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ABSTRACT

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We study sovereign external debt crises over the past 200 years, with a focus on creditor losses, or "haircuts". Our sample covers 327 sovereign debt restructurings with external private creditors over 205 default spells since 1815. Creditor losses vary widely (from none to 100%), but the statistical distribution has remained remarkably stable over two centuries, with an average haircut of around 45 percent. The data also reveal that "serial restructurings", meaning two or more debt exchanges in the same default spell, are on the rise. To account for this trend toward serial renegotiation, we introduce the "Bulow-Rogoff haircut" – a cumulative measure that captures the combined creditor loss across all restructurings during a single debt crisis. Using this measure, we show that longer debt crises deliver larger haircuts and that interim restructurings provide limited debt relief. We further examine past predictors of the size of haircuts and identify "rules of thumb" applicable to future defaults. Poorer countries, first-time debt issuers, and those that borrowed heavily from external creditors all record significantly higher haircuts in case of a default. Geopolitical shocks – such as wars, revolutions, or the break-up of empires – deliver the deepest haircuts. Sovereign debt investment disasters are often linked to (geo-)political disasters.

Keywords: Sovereign Default, Debt Restructuring, Credit Events, Financial Crises, Geopolitical Risk

JEL classification: F34, H63, G15

[1] *This paper was written in honor of Ken Rogoff, on the occasion of the 24th Jacques Polak Annual Research Con- ference at the IMF. We thank Julie Bernard, Arnold Kinzel and Emanuele Properzi for excellent research assistance. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors, and do not necessarily reflect the views of institutions they are associated with. Contact: clemens.grafvonluckner@sciencespo.fr; jmeyer@diw.de; carmen_reinhart@hks.harvard.edu; Christoph.Trebesch@ifw-kiel.de*

Sovereign haircuts: 200 years of creditor losses

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Abstract

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1 Introduction

Sovereign defaults are best avoided since they tend to be painful for debtors and creditors alike. For sovereign debtors, it may mean financial autarky, severe and protracted recession, and a worsening of poverty and other social indicators.[1] For creditors, it usually means (sooner or later) recognizing losses in their portfolios. Measuring or predicting the "severity" of the debt crisis from either the vantage point of the debtor or creditor remains a relatively understudied area. For a long time, the literature on sovereign defaults has modeled sovereign debt crises in a binary manner (crisis=1, no crisis=0), irrespective of whether the crisis was resolved with minor investor losses or whether the debt was repudiated altogether. This was a rather crude approach, especially when compared to the characterization of other crises, like currency crashes, inflation, or even banking crises.[2]

In this paper, we move beyond the binary characterization of debt crises by examining the history of sovereign external defaults with a comprehensive 200-plus-year dataset on the size of creditor losses, or "haircuts". To do so, we build on the earlier work of Cruces and Trebesch (2013) and Meyer, Reinhart, and Trebesch (2022). The analysis stands in the tradition of Reinhart and Rogoff (2009) in that we examine the past to draw lessons for possible future crises and defaults. We find a striking dispersion of creditor losses across space and time. Both then and now, there is a large variation in how sovereign default crises are resolved and how much creditors lose. To examine what drives the cross-episode variation in haircut size, we couple the haircut database with data on debt crisis spells, macro fundamentals, and geopolitical shocks (wars, revolutions, and country break-ups). We also introduce a new database on sovereign borrowers' first-time access to the international bond or loan market over 200 years. The long-run data allow us to identify broad "rules of thumb" for what to expect in terms of the size of creditor losses once a new default occurs.

Our analysis has been influenced by the seminal work of Bulow and Rogoff (1989a), who were among the first to rigorously model sovereign debt renegotiations. The evidence that emerges from our new long-run data lends support to two of the key propositions in their paper: (i) debt restructurings are a central feature of sovereign debt markets and often "serial" in nature; and (ii) that defaults are partial rather than full. Indeed, full repudiation is comparatively rare.

[1] See Borensztein and Panizza (2009), Farah-Yacoub, Graf von Luckner, Ramalho, and others. (2022) and Mitchener and Trebesch (2023).

[2] See Reinhart and Rogoff (2009) and references cited therein. For inflation and currency crashes, it is straightforward to assess their severity; a 30 and a 300 percent currency depreciation or annual inflation are not the same thing. In the banking crisis literature, a distinction is often made between systemic crises and borderline episodes. For a recent discussion of banking crisis definitions see Baron, Verner, and Xiong (2021).

On the first point of serial restructurings[3], we document that a sizable share of debt crises (default spells) over the entire sample involves two or more sovereign debt restructurings. On average, it takes two restructurings to resolve a debt crisis, but some sovereigns have faced as many as seven debt exchange operations to "cure" (bring to an end) the default. This modality of debt crisis resolution provides empirical grounding to Bulow and Rogoff (1989a), who model sovereign debt as an asset with constant recontracting and who note that "all parties in a debt rescheduling negotiation realize that today's debt rescheduling agreement may itself have to be renegotiated in the future. To date, the empirical literature has often ignored this repeated game aspect in sovereign debt negotiations. Typically, each restructuring is treated individually, even in cases when there are multiple debt exchanges in quick succession and/or if the restructurings are part of the same debt crisis.

In this paper, we propose a new "cumulative" haircut measure that quantifies the magnitude of creditor losses across all restructurings within the same default spell. Following the definition in Reinhart and Rogoff (2009), a default spell begins with a credit event, such as missed payments, and ends when a debt restructuring resolves the default for at least 24 months. This approach allows us to better capture creditor losses when there is more than one restructuring within a debt crisis episode. Because Bulow and Rogoff (1989a) were visionary in characterizing sovereign defaults as a process of recurrent re-contracting involving serial restructurings, we term this cumulative measure the **Bulow-Rogoff (BR) Haircut**.

A cumulative BR-type haircut measure is increasingly relevant. As our analysis highlights, serial restructurings have become more common in modern-day sovereign debt crises. In the 19th and earlier part of the 20th centuries, defaults were very protracted, typically spanning decades, but there were fewer interim restructurings. Today, default spells have shortened, on average, but we see many more interim restructurings. Interim deals are often shallow in that they deliver below-average haircuts and may only cover a modest share of outstanding debts. For those reasons, the debt contracts often need to be renegotiated again, possibly more than once. We show that these types of timid or "too little, too late" restructurings (IMF 2013)[4] are anything but new.[5] However, the prevalence of interim restructurings has been increasing over time,

[3]Serial restructuring is not to be confused with serial default Reinhart, Rogoff, and Savastano (2003). The latter refers to a country with a history of two or more default episodes or spells since independence. The term serial restructuring refers to two or more debt restructurings within a single default episode. Usually serial restructurings typically arise when the earlier restructuring deal(s) does not provide enough debt reduction to place the country on a sustainable debt path.

[4]An influential IMF (2013) report stated that "debt restructurings have often been too little and too late, thus failing to reestablish debt sustainability and market access in a durable way." (p. 1) https://www.imf.org/en/Publications/.../PP4772

[5]Our novel historical dataset is replete with examples of interim debt exchange agreements that did not cure the

especially since the 1970s. The cumulative BR haircut accounts for this shift and makes creditor losses more comparable across our 200-year sample. Based on the BR haircut measure, we show that the average investor losses in defaults have been strikingly stable over the past 200 years and that the size of haircuts tends to increase in the number of restructurings needed to exit the default.

The second of the above-mentioned BR propositions - of defaults being "partial" - is strikingly visible in the data. Median net present value haircuts (NPV) range from 38 percent for individual restructurings to a median of 42 percent using the cumulative BR haircut measure. Full repudiations (i.e., haircuts of 100%) account for about 3 percent of defaults and these occur in exceptional circumstances (wars, revolutions, or the break-up of countries/empires). In effect, about half (52 percent) of the distressed debt restructurings in our dataset are pure reschedulings, with maturities being extended without a face-value debt reduction. The modeling of default as full repudiation, embedded in the influential Eaton and Gersovitz (1981) framework and other canonical sovereign debt models (e.g., Arellano 2008), has little empirical support. This underscores the foresight of Bulow and Rogoff (1989a), who, unlike the dominant strand in the literature on sovereign debt crises, departed from the standard assumption of full repudiation early on. Much of the literature stuck to a binary classification of defaults for another 30 years (see the survey by Mitchener and Trebesch 2023).[6]

Beyond documenting the stylized facts of private foreign creditors' losses over more than two centuries, we study a set of variables that help to predict the magnitude of creditor losses or haircut. Our key empirical findings can be summarized as follows:

1. The depth of haircuts varies substantially across debt restructurings.
2. Defaults are partial, with a median haircut of around 40 percent.
3. Serial restructurings are common, especially in recent decades.
4. Interim restructurings have smaller haircuts than final restructurings.
5. Haircuts are higher if debt stocks are high. Besides the level effect, we find that the speed of the debt build-up is predictive. (External) debt surges pre-crisis are associated with high creditor losses following a default.

default, as we show below.

[6] Only relatively recently has there been a shift to include the far more common partial defaults (debt restructuring events) and to incorporate haircuts. See Arellano, Mateos-Planas, and Ríos-Rull (2023) for a recent contribution on partial defaults.

6. Haircuts are higher for low-income sovereigns.

7. Haircuts are higher for first time-borrowers.

8. Haircuts are especially high in case of geopolitical disasters (wars, revolutions, country-break-ups).

9. Haircuts are higher for longer debt crises. Delays are highly correlated with the magnitude of creditor losses.

10. Haircuts are higher for deeper economic output contractions.

Our long historical view also supports earlier work by Bulow and Rogoff (1990) and Bulow and Rogoff (2005), who have long argued that the poorest countries would be better off avoiding global private debt markets altogether. As stated above, we find that poorer countries see significantly higher haircuts in case of a default. Since 1987, 83% of defaults that required an above-median haircut were low or lower-income countries (LIC and LMICs). Such a high haircut can become a costly legacy for the debtor country, as larger haircuts may delay gaining re-access to new finance, possibly even official finance (Cruces and Trebesch 2013). Furthermore, we show that high haircuts are more common among first-time issuers who subsequently default. First-time borrowers from private creditors in international capital markets (e.g., after independence or after "graduating" to frontier economy status) are much more likely to restructure their debt with deep haircuts than their more seasoned counterparts. These findings hold both in the historical sample and in the modern data. For private creditors, the risks of lending to poor and inexperienced borrowers should not be underestimated.

Rather than borrowing from foreign banks or bondholders on market terms, the poorest countries would likely be better served by grants and highly concessional loans by other governments or multilateral organizations. In such a world of increased official lending, Bulow and Rogoff (1990, p. 42) posit: "leaders will not be able to indenture the income of future generations quite so easily, and the imprudent borrowing policies of the 1970s could not be repeated." Of course, the "catch" to this scenario is that wealthier official donor nations would be the ones determining the availability of grants and other forms of concessional finance.

We also discuss what haircuts may or may not reveal about the critical question of debt relief, that is, the reduction of the government's debt burden as a result of the restructuring. We stress that it is crucial not to confuse "haircuts" and "debt relief," see; see also Sturzenegger and Zettelmeyer (2007) and Reinhart and Trebesch (2016). Our standard haircut measure

captures the size of losses incurred by creditors during a restructuring, whereas debt relief measures debt reduction from the debtor government's perspective. The restructurings with private external creditors we study here often affect only a fraction of the total outstanding debts. Most importantly, they neither involve official debts, particularly significant for LICs, nor domestic debts Reinhart and Rogoff (2009) and Reinhart and Rogoff (2011). In addition, many restructurings with private creditors avoid an outright debt write-down. As a result of these factors, we find that less than half of our sample of private debt restructurings since 1815 result in a decrease in total debt outstanding in that year.

Our paper contributes to the literature in several ways. We complement earlier long-run studies on sovereign debt and default (Lindert and Morton 1989; Marichal 2000; Wynne 2000; Reinhart and Rogoff 2009; Suter 2019, among others) by providing one **big missing piece: haircuts**. Compared to Asonuma and Trebesch (2016), Cruces and Trebesch (2013), Schlegl, Trebesch, and Wright (2019), Sturzenegger and Zettelmeyer (2008), and Asonuma, Niepelt, and Ranciere (2023), we study haircuts using an additional 150 years of data. Despite some work on historical sovereign defaults by rating agencies (Moodys 2011; Standard and Poor's 2006) and some research on the history of corporate defaults (Giesecke and others. 2014), we are not aware of historical studies on loss-given-default for the case of sovereigns and in a bigger picture view. As some of us discuss in Meyer, Reinhart, and Trebesch (2022), previous work on long-run asset returns does not account for the size of haircuts on government debts (Dimson, Marsh, and Staunton 2002, Jorda and others. 2019). While building on Meyer, Reinhart, and Trebesch (2022), who trace investor returns through the ages, this paper delves deeper into the characteristics and correlates of haircuts. We exploit the new long-dated data to uncover recurring patterns in sovereign debt crises and their resolution and identify a set of "rules of thumb" on the size of haircuts.

The remainder of the paper is structured as follows: The next section describes the data, the calculation of investor losses employed in our analysis and introduces a new haircut measure that tallies investor losses across multiple restructurings during the same default spell - the BR haircut. Section 3 presents some salient stylized facts on creditor losses over the past two centuries, while Section 4 delves into some of the key factors that help predict the size of the haircut and can serve as "rules of thumb' in assessing the scale of future haircuts. Section 5 discusses why creditor haircuts are not necessarily a good proxy for debt relief. The concluding remarks touch on what may lie ahead in this area, both in terms of research and policy.

2 Concepts and Measurements

2.1 Definitions and Data

Our analysis covers sovereign debtors and private external creditors over 1815-2023. Foreign creditors encompass foreign bondholders but also foreign commercial banks (e.g., the "London Club" creditor banks during the 1970s or 1980s). Following Cruces and Trebesch (2013), we employ the following set of criteria to select the relevant default and restructuring cases.

We focus on sovereign external debt restructurings, defined as the reorganization (recontracting) of public (government) or publicly guaranteed external debt and "haircuts", which measure creditor losses due to that reorganization. Debt exchanges between private debtors and private creditors are thereby excluded, even in cases where substantial workouts of private sector debt were orchestrated by the sovereign, as seen during the Asian Crisis (Korea 1997 and Indonesia 1998). Importantly, we consider only "distressed" debt exchanges. Distressed restructurings arise in the context of crises and typically involve the exchange of an existing instrument(s) against a new financial instrument(s) with less advantageous terms for the creditor than the original bond(s) or loan(s). Routine liability management actions like voluntary debt swaps are not considered. Because our focus is on sovereign debt restructurings involving foreign private creditors, restructurings primarily affecting domestic creditors are excluded. Restructurings with official external creditors, including those negotiated under the auspices of the Paris Club (Schlegl, Trebesch, and Wright, 2019; Cheng, Díaz-Cassou, and Erce, 2019), as well as restructurings involving Chinese state creditors (Horn, Reinhart, and Trebesch, 2021a) are not considered here. As in Cruces and Trebesch (2013), we narrow down the sample to defaults and restructurings of medium and long-term debt, thereby excluding deals solely involving short-term debt, such as short-term credit line maintenance, 90-day debt rollovers, or instances of short-term maturity extension of less than a year. Lastly, we only include restructurings that were realized, excluding cases where an exchange offer or agreement was never implemented.

The data on debt restructurings comes from (i) Meyer, Reinhart, and Trebesch (2022), for the period 1815-1970, when sovereign international finance was long dominated by bonds issued in London; (ii) from Cruces and Trebesch (2013) for the bank-debt dominated period in the 1970s and 1980s and the return of international sovereign bonds during the 1990s and 2000s; (iii) Asonuma and Trebesch (2024) for five cases (Ukraine, 2016 (for both the bond and loan restructuring); Chad, 2014; Chad 2018; Mozambique, 2023); and (iv) our own calculations for an

additional 12 cases not sufficiently covered elsewhere (Argentina, 2020; Barbados, 2019; Belize, 2017, 2020 and 2021; Ecuador, 2020; Grenada, 2019; Mongolia, 2017; and Mozambique, 2016 and 2019; as well as Suriname 2020 and 2023).

