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Silvia Marchesi *

Tania Masi **

Pietro Bomprezzi ***

* University of Milano Bicocca, CefES and Centro Studi Luca D'Agliano

** "G. d'Annunzio" University of Chieti-Pescara and CefES

*** University of Milano Bicocca and CefES

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Silvia Marchesi

University of Milano Bicocca, CefES and Centro Studi Luca D'Agliano

Tania Masi

"G. d'Annunzio" University of Chieti-Pescara and CefES

Pietro Bompreszi

University of Milano Bicocca and CefES

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We examine the link between sovereign defaults and credit risk, by taking into account the depth of a debt restructuring and by distinguishing between commercial and official debt. The focus is on debt restructuring events, which take place at the end of a default spell. We use a novel methodology (Jordà and Taylor 2016) to estimate the average treatment effect of a default episode on our outcome variables, agency ratings and bond yield spreads, accounting for the endogeneity of the default. Our results show that the average treatment effect on ratings is negative (and positive for bond spreads) up to seven years following a default, while the opposite holds for a default with official creditors. Our results are robust to using a panel analysis, which allows us to investigate on the importance of the (final) haircut size. Specifically, we find that the rating (spread) variation (increase) is larger for cases with deeper haircuts. Therefore, we find evidence that official and private defaults may have different costs and then induce selective defaults.

Keywords: Sovereign defaults, Haircut, Credit Rating Agencies, bond yield spreads, local projection.

JEL Classification: F34, G15, G24, H63.

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1 Introduction

In the wake of the Covid-19 pandemic, as the economic slowdown is prolonged and debt servicing problems loom large (especially in developing countries), a wave of sovereign debt restructuring is foreseeable in the coming years, including those with official creditors. As recently shown by Horn *et al.* (2020), official lending is much larger than generally assumed (see Figure 1), often surpassing total private cross-border capital flows, especially in times of global turmoil when these flows generally shrink.¹ Despite the fact that official debt accounts for a substantial share of total sovereign debt (especially in developing countries) and that is expected to increase in the future, there is still too little research on the relative treatment of official versus private defaults.

FIGURE 1 HERE

Given the historical evidence on the interplay between the two, it is then important to have information about how credit agencies and the bond market, in particular, evaluate specific restructuring episodes, especially considering private and official restructurings. Despite a renewed interest on the role of official creditors (e.g., Horn *et al.* 2020; Lang *et al.* 2021; Mitchener and Trebesch 2021; Schlegl *et al.* 2019), not enough is yet known about the implications of debt restructurings involving official creditors.

This paper aims to fill this gap by documenting the relationship between sovereign debt default and a country's credit risk, looking at how borrowing costs vary in the aftermath of a default. In particular, we take both an indirect and a direct measure of borrowing costs, such as agency ratings and bond yield spreads. Compared to bond spreads, credit ratings are available for a larger set of countries and a reliable measure in times of crisis. Moreover, as a consequence of the Covid-19 crisis, credit-rating agencies are likely to be put under the spotlight, as it is normally the case during downturns.² Our results may then provide some insight for the debate on the consequences of debt heterogeneity, which introduces the possibility for governments to operate selective defaults discriminating across investors (e.g., Erce and Mallucci 2018; D'Erasmus and

¹For example, during the Eurozone crisis (2010-2012) private international lending was replaced by official international loans and the governments of Cyprus, Greece, Ireland Portugal and Spain all received official funds from both the International Monetary Fund and the newly created European Financial Stability Facility (now the European Stability Mechanism).

²During the last financial crisis they were accused of accelerating the euro-zone sovereign-debt crisis by downgrading some of the bloc's big economies, including France (The Economist May 9th 2020). Recent papers have examined the reaction of credit agencies and bond markets to the last financial crisis (e.g., Born *et al.* 2020, Daehler *et al.* 2020, Hale *et al.* 2020, Kempf and Tsoutsoura 2020).

Mendoza 2021).³

We take into account a measure of creditors’ loss (or haircut), as in Cruces and Trebesch (2013a). Hence we take restructurings - and not default - as our main explanatory variable. Restructurings typically take place at the end of a renegotiation spell, which may take years after the default occurs.⁴ Figure 2 describes the timeline we consider for our analysis. What is more, we distinguish between *official* and *private restructurings*. More specifically, *official restructuring* stands for agreements reached with official creditors (in the Paris Club of official creditors).⁵ In contrast, *private restructuring* denotes a restructuring deal with external private creditors (foreign banks and bondholders).

We add to previous works by comparing the rating outcome of official and private restructurings, hence primarily contributing to the emerging empirical literature on official debts. To the best of our knowledge, it is the first time in this literature that the distinction between private and official deals, as well as the occurrence and magnitude of a default, are taken into account in the context of agency ratings and bond spreads.

FIGURE 2 HERE

Sovereign credit ratings can be interpreted as a forward-looking summary indicator of macro-economic and (often) political conditions as these affect repayment prospects and tend to be highly correlated with borrowing costs.⁶ We should clarify, however, that these measures explicitly pertain to a sovereign’s ability (and willingness) to service financial obligations to non-official (commercial) creditors. Hence, they are “biased” in favour of measuring the probability of default on debt owed to private creditors. Understanding how rating agencies and institutional investors evaluate the repayment ability towards official creditors is not straightforward. This depends on how “visible” official debt risk is and on how rating agencies incorporate it into their rating models.

³Erce and Mallucci (2018) assume that a government issues debt both domestically and abroad and can operate selective defaults between the two types of debt. Using new data on the legal jurisdiction of sovereign defaults (hence distinguishing between defaults under domestic law and default under foreign law), they show that selectiveness is the norm. D’Erasmus and Mendoza (2021) take a novel approach by building a model in which the government chooses optimal debt and default on domestic and foreign creditors by taking the distributional consequences of a default into account.

⁴In a recent paper Meyer *et al.* (2020) show that default episodes take, on average, seven years to resolve and that they typically involve multiple restructurings.

⁵The Paris Club is an informal forum of the most important official creditor countries, which was designed in 1956 to deal with the payment difficulties of debtors.

⁶Cantor and Packer (1996) were among the first to focus on the relationship between default history and credit ratings, finding that countries that defaulted after 1970 are associated with a significant drop in a country’s credit rating.

From their official documentation, rating agencies seem to evaluate official risk only to the extent to which it can also affect the repayment prospects of government obligations to the private sector, due to the preferred creditor status associated with many of official claims (e.g., DBRS 2018).⁷ In other words, official debt seems to be generally perceived as “problematic”, and hence adversely affect sovereign rating, only to the extent to which arrears to official creditors may indicate growing financial distress and/or lack of willingness to pay, which eventually is going to affect private repayments as well. What is more, the Paris Club includes a “comparability of treatment” clause, which aims to ensure balanced treatment of the debtor country’s debt by all external creditors.⁸ Despite this caveat, we still believe that showing the heterogeneous treatment of creditors in the event of default, is important as it could help to shed light on what precisely are the costs of default to a sovereign country.

Debt restructuring could affect a country’s prospects in at least two alternative ways. Default involving higher haircuts/restructurings may entail more severe reputational costs. On the other hand, the channel of debt relief operates in the opposite direction. Since higher haircuts reduce the level of government’s debt more substantially, such debt reduction may allow countries to exit a debt overhang improving in this way economic prospects, as described by Krugman (1988). The overall impact of a debt restructuring on a country’s economy is then theoretically ambiguous and remains an empirical question. Showing the heterogeneous determinants of default, as well as the heterogeneous treatment of creditors in the event of default, is important as it could help to shed light on what precisely are the costs of default to a sovereign country.⁹

Analyzing 264 default episodes over the 1990-2013 period, we use both the Adjusted Inverse Propensity-score Weighted (hereafter AIPW) estimator, which consists in propensity-score based method combined with local projections (Jorda and Taylor 2016), and standard panel data analy-

⁷Such preferred status, however, is not confirmed by a recent paper of Schlegl *et al.* (2019), who, while confirming that multilateral institutions are senior creditors, show that official bilateral debt is junior, or at least not senior, to bank loans and bonds. In sum, private creditors seem to "free ride" on official ones: they are typically paid first and lose less than bilateral official creditors.

⁸More specifically, in accordance with this clause, debtor countries should seek from other official bilateral creditors (that are not members of the Paris Club) and private creditors, a treatment on comparable terms to those granted in the Paris club. Debtors are also required to share with the Paris Club the results of its negotiations with other creditors. Seeking comparable terms with the Paris club, however, does not necessarily imply being able to obtain them. Timing is also very important as rating agencies may consider an agreement with the Paris Club a negative (or positive) event depending on whether it is (or not) followed by a private deal. In a similar vein, they may positively evaluate a private agreement, which is directly followed by an official one that may contribute to reducing the overall debt burden.

⁹Recent papers (e.g., Arellano *et al.* 2019; Amador and Phelan 2021) present theories of sovereign default able to rationalize the large heterogeneity in debt crisis, which are typically partial and vary in their duration. Yue (2010) theoretically investigates sovereign default and the role of debt renegotiation in sovereign debt markets. Consistent with the empirical evidence, the model predicts that interest rates and haircuts increase with the level of debt.

sis. Since the choice to enter into a restructuring is contingent on the country's economic conditions, this novel methodology allows us to explicitly model and account for the endogeneity of a default episode. The AIPW estimator proceeds in two stages: the first stage estimates a propensity score for each observation in the sample, while the second stage rebalances the sample and estimates the Average Treatment Effect (hereafter ATE) using a conditional local projection forecast. In other words, we estimate the potential change in outcome in the post-default with local projections. Our results show that commercial and official defaults are associated with different outcomes: while the average treatment effect on ratings is negative (and positive for bond spreads) over the seven years following a default episode, the opposite holds for a default involving official creditors.

In the second part of the paper we use a panel analysis to explicitly focus on the size of the private/official haircut. Moreover, our data allows us to take into account of the dyadic relationship between agency-country pairs, at least as time-invariant factors are concerned.¹⁰ Using dyadic monthly data for 8 rating agencies and 130 countries, we find that private defaults seem to involve some reputational costs up to seven years since the last agreement, while official defaulters may even benefit from the present value reduction. Using the bond spread as dependent variable, we confirm the results of Cruces and Trebesch (2013a) in the case of private haircuts, while we find that spreads go down up to seven years after final official deals.

Thus, the main result is that private credit events are more costly than private ones, when it comes to sovereign risk. Moreover, the rating (spread) variation (increase) is larger for cases with deeper haircuts, which are both new results. Even if our results may depend on how rating agencies incorporate official risk into their rating models, they are important because they document that the costs of default vary with the amounts of debt and the type of creditors affected.¹¹ In particular, the higher cost of large defaults is most likely driven by a less creditor-friendly negotiation process, which in turn results in higher economic uncertainty and more severe punishment from the creditors.¹² On the other hand, official restructuring that are arranged within the "Paris Club umbrella" are supposed to guarantee a relatively smoother approach to the way in which deals

¹⁰Recent studies document the existence of incentives of ratings agencies to distort ratings in favor of their respective home countries, as well as economically and culturally aligned countries (Fuchs and Gehring 2017) or of issuers, in the market for commercial mortgage-backed securities (Sean *et al.* 2019). More recently, Kempf and Tsoutsoura (2020) find that partisan perception affects the actions of professionals in the financial sector.

¹¹The importance of the way in which restructuring are actually arranged, at least for private defaulters, is also confirmed by the results of both Asonuma and Trebesch (2016), Trebesch and Zabel (2017) and Asonuma *et al.* (2019), who find that less confrontational (or preemptive) restructurings are associated with a lower output loss as compared to soft (non-preemptive) defaults.

¹²In the literature on sovereign debt has recently investigated on different dimension of default costs, including legal aspects. In particular, Schumacher *et al.* (2021) show the legal developments have strengthened the hands of private external creditors and raised the cost of default for debtors.

are actually orchestrated than private ones, hence lowering even further the collateral damage of a default.¹³ Moreover, while an official default often occurs without much media coverage, defaulting on private debt is more visible and then more likely to result in a rating downgrade. Finally, new evidence (Horn *et al.* 2020; Schlegl *et al.* 2019) suggests that official lenders typically shoulder the burden for private creditors, which could explain why we find evidence of positive market sentiment in the aftermath of an official restructuring.

Sovereigns, being aware that the consequences of a default depend in important ways on who the defaulted creditors are and what bargaining power each creditor group has, may then decide to prioritize their repayments accordingly. These results are consistent with Schlegl *et al.* (2019), who find evidence of seniority for multilateral institutions but not for official bilateral debt. The increase in borrowing costs we detect after private restructuring may then explain why private creditors are typically paid first. To summarize, documenting this difference can then help shed some light on why countries default, which creditors are the most affected, and why. In the wake of the Covid-19 pandemic, as official lending is likely to increase and official debt sustainability is going to become an important concern, understanding the difference between private and official deals has become even more important.¹⁴

The empirical literature on sovereign defaults has generally found that default costs are difficult to quantify and short lived.¹⁵ Only recently, thanks to novel measurement strategies of a country's repayment record can persistent effects of default be precisely detected, bringing the empirical results in line with the effects of a default according to the theory. This paper then contributes to the (empirical) literature of default costs. In particular, to the emerging literature focusing on the characteristics and the economic relevance of debt restructuring, both from both a private sector perspective (Asonuma and Trebesch 2016; Asonuma *et al.* 2019; Forni *et al.* 2016; Kuvshinov and Zimmermann 2019; Meyer *et al.* 2019, Reinhart and Trebesch 2016; Schlegl *et al.* 2019; Schumacher *et al.* 2021; Trebesch and Zabel 2017) and an official sector perspective (Cheng *et al.* 2017, 2018a, 2018b; Corsetti and Erce 2018; Lang *et al.* 2021; Marchesi and Masi 2020, 2021;

¹³As argued by Tomz (2007) concerns about reputation sustain international lending and repayments. Hence, any measure that would help to reinforce the reputational mechanism between debtors and creditors are particularly important as they would be to help investors distinguish excusable defaults and inexcusable ones (e.g., Grossman and Van Huyck 1988).

¹⁴Despite our data end only in 2013, and hence we cannot give specific answers as the current crisis is concerned, nevertheless our results may provide some insights derived from the most recent historical evidence.

¹⁵This literature has mainly looked at the effects of sovereign defaults on international trade (e.g., Rose 2005, Borensztein and Panizza 2010, Broner *et al.* 2010), international credit market (e.g., Borensztein and Panizza 2009, Gelos *et al.* 2011 and Panizza *et al.* 2009), and GDP growth (Sturzenegger and Zettelmeyer 2008, Borensztein and Panizza 2009, De Paoli *et al.* 2009, Levy Yeyati and Panizza 2011), finding, overall, short lived effect of sovereign defaults. For a survey of this literature see Panizza *et al.* (2009) and Tomz and Wright (2013).

Reinhart and Trebesch 2016).¹⁶

The rest of this paper is organized as follows. Section 2 describes the data. Section 3 describes the inverted-propensity score local projection approach, and section 4 shows the results. Section 5 presents the results of the panel analysis, while section 6 contains a discussion of all results, as well as some additional evidence on the importance of litigation costs. Section 7 concludes.

2 Data

As a proxy for the severity of the debt restructuring, we consider the corresponding present value reduction, or "haircut", and (as robustness) the face value reduction. We rely on the original dataset by Cruces and Trebesch (2013b) for the data on debt restructurings with foreign private creditors (i.e., commercial banks and bondholders). These data then exclude debt restructurings that mainly affected domestic creditors. Focusing on foreign creditors makes sense for different reasons, one of which being to measure access to markets which is not too influenced by domestic events.

This dataset provides a list of 187 distressed sovereign debt restructurings with external banks and bondholders that occurred between 1970 and 2013. It includes information on the amount of debt restructured, the face value reduction, and a measure of debt relief (Preferred Haircut HSZ) computed by the authors considering the present value of both old and new debt instruments.

For official debt restructurings, we rely on the original dataset built by Cheng *et al.* (2017), which contains 429 sovereign debt restructurings with the Paris Club, between 1956 and 2015.¹⁷ Paris Club creditors may provide (official) debt treatments to debtor countries in the form of reschedul-

¹⁶In a companion paper (Marchesi and Masi 2020) we find similar results using the Institutional Investor's index as the dependent variable and the Synthetic Control Method. Due to data limitations, we could only apply this method to the ratings provided by the Institutional Investor Magazine, but not to agency ratings, which are only available since the '90s. What is more, while the SCM allows us to contrast the rating outcome of either private or official defaulters, the local projection analysis allows us to enlarge the sample by considering countries defaulting with both types of creditors, as well as to take the severity of the default into account.

¹⁷The restructuring approach of the Paris Club has evolved over time. In the 1980s, negotiations took place on a case-by-case basis and focused on short-term liquidity problems, mostly implementing maturity extensions without nominal debt reduction. During the 1990s and 2000s, especially for low income countries, restructurings became increasingly concessional, including debt stock cancellations. Specifically, as low-income countries are concerned, the possibility of a partial debt stock cancellation of non-ODA debt was gradually extended from 33% of the eligible debt in 1988 (Toronto Terms) to 50% in 1991 (London Terms) and 66% in 1994 (Naples Terms). In 1996, the World Bank and the IMF have implemented the Heavily Indebted Poor Countries (HIPC) Debt Initiative, which was first strengthened in 1999, and, more recently, in 2005, when, under the Multilateral Debt Relief Initiative (MDRI) multilateral institutions were encouraged to increase their specific contribution to debt reduction. Debt relief at completion point under the HIPC Initiative is provided within the HIPC Exit Terms.

ing (i.e., debt relief by postponement of debt service payments) or, in the case of concessional rescheduling, reduction in debt service obligations during a defined period (flow treatment) or as of a set date (stock treatment). Following Cheng *et al.* (2017), by looking at the terms of treatment (reported in Table 3 of their paper), we were able to compute the present value reduction for official deals, and to compare this value with the corresponding haircut measure in the case of private agreements (or *Preferred Haircut HSZ*) used by Cruces and Trebesch (2013a).¹⁸

Our sample includes a maximum of 130 developing countries. Since the data on private debt restructurings are available only up to 2013, our year sample ends then. It includes 68 defaulting countries which experienced at least one debt crisis during the sample period as well as 62 non-defaulters. Among defaulters, 47 countries had both private and official debt restructurings, 14 countries had only an official restructurings (through the Paris Club) while only 7 countries experienced only private defaults. Table A1, in the online Appendix A, shows all countries and years, including a list of debt crisis episodes studied here.

