements with maturity extension of less than a year. We do include, however, cases in which short-term debt is exchanged into debt with a maturity of more than one year.
- We only regard restructurings that are actually implemented, thus ignoring cases in which negotiations where never concluded or in which an agreement in principle or an exchange offer were never finalized.

Based on these selection criteria, we identify 182 sovereign debt restructurings with private creditors since 1970, in 68 countries. Note that we were able to gather sufficient data to compute haircuts for all of these cases, except for the cases of Togo 1980 and 1983. This means that our final sample of cases covers 180 debt restructurings with

[37] The term "London Club" is often used to describe negotiations conducted under the chairmanship of a bank advisory committee (or steering committee). These committees of five to twenty major banks met regularly with government representatives of defaulting countries to negotiate the restructuring terms on behalf of all affected banks. Most bank debt restructurings of the 1980s and 1990s were arranged in a London Club framework (see Rieffel 2003, chapter 6, for an excellent account).

banks and bondholders since 1970. Figure A2 provides an overview of cases by year from 1970 until 2010.

Figure A2: Sovereign Debt Restructurings with Private Creditors, 1970-2010



This figure shows the number of sovereign debt restructurings by year involving bank and bond debt. The 1980s were prolific in bank debt restructurings which often involved the same debt that was renegotiated over and over again. Bond debt restructurings became more prevalent in the latter part of the sample.

The graph shows that there were no restructurings in the early and mid-1970s. Furthermore, it illustrates that sovereign bond restructurings have reentered the sovereign debt universe only after the Brady plan of the early 1990s, which exchanged bank loans into new bond instruments. Since 1998, there have been 17 distressed sovereign bond exchanges with foreign bondholders, in 13 countries. This does not mean, however, that bank debt restructurings are a phenomenon of the past. Recent loan restructurings include a number of debt buy-backs in low-income countries, but also bank debt restructurings such as in Pakistan 1999, in Serbia and Montenegro 2004, in the Dominican Republic 2005, or in Iraq 2006.

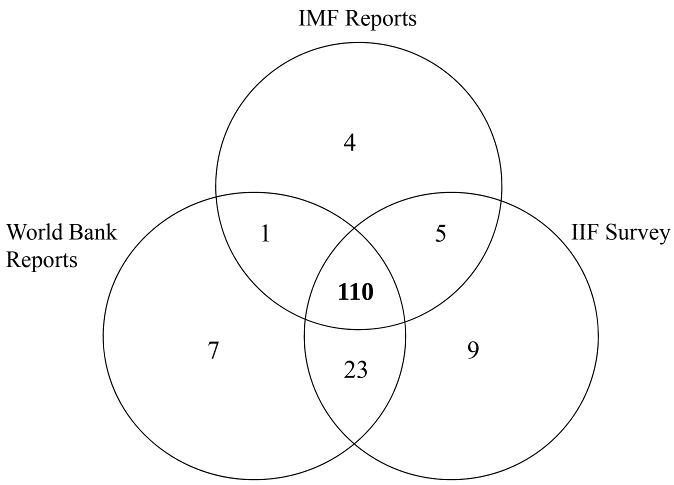
A3. Data Sources and Data Quality

A3.1. Data Sources on Restructuring Terms

When starting this project, there was no single standardized source providing the degree of detail, reliability and completeness necessary to set up a satisfactory database of cash flow and haircut estimates for the period after World War II. We therefore gathered data from all publicly available lists on restructuring terms and from many further sources, including articles in the financial press and the IMF archives.

Overall, our information set is based on 29 documents containing systematic lists with debt restructuring terms, as well as more than 160 additional sources such as books, academic articles, policy reports, offering memoranda, and press articles. Among the many sources, some are much more important than others. In particular, we build heavily on three publication series, in descending order of relevance: (i) a series of reports providing detailed and high-quality coverage on debt restructuring terms from the IMF (1986, 1987, 1989, 1990a, 1990b, 1991, 1993, 1995), (ii) a detailed survey collected by the Institute of International Finance (IIF 2001) and (iii) various issues of World Debt Tables and Global Development Finance (GDF hereafter) published by the World Bank between 1991 and 2007 .

Figure A3: Case Coverage across Main Sources



Our three main sources, the IMF restructuring lists, IIF 2001 and the World Bank restructuring lists cover 159 cases out of 180. The remaining 21 restructurings are covered by various other sources, including Sturzenegger and Zettelmeyer (2006), financial press, offering memoranda, country specific IMF reports, case studies etc.

Figure A3 depicts the number of cases covered by each combination of our three main sources and shows that there is a considerable overlap, with 110 cases covered by all three of them. However, a total of 21 cases are not covered by the main lists, so that we had to rely on additional sources.

For the more recent period, a key source was Sturzenegger and Zettelmeyer (2006, 2007, and 2008, referred collectively as SZ hereafter). These authors generously shared their database of bond-by-bond haircut calculations covering restructurings in eight countries since 1998. For the earlier part of our sample, a valuable archive was the list of debt restructuring terms in Stamm (1987) covering the period from 1956 to 1985.[38]

In addition, we gathered information from the financial press, from the IMF Archives, from published IMF country reports, from case studies by various authors and from offering memoranda or press releases on debtor government websites. To identify many of these sources we draw extensively on the qualitative information collected by Enderlein, Trebesch and von Daniels (2010) and Trebesch (2011). Their data collection is based on 20,000 pages of crisis related press articles[39], as well as numerous policy reports, academic articles and books.

While we collected many sources, we generally relied on only one primary source and, sometimes, one or two additional sources for the final calculations. Table A4 provides an overview.

Table A4: Overview of Sources as Used in the Calculations

Primary Source	IMF	IIF	SZ	Press	WB	Stamm	Other	Sum
	99	46	14	7	6	0	8	180
Secondary Sources								
IMF	--	8	0	0	1	5	0	14
IIF	11	--	0	0	0	0	0	11
SZ	0	0	--	0	0	0	0	0
Press	5	4	0	--	0	0	6	15
WB	4	3	0	0	--	0	0	7
Stamm	5	0	0	0	0	--	0	5
Other	5	4	1	5	3	0	--	18

SZ stands for Sturzenegger and Zettelmeyer (2006, 2007, 2008), Stamm stands for Stamm (1987). The IMF, IIF and Word Bank (WB) provide detailed lists with restructuring terms.

A3.2. Data Quality and Scope of Information

With no single reliable dataset available, we adopted several strategies to minimize errors and guarantee high data quality and completeness. First, we systematically

[38] The list provided in Stamm (1987) was originally assembled for a book draft by Ulrich Pfister and Christian Suter, which, however, was never published (see Suter 1992).

[39] The press search in these papers was conducted using the online news database *Factiva* and entailed a standardized search in six flagship media sources: The Financial Times, Reuters, The Wall Street Journal, Dow Jones News Service, The New York Times and Associated Press. To identify relevant articles the search algorithm "countryname w/10 debt" was used.

collected and compared the available information across all our sources. Second, we also report a data quality index for each restructuring, to be as transparent as possible with regard to the quality of our calculations.

Comparing Data Sources

For each restructuring deal, we gathered information from at least two, but mostly from three or more independent sources. To minimize errors, we started by merging the information contained in the main lists of restructuring terms by the IMF, IIF and World Bank, as well as by Stamm (1987) and SZ. We then compared restructuring details as provided by each source, in particular the information on agreement dates, maturity, grace period, interest rate, repayment schedule, and any further key characteristics of the debt restructured. In case we faced contradictory information across sources, we collected as much additional information as possible, especially from the financial press and from the IMF archives. This detailed comparison exercise enabled us to fill most data gaps and correct many minor inaccuracies contained in the individual sources. It also revealed notable differences in the content and scope of the available sources.

For the 1980s and 1990s, the IMF and IIF reports were more detailed than the other available sources.[40] They are therefore used as primary source for coding in most restructurings (together 145 cases). For the more recent period, the most reliable source is the data by SZ, which we use whenever available (14 cases). We also found detailed information in Finger and Mecagni (2007), in IMF country reports, offering memoranda and in the International Financing Review, a weekly investor magazine.

To our surprise, the information contained in GDF reports by the World Bank are sometimes incomplete, imprecise, or outright wrong.[41] This is relevant, because GDF data on debt restructurings are widely used in the literature, amongst others, by Arteta and Hale (2008), Benjamin and Wright (2009), Detragiache and Spilimbergo (2001) and Pescatori and Sy (2007). For a non-negligible number of cases, we found the World Bank lists to miss restructuring deals, to omit important details, to provide wrong figures on the amount of debt restructured, or to identify a date as restructuring date, when it was only an agreement in principle. Therefore, the World Bank reports are used as primary source for only 6 out of 180 cases in our sample.

Data Quality Index

We create an index of data quality, capturing the depth and validity of information available for each restructuring. The index consists of five components, each coded as a

[40] An exception is the subset of Brady deal restructurings, for which the GDF lists provide very detailed information.

[41] The errors and omission became evident after comparing the details in the World Bank reports with the restructuring lists by the IIF and IMF, and re-checking that information with details from the press, case studies, official debtor country websites or offering memoranda.

binary variable. The result is a composite index with a maximum of 5 (excellent scope of information) and a minimum of 0 (no criterion fulfilled, only basic information available).

The five indicators are:

1. Knowledge of when the restructuring is implemented. This includes the exact month of the agreement and whether a deal was ultimately implemented or not (fulfilled in all cases).
2. Knowledge of the key characteristics of the new debt issued, including the type of debt and the amounts restructured, as well as the maturity, grace period and interest rate of the new instruments (fulfilled in 175 cases, 97%);
3. Knowledge of the key characteristics of the old debt being restructured. This includes knowledge on which parts of the outstanding debt had fallen due at the time of restructuring or, for parts still to mature, main characteristics such as the interest rate, maturity and redemption profile (fulfilled in 122 cases, 68%);
4. Full consistency of information across all available sources. This includes all key characteristics, in particular the date, volumes, interest rate and repayment schedule (fulfilled in 93 cases, 52%);
5. Whether restructuring terms are available by instrument, i.e. loan-by-loan or bond-by bond (fulfilled in 49 cases, 27%);

The coding of these indicators for each case reveals interesting patterns. Table A5 reports the data quality index over time, showing a clear upward trend. The maximum index value of 5 is fulfilled in only 24 restructurings of the 1990s and 2000s.

Table A5: Data Quality Across Time

Data Quality Index Value (1-5)	1970s	1980s	1990s	2000s	Nr. of Restructurings
1	0	0	0	0	0
2	1	21	2	0	24
3	0	52	20	5	77
4	3	21	25	6	55
5	0	0	11	13	24
Nr. of Restructurings	4	94	58	24	180
Average Data Quality	3.5	3	3.8	4.3	3.4

The table shows the distribution of our Data Quality Index by decade. The index is calculated for each of the 180 debt restructurings. The average data quality has increased notably over time.

More specifically, the terms of new debt instruments could be collected for almost all restructurings. The same is true for information on the date and implementation of agreements (partly taken from Trebesch 2008). Knowledge of the terms of the old debt was harder to come by, with details being available in only 68% of the cases. This means that, for about a third of the cases, we have to make simplifying assumptions to calculate H_{SZ} (see section A4.1). Similarly, we could gather bond-by-bond and loan-by-loan information for only about one fifth of debt restructurings, including all bond restructurings of recent years and most Brady deals. Finally, it is striking that a full consistency across sources is fulfilled for only about one half of the sample. This underlines the necessity to collect (and compare) data from more than one source.

A4. Haircut Computation Methodology

We next review in detail the methodology used to compute haircuts. We first discuss our approach to compute cash flows of the old and new debt, and end with a detailed account of our computation of discount rates specific to each restructuring.

A4.1. Computation of Cash Flow Streams: Details and Assumptions

Timing: We use the month of the final agreement for bank loan restructurings or the date of the debt exchange for bond debt restructurings as a baseline date to compute cash flow streams and to identify the discount rates applied. This is the beginning of year 1 in the event timeline. From there, all cash flows are computed on an annual basis, so within-year interest and principal repayments are added up. Accordingly, we compute the first due amount in the cash flow stream to occur exactly 12 months after the final agreement –which would be the end of year 1 in event time.

Principal Repayment - Grace Period and Maturity: Information on grace periods and maturity is readily available for all restructurings. For many deals we also know the exact repayment timeline, i.e. which percent of the principal is due in every future month. When the exact redemption timeline is unknown we assume repayment in equal yearly tranches between the end of the grace period and the year of maturity. This assumption, which applies mostly to deals of the 1980s and 1990s, is in line with the terms of most commercial restructurings during the time and also follows standard Paris Club practice until the late 1990s (see Rieffel 2003, p. 87).