For each restructuring, we identify the sovereign default event that preceded it. For this purpose, we rely on data since 1970 from Asonuma and Trebesch (2016), and for the historical sample from Farah-Yacoub, Graf von Luckner, and Reinhart (2022), who collect data on defaults by retroactively applying the methodology used by the major sovereign credit rating agencies today, including for countries that were(are) not rated and for the time pre-1918, when sovereign credit ratings did not yet exist. According to this methodology, a sovereign default occurs when either (1) the sovereign debtor misses debt payments beyond the grace period; (2) there are changes to the debt contract that are less favorable to the private external creditors than the original contract, thereby including distressed debt exchanges that reduce the debtor's obligations; or (3) unilateral changes imposed by the debtor resulting in diminished financial obligation, such as a forced currency re-denomination (see Ams and others. (2019) for a detailed discussion). In cases (2) and (3), when there are no prior missed payments, the default date coincides with the restructuring date. Historically, most defaults were triggered by the non-servicing of a debt obligation beyond a grace period, a classic payment default in the legal sense. Preemptive debt restructurings without default are a relatively recent phenomenon discussed in Asonuma and Trebesch (2016).[7]

Debt restructurings can be categorized into two types: final restructurings that effectively resolve the debt crisis and cure the default, and interim restructurings that fall short of establishing a sustainable debt trajectory and result in a relapse shortly after, meaning that a new round of restructuring becomes necessary within two years. Importantly, this classification is done with the benefit of hindsight, as predicting the success of restructuring deals in advance is a Herculean task. Default spells often encompass one or more interim restructuring deals.[8]

2.2 "Individual" Haircuts: Sturzenegger and Zettelmeyer (2006 and 2007)

Whenever a restructuring takes place, old debt instruments are exchanged for new ones. The new instruments typically differ from the old ones in either one or all of three dimensions: the interest rate, the maturity, and the face value of the obligation. Since sovereign debt restructurings

[7]As discussed in Section 4, to reduce endogeneity in the analysis of the correlates of haircuts, we focus on the period at or before default, rather than at or before the (subsequent) restructuring.

[8]As defined above, a default spell traces a debt crisis from beginning (default) to its ultimate cure or resolution (final restructuring).

take place when a sovereign's debt cannot be serviced as agreed in the original contract, the outcome almost always results in changes to debt obligations that are less favorable to creditors. Haircuts capture by how much the creditors' worth has declined because of an effectuated debt exchange. In measuring these sovereign haircuts, we adopt the standard approach as proposed by Sturzenegger and Zettelmeyer (2006) and Sturzenegger and Zettelmeyer (2007), as follows,

To calculate the Net-Present-Value (NPV) - Haircut H_j for restructuring j at time t, we compare the net present value of the contractual payment streams of the new debt issued during the restructuring with the NPV of the old debt in default, accounting for arrears (also referred to as past due interest or accrued interest arrears) and cash payments. Both payment streams are discounted using the weighted average exit yield as the discount rate at the time of the restructuring, j.

$$H_j = 1 - \frac{NPV_{j,New}}{NPV_{j,Old}} \tag{1}$$

This measure accounts for the characteristics of both old and new debt, in particular, any changes in maturity and interest structure. Intuitively, H_j compares the present value of the new and the old debt in a hypothetical scenario in which the sovereign continues to service any remaining outstanding old debts on an equal basis as the newly issued debt. H_j thus captures the creditor loss of participating in a debt restructuring compared to a small holdout creditor who evades a haircut and whose old, non-exchanged bonds continue to be repaid as if no default happened. To obtain a meaningful comparison, we apply the same discount rate to compute the NPV of the new and the old (holdout) debts. Both old and new instruments are exposed to the risk of future defaults, and they both benefit from the debt relief effect of the restructuring.

2.3 "Bulow-Rogoff" Haircuts – A New Cumulative Measure Covering a Default Spell

In *'sovereign lending [...] the bargaining between debtors and creditors is ongoing, with contracts constantly subject to renegotiation. By contrast, domestic bankruptcy negotiations have more of a one-time flavor"* - Bulow and Rogoff (1989a, p. 156)

The quote from Bulow and Rogoff (1989a) sets the stage for the serial restructurings that are frequently observed over the course of a single but multi-year debt crisis. For these cases, where there is more than one debt exchange, there is a need to aggregate haircuts over the multiple restructurings to quantify the full extent of creditor losses between the start of debt distress and its ultimate resolution.

To estimate the cumulative impact of multiple debt restructurings during a single debt crisis on creditors, we introduce a new measure, which we term "Bulow-Rogoff" haircuts.[9] This cumulative metric captures the compound loss experienced by a passive investor who held a face-value weighted portfolio of all the securities or loans placed by the country, including those restructured in the previous debt restructuring deals. Specifically, for every default spell, i, the Bulow-Rogoff haircut can be computed as:

$$\text{Cumulative H}_i = 1 - \prod_{j=1}^{J^i} R_{i,j} \tag{2}$$

where J represents the number of restructurings that occurred during the spell, before it was concluded, and $R_{i,j}$ denotes the recovery rate in the j-th restructuring event of default spell, i. The recovery rate is defined as 1 minus the effective estimated haircut for the particular restructuring event, so that both the size of haircuts and the amount of debt restructured is considered. [10]

$$\begin{aligned} R_{i,j} &= \frac{DebtAffected_{i,j}}{TotalDebt^i_{t-1}}(1 - H_{i,j}) + (1 - \frac{DebtAffected_{i,j}}{Total\ Debt^i_{t-1}}) \\ &= \quad 1 - Effective\ H_{i,j} \end{aligned} \tag{3}$$

The effective haircut accounts for the share of debt restructured in the particular exchange and weights it by total debt to private external creditors outstanding. The data for $DebtAffected_{i,j}$ is a key variable in our new comprehensive restructuring dataset (amounts restructured in USD). $TotalDebt_{t-1}$ was not readily available and required additional data gathering. Given our focus on restructurings with private external creditors (foreign banks and bondholders), we need an analogous measure of $TotalDebt$ capturing total debt to private external creditors.

A key input to the cumulative haircut formula is thus comprehensive data on government debt stocks owed to private external creditors across 200 years (the $TotalDebt$ series). This originates from various sources. For the past decades (after 1970), we use the World Bank's International Debt Statistics (IDS) dataset, supplemented with IDS data from earlier vintages as collected by Horn, Mihalyi, and others. (2023). For the historical sample we draw on Reinhart and Rogoff (2009) and Horn, Reinhart, and Trebesch (2021b), supplemented with the data and archival

[9] An analogous measure was earlier used in the Appendix of the paper by Cruces and Trebesch (2013).

[10] Our recovery rate is the pedant to what is often referred to as *ultimate recovery rate* in the corporate finance literature, where recovery rates (one minus the haircut or "loss given default") are typically measured using prices around default, rather than using haircuts at the time the restructuring is completed. See Meyer, Reinhart, and Trebesch (2022) for a detailed discussion.

sources collected by Meyer, Reinhart, and Trebesch (2022), in particular the Investors Monthly Manual, Moody's Investor's Manual, Corporation of Foreign Bondholders, and Stock Exchange Yearbooks. From these sources, we gather bond-level data on bond amounts outstanding and aggregate them to create a series of external debt owed to foreign bondholders. Like all monetary series, the debt stocks are expressed in 2020 USD, de-/inflated using data from Williamson (2024).

In sum, our BR haircut captures the dynamic aspect of multiple debt exchanges, offering a unified summary of creditor losses, i.e. the long-term compound impact of multiple debt restructurings on the wealth of investors holding the debt of a particular sovereign. The measure is especially useful when comparing across eras with different restructuring modalities. It is also particularly informative when there are interim restructurings with low haircuts that were followed by deals with deeper haircuts in the same crisis spell, as was the case during the 1980s. Simply averaging individual haircuts results in bias due to an overweighting of interim low-haircut deals and ignores the serial nature of debt renegotiation.

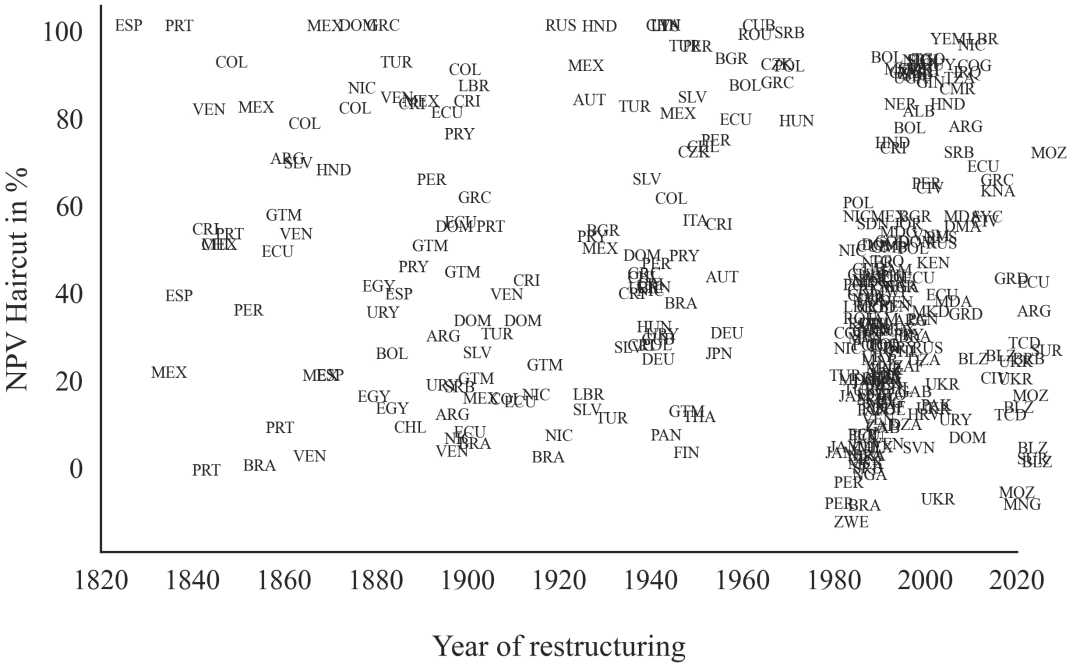
3 Sovereign debt restructurings and haircuts, 1815-2020

Stylized fact 1: The magnitude of haircuts varies substantially across debt restructurings.

Haircuts vary considerably across time and geography. The significant cross-country variation in haircut size is a common thread in external sovereign debt markets across all eras we cover. The large variation is evident from the very early days of this high-yield bond market when newly formed Latin American sovereigns tapped the London market and subsequently defaulted for the first time alongside some of Europe's high-risk borrowers (Greece, Portugal, and Spain). Figure 1 shows the large dispersion in haircuts as a scatter plot of the year of the (individual) restructuring and the NPV haircut (in percent) for that debt exchange. Country abbreviations accompany the dots, which in the 1980s and 1990s become intensely clustered as the far-reaching emerging market and developing country debt crisis unfolds. The consistently less crowded space prior to WW2 in Figure 1 is less indicative of a lower incidence of debt crises rather than of the fact that there were much fewer sovereigns in the era of colonial powers. Also, defaults were considerably longer prior to WW2 and the number of interim restructurings more spaced out than in the modern era, as we shall discuss. See also Reinhart and Rogoff (2009) on an analysis

of default duration.

Figure 1: Individual external debt restructuring episodes with private creditors, 1815-2020



Note: Country-Markers represent the time of the 327 individual debt restructurings.
Sources: Meyer, Reinhart, and Trebesch (2022), Cruces and Trebesch (2013), and Asonuma and Trebesch (2024) and authors' calculations.

In the lower bound of the haircut spectrum in Figure 1, there are about a dozen cases where haircuts were actually negative, meaning that the debt's NPV was higher after the debt exchange. These restructurings are rare and almost always occur in the early stages of a crisis. Eager to avoid a default, sovereigns may go to great lengths and, for example, extend debt maturities at higher interest rates than in the prior contract. These deals do not imply debt relief but may nevertheless be seen as beneficial for the government, at least in the short term, as the new debt contracts may smooth out repayment and reduce rollover risks.[11]

At the other extreme, we have even rarer full repudiation cases (100 percent haircut). There are 10 cases (out of a sample of 327) that fall into this category, and these are dominated by geopolitical turmoil, such as revolutions or wars, which we examine more closely below. The concept of odious debt applies to some of the cases of 100 percent haircut, meaning that debts are declared as politically illegitimate by the legislative or executive branch (Jayachandran and

[11] It is also important to remember that some of these haircuts apply to a single loan or bond. For example, one of the 12 cases of negative haircuts in our sample is Ukraine's 1999 restructuring of it's ING loan (haircut estimated at -8.2 percent, Cruces and Trebesch (2013)). Less than a year later, in a Global Exchange, Ukraine restructured a much larger share of its debt (about 10 times the size of the ING loan) with a haircut of 18 percent.

Kremer, 2006). The low incidence of repudiation in the history of this market (3 percent of the cases) is at odds with Eaton and Gersovitz (1981) and other canonical sovereign debt models that equate sovereign default with a 100% haircut.

Stylized Fact 2: Defaults are partial, with a median haircut around 40 percent.

Table 1: Sovereign debt haircuts - descriptive statistics, 1815-2020

	Cases	Mean	Median	SD in p.p.	25th Percentile	75th Percentile
Panel A: Full Sample						
Individual haircuts (by restructuring)	327	42%	38%	30	18%	65%
Bulow-Rogoff haircuts (Cumulative, by default spell)	205	46%	42%	33	17%	79%
Face value haircuts (by restructuring)	327	23%	0%	33	0%	41%
Panel B: Subsamples - using standard NPV haircuts (individual restructurings)						
Bonds (individual haircuts), historic (1815-1970)	136	51%	48%	31	25%	81%
Bank debt (individual haircuts), modern (1970 - 1997)	138	34%	30%	26	16%	46%
Bonds (individual haircuts), modern (1998 - 2020)	53	42%	38%	32	15%	68%
Panel C: Subsamples – using the new cumulative Bulow-Rogoff haircut measure						
Bonds (BR haircuts), historic (1815-1970)	106	46%	42%	35	12%	80%
Bank debt (BR haircuts), modern (1970 - 1997)	55	47%	45%	30	22%	75%
Bonds (BR haircuts), modern (1998 - 2023)	44	47%	39%	32	21%	73%

As Table 1 highlights, the statistical properties of haircuts over the full sample are remarkably stable over time, especially when the Bulow-Rogoff cumulative haircut measure is used. The median haircut in the full sample is 38% for individual restructurings, while the mean is 42%. Both the mean and median are somewhat higher (46% and 42%, respectively) for the cumulative BR haircut, which computes losses for the full debt crises. The usefulness of the BR haircut measure is highlighted when comparing the sub-samples over time (Panels B and C of Table 1). The standard haircut measure suggests that the creditors fared relatively well during the 1980s

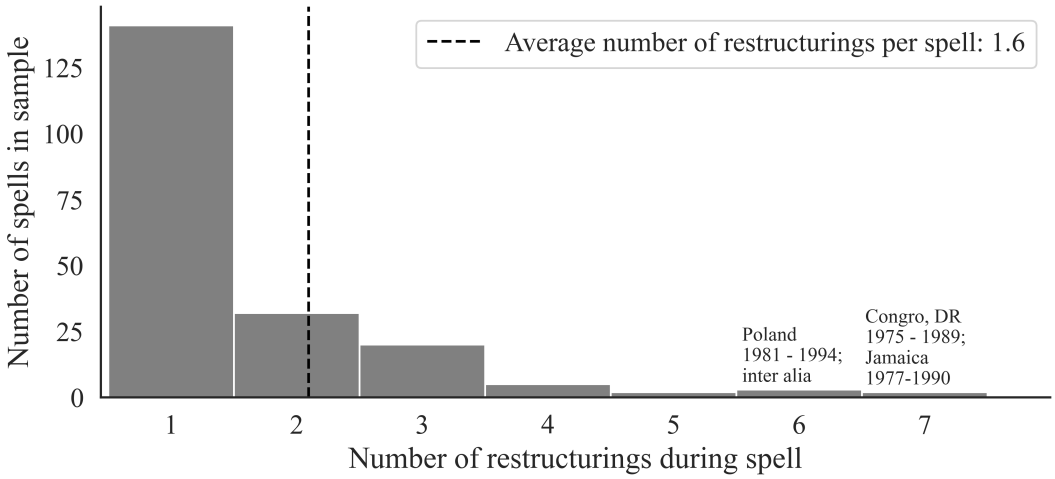
debt crisis involving syndicated bank loans. Indeed, in Panel B, bank debt haircuts in the period 1970-1997 are comparatively low, at 34%, which is 14 percentage points below the rest of the sample. This average across all individual restructuring episodes, however, is biased downwards by separately counting each of the many interim deals of the early and mid-1980s which usually had low haircuts. As that period became the "lost decade" for developing countries, it became clear that these shallow restructurings merely delayed restoring debt sustainability without curing the defaults (Cline 1995).