Table 1 shows summary statistics for different subperiods in the full sample of 264 restructurings.¹⁹ While the average haircut is about 34 percent over the full sample mean, looking at the three different subperiods, we detect a sizeable increase in this amount over time. Average haircut size is more than double during the last subperiod (2002-2013), as compared to the initial period (1970-1988), and about 20 percent higher with respect to the intermediate one (1989-2001).

As official restructurings are concerned, we find that the average haircut over the full period is about 64 percent, much higher than the corresponding average for private.²⁰ Looking at the three different subperiods, we also find an increase in their size over time. Average haircut size during the last subperiod (2002-2013) is more than two times the average haircut implemented during the initial period (1970-1988), and almost double with respect to the average size of the intermediate period (1989-2001).

Figure 3 shows the evolution over time of the percentage of both private and official debt haircut. As can be seen, while private agreements were more common up to the mid-nineties, Paris club deals prevail in more recent years. What is more, haircuts tend to be much higher under official deals.

¹⁸In general, Cheng *et al.* (2017) provide a detailed overview of the different terms and report the net present value relief associated with the different Paris Club Terms of Treatment over the years. In some cases (i.e., for some of the "ad hoc" agreements) we had to calculate ourselves the net present value relief by directly looking at the Paris Club documentation (<http://www.clubdeparis.org/en/traitements>).

¹⁹Among those, 158 episodes involved restructuring with private creditors while 106 involved deals with official creditors.

²⁰As said, in order to compare the two types of defaulters, we only consider official restructurings that were agreed until 2013, which is the last year for which we have information about the size of private restructurings.

Table 2 presents summary statistics of the haircut, according to a country’s income. As the number of countries is concerned, we find that middle-income countries tend to default more with both types of creditors, while low-income countries tend to benefit from the highest average haircuts.²¹ Finally, Figure 4 illustrates the frequency, by size, of haircut and face value debt reduction. While lower haircuts are more common in the case of private agreements, the opposite holds in the case of official restructurings.

TABLES 1 & 2 HERE

FIGURES 3 & 4 HERE

2.1 Dependent variables

Our main proxy to measure the creditworthiness of a country is its sovereign’s long-term foreign-currency rating. As shown by Reinhart (2002), ratings predict defaults. Hence this makes them an informative measure of creditworthiness for countries with severe payment problems. Moreover, ratings may also represent a ceiling for the credit rating of private companies from the respective country (Borensztein *et al.* 2013). They may also capture the private sector’s ease of access to foreign capital (Gehring and Lang 2020) as well as representing a good proxy for a country’s access to international financial markets.²²

We retrieve monthly information via Bloomberg on eight rating agencies: CI, Dagong, DBRS, Fitch, JCR, Moody’s, R&I, and S&P. To analyze the dynamics around default times, we use data at a monthly frequency. We obtained an unbalanced panel, as each agency assigns ratings to a different set of countries over varying time periods. Table A2a, in the online Appendix A, shows the number of observations, countries and years for each agency. The pair-wise correlation between sovereign ratings from the eight credit rating agencies under analysis ranges from 0.869 (between Standard and Poor’s and Dagong Global) and 0.992 (between Fitch and Japan Credit Rating Agency) (see Table A2b). For our empirical analysis, all ratings have been translated to a 21-point scale. This means that we assign the highest value of 21 for an “AAA” rating. “C” and “D” in turn are translated into a value of one. We follow the translation described by Fuchs and Gehring (2017), which is reported in Table A3, in the online Appendix A.

Since the data on credit agencies are available for the full sample of countries only since 1990, our monthly data are organized in an unbalanced panel, including a maximum of 130 developing

²¹The only high-income country which receives an official haircut of 100% is Seychelles in 2009.

²²Afonso *et al.* (2012) related ratings to changes in government bond spreads.

countries, over the years 1990-2013 (instead of the full period 1970-2013). In order to account for the possible influence of agency-country time-invariant characteristics (what is called the "home bias" in sovereign rating, see Fuchs and Gehring 2017) we use the agency-country pairs of ratings (dyadic data).²³ As a robustness check, we also estimate the effects on the average of all the agencies' ratings (rather than dyadic data), as well as the average of only American agencies (i.e., Moody's, Fitch, Standard & Poor's, Dominion Bond Rating Services), and the rating provided by Moody's, that is the agency that supplies information for the highest number of countries.

We also consider as the dependent variable the monthly average secondary market bond stripped yield spread from J.P. Morgan's EMBI Global (EMBIG) for each country.²⁴ EMBIG spreads have been used to proxy foreign currency borrowing costs of both governments and the private sector in emerging market economies. The stripped yield spread is the difference between the weighted average yield to maturity of a given country's bonds included in the index and the yield of a US Treasury bond of similar maturity. Due to data availability, the sample is now restricted to 47 countries over the year 1993-2013. Among the 47 countries covered by the EMBIG, 23 are defaulters which restructured their debt, while the other 24 countries are non-defaulters.²⁵ Table A2c, in the online Appendix A, shows the correlation between the (average) agency rating and bond spread in the reduced sample, while Table A4 presents some summary statistics.

3 AIPW estimation

We exploit a novel econometric methodology developed by Jordà and Taylor (2016) to account for the endogeneity of a sovereign default. By using a propensity-score based method, combined with local projections (Jordà 2005), we find the average treatment effect of a default on our outcome variables over a seven year period.

²³Fuchs and Gehring (2017) investigates how the home country of rating agencies could affect rating decisions as a result of political economy influences and cultural distance. They find that agencies have biases in favor of the respective home countries, as well as in favor of culturally more similar countries, and countries in which home-country banks have a larger risk exposure. In particular, cultural proximity (as measured by linguistic similarity) is shown to be the main transmission channel that explains the advantage of the home country.

²⁴The stripped yield spread is the difference between the weighted average yield to maturity of a given country's bonds included in the index and the yield of a US Treasury bond of similar maturity.

²⁵The 23 defaulters are Algeria, Argentina, Belize, Brazil, Bulgaria, Cote d'Ivoire, Croatia, Dominican Republic, Ecuador, Iraq, Mexico, Nigeria, Pakistan, Panama, Peru, Philippines, Poland, Russia, Serbia and Montenegro, South Africa, Ukraine, Uruguay, and Venezuela. The 24 non-defaulters are: Chile, China, Colombia, Egypt, El Salvador, Gabon, Georgia, Ghana, Greece, Hungary, Indonesia, Jamaica, Kazakhstan, Lebanon, Lithuania, Malaysia, Morocco, South Korea, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, Turkey and Vietnam. This list includes countries with no external sovereign debt restructuring in the chosen period, as well as countries that entered the EMBIG more than seven years after their restructuring. For more information, see Cruces and Trebesch (2013a).

Calculating the average, unbiased, effect of a sovereign default on ratings would require comparing two contrasting scenarios: one where we can measure the change in ratings following a default, and one where we measure the change in ratings when no default has occurred, *ceteris paribus*. If the decision was fully exogenous, we could simply compare the average change in ratings of defaulters versus non-defaulters. However, the choice to enter into a restructuring both with private or official creditors is endogenous to a number of observable and non-observable factors influencing ratings. Furthermore, it is difficult to pinpoint the direction of the effect, as falling ratings are just as likely to signal a default as they are to be a consequence of defaults. With this methodology we accept the endogeneity of default, and instead attempt to explicitly model and account for it.

This technique was first applied to the area of sovereign debt distress by Kushinov and Zimmerman (2019), who estimate the effect of defaults on GDP. We rely on a series of country-level indicators to estimate the probability of a country entering a debt crisis with either a private or an official creditor.²⁶ If the decision is modeled correctly, we can re-balance the sample as if the decisions were taken at random (Jordà and Taylor 2016; Kushinov and Zimmerman 2019). We follow Manasse and Roubini (2009), who provide a comprehensive survey of indicators suitable for estimating the likelihood of default, for modeling our sample of sovereign defaults.

We use as the potential outcome variables in the second stage the agency-country pairs of ratings (dyadic) and the monthly bond spread, as described in the previous section. The AIPW estimator gives us an unbiased estimate for the average treatment effect of a final restructuring on sovereign credit ratings. We define as final restructurings those that were not followed by another restructuring vis-a-vis private or official creditors within (at least) the subsequent four years. Local projections have the attractive property of being free of structural constraints that would instead be imposed on a parallel VAR model, and therefore our ATE response varies non-linearly over the forecast horizon. In the scope of this paper, we apply this methodology to cases of defaults with private and official creditors in order to compare the differential effects on sovereign credit ratings and bond spreads.

3.1 Identification

The methodology is divided into two stages. First, we model the probability of entering a debt crisis by estimating a propensity score for each element in our sample. As an indicator for the start of the debt crisis, we use data from Asonuma and Trebesch (2016), for private defaults, and

²⁶We should emphasize here that we do not consider the probability to enter a private, or an official debt crisis, as two separate events, as these two type of default are, in most cases, intertwined. As described in Section 2, among the 68 defaulters in our sample, 47 countries had both private and official debt restructurings.

data from Cheng *et al.* (2017) for official ones.²⁷ The propensity score is then the likelihood of a default as predicted by the logit model:

$$PD_{i,t} = \Lambda(\beta, Z_{i,t-1}) \quad (1)$$

where Λ is the logistic distribution function and Z is a vector of macro and political control variables, lagged by one year. As mentioned before, our predictor variable set is based on Manasse and Roubini (2009), who provide a survey of relevant macro variables associated to sovereign defaults, as well as Kushinov and Zimmerman (2019), which apply the same methodology in a similar context. In particular, we use as predictor variables: current account balance to GDP, change in executive, external debt to GDP, GDP per capita, government debt to GDP, government spending, inflation rate, openness, polity IV index for democracy, reserves to external debt, terms of trade, war, US treasury 3-year T-bill rate, and share of past months in default. The standard errors are clustered at the country level, as in the reference papers (Jordà and Taylor 2016; Kushinov and Zimmerman 2019). The estimated $\widehat{PD}_{i,t}$ is then the predicted default probability for country i at time t conditional on our set of predictor variables.

Then, the second stage re-balances in order to create a synthetic sample where the default decision is as good as random. Using our logit estimates, we can estimate the extent of the non-randomness in our sample. Specifically, a highly endogenous default would be predictable based on observables and have a high $\widehat{PD}_{i,t}$, while a highly endogenous control country would have a low $\widehat{PD}_{i,t}$. We assign the weights $1/\widehat{PD}_{i,t}$ to the defaulter (treatment) group and $1/(1 - \widehat{PD}_{i,t})$ to the non defaulter (control) group. The average treatment effect, given the re-balanced sample, will then be the difference of the average weighted potential outcomes of defaulters and non-defaulters across our sample.

Table B2, in the online Appendix B, reports the estimated coefficients from the first stage. More specifically, levels of debt are less important for predicting the start of a debt crisis, while level of reserves to external debt is negatively and significantly correlated with a debt crisis. There is strong evidence of path dependency, political variables also affect the probability of a crisis and measures of systemic financial risk increase the probability of default.

Figures 5 and 6 show the Receiver Operating Characteristic (ROC) curves for credit ratings and bond spread, respectively. The ROC curve plots the true positive rates against the false positive rates, and we can interpret the area under the curve (AUC statistic) as the predictive ability of

²⁷The information on the duration of private debt crisis come from Asonuma and Trebesch (for private), while we rely on Beers and Mavalwalla (2018) and Cheng *et al.* (2017) for information regarding the duration of official debt crises.

the model. Under the null that the covariates have no predictive ability, the AUC is equal to 0.50, and perfect predictive ability corresponds to an AUC statistic of 1. The first stage for estimating the probability of entering into a debt crisis returns an AUC of 0.98 for credit ratings, and 0.93 for bond spread. Thus, the predictive ability of our model is confirmed.

Figure 7 proves that the matching procedure does generate a control group that is similar enough to the treated group. Indeed, most observations of treated and control groups, for both credit ratings and bond spreads, range in the same level of the estimated probability of entering a debt crisis. In the case of credit ratings, in particular, the two groups have the same median.

The potential outcome, which is modeled in the second stage, is the change in ratings following the end of a restructuring as measured with a local projection (Jordà, 2005):

$$\Delta y_{i,k,t+h} = \alpha + \beta Z_{i,t-1} + \gamma_j FC_{i,t} + \delta_j FR_{i,t} + \eta_{i,h} + \tau_t + u_{i,h,t}, \quad h = 1, \dots, 7. \quad (2)$$

Here $\Delta y_{i,k,t+h}$ is the conditional forecast of the change in outcome for time t to $t+h$, and h is our forecast horizon spanning up to seven years. We consider as outcome both the credit rating, measured at country i and agency k , and, for bond spreads, only for country i . We take as time t for the treatment the period belonging to the year of the final private (or official) restructuring, therefore estimating the conditional forecast of changes in ratings following the end of a debt crisis. Furthermore, because we are interested in evaluating the stigma effects, and not just the mechanical co-movements of ratings over the restructuring period, as in Cruces and Trebesch 2013a, we exclude the years of the crisis.

$FC_{i,t}$ is a dummy equal to one when a country has finalized its final private (or official) final restructuring and $FR_{i,t}$ denotes the corresponding amount of final private (or official) haircut. We include both private and official restructurings in the same specification, because of the importance of accounting for both type of events given the overlap between the two. $Z_{i,t-1}$ is a vector containing macroeconomic and political control variables, lagged by one year as in the first stage. $\eta_{i,k}$ indicates agency-country pair fixed effects (while in the bond spread regression we include only country fixed effects η_i). τ_t denotes time fixed effects, which allows us to control for common trends. In this way we can also account for global factors that might have influenced the simultaneous dating choice of debt restructuring events (e.g., Baker or Brady plan in the two periods, 1985-88, or 1989-94). Finally, $u_{i,k,t}$ is the error term. As in the first stage, we cluster the standard errors at the country level, as the treatment occurs at the country level.

As the control variables are concerned, we mainly rely on the specification by Cruces and Trebesch (2013a). Therefore, in order to capture the sovereign's domestic economic performance, we in-

cluded public debt to GDP, the general government net lending/borrowing, GDP real growth, reserves to imports, inflation rate (based on consumer prices), current account, the ICRG law and order indicator.²⁸ Furthermore, we include the amount of IMF net lending to control for the possibility that the different results, between private and official agreements, may depend on additional financing from the IMF that are associated with official restructurings. While an IMF programme is a *sine quo non* condition for Paris Club creditors to provide relief, not all private restructurings were associated with IMF programmes. Table B1, in the online Appendix B, provides a detailed description of each variable and its source.

We run the above regression, for each point in horizon h on the re-balanced sample and reach the desired average treatment effect, or ATE:

$$ATE_h = \frac{1}{n} \sum_i \sum_t \left\{ \left[\frac{(y_{i,t+h} - y_{i,t})(FC_{i,t})}{PD_{i,t}} - \frac{(y_{i,t+h} - y_{i,t})(1 - FC_{i,t})}{1 - PD_{i,t}} \right] - \frac{(FC_{i,t} - PD_{i,t})}{PD_{i,t}(1 - PD_{i,t})} \left[(1 - PD_{i,t})m_1^h(Z_{i,t-1}, FR_{i,t}, \theta_1^h) + PD_{i,t}m_0^h(Z_{i,t-1}, FR_{i,t}, \theta_{0h}) \right] \right\} \quad (3)$$

Here $y_{i,t+h} - y_{i,t}$ is the estimated conditional forecast from our local projections, and $FC_{i,t}$ is the dummy used to distinguish between defaulters and non-defaulters and $PD_{i,t}$ are the estimated propensity scores from the first stage. The first part is a standard inverse score weighted estimator of the ATE. Intuitively, this is like a group-means comparison between defaulters and non-defaulters, with the difference that we correct for allocation bias of the treatment by modeling for it with the propensity score, afterwards inverting it to achieve a random distribution. The second part is an adjustment term consisting of the weighted average of the two regression estimators. The purpose of the adjustment term is to stabilize the estimator as the propensity score gets close to the extremes (0 or 1) and therefore alleviates the need to truncate the weights. Hence ATE_h is the average treatment effect of final restructuring computed over the seven-year horizon.

The AIPW estimator has a number of features that make it suitable for calculation of the dynamic effects and for estimation under endogeneity issues. The combination of local projections and propensity score weighting is doubly-robust, in that the estimator will be unbiased as long as either of the stages is specified correctly, an assumption referred to as selection on observables. The underlying idea is that the predictor set in the first stage, and the control set in the second

²⁸We consider "law and order" instead of "political risk" (as in Cruces and Trebesch 2013a) given the growing importance, over time, of legal aspects in sovereign debt restructuring.

stage, should be expansive enough so as to explain as much variation in sovereign default decisions as possible.²⁹

4 Results

This section presents the estimates of the average treatment effect obtained using the AIPW estimation. We start by taking credit rating as the dependent variable, while in the next section we use bond spread as the dependent variable.

4.1 Credit ratings

Table 3 shows impulse response functions for the average treatment effect in the case of private restructurings. The estimates indicate a persistent negative effect of a restructuring with private creditors on agency ratings. While in the first years there is an average drop by less than one notch in our scale of agency ratings, by the third year, the drop in agency ratings increases to more than one notch. The effect peaks after 3 years with a 1.63 drop in agency ratings. Notably, the estimated ATE's are negative and significant for all the seven years in the analysis.

The dynamics of ratings in a post-crisis setting suggest that a private restructuring likely implies a long-lasting, reputational effect on the sovereign defaulter. Clearly this is influenced by the size of the haircut imposed on creditors, which is the reason why we control for the severity of default. The second stage local projection used in the estimation of this ATE does well in forecasting the change in agency ratings both in the short and long term, with the R-squared going from 21% to 70%.³⁰

TABLE 3 HERE

Table 4 shows the results for official restructurings. We find an average increase on our scale of ratings, which is always positive following the end of a restructuring with official creditors. As before, the results are significant for every year considered, the effect peaks after 6 years, when the expected change in ratings is of 0.59 notch with respect to the base year.

²⁹With this, we do not need to rely on exclusion restrictions. Even if all our variables were endogenous, as long as there is no unexplained deviation from the conditional forecasted change in ratings, the ATE will be unbiased (Jordà and Taylor 2016).

³⁰The coefficients from the second stage local projection are reported in Table B3, in the online Appendix B.

Positive spillover effects seem to dominate following a restructuring with official creditors. Both the ATE's from Table 3 and Table 4 are plotted in Figure 8. As we can see, the dynamic response of agency ratings following the end of a restructuring episode for both event types is persistent for all the years of our estimates. The differences between private and official defaults persist when we consider single measures of rating, rather than dyadic data. In particular, we use the average of all the agencies' ratings (rather than dyadic data), as well as the average of only American agencies (i.e., Moody's, Fitch, Standard & Poor's, Dominion Bond Rating Services), and the rating provided by Moody's. Table B5 and Figure B1, in the online Appendix B, show the estimated ATE.