Interest / Coupon Payments: In case of fixed interest rates, the amount of annual interest payments can be easily computed. During the 1980s and 1990s, however, interest payments where typically the sum of a floating reference rate (such as the US London Interbank Offered Rate, Libor) and a spread above this rate. In this latter case it is necessary to assume an expected path of those future rates at the time that the debt instrument is being valued. To do this, we construct Libor forward rates using the settlement price of Eurodollar contracts traded at the Chicago Mercantile Exchange at the end of each month. The price data were obtained from the Futures Industry Institute and from Bloomberg.

At each point time, we fitted a cubic polynomial through all the available 90-day implicit Libor futures rates. From the estimated Libor futures curve, we extracted the rates prevailing for day 90 and for all of its multiples until the farthest futures contract available at that point in time (180 days, 270, 360, 450, 540, etc.). Since our valuation methodology computes annual interest payments, we next computed the average of the future Libor rates prevailing during the first year, the second year, etc. When the valuation horizon exceeded the farthest available futures contract, we assumed a flat yield curve thereafter.[42] These future rates would have been the fixed rate of an interest rate swap if the debt holder wanted to trade his right for variable coupons for a fixed rate on the restructuring month.

Aggregation: Whenever disaggregated information on the old and new debt is available loan-by-loan and bond-by-bond we take advantage of it. However, such information is not always available, particularly in the early part of our sample. In the 1970s and early 1980s, for example, restructurings often imposed the same terms on a bundle of loans with no information on the composition and detailed characteristics of the instrument exchanged. In these cases we simply compute a single discounted cash flow stream and haircut for all of the debt. In the late 1980s more and more deals imposed differing terms across (aggregated) subcomponents of restructured debt. The same is true for the Brady deals of the 1990s, which typically allowed creditors to choose from a menu of three or four different instruments. For these cases, we calculate the haircut that would be inflicted upon a creditor that held a value-weighted portfolio of the country's debt – see section A4.4 for specific examples. Also for two more recent restructurings (Argentina 2005 and Uruguay 2003) we aggregate instruments for ease of calculation so as to get summary debt service streams for subsets of similar bonds being exchanged. Aggregating across instruments is unlikely to have a major impact on the results, but simplifies our calculations significantly.[43]

Computing *PV Old*: Computing H_{SZ} type haircuts from equation (2) requires calculating *PV Old*, which is computed analogously to *PV New,* i.e. using the same set of assumptions, the same Libor forward rates and the same discount rates. For consistency, we also use the same US dollar reference amounts to derive payment streams of the new and the old debt, except for cases with face value reduction or debt

[42] For debts whose interests are tied to 180-day Libor, we proceeded in the same way though in this case we previously compounded the future 90-day Libor rates to obtain 180-day rates. Before the inception of Eurodollar futures contracts in December 1982, we assumed a flat Libor yield curve fixed at the one year spot. We took the latter from the IMF's International Financial Statistics.

[43] Sturzenegger and Zettelmeyer (2008, p. 789) acknowledge that the difference between "mean haircuts", i.e. the average of haircuts computed for each instrument in the deal (weighted by debt volumes), and "aggregate haircuts", derived from summary cash flow streams across instruments, is small in most cases, often "with differences of less than a percentage point."

forgiveness. Note also that, for simplicity, we only discount cash flows on the old instruments if their remaining maturity exceeds one year. We thus disregard negligible, intra-year differences between discounted and face value.

Due to data constraints, especially for the 1970s and 1980s, the detailed characteristics of old instruments are not always available. If this is the case, we derive approximate principal and interest payments in the following way.

- For principal payments, we derive an approximate redemption timeline by taking advantage of readily available information on consolidation periods. The consolidation period of a restructuring is the time window in which the debt being exchanged would have originally fallen due. For example, a restructuring deal in July 1987 might have a consolidation period of January 1985 to December 1989, so that all principal due in this period is subject to the exchange. In line with the above, we assume a linear repayment pattern over the consolidation period and discount only those principal amounts coming due after the restructuring date (here, between July 1987 and December 1989). Payments due before the restructuring month, including unpaid interest tranches, are taken at face value and added to the sum of discounted future debt. Penalties for missed payments are ignored.
- To compute interest payments on unmatured parts of the old debt, we construct a series of past sovereign interest rates by country (spread above US Libor).[44] Specifically, we calculate past average spreads from primary market loan data in the five year period prior to the default.[45] To avoid bias, we use the full universe of US dollar denominated public and publicly guaranteed loans issued by each developing country and weight the average spreads by volume of the individual issuances. For the 1970s, loan-by-loan data on sovereign debt issuances is from Borrowing in International Capital Markets, a World Bank publication, as collected by Benczur and Ilut (2009). The data covers more than 1000 sovereign syndicated loans issued by developing countries in the period 1973-1979, including information on volume, currency and interest rate spread (spreads range from 0.125 to 2.5 percentage points). For the 1980s and 1990s we rely on the full sample of more than 7000 US dollar sovereign syndicated loans by developing countries as reported by the comprehensive Dealogic database.

Accounting for Previously Restructured Debt: 61 restructuring events out of the 179 in our sample affect debt that had been previously restructured, meaning that the same

[44] We focus on spread data because this set of assumptions is applied only on bank debt restructurings prior to 1998, a period when interest on sovereign debt was predominantly linked to the Libor rate. Given the much better knowledge on the characteristics of restructured bonds, we do not need to apply a similar procedure to any of the recent bond restructurings.
[45] To identify the five-year period prior to default, we use S&P data on default years.

original debt is exchanged more than once.[46] A benefit of computing haircuts from equation (2) is that it allows accounting for such restructurings that include portions of previously restructured debt (PRD). Previously restructured loans or bonds can in fact be treated the same way as other old instruments. The relevant future payment streams can be easily computed given the detailed knowledge on the terms of previous restructurings. As with other instruments, we take those parts of PRD that have already fallen due at face value, while future payments are computed using the updated Libor forward rates and are discounted from the date of the restructuring on using the most recent discount rate.

Treatment of "New Money": 25 restructurings in the sample involve so called new money or concerted lending, which was a common feature of agreements of the 1980s and 1990s. A main rationale of issuing new money to distressed debtors was to allow governments to continue servicing interest payments so as to avoid loan-loss write offs in the creditor bank's balance sheets. In principle, debt rescheduling and new lending can be seen as functionally equivalent as they both provide payment relief to debtors. Despite this, we do not include new money loans or bonds in the baseline haircut calculations. The reason is that these instruments tend to have a short maturity as compared to the "regular" new instruments, so that including them tends to bias the overall haircut estimate downwards.[47] However, we calculate an additional set of haircut estimates in which new money loans or bonds become an integral part. The results do not differ markedly and are available upon request.

A4.2. Methodology to Estimate Discount Rates for Each Restructuring

The value of sovereign debt at the exit from default is subject to both aggregate credit market and specific country conditions prevailing at that time. The procedure explained below reconstructs these conditions for each country-month from 1978 until 2010. To our knowledge, no set of discount rate estimates used in the literature spans such a large sample of countries and years. To summarize briefly, the estimation method starts by using the secondary market yield to maturity on low-grade US corporate bonds, a truly free market price. For each credit rating category we then estimate the average spread between US corporate and EMBI sovereign yields. We then add this spread to the original corporate yield series to obtain an estimated time series of sovereign secondary market yields for each credit rating category. In the last step, we use the country credit rating in each semester to obtain a discount rate reflecting both global financial market

[46] For example, the government of Venezuela restructured $20 bn of outstanding debt in a multi-year restructuring agreement in February 1986, then amended the terms of this agreement in September 1988 and then re-restructured the debt again in its Brady deal in December 1990.

[47] More specifically, the haircut will be biased downward (i) when the maturity of the new money debt is shorter than the average maturity of other new debt instruments and (ii) when the discount rate exceeds the interest/coupon rate on the new debt. Both conditions are met in the large majority of cases.

conditions and the specific country situation. The procedure is carried out in four steps that we next describe.

Step 1: Constructing a full time series of low grade US corporate bond yield

In this step we use an extrapolation routine to obtain a full time series of speculative grade US corporate bond yields to maturity from 1978 until 2010 by credit rating. Low-grade yield data for the 1978-1990 period is only available for the aggregate US market but not by individual credit grades. Altman (1987 and 1989) and Asquith, Mullins and Wolff (1989) are the only sources that report these yields for the early 1980s –a market that was very thin at the time. We chose the Altman (1987) figures for they have the widest coverage and are similar to those of the other papers. Unfortunately, Altman (1987) provides only a single average yield per year for this market.[48] Starting in 1987, Lehman Brothers began computing the yield to maturity on its US corporate high-yield index on a monthly basis.[49] We merge the two series into a single aggregate market index yield combining Altman for 1980-1986 with Lehman for 1987-1991.[50] Starting in January 1991 Moody's provides monthly median secondary market yields on intermediate term US corporate bonds by credit grade.[51]

Using the yields from Moody's and from the Barclays-Lehman Brothers index for the overlapping years, for each credit rating grade we run a linear time-series regression of the former on the latter.[52] Table A6 reports the results for the complete sample period and for two split samples.

[48] Altman (1989) does provide a breakdown of yield by credit rating. However the series are incomplete and stop in 1987. Since we have the same problem for the 1988-1990 period, in this step we apply a common method to the aggregate market yield (both from Altman and from the Lehman Brothers index introduced next) to estimate the breakdown of yield by credit grade back to 1978.

[49] Although the return history of the index was backfilled until earlier years, the yield to maturity series start in 1987 (Fridson, 2007, and Horan, 2007). Other index providers are Credit Suisse, KDP and Merrill Lynch, but the Lehman one has earliest information about yields. The correlation among all of these indices is very high. Altman (1987) and the Lehman index overlap during 1987. The average yield from the two sources is 12.67 and 12.99 respectively, so they seem quite consistent with one another. In 2008 Lehman was taken over by Barclays Capital and the index was relabeled accordingly. We will refer to it as the Barclays-Lehman Brothers US corporate high-yield index hereafter.

[50] In part as a result of the difficulties of compiling first-hand information on the low-grade public debt market, a number of studies (e.g. Fons, 1987, Fridson and Gao, 1996) also rely on aggregate market index yields for this period.

[51] To be included in the index, bonds must be regular coupon type (no zero coupons or floating-rate), have maturities between six and eight years, have outstanding values of more than $50 million and be rated by Moody's. Each observation is unweighted in the sample, and the yields are calculated for end-of-month values. All yields are yield-to-maturity calculated on a semi-annual basis and Moody's reports the simple median yield for each credit rating grade. Typically, the index will have 1000-1200 bonds each month.

[52] We also tested a quadratic version of the model but it produced minor differences so we use the linear model for simplicity.

The table shows a high correlation between the two variables as the adjusted R2 is between 0.65 and 0.94. Both the fit and the slope coefficient increase almost monotonically as the credit quality deteriorates so the lower the credit rating, the more sensitive and volatile are yields to a given change in market conditions. These lower ratings are our primary focus of interest since defaulting countries will typically be in the lower categories upon completion of a restructuring process –even within the speculative ratings considered here.