The BR haircut measure corrects for this bias by accounting for the increasingly serial nature of restructurings and the cumulative nature of creditor losses across all restructurings in the same default spell. The results change markedly for that period. For the bank debt during the period 1970-1997, the average haircut increases from a low 34% when counting individual restructurings (Panel B) to 47% when computing cumulative haircuts per default spell (Panel C), while the median rises from 30% to 45%. A similar pattern emerges in the modern bond era (1998-2023), where average haircuts climb from 42% in Panel B to 47% in Panel C. It is also noteworthy that the BR haircut shows a much more stable average over time, at around 47% for all eras than the classic individual haircut measure, which drops from 51% in the historical sample to 34% in 1970-1997 and jumps up again to 42% in 1998-2023. In fact, once we account for the phenomenon of serial restructurings during a debt crisis through the BR haircuts, the mean, median, and standard deviations in Panel C are all astonishingly stable over time. This stability in the distribution of default outcomes is remarkable given the fundamental changes in the way sovereign debt markets operate today compared to the 19th century. And though it is relatively well-known that defaults have rarely meant full repudiation during the better studied recent five decades, our results show that full repudiations have, in fact, been rare across the past centuries. The consistency over time is also noteworthy, given the profound shocks that investors faced in the 19th and 20th centuries, including global wars, communist revolutions, and the collapse of once-dominant hegemonic empires.

Stylized fact 3: Serial restructurings are increasingly common

As noted, sovereign defaults often involve multiple rounds of restructuring Graf von Luckner and others. (2021). Figure 2 shows that, on average, default spells required 1.6 restructurings before finding the exit, with some cases having required as many as seven distinct restructurings. More than one-third of the 205 default spells covered in this study required two or more debt restructurings to cure the default.

Figure 2: Serial restructurings during prolonged debt crises, 1815-2023



Note: Histogram of restructurings during spell. The figure considers N = 205 default spells. A spell consists of serial restructurings until a restructuring achieves to *cure* the default, which is measured by the sovereign not re-defaulting for at least 24 months after the restructuring.

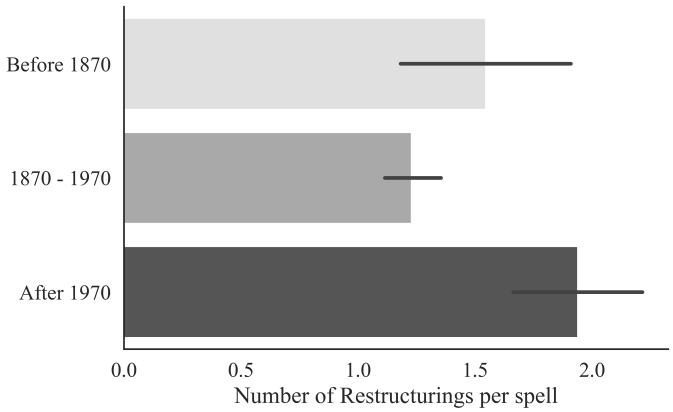
Importantly, the phenomenon of serial restructurings has grown in importance in recent decades. This can be seen in Figures 4 and 5, which show the full history of external defaults and restructurings country by country. Recent decades feature a much higher incidence of restructurings in short succession—often in the same default spell.

The growing number of interim restructurings in recent decades has coincided with shorter default spells, as shown in 3a. In the 19th century, during the long nation-building process in Latin America and elsewhere (Greece), defaults were commonly stretched out over decades as countries faced border wars, internal revolutions, and disarray.[12] When greater political stability emerged later in the 19th century and earlier part of the 20th, defaults also became shorter (Figure 3a). In recent decades defaults became shorter still - but they now typically involve more interim restructuring deals (that often deliver low haircuts).

[12]See Centeno (2002), for an excellent analysis of this era.

Figure 3: Number of restructurings per default spell and spell duration, 1815 - 2023

(a) Number of debt restructurings per default spell, 1815-2023



(b) The duration of default, 1815-2023

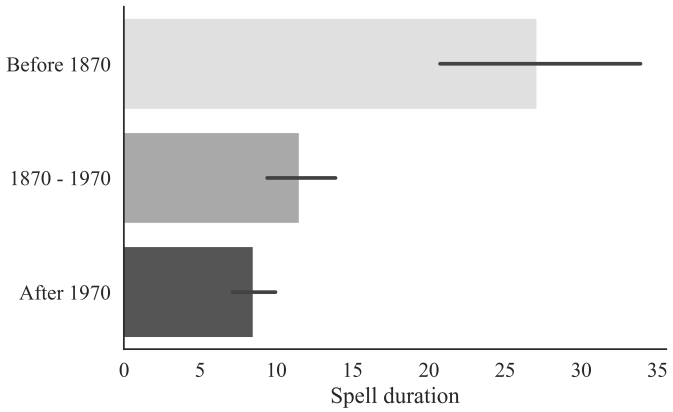


Figure 4: 200 years of serial restructurings, Panel A, 1815 - 2023

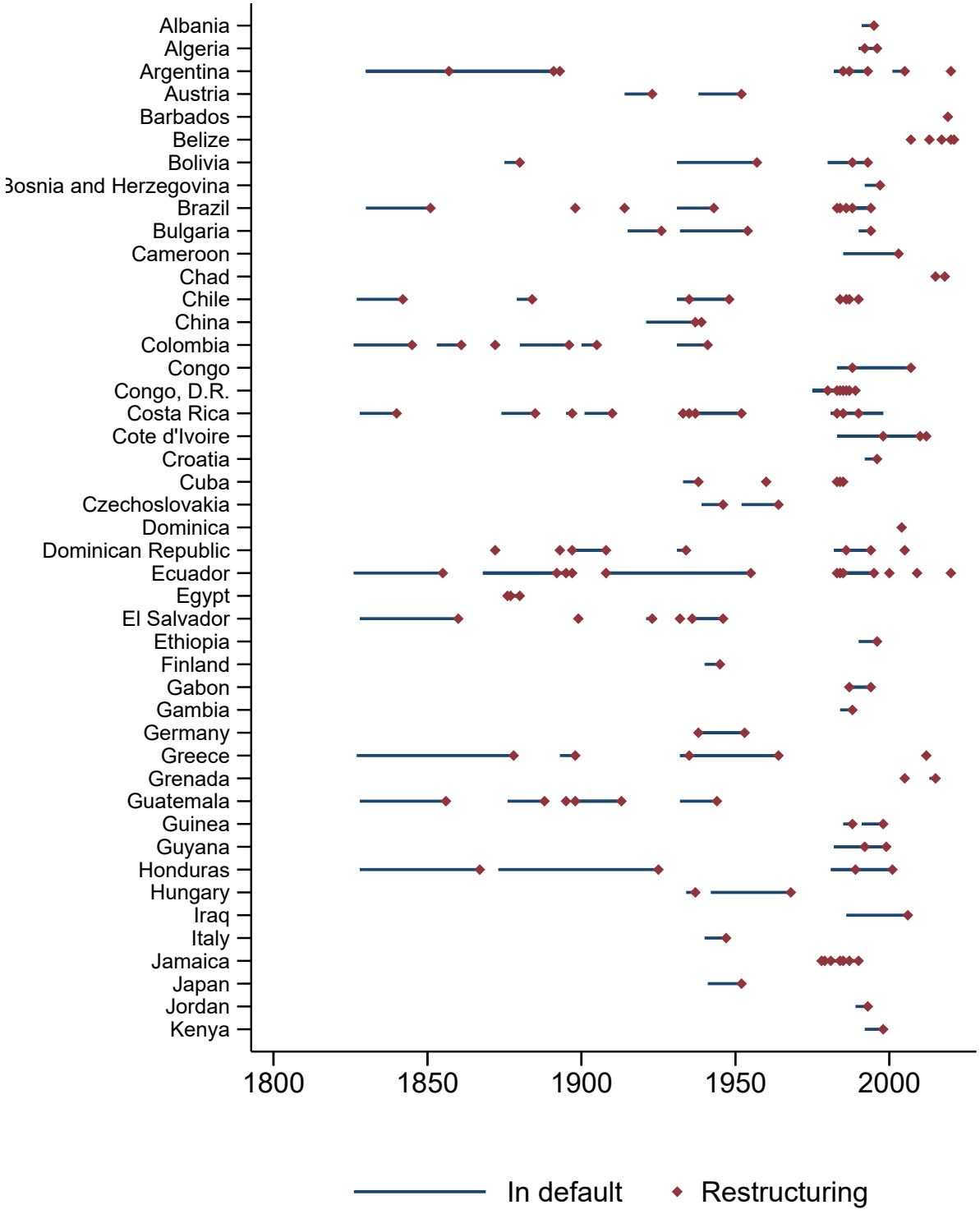
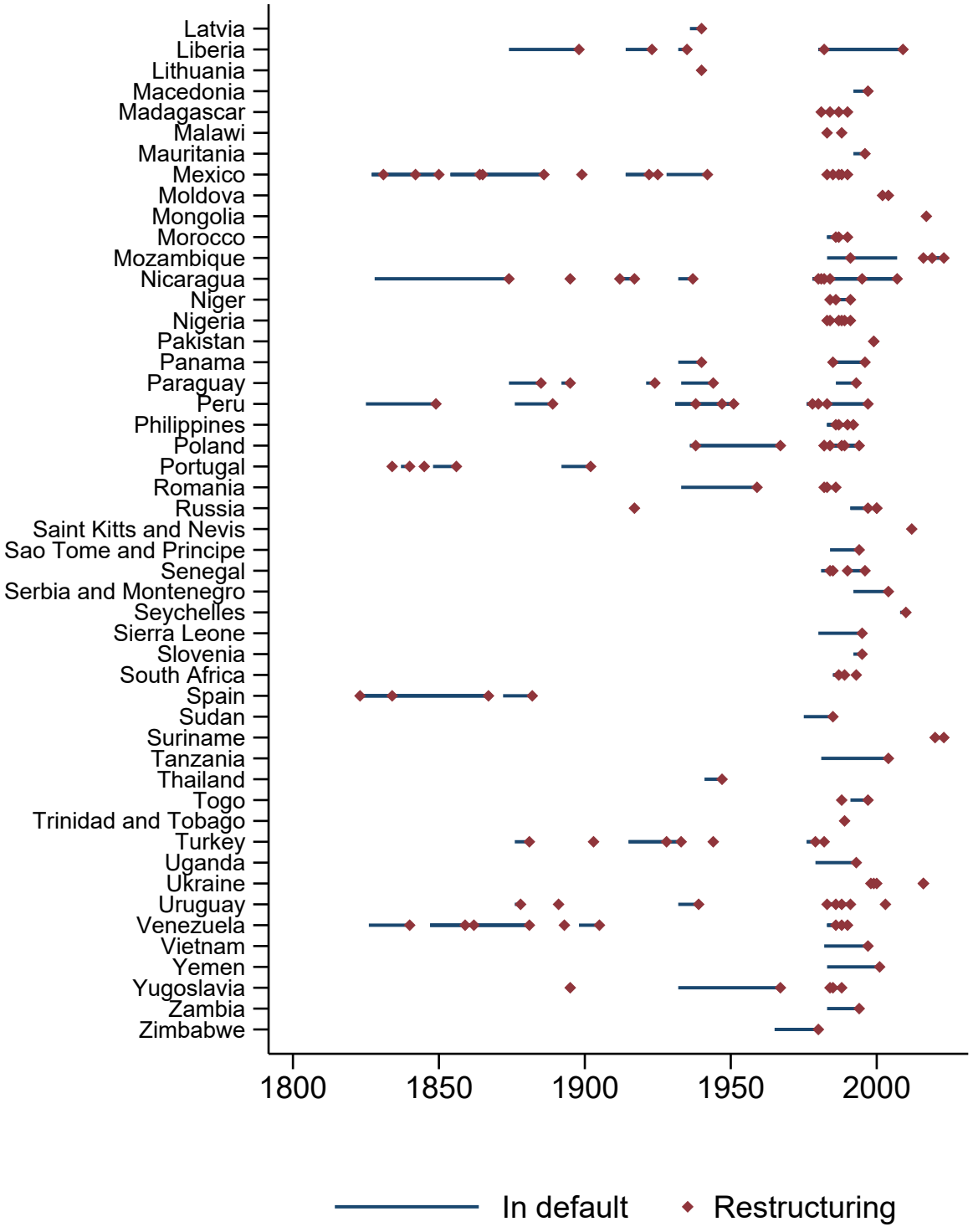


Figure 5: 200 years of serial restructurings, Panel B, 1815 - 2023



Source: Meyer, Reinhart, and Trebesch (2022), Cruces and Trebesch (2013), Asonuma and Trebesch (2024), and Farah-Yacoub, Graf von Luckner, Ramalho, and others. (2022) and authors' calculations.

Stylized fact 4: Interim restructurings have smaller haircuts than "final" ones

Our findings, as presented in figure 6, reveal a novel trend in the restructuring landscape. The chart pools the 327 individual restructurings into two categories: "final" restructurings that cured a default and led to the country's debt crisis status, and interim restructurings, which can range from one to seven in our sample. These are the restructurings that do not end the default spell. The most striking discovery is that interim restructurings have a significantly lower median haircut than their spell-ending counterparts (about 30 percent versus 50 percent). The most significant bunching is at the bottom, with interim deals showing haircuts of just 10 or 20 percent. This is a stark contrast to debt-spell-concluding restructurings, where the dispersion of outcomes is evenly distributed across haircut sizes, though around a higher mean. This finding supports the view that serial restructurings are often the result of shallow debt exchanges — with low haircuts and limited amounts of debt covered by the exchange. These limited exchanges often need to be renegotiated again and do not cure the default.

Figure 6: Interim and final debt restructurings and haircut size: 1815-2023

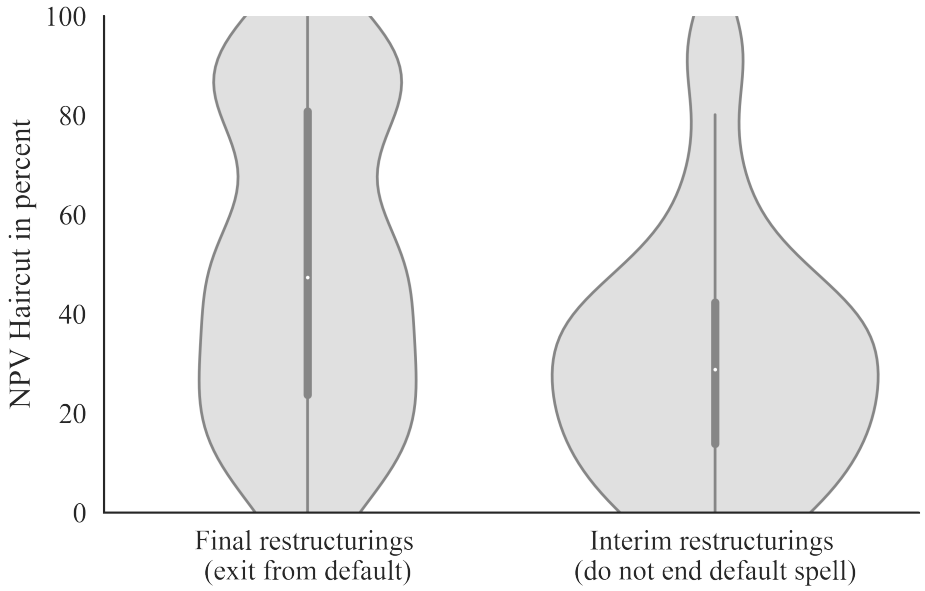
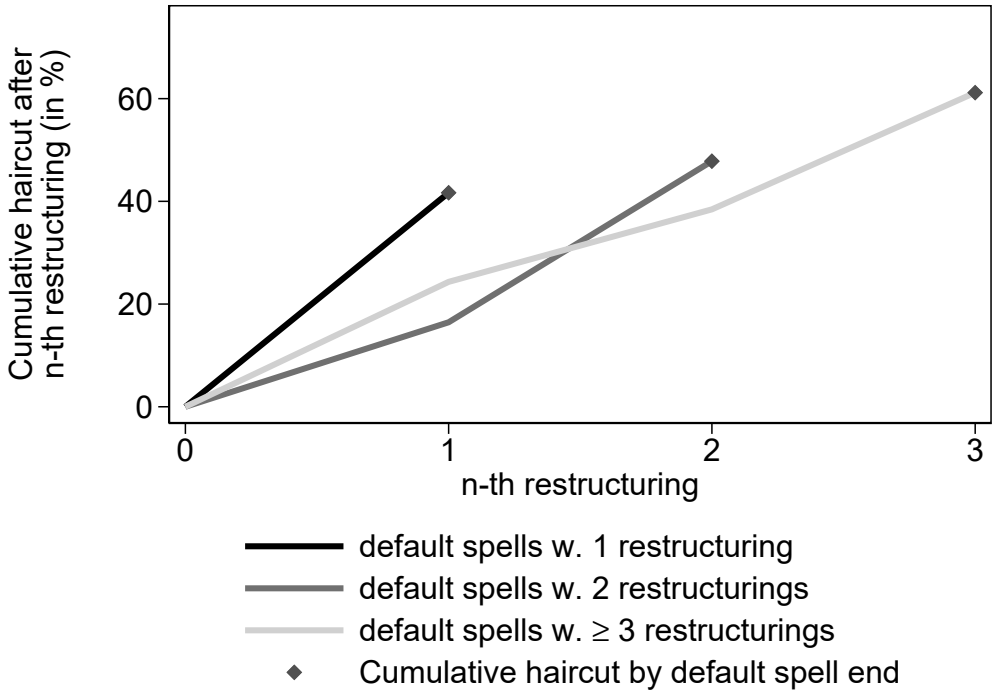


Figure 7 lends further support to this view. Based on our new cumulative BR haircut, we find that creditor losses increase as more restructurings become necessary. The first restructuring shows haircuts of slightly above 40%, while defaults with 3 or more restructurings show cumulative haircuts of 60%, on average. Mistaking insolvency for illiquidity can, among other reasons, give rise to debt exchanges that are shallow and need to be revisited soon after, a point that is consistently emphasized by Bulow and Rogoff (1989a) and Bulow and Rogoff (1989b).