TABLE 4 HERE

FIGURE 8 HERE

4.2 Bond spread

This section presents the results of the AIPW methodology applied to the monthly average secondary market bond stripped yield spread (EMBIG). Given the direct connection between ratings and spread we expect our results to mirror those on ratings.

Tables 5 and 6 show the computed average treatment effect, while Table B4, in the online Appendix B, report the coefficients from the second stage. As above, the estimated local projection controls for country and time fixed effects, thereby estimating the average treatment effect of the conditional forecast of bond spreads for h-steps ahead. Following the end of a private restructuring, the average treatment effect is large. One year after the event, we find an increase of about 279 basis points in the spread. The effect peaks after 3 years, when the spread with respect to the base period is 10.8 percent (1792 bp) higher, after which this change in spread falls. Finding such results for secondary market yields reveals that the aforementioned reputational effects are felt on markets as well as being perceived by credit rating agencies. Even after the end of a debt crisis involving private creditors, investors sentiment remains sour with respect to sovereign debt instruments.

Table 6 highlights the results for official restructurings. The change in spread with respect to the base year is always falling, where in the first period the spread falls by a little more than 100 basis points, or about 1 percent, and then falls consistently over the forecast horizon. Both the ATE's from Table 5 and Table 6 are plotted in Figure 9. As we can see, the dynamic response of bond spread following the end of a restructuring episode for both event types is persistent for all the

years in our estimates.

Similar results are obtained when considering the Institutional Investor's index as the dependent variable, and using the Synthetic Control Method instead of the AIPW (see Marchesi and Masi 2020). On the other hand our results contrast with those of Reinhart and Trebesch (2016), who document a strong increase in average ratings in emerging markets in the case of private agreements following a debt relief and the crisis-exit year. Reinhart and Trebesch also find that despite the substantial relief obtained, ratings in advanced economies do not recover after the war official debt forgiveness of 1934.

In summary, consistently with Schlegl *et al.* (2019), we find that defaulting on private debt is highly visible and then more likely (than official crisis) to result in a rating downgrade. On the other hand, new evidence from Horn *et al.* (2020) suggests that official lenders typically shoulder the burden for private creditors, which is one explanation for why following official restructurings we find evidence of positive market reaction.

A third explanation for this different reaction by the markets, as previously mentioned, is likely to depend on the different terms of the restructurings with private with respect to official creditors. In particular, the higher cost of large defaults is most likely driven by a less creditor-friendly negotiation process, which in turn results in higher economic uncertainty and more severe punishment from the creditors. On the other hand, official restructuring that are arranged within the "Paris Club umbrella" are supposed to guarantee a relatively smoother approach to the way in which deals are actually orchestrated than private ones, hence lowering even further the collateral damage of a default. In the next two sections we provide some additional evidence on the importance of the size of the restructuring, as well as on the role of litigation costs in the case of private agreements.

TABLE 5 & 6 HERE

FIGURE 5 HERE

5 Restructuring size

The AIPW methodology, combined with the local projections, comes with the advantages of overcoming the endogeneity bias and being free of structural constraints. However, it does not allow us to evaluate whether the effect changes at different level of restructuring size. To do this, we use ordinary least squares to distinguish the rating variation associated with the default *per se*

from that associated with the amount of the debt affected, i.e. "occurrence" versus "magnitude." Session 5.1 and 5.2 present the results obtained by using as the dependent variable credit ratings and bond spreads, respectively.

5.1 Credit ratings

To identify post-crisis episodes, we focus, as above, on final restructurings only, we exclude observations during crisis years, and we take up to seven years after the final haircut, in order to capture the existence of persistent effects.³¹ We estimate a model which includes agency-country (pair) fixed effects, period-fixed effects and we cluster the standard errors at the pair-level. We therefore control for unobserved effects that exclusively vary at the pair and period-level, substantially reducing concerns over endogeneity. Ordinary least squares treat the dependent variable as cardinal. This implies that the difference between an "AA" and an "AA+" rating, for example, is the same as between "BB" and "BB+."³² The regression equation then is:

$$c_{i,k,t} = \alpha + \beta Z_{i,t-1} + \gamma_j FC_{i,t-j} + \delta_j FR_{i,t-j} + \eta_{i,k} + \tau_t + u_{i,k,t}, \quad j = 1, \dots, 3, 4\&5, 6\&7 \quad (4)$$

where $c_{i,k,t}$ represents the credit rating provided to country i , by agency k at time t . $FC_{i,t-j}$ is a dummy equal to one when a country has finalized its final private (official) restructuring and $FR_{i,t-j}$ denotes the corresponding amount of private (official) haircut, and Z is a vector containing the control variables (lagged by one year). $\eta_{i,k}$ and τ_t denote agency-country pair and time fixed effects, respectively. Finally, $u_{i,k,t}$ is the error term.

As explained above, the advantage of including both official and private restructurings in the same specification is that it allows us to detect their effects by avoiding an omitted variable bias. Moreover, we are also able to distinguish the rating variation associated with the default per se from that associated with the haircut size (i.e., "occurrence" versus "magnitude"). The list of control variable is the same described in section 3.1. Table C1, in the online Appendix C, provides a detailed description of all our variables, while Table C2 shows some summary statistics.

Table 7 presents the results obtained by considering the size of private and official haircut.³³ In columns 1-2 of Table 7, we include the haircut size, expressed in percentage points, up to seven

³¹As in Cruces and Trebesch (2013a), we add together the years 4&5, and 6&7, after a restructuring to give more weight to events which are further back in time.

³²We should emphasize, however, that the economic consequences of the rating contraction may not be linear, as losing the two notches from junk territory is clearly different than switching, for example, from AAA to AA (in S&P's rating).

³³The results obtained using the private and official nominal haircut are reported in Table C3, and in Figures

years after the final restructuring (with and without control variables, respectively). Column 2 shows that a one percentage point increase in the private haircut size is associated with a decrease of about 0.05 notch in the credit rating, in year one after the final haircut. This implies that a final haircut of about 40 percent, roughly corresponding to the mean for our sample, can be associated with a decrease of about 2 notches in year one.

In the case of an official agreement, a one percentage point increase in an official haircut is associated with an increase of about 0.02 notch in the credit rating, in year one after the restructuring. Hence, a haircut of about 60 percent (the mean for our sample) can be associated with an increase of about 1.2 notch, in year one. These results are economically relevant both in the case of private and official restructurings. In turn, in columns 3-4, we include only the dummy indicating the occurrence of the private and official restructuring, while the last two columns contain the full specification (with and without control variables). While all these results are reported for comparison, we mostly base the discussion on the fully specified model of column 6.

TABLE 7 HERE

To be able to comment these results, however, it should be kept in mind that the coefficients shown in the fully specified model have to be interpreted conditionally, as in any interaction model. The best way to interpret the findings of Table 7 is to look at Figures 10a and 10b, which show the expected variation in agency ratings conditional on the private and official haircut size. In other words, we plot the marginal effect $\delta_j R_{i,t-j} + \gamma_j$ from equation 4 above. The different panels correspond to the number of years after the restructuring, and the dotted lines show 90 percent confidence bands. The effects are calculated from the complete specification (column 6). Aside from an easier interpretation, this joint estimate and the resulting graphs are important because the high correlation between C and R makes it complicated to draw inference about individual effects, but facilitates inference about their sum (see Cruces and Trebesch 2013a).³⁴

FIGURES 10a & 10b HERE

The bottom line of Figure 10a is that private haircuts are negative and statistically significant for years one to seven after the final agreement. This can be seen because the upper confidence band

C1a and C1b, in the online Appendix C. Due to data limitations, however, we were able to use this variable only in the specification with agency rating as the dependent variable.

³⁴As pointed out by Cruces and Trebesch (2013a), multicollinearity does not bias least squares estimates, but the high correlation between C and R will tend to increase the estimated standard errors. The high correlation between C and R (about 0.7 in our sample) lowers the variance of the estimated effect of interest, $\gamma + \delta R$.

is always below the zero horizontal line for every haircut size greater than 20 percent (the mean of this sample being around 40 percent). The reduction in credit rating associated with haircut size is also economically substantial, especially for years one and two after the final agreement.

In the case of official deals, as in Figure 10b, the rating increase of a restructuring is statistically significant for levels of haircut at which the lower confidence band is above the zero horizontal line. In years one to three after the final agreements, haircuts greater than 60 percent (corresponding to the mean of this sample) can be associated with significantly higher ratings. At lag 4&5, the rating increase can be significant only for haircuts greater than 80 percent, while at lag 6&7 the effect is never significant.

The results are robust to including further variables to control for the presence of omitted variable bias, such as the number of years the chief executive has been in office, total population (in log) and per capita GDP.³⁵ The results also hold when using an ordered-logit model for the discrete 21-step end-of-month rating, which accounts for the bounded nature of the dependent variable. As shown in section 4.1, they are also robust to using, as the dependent variable, an average of all the agencies' ratings (rather than dyadic data), as well as the two separate averages of only American agencies (i.e., Moody's, Fitch, Standard & Poor's, Dominion Bond Rating Services) as opposed to only Moody's'. Columns 1-5 of Table C4, and Figure C2a ad C2b, in the online Appendix C, report all these robustness checks. Taken together, this is strong evidence pointing to a significant difference between the effects on credit ratings from private and official restructuring events.

In conclusion, the (private) haircut size seems to involve some reputational costs and the correlation between private restructuring and agency credit rating is negative for years one to seven after the restructuring episode. These results are consistent with Meyer *et al.* (2019), who document that the decline in investor returns is much smaller for low-haircut cases (i.e., lower than the median value) and with Asonuma *et al.* (2019), who find that post-default restructurings are associated with a decline in bank credit, an increase in lending interest rates, and a higher likelihood of triggering a banking crisis (especially in the case of pre-emptive agreements). Finally, they are also in line with Gennaioli *et al.* (2014) who show that the spillovers of a default, on domestic and foreign banks, are larger the higher the haircut.

The opposite holds in the case of official agreements, where agency rating generally improve, and the more so the larger the haircut.³⁶ As previously mentioned, there is a trade-off concerning the

³⁵Our estimation results could still be biased due to the omission of time-varying country-specific variables correlated with both the government negotiation behavior and rating (e.g., the haircut size may vary when new governments take over).

³⁶Hence, the positive growth prospect observed for official defaulters after the end of the default (see for example Marchesi and Masi (2021)) might be due to the absence of a negative stigma in the credit markets.

effect of debt reduction: a positive "debt relief effect" and a negative "reputational effect." This evidence then suggests that while for private defaulters the negative reputational effect dominates, for official defaulters positive (debt relief) spillovers seem to prevail (as in Arslanalp and Henry 2005).³⁷ The results in this section, however, should be taken cautiously, as identification is difficult and we cannot detect any causal effect but only strong conditional correlations. In the next section we will consider a more direct measure of borrowing costs, such as the bond spread, as in Cruces and Trebesch (2013a).

5.2 Bond spread

In this section we take, as the dependent variable, the bond spread for each country (EMBIG stripped spread). More specifically, we estimate the following equation:

$$E_{i,t} = \alpha + \beta Z_{i,t-1} + \gamma_j FC_{i,t-j} + \delta_j FR_{i,t-j} + \eta_i + \tau_t + \varepsilon_{i,t}, \quad j = 1, \dots, 3, 4 \& 5, 6 \& 7 \quad (5)$$

where $E_{i,t}$ represents monthly bond spread of a country i , at time t . $FC_{i,t-j}$ is a dummy equal to one when a country has finalized its last private (official) haircut, $FR_{i,t-j}$ denotes the corresponding amount of private (official) haircut in the last restructuring and Z is a vector of control variables (lagged by one year). η_i , and τ_t denote country and time dummies, respectively. Finally, the list of controls is the same as the one described in section 3.1.

The results are presented in Table 8. As in the previous section, in columns 1-2 of Table 8, we include the haircut size, expressed in percentage points, up to seven years after the final agreement (with and without control variables). Column 2 shows that a one percentage point increase in haircut is associated with bond spread spreads that are about 6 bp higher in year 1 after the restructuring. Thus, a restructuring involving about 40 percent (which is about the mean for our sample) can be associated with 240 bp higher in year one. In the case of an official agreement, a one percentage point increase in an official haircut is associated with a decrease of about 5 bp in the credit rating, in year one after the restructuring. This implies that a restructuring with a haircut of about 60 percent (the mean for our sample) can be associated with a reduction of almost 300 bp, in year one after the last official agreement. These results are sizeable both in the case of private and official deals.

³⁷Since quite a few cases of official haircut concern countries which were eligible for the HIPC Initiative, these results are somehow in line with Raddaz (2011), who finds that the stock prices of companies having subsidiaries in countries benefited by multilateral debt relief (through the HIPC and the MDRI, increase significantly above those of other firms, especially around the launching of these initiatives.

In columns 3-4, as before, we include only the dummy indicating the occurrence of the private/official default, while the last two columns contain the full specification, which confirm the relationship between private haircut and subsequent spreads for years four to seven after the restructuring. In particular, Figures 11a and 11b, which are based on the full specification, show the mean increase in bond spreads associated with a debt restructuring for different levels of haircut and at different lag lengths. The main message of Figure 11a is that restructurings with haircuts above 40 percent (the mean of this sample) can be associated with significantly higher spreads from one to the seven years after a restructuring.³⁸ For further illustration, suppose that haircuts increase by 1 standard deviation (21 pt in this sample); this implies spreads that are 101 bp higher in years 4 and 5 after the restructuring, and 107 bp higher in years 6 and 7. These results are economically relevant and quite similar to those obtained by Cruces and Trebesch (2013a) in the case of private deals.

TABLE 8 HERE

FIGURES 11a & 11b HERE

Finally, as official restructuring are concerned, Figure 11b shows that haircuts above 30 percent (the mean of this sample being around 60 percent) can be associated with significantly lower spreads from one to seven years after the final official restructuring (at lag 6&7 the effect is actually significant only for smaller haircuts, that between 10 and 50 percent). More specifically, an increase of official haircut by one standard deviation (39 pt in this sample) implies spreads that are 156 bp higher in years 4 and 5 after the restructuring (while the coefficient is not significant at lag 6&7). This result is, at least to some extent, consistent with the recent findings of Lang *et al.* (2021), who show that countries benefiting from the the Debt Service Suspension Initiative (DSSI) experience a larger decline in bond spread compared to similar but ineligible countries.³⁹ As the DSSI is a NPV-neutral debt service suspension, we actually find that official debt relief do not generate stigma, even when it is associated to an NPV reduction.⁴⁰

In summary, as in Cruces and Trebesch (2013a), we find that controlling for both the occurrence and the magnitude of default is crucial to detecting a more lasting link between debt default and

³⁸At lag 3 and 6&7 significance is actually reached for values of haircut greater than 50 percent.

³⁹The World Bank and the International Monetary Fund urged G20 countries to establish the DSSI, which took effect on 1st May 2020, and has been extended until the end of 2021. It has so far delivered about \$5 billion in relief to more than 40 countries (in all 73 are eligible). The DSSI is a form of debt relief that eases financing constraints through liquidity provision by deferring debt service repayments without affecting the NPV of public debt.

⁴⁰Moreover, while they focus on the beginning of the debt crisis spell, we consider what happen in the aftermath of the default, by taking into account the haircut size.

borrowing costs. Most importantly, private (official) restructurings are generally associated with lower (higher) ratings and higher (lower) spreads up to seven years since the last restructuring. What is more the rating (spread) decline (increase) is larger for cases with deeper haircuts.

As rating and spread represent indirect and direct measures for borrowing costs, respectively, our result suggest that the costs of default may vary with the restructuring terms and the relative treatment of official versus private creditors. Our results point to the importance of the way in which debt restructurings are orchestrated, in line with the distinction between "excusable and inexcusable" (Grossman and van Huyck 1988) and "hard" and "soft" defaults (Trebesch and Zabel 2017). In the next section we provide some further discussion on this issue, as well as some additional results pointing to the importance of the restructuring terms.

6 Discussion of the results

This section provides some further discussion on the reasons lying behind the difference in sovereign risk, in the aftermath of a defaults on private as opposed to official creditors. As we have already mentioned, there are at least three reasons explaining this difference. The first reason is likely to depend on the greater overall "visibility" of private deals, as opposed to official ones. As previously mentioned, official defaults occur without much media coverage and hence less likely to determine some collateral damage. On the other hand, defaulting on private debt is highly visible and then less likely to result in a rating downgrade. For example, recent evidence from collective memory of private restructurings (read Greece 2010 and Argentina v. NML Capital) indicate that private restructurings are considerably more influential for financial markets.

A second reason may depend on the circumstance that official lenders, at least to some extent, shoulder the debt burden for private creditors, as suggested by new evidence from both Horn *et al.* (2020) and Schleg *et al.* (2019), which could explain, for example, why we find evidence of positive market sentiment in the aftermath of an official restructuring. For example, even the decline in bond spread after the DSSI (Lang *et al* 2021) could be explained by the fact that private markets interpret the postponement of debt service repayments to official creditors as good news for their own debt service repayments.

The final reason may depend on the different relationship between debtors and official or private creditors. More generally, contrary to official defaults, the relationship between debtors and private creditors may vary a lot across crises (and sometimes even during the same default episode). As illustrated by Trebesch and Zabel (2017) there are striking differences across debt crisis events.

On the one hand, there are cases such as Russia during the 1990s, Ecuador 2008-09 or Argentina 2002-05, in which governments opted for a unilateral payment moratorium and sometimes even refused to negotiate with their foreign banks and bondholders. On the other hand, there are debt crises that were solved in a consensual manner, with close creditor consultations and little (or no) missed payments (examples may include the Ukraine in 1999-2000 and Uruguay in 2003).

What is more, recent evidence show that disruptive private creditors litigation on external debt has been increasing over time.⁴¹ More specifically, as recently shown by Schumaker *et al.* (2021), the existence of litigation costs have strengthened the hands of private external creditors and raised the cost of default for debtors. These authors find that legal disputes in the US and the UK disrupt government access to international capital markets. To the extent that litigation costs increase the default costs but involve only external debt held by private creditors, these findings may help us to understand the increase in borrowing costs in the aftermath of a default with private creditors.⁴²

In order to provide some evidence on the importance of litigation costs for sovereign risk, in the next section, we extend our framework to empirically test how litigation costs may increase sovereign risk both during a debt crisis and in the aftermath of a default.