Table A6: Regression of US Corporate Secondary Market Yields on the High-Yield Index

$$Yield_t^i = \alpha^i + \beta^i \; Yield_t^{Barclays} + \varepsilon_t^i, where \quad \begin{array}{l} i = Ba1,\ Ba2,\ Ba3,\ B1,\ B2,\ B3,\ Caa \\ t = \text{Jan}-1991, \text{Feb}-1991, ..., \text{Dec}-2010 \end{array}$$

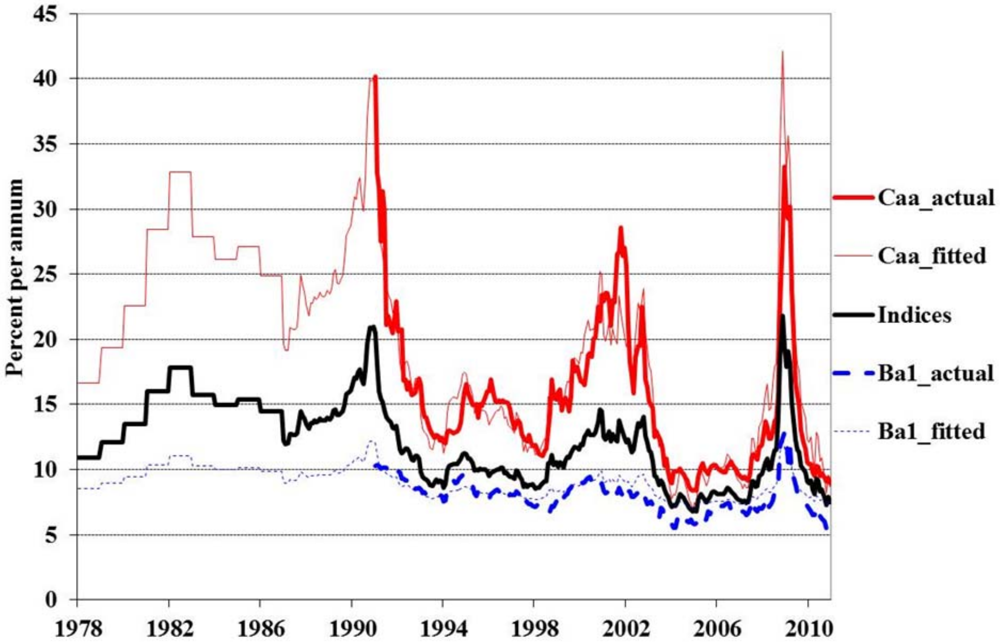
i	**1991-2010**			**1991-1999**			**2000-2010**		
	α^i	β^i	**Adj. R2**	α^i	β^i	**Adj. R2**	α^i	β^i	**Adj. R2**
Ba1	3.39	0.43	0.75	4.60	0.36	0.65	2.89	0.45	0.88
Ba2	3.08	0.51	0.79	4.59	0.41	0.75	2.47	0.54	0.89
Ba3	3.38	0.52	0.77	3.41	0.58	0.82	3.24	0.49	0.92
B1	3.80	0.54	0.73	4.32	0.55	0.78	3.46	0.51	0.92
B2	3.28	0.65	0.78	2.70	0.77	0.86	3.32	0.59	0.94
B3	1.48	0.93	0.87	1.06	1.03	0.88	1.50	0.89	0.94
Caa	-5.90	2.02	0.85	-8.82	2.33	0.90	-4.99	1.89	0.84
N	240			108			132		

This table shows the coefficient estimates of a regression of US corporate secondary market yields from Moody's on Barclays-Lehman Brothers US Corporate High-Yield Bond Index since the start of the disaggregated Moody's data. A separate regression is done for each credit rating level. Since Chow tests indicate that all coefficients are significantly different across decades, we use the coefficient estimates from 1991-1999 to generate a yield series by credit rating for 1978-1990. All coefficient estimates are significant at 1 percent level or better.

Chow tests on the split sample revealed that the coefficients during the 1990s were significantly different from those during the 2000s for all ratings. Therefore, we use the estimated coefficients for 1991-1999 to obtain imputed yields for the years 1978 through 1990 for bonds in each credit rating category. The explanatory variable is the Barclays-Lehman Brothers index yield for 1987-1990 and the Altman (1987) average annual yields for 1978-1986.

The output of this step is a full time series of corporate bond yields for the 1978-2010 period where the series up to 1990 result from the extrapolation just discussed and the series for 1991-2010 are taken from Moody's. Figure A4 shows the actual and estimated secondary market yields for the two extreme rating categories (Ba1 and Caa) together with the index yields. The good fit of the linear models is apparent in the figure. This is true even out of sample into the 2000s which we do not use. More importantly, the imputed yields for the period before 1987 closely correspond to actual yields by category directly computed off market data by Altman (1989) for the few years and categories for which the latter are available.

Figure A4: Yield to Maturity on US Low-Grade Corporate Bonds



This figure shows that yields on low grade US corporate bonds differ markedly by credit rating level over the period 1978 to 2010. The risk premium between the Ba1 and Caa ratings is also notably volatile. The solid thick middle line shows average sub-investment grade US corporate bond yield as reported by Altman (1987) from 1978 until 1986 and the yield on the Barclays-Lehman Brothers US Corporate High-Yield Bond Index thereafter. The top and bottom thick lines show the yields at the end of each month which are available since 1991 from Moody's. The thin lines report the extrapolated series for the Ba1 and the Caa credit ratings based on the coefficients from the 1991-1999 regression. The thin lines show a precise tracking of the actual yields in sample (1991-1999) as would be expected, but also out of sample (2000-2010). The thin lines for 1978-1990 show the extrapolation of yields for the two extreme non-investment grade categories based on the yield of the aggregate index at each point in time.

Step 2: From US corporate yields to sovereign yield

In this step, we convert the corporate yields from step 1 into discount rates on sovereign debt by estimating the spread that the market typically adds to corporate yields for a given credit rating. We use three data inputs in this step:

i. The corporate median yield spreads over US Treasury from Moody's which are part of the same data package used in step 1.
ii. JP Morgan's Emerging Markets Bond Index (EMBI) Global stripped yield spread prevailing for each country at the end of each month from December 1991 until December 2010. Since the Global index is not available for 1991-

1993, we take spreads from the plain EMBI index for those years.[53] This set includes 45 countries that were in the index at some point or another.

iii. For each country-month in JP Morgan's sample, we take the long term foreign currency sovereign debt issuer rating from Moody's and focus on those in the speculative grade categories (Ba1 and under).[54]

We next match, for each month and credit rating category, the median sovereign and corporate spreads, and take the difference thereof.[55] Table A7 shows statistics of these differences for the whole sample and by decade.

There was more than twice the number of observations across the different rating grades during the 2000s than during the 1990s, which reveals that the market was much less developed in the earlier years.[56] During the full sample, there was a median sovereign minus corporate difference of about 110 basis points per annum for bonds of a given grade. So typically, for a given credit rating category, sovereign yields were larger. However, the 5th and 95th percentiles in the table show that the distribution shifted to the left during latter decade. Moreover, the positive gap that prevailed during most of the sample reversed during the 2008-2009 crisis in the US so that, for the higher ratings, sovereign bonds actually had lower median yields during the last decade.[57]

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[53] The original EMBI index focused only on Brady bonds. As countries later began issuing non-Brady bonds, JP Morgan constructed two broader indices: the EMBI+ and the EMBI Global which start in December 1997. The EMBI Global has less stringent liquidity criteria for the included bonds than the EMBI+ and so covers more securities and a wider set of countries. We focus on the EMBI Global to maximize the sample coverage as many of the defaulting countries lack a highly liquid secondary market.

[54] We neglect country-months rated by Standard and Poor's and not by Moody's as recent evidence suggests that investors differentiate between the two rating agencies and assign more weight to the ratings from Moody's, the more conservative rating agency (Livingston, Wei and Zhou, 2011).

[55] Since the lowest category in Moody's US corporate yields data is Caa (withouth a qualifying number), we blend all country-months in the Caa1 and Caa2 categories in a single both to match the corporate Caa one, and we discard all country-months rated Caa3 and lower.

[56] A polar case is the Caa category for which there were only three months in the 1990s for which EMBI countries were in this range compared to 125 such cases during the 2000s.

[57] If we cut the sample in December 2007, the median diffence across all ratings is about 41 basis points larger.

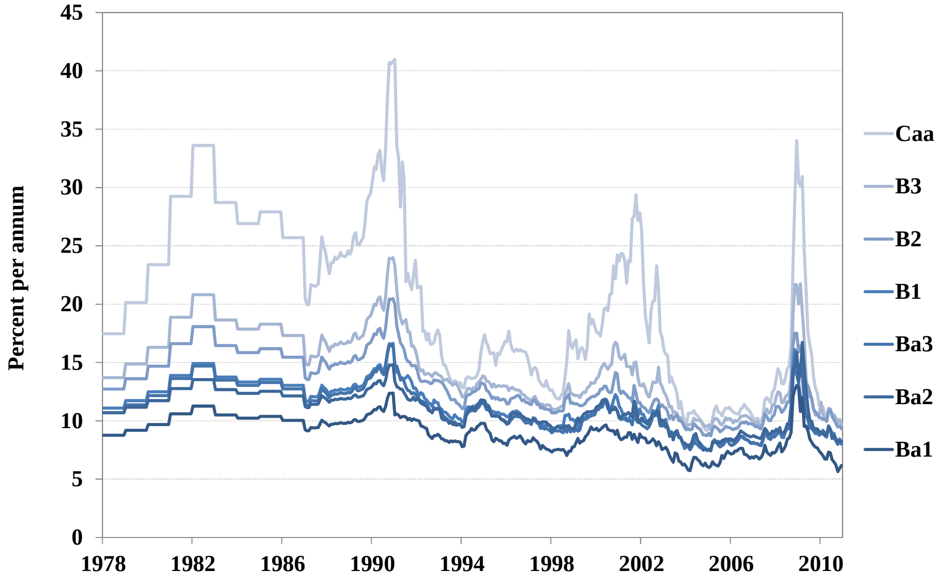
Table A7: Statistics of the Sovereign minus Corporate Bond Yield Differential

Credit rating	Period	N	5th pct.	Median	95th. Pct.
Ba1	All	193	-2.76	0.21	5.86
	1991-1999	61	1.16	2.55	7.93
	2000-2010	132	-3.16	-0.92	1.78
Ba2	All	177	-2.27	1.61	5.34
	1991-1999	58	1.41	3.24	7.40
	2000-2010	119	-2.51	0.29	3.55
Ba3	All	207	-2.93	0.99	9.45
	1991-1999	76	0.36	2.24	11.64
	2000-2010	131	-3.24	-0.44	2.51
B1	All	204	-2.19	0.72	7.18
	1991-1999	81	0.20	2.59	8.31
	2000-2010	123	-2.29	-0.22	4.03
B2	All	199	-1.23	1.55	7.14
	1991-1999	67	0.39	3.15	8.49
	2000-2010	132	-1.39	0.35	3.69
B3	All	159	-1.72	1.41	26.76
	1991-1999	32	1.41	19.55	37.59
	2000-2010	127	-1.72	0.88	6.05
Caa	All	128	-7.84	0.80	24.07
	1991-1999	3	19.32	22.79	25.70
	2000-2010	125	-7.84	0.73	23.76
All ratings	All	1267	-2.50	1.10	8.57
	1991-1999	378	0.42	3.09	19.32
	2000-2010	889	-2.82	-0.04	4.29

This table shows statistics of the sovereign over corporate premium for a given credit rating category (figures in percentage points). More specifically, the base variable is the gap between the median EMBI/EMBI Global sovereign stripped yield spread over US Treasury and the median US corporate bond spread over US Treasury reported by Moody's. The figures show that the risk premium for sovereign over corporate debt of a given creditworthiness was much higher in the 1990s when this market started to develop than in recent years. The median gaps for each credit rating grade during the whole sample are added to the corporate yields from step 1 to generate the imputed sovereign yields by credit rating from 1978 until 2010 shown in Figure A5.

Because we seek to impute secondary market sovereign spreads for the whole sample, we use the overall sample median difference hereafter. We next add the median all sample difference for each rating category to the median US corporate secondary market yield for that category from step 1. The output of step 2 is thus a time series of imputed secondary market sovereign yields for each credit rating grade from 1978 until 2010 as shown in Figure A5.

Figure A5: Imputed Sovereign Discount Rates for Long Term US Dollar Debt by Different Issuer Credit Ratings



This figure shows the evolution over time of a market-based imputed yield to maturity on medium-term US dollar denominated sovereign bonds for the different Moody's speculative credit rating categories. Both the levels of yields and the gaps between yields for different ratings vary substantially over time.

Step 3: Correspondence between Moody's sovereign credit grade and the Institutional Investor country credit ratings

Very few countries had agency credit ratings during the 1980s and early 1990s so we cannot rely on Moody's ratings to assess discount rates that vary depending on defaulters' conditions. However, as early as 1979, Institutional Investor (henceforth *II*), a trade magazine, started publishing country credit ratings for an initial list of 93 countries, which grew to over 178 nowadays. The ratings are the average of the credit score assigned to governments by the credit rating teams of a pool of about 100 internationally active banks. Because of their ample coverage, the *II* ratings have been widely used in the international finance literature (Feder and Ross, 1982, Feder and Uy, 1985, Lee, 1993, Ul-Haque, Kumar, Mark and Mathieson, 1996, Erb, Harvey and Viskanta, 1995 and 1997, later jointly with Bekaert, 1997, Ferson and Harvey, 1997, Reinhart and Rogoff, 2009, see Cruces, 2006, for a review). Since a large part of our restructurings are not covered by Moody's or Standard and Poor's, we rely on *II* for a set of credit ratings that are consistent both in the time series and in the cross sectional dimension.[58] However, given that the yield data from step 2 are for Moody's credit

[58] Since our ultimate object of interest is the haircut imposed by a country compared to that imposed by other similar countries, or to that imposed by the same country in other time periods, in case there is a systematic bias in the computation of discount rates, this would presumably affect all restructurings in a similar fashion.

rating categories, in this step we convert the *II* country credit ratings into their Moody's equivalents.