Figure 7: Haircuts increase as more restructurings become necessary



Note: The haircut at each n-th restructuring considers the unweighted average of cumulative haircuts by the n-th restructurings across all spells with at least n restructurings. The sample is winsorized above three restructurings because of the reduced sample size of default spells with more than three restructurings, as is shown in Figure 2.

4 Predicting the size of haircuts: Some rules of thumb

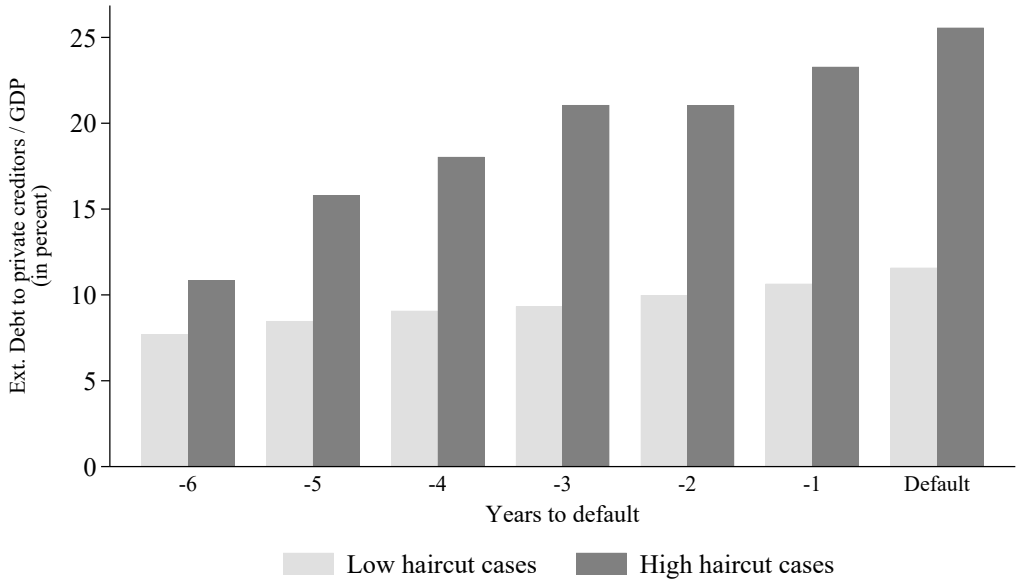
In this section, we examine some of the factors that help to predict the size of the haircut. Some of these factors are known and measurable at the time of default and can thus be useful to gauge the possible magnitude of the haircut that may eventually follow. For example, what is the income per capita of the defaulting sovereign? How high are the sovereign's (foreign) liabilities? Other factors that influence the size of the haircut only become apparent over the course of time, for example, the time elapsed since the start of default (duration of default) or the depth of the output decline during a default. No doubt, a host of drivers beyond those analyzed here affect restructuring outcomes. The longer list includes idiosyncratic factors of the debtor country, global circumstances, the bargaining strengths of the debtors and creditors, legal considerations, and so on. A catalog of these is beyond the scope of our study.

4.1 Pre-default warning signals

Stylized fact 5: High haircuts often follow debt surges

Boom-bust cycles in sovereign (and private) debt often end badly. Mendoza and Terrones (2008), who study the nexus between credit cycles and banking crises, observes that not all credit booms end with a crisis, but most, if not all (banking) crises are preceded by a credit boom. The parallels to sovereign external debt surges and defaults are strong. In their influential paper on "Rules of thumb for sovereign debt crises", Manasse and Roubini (2009) model debt crisis as a binary variable. They find total external debt/GDP and public debt/fiscal revenue among their top ten predictors of a crisis event. Here, we extend this line of work to predict haircuts and by examining both debt stock and the magnitude of the debt build-up. Since our analysis focuses on restructurings of public or publicly guaranteed debt to private external creditors, we focus on debt owed to these same creditors (as a ratio to GDP, see Data Appendix). Figure 8 shows that the pre-default debt surge was about twice as large in the cases that ended up with large haircuts (above the median) than for the cases where haircuts were small (below the median).

Figure 8: The pre-default build-up in private ext. debt - high vs low haircut cases, 1815-2023



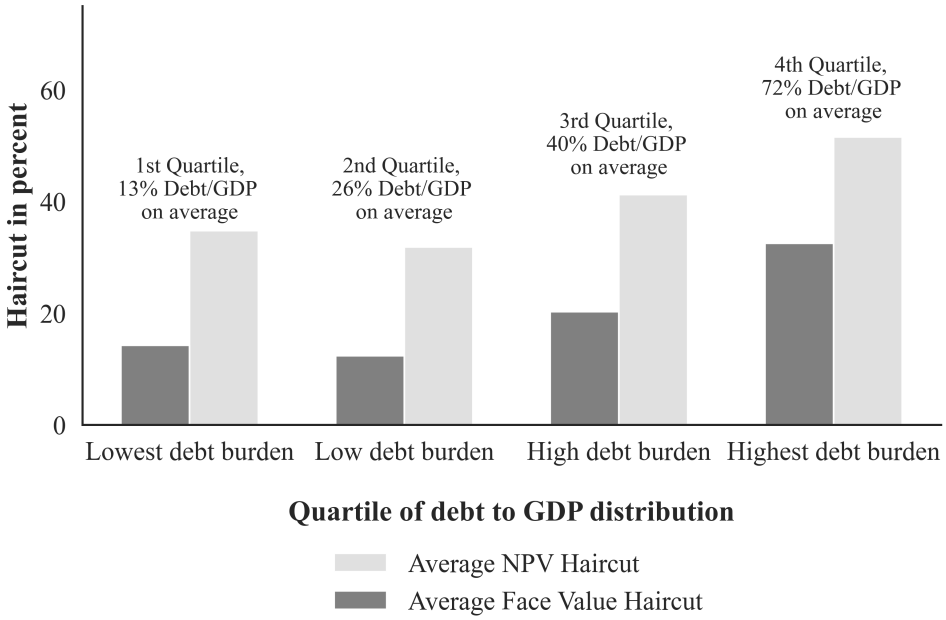
Note: The y-axis plots external debt owed to private creditors relative to GDP. High (low) haircuts are defined as such with an NPV haircut above (below) the median. The debt and GDP data are combined from a variety of sources (see the Data Appendix).

In principle, the level of public and publicly guaranteed external debt is an observable variable prior to the debt crisis, thus being a useful warning sign. However, in practice, the reliability of the data varies considerably across countries and time. There are a variety of "hidden debt"

problems that can mask the full extent of the debt build-up and the size of the debt outstanding (eg. see Horn, Mihalyi, and others. 2023).[13]

With these limitations in mind, Figure 9 focuses on the level of debt, more precisely on total (private plus official) external debts, as a percentage of the debtor country's GDP. As can be seen, debt stocks map into haircut size. Countries in the upper two quartiles of the debt distribution record higher average NPV haircuts. The difference is largest for face value haircuts, which is more than twice as large in the 4th quartile than in the 1st quartile.

Figure 9: Higher pre-default external debt usually means higher haircuts, 1815 - 2023



Note: To avoid bias due to outliers, debt/GDP (external debt owed to private and official creditors) is winsorized at 200%. The debt data is combined from a variety of sources (see Data Appendix).

Stylized fact 6: Haircuts are higher for low-income countries

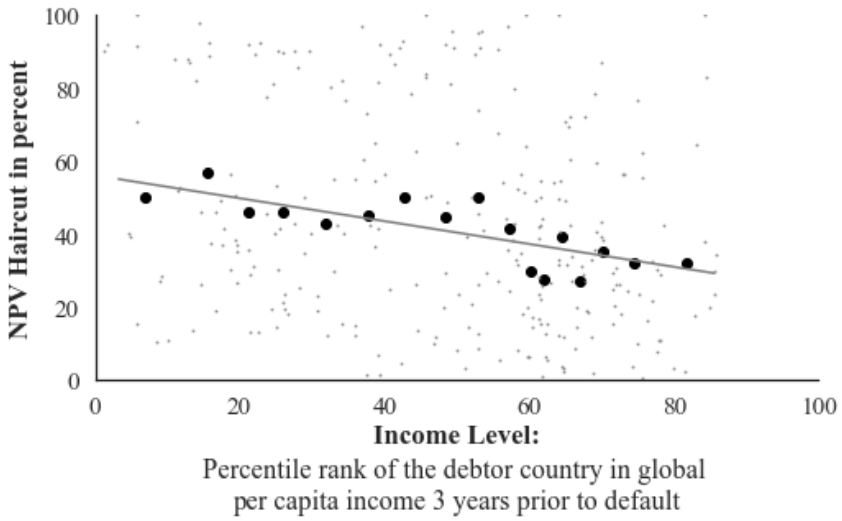
Another indicator readily known at the time of default, at least in the modern era, is a country's real income per capita. The challenges to gather reliable income data are markedly greater in the 19th century and prior to WWII in the 20th century.[14]

[13]Horn, Reinhart, and Trebesch (2021a), document acute under-reporting of debts owed to China by many emerging and developing countries. In numerous cases of debt distress in recent years (Mozambique, the Democratic Republic of Congo and Pakistan, among others) the full extent of external indebtedness was not known until the crisis erupted or the country approached the IMF for assistance. Furthermore, Reinhart and Rogoff (2009) argued that to predict external default it was not enough to look at external debt buildups but also the accumulation of domestic debt, as its debt servicing is also a drain on fiscal revenues. They highlight that, for example, it would have been difficult to predict the Philippines' 1983 default on the basis of external debt alone.

[14]It is particularly problematic for smaller Latin American countries, where independence is gained in the early 1800s but time series for per capita real GDP are only available much later. This issue is less pressing for Asia

As a proxy for debtor capacity to pay, we use the debtor's per capita income relative to the global average income — both measured in the same year. Using this relative measure allows us to compare income levels across a long historical sample. For example, in dollar terms, even the richest countries of the mid-19th century would be considered low-or middle-income by today's standards. Because economic downturns prior to default are the norm (see Yeyati and Panizza (2011) and Reinhart and Rogoff (2009)), we use income levels three years prior to the default.

Figure 10: Lower per capita GDP usually means higher haircuts, 1815 - 2023



Note: Small blue dots represent individual observations, and large black dots represent binned observations. Number of bins is set equal to $\sqrt{N}$, with N = 277. The percentile rank in global per capita income is calculated per year to reflect the defaulter's relative economic development three years prior to the default (in order to reflect income levels prior to a possible economic downturn around the default).

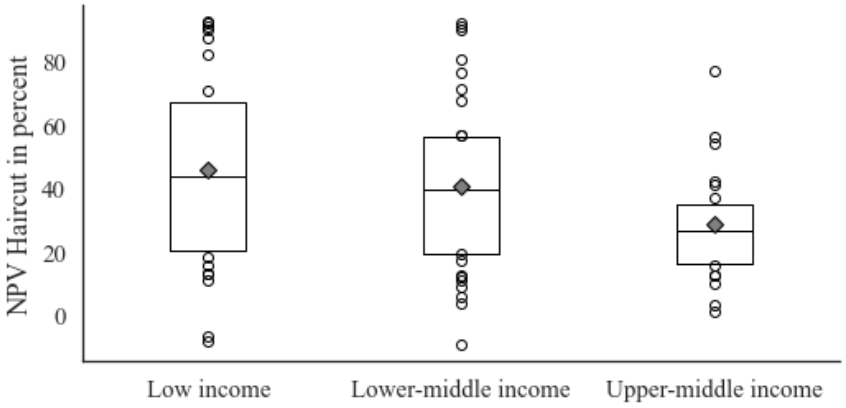
Figure 10 shows a binned scatter plot on the size of individual NPV haircuts against the debtors' percentile rank in the global real per capita income distribution. Haircuts are highest for countries with the lowest income. Figure 11 conveys the same message using the World Bank's income classification, which is available since 1987. Median haircuts are twice as large for low-income debtors when compared to the middle-high-income counterparts.

However, these results do not imply that low-income countries benefit from more generous debt relief. As explained later in this section, haircuts (from a creditor perspective) and debt relief (from a debtor country perspective) are two very different concepts. Poorer countries tend to borrow only sporadically from private creditors in international capital markets, and often in relatively small amounts (Meyer, Reinhart, and Trebesch 2022). For these countries, official (bilateral and multilateral) debt plays the dominant role, especially in recent decades (Horn,

and Africa where independence follows after WWII or even much later.

Reinhart, and Trebesch 2021b). Consequently, the deep haircuts in low-income countries often apply to a small "base" and will thus result in only limited relief in the total debt burden.

Figure 11: World Bank income group as a predictor of haircut size, 1987-2023



Note: This income classification was introduced by the World Bank in 1987. Boxes represent interquartile ranges, observations above (below) the 75th (25th) percentile are shown as dots. Horizontal lines and green triangles are at the median and mean of the respective sub-sample.

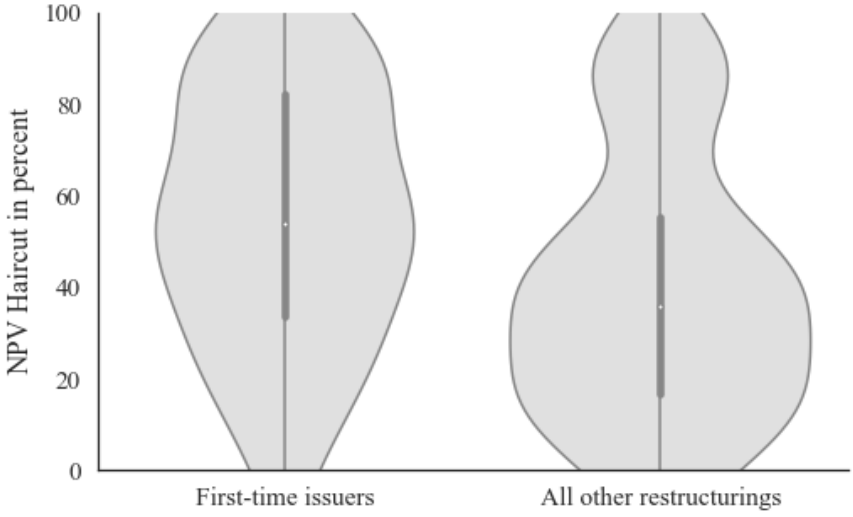
Stylized fact 7: Haircuts are higher for first time debt issuers

As with debt and per capita income, a country's debt issuance history is quantifiable at the time of default, although issuance data is not readily available from most existing databases. To address this gap, we provide such a database, albeit with the benefit of hindsight. Our novel data captures the year in which sovereigns placed a bond in international capital markets or arranged an international syndicated loan for the first time.