6.1 Litigation costs

Schumaker *et al.* (2021) provide new data on litigation costs, building, in particular, three measures of litigation. The first indicator is a dummy equal to one in those years in which a sovereign faces one or more pending creditor lawsuits; the second indicator is coded as one if one or more creditor attempt to seize assets of the respective sovereign; finally, the third indicator is a variable built as a share of litigation to GDP, which is constructed by using the available information on case amounts and then sum the amounts at a country-year level. In this section, we use this last measure and consider either all the data on litigation (to GDP) occurring throughout the default period, or only the "final" one, that is the case amount associated to the debt crisis exit.

Since litigation costs are available at the country year level, we take as dependent variable the Institutional Investor's creditworthiness index (Institutional Investor Magazine), which was pub-

⁴¹While for centuries, defaulting governments were immune from legal action by foreign creditors, Schumaker *et al.* 2021 shows that this is no longer the case. More generally, the interest on the legal aspects of sovereign debt contracts has been increasing over the more recent years (among others see Bolton *et al.* 2020; Carletti *et al.* 2020; Fang *et al.* 2021).

⁴²Schumaker *et al.* (2021) describe the evolution of litigation environment, in particular, they distinguish among three different phases: (1) Erosion of sovereign immunity (1976-1991); (2) Entry of specialized hedge funds 1992-1999; (3) Asset seizures and *pari passu* (2000-2010).

lished twice a year since 1979 (up to 2016) in the March and September issues of the Institutional Investor Magazine. We take annual observations (i.e., yearly averages of these bi-annual data) of this variable. This rating is based on information provided by economists and sovereign risk analysts at leading global banks and securities firms. The rating grades each country on a scale from 0 to 100 and is available for 178 countries over the period 1979-2016.⁴³

The sample of countries is the same as that used in the previous sections, while the data now go from 1990 to 2010, as litigation costs are available only up to 2010. More specifically, we estimate the following two equations:

$$IR_{i,y} = \alpha + \beta C_{i,y} + \gamma L_{i,y} + \delta C_{i,y} * L_{i,y} + \zeta X_{i,y} + \eta_i + \tau_y + u_{i,y} , \quad (6)$$

and:

$$IR_{i,y} = \alpha + \theta L_{i,y} + \kappa FC_{i,y} + \lambda_j (FC_{i,y} * L_{i,y})_{i,y-j} + \mu X_{i,y} + \eta_i + \tau_y + u_{i,y} \quad j = 0, 1, \dots, 3, 4 \& 5, 6 \& 7 \quad (7)$$

where $IR_{i,y}$ represents annual Investor rating of a country i , at year y . $C_{i,y}$ is a dummy equal to one for every year of the default spell, while $L_{i,y}$ denotes the size of litigation to GDP. $FC_{i,y}$ is a dummy equal to one in the last year of the private debt crisis, while $FL_{i,y} * L_{i,y}$ denotes the amount of litigation to GDP associated with the end of the default spell. X is a vector containing the control variables (lagged one year). η_i , and τ_y denote country and year dummies, respectively. The list of controls is the same as the one described in the previous sections.

To investigate more carefully on the importance of litigation for sovereign risk, contrary to previous specifications, we now consider both the duration of the debt crisis and up to seven periods after the end of default. Considering the scope of litigation within the crisis period is important because it helps quantify the determinants of a negative drop in ratings, while looking at after the crisis retains the same interpretation as in our original analysis (that is the reputational effects of a default event). Thus, we apply our baseline specification from the start of the debt crisis, and using duration data for private (Asonuma and Trebesch 2016) debt crises. As above, we then include up to seven year lags of both the occurrence and the magnitude of "final" litigation.

⁴³ As pointed out by Reinhart and Rogoff (2009), the Institutional Investor's index can be then seen as a survey-based measure of the perceived creditworthiness of a large number of countries, with two main differences with respect to the credit ratings provided by agencies. First, this index can be regarded as a continuous variable, while the credit ratings assigned by the rating agencies have the features of a discrete variable. Second, this index changes annually over time, while the ratings may remain constant for a long period of time.

The results are presented in Table 9. In columns 1-2, we control for both the duration of private debt crisis, and the amount of litigation to GDP (expressed in percentage points) on private debt, with and without control variables, respectively. In columns 3-4, we include final private litigation to GDP (that is associated to the end of the debt crisis) up to seven years after the end of the default spell, with and without control variables, respectively.

As our variables of interests are concerned, *during the debt crisis*, we can observe that prolonged private debt crises are associated with a significant contraction of Investor's rating of about 4.6 to 5.1 points in the Investor's rating per year, depending on the specification (all coefficients are significant at the one percent level). As the average duration of a private defaults is about 8 years in this sample, this result implies that the average GDP loss associated to private default is about 40 points in total. The coefficient of the interaction between the scope of litigation and duration is also negative and significant at the one percent level. The size of the coefficients goes from 2.5 to 3.2, implying a total contraction in the Investor's rating of about 8 points, due to litigation costs.

After the end of the debt crisis, in column 4, we find that both the coefficients denoting the lags of the end of the default spell and those denoting the lags of the litigation size are always negative and generally significant up to five years after the final agreement. The best way to interpret these findings, however, is to look at Figure 12, which shows the expected variation in Investor rating conditional on the litigation size. The different panels correspond to how many years after the end of the default spell rating is being measured, and the dotted lines show 90 percent confidence bands. The effects are calculated from the specification of Table 9, column 4. The rating decrease due to litigation costs is statistically significant for levels of litigation at which the lower confidence band is below the zero horizontal line. We can observe a significant decrease in Investor rating for any size of litigation from one to three years after the end of default. After four to five years the effect is not significant, while after six to seven years ratings start to improve.

In summary, we find that Investor's rating decreases with litigation costs in the aftermath of a defaults. To the extent that litigation costs characterize deals with private creditors only, these results may explain the different outcome in terms of sovereign risk of private versus official deals.

TABLE 9 HERE

FIGURE 12 HERE

7 Conclusions

This paper studies the relationship between sovereign debt default and a country's creditworthiness, by taking into account the depth of a debt restructuring and by distinguishing between commercial and official sovereign debt agreements.

We analyze 264 default episodes in 130 countries over the period 1990-2013, and we consider agency ratings and bond spreads as indirect and direct measure of borrowing costs, respectively. Using both the adjusted inverse propensity-score weighted estimator and a standard panel data analysis, we find we find a more lasting relationship between debt default and credit risk. More specifically, this paper provides evidence on the heterogeneous effect of private and official defaults on borrowing costs: (i) private events are more costly (in terms of higher sovereign risk) than official ones; (ii) the rating (spread) variation (increase) is larger for cases with deeper haircuts.

Hence, the trade-off concerning the effects of sovereign debt restructurings seems to be associated with opposite outcomes for private and official defaulters. For the former, negative (reputational) spillovers seem to prevail, while for official defaulters the positive spillovers of a debt reduction are more important (Arslanalp and Henry 2005).

Therefore, our results point to the importance of the way in which debt restructurings are orchestrated, in line with the distinction between "hard" and "soft" defaults (Asonuma and Trebesch 2016, Trebesch and Zabel 2017). To the extent that Paris Club deals may represent an example of a "soft" default, this evidence suggests that they are associated with better outcomes in terms of borrowing costs.

To conclude, we find further evidence for the heterogeneity of the economic impact of debt restructurings, confirming that official and private defaults may have different costs and then induce selective defaults. Debtor countries, being aware that the consequences of default depend on who the defaulted creditors are, may then decide to prioritize their repayments accordingly. In particular, these results are consistent with Schlegl *et al.* (2019) who find evidence of a preferred status (i.e., seniority) for multilateral institutions but not for official bilateral debt. The increase in borrowing costs we detect after private restructuring may then explain why private creditors are typically paid first. In other words, private creditors seem to "free ride" on official ones as they lose less than bilateral official creditors.

As the looming presence of debt restructurings, including those with official creditors, are expected to materialize in the next years, as a result of the negative shock from Covid-19, it becomes crucial to consider who is going to bear the actual costs of sovereign debt renegotiations.

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Tables

Table 1: Restructurings and haircuts over time (in %)

	Observations	Mean	SD	Min	Max
Private haircut					
1970-1988	81	23	53	-10	93
1989-2001	57	43	26	-8	92
2002-2013	20	53	31	5	96
Official haircut					
1970-1988	1	33	0	33	33
1989-2001	71	58	20	12	100
2002-2013	34	77	28	4	100

Table 2: Haircuts and face value reduction by country's income

		High Income	Middle Income	Low Income
Haircut %	Private	27	33	53
	Official	100	65	62
# of restructuring countries	Private	7	42	5
	Official	1	22	9

Table 3: ATE on change in ratings, private restructuring

Year	1	2	3	4	5	6	7
AIPW	-0.75*** (0.001)	-0.44*** (0.001)	-1.63*** (0.001)	-1.51*** (0.001)	-1.51*** (0.001)	-1.16*** (0.001)	-0.82*** (0.001)
Observations	24624	22701	20795	18857	16807	14788	12852

Notes: Table shows average treatment effect of private restructurings on change in agency ratings. Standard errors (in parenthesis) are clustered at the agency-country level. The model uses predictors and controls for first and second stage listed in the Online Appendix B and controls for agency-pair invariant and time-varying heterogeneity. Significance levels: *0.10, ** 0.05, *** 0.01.

Table 4: ATE on change in ratings, official restructuring

Year	1	2	3	4	5	6	7
AIPW	0.14*** (0.001)	0.06*** (0.01)	0.40*** (0.01)	0.27*** (0.01)	0.49*** (0.01)	0.59*** (0.01)	0.59*** (0.01)
Observations	24624	22701	20795	18857	16807	14788	12852

Notes: Table shows average treatment effect of official restructurings on change in agency ratings. Standard errors (in parenthesis) are clustered at the agency-country level. The model uses predictors and controls for first and second stage listed in the Online Appendix B and controls for agency-pair invariant and time-varying heterogeneity. Significance levels: *0.10, ** 0.05, *** 0.01.

Table 5: ATE on change in bond spread, private restructuring

Year	1	2	3	4	5	6	7
AIPW	279.77*** (0.12)	486.59*** (0.23)	1792.16*** (0.97)	292.16*** (0.19)	509.05*** (0.38)	42.18*** (0.03)	-344.10*** (0.27)
Observations	3363	2968	2586	2208	1878	1587	1301

Notes: Table shows average treatment effect of private restructurings on change in monthly average country yield spread over US Treasury bonds (EMBIG stripped spread) measured in basis points (bp). Standard errors (in parenthesis) are clustered at the country level. The model uses predictors and controls for first and second stage listed in the Online Appendix B and controls for country invariant and time-varying heterogeneity. Significance levels: *0.10, ** 0.05, *** 0.01.

Table 6: ATE on change in bond spread, official restructuring

Year	1	2	3	4	5	6	7
AIPW	-117.56*** (0.08)	-260.87*** (0.15)	-303.49*** (0.22)	-147.78*** (0.13)	-359.81*** (0.37)	-27.04*** (0.04)	-73.22*** (0.13)
Observations	3363	2968	2586	2208	1878	1587	1301

Notes: Table shows average treatment effect of official restructurings on change in monthly average country yield spread over US Treasury bonds (EMBIG stripped spread) measured in basis points (bp). Standard errors (in parenthesis) are clustered at the country level. The model uses predictors and controls for first and second stage listed in the Online Appendix B and controls for country invariant and time-varying heterogeneity. Significance levels: *0.10, ** 0.05, *** 0.01.

Table 7: Private and official haircut and agency credit rating, 1990-2013, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Final Private Haircut (-1)	-0.064*** (-4.901)	-0.053*** (-4.448)			-0.030* (-1.679)	-0.026* (-1.810)
Final Private Haircut (-2)	-0.048*** (-4.658)	-0.039*** (-3.878)			-0.019 (-1.255)	-0.020* (-1.650)
Final Private Haircut (-3)	-0.028*** (-5.107)	-0.020*** (-3.689)			-0.003 (-0.344)	-0.002 (-0.338)
Final Private Haircut (-4 & 5)	-0.023*** (-4.610)	-0.017*** (-3.347)			-0.007 (-0.775)	-0.007 (-1.069)
Final Private Haircut (-6 & 7)	-0.015*** (-3.404)	-0.012*** (-3.026)			-0.012 (-1.468)	-0.010 (-1.560)
Final Official Haircut (-1)	0.001 (0.165)	0.016*** (3.213)			0.032*** (3.260)	0.033*** (4.590)
Final Official Haircut (-2)	-0.000 (-0.067)	0.011** (2.420)			0.030*** (3.464)	0.025*** (3.665)
Final Official Haircut (-3)	-0.003 (-0.700)	0.006 (1.557)			0.022*** (2.694)	0.016*** (2.666)
Final Official Haircut (-4 & 5)	-0.002 (-0.571)	0.005* (1.717)			0.018*** (2.730)	0.014*** (3.082)
Final Official Haircut (-6 & 7)	0.001 (0.394)	0.005 (1.404)			0.010*** (2.693)	0.008** (2.002)
Final Priv. Haircut Dummy (-1)			-3.117*** (-5.768)	-2.998*** (-5.232)	-1.879*** (-3.024)	-1.693*** (-3.737)
Final Priv. Haircut Dummy (-2)			-2.239*** (-5.593)	-1.999*** (-4.484)	-1.522*** (-2.901)	-1.140*** (-2.836)
Final Priv. Haircut Dummy (-3)			-1.317*** (-5.072)	-1.028*** (-3.830)	-1.242*** (-2.733)	-0.989*** (-2.811)
Final Priv. Haircut Dummy (-4 & 5)			-0.948*** (-4.376)	-0.747*** (-3.154)	-0.719* (-1.847)	-0.504 (-1.543)
Final Priv. Haircut Dummy (-6 & 7)			-0.504*** (-2.756)	-0.448** (-2.468)	-0.124 (-0.390)	-0.115 (-0.394)
Final Off. Haircut Dummy (-1)			-0.647 (-1.414)	0.454 (0.971)	-2.183*** (-3.456)	-1.218** (-2.119)
Final Off. Haircut Dummy (-2)			-0.792** (-2.080)	0.158 (0.424)	-2.097*** (-3.995)	-0.998** (-1.971)
Final Off. Haircut Dummy (-3)			-0.771** (-2.440)	0.073 (0.282)	-1.713*** (-3.884)	-0.646* (-1.656)
Final Off. Haircut Dummy (-4 & 5)			-0.687** (-2.515)	-0.023 (-0.104)	-1.475*** (-4.065)	-0.680** (-2.366)
Final Off. Haircut Dummy (-6 & 7)			-0.266 (-1.537)	0.099 (0.763)	-0.705*** (-3.361)	-0.269* (-1.803)
GDP real growth (-1)		0.045*** (3.141)		0.049*** (3.294)		0.048*** (3.304)
Primary balance to GDP (-1)		0.023 (1.347)		0.024 (1.427)		0.025 (1.448)
Current Account to GDP (-1)		-0.048*** (-4.878)		-0.046*** (-4.777)		-0.046*** (-4.763)
Reserves to imports (-1)		0.005 (1.582)		0.005 (1.582)		0.004 (1.312)
Public debt to GDP (-1)		-0.046*** (-4.865)		-0.045*** (-4.728)		-0.045*** (-4.753)
Inflation (-1)		-1.528 (-0.952)		-1.416 (-0.881)		-1.491 (-0.929)
Law and Order (-1)		0.167 (1.101)		0.164 (1.064)		0.159 (1.042)
IMF Net Loans (-1)		-0.103 (-1.460)		-0.092 (-1.320)		-0.109 (-1.569)
Constant	13.135*** (18.575)	14.911*** (11.610)	13.225*** (18.614)	14.835*** (11.631)	13.213*** (18.596)	14.898*** (11.825)
Observations	57,984	43,614	57,984	43,614	57,984	43,614
R-squared	0.134	0.324	0.142	0.323	0.151	0.330
Number of Pair	454	363	454	363	454	363
Pair FE	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES

Notes: This table shows coefficients of an unbalanced panel data regression with OLS fixed effects at the agency-country-period-level. The dependent variable is the monthly country agency rating, while the key explanatory variables are the lagged values of C and R taken up to seven years after each final restructuring. Agency-country and period-fixed effects are included. Standard errors are clustered at the agency-country-level, t statistics are in parentheses. Significance levels: *0.10, ** 0.05, *** 0.01.