Our goal is to have a good prediction for non-investment grade countries, as these are the ones most likely to undergo credit difficulties. The maximum *II* credit rating for a non-investment grade country in our sample was 65. Because we want to estimate the distribution of Moody's ratings conditional on a given *II* rating, we discard all country-semesters with an *II* rating greater than 65. We next take the prevailing Moody's credit rating as of January and July of each year, starting in mid-1979, and convert it to a numerical scale going from 21 for the A category all the way down to 2 for the Ca category.[59] We match these country-month ratings to those of the March and September *II* surveys for the same years.[60] Table A8 reports the results of a linear projection of the Moody's ratings on those from *II*,[61]

Table A8: Linear Projection of Moody's on Institutional Investor Ratings

$$Moody's\,CCR_{jt} = \alpha + \beta\, Institutional\ Investor\ CCR_{jt} + v_{jt}$$

Sample	α	β	*N*	*Adj. R2*
Full sample	1.232 (7.71)	0.215 (61.93)	1,867	0.67
1980s	8.580 (5.14)	0.154 (4.42)	74	0.20
1990s	1.885 (8.56)	0.216 (45.53)	603	0.77
2000s	0.705 (4.93)	0.212 (67.91)	1,190	0.80

This table shows the results of a linear regression of country credit ratings from Moody's on those from Institutional Investor. We run one separate regression for each decade and one for the whole sample. Very few countries were actually rated by Moody's in the 1980s (less than 4% of the sample). These countries had better unobservable characteristics than those that Moody's began rating in later decades. This is shown by the reduction of the intercept from 8.6 in the 1980s to 1.9 in the 1990s and to 0.71 in the 2000s. The slope is markedly stable after 1990. As the output of step 3 we use the full sample estimates to generate an estimated Moody's rating for each country-semester with an Institutional Investor rating. This imputed rating is matched with the yields from step 2 to generate a country-month specific discount rate in step 4.

The table shows a strong positive relation between ratings from the two sources. The slope coefficient for the whole sample is 0.215 so that it takes 4.65 *II* credit points to raise one notch in the Moody's scale. The table shows that this slope coefficient is quite

[59] This conversion of categorical to ordinal scales is standard in the literature; see Cantor and Packer (1996) for references.

[60] Cruces (2006) documents that the Institutional Investor surveys whose results are published in March and September of each year are conducted about two to three months before publication.

[61] We also try a quadratic specification but the significance of the quadratic term is very unstable over time.

similar for the 1990s and the 2000s. The lower slope coefficient for the 1980s sample results from some outliers which kept high Moody's ratings even as the country situation deteriorated substantially. For example, Venezuela had an Aa rating issued in 1983 and kept it until Moody's lowered this by nine rating notches to Ba2 in mid-1987 (see Moody's 2010). In the meantime, its *II* rating fell monotonically each semester from 57.2 points in 1983 to 36.9 in mid-1987.

The intercept represents heterogeneity that is not captured by the *II* ratings: it is larger for the earlier period and it falls as time progresses. In fact Moody's focused on the subset of most developed countries in the 1980s and it incorporated less developed countries as the years went by, hence the secular reduction in the intercept.

Given the stability of the slope coefficients over time and because we are analyzing countries with credit difficulties and at different levels of development during the three decades, in the next step we use the full sample specification to impute a Moody's equivalent credit rating for each country-semester Institutional Investor rating.

Step 4: Individual country discount rates at each point in time

From step 2 we have imputed secondary market yields for sovereign bonds in each of Moody's speculative grades (Fig. A4). Step 4 uses the sovereign rating for each country-month in the sample from step 3 and imputes a market discount rate for that rating-month combination by linear interpolation of rates from step 2. When the imputed Moody's rating falls in the investment grade range, we avoid computing a discount rate as our procedure is designed for countries facing debt problems. These are the final discount rate sequences from 1978 until 2010 from which we pick the specific rates prevailing after each restructuring.

While very comprehensive, the *II* report provides no ratings for a small set of poor countries in the 1980s and 1990s. As a result, we are not able to estimate country-specific discount rates for 12 restructurings. As a proxy, we use the respective monthly rates of the nearest country in the region that was also in default or implemented a restructuring during the time. For the cases of Bosnia and Macedonia in 1997 we use the rate estimated for Albania; for Dominica in 2004 we use the respective monthly rate of the Dominican Republic; for Gambia and Guinea in 1988 we use Sierra Leone's rate, respectively; for the cases of Madagascar 1981, 1984, 1987 and 1990 and for Mozambique in 1987 we use Tanzania's rate; for Niger 1984 and 1986 we use Sudan's rate and for Togo 1988 we use the rate estimated for Liberia. For Jamaica's 1978 restructuring, we backward extrapolated linearly the rates in 1979.

The discount rates so computed are used in 161 of the 180 cases. 18 of the remaining cases consist of buybacks of all fallen due debt for which no discount rate is needed (*PV*

New is the buyback price and *PV Old = FV Old*).[62] The remaining case is Russia 1999 which is a complicated local currency denominated exchange for which we borrow the rate from Sturzenegger and Zettelmeyer (2008) who went through the painstaking job of estimating it as an exit yield was not readily available.

The unbiasedness and the timeliness of credit ratings have been subject of much debate in recent years. While some authors argue that agencies add fundamental value above and beyond market prices (e.g. Cavallo, Powell and Rigobon 2008, Sy 2004), others have criticized them for reacting to public information with delay (see Kaminsky and Schmukler 2002, among others). Despite this, we think that the Institutional Investor ratings are the most reliable and useful source of information on sovereign risk across countries and time for our purposes: First, they arise directly from the credit analysis teams of large internationally active banks who were the players in the sovereign debt market, hence the agents who would potentially trade these assets in primary or secondary markets. Second, they span a much larger number of countries and cover a wider time period than any alternative source of data on sovereign risk (including bond or loan spreads). Furthermore, we use semester data, which will be less prone to agency rating delays and bias compared to rating data on a daily or weekly basis.

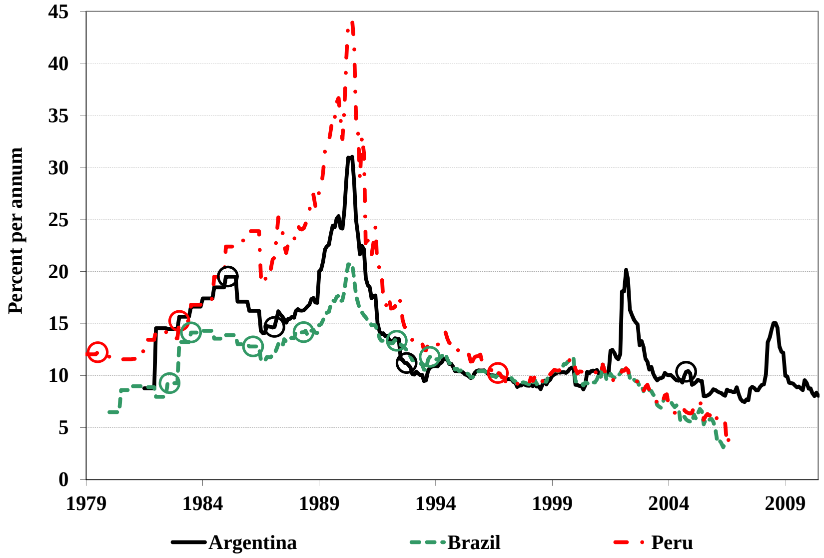
[62] A few other buybacks involve yet to mature debt and are among the 161 cases.

A4.3. Resulting Discount Rates: Overview and Benchmarking

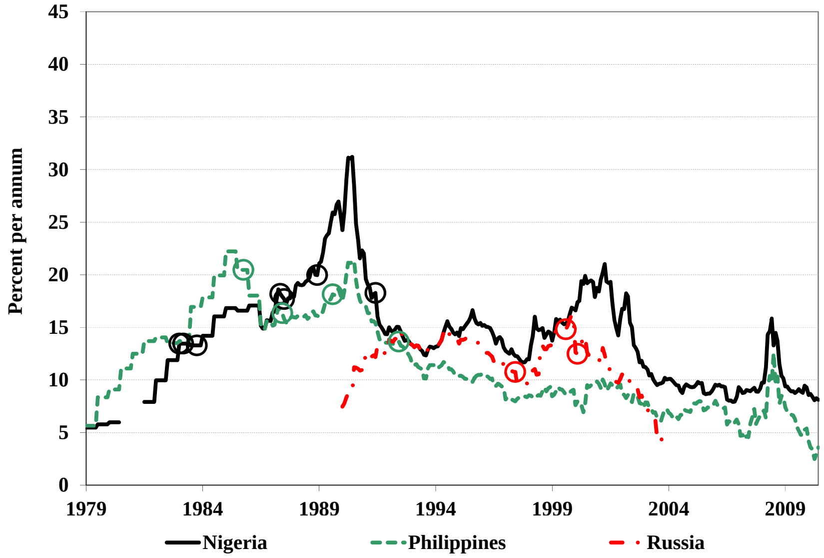
For illustration purposes, Figure A6 shows the time series of discount rates for six selected countries with circles highlighting the rates that are actually used (i.e. restructuring cases) along each country's series.

Figure A6: Imputed Discount Rates for Selected Countries

Panel A:



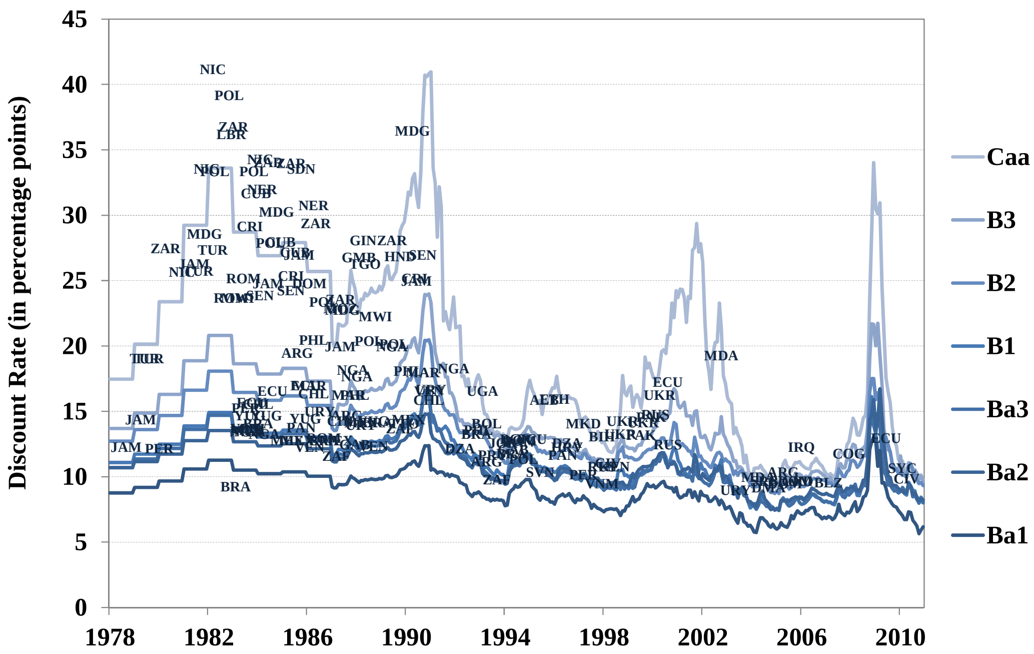
Panel B:



This figure shows the discount rates imputed to six countries over the sample period and highlights that yields respond to changing country and world market conditions. The circles along each series correspond to those rates that are actually used in computing haircuts. Some lines are discontinued, because we no longer compute yields when a country's imputed credit rating graduates to investment grade (Baa), e.g. Russia after 2004.