Our focus on sovereigns implies the first issuance after independence, excluding debts issued by colonies that usually carried an explicit or implicit guarantee from the colonial power. Independence dates are from Reinhart and Rogoff (2009). For the period prior to 1970, we determine whether a sovereign defaulted on its first sovereign bond(s) on a case-by-case basis using data based on archival sources by Meyer, Reinhart, and Trebesch (2022). For the post-1970 period, we rely on the World Bank's International Debt Statistics (IDS), which contains data on outstanding debt and new borrowing from foreign financial institutions (excluding trade credit banks and official development banks) or through bond issuance. The creditor breakdown is available on a country-by-country basis, and the report also publishes the average maturities of debt outstanding in any given year. These data allow us to approximate when sovereigns first tapped international capital markets and infer whether the original debts were still outstanding at the time of default.

Figure 12 presents a violin chart that compares the individual NPV haircuts of defaults for first-time sovereign issuers/borrowers (there are 28 cases in the full sample) with all other haircuts. The median (mean) haircut is around 54% (55%) for new entrants to the international capital market, well above the 36% (40%) for all other cases.

Figure 12: Haircuts of first-time issuers tend to be higher, 1815-2023



Note: 287 cases for which we have sufficient issuance data (to code first-time issuers). To identify defaults on the first market issuance of debt instruments, we rely on bond issuance for the period before 1970 and data from the World Bank's IDS thereafter. For the 1970s and 1980s, when bank loans took the place of bonds, we consider non-trade-credit loans from private financial institutions as market issuance.

4.2 Geopolitical and economic shocks during default

This section moves beyond indicators of haircut size that are readily observable at the time of default to those that may only become known as the default unfolds over time. We show that geopolitical disasters, delays in crisis resolution (crisis duration), and deep GDP contractions each accompany larger haircuts.

Stylized fact 8: Haircuts are especially high in case of geopolitical disasters (wars, revolutions, country-break ups)

The geopolitical shocks considered here (wars, revolution, country break-ups) may or may not be known or anticipated by private creditors at the time of lending or at the time of default, but if these unsettling events come to pass, they tend to consistently deliver deep creditor losses. Wars, revolutions (often under foreign influence), or the dissolution of empires have resulted in

some of the worst creditor outcomes in the history of sovereign default, including several cases of full debt repudiation (100% haircuts) and many other cases with haircuts in the top 10% of the distribution. This is shown in Table 2, which reports all defaults with creditor losses of 95 percent or higher. As the last two columns highlight, geopolitical turmoil leaves creditors with major losses.

Table 2: Geopolitical disasters (wars, revolutions, country break ups) and haircuts: The largest creditor losses, 1815-2023

Debtor country	Default start	Default end	Haircut size in %	Volume million USD	Type of shock	Context
Spain	1823	1833	100	2,440	Foreign intervention	Debt raised during "liberal Triennium" repudiated after absolute monarchy was reinstalled under Ferdinand VII
Portugal	1834	1834	100	na	Foreign intervention	Debt raised by Dom Miguel declared void after he is toppled with the help of foreign powers
Mexico	1865	1865	100	na	Foreign intervention	Debt raised by French-installed king Maximilian I declared void after the Republic is reinstated
Dom. Republic	1872	1872	100	137	Domestic only	Parliament rejects debt restructuring agreement and declares debts as illegitimate.
Russia	1917	partly rest.*	100	23,892	Revolution	Lenin cancels all foreign debts plus seizure of foreign assets
China	1938	partly rest.*	100	4,109	Revolution	Mao fully repudiates foreign debts after 1949
Lithuania	1940	1940	100	180	Foreign annexation	Foreign debts never repaid after Soviet annexation
Latvia	1940	1940	100	109	Foreign annexation	Foreign debts never repaid after Soviet annexation
Cuba	1960	1960	100	299	Revolution	Castro repudiates all foreign debts
Ottoman Empire	1915	1928	100	6,304	Break-up	Debts of the dissolved Ottoman empire are fully repudiated
Romania	1933	1959	98	1,170	Foreign intervention	Debts repudiated in the wake of WW2 and Soviet control
Yugoslavia	1932	1967	98	924	Foreign intervention	Debts repudiated in the wake of WW2 and Soviet control
Liberia	1980	2009	97	1,278	Multiple	Civil wars, instability, natural disasters
Yemen	1983	2001	97	725	Multiple	Civil wars, instability, natural disasters
Nicaragua	1979	2007	96	1,438	Revolution	Sandinista Revolution, 1978/79 plus natural disasters
Peru	1931	1947	95	645	War	Long-delayed default after the Great Depression and WW2
Turkey	1944	1944	95	9,293	Break-up & war	Former restructured Ottoman Empire debt

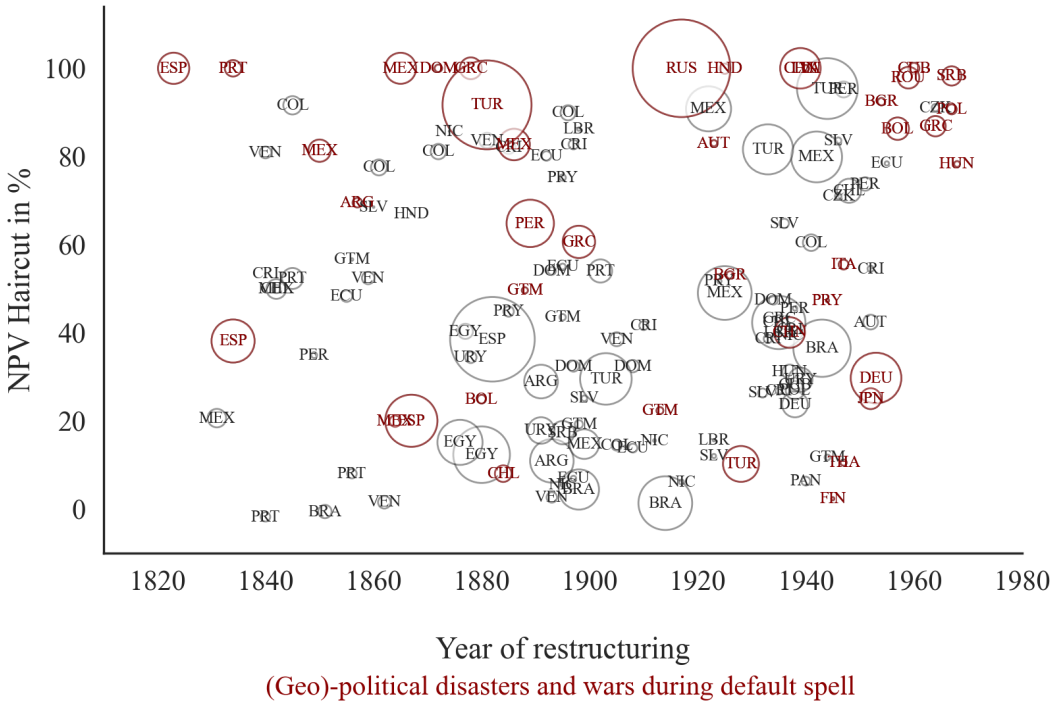
Note: *A small part of Russia's repudiated 1917 debts were restructured, namely in 1986 with UK creditors (USD 304m) and in 1997 with French creditors (USD 1,256m). The big remainder, however, remains unpaid (USD 20,765m). Also a minor part of China's repudiated debts were settled, namely in 1987 with UK creditors (USD 154m), while the rest remains unpaid (USD 3,969m).

In Figure 13, we move beyond the most extreme cases shown in Table 3 and consider all cases of geopolitical turmoil in the sample (shown in red) alongside the remaining restructurings. Specifically, we classify debt crises with geopolitical turmoil in case the default spell overlaps with major wars, revolutions, or country break-ups. For this purpose, we use data on (i) interstate wars from Horn, Reinhart, and Trebesch (2021b), Sarkees and Wayman (2010), Gleditsch and others. (2002) and Davies, Pettersson, and Öberg (2023), (ii) revolution dates from Banks and Wilson (2023), and (iii) country break-ups (own coding, see Data Appendix).

In Figure 14 we use the same approach but group the turmoil cases into three buckets (war, revolution, and country break-ups). Haircuts are about 20 percent higher (from an average

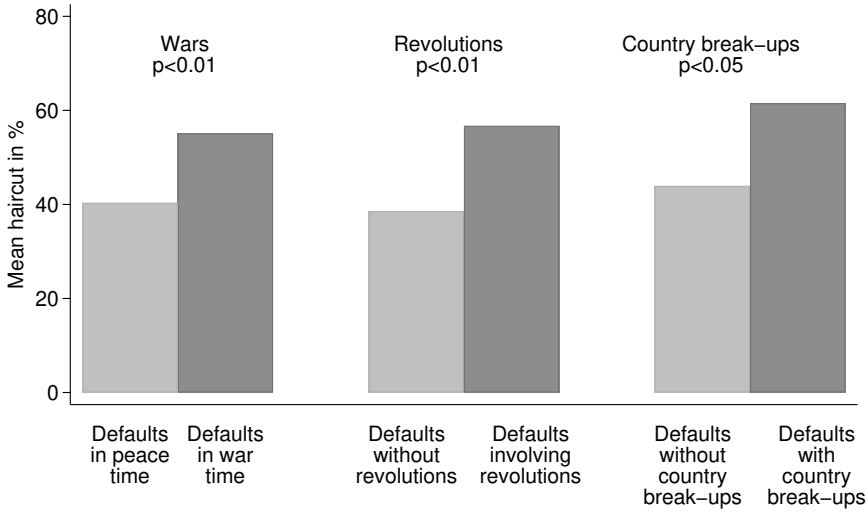
of about 40% to about 60%) for cases involving major geopolitical turmoil. The differences are statistically significant when compared to debt restructurings that did not involve these geopolitical shocks.

Figure 13: Sovereign haircuts with and without major geopolitical shocks



Note: For illustrative purposes we focus on a subset of episodes prior to 1980. Country-markers represent the time of the debt restructuring. The size of the circle represents the size of the restructuring in inflation-adjusted 2020 USD. Restructurings marked red are those involving one or more geopolitical disasters (war, revolution, country break up). See Data Appendix for details on sources.

Figure 14: Geopolitical disasters usually mean higher haircuts, 1815-2023

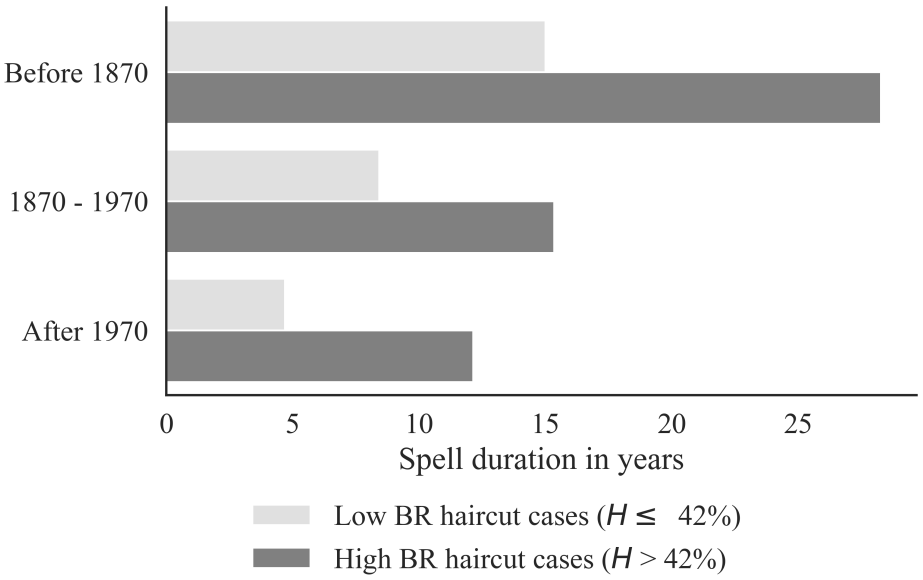


Note: See Data Appendix for sources on wars, revolutions and country break-ups.

Stylized fact 9: Haircuts are higher for longer debt crises

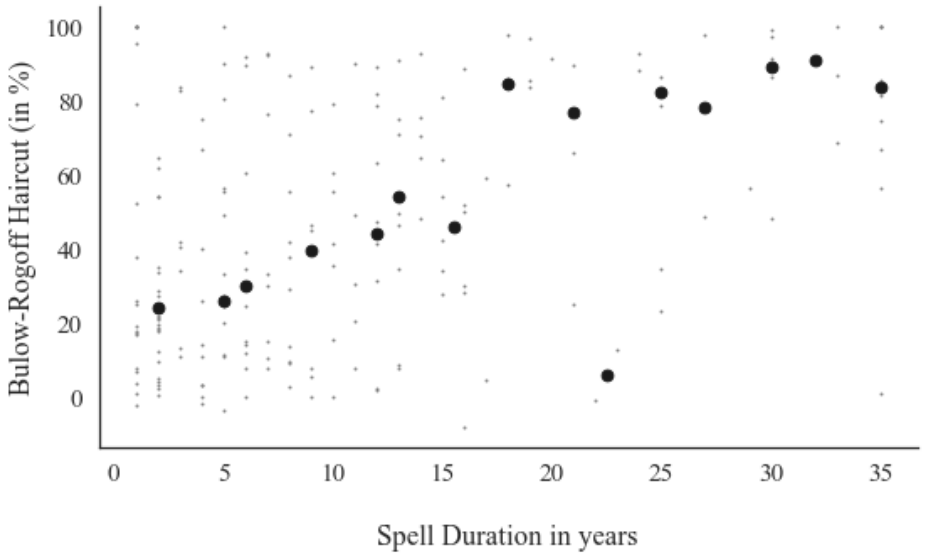
Once a default occurs, it is very difficult, if not outright impossible, to predict how long it will take for its resolution. As shown earlier in Figure 3b, the average duration of a default spell by era has shortened from an average of well over 20 years prior to 1870 to about 8 years since 1970 (across all default spells on external private debt). Figure 15 uses the same breakdown by eras but adds information on haircut size. To define high and low haircuts, we use the Bulow-Rogoff cumulative measure and make the cut at the median of 42 percent (see Table 1). In all sub-periods, longer default spells were associated with significantly higher haircuts (in line with the theory by Benjamin and Wright (2009)). This finding is reinforced in Figure 16, which plots the cumulative BR haircuts against the duration of the default spell in a binned scatter plot.

Figure 15: A longer default spell (debt crisis) usually means a higher BR haircut, 1815-2023



Note: The sample includes 199 spells, excluding full repudiation cases, where duration could be seen as zero or infinity. Spell Duration is measured as the timed lapse between the first default and the final, spell-ending restructuring. A restructuring is considered to be spell-ending, when it is not followed by a default within the two years thereafter. High (low) haircuts are defined as such with a haircut above(below) the sample median.

Figure 16: Bulow-Rogoff haircut, by default duration



Note: Binned scatter plot using the method introduced by Cattaneo and others. (2019). Dots represent binned means. The sample includes 199 spells, excluding full repudiation cases, where duration could be seen as zero or infinity. Spell duration is winsorized at 35 years.