Table 8: Private and official haircut and bond spread, 1990-2013, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Final Private Haircut (-1)	7.213*** (4.397)	5.638*** (4.515)			6.420** (2.021)	2.470 (0.729)
Final Private Haircut (-2)	4.745*** (3.975)	3.492*** (2.908)			6.186** (2.544)	3.202 (1.167)
Final Private Haircut (-3)	4.088*** (3.467)	2.487** (2.023)			5.354** (2.359)	4.866* (1.920)
Final Private Haircut (-4 & 5)	3.186*** (3.704)	1.790* (1.952)			7.012*** (4.039)	4.829** (2.310)
Final Private Haircut (-6 & 7)	0.714 (0.791)	0.660 (0.738)			7.787*** (5.066)	5.030*** (3.080)
Final Official Haircut (-1)	-6.099*** (-6.917)	-4.071*** (-4.433)			-7.074*** (-5.864)	-4.151*** (-3.014)
Final Official Haircut (-2)	-7.726*** (-6.539)	-5.046*** (-4.783)			-8.974*** (-5.102)	-5.838*** (-3.189)
Final Official Haircut (-3)	-5.824*** (-3.891)	-4.738*** (-3.719)			-4.889** (-2.414)	-3.144 (-1.462)
Final Official Haircut (-4 & 5)	-5.537*** (-4.596)	-5.030*** (-4.516)			-5.235*** (-3.075)	-4.068** (-2.066)
Final Official Haircut (-6 & 7)	-4.320** (-2.461)	-2.056 (-1.044)			-3.434 (-1.562)	-0.744 (-0.277)
Final Priv. Haircut Dummy (-1)			282.817*** (3.449)	259.951*** (3.052)	16.249 (0.107)	165.970 (0.861)
Final Priv. Haircut Dummy (-2)			165.635*** (2.616)	144.960** (2.072)	-84.230 (-0.702)	19.590 (0.138)
Final Priv. Haircut Dummy (-3)			132.791** (2.153)	62.470 (1.089)	-72.835 (-0.654)	-112.234 (-1.062)
Final Priv. Haircut Dummy (-4 & 5)			69.092 (1.463)	33.756 (0.709)	-192.207** (-2.174)	-133.609 (-1.351)
Final Priv. Haircut Dummy (-6 & 7)			-47.559 (-1.179)	-20.985 (-0.507)	-313.644*** (-4.109)	-183.452** (-2.229)
Final Off. Haircut Dummy (-1)			-402.231*** (-3.239)	-246.133*** (-3.014)	95.154* (1.759)	47.189 (0.746)
Final Off. Haircut Dummy (-2)			-237.451* (-1.686)	-207.189** (-2.431)	209.638** (2.170)	71.257 (0.688)
Final Off. Haircut Dummy (-3)			-236.661** (-2.287)	-226.359*** (-2.885)	12.591 (0.151)	-46.265 (-0.429)
Final Off. Haircut Dummy (-4 & 5)			-213.239*** (-2.895)	-189.468*** (-3.182)	47.605 (0.696)	5.919 (0.069)
Final Off. Haircut Dummy (-6 & 7)			-200.692** (-2.226)	-130.037 (-1.508)	-86.382 (-1.317)	-110.601 (-1.329)
GDP real growth (-1)		10.680*** (5.764)		11.598*** (5.841)		10.067*** (5.119)
Primary balance to GDP (-1)		-3.384 (-0.969)		-1.771 (-0.500)		-1.242 (-0.359)
Current Account to GDP (-1)		-1.293* (-1.910)		-1.949*** (-2.638)		-1.367* (-1.719)
Reserves to imports (-1)		-0.154 (-1.229)		-0.116 (-0.947)		-0.183 (-1.521)
Public debt to GDP (-1)		-14.167** (-2.523)		-16.260*** (-2.932)		-15.205*** (-2.733)
Inflation (-1)		-8.293*** (-2.800)		-9.561*** (-3.091)		-8.435*** (-2.796)
Rule of Law (-1)		-47.273** (-2.479)		-51.811*** (-2.687)		-37.329* (-1.943)
IMF Net Loans (-1)		29.558 (1.370)		28.891 (1.399)		31.564 (1.482)
Constant	437.257*** (6.179)	630.468*** (5.703)	417.133*** (4.504)	617.205*** (4.410)	465.725*** (5.208)	576.774*** (4.185)
Observations	5,369	4,189	5,369	4,189	5,369	4,189
R-squared	0.350	0.445	0.332	0.440	0.367	0.454
Number of Panel	47	35	47	35	47	35
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Notes: This table shows coefficients of an unbalanced panel data OLS regression with fixed effects at the country-year-level. The dependent variable is the monthly average country yield spread over US Treasury bonds (EMBIG stripped spread) measured in basis points (bp). Standard errors are clustered at the country-year level, t statistics are in parentheses. Significance levels: *0.10, ** 0.05, *** 0.01.

Table 9: Private default, Investor's index and litigation, 1990-2010, OLS

	(1)	(2)	(3)	(4)
End of Private Default Dummy			-3.517***	-5.160***
			(-3.077)	(-3.939)
End of Private Default Dummy (-1)			-2.263*	-4.397***
			(-1.850)	(-3.420)
End of Private Default Dummy (-2)			-0.742	-2.873**
			(-0.611)	(-2.206)
End of Private Default Dummy (-3)			-0.246	-1.525
			(-0.206)	(-1.225)
End of Private Default Dummy (-4 & 5)			0.249	-0.421
			(0.233)	(-0.395)
End of Private Default Dummy (-6 & 7)			0.783	1.010
			(0.748)	(1.016)
Litigation scope x End of Private Default			-3.244	-1.796
			(-1.473)	(-1.193)
Litigation scope x End of Private Default (-1)			-4.557***	-3.130**
			(-2.768)	(-2.366)
Litigation scope x End of Private Default (-2)			-1.670	-0.700
			(-0.866)	(-0.432)
Litigation scope x End of Private Default (-3)			-2.015	-1.574
			(-1.052)	(-1.042)
Litigation scope x End of Private Default (-4 & 5)			-0.487	1.702
			(-0.088)	(0.456)
Litigation scope x End of Private Default (-6 & 7)			2.635	2.612
			(1.429)	(1.582)
Litigation scope	-0.905*	-0.432	-1.796	-1.182
	(-1.879)	(-1.566)	(-1.454)	(-1.284)
Private Default duration	-5.132***	-4.603***		
	(-2.892)	(-2.964)		
Private Default duration x Litigation scope	-3.164***	-2.490***		
	(-4.367)	(-3.938)		
Constant	31.015***	25.372***	28.980***	23.219***
	(24.680)	(8.260)	(27.328)	(7.433)
Observations	1,897	1,364	1,830	1,357
R-squared	0.598	0.657	0.585	0.656
Number of Countries	98	77	98	77
Controls	NO	YES	NO	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: This table shows coefficients of an unbalanced panel data OLS regression with fixed effects at the country-year-level and country-year clustered standard errors. The dependent variable the Institutional Investor's creditworthiness index (Institutional Investor Magazine). t statistics are in parentheses. Significance levels: *0.10, ** 0.05, *** 0.01.

Figures

Figure 1: Share of private and official debt

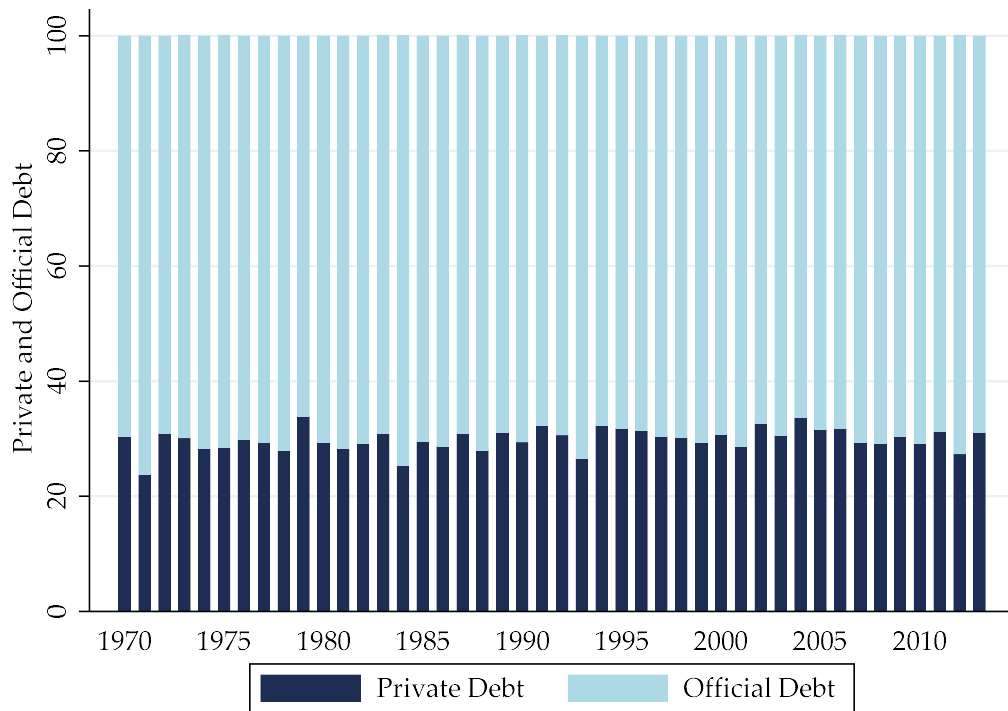


Figure 2: Crisis timeline

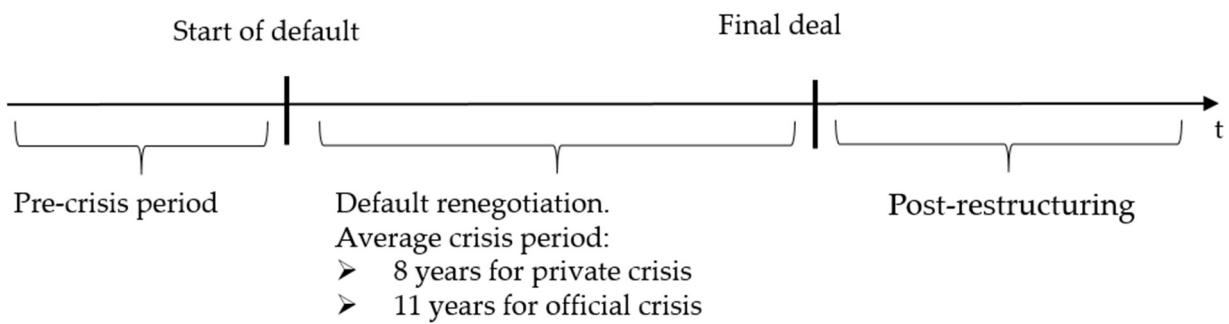


Figure 3: Share of private and official haircuts over time

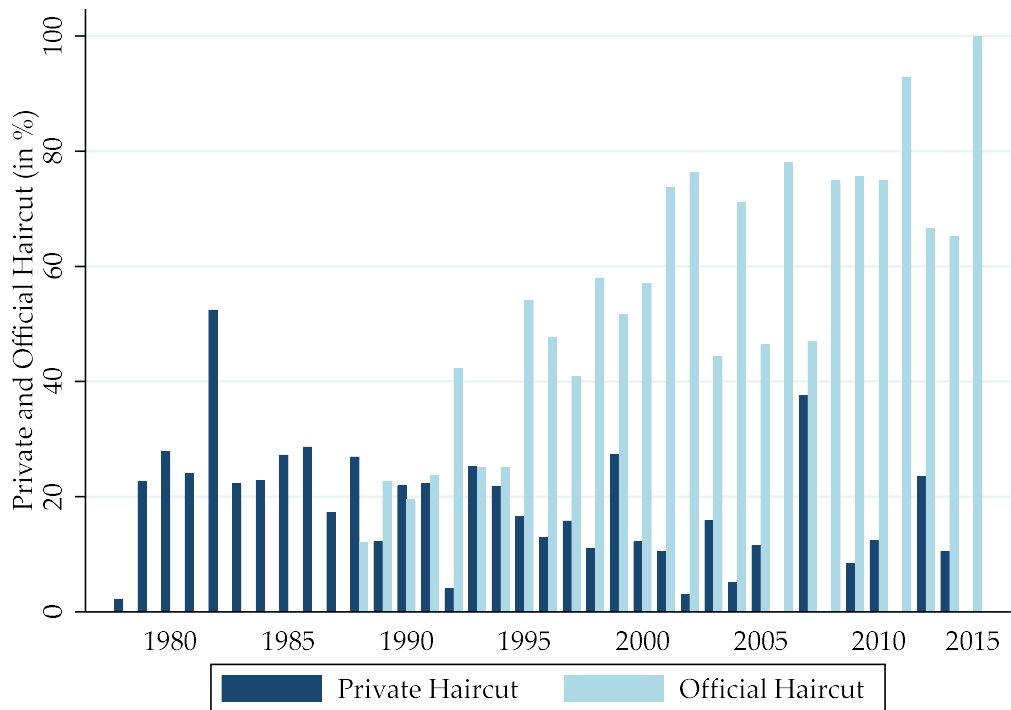


Figure 4: Frequency by size of private and official haircuts

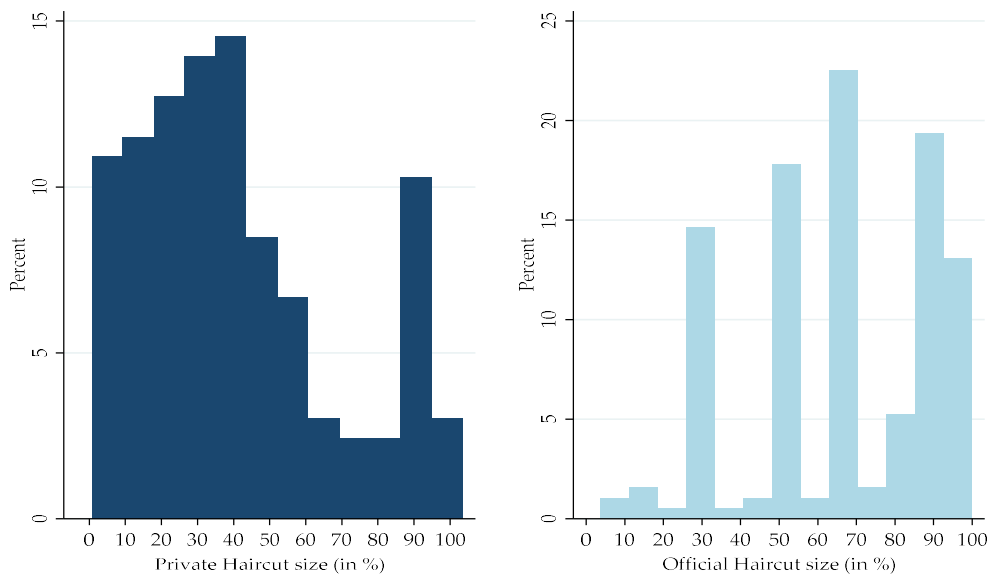
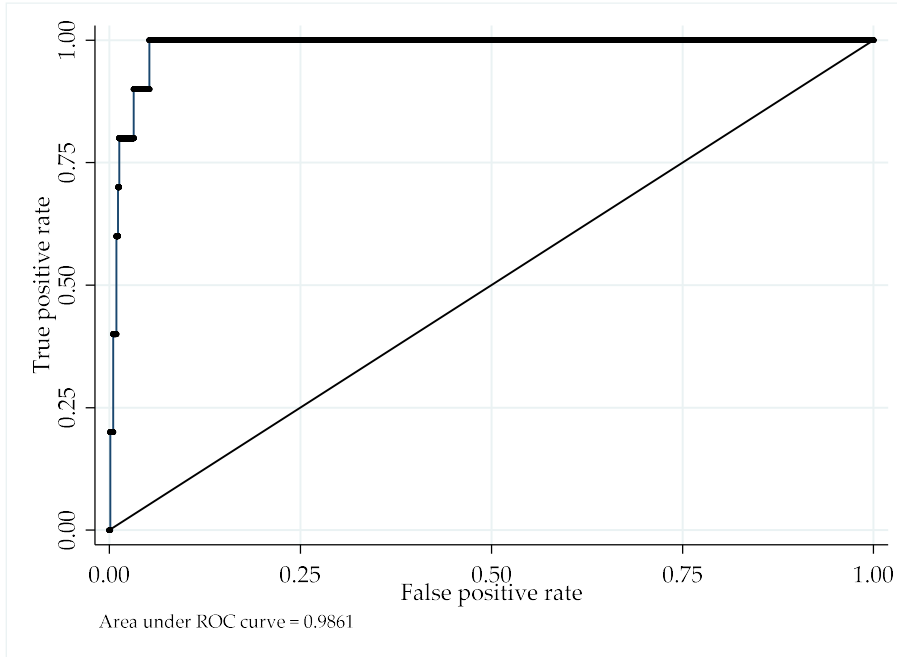
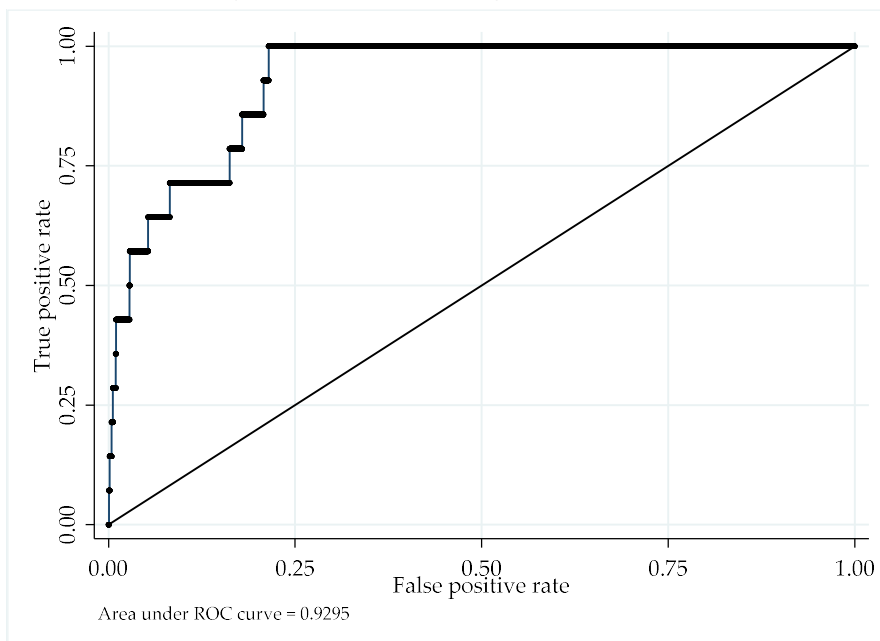


Figure 5: AIPW first stage credit ratings, ROC



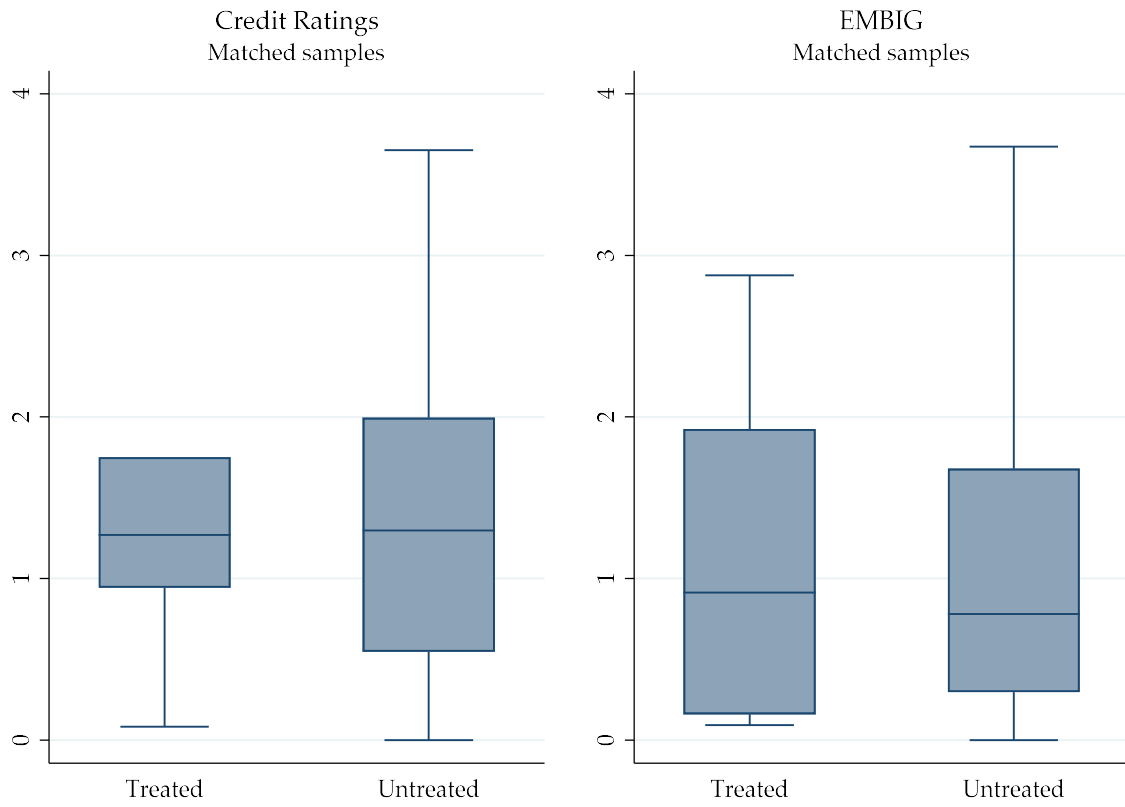
Notes: Figure B1 gives some results on the predictive ability of our first stage, when using data for agency ratings. The Receiver Operating Characteristic (ROC) curve plots the true positive rates against the false positive rates, and we can interpret the area under the curve (AUC statistic) as the predictive ability of the model. Under the null that the covariates have no predictive ability, the AUC is equal to 0.50, and perfect predictive ability corresponds to an AUC statistic of 1. The first stage for estimating the probability of entering into a debt crisis returns an AUC of 0.98.