The figure clearly shows that there are very volatile common movements in discount rates which make them swing together between about 7% and 25%. It also underscores that there are important specific country conditions above and beyond the common movements: the upswing of Argentina and Nigeria around 2001 is not accompanied by Brazil, Peru, Philippines or Russia. Last, while country and world conditions change over time, it could be the case that countries restructure at times when discount rates reach a certain fixed level (e.g. 10% as used by some authors), which would make this whole discount rate estimation procedure futile. The example of the six countries in Figure A7 shows that although the discount rates actually used are less volatile than the underlying series, they still range from about 9% to slightly over 20% so that it seems appropriate to have restructuring-specific discount rates in order to compute haircuts.

Figure A7: Discount Rates Actually Used Each Year in Computing Haircuts

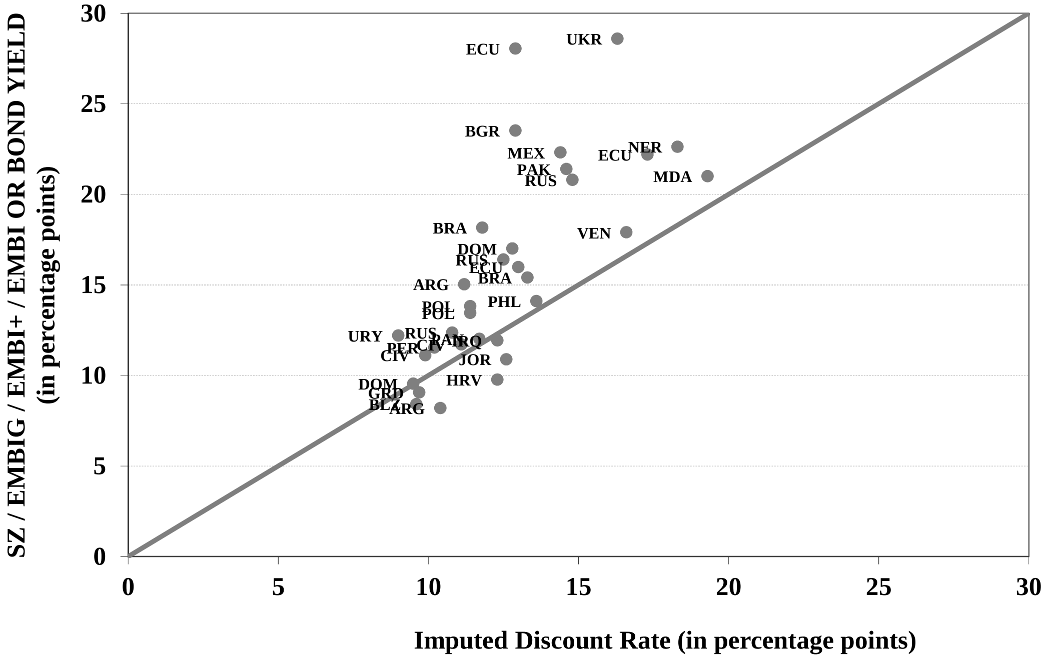


This figure shows the discount rates actually used in computing haircuts and the time and country to which they correspond. One fourth of the discount rates were lower than 12.8% and another fourth were higher than 24.3. The first half of the sample shows the largest discount rates.

Figure A7 provides even stronger evidence of the relevance of this exercise by showing the discount rates actually used in each restructuring by the different countries and their breakdown over time. The first quartile of the series is 12.8 and the third quartile is 24.3, so that about one half of the discount rates are outside of this range.

Finally, we provide two acid tests of the validity of our discount rate imputation procedure. For a set of 31 recent restructurings, exit yields are available from SZ (2006, 2008), from the EMBI or EMBI Global indices and/or from major bonds whose yields are reported by Morgan Markets. Figure A8 compares these data with our discount rates and superimposes a 45º line.

Figure A8: Benchmarking Imputed Rates against Actual Exit Yields: 1990s/2000s



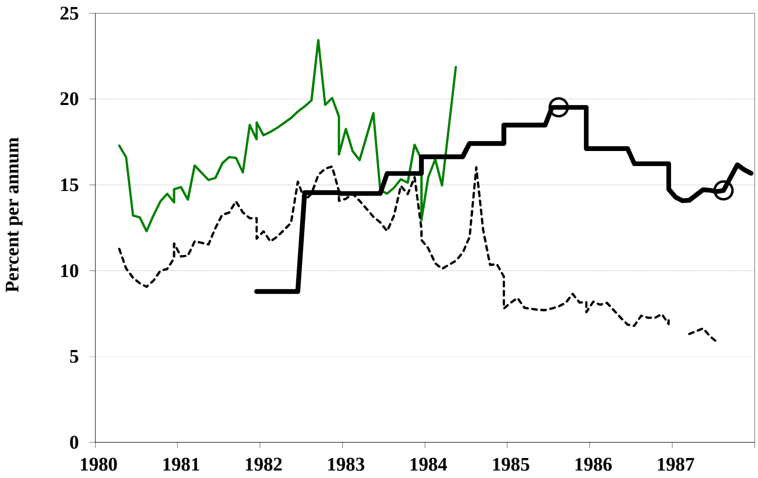
This figure contrasts our discount rates (x-axis) with the exit yields from SZ (2006, 2008), EMBI/EMBIG and MorganMarkets (y-axis) for 31 recent restructurings for which these latter data are available. While the methodology presented in this paper seems to underestimate exit yields at levels above 15%, the correlation coefficient between the two series is 0.73.

As evident from the figures, our imputed rates are largely consistent with actual exit yields whenever they are available. The correlation coefficient is a high 0.73. Yet, there are a few cases above 12% for which our procedure underestimates the exit yields. As shown in Figure 3 in the paper, exit yields drop considerably in the few months after the new bonds begin circulating. It is then natural to ask whether holders of old debt instruments will sell their claims immediately after the new bonds begin circulating or if they will wait a few months until the situation normalizes (and their haircuts are reduced as the exit yields taper off).

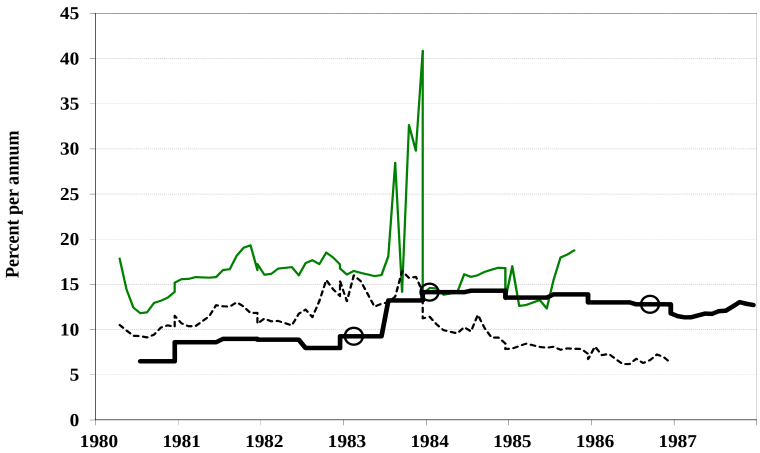
Our last acid test compares discount rates at the other extreme of the sample, the 1980s. Folkerts-Landau (1985) and Edwards (1986, ft.25) report emerging country bond yields from the International Herald Tribune. This newspaper has continuous series for very few emerging countries, most notably Argentina, Brazil and Mexico. We retrieved those yields, following the same bonds over time, and computing the average thereof on the first Monday of each month from 1980 until they ceased to be listed. Figure A9 shows the average among US dollar and Deutsche mark bonds together with our discount rates (thick line).[63] The circles on the thick line highlight the discount rates that are actually used in computing haircuts.

Figure A9: Benchmarking Imputed Rates against Secondary Market Yields: 1980s

Panel A: Argentina

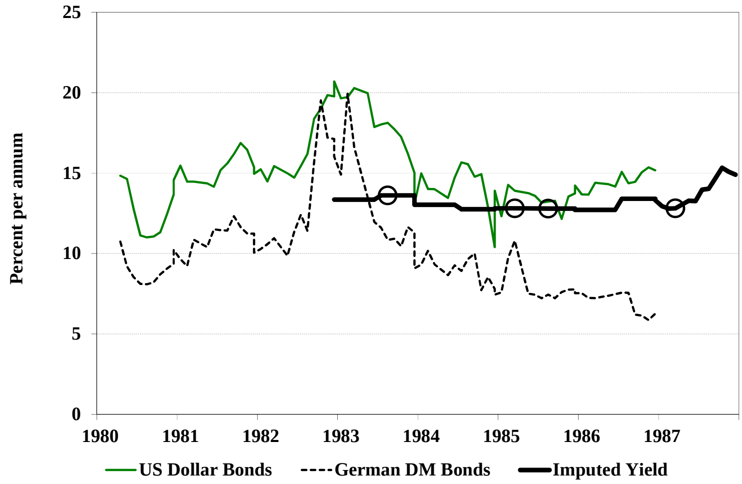


Panel B: Brazil



[63] Our discount rates are constant within a semester up to 1986 due to the fact that the corporate yields from step 1 are only available by year for that early period while country credit ratings vary by semester.

Panel C: Mexico



A few emerging countries floated hard currency bonds which were traded in very thin international markets in the 1980s. This figure shows the average yield at the beginning of each month on the US dollar and the Deutsche mark bonds for the very few countries that had continuous reporting of their yields by the International Herald Tribune. It also shows our imputed discount rates which for the pre-1987 period varied only by semester. The circles highlight the yields that are actually used in computing haircuts. It is apparent from this figure that the imputed discount rates are broadly consistent with the levels and changes of these secondary market yields.

Again, while the data are noisy, due in part to the thinness of these markets, it is apparent from the figure that the imputed discount rates are broadly consistent with the levels and changes over time in these secondary market yields even for the 1980s.

A4.4. Computing Haircuts: Four Examples

Sovereign debt markets have evolved considerably over time, and so have debt restructuring techniques. The following paragraphs illustrate our haircut computation approach for four representative restructurings during the 1980s, 1990s and 2000s.

Poland's April 1982 Rescheduling

Poland's 1982 debt agreement was a landmark case, being the first restructuring of the 1980s debt crisis with "a broader systemic significance" (Rieffel 2003, p. 102). It also was a typical deal of the early 1980s, in that it featured consolidation periods of one or two years only and affected debt that had already fallen due or that was about to mature in the very short-term. Poland and its creditor banks signed the restructuring agreement in April 1982. The deal rescheduled 95% of principal that had fallen due in 1981 ($1.95 bn) into a new loan with maturity of seven years, grace period of four years and a 1.75 interest spread above Libor. The relevant 180-day Libor forward rate computed for April 1982 is 14.75% and remains flat for the entire horizon of the new loan. Based on this basic information, we derive the following repayment schedule: Annual interest payments of 16.5% on the outstanding principal from year one to seven, disbursed in end March of each year. Principal repayment in equal amounts after the end of the grace period, with 33% being paid back at the end of March of 1987, 1988 and 1989 respectively.

The discount rate applied is a very high 33.45%, which reflects the exceptionally low country credit rating of Poland and a low appetite for high-risk debt at the time. Specifically, Poland had a country credit rating of 13 on the Institutional Investor (IICCR) scale. This rating is tantamount to 4.03 on an ordinal scale in which 4 corresponds to a Moody's rating of Caa and 6 to B3. At the time, the yield on medium term US corporate bonds rated Caa was 32.81%, a price of credit risk only surpassed in late 1990 and 2008.

The resulting present value of the discounted debt servicing stream is 1.16 bn US$, yielding an overall market haircut of 40.6% (roughly: 1- 1.16/1.95). Because all of the old debt had already matured at the time of exchange, this H_M is equal to H_{SZ}, which is a typical pattern of restructuring deals in this period.

Chile's 1987 Baker Plan Deal

The mid and late 1980s saw a new type of debt restructurings, which were coined "Multi Year Restructuring Agreements" (MYRAs) or as Baker Plan restructurings (see Chuhan and Sturzenegger 2005 for details). MYRAs restructured unmatured debt coming due in a period of up to five years in the future, and resulted in new loans with a maturity of up to 25 years. The newly negotiated interest rates were more concessional than in the early 1980s, with spreads above Libor of around 1% or less. Overall, these agreements were both more comprehensive and more complicated to assess, because they involved previously restructured debt and often resulted in more than one new debt instrument.