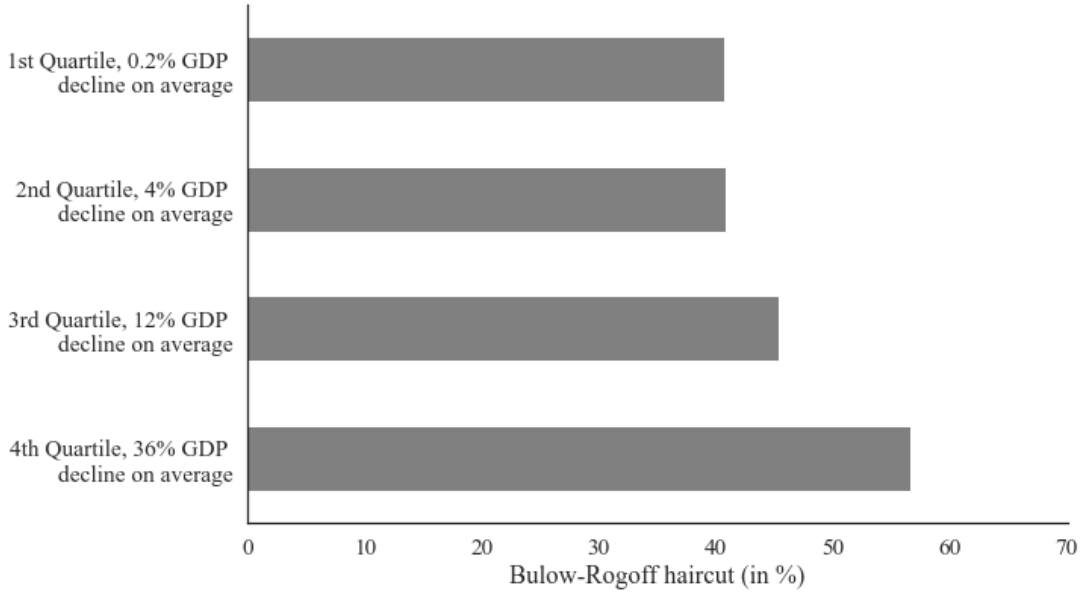
Thus, as a rule of thumb in the modern era, creditors can expect a high (above median) haircut once a number of years have passed and the debt crisis remains unresolved. As analyzed in Reinhart and Rogoff (2009), and Farah-Yacoub, Graf von Luckner, Ramalho, and others. (2022), long defaults often deliver protracted output losses and worsening social fundamentals which can markedly further undermine the repayment capacity of the debtor in default. Therefore, these outcomes may require higher haircuts to cure the default. The link between default duration and high haircuts may also reflect the geopolitical disruptions previously discussed, which certainly added to the length of many pre-WWII defaults. See also Trebesch (2019) on the link between political risk and default duration.

Stylized Fact 10: Haircuts are higher for deeper output contractions

The disruptions from a sovereign default are manifold, and it is not uncommon to record output collapses. We measure an output contraction as the decline in GDP either from two years prior before default or the closest local maximum thereafter (if there was economic growth in the two years preceding default) to the closest local minimum, the trough before economic growth returns (even if the return is modest and transitory). If the default does not coincide with any economic contraction, the measure is set to zero.

In default, the average real GDP decline for the upper two quartiles, as shown in Figure 17, ranges from 8 to 31 percent. Such severe economic contractions may require time to fully reverse, further impacting the country's debt servicing capacity and resulting in higher haircuts. As Figure 17 illustrates, average haircuts rise from around 35 percent for the milder cases to an average haircut of nearly 60 percent for cases with deep output contraction.

Figure 17: GDP contractions and Bulow-Rogoff haircuts



Note: The decline in GDP is measured from two years prior to default to the "first" trough following the default. Due to missing data on historical GDP, the sample consists of 164 default spells.

4.3 Summary regression

In this section, we combine the stylized facts discussed above in a systematic way. To do so, we run simple OLS regressions using individual haircuts as the dependent variable. The results in Table 3 confirm the prior discussion. All of the above-mentioned variables are highly correlated with haircut size, including the pre-crisis warning indicators (income level of debtor countries, pre-default debt/GDP ratio, and the dummy variable for first-time issuers). Also, the dummies for geopolitical shocks show large and highly significant coefficients and the same is true for default duration and the size of GDP contractions.

When combining all variables into one regression, we find that the debt and income level, revolutions, and default duration show significant coefficients (Column 10). The estimated coefficients are economically large. Specifically, a 10-percentage-point higher debt-to-GDP level pre-default is associated with a 4 percentage points higher haircut, while a 5 years longer default process is associated with a 12.5-percentage point higher haircut.

Table 3: Correlates of Haircuts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Income level (%-tile of world income distribution)	-0.3*** (-4.0)								-0.1 (-1.2)	-0.2** (-1.9)
Debt/GDP pre-default (ext. debt, in %)		0.4*** (4.2)							0.3*** (3.5)	0.4*** (5.4)
First time issuer (dummy)			15.2*** (2.7)						7.7 (0.9)	-1.4 (-0.2)
WWI/WWII defaults (dummy)				21.4*** (4.3)						5.4 (0.7)
Revolution (dummy)					18.8*** (5.2)					6.5* (1.8)
GDP contraction (in percent)						0.7*** (5.5)				0.2 (1.0)
Default duration (in years)							1.6*** (9.8)			2.5*** (6.5)
Country breakup (dummy)								22.7*** (2.4)		
constant	56.0*** (13.1)	26.4*** (7.0)	39.7*** (22.4)	39.9*** (23.0)	37.8*** (19.9)	36.1*** (18.0)	30.6*** (16.1)	41.8*** (24.9)	33.3*** (4.6)	15.9*** (2.9)
No. Observations	277	175	290	327	320	276	327	327	166	164
R-squared	0.05	0.09	0.02	0.05	0.08	0.10	0.23	0.02	0.11	0.57

Note: OLS regression with NPV haircut as dependent variable. All explanatory variables other than income level, debt/GDP and default duration are dummy variables. T-stats are reported in parentheses. *,** and *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent significance level respectively.

5 A brief detour on haircuts vs. debt relief

A common misconception equates haircuts (from a creditor perspective) and debt relief (from a debtor country perspective). Indeed, most restructurings of private external debt do not reduce total external debt to GDP significantly in the year of the restructuring. This seeming paradox arises for a variety of reasons. First, currency crashes often accompany default and debt restructuring. With external debt denominated in a hard currency (usually US dollars), the valuation effect can produce a sudden and significant surge in the external debt-to-GDP ratio. Second, output collapses, as discussed previously, can drastically reduce the denominator, further increasing the ratio of total external debt relative to GDP. Third, if the country avails itself to IMF financing during the debt exchange (a common practice), it incurs more official debt in the process, which is sometimes supplanted by additional loans from the World Bank or other multilateral and official lenders. Last but certainly not least, the amount of debt affected (or treated) in the restructuring (especially initial or interim restructurings) may be quite small as a share of the total external debt stock. Thus, the coverage of the restructuring is critical in determining the extent of debt reduction achieved.

This last important point can be illustrated with our new dataset. For 182 individual restructurings for which we have detailed data on total external debt stocks, the median share of debt covered by the renegotiation with private creditors only accounts for 16 percent of total external debt (the average is 35 percent). When the restructured share of debt is low, even a high haircut will not deliver much debt relief (debt reduction). There is a natural analogy with taxes. Even very high taxes, when applied to a small tax base, can end up yielding very little revenue. In our context, the "tax rate" on private creditors can be interpreted as the haircut size (in percent) while the tax base is the debt stock amount covered by the restructuring. This helps explain, as discussed earlier, why, in most low-income countries, where debt to private creditors is only a small share of external debt, high haircuts may not deliver much debt relief. "Final" debt restructurings usually not only involve higher haircuts but also cover a much larger share of total debts outstanding, as was the case for the Brady deals of the early to mid-1990s (Cline, 1995).

6 Conclusion

This paper attempts to fill existing gaps in the literature on external sovereign debt crises. One such gap involves adapting key insights from Bulow and Rogoff (1989a) empirically. In their seminal work, the authors emphasize that debt restructuring is a repeated game so a priori, there is no reason to expect that a default can be brought to an end with a single debt restructuring. Previous research thus far focused on haircuts in each restructuring deal separately rather than considering the full crisis spell. In this paper, we measure creditor losses over the course of repeated restructurings a la Bulow-Rogoff. For example, in the case of Brazil's 1980s debt crisis, the deal-by-deal approach yields six different haircut estimates (ranging from -9 in 1983 to 29 percent in the Brady deal of 1994). The cumulative BR haircut for Brazil during its 13-year-long default spell is 46.6 percent.

We distinguish between milder and more severe crisis spells, albeit from a creditor perspective, thus filling another gap in the empirical crisis literature and facilitating comparison across episodes. While the focus is on the size of creditor losses, our analysis is not silent on other dimensions of the severity of the debt crisis that particularly impact the debtor country. For instance, we have shown a strong link between haircut size and the duration of the default spell, as well as the magnitude of output losses. In other words, low BR haircuts usually coincide with shorter default spells and milder recessions.

The rules of thumb presented here are far from exhaustive on the drivers of haircuts. The list of possibilities includes idiosyncratic factors of the debtor country, global circumstances, the bargaining strengths of the debtors and creditors, as well as legal considerations and the changing global legal frameworks surrounding sovereign debt and default resolution. Further work is needed to understand the determinants of creditor losses in this market and the legacy of high or low haircuts. Another promising field of study is haircuts and debt relief vis-a-vis official creditors (bilateral and multilateral debt), which have received too little attention, especially given the relevance for lower-income countries (see Schlegl, Trebesch, and Wright, 2019 or Horn, Reinhart, and Trebesch, 2021b). The same is true for domestic debt restructurings. As Reinhart and Rogoff (2009) observe, even with all its limitations, external debt crises and their resolution are far better documented and understood than domestic debt crises. Filling this knowledge gap will be particularly important as more and more countries have turned to domestic sources of funding (see Erce, Mallucci, and Picarelli, 2022).

Concerning policy implications, our results primarily confirm conclusions from prior studies,

though too often still ignored by policymakers. The evidence presented here further reinforces the view that shallow restructurings, even when there are multiple of them, rarely cure a default. Multilateral institutions are seldom in the driver's seat during a debt restructuring between a sovereign and its private creditors. Yet, these institutions may play a role in reducing the odds of minimalist restructurings with low haircuts by providing more realistic assessments in their debt sustainability analyses (DSAs), which have historically suffered from chronic over-optimism (see Boughton, 2004 and IMF, 2017). Disguising insolvency as illiquidity and delaying the correct diagnosis has often led debtors and creditors to jointly gamble for resurrection, resulting in debtors ending up with more debt and creditors with a worse portfolio.

References

Ams, Julianne, Reza Baqir, Anna Gelpern, and Christoph Trebesch, 2019, "Sovereign Default," in Sovereign Debt: A Guide for Economists and Practitioners, ed. by S. Ali Abbas, Alex Pienkowski, and Kenneth Rogoff (Oxford, Oxford University Press).

Anthony, Myrvin, Gregorio Impavido, and Bert van Selm, 2020, "Barbados' 2018-19 Sovereign Debt Restructuring-A Sea Change?," IMF Working Paper No. 20/34 (Washington D.C., International Monetary Fund).

Arellano, Cristina, 2008, "Default Risk and Income Fluctuations in Emerging Economies," American Economic Review, Vol. 98, No. 3, pp. 690–712.

Arellano, Cristina, Xavier Mateos-Planas, and José-Víctor Ríos-Rull, 2023, "Partial Default," Journal of Political Economy, Vol. 131, No. 6, pp. 1385–1439.

Asonuma, Tamon, Dirk Niepelt, and Romain Ranciere, 2023, "Sovereign bond prices, haircuts and maturity," Journal of international economics, 140, p. 103689.

Asonuma, Tamon, Michael G. Papaioannou, Gerardo Peraza, Kristine Vitola, and Takahiro Tsuda, 2017, "Sovereign Debt Restructurings in Belize: Debt Sustainability and Financial Stability Aspects," Journal of Banking and Financial Economics, Vol. 2, No. 8, pp. 5–26.

Asonuma, Tamon and Christoph Trebesch, 2016, "Sovereign Debt Restructurings: Preemptive or Post-default," Journal of the European Economic Association, Vol. 14, No. 1, pp. 175–214.

– 2024, "Sovereign Debt Restructuring Database,"

Banks, Arthur S. and Kenneth A. Wilson, 2023, Cross-National Time-Series Data (CNTS).

Baron, Matthew, Emil Verner, and Wei Xiong, 2021, "Banking Crises Without Panics," The Quarterly Journal of Economics, Vol. 136, No. 1, pp. 51–113.

Benjamin, David and Mark Wright, 2009, "Recovery Before Redemption: A Theory of Delays in Sovereign Debt Renegotiations," SSRN Working Paper No. 1392539.

Borensztein, Eduardo and Ugo Panizza, 2009, "The Costs of Sovereign Default," IMF Staff Papers, Vol. 56, No. 4, pp. 683–741.

Boughton, James M., 2004, "The IMF and the Force of History: Ten Events and Ten Ideas that have Shaped the Institution," IMF Working Paper 2004/075 (Washington D.C., International Monetary Fund).

Bulow, Jeremy and Kenneth S. Rogoff, 1989a, "A Constant Recontracting Model of Sovereign Debt," Journal of Political Economy, Vol. 97, No. 1, pp. 155–178.

– 1990, "Cleaning Up Third-World Debt without Getting Taken to the Cleaners," Journal of Economic Perspectives, Vol. 4, No. 1, pp. 31–42.

– 2005, "Grants versus Loans for Development Banks," American Economic Review, Vol. 95, No. 2, pp. 393–397.

Bulow, Jeremy I. and Kenneth S. Rogoff, 1989b, "Sovereign Debt: Is to Forgive to Forget?," American Economic Review, Vol. 79, No. 1, pp. 43–50.

Cattaneo, Matias D, Richard K Crump, Max H Farrell, and Yingjie Feng, 2019, "On Binscatter," Staff Report 881 (New York, Federal Reserve Bank of New York).

Centeno, Miguel Angel, 2002, Blood and Debt: War and the Nation-state in Latin America (Philadelphia, Penn State Press).

Cheng, Gong, Javier Díaz-Cassou, and Aitor Erce, 2019, "The Macroeconomic Effects of Official Debt Restructuring: Evidence from the Paris Club," Oxford Economic Papers, Vol. 71, No. 2, pp. 344–363.

Cline, William R., 1995, Resolving the European Debt Crisis (Washington D.C., Peterson Institute for International Economics).

Cruces, Juan J. and Christoph Trebesch, 2013, "Sovereign Defaults: The Price of Haircuts," American Economic Journal: Macroeconomics, Vol. 5, No. 3, pp. 85–117.

Davies, Shawn, Therese Pettersson, and Magnus Öberg, 2023, "Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings, 1998-2005," Journal of Peace Research, Vol. 60, No. 4.

Dimson, Elroy, Paul Marsh, and Mike Staunton, 2002, Triumph of the Optimists: 101 Years of Global Investment Returns (Princeton, Princeton University Press).

Eaton, Jonathan and Mark Gersovitz, 1981, "Debt with Potential Repudiation: Theoretical and Empirical Analysis," The Review of Economic Studies, Vol. 48, No. 2, pp. 289–309.

Erce, Aitor, Enrico Mallucci, and Mattia Osvaldo Picarelli, 2022, "A Journey in the History of Sovereign Defaults on Domestic-Law Public Debt," European Stability Mechanism Working Paper 51.

Farah-Yacoub, Juan P., Clemens Graf von Luckner, Rita Ramalho, and Carmen M. Reinhart, 2022, "The Social Costs of Sovereign Default," World Bank Policy Research Working Paper 10157 (Washington D.C., World Bank).

Farah-Yacoub, Juan P., Clemens Graf von Luckner, and Carmen M. Reinhart, 2022, "Eternal External Debt Crises: A Long View," Mimeo.

Giesecke, Kay, Francis A. Longstaff, Stephen Schaefer, and Ilya A. Strebulaev, 2014, "Macroeconomic Effects of Corporate Default Crisis: A long-term Perspective," Journal of Financial Economics, Vol. 111, No. 2, pp. 297–310.

Gleditsch, Nils, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Havard Strand, 2002, "Armed Conflict 1946-2001: A New Dataset," Journal of Peace Research, Vol. 39, No. 5.

Graf von Luckner, Clemens, Josefin Meyer, Carmen Reinhart, and Christoph Trebesch, Mar. 2021, "External Sovereign Debt Restructurings: Delay and Replay," Vox EU column.

Horn, Sebastian, David Mihalyi, Philipp Nickol, and Cesar Sosa-Padilla, 2023, "Hidden Debt Revelations," Mimeo.

Horn, Sebastian, Carmen Reinhart, and Christoph Trebesch, 2021a, "China's Overseas Lending," Journal of International Economics, Vol. 133, pp. 1035–39.

– 2021b, "Coping with Disasters: Two Centuries of International Official Lending," NBER Working Paper 27343 (Cambridge, Massachusetts, National Bureau of Economic Research).

IMF, 2013, "Sovereign Debt Restructuring - Recent Developments and Implications for the Fund's Legal and Policy Framework," (Washington D.C., International Monetary Fund).

– 2017, "Review of the Debt Sustainability Framework in Low-Income Countries: Proposed Reforms," IMF Policy Paper (Washington D.C., International Monetary Fund).