Figure 6: AIPW first stage EMBIG, ROC



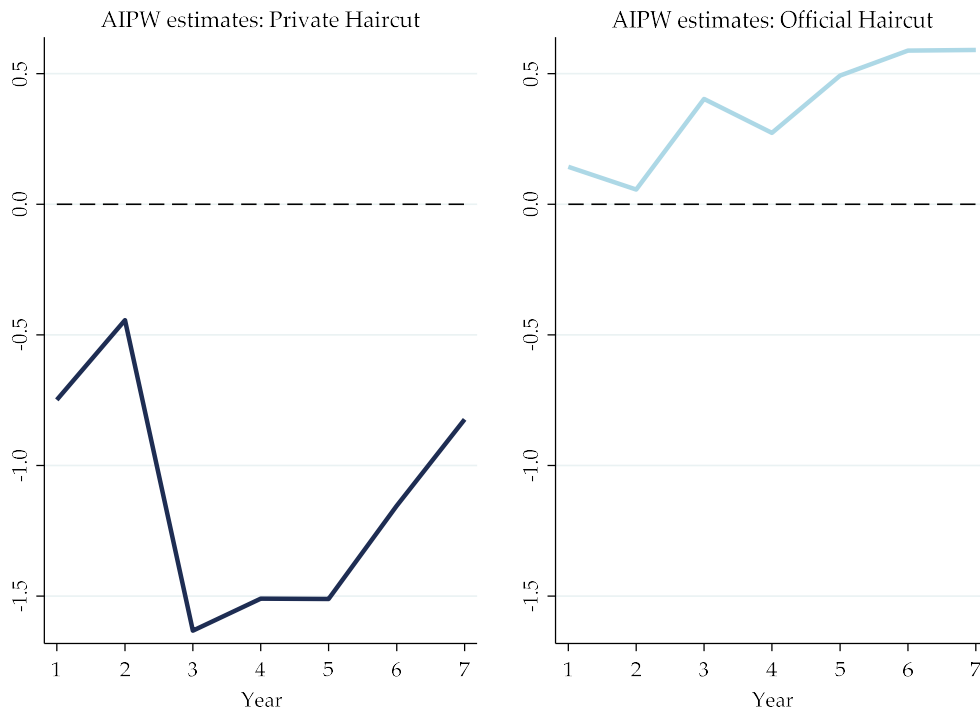
Notes: Figure B2 gives some results on the predictive ability of our first stage, when using data on bond spread. The Receiver Operating Characteristic (ROC) curve plots the true positive rates against the false positive rates, and we can interpret the area under the curve (AUC statistic) as the predictive ability of the model. Under the null that the covariates have no predictive ability, the AUC is equal to 0.50, and perfect predictive ability corresponds to an AUC statistic of 1. The first stage for estimating the probability of entering into a debt crisis returns an AUC of 0.93.

Figure 7: Post-matching estimated propensity score



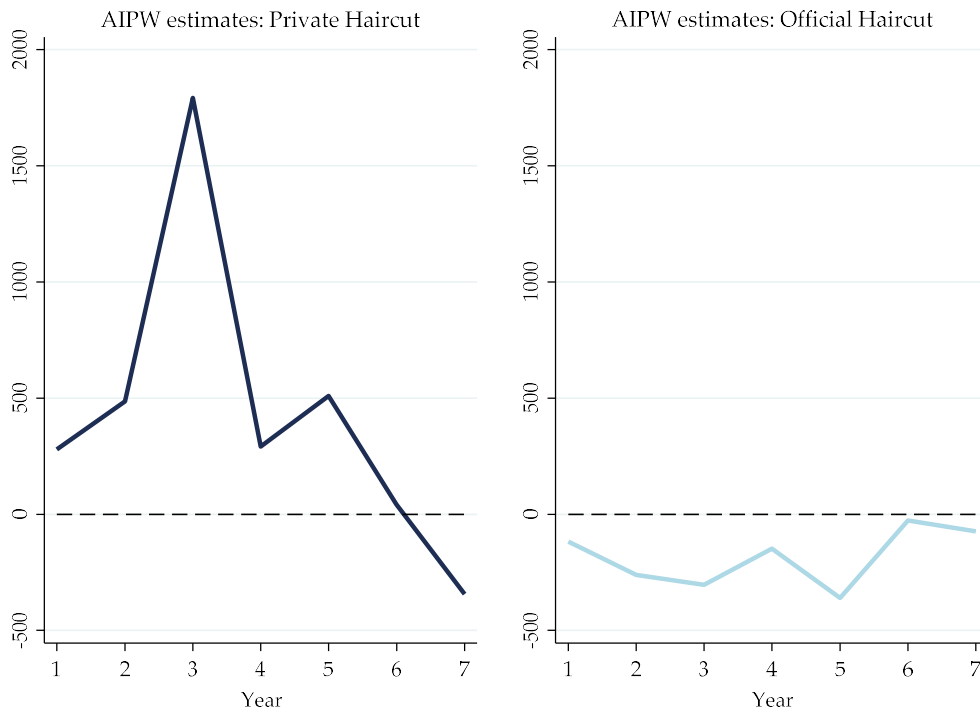
Notes: Boxplots of the estimated propensity scores, after the matching procedure, between countries that entered a debt crisis (treated countries) and countries that did not experience a debt crisis (untreated countries). The figure on the left-hand side shows the distribution of the propensity scores when using data on credit ratings. The figure on the right-hand side shows the results when using data on bond spreads.

Figure 8: Year-by-year ATE, credit ratings



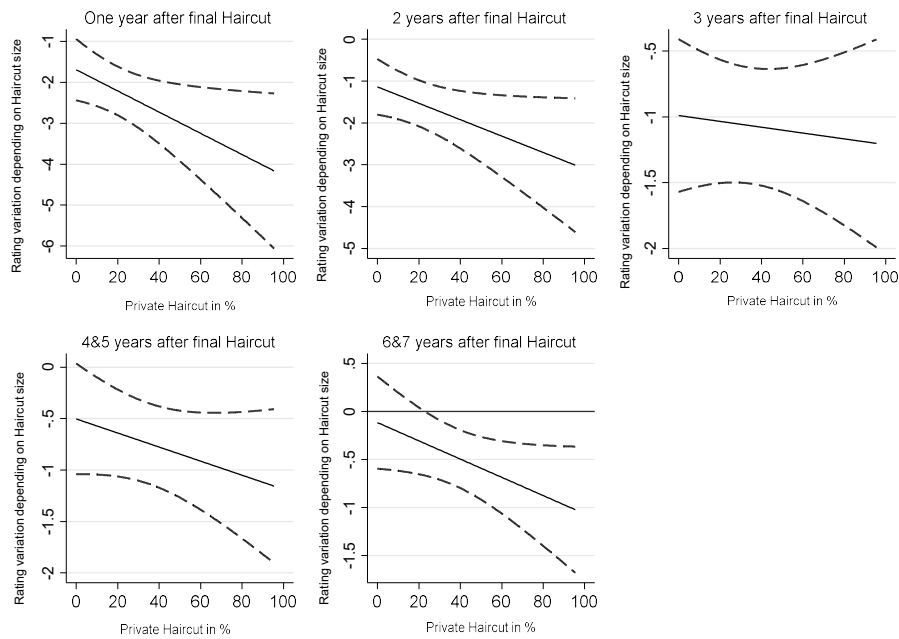
Notes: Graphs show AIPW average treatment effect estimates for each h-step ahead forecast of change in agency ratings following the end of a private and official restructuring.

Figure 9: Year-by-year ATE, bond spreads



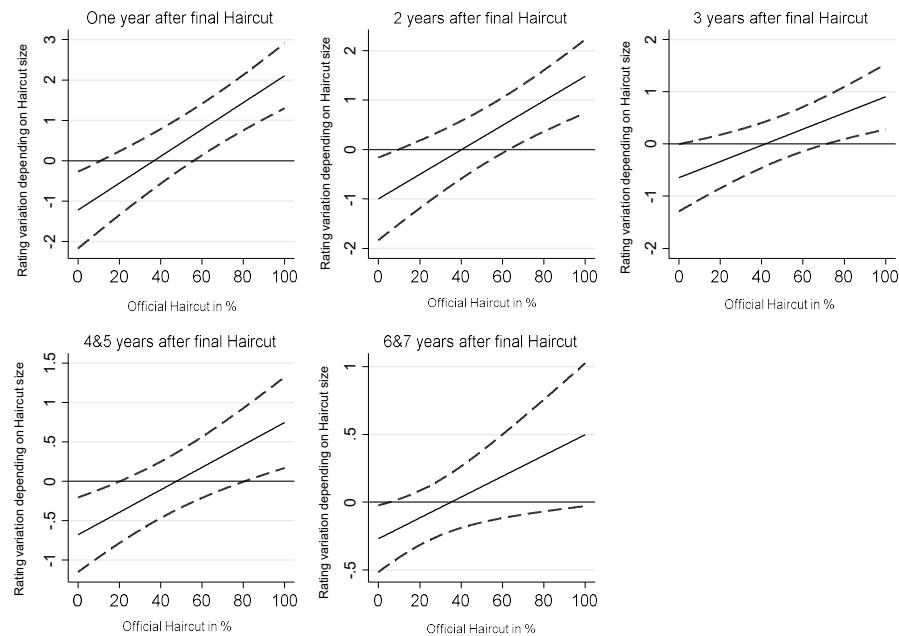
Notes: Graphs show AIPW average treatment effect estimates for each h-step ahead forecast of change in monthly average country yield spread over US Treasury bonds (EMBIG stripped spread) measured in basis points (bp) following the end of a private and official restructuring.

Figure 10a: Expected effect on agency rating for different levels of private haircut



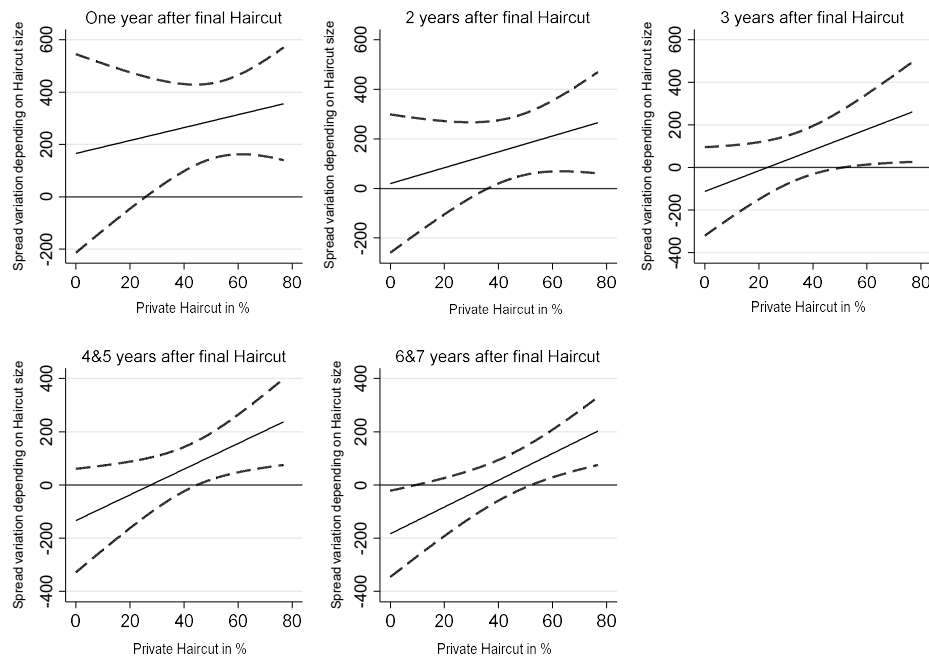
Notes: Each graph shows the marginal effect of private haircut on agency rating, for different haircut sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table 3, column 6. The rating contraction of a restructuring is statistically significant for levels of haircut at which the upper confidence band is below the zero horizontal line. We can see that haircut greater than 20 percent (the mean of this sample being about 40 percent) can be associated with significantly lower ratings during the seven years after a restructuring.

Figure 10b: Expected effect on agency rating for different levels of official haircut



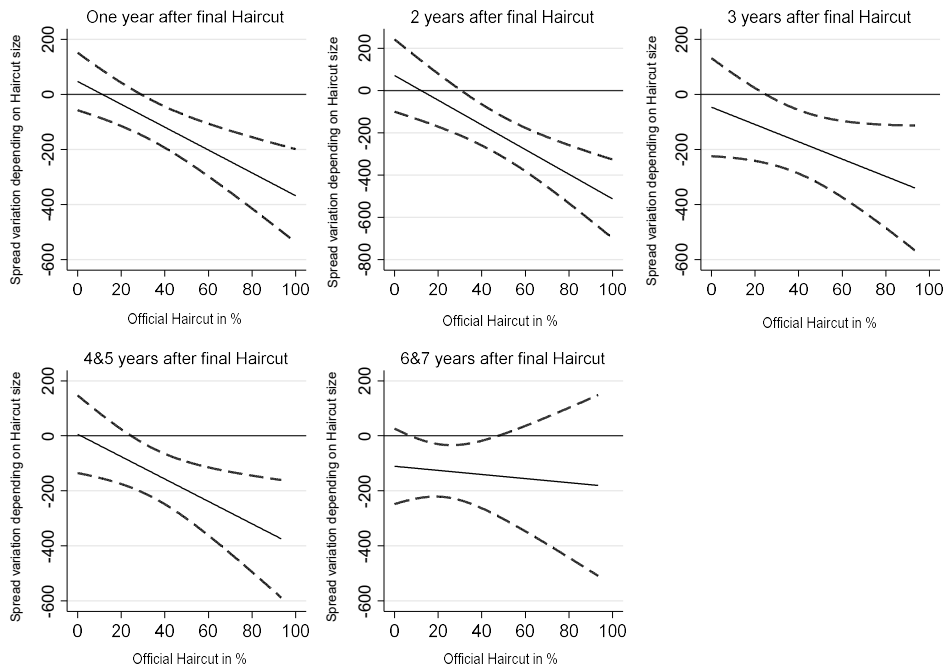
Notes: Each graph shows the marginal effect of official haircut on agency rating, for different haircut sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table 3, column 6. The rating increase of a restructuring is statistically significant for levels of haircut at which the lower confidence band is above the zero horizontal line. From year one to three after the final agreements, we can see that haircut greater than 60 percent (about the mean of this sample) can be associated with significantly higher ratings. At lag 4&5, the rating increase can be significant only for haircuts greater than 80 percent, while at lag 6&7 the effect is never significant.

Figure 11a: Expected effect on bond spread for different levels of private haircut



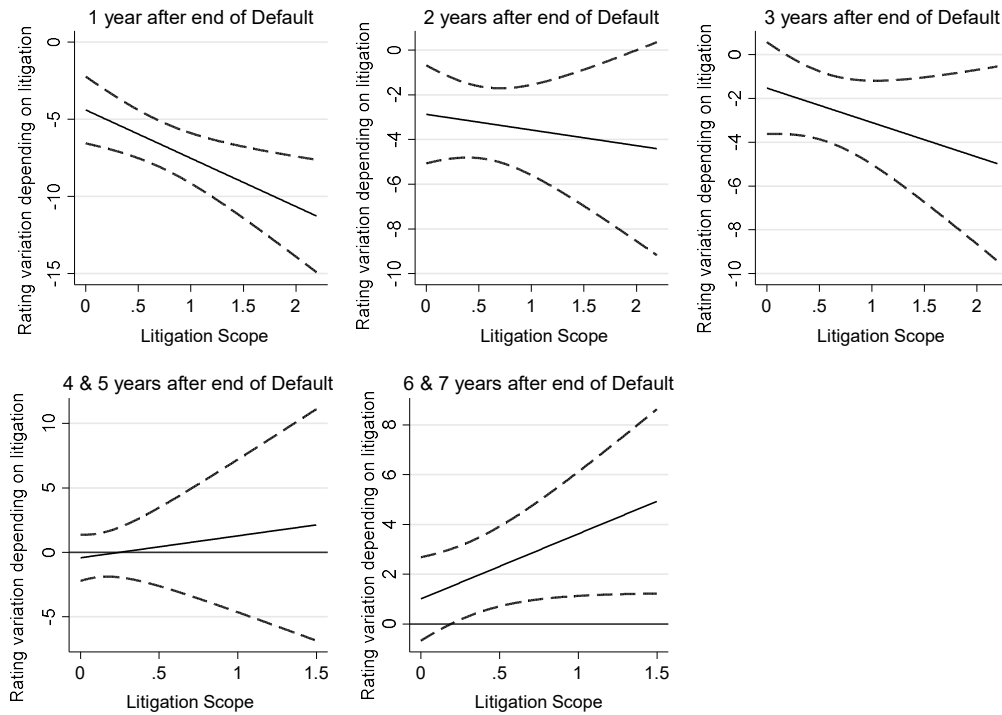
Notes: Each graph shows the marginal effect of private haircut on bond spreads, for different haircut sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table 8, column 6. The spread increase of a restructuring is statistically significant for levels of haircut at which the lower confidence band is above the zero horizontal line. We can see that haircuts above 40 percent (the mean of this sample) can be associated with significantly higher spreads from one to the seven years after a restructuring (at lag 3 and 6&7 significance is actually reached for values of haircut greater than 50 percent).