An exemplary case for the period is Chile's June 1987 restructuring, which had three main elements: Part one restructured $1.41 bn of maturing new money loans that had been issued in June 1984 and April 1986 into a new loan with five years maturity, three years grace period and a 1.125% spread. Part two exchanged $2.95 bn of debt that had been previously restructured in agreements of November 1983 and January 1984. The PRD falling due between January 1988 and December 1990 is exchanged into a new loan with a maturity of 15.5 years, a grace period of five years and a spread of 1%. The same terms applied for part three, which restructured $1.53 bn of previously unrescheduled debt falling due between January 1988 and December 1991 into a new loan with 15.5 years maturity, five years grace and 1% spread. The imputed 180-day Libor forward rate for June 1987 increases from 7.67% in year one to 9.16% in year 10 (as a reference, the yield to maturity on 10-year US Treasury bonds was 8.4% at the time). The imputed country specific discount rate applied to all three parts is 14.32%. Chile's IICCR was 26, which was tantamount to about a B2 on Moody's scale. The return on US corporate bonds rated B2 was about 12.51% at the time.

For the restructured new money loans of part one of the deal we compute interest rate payment streams that increase from 8.67% (7.67% + 1%) in year one, to 10.3% at the end of year five. 50% of principal is redeemed at the end of the fourth year, the other half in year five. The resulting present value of this new instrument is \$1.21 bn, compared to \$1.42 bn in face value. Parts two and three of the deal also foresee annual interest payments going from 8.7% in year one to a maximum of 10.3%. Principal payment occurs linearly at a rate of 9.52% from year six to 15 and 4.75% in the last six months (July to December 2002). The resulting present value is \$2.26 bn for part two, and \$1.18 bn for part three, compared to \$2.95 bn and \$1.53 bn in face value, respectively. Overall, this yields a weighted market haircut H_M of 21.2% (roughly: 1-(1.21+2.26+1.18)/ (1.42+ 2.95+1.53)).

Calculating H_{SZ} for this restructuring builds on two approaches. For parts one and two of the deal, *PV Old* can be computed using the known terms of the new money and PRD of 1983 and 1984. For the old instruments of part one we apply an average interest rate spread to of 2.06% above Libor, which is the weighted average spread of the 1.3 bn of new money of November 1983 (with a spread of 2.25%) and the 780 m of new money of June 1984 (with a spread of 1.75%). For part two we apply a 2.25% spread, as all relevant parts of the 1983 and 1984 restructuring agreements had this spread. With reference to the original terms, the relevant principal repayment of both parts are plotted in equal annual tranches until the end of 1990. The reference Libor forward rates and the discount rate applied are the same as for the new debt, i.e. using those relevant in June 1987. The result is *PV Old* of \$1.31 bn for part one and of \$2.74 bn for part two of the deal, which is significantly less than their face value of \$1.42 bn and \$2.95 bn of their face value, respectively.

Computing *PV Old* for part three of the deal is more complicated, as this part does not affect PRD and because we have little further information on the old loans being restructured. As discussed in section A4.1, we therefore derive an approximate payment schedule and assume linear redemption across all years of the relevant consolidation period (01/1988-12/1990). To derive interest payments we apply the weighted average interest rate spread on all of Chile's public and publicly guaranteed loans issued between 1978 to 1982 using loan by loan data from Dealogic and the Borrowing in International Capital Markets publication series (see A4.1). This retrospective average spread amounts to 1.07%, while the Libor forward rates and the discount rate applied are those of June 1987. The resulting *PV Old* for part three is \$ 1.37 bn compared to 1.53 bn of its face value. When summing up the present value of all three parts, we get \$ 5.31 bn and a H_{SZ} haircut of only 14.3% (roughly: 1- (1.21+2.26+1.18)/(1.31+ 2.74 +1.37)), about two-thirds of its H_M counterpart.

Mexico's 1990 Brady Deal

Mexico was the first country to reach a restructuring agreement under the Brady initiative, which implied outright debt reduction and the exchange of bank debt into bonds. Mexico's February 1990 agreement was a typical Brady exchange in that it allowed creditors to choose from a menu of options so as to accommodate differences in business goals and regulatory environment across banks. Specifically, Mexico's deal had four parts: Under option one (chosen for $20.55 bn) banks exchanged outstanding principal with a 35% discount into new 30 year bonds with bullet maturity and a spread of 0.8125%. Option two (chosen for $22.43 bn) implied interest reduction, as debt was exchanged into 30-year bullet bonds with a fixed interest rate of 6.25%. For both of these 30-year bonds, principal payments were collateralized with US Treasury zero-coupon bonds while interest payments were backed by an 18-month rolling interest guarantee. Collateralization was supported through a special Brady deal funding facility set up by the IMF and the World Bank. Option three (chosen for $5.1 bn) did neither foresee principal nor interest reduction, but exchanged debt at par if creditors where willing to provide new money (in the form of new lending or trade finance) equivalent to 25% of eligible debt. The bonds exchanged in option three had a maturity of 15 years, a grace period of seven years and a spread of 0.8125% above Libor. Beyond these three options, the deal foresaw the restructuring of $6.4 bn of debt coming due from previous new money packages (of 1983, 1984 and 1987) without debt and debt-service reduction. The resulting bonds also had a maturity of 15 years, a grace period of 7 years and a spread of 0.8125% above Libor. The imputed forward Libor rate of February 1990 increases from 8.59% in year one to 9.29% from year 10 on. As a reference, the yield to maturity on 10-year treasuries was 8.47% at the time.

Debt payments on all uncollateralized bonds are discounted at the exit yield of 14.42%. Mexico had an IICCR of 32.6 at the time, which was tantamount to 8.24 on Moody's ordinal scale in which 8 corresponds to B1 and 9 corresponds to Ba3. The yield on medium-term US corporate bonds rated B1 was 13.76 and on those rated Ba3 was 13.25 at the time. A different rate has to be applied to the 30-year bullet bonds, as they are collaterized with US Treasuries. Specifically, we discount the principal repayment of these bonds in year 30 (February 2020) using a discount rate derived from the US Treasury yield curve of February 1990 (8.45%). The interest payments are discounted at the 15.35% country rate, except for the first 18 months, which are guaranteed and thus discounted using a rate derived from the US Treasury yield curve (8.12% in the first year and 8.43% for months 13 to 18). As to the repayment schedule, the bonds of option three as well as the additional bond on previous new money have annual principal repayments of 12.5% from year eight to 15 as well as yearly interest disbursements, which are linked to the (forward) Libor.

To compute the overall haircuts, we discount the debt streams of each of the instruments as described above and add their present values to get *PV New*. This results in an overall H_M of 43.7%. *PV Old* is easy to compute here, as in March 1987 all outstanding sovereign loans (including previously restructured ones) had been exchanged into to two new instruments with a spread of 0.8125% above Libor and maturities of 10 and 20 years. To derive cash flows streams, we can therefore simply use the terms of these two instruments, as well as the terms of four new money loans issued at that time (same spread and maturities of eight, 12 and 15 years). Due to the long remaining maturity, the present value of the outstanding debt instruments amounts to a low $43.97 bn, compared to the face value of $54.3 bn. The resulting H_{SZ} is 30.5%, which is significantly smaller than the market haircut. The face value haircut is even lower, 13.1%, because only part one of Mexico's Brady deal menu implied principal reduction.

Ecuador's 2000 Bond Exchange

Ecuador's 2000 exchange is an exemplary case of a modern-era bond restructuring. In 1999, Ecuador was the first country to default on its Brady bonds. The government launched an exchange offer on six outstanding bonds in July 2000, which was successfully closed on August 17 with a participation rate of nearly 99%. The deal affected four bonds resulting from the country's 1996 Brady deal, as well as a $350 m bullet Eurobond maturing in 2002 and a $150 m bullet Eurobond maturing in 2004. The Brady instruments had an outstanding face value of $1,655 m (Brady Par bonds), 1,435 m (Bray Discount bonds), 2,781 m (Brady Past Due Interest bonds) and 143.25 m (Brady Interest Equalization bonds). Their maturities are 2025, 2025, 2015 and 2004 respectively. The Brady bonds have an interest rate of 0.8125% above Libor except for the Par bond, which has a step up coupon rate increasing from 3% to 5% annually.

All six old bonds were exchanged into a new 30 year bullet bond maturing in August 2030 with annual coupon rates increasing from 4% in year one to 10% from year nine on. Besides a lengthening of maturities, the exchange implied a cut in principal of 60% for the Brady Par bonds, of 42% for the Brady Discount bonds and of 22% for the Brady PDI bonds (this yields an overall weighted cut in principal of 33.88%). Note, however, that this cut in principal was accompanied by a sweetener, as holders of Brady PDI and Brady Discount bonds that agreed to the exchange became eligible to a cash payment of 23.5% of principal outstanding. Furthermore, the deal foresaw the capitalization of a total of $185.3 m of overdue interest payments on all of the six old instruments. This accrued interest was exchanged into a new bullet Eurobond maturing in 2012 and paying a fixed 12% annual coupon. Future payments are discounted with the imputed country specific discount rate of 17.3%. At the time Ecuador had an IICCR of 18.3 which is tantamount to 5.16 on Moody's ordinal scale in which 4 corresponds to Caa and 6 corresponds to B3. The yield on medium-term US corporate bonds at the time was 13.3 for B3 bonds and 20.04 for Caa bonds as computed directly by Moody's.

In this case, we can compute *PV Old* precisely, given the detailed knowledge on all of the old instruments, including their exact principal redemption schedule. We apply the same country-specific discount rate of 17.3%, except for the collaterized Brady bonds which are discounted based on the prevailing US 30-year Treasury yield curve). To get the total present value of the old instruments, we compute present value estimates for each of the six outstanding bonds and add to this the total accrued past interest. This results in a total present value of the old debt of $43.58 bn, compared to $66.99 bn in outstanding face value. Next, we compute the present value of the two new bonds and add to this the cash payment sweetener on the Brady PDI and Discount bonds. The result is a total *PV New* of $26.91 bn. Overall, we thus get a market haircut of 59.8% (roughly: 1- 26.91/66.99) and a SZ haircut estimate of 38.3% (roughly: 1- 26.91/43.58). This large discrepancy between H_M and H_{SZ} can mainly be explained by the long remaining maturity of the old outstanding Brady debt instruments. Finally, it should be mentioned that the agreement also had a sizable face value haircut of 33.88%, due to the substantial write-off on three of the six outstanding instruments.

A5. Detailed List of Restructuring Cases

Table A9 provides the complete list of all 180 restructurings 1970 to 2010. The table also provides details on key features of each restructuring agreement, in particular:

1. The volume of debt restructured in million US dollars,
2. If the restructuring involves bond debt only,
3. If the deal implies a reduction in face value of outstanding debt,
4. If the deal is a buy-back,
5. If the restructuring is a Brady deal,
6. If the deal is donor funded or supported by bilateral or multilateral money, e.g. via funds by International Development Association Debt Reduction Facility (World Bank 2007, 2010),
7. If all the old debt being restructured had fallen due at the time of the restructuring,
8. If the exchange includes previously restructured debt (PRD),
9. If the agreement includes the provision of new money or concerted lending,
10. If the agreement also affects short-term debt, e.g. trade credits, and
11. The Data Quality Index, reflecting the scope of information available.

Figure A10 provides a more condensed overview. The graph underlines the high frequency of restructurings, both within and across countries. On average, defaulting countries restructured their debt two and a half times since 1970. Especially the 1980s saw a large number of successive restructurings, which were often linked to each other. The country with the largest number of completed debt exchanges was Poland with eight deals, followed by Mexico, Congo (Dem. Rep.), Jamaica and Nigeria with seven deals each and then by Argentina, Brazil and Mexico with six deals each. These figures reconfirm the notion of serial defaults highlighted by Reinhart and Rogoff (2009). In addition, it is noteworthy that some renegotiations took very long to complete. Peru, for example, was in default for as long as 14 years before reaching its Brady plan agreement in 1997.