Jayachandran, Seema and Michael Kremer, 2006, "Odious Debt," American Economic Review, Vol. 96, No. 1, pp. 82–92.

Jorda, Òscar, Katharina Knoll, Dmitry Kuvshinov, Moritz Schularick, and Alan M Taylor, 2019, "The Rate of Return on Everything, 1870–2015," The Quarterly Journal of Economics, Vol. 134, No. 3, pp. 1225–1298.

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. by Jeffrey D. Sachs (Chicago, University of Chicago Press).

Manasse, Paolo and Nouriel Roubini, 2009, "'Rules of Thumb" for Sovereign Debt Crises," Journal of International Economics, Vol. 78, No. 2, pp. 192–205.

Marichal, Carlos, 2000, A Century of Debt Crises in Latin America (Princeton, Princeton University Press).

Mendoza, Enrique G. and Marco E. Terrones, 2008, "An Anatomy of Credit Booms: Evidence from Macro Aggregates and Micro Data," NBER Working Paper 14049 (Cambridge, Massachusetts, National Bureau of Economic Research).

Meyer, Josefin, Carmen Reinhart, and Christoph Trebesch, 2022, "Sovereign Bonds Since Waterloo," The Quarterly Journal of Economics, Vol. 137, No. 3, pp. 1615–1680.

Mitchener, Kris James and Christoph Trebesch, 2023, "Sovereign Debt in the Twenty-first Century," Journal of Economic Literature, Vol. 61, No. 2, pp. 565–623.

Moodys, 2011, "Sovereign Default and Recovery Rates, 1983-2010," Moody's Investor Services, New York.

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

– 2011, "From Financial Crash to Debt Crisis," American Economic Review, Vol. 101, No. 5, pp. 1676–1706.

Reinhart, Carmen, Kenneth S. Rogoff, and Miguel Savastano, Spring 2003, "Debt Intolerance," Brookings Papers for Economic Activity, Vol. 1, pp. 1–74.

Reinhart, Carmen and Christoph Trebesch, 2016, "Sovereign Debt Relief and its Aftermath," Journal of the European Economic Association, Vol. 14, No. 1, pp. 215–251.

Sarkees, Meredith Reid and Frank Wayman, 2010, Resort to War: 1816 – 2007 (Washington D.C., CQ Press).

Schlegl, Matthias, Christoph Trebesch, and Mark LJ Wright, 2019, "The Seniority Structure of Sovereign Debt," (Cambridge, Massachusetts, National Bureau of Economic Research).

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

Sturzenegger, F. and J. Zettelmeyer, 2006, Debt Defaults and Lessons from a Decade of Crises (Cambridge, The 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, Vol. 5, No. 2-3, pp. 343–351.

– 2008, "Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings, 1998-2005," Journal of international Money and Finance, Vol. 27, No. 5, pp. 780–805.

Suter, Christian, 2019, Debt Cycles in The World-Economy: Foreign Loans, Financial Crises, And Debt Settlement, 1820-1990 (Oxfordshire, Routledge).

Trebesch, Christoph, Apr. 2019, "Resolving Sovereign Debt Crises: The Role of Political Risk," Oxford Economic Papers, Vol. 71, No. 2, pp. 421–444.

Van Zanden, J. and J. Bolt, 2020, "Maddison Style Estimates of the Evolution of the World Economy. A New 2020 Update," Maddison-Project Working Paper WP-15.

Williamson, Samuel H., 2024, What Was the U.S. GDP Then?

World Bank, 2022, World Development Indicators.

Wynne, William H, 2000, State Insolvency and Foreign Bondholders: Selected Case Histories of Governmental Foreign Bond Defaults and Debt Readjustments vol. Vol. 2 (Beard Books).

Yeyati, Eduardo Levy and Ugo Panizza, 2011, "The Elusive Costs of Sovereign Defaults," Journal of Development Economics, Vol. 94, No. 1, pp. 95–105.

A Appendix - Data Sources and Descriptives

A.1 Data on Restructurings, Defaults, and Debt

Restructuring events: Our dataset on sovereign external debt restructurings includes cases of reorganization (recontracting) of public (government) or publicly guaranteed external debt, along with the associated "haircuts" that measure creditor losses due to the restructuring process. The focus is on "distressed" debt exchanges that arise in the context of financial crises and distress, and which involve the exchange of existing instrument(s) for new financial instrument(s) with terms less advantageous to the creditor compared to the original bond(s) or loan(s). In line with the approach taken by Cruces and Trebesch (2013), we narrow down the sample to include only defaults and restructurings of medium and long-term debt. Lastly, our dataset only includes realized restructurings and excludes cases where an exchange offer or agreement was never implemented.

The data on debt restructurings comes from (i) Meyer, Reinhart, and Trebesch (2022) for 136 cases during the period 1815-1970 when sovereign international finance was long dominated by bonds issued in London; (ii) Cruces and Trebesch (2013) for 174 cases during the bank-debt dominated period in the 1970s and 1980s and the return of international sovereign bonds during the 1990s and 2000s; (iii) Asonuma and Trebesch (2024) for five recent cases (Ukraine, 2016 (for both the bond and loan restructuring); Chad, 2014; Chad 2018; Mozambique, 2023); and (iv) our own calculations for an additional 12 cases not sufficiently covered elsewhere (Argentina, 2020; Barbados, 2019; Belize, 2017, 2020 and 2021; Ecuador, 2020; Grenada, 2019; Mongolia, 2017; and Mozambique, 2016 and 2019; as well as Suriname 2020 and 2023).

Debt restructured/affected: Our analysis focuses on sovereign debt owed to and restructured with private external creditors from 1815 to 2023. Foreign creditors include foreign bondholders and foreign commercial banks (e.g., the "London Club" creditor banks during the 1970s or 1980s). The information on the size of the debt stock that was restructured stems from the same sources as the haircuts themselves. For consistency all debts are expressed in 2020 USD.

Defaults - countries and years: For each restructuring, we identify the sovereign default event that preceded it. For this purpose, we rely on data since 1970 from Asonuma and Trebesch (2016), and for the historical sample from Farah-Yacoub, Graf von Luckner, and Reinhart (2022), who collect data on defaults by retroactively applying the methodology used by the major sovereign credit rating agencies today, including for countries that were (are) not rated; and for

the time pre-1918, when sovereign credit ratings did not yet exist. According to this methodology, a sovereign default occurs when either (1) the sovereign debtor misses debt payments beyond the grace period; (2) there are changes to the debt contract that are less favorable to the private external creditors than the original contract, thereby including distressed debt exchanges that reduce the debtor's obligations; or (3) unilateral changes imposed by the debtor resulting in diminished financial obligation, such as a forced currency re-denomination (see Ams and others. (2019) for a detailed discussion). In cases (2) and (3), when there are no prior missed payments, the default date coincides with the restructuring date. Historically, most defaults were triggered by the non-servicing of a debt obligation beyond a grace period, a classic payment default in the legal sense. Preemptive debt restructurings without default are a relatively recent phenomenon discussed in Asonuma and Trebesch (2016).

Default spells/debt crisis spells: Based on the dating of the defaults and restructurings outlined above, we code the debt crisis spells (or default spells, two terms we use interchangeably) - defined as the period between a default and the final/sustainable restructuring of the debt and hence exit from default.

Focusing on default spells, rather than individual default episodes or restructurings, provides a more comprehensive understanding of sovereign debt crises, since a restructuring that is followed by another default within less than two years can hardly be seen as the conclusion of a prior debt crisis. Instead, we treat such instances as interim restructurings that become part of one debt crises. Take for instance the example of Brazil in the 1980s and 1990s. After defaulting in 1982, Brazil swiftly restructured its debt, formally exiting default the next year. The haircut (-9.4% in NPV terms) *granted* at the time was far from solving Brazil's debt overhang, so Brazil re-defaulted that same year. In 1984 Brazil's debt was restructured once again, with a haircut of 1.7% in NPV terms, leading to yet another default in the same year. It took three more iterations and the eventual Brady Bonds initiative before Brazil's debt saw a haircut that reduced it's debt stock both in NPV and nominal terms. By considering default spells/debt crises, we capture these multi-stage processes, as well as the cumulative effects of the restructurings on the sovereign debtor, and, importantly, its creditors.

The example of Brazil in the 1980s also illustrates how, ex post, debt restructurings can be categorized into two types: final restructurings that effectively resolve the debt crisis and cure the default, and interim restructurings that fall short of establishing a sustainable debt trajectory and result in a relapse shortly after, meaning that a new round of restructuring becomes necessary within two years.

Public external debt to private creditors: A key input to the cumulative haircut formula is comprehensive data on government debt stocks owed to private external creditors across 200 years. That data series originates from various sources. For the most recent decades (after 1970) we use the World Bank's International Debt Statistics (IDS) dataset, supplemented with IDS data from earlier vintages as collected by Horn, Mihalyi, and others. (2023). For the historical sample, we draw on Reinhart and Rogoff (2009) and Horn, Reinhart, and Trebesch (2021b), supplemented with the data and archival sources collected by Meyer, Reinhart, and Trebesch (2022), in particular the Investors Monthly Manual, Moody's Investor's Manual, Corporation of Foreign Bondholders, and Stock Exchange Yearbooks. From these sources, we gather bond-level data on bond amounts outstanding and sum them up to create an aggregate series of external debt owed to foreign bondholders. Like all monetary series, the debt stocks are expressed in 2020 USD, de-/inflated using data from Williamson (2024).

Total public external debt: Data on public external debt stocks (i.e., owed to private and official creditors) largely come from the same sources as the data on public external debt owed to private creditors. To arrive at a series of total public debt, we use the series on debt owed to private external creditors described above and add to it a data series of the same structure on debt owed to official creditors. The data for the latter series stem from the International Debt Statistics for the period after 1970 (supplemented with IDS data from earlier vintages, as presented in Horn, Mihalyi, and others. (2023)). For the period before 1970, we use data from Horn, Mihalyi, and others. (2023), as well as Reinhart and Rogoff (2009) when the former is not available. As with all other monetary series, these debt stocks are expressed in 2020 USD, deflated, or inflated using data from Williamson (2024).

Total public debt / GDP: Debt as a ratio to GDP is computed by dividing total public debt with GDP (external plus domestic government debt). The debt data stems from the same sources as on total public external debt.

Debt issuance and first-time issuers For each country we identify issuance patterns and in particular the year with first-time bond/debt issuance in international markets. For the historical period (pre-1970), we code bond issuance and first-time (external) bond issuers on a case-by-case basis using data based on archival sources by Meyer, Reinhart, and Trebesch (2022). We also determine and whether and when a sovereign defaulted on its first sovereign bond(s) casewise. For the post-1970 period, we rely on the World Bank's International Debt Statistics (IDS), which contains data on outstanding debt and new borrowing from foreign financial institutions (excluding trade credit banks and official development banks) or through bond issuance. The

creditor breakdown is available on a country-by-country basis, and the report also publishes the average maturities of debt outstanding in any given year. These data allow us to approximate when sovereigns first tapped international capital markets and infer whether the original debts were still outstanding at the time of default.

A.2 Data on income and geopolitical disasters

GDP and income levels: For measures of economic output, we rely on real GDP data from the World Bank post-1970 (World Bank, 2022). Prior to 1970, we extrapolate that series backward using historical data on real GDP growth data from the Maddison project (Van Zanden and Bolt, 2020), as follows:

$$GDP_{t-1} = \frac{GDP_t}{(1+g_t)} \tag{4}$$

Where g is the growth rate in year t, sourced from the Maddison project (Van Zanden and Bolt, 2020). The resulting series is then expressed in 2020 USD, de-/inflated using data from Williamson (2024).

As a proxy for debtor capacity to pay, we use the debtor's per capita income relative to the global average income — both measured in the same year. Using this relative measure allows us to compare income levels across a long historical sample. For example, in dollar terms, even the richest countries of the mid-19th century would be considered low- or middle-income by today's standards. Additionally, we consider the World Bank's income classification, published as part of the World Development Indicators (WDI), for the period since 1987.[15]

Geopolitical disasters (wars, revolutions, and break-ups): For geopolitical turmoil, we consider major wars, revolutions, and country break-ups. For this purpose, we use data on (i) interstate wars from Horn, Reinhart, and Trebesch (2021b), Sarkees and Wayman (2010), Gleditsch and others. (2002), and Davies, Pettersson, and Öberg (2023); (ii) revolution dates from Banks and Wilson (2023); and (iii) country break-ups, which describes instances when a default coincided with the division of prior jointly governed administrative unit. The data for country break-ups is based on our own historical research. The cases we consider under this category are Austria, 1914; Venezuela, 1826; Costa Rica, 1828; Slovenia, 1828; Guatemala, 1828; Nicaragua, 1828; Honduras, 1828; Colombia, 1826; Ecuador, 1826 and Turkey, 1915.

[15] For a discussion on the methodology see here.

A.3 Descriptive Statistics

Table A.1: Descriptive Statistics: Continuous Variables

	Income level (%-tile of world income distribution)	Debt/GDP pre-default (ext. debt)	GDP contraction	Default duration (in years)
Observations	277	175	276	327
Mean	48.41	37.45	8.50	7.27
Standard Deviation	21.48	24.20	14.02	8.82
Minimum	1.14	0.19	0.00	1.00
25th percentile	29.73	19.89	0.00	2.00
Median	52.91	31.36	2.30	3.00
75th percentile	64.86	52.77	10.01	9.50
Maximum	85.94	130.17	90.45	53.00

A.4 Computing Haircuts

This subsection complements section 2 and provides more details on our sources, methods and procedures for calculating haircuts, as well as the underlying assumptions we made.

A.4.1 Case Inclusion Criteria

We construct a comprehensive dataset of sovereign debt restructurings from 1815 to 2023, building upon the methodology of Cruces and Trebesch, 2013 and Meyer, Reinhart, and Trebesch, 2022. In line with these prior works, our sample selection criteria are as follows: First, we concentrate on sovereign debt defaults and restructurings, which are defined as those pertaining to bonds or loans owed by a country's central government, excluding debts of local or regional governments. Second, we limit our focus to distressed debt exchanges, characterized as restructurings of bonds or bank loans on terms less favorable than those of the original debt, consistent with the standard definition employed by credit rating agencies. We exclude routine sovereign liability management operations such as debt swaps and buybacks occurring during normal times. Third, our analysis encompasses restructurings of medium- and long-term debt, excluding short-term agreements like 3-month debt rollovers or deals providing short-term bridge financing or maturity extensions of less than one year. However, we do include restructurings that transform short-term debt into medium- or long-term debt, such as Mexico's restructurings in the 1920s. Fourth, we concentrate on restructurings of privately held, foreign-currency debt, typically owned by foreign commercial creditors, excluding defaults on private-to-private or public-to-public debt, such as

the restructuring of public war debts following World War I and World War II (see Reinhart and Trebesch, 2016). We also exclude restructurings of domestic bonds, as they were primarily held by domestic creditors for most of the 19th and 20th centuries. Few exceptions exist, where domestic debt was almost exclusively held by foreigners. Finally, we only consider restructurings that are actually implemented, disregarding interim agreements that were never completed or temporary deals intended solely to bridge the time until a permanent settlement and debt exchange.

A.4.2 Historical cases - treatment of sinking funds, debt buybacks, sinking funds, gold and currency exchange clauses, selective agreements, perpetuities, etc.

Sovereign debt restructurings and bond contracts have seen many contractual innovations coming in and out of fashion over the past 200 years. Including the use of sinking funds, the inclusion of gold- and currency conversation clauses, the issuance of perpetual debt instruments, and the regular rise and fall of debt-buyback liability-management strategies. Developing an internally consistent dataset of haircuts on debt instruments across these two centuries requires a systematic treatment of such contractual particularities. For a comprehensive overview of how these were treated, we refer the reader to the online appendix that accompanies the works of Meyer, Reinhart, and Trebesch, 2022 and Cruces and Trebesch, 2013.