Figure 11b: Expected effect on bond spread for different levels of official haircut



Notes: Each graph shows the marginal effect of official haircut on bond spreads, for different haircut sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table 7, column 6. The spread decrease of a restructuring is statistically significant for levels of haircut at which the upper confidence band is below the zero horizontal line. We can see that haircuts above 30 percent (the mean of this sample being 60 percent) can be associated with significantly lower spreads from one to the seven years after a restructuring (at lag 6&7 the effect is actually significant only for much smaller haircuts (i.e., between 10 and 50 percent)).

Figure 12: Expected effect on Investor rating for different levels of litigation scope



Notes: Each graph shows the marginal effect of litigation size on Investor rating for different litigation sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table 9, column 4. The rating decrease due to litigation costs is statistically significant for levels of litigation at which the lower confidence band is below the zero horizontal line. We can observe a significant decrease in Investor rating for any size of litigation from one to three years after the end of default. After four to five years the effect is never significant, while after six to seven years ratings start to improve.

Online Appendix A: Sample and descriptive statistics

Table A1a: Country sample, defaulters

Table A1b: Country sample, non-defaulters

Table A2a: List of agencies

Table A2b: Correlations between agency credit rating, 1990-2018

Table A2c: Correlation between agency and EMBIG spread

Table A3: Translation of sovereign ratings into numerical values (21-point scale)

Table A4: Descriptive statistics

Online Appendix B: Augmented inverse propensity score weighted

Table B1: Variable definitions and sources

Table B2: First stage, logit results

Table B3: Second stage credit ratings, private and official restructuring

Table B4: Second stage bond spread, private and official restructuring

Table B5: ATE on change in ratings, robustness checks

Figure B1: Year-by-year ATE, robustness checks

Online Appendix C: Restructuring size

Table C1: Variable definitions and sources

Table C2: Descriptive statistics

Table C3: Private and official nominal haircut and agency credit rating, 1990-2013, OLS

Table C4: Private and official haircut and agency rating, 1990-2013, robustness checks

Figure C1a: Expected effect on agency rating for different levels of private nominal haircut

Figure C1b: Expected effect on agency rating for different levels of official nominal haircut

Figure C2a: Expected effect on (mean of) agency rating for different levels of private haircut

Figure C2b: Expected effect on (mean of) agency rating for different levels of official haircut

Online Appendix A: Sample and descriptive statistics

Table A1a: Country sample, defaulters

	Private restructurings		Official restructurings	
Albania	1991-1995		1993-2000	
<i>Angola</i>			1989	
Argentina	1982-1993	2001-2005	1985-1992	2014
Belize	2006-2013			
<i>Benin</i>			1989-2003	
Bolivia	1980-1993		1986-2001	
Bosnia Herzegovina	1992-1997		1998-2000	
Brazil	1983-1994		1983-1992	
Bulgaria	1990-1994		1991-1994	
<i>Burkina Faso</i>			1991-2002	
<i>Cambodia</i>			1995	
Cameroon	1985-2003		1989-2006	
Chile	1983-1990		1975-1987	
Congo, Dem. Rep.	1975-1989		1976-1989	2002-2010
Congo, Rep.	1983-1988	2007	1986-2004	2010
Costa Rica	1981-1990		1983-1993	
Cote d'Ivoire	1983-1998	2000-2012	1984-1994	1998-2012
Croatia	1992-1996		1995	
Cuba	1983-1985		1985-1986	
Dominican Republic	1982-1994	2004-2005	1985-1991	2004-2005
Ecuador	1982-1995	1999-2000	2008-2009	1983-2003
<i>Egypt, Arab Rep.</i>			1987-1991	
<i>El Salvador</i>			1990	
Ethiopia	1990-1996		1992-2004	
Gabon	1986-1994		1987-1995	2000-2004
<i>Georgia</i>			2001-2004	
<i>Ghana</i>			1996-2004	
Greece	2012			
Grenada	2004-2005		2006	
<i>Guatemala</i>			1993	
Honduras	1981-2001		1990-2005	
<i>Indonesia</i>			1994-2005	
Iraq	1986-2006			
Jamaica	1977-1990		1984-1993	
Jordan	1989-1993		1989-2002	
Kenya	1992-1998		1994-2004	
<i>Kyrgyz Republic</i>			2002-2005	
Macedonia	1983-1988	1992-1997	1984-1988	1995-2000
<i>Mali</i>			1988-2003	
Mexico	1982-1990		1983-1989	
Moldova	2001-2004		2006	
Morocco	1983-1990		1983-1992	
Mozambique	1983-1991	2007	1984-2001	
Nicaragua	1978-1995	2007	1991-2004	
Nigeria	1982-1991		1986-1991	2000-2005
Pakistan	1998-1999		1981	1999-2001
Panama	1984-1996		1985-1990	
Paraguay	1986-1993			
Peru	1978-1997		1978-1996	
Philippines	1983-1992		1984-1994	
Poland	1981-1994		1981-1991	
Romania	1981-1983	1986	1982-1983	

Russia	1991-2000		1993-1999
<i>Rwanda</i>			1998-2005
Senegal	1980-1985	1990-1996	1981-2004
Serbia			
Seychelles	2008-2010		
Slovenia			
South Africa	1985-1993		
<i>Sri Lanka</i>			2005
Trinidad and Tobago	1988-1989		1989-1990
Turkey	1976-1982		1978-1980
Uganda	1979-1993		1981-2000
Ukraine	1998-2000		2001
Uruguay	1983-1991	2003	
Venezuela, RB	1983-1990		
Viet Nam	1982-1997		1993
Zambia	1983-1994		1983-2005

Notes: Countries in bold correspond to are those with only private restructurings, while countries in italics are those with only official restructurings.

Table A1b: Country sample, non-defaulters

Andorra	Czech Rep.	Lesotho	Slovak Rep.
Armenia	Estonia	Libya	St. Vincent and the Gren.
Aruba	Faroe Islands	Liechtenstein	Suriname
Azerbaijan	Fiji	Lithuania	Taiwan
The Bahamas	French Polynesia	Macao	Tajikistan
Bahrain	Gibraltar	Malaysia	Thailand
Bangladesh	Hong Kong	Maldives	Tunisia
Barbados	Hungary	Malta	Turkmenistan
Belarus	India	Mauritius	Turks and Caicos Islands
Bermuda	Iran	Mongolia	United Arab Emirates
Botswana	Isle of Man	Montenegro	Uzbekistan
Cabo Verde	Israel	Namibia	
Cayman Islands	Kazakhstan	Oman	
China	South Korea	Papua New Guinea	
Colombia	Kuwait	Qatar	
Curacao	Latvia	Saudi Arabia	
Cyprus	Lebanon	Singapore	

Table A2a: List of agencies

Variable	Observations	Countries	Years	Headquarter	Source
Standard & Poor's (S&P)	24621	114	1977-2018	United States	Bloomberg
Moody's Investors Service	22950	117	1986-2018	United States	Bloomberg
Fitch Ratings	18596	99	1994-2018	United States/France	Bloomberg
Dominion Bond Rating Services (DBRS)	1609	20	2006-2018	Canada	Bloomberg
Dagong Global	6079	67	2010-2018	China	Bloomberg
Rating and Investment Information (R&I)	6189	28	1998-2018	Japan	Bloomberg
Japan Credit Rating Agency (JCR)	4041	21	1998-2018	Japan	Bloomberg
Capital Intelligence (CI)	4884	36	2002-2018	Cyprus/Kuwait	Bloomberg

Table A2b: Correlations between agency credit rating, 1990-2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Standard & Poor's (S&P)	1							
Moody's Investors Service	0.979	1						
Fitch Ratings	0.991	0.987	1					
Dominion Bond Rating Services (DBRS)	0.977	0.992	0.988	1				
Dagong Global	0.869	0.913	0.907	0.919	1			
Rating and Investment Information (R&I)	0.934	0.955	0.957	0.954	0.973	1		
Japan Credit Rating Agency FN (JCR)	0.942	0.966	0.968	0.972	0.980	0.992	1	
Capital Intelligence (Cyprus)	0.974	0.991	0.988	0.989	0.942	0.979	0.986	1

Table A2c: Correlation between agency and EMBIG spread

	(1)	(2)
Agency rating (mean)	1	
EMBIG spread	-0.563	1

Table A3: Translation of sovereign ratings into numerical values (21-point scale)

CI CYP (KWT)	Dagong CHN	DBRS CAN	Fitch USA (FRA)	Moody's USA	JCR JPN	R&I JPN	S&P USA	Numerical scale
AAA	AAA	AAA	AAA	Aaa	AAA	AAA	AAA	21
AA+	AA+	AAH	AA+	Aa1	AA+	AA+	AA+	20
AA	AA	AA	AA	Aa2	AA	AA	AA	19
AA-	AA-	AAL	AA-	Aa3	AA-	AA-	AA-	18
A+	A+	AH	A+	A1	A+	A+	A+	17
A	A	A	A	A2	A	A	A	16
A-	A-	AL	A-	A3	A-	A-	A-	15
BBB+	BBB+	BBBH	BBB+	Baa1	BBB+	BBB+	BBB+	14
BBB	BBB	BBB	BBB	Baa2	BBB	BBB	BBB	13
BBB-	BBB-	BBBL	BBB-	Baa3	BBB-	BBB-	BBB-	12
BB+	BB+	BBH	BB+	Ba1	BB+	BB+	BB+	11
BB	BB	BB	BB	Ba2	BB	BB	BB	10
BB-	BB-	BBL	BB-	Ba3	BB-	BB-	BB-	9
B+	B+	BH	B+	B1	B+	B+	B+	8
B	B	B	B	B2	B	B	B	7
B-	B-	BL	B-	B3	B-	B-	B-	6
CCC+	CCC+	CCCH	CCC+	Caa1	CCC+	CCC+	CCC+	5
CCC	CCC	CCC	CCC	Caa2	CCC	CCC	CCC	4
CCC-	CCC-	CCCL	CCC-	Caa3	CCC-	CCC-	CCC-	3
CC	CC	CC	CC	Ca	CC	CC	CC	2
C	C	C	C	C	C		C	1
DDD			DDD		DDD		SD	1
DD			DD		DD			1
D	D	D	D		D	D	D	1
			RD		RD			1

Source : Fuchs and Gehring (2017).

Table A4: Descriptive statistics

Variable	N	Mean	SD	Min	Max
EMBIG	3,363	364.60	295.04	0	3158.22
Credit rating	24,624	10.50	2.81	1	17
Final Private Haircut Dummy	24,624	0.01	0.02	0	1
Final Official Haircut Dummy	24,624	0.01	0.02	0	1
Final Private Haircut	24,624	0.35	0.80	0	95.50
Final Official Haircut	24,624	0.21	0.75	0	100
External debt (billions)	24,624	96.10	119	1.77	557
Reserves to external debt	24,624	56.12	50.02	3.81	444.36
General gov. gross debt to GDP	24,624	45.28	21.67	5.87	145.10
Per capita GDP	24,624	4982.88	3184.72	757.67	12052.72
Inflation	24,624	6.30	5.91	-1.55	59.22
Terms of trade (billions)	24,624	689	29800	-152000	298000
Current account	24,624	-1.87	6.03	-54.14	24.01
Openness	24,624	78.97	38.10	20.72	210.37
Government consumption	24,624	13.49	3.92	5.04	25.19
War	24,624	4.00	0.00	2.00	4.00
Government change	24,624	0.16	0.37	0	1
Polity2	24,624	5.27	5.20	-7	10
IMF net loans	24,624	0.01	0.75	-3.23	5.90
Law and order	24,624	3.08	0.96	1	6

Notes: Descriptive statistics refer to the specification of Table 3, column 6. Statistics on bond spread (EMBIG) refer to the specification of Table 5, column 6.

Online Appendix B: Augmented inverse propensity score weighted

Table B1: Variable definitions and sources

Variable	Definition	Source
CONTROLS & PREDICTORS: USED IN BOTH STAGE 1 (LOGIT) AND STAGE 2 (LOCAL PROJECTION)		
Current account	Current account to GDP	World Development Indicators, World Bank (2018)
Government change	Dummy variable with a value of one	Database of Political Institutions, World Bank (2017)
External debt	Ratio of external debt	World Development Indicators, World Bank (2018)
Per capita GDP	Per capita GDP (constant 2005 US\$)	World Development Indicators, World Bank (2018)
General gov. gross debt to GDP	General government gross debt to GDP	International Financial Statistics, IMF (2018)
Government consumption	General government final consumption expenditure (% of GDP)	World Development Indicators, World Bank (2018)
Inflation	Consumer price index (2010 = 100), Annual rate of change	World Development Indicators, World Bank (2018)
Openness	Exports plus imports of goods and services, ratio to GDP	World Development Indicators, World Bank (2018)
Polity2	Revised combined Polity IV score (Polity2) ranging from -10 (hereditary monarchy) to 10 (consolidated democracy)	Polity IV Project (Marshall et al. 2014)
Reserves to external debt	Total reserves (% of total external debt)	World Development Indicators, World Bank (2018)
Terms of trade	Annual change in terms-of-trade (in million)	World Development Indicators, World Bank (2018)
War	ICRG war index. A score of 4 points equates to Very Low Risk and a score of 0 points to Very High Risk.	International Country Risk Guide, The PRS Group (2018)
PREDICTORS USED IN STAGE 1 (LOGIT) ONLY		
U.S treasury 3-year T-bill rate	3-Month Treasury Bill, Secondary Market Rate (Percent). Monthly (Averages of Business Days, Discount Basis) data, not seasonally adjusted.	Board of Governors of the Federal Reserve System (US), retrieved from FRED, Federal Reserve Bank of St. Louis
Share of past months in default	Share of past months in default, specific to years available for each country in sample.	Built by the authors
CONTROLS USED IN STAGE 2 (LOCAL PROJECTION) ONLY		
Final Private Haircut	Private debt haircut, in percent	Built by the authors, based on Cruces and Trebesch (2013b)
Final Private Haircut Dummy	Dummy =1 in case of a private haircut	Built by the authors
Final Official Haircut	Official debt haircut, in percent	Built by the authors, based on Cheng <i>et al.</i> (2017)
Final Official Haircut Dummy	Dummy =1 in case of an official haircut	Built by the authors
IMF net loans	IMF net loans, ratio to GDP	World Development Indicators, World Bank (2018)
Law and order	ICRG law and order index.	International Country Risk Guide, The PRS Group (2018)

Table B2: First stage, logit results

	Agency rating	Bond spread
External debt to GDP (-1)	-0.001 (0.001)	-0.001* (0.001)
Reserves to external debt (-1)	-0.155* (0.083)	-0.087*** (0.026)
General gov. gross debt to GDP (-1)	-0.008 (0.014)	-0.008 (0.006)
Per capita GDP (-1)	-0.001 (0.001)	-0.001 (0.001)
Inflation (-1)	0.016 (0.033)	0.008** (0.004)
Terms of trade (-1)	0.001 (0.001)	0.001 (0.001)
Current account (-1)	0.100 (0.072)	0.058 (0.059)
Openness (-1)	0.039 (0.025)	0.013* (0.007)
Government consumption (-1)	-0.163 (0.236)	-0.039 (0.048)
Government change (-1)	0.969 (0.599)	0.048 (0.844)
Polity2 (-1)	0.059 (0.166)	0.042 (0.046)
War (-1)	-	0.875 (0.665)
Share of past months in default (-1)	18.115** (8.926)	-0.018 (1.268)
U.S treasury 3-year T-bill rate (-1)	0.463** (0.198)	0.211 (0.162)
Constant	-4.581 (2.801)	-7.318*** (2.802)
Pseudo R-squared	0.36	0.24
Adjusted pseudo R-squared	0.16	0.07
Hosmer-Lemeshow p-value	1.00	0.97
Income group FE	YES	YES
Observations	25,269	11,628

Notes: The model uses predictors listed in Table B1 in the first stage and income group dummies as fixed effect. For Hosmer-Lemeshow test, reporting p-value of test using 15 groups (p number of covariates); null is that observed and expected proportions are the same across all doses (model adequately fits the data). Standard errors are clustered at the country level, t-statistics in parenthesis. Significance levels: *0.10, ** 0.05, *** 0.01.

Table B3: Second stage, credit ratings, private and official restructuring

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Final private haircut (dummy)	-0.749*	-0.443	-1.632**	-1.509**	-1.511*	-1.156	-0.824
	(0.437)	(0.543)	(0.636)	(0.741)	(0.869)	(0.861)	(0.930)
Final official haircut (dummy)	0.144	0.056	0.404	0.274	0.494	0.590	0.591
	(0.247)	(0.334)	(0.390)	(0.441)	(0.364)	(0.373)	(0.379)
Final private haircut	0.000	-0.002	-0.002	-0.004	-0.009	-0.014*	-0.010
	(0.005)	(0.006)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)
Final official haircut	0.936	0.203	2.282***	1.900*	1.889	1.320	0.821
	(0.586)	(0.746)	(0.866)	(1.008)	(1.163)	(1.202)	(1.288)
External debt to GDP (-1)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	-0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Reserves to external debt (-1)	0.001	-0.001	-0.005**	-0.008**	-0.008**	-0.009**	-0.013***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
General gov. gross debt to GDP (-1)	-0.002	-0.001	-0.010	-0.011	-0.011	-0.010	-0.012
	(0.002)	(0.004)	(0.006)	(0.008)	(0.009)	(0.010)	(0.011)
Per capita GDP (-1)	-0.001**	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation (-1)	0.006*	0.014**	0.017*	0.010	0.005	-0.007	-0.023
	(0.004)	(0.007)	(0.009)	(0.010)	(0.013)	(0.015)	(0.016)
Terms of trade (-1)	0.001	0.001	0.001	0.001*	0.001***	0.001***	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Current account (-1)	0.022***	0.031***	0.058***	0.052***	0.059***	0.067***	0.070***
	(0.004)	(0.009)	(0.012)	(0.014)	(0.017)	(0.018)	(0.021)
Openness (-1)	-0.001	-0.005	-0.012***	-0.016**	-0.018**	-0.013	-0.008
	(0.002)	(0.003)	(0.005)	(0.006)	(0.008)	(0.009)	(0.011)
Government consumption (-1)	-0.006	-0.014	-0.021	-0.041	-0.060	-0.097*	-0.187***
	(0.011)	(0.023)	(0.036)	(0.045)	(0.050)	(0.052)	(0.064)
Government change (-1)	0.080**	0.094	0.098	0.093	0.062	-0.069	0.074
	(0.036)	(0.059)	(0.084)	(0.078)	(0.077)	(0.085)	(0.097)
Polity2 (-1)	-0.007	-0.025	-0.006	-0.010	-0.035	-0.058	-0.067
	(0.015)	(0.022)	(0.025)	(0.038)	(0.047)	(0.053)	(0.065)
IMF net loans	0.017	-0.051	-0.117***	-0.198***	-0.197***	-0.068	0.078
	(0.029)	(0.042)	(0.035)	(0.047)	(0.061)	(0.071)	(0.072)
Law and order	0.037	0.052	0.055	0.012	-0.039	0.125	0.200
	(0.055)	(0.102)	(0.122)	(0.147)	(0.166)	(0.180)	(0.200)
Constant	0.507	1.518**	3.770***	5.272***	6.551***	6.822***	8.031***
	(0.322)	(0.612)	(0.923)	(1.281)	(1.563)	(1.888)	(2.346)
R-squared	24,624	22,701	20,795	18,857	16,807	14,788	12,852
Observations	0.215	0.342	0.439	0.506	0.586	0.656	0.706
Time FE	YES	YES	YES	YES	YES	YES	YES
Pair FE	YES	YES	YES	YES	YES	YES	YES

Notes: Table shows inverse propensity weighted regression results for each h-step ahead forecast on change in agency ratings using dyadic data. The model uses controls listed in Table B1 and controls for agency-pair invariant and time-varying heterogeneity. Standard errors are clustered at the agency-country level, t-statistics in parenthesis. Significance levels: *0.10, ** 0.05, *** 0.01.