Table A9: Sovereign Debt Restructurings 1970-2010

Case Nr	Country	Date	Debt Affected in m USD	Bond Exchange	Reduct. in Face Value	Buy Back Deal	Brady Deal	Donor Funded	All Fallen Due	Affects PRD	New Money Incl.	Short-Term Debt Incl.	Data Quality Index
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	Albania	08 / 1995	501		1			1	1				2
2	Algeria	03 / 1992	1,457										3
3	Algeria	07 / 1996	3,200							1			2
4	Argentina	08 / 1985	9,900						1		1	1	2
5	Argentina	08 / 1987	29,515						1		1	1	3
6	Argentina	04 / 1993	28,476		1		1			1			3
7	Argentina (Global)	04 / 2005	43,736	1	1					1			5
8	Belize	02 / 2007	516	1									5
9	Bolivia	03 / 1988	473		1	1			1				2
10	Bolivia	04 / 1993	171		1	1		1	1				3
11	Bosnia & Herzeg.	12 / 1997	1,300		1	1				1			4
12	Brazil	02 / 1983	4,452						1		1	1	2
13	Brazil	01 / 1984	4,846								1	1	2
14	Brazil	09 / 1986	6,671						1			1	2
15	Brazil	11 / 1988	62,100								1	1	2
16	Brazil	11 / 1992	9,167						1				4
17	Brazil	04 / 1994	43,257		1		1			1			3
18	Bulgaria	06 / 1994	7,910		1		1		1				3
19	Cameroon	05 / 2002	600		1	1		1	1				3
20	Cameroon	08 / 2003	796		1	1		1	1				3
21	Chile	11 / 1983	2,169								1	1	2
22	Chile	01 / 1984	1,160						1				3
23	Chile	04 / 1986	6,007							1	1	1	3
24	Chile	06 / 1987	5,901							1		1	3
25	Chile	12 / 1990	6,494							1	1	1	3
26	Congo, DR (Zaire)	04 / 1980	402						1				3
27	Congo, DR (Zaire)	01 / 1983	58										3
28	Congo, DR (Zaire)	06 / 1984	64										3
29	Congo, DR (Zaire)	05 / 1985	61										3
30	Congo, DR (Zaire)	05 / 1986	65										3
31	Congo, DR (Zaire)	05 / 1987	61										3
32	Congo, DR (Zaire)	06 / 1989	61							1			3
33	Congo, Rep.	12 / 2007	2,100		1			1	1				2
34	Costa Rica	09 / 1983	609									1	2
35	Costa Rica	05 / 1985	440									1	2
36	Costa Rica	05 / 1990	1,384		1		1			1			4
37	Cote d'Ivoire	03 / 1998	6,462		1		1	1		1			4
38	Cote d'Ivoire	04 / 2010	2,940	1	1					1			4
39	Croatia	07 / 1996	858							1		1	5
40	Cuba	12 / 1983	130						1			1	3
41	Cuba	12 / 1984	103						1			1	2
42	Cuba	07 / 1985	90						1			1	2
43	Dominica	09 / 2004	144	1	1								4
44	Dom. Rep.	02 / 1986	823						1				2
45	Dom. Rep.	08 / 1994	1,087		1		1			1			3
46	Dom. Rep. (Bonds)	05 / 2005	1,100	1									5
47	Dom. Rep. (Loans)	10 / 2005	180										2
48	Ecuador	10 / 1983	970						1		1	1	2
49	Ecuador	08 / 1984	350						1			1	2
50	Ecuador	12 / 1985	4,224								1	1	2
51	Ecuador	02 / 1995	7,170		1		1			1			4
52	Ecuador	08 / 2000	6,700	1	1					1			5
53	Ecuador	06 / 2009	3,190	1	1	1				1			4
54	Ethiopia	01 / 1996	226		1	1		1	1				3
55	Gabon	12 / 1987	39										2
56	Gabon	05 / 1994	187						1				3
57	Gambia,The	02 / 1988	19						1				3
58	Grenada	11 / 2005	210	1									4
59	Guinea	04 / 1988	43						1			1	2
60	Guinea	12 / 1998	130		1	1		1	1				2

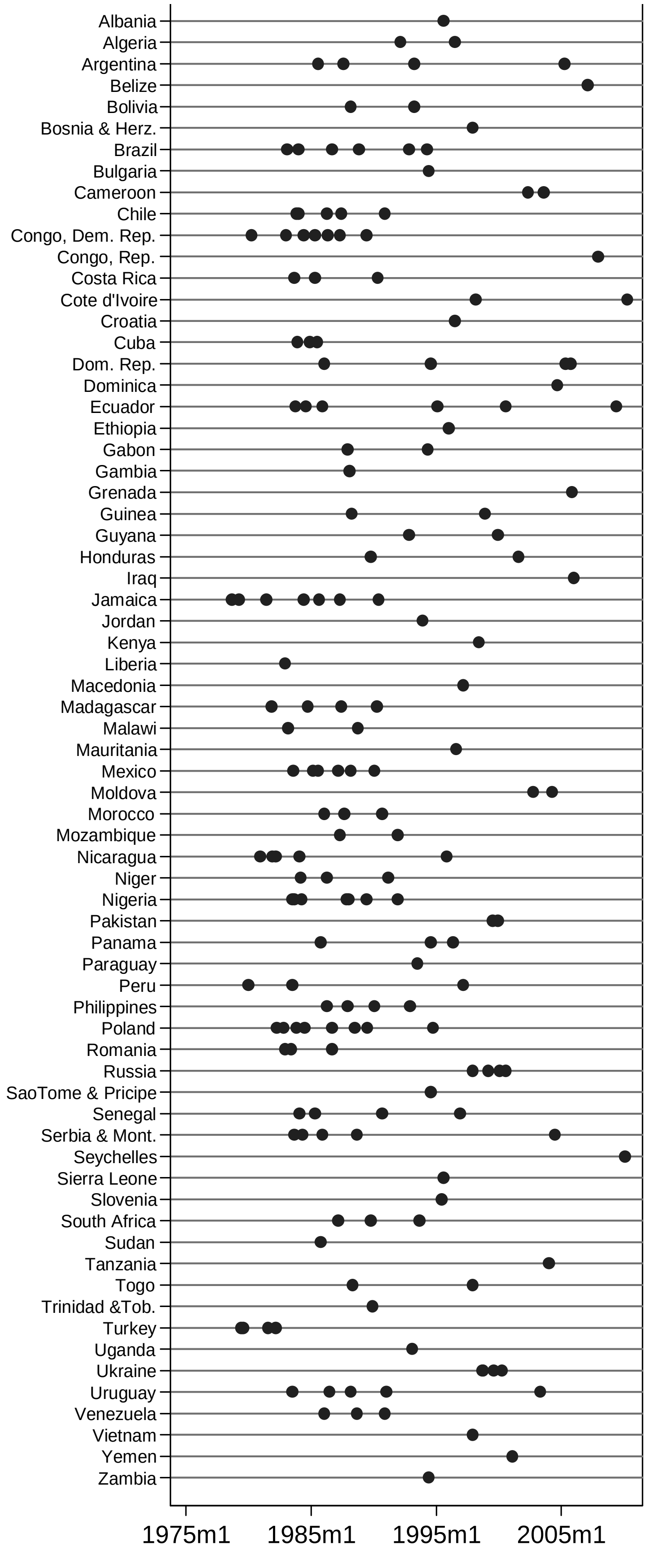
Table A9: Sovereign Debt Restructurings 1970-2010 (Cont'd)

Case Nr	Country	Date	Debt Affected in m USD	Bond Exchange (1)	Reduct. in Face Value (2)	Buy Back Deal (3)	Brady Deal (4)	Donor Funded (5)	All Fallen Due (6)	Affects PRD (7)	New Money Incl. (8)	Short-Term Debt Incl. (9)	Data Quality Index (10)
61	Guyana	11 / 1992	93		1	1		1	1				3
62	Guyana	12 / 1999	56		1	1		1	1				3
63	Honduras	10 / 1989	132						1				3
64	Honduras	08 / 2001	13		1	1		1	1				3
65	Iraq	01 / 2006	17,710		1	1			1				4
66	Jamaica	09 / 1978	63						1				3
67	Jamaica	04 / 1979	149										2
68	Jamaica	06 / 1981	89								1		2
69	Jamaica	06 / 1984	165						1				3
70	Jamaica	09 / 1985	369							1			3
71	Jamaica	05 / 1987	285							1			3
72	Jamaica	06 / 1990	332							1			3
73	Jordan	12 / 1993	1,289		1		1		1	1			3
74	Kenya	06 / 1998	91		1				1				4
75	Liberia	12 / 1982	30										2
76	Macedonia, FYR	03 / 1997	229							1			5
77	Madagascar	11 / 1981	147						1				3
78	Madagascar	10 / 1984	195						1			1	3
79	Madagascar	06 / 1987	60							1			4
80	Madagascar	04 / 1990	49							1			3
81	Malawi	03 / 1983	57										3
82	Malawi	10 / 1988	35						1				3
83	Mauritania	08 / 1996	53		1	1		1	1				3
84	Mexico	08 / 1983	18,800								1	1	3
85	Mexico	03 / 1985	28,600							1			3
86	Mexico	08 / 1985	20,100							1			3
87	Mexico	03 / 1987	52,300							1	1		3
88	Mexico	03 / 1988	3671		1				1				3
89	Mexico	02 / 1990	54,300		1		1			1		1	4
90	Moldova (Eurobonds)	10 / 2002	40	1					1				5
91	Moldova (Gazprom)	04 / 2004	115		1	1			1				5
92	Morocco	02 / 1986	538						1			1	3
93	Morocco	09 / 1987	2,444						1	1		1	2
94	Morocco	09 / 1990	3,200						1	1			2
95	Mozambique	05 / 1987	253						1			1	3
96	Mozambique	12 / 1991	124		1	1		1	1				2
97	Nicaragua	12 / 1980	582						1			1	2
98	Nicaragua	12 / 1981	192						1			1	2
99	Nicaragua	03 / 1982	100						1			1	2
100	Nicaragua	02 / 1984	145						1	1			2
101	Nicaragua	11 / 1995	1100		1	1		1	1				3
102	Niger	03 / 1984	27										2
103	Niger	04 / 1986	52										2
104	Niger	03 / 1991	111		1	1		1	1				2
105	Nigeria	07 / 1983	1350						1			1	2
106	Nigeria	09 / 1983	585						1			1	2
107	Nigeria	04 / 1984	925						1			1	2
108	Nigeria	11 / 1987	4,249						1		1	1	2
109	Nigeria	01 / 1988	1,213						1				3
110	Nigeria	06 / 1989	5,829							1		1	2
111	Nigeria	12 / 1991	5,883		1		1			1			2
112	Pakistan (Bank debt)	07 / 1999	777						1			1	4
113	Pakistan (Bond debt)	12 / 1999	610	1									5
114	Panama	10 / 1985	579								1	1	2
115	Panama	08 / 1994	452	1					1				4
116	Panama	05 / 1996	3,936		1		1			1			3
117	Paraguay	07 / 1993	20			1			1				3
118	Peru	01 / 1980	340							1			3
119	Peru	07 / 1983	380						1		1	1	2
120	Peru	03 / 1997	10,600		1		1		1				3

Table A9: Sovereign Debt Restructurings 1970-2010 (Cont'd)

Case Nr	Country	Date	Debt Affected in m USD	Bond Exchange	Reduct. in Face Value	Buy Back Deal	Brady Deal	Donor Funded	All Fallen Due	Affects PRD	New Money Incl.	Short-Term Debt Incl.	Data Quality Index
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
121	Philippines	04 / 1986	3,242						1			1	2
122	Philippines	12 / 1987	9,690							1		1	2
123	Philippines	02 / 1990	2,120		1					1	1		3
124	Philippines	12 / 1992	4,471		1		1			1	1		3
125	Poland	04 / 1982	1957						1				3
126	Poland	11 / 1982	2,225						1			1	3
127	Poland	11 / 1983	1,192						1			1	2
128	Poland	07 / 1984	1,390									1	2
129	Poland	09 / 1986	1,970							1		1	2
130	Poland	07 / 1988	8,441							1		1	2
131	Poland	07 / 1989	206							1			2
132	Poland	10 / 1994	13,531		1		1			1	1	1	3
133	Romania	12 / 1982	1,598						1			1	3
134	Romania	06 / 1983	567						1				2
135	Romania	09 / 1986	800							1			2
136	Russia	12 / 1997	30,500						1				4
137	Russia (GKOs)	03 / 1999	4,933	1	1								5
138	Russia (MinFin3s)	02 / 2000	1,307	1						1			5
139	Russia (Prins, IANs)	08 / 2000	31,943	1	1					1			5
140	Sao Tome and Principe	08 / 1994	10.1		1	1		1	1				3
141	Senegal	02 / 1984	77						1				2
142	Senegal	05 / 1985	20										3
143	Senegal	09 / 1990	37						1				3
144	Senegal	12 / 1996	80		1	1		1	1				2
145	Serbia and Montenegro	07 / 2004	2700		1					1			3
146	Seychelles	02 / 2010	320	1	1								3
147	Sierra Leone	08 / 1995	235		1	1		1	1				2
148	Slovenia	06 / 1995	812							1			3
149	South Africa	03 / 1987	10900						1	1		1	3
150	South Africa	10 / 1989	7500						1	1			3
151	South Africa	09 / 1993	5000						1	1		1	4
152	Sudan	10 / 1985	920						1	1		1	3
153	Tanzania	01 / 2004	155.8		1	1		1	1				2
154	Togo	05 / 1988	49						1				3
155	Togo	12 / 1997	75		1	1		1	1				3
156	Trinidad and Tobago	12 / 1989	446							1			3
157	Turkey	06 / 1979	429						1		1	1	3
158	Turkey	08 / 1979	2,269						1			1	3
159	Turkey	08 / 1981	100						1				3
160	Turkey	03 / 1982	2269							1			3
161	Uganda	02 / 1993	153		1	1		1	1				3
162	Ukraine (OVDPs)	09 / 1998	420	1									5
163	Ukraine (Chase loan)	10 / 1998	109						1				5
164	Ukraine (ING loan)	08 / 1999	163		1				1				5
165	Ukraine (Global)	04 / 2000	1,598	1	1								5
166	Uruguay	07 / 1983	575								1	1	3
167	Uruguay	07 / 1986	1,958							1			4
168	Uruguay	03 / 1988	1,770							1			3
169	Uruguay	01 / 1991	1,610		1		1			1	1		4
170	Uruguay	05 / 2003	3,127	1						1			5
171	Venezuela, RB	02 / 1986	20,307										2
172	Venezuela, RB	09 / 1988	20,338							1			3
173	Venezuela, RB	12 / 1990	19,585		1		1			1	1		4
174	Vietnam	12 / 1997	782		1		1		1				3
175	Yemen, Republic of	02 / 2001	607		1	1		1	1				2
176	Yugoslavia	09 / 1983	950						1		1	1	2
177	Yugoslavia	05 / 1984	1,250						1				2
178	Yugoslavia	12 / 1985	3,600							1			3
179	Yugoslavia	09 / 1988	6,895							1	1	1	2
180	Zambia	06 / 1994	570		1	1		1	1				2