A.4.3 Bulow-Rogoff Haircuts

"Bulow-Rogoff" haircuts help quantify the cumulative impact of multiple debt restructurings on creditors during a single debt crisis. The metric, described in section 2, captures the compounded loss incurred by a passive investor holding a face-value weighted portfolio of all the securities or loans issued by the country, including those restructured in previous debt restructuring deals within the same default spell. To calculate the Bulow-Rogoff haircut, we employ an aggregation of creditor losses across multiple debt restructurings, incorporating the number of restructurings that occurred during the spell and the recovery rates associated with each restructuring event. The recovery rate is thereby defined as one minus the effective estimated haircut for the particular restructuring event, taking into account both the size of the haircuts and the amount of debt restructured. This is important since the Bulow-Rogoff haircut aims to estimate the losses faced by an investor holding face-value weighted portfolio of all the securities or loans issued by the defaulter. Hence, a restructuring can be high, but only involve a small

share of the debt a sovereign owes, so that the losses faced by an investor are in fact low. A crucial input for the cumulative haircut formula is comprehensive data on government debt stocks owed to private external creditors over the past 200 years. We compile this data from various sources, including the World Bank's International Debt Statistics (IDS) dataset (Horn, Mihalyi, and others, 2023), Reinhart and Rogoff (2009), Horn, Reinhart, and Trebesch (2021b), and archival sources collected by Meyer, Reinhart, and Trebesch (2022), such as the Investors Monthly Manual, Moody's Investor's Manual, Corporation of Foreign Bondholders, and Stock Exchange Yearbooks. We gather bond-level data on outstanding bond amounts and aggregate them to create a series of external debt owed to foreign bondholders, expressing all monetary series in 2020 USD using deflators from Williamson (2024).

Our Bulow-Rogoff haircut measure captures the dynamic aspect of multiple debt exchanges, providing a unified summary of creditor losses and the long-term compound impact of multiple debt restructurings on investor wealth. This measure is not just a theoretical concept but a practical tool that is particularly useful when comparing eras with different restructuring modalities and when there are interim restructurings with low haircuts followed by deals with deeper haircuts in the same crisis spell, as observed during the 1980s. By considering the serial nature of debt renegotiation, our measure addresses the bias that arises from simply averaging individual haircuts, which overweights interim low-haircut deals.

One important caveat is that the Bulow-Rogoff Haircut formula can lead to misrepresentation of full repudiation cases when the debt treated in the restructuring data does not represent 100% of the sovereign's debt to private external creditors. For cases where we are confident that although the bond-debt stocks reported in Meyer, Reinhart, and Trebesch (2022) are only a subset of the outstanding debt to private creditors, other private creditors' claims were also repudiated, we set the BR haircut to 100%. These cases include China's 1939 repudiation and Lithuania in 1940.

To highlight the difference between the cumulative BR haircut and individual NPV haircut, in the following we highlight some examples, and how the different measurements differ.

- Brazil experienced its first default in December 1982. Five additional defaults occurred until 1994 when Brazil returned to a sustainable debt path. The individual haircuts for these six defaults ranged from 9% to 29% in 1994. In comparison, the overall BR cumulative haircut for this default spell from 1982 to 1994 amounted to 46.6%.
- Between 1977 and 1990, Jamaica underwent seven individual NPV haircut events, resulting in a cumulative BR haircut of 70%. The individual NPV haircuts were significantly lower,

gradually increasing from 2% in 1977 to 44% in 1983.

- Another example is Poland's default spell in the 1980s, which lasted from 1981 to 1994 and involved four individual NPV haircut events. The cumulative BR haircut amounted to 93%, while the individual NPV haircuts ranged from 12-59%.

A.4.4 Haircut Estimation 2015 - 2023

To construct a comprehensive dataset of haircuts in sovereign debt restructurings involving private external creditors, we augment existing data with estimates of haircuts for twelve cases since 2015. These cases include debt restructurings on debt owed to private external creditors that are not covered in existing studies or instances where the haircut estimates in existing studies are methodologically inconsistent with the remainder of our sample. We provide a list of these cases and the sources used for the haircut calculations below.

Our haircut estimation procedure is as follows:

1. We gather information on old and new debt instruments, including nominal amounts, interest rates, maturity structures, and issuance dates. We thereby prioritize official sources, such as bond prospectuses and official government press releases, and use other sources to fill gaps when necessary.
2. We model the cash flows for all old and new debt instruments.
3. We calculate a weighted average exit yield based on the mid-market yields and outstanding nominal amounts of each new instrument, using pricing data on new bonds.
4. We discount the cash flows of all old and new instruments using the weighted average exit yield, assigning a single net present value to each instrument based on the value of its future cash flows on the date of the exchange.
5. We identify and estimate amounts of potential past-due interest (PDI) based on cash flows between default dates and the final debt exchange, as well as any available information on partial debt service during that period.
6. Using the above information, we estimate the face value (FV) haircut as follows:

$$H_{FV} = 1 - \frac{FV_{New}}{(FV_{Old} + PDI)}$$

and the net present value (NPV) haircut as:

$$H_{NPV} = 1 - \frac{NPV_{New}}{(NPV_{Old} + PDI)}$$

The haircut estimate thus represents the losses faced by an investor who holds a portfolio consisting of all medium—and long-term debt instruments the country owes to private external creditors. The investment in each instrument is a function of its relative size in the sovereign's debt portfolio.

To calculate haircuts 2014-2023, we draw on a core set of sources, in particular the new and old bond prospectuses, consent solicitation documents, and government press releases accessed via the Luxembourg Stock Exchange. We also draw on parliamentary resolutions and laws on the restructuring, as well as public communiques by creditor committees . In some cases, we also draw on information from reputed financial press outlets and on academic research (e.g. Asonuma, Papaioannou, and others., 2017; Anthony, Impavido, and Selm, 2020; Asonuma, Niepelt, and Ranciere, 2023). All exit yields stem from JP Morgan Markets and/or Bloomberg. The following tables gives a more detailed overview on the sources used to compute haircuts in recent restructurings.

Table A.2: Sources for haircut estimation: 2015 - 2023

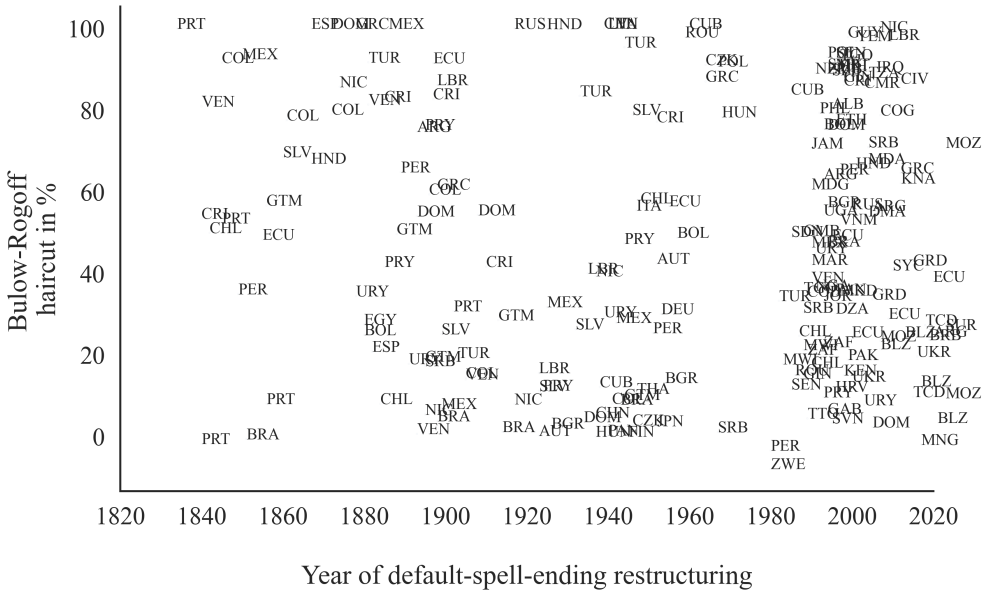
Country	Year	Nominal Restructured (in million USD)	Case specific sources
Argentina	2020	66 240	Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets.
Barbados	2019	632	Press Release on the results of Barbados' Exchange Offer for its US Dollar-Denominated Commercial Debt. Exit yields stem from JP Morgan Markets and Bloomberg.
Belize	2017	527	Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.
Belize	2020	527	Fitch Ratings Reports; S&P Ratings Reports, Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.
Belize	2021	553	Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.
Ecuador	2020	18 380	Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.
Grenada	2015	247	Parliamentary Resolution for the purposes of section 56 of the Public Finance Management Act, No. 17 of 2015; Government Press Releases accessed via the Eastern Caribbean Securities Exchange; Asonuma et al., 2018 (Sovereign Debt Restructurings in Grenada: Causes, Processes, Outcomes, and Lessons Learned). Exit yields stem from Bloomberg.
Mongolia	2017	476	Government Press Release on successful consent solicitation, and accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.
Mozambique	2016	697	Bond Prospectuses, Reuters. Exit yields stem from JP Morgan Markets and Bloomberg.
Mozambique	2019	727	Fitch Ratings Reports, Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange, Wall Street Journal. Exit yields stem from JP Morgan Markets and Bloomberg

Suriname	2020	675	Fitch Ratings Reports; S&P Ratings Reports; Asonuma & Trebesch Database; Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.
Suriname	2023	675	Fitch Ratings Reports; S&P Ratings Reports; Asonuma & Trebesch Database; Bond prospectuses, Consent Solicitation Documents, and Government Press Releases accessed via the Luxembourg Stock Exchange. Exit yields stem from JP Morgan Markets and Bloomberg.

B Additional Figures and Tables

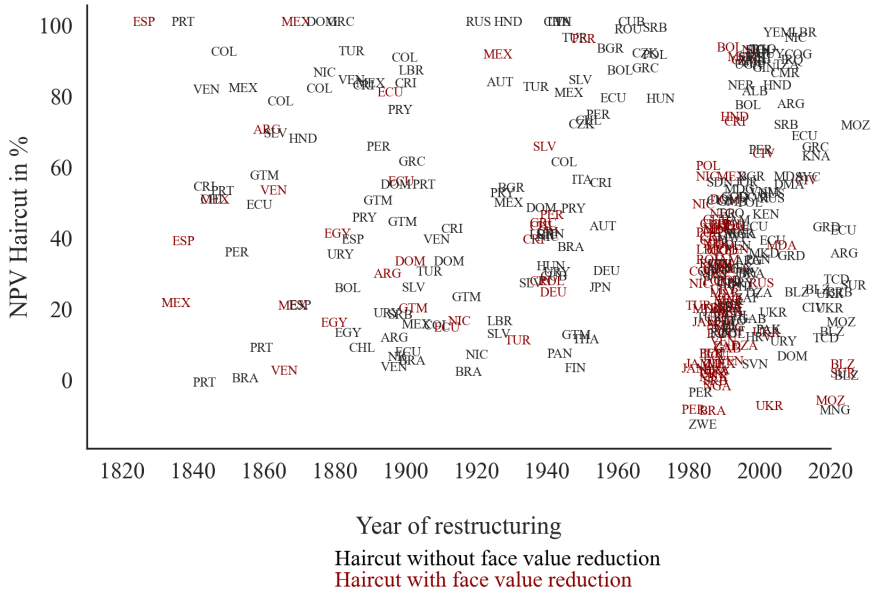
In the following, we present alternative versions of Figure 1. Figure A.1 splits the sample into interim and spell-ending restructurings, reiterating that interim restructurings have become more common and often come with lower haircuts. In Figure A.2 we divide the sample of 327 haircuts into those with and those without any face value reduction. As a complementary graph to that, we show the levels of face value haircuts across the 200-year history in Figure A.3. Finally, Figure A.4 shows Bulow-Rogoff Haircuts by the time a default spell was concluded.

Figure A.4: 200 years of Sovereign haircuts: Bulow-Rogoff haircuts



Note: Country-Markers represent the time of the end of a spell. *Sources*: Meyer, Reinhart, and Trebesch, 2022; Cruces and Trebesch, 2013; Asonuma and Trebesch, 2024 and authors' calculations.

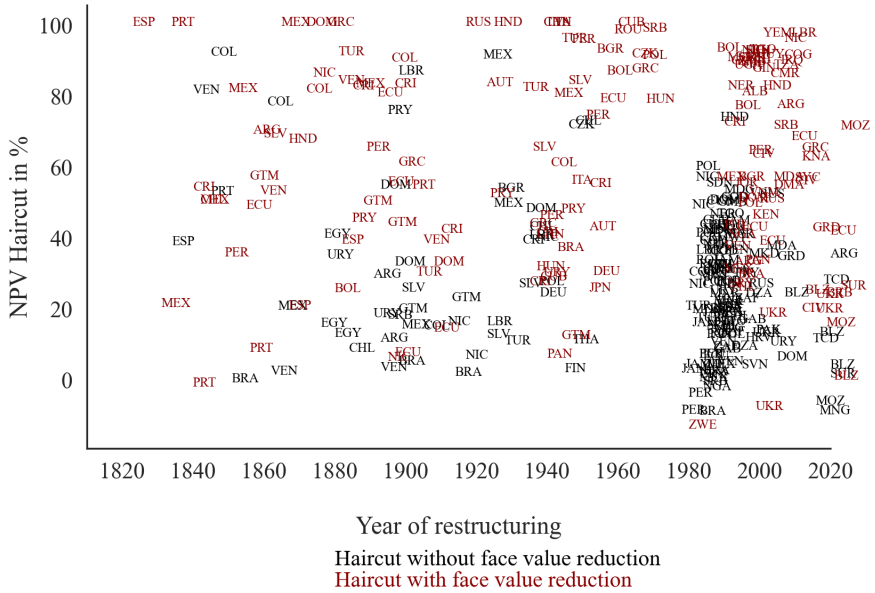
Figure A.1: 200 years of Sovereign haircuts: interim and spell-ending restructurings.



Note: Country-Markers represent the time of the debt restructuring.

Sources: Meyer, Reinhart, and Trebesch, 2022; Cruces and Trebesch, 2013; Asonuma and Trebesch, 2024 and authors' calculations.

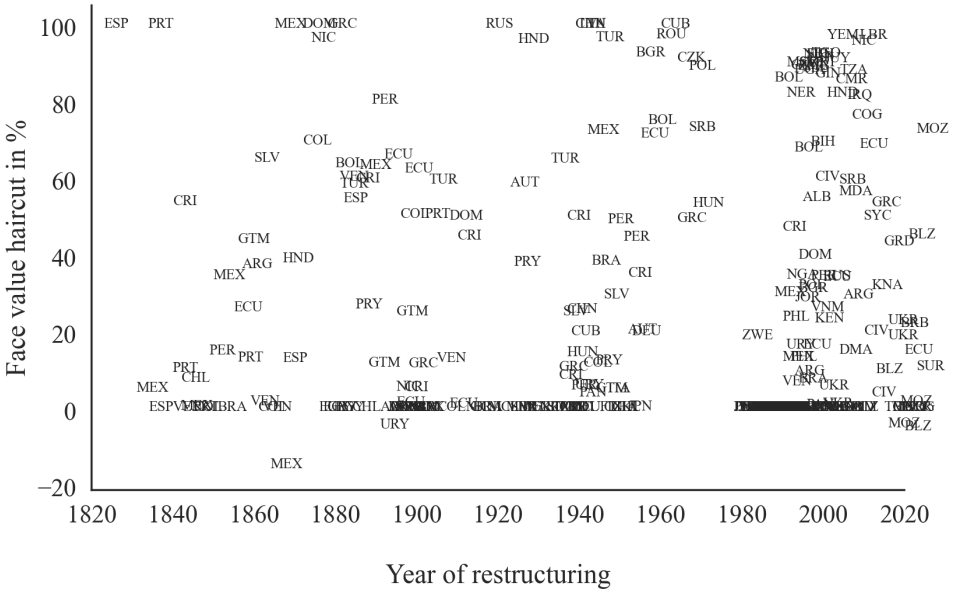
Figure A.2: 200 years of Sovereign haircuts : with and without face value reduction



Note: Country-Markers represent the time of the debt restructuring.

Sources: Meyer, Reinhart, and Trebesch, 2022; Cruces and Trebesch, 2013; Asonuma and Trebesch, 2024 and authors' calculations.

Figure A.3: 200 years of Sovereign haircuts: Face vale haircuts



Note: Country-Markers represent the time of the debt restructuring.
Sources: Meyer, Reinhart, and Trebesch, 2022; Cruces and Trebesch, 2013; Asonuma and Trebesch, 2024 and authors' calculations.

Figure A.5 shows an illustrative sample of historical precedents of sovereigns that accessed markets for the very first time and defaulted very soon thereafter, to complement the discussion in Section 4.

Figure A.5: Market Access and Default of selected first-time borrowers from international capital markets.