Figure A10: Sovereign Restructurings by Country 1970 - 2010



References Cited in the Appendix

Altman, Edward I. 1987. “The Anatomy of the High-Yield Bond Market.” *Financial Analysts Journal*, 43(4): 12-25.

Altman, Edward I. 1989. “Measuring Corporate Bond Mortality and Performance.” *Journal of Finance*, 44(4): 909-922.

Arteta, Carlos, and Galina Hale. 2008. “Sovereign Debt Crises and Credit to the Private Sector.” *Journal of International Economics,* 74(1): 53–69.

Asquith, Paul, David W. Mullins, Jr., and Eric D. Wolff. 1989. “Original Issue High Yield Bonds: Aging Analyses of Defaults, Exchanges, and Calls.” *Journal of Finance*, 44(4): 923-952.

Beck, Thorsten, Clarke, George, Groff, Alberto , Keefer, Philip, and Patrick Walsh. 2001. “New Tools in Comparative Political Economy: The Database of Political Institutions.” *World Bank Economic Review*, 15(1): 165–176.

Bedford, Paul, Adrian Penalver and Chris Salmon. 2005. “Resolving Sovereign Debt Crises: The Market based Approach and the Role of the IMF.” *Bank of England Financial Stability Review*, (18): 91 - 100.

Bekaert, Geert, Claude B. Erb, Campbell R. Harvey, and Tadas E.Viskanta. 1997. “The Cross Sectional Determinants of Emerging Market Equity Returns.” In *Quantitative Investment for the Global Markets – Strategies, Tactics and Advanced Analytical Techniques*, ed. Peter Carman, 221-272. Chicago: Glenlake Publishing.

Benczur, Peter, and Ilut Cosmin. 2009. “Evidence for Relational Contracts in Sovereign Bank Lending.” Duke University Mimeo.

Benjamin, David, and Mark L.J. Wright. 2009. “Recovery before Redemption: A Theory Of Delays in Sovereign Debt Renegotiations.” Universidad of California at Los Angeles Mimeo.

Cantor, Richard, and Franck Packer. 1996. “Determinants and Impact of Sovereign Credit Ratings.” *Federal Reserve Bank of New York Economic Policy Review*, 2(2): 37-53.

Cavallo, Eduardo, Andrew Powell, and Roberto Rigobon. 2008. “Do Credit Rating Agencies Add Value? Evidence from the Sovereign Rating Business Institutions.” Inter-American Development Bank Research Department Working Paper 4601.

Chuhan, Punam, and Federico Sturzenegger. 2005. “Default Episodes in the 1980s and 1990s: What Have We Learned.” In *Managing Economic Volatility and Crises: A Practitioner's Guide*, ed. Aizenman, Joshua and Brian Pinto, 471-519. Cambridge, MA: Cambridge University Press.

Cruces, Juan J. 2006. “Statistical Properties of Country Credit Ratings.” *Emerging Markets Review*, 7(1): 27-51.

Detragiache, Enrica, and Antonio Spilimbergo. 2001. “Crises and Liquidity: Evidence and Interpretation.” IMF Working Paper 01/02.

Díaz-Cassou, Javier, Aitor Erce-Domínguez and Juan J. Vázquez-Zamora. 2008. "Recent Episodes of Sovereign Debt Restructurings. A Case-Study Approach." Bank of Spain Occasional Paper 0804.

Edwards, Sebastian. 1986. “The Pricing of Bonds and Bank Loans in International Markets: An Empirical Analysis of Developing Countries' Foreign Borrowing.” *European Economic Review*, 30(3): 565-589.

Enderlein, Henrik, Christoph Trebesch, and Laura von Daniels. 2010. “Sovereign Debt Disputes.” Unpublished Paper, Hertie School of Governance.

Erb, Claude, Campbell Harvey, and Tadas Viskanta. 1995. “Country Risk and Global Equity Selection.” *Journal of Portfolio Management*, 21: 74-83.

Erb, Claude, Campbell Harvey, and Tadas Viskanta. 1997. “The Making of an Emerging Market.” *Emerging Markets Quarterly*, 1(1): 14-19.

Feder, Gershon, and Knud Ross.1982. “Risk Assessments and Risk Premiums in the Eurodollar Market.” *Journal of Finance*, 37(3): 679-691.

Feder, Gershon, and Lily V. Uy. 1985. “The Determinants of International Creditworthiness and Their Policy Implications.” *Journal of Policy Modeling*, 7(1): 133-156.

Ferson, Wayne E., and Campbell R. Harvey. 1997. “Fundamental Determinants of National Equity Market Returns: A Perspective on Conditional Asset Pricing.” *Journal of Banking and Finance*, 21(11-12): 1625-1665.

Finger, Harald, and Mauro Mecagni. 2007. “Sovereign Debt Restructuring and Debt Sustainability. An Analysis of Recent Cross-country Experience.” International Monetary Fund Occasional Paper 255.

Folkerts-Landau, David. 1985. “The Changing Role of International Bank Lending in Development Finance.” *IMF Staff Papers*, 32(2): 317-363.

Fons, Jerome S. 1987. “The Default Premium and Corporate Bond Experience.” *Journal of Finance*, 42(1): 81-97.

Fridson, Martin S., and Yan Gao. 1996. “Primary versus Secondary Pricing of High-Yield Bonds.” *Financial Analysts Journal*, 52(3): 20-27.

Fridson, Martin (2007): private correspondence.

Gelos, Gaston R., Ratna Sahay, and Guido Sandleris. 2011. "Sovereign Borrowing by Developing Countries: What Determines Market Access?" *Journal of International Economics*, 83(2): 243-254.

Horan, Kevin (2007): private correspondence.

Institute of International Finance. 2001. “Survey of Debt Restructuring by Private Creditors.”

International Financing Review, various issues.

International Monetary Fund. 1986. “International Capital Markets: Development and Prospects. World Economic and Financial Surveys.”

International Monetary Fund. 1987. “Capital Market Financing for Developing Countries: Recent Developments”

International Monetary Fund. 1989. “Capital Market Financing for Developing Countries: Recent Developments.”

International Monetary Fund. 1990a. “International Capital Markets: Development and Prospects. World Economic and Financial Surveys.”

International Monetary Fund. 1990b. “Capital Market Financing for Developing Countries: Recent Developments.”

International Monetary Fund. 1991. “International Capital Markets: Development and Prospects. World Economic and Financial Surveys.”

International Monetary Fund. 1993. “Private Market Financing for Developing Countries. World Economic and Financial Surveys.”

International Monetary Fund.1995. “Private Market Financing for Developing Countries. World Economic and Financial Surveys.”

Kaminsky, Graciela, and Sergio L. Schmukler. 2002. “Emerging Market Instability: Do Sovereign Ratings Affect Country Risk and Stock Returns?” *The World Bank Economic Review*, 16(2): 171-195.

Lee, Suk Hun. 1993. “Are the Credit Ratings Assigned by Bankers Based on the Willingness of LDC Borrowers to Repay?” *Journal of Development Economics*, 40(2): 349-539.

Livingston, Miles, Jie Wei, and Lei Zhou, 2011, Moody's and S&P Ratings: Are They Equivalent? Conservative Ratings and Split Rated Bond Yields, *Journal of Money, Credit and Banking*, forthcoming.

Moody’s. 2010. “Sovereign Default and Recovery Rates, 1983-2009.“ Report of April 2010.

Pescatori, Andrea, and Amadou Sy. 2007. "Are Debt Crises Adequately Defined?" *IMF Staff Papers*, 54(2): 306–337.

Reinhart, Carmen, and Kenneth Rogoff. 2009. *This Time is Different. Eight Centuries of Financial Folly*. Princeton: Princeton University Press.

Richmond, Christine, and Daniel A. Dias. 2009. "Duration of Capital Market Exclusion: An Empirical Investigation." Unpublished Paper, UCLA.

Rieffel, Lex. 2003. *Restructuring Sovereign Debt: The Case for Ad Hoc Machinery*. Washington, D.C.: Brookings Institution Press.

Stamm, Hans-Peter. 1987. *Kooperation und Konflikt im Weltfinanzsystem. Eine Analyse multilateraler Umschuldungsaktionen seit 1956*. Soziologisches Institut der Universität Zürich.

Standard and Poor's. 2006. "Default Study: Sovereign Defaults At 26-Year Low, To Show Little Change In 2007." Standard and Poor's Credit Week, September 18 2006.

Standard and Poor's. 2011. Sovereign Defaults and Rating Transition Data: 2010 Update. Standard and Poor's, RatingsDirect. 23 February 2011. http://www.standardandpoors.com/ratings/articles/en/us/?assetID=1245302231824

Sturzenegger, Federico, and Jeromin Zettelmeyer. 2006. *Debt Defaults and Lessons form a Decade of Crises*. Cambridge, MA: MIT Press.

Sturzenegger, Federico, and Jeromin Zettelmeyer. 2007. "Creditors Losses versus Debt Relief: Results from a Decade of Sovereign Debt Crises." *Journal of the European Economic Association*, 5(2-3): 343-351.

Sturzenegger, Federico, and Jeromin Zettelmeyer. 2008. "Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings, 1998-2005." *Journal of International Money and Finance*, 27(5): 780-805.

Suter, C. 1992. *Debt cycles in the World-Economy: Foreign Loans, Financial Crises, and Debt Settlements, 1820-1990*. Boulder, Colorado: Westview Press.

Sy, Amadou N.R. 2004. "Rating the rating agencies: Anticipating currency crises or debt crises?" *Journal of Banking and Finance*, 28(11): 2845-2867.

Trebesch, Christoph. 2008. "Delays in Sovereign Debt Restructurings." Unpublished Paper, Free University of Berlin.

Trebesch, Christoph. 2011. "Sovereign Default and Crisis Resolution." Dissertation Manuscipt, Free University of Berlin.

Ul Haque, Nadeem, Manmohan S. Kumar, Nelson C. Mark, and Donald J. Mathieson. 1996. "The Economic Content of Indicators of Developing Country Creditworthiness." *International Monetary Fund Staff Papers*, 43(4): 688–724.

World Bank. *Borrowing in International Capital Markets* (various issues). The World Bank, Washington, D.C.

World Bank. *Global Development Finance* (various issues). The World Bank, Washington, D.C.

World Bank. *World Debt Tables* (various issues). The World Bank, Washington, D.C.

World Bank. 2007. "Debt Reduction Facility for IDA-Only Countries: Progress Update and Proposed Extension," Board Report 39310, Washington, D.C.

World Bank. 2010 "Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI)—Status of Implementation", Washington, D.C