Table B4: Second stage, bond spread, private and official restructuring

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Final private haircut (dummy)	279.940 (171.594)	486.918** (220.102)	1,793.555*** (336.012)	292.431 (271.716)	509.596 (465.174)	42.208 (255.564)	-344.368** (152.891)
Final official haircut (dummy)	-117.734 (76.885)	-261.136*** (85.660)	-303.963* (174.077)	-148.053 (176.035)	-360.584 (473.065)	-27.123 (58.203)	-73.508 (72.788)
Final private haircut	-2.220 (3.139)	31.466* (16.287)	-4.180 (2.587)	-6.092** (2.462)	-5.196 (4.707)	-3.319 (4.959)	2.832 (1.926)
Final official haircut	-570.034** (279.366)	-1,245.391*** (345.352)	-3,171.284*** (462.813)	-1,374.310*** (324.259)	-2,326.655*** (556.596)		
External debt to GDP (-1)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)
Reserves to external debt (-1)	1.148** (0.562)	2.650** (1.001)	3.368** (1.436)	3.218* (1.850)	1.383 (1.220)	0.539 (0.706)	0.716 (0.620)
General gov. gross debt to GDP (-1)	0.239 (1.716)	-0.524 (3.152)	-2.644 (3.313)	-4.315 (4.258)	-4.831 (4.611)	-1.003 (4.016)	6.197 (4.592)
Per capita GDP (-1)	0.020 (0.025)	0.032 (0.048)	0.022 (0.072)	0.061 (0.106)	0.079 (0.129)	0.086 (0.153)	0.314** (0.142)
Inflation (-1)	-5.143** (2.454)	-6.277* (3.258)	-3.695 (3.324)	-4.431 (3.534)	0.728 (5.862)	-1.300 (5.522)	9.249** (4.278)
Terms of trade (-1)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Current account (-1)	0.672 (3.671)	2.143 (5.221)	5.870 (4.622)	11.643 (10.678)	11.202 (12.756)	17.205** (8.172)	7.197 (9.029)
Openness (-1)	0.492 (1.155)	0.690 (2.047)	-0.884 (1.968)	1.004 (2.493)	0.446 (3.722)	-0.732 (4.077)	-5.358 (3.728)
Government consumption (-1)	4.205 (8.534)	-4.917 (14.762)	-15.691 (24.442)	-6.269 (45.306)	-23.518 (47.122)	-5.196 (40.400)	86.950* (42.355)
War (-1)	172.364 (141.709)	254.509 (155.048)	261.054 (184.699)	259.585 (224.411)	67.765 (197.452)	-156.043 (131.180)	-274.868*** (93.163)
Government change (-1)	52.645 (39.599)	95.526** (36.308)	65.772 (44.320)	8.071 (34.022)	-6.208 (33.783)	13.630 (36.854)	11.668 (41.399)
Polity2 (-1)	-14.099 (10.079)	-18.889 (20.381)	-21.946 (16.665)	-20.900 (25.861)	-40.376 (42.494)	-52.524 (56.257)	78.966** (34.694)
IMF net loans	2.785 (20.831)	4.567 (16.759)	-10.824 (16.795)	-22.822 (33.613)	-62.379* (33.516)	-46.687* (26.707)	-83.203*** (19.668)
Law and order	-18.905 (24.869)	-35.112 (58.791)	-65.289 (55.025)	-6.055 (72.356)	51.653 (101.239)	9.716 (70.240)	53.591 (71.103)
Constant	-1,047.543 (629.821)	-1,387.247 (858.500)	-987.079 (1,226.410)	-1,453.713 (1,541.434)	-339.567 (1,388.432)	228.558 (1,862.605)	-4,331.277** (1,861.921)
R-squared	3,363	2,968	2,586	2,208	1,878	1,587	1,301
Observations	0.211	0.331	0.397	0.400	0.435	0.497	0.659
Time FE	YES	YES	YES	YES	YES	YES	YES
Pair FE	YES	YES	YES	YES	YES	YES	YES

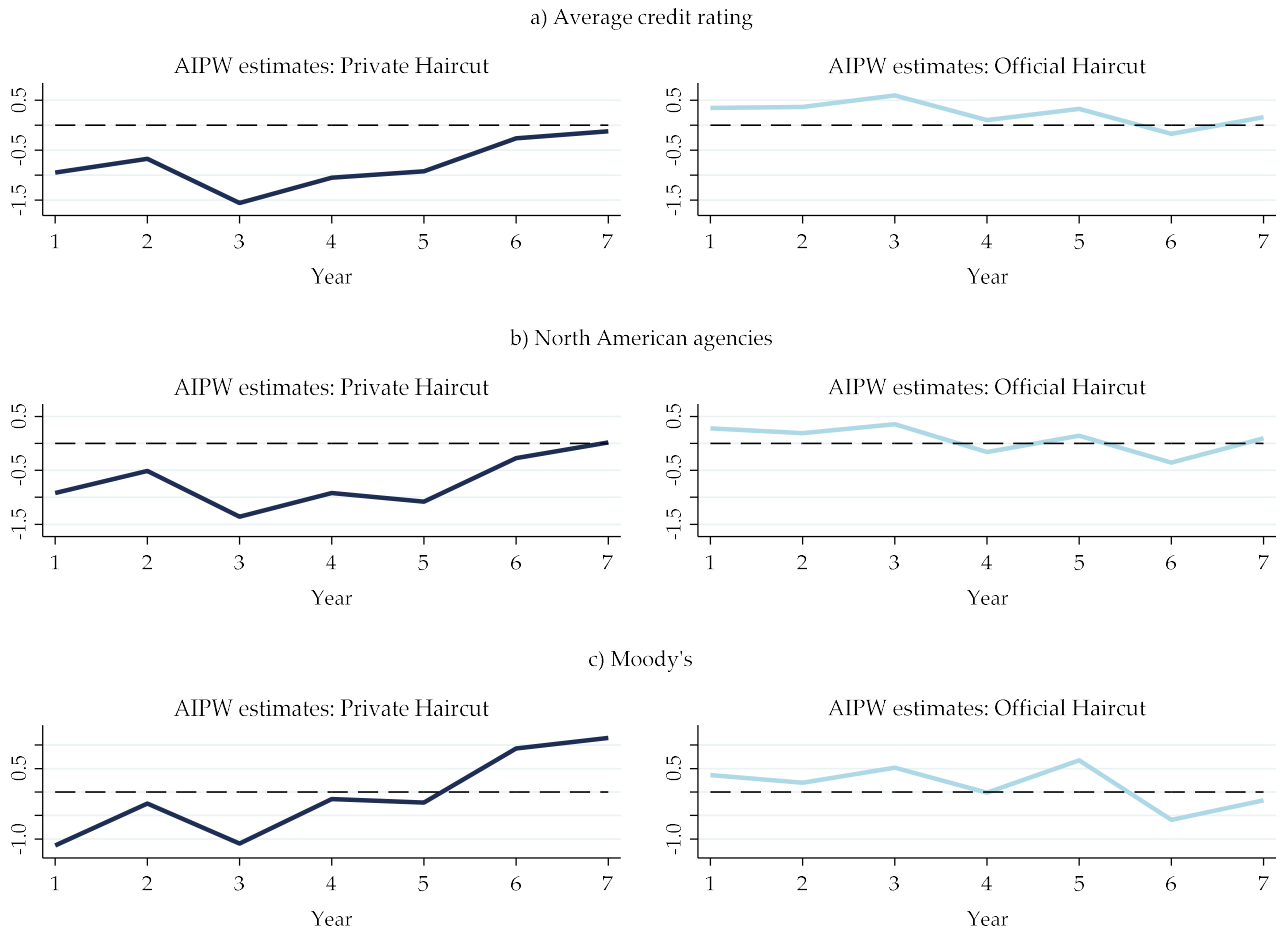
Notes: Table shows inverse propensity weighted regression results for each h-step ahead forecast on change in monthly secondary market yield spreads. The model uses controls listed in Table B1 and controls for country-level invariant and time-varying heterogeneity. Standard errors are clustered at the country level, t-statistics in parenthesis. Significance levels: *0.10, ** 0.05, *** 0.01.

Table B5: ATE on change in ratings, robustness checks

	Average credit rating		North American agencies		Moody's	
	Private	Official	Private	Official	Private	Official
	(1)	(2)	(3)	(4)	(5)	(6)
Year 1	-0.95*** (0.001)	0.35*** (0.001)	-0.92*** (0.001)	0.28*** (0.001)	-1.14*** (0.001)	0.36*** (0.001)
Year 2	-0.67*** (0.001)	0.36*** (0.001)	-0.51*** (0.001)	0.19*** (0.001)	-0.24*** (0.001)	0.20*** (0.001)
Year 3	-1.56*** (0.001)	0.60*** (0.001)	-1.36*** (0.001)	0.36*** (0.001)	-1.09*** (0.001)	0.52*** (0.001)
Year 4	-1.05*** (0.001)	0.10*** (0.001)	-0.92*** (0.001)	-0.16*** (0.001)	-0.15*** (0.001)	-0.01*** (0.001)
Year 5	-0.92*** (0.001)	0.33*** (0.001)	-1.08*** (0.001)	0.14*** (0.001)	-0.22*** (0.001)	0.68*** (0.001)
Year 6	-0.26*** (0.001)	-0.17*** (0.001)	-0.27*** (0.001)	-0.36*** (0.001)	0.93*** (0.001)	-0.59*** (0.001)
Year 7	-0.12*** (0.001)	0.16*** (0.001)	0.02*** (0.001)	0.10*** (0.001)	1.15*** (0.001)	-0.17*** (0.001)

Notes: Table shows average treatment effect of private and official restructurings on change in agency ratings. The dependent variables are: the monthly mean of all agencies' rating (Columns 1 and 2); the monthly mean of the four North American agencies, i.e. Standard & Poor's, Moody's, Fitch, Dominion Bond Rating Services (Columns 3 and 4); the monthly mean of Moody's (Columns 5 and 6). Standard errors (in parenthesis) are clustered at the agency-country level. The model uses predictors and controls for first and second stage listed in the Online Appendix B and controls for agency-pair invariant and time-varying heterogeneity. Significance levels: *0.10, ** 0.05, *** 0.01

Figure B1: Year-by-year ATE, robustness checks



Notes: Graphs show AIPW average treatment effect estimates for each h-step ahead forecast of change in agency ratings following the end of a private and official restructuring. The dependent variables are: the monthly mean of all agencies' rating (panel a); the monthly mean of the four North American agencies, i.e. Standard & Poor's, Moody's, Fitch, Dominion Bond Rating Services (panel b); the monthly mean of Moody's (panel c).

Online Appendix C: Restructuring size

Table C1: Variable definitions and sources

Variable	Definition	Source
DEPENDENT VARIABLE		
Sovereign Rating	Sovereign rating on a 21-point scale, monthly (8 agencies, see Table A2b)	Bloomberg
EMBIG spreads	Monthly average secondary market bond stripped yield spread, (EMBIG)	J.P. Morgan
Institutional Investor's Index	Perceived creditworthiness of a large number of countries, monthly	Institutional Investor Magazine
VARIABLES OF INTEREST		
Final Private Haircut	Final Haircut of debt held by private creditors, in percent	Built by the authors, based on Cruces and Trebesch (2013b)
Final Private Haircut Dummy	Dummy =1 in case of a final private haircut	Built by the authors
Final Private Face Value Reduction	Nominal final Haircut of debt held by private creditors, in percent	Built by the authors, based on Cruces and Trebesch (2013b)
Final Private Face Value Reduction Dummy	Dummy =1 in case of a private final nominal haircut	Built by the authors
Final Official Haircut	Final Haircut of debt held by official creditors, in percent	Built by the authors, based on Cheng <i>et al.</i> (2017)
Final Official Haircut Dummy	Dummy =1 in case of an official final haircut	Built by the authors
Final Official Face Value Reduction	Final Nominal Haircut of debt held by official creditors, in percent	Built by the authors, based on Cheng <i>et al.</i> (2017)
Final Official Face Value Reduction Dummy	Dummy =1 in case of an official final nominal haircut	Built by the authors
Private default duration	Dummy=1 for each year of default to private creditors	Asonuma and Trebesch (2016)
End of Private Default dummy	Dummy=1 at the end of the default on debt held by private creditors	Asonuma and Trebesch (2016)
Litigation scope	Ratio of the total case amounts to debtor countries' GDP	Shumaker <i>et al.</i> (2021)
CONTROL VARIABLES		
Current Account	Current account to GDP	World Development Indicators, World Bank (2018)
External debt to GDP	Ratio of external debt to GDP	World Development Indicators, World Bank (2018)
Government change	Dummy variable with a value of one	Database of Political Institutions, World Bank (2017)
GDP growth	Per capita GDP (constant 2015 US\$), Annual rate of change	World Development Indicators, World Bank (2018)
Inflation	Consumer price index (2010 = 100), Annual rate of change	World Development Indicators, World Bank (2018)
(log) Population	Log of total population	World Development Indicators, World Bank (2018)
Net lending/borrowing	General government net lending/borrowing	World Economic Outlook Database, IMF (2018)
Per capita GDP	Per capita GDP (constant 2005 US\$)	World Development Indicators, World Bank (2018)
Law and Order	ICRG Law and Order Index	International Country Risk Guide, The PRS Group (2018)
IMF Net Loans	IMF net loans, ratio to GDP	World Development Indicators, World Bank (2018)
Reserves to imports	Total reserves (% of total imports)	World Development Indicators, World Bank (2018)

Table C2: Descriptive statistics

Variable	N	Mean	SD	Min	Max
Agency rating	43614	12.20	3.77	1	21
Bond spread	4189	456.77	417.51	24.28	5798.78
Investor rating	1357	40.74	17.67	5.30	92.52
Litigation scope	1357	0.10	0.58	0	7.21
Final Priv. Haircut Dummy (-1)	43614	0.01	0.09	0	1
Final Priv. Haircut Dummy (-2)	43614	0.01	0.10	0	1
Final Priv. Haircut Dummy (-3)	43614	0.01	0.12	0	1
Final Priv. Haircut Dummy (-4 & 5)	43614	0.03	0.18	0	1
Final Priv. Haircut Dummy (-6 & 7)	43614	0.04	0.20	0	1
Final Private Haircut (-1)	43614	0.39	5.09	0	95.50
Final Private Haircut (-2)	43614	0.45	5.29	0	95.50
Final Private Haircut (-3)	43614	0.52	5.48	0	95.50
Final Private Haircut (-4 & 5)	43614	1.41	8.95	0	95.50
Final Private Haircut (-6 & 7)	43614	1.58	9.13	0	95.50
Final Off. Restr. Dummy (-1)	43614	0.01	0.07	0	1
Final Off. Restr. Dummy (-2)	43614	0.01	0.08	0	1
Final Off. Restr. Dummy (-3)	43614	0.01	0.08	0	1
Final Off. Restr. Dummy (-4 & 5)	43614	0.01	0.12	0	1
Final Off. Restr. Dummy (-6 & 7)	43614	0.02	0.13	0	1
Final Official Haircut (-1)	43614	0.23	4.23	0	100
Final Official Haircut (-2)	43614	0.25	4.39	0	100
Final Official Haircut (-3)	43614	0.28	4.67	0	100
Final Official Haircut (-4 & 5)	43614	0.61	6.74	0	100
Final Official Haircut (-6 & 7)	43614	0.72	7.38	0	100
GDP real growth (-1)	43614	4.19	3.55	-15.14	33.72
Primary balance to GDP (-1)	43614	-1.81	5.68	-20.35	43.30
Current Account to GDP (-1)	43614	-0.62	8.77	-46.72	45.45
Reserves to imports (-1)	43614	51.54	39.15	1.11	320.27
Public debt to GDP (-1)	43614	45.77	29.29	2.22	183.07
Inflation (-1)	43614	0.5	0.15	0.12	1
Law and Order (-1)	43614	3.77	1.11	1	6
IMF Net Loans	43614	0.02	0.54	-4.21	5.90

Notes: Descriptive statistics refer to the specification of Table 7, column 6. Statistics on Bond spread refer to the Specification of Table 8, column 6, while statistics on litigation (scope) and International Investor rating refer to the specification of Table 9, column 4.

Table C3: Private and official nominal haircut and agency credit rating, 1990-2013, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Final Private Nom. Haircut (-1)	-0.076*** (-3.897)	-0.064*** (-4.295)			-0.048* (-1.814)	-0.030 (-1.111)
Final Private Nom. Haircut (-2)	-0.061*** (-3.771)	-0.053*** (-4.080)			-0.052** (-2.419)	-0.053*** (-2.857)
Final Private Nom. Haircut (-3)	-0.037*** (-3.833)	-0.032*** (-4.311)			-0.037** (-2.413)	-0.044*** (-3.473)
Final Private Nom. Haircut (-4 & 5)	-0.030*** (-3.398)	-0.029*** (-3.753)			-0.037*** (-2.674)	-0.045*** (-3.840)
Final Private Nom. Haircut (-6 & 7)	-0.022*** (-2.971)	-0.023*** (-3.434)			-0.040*** (-3.143)	-0.044*** (-3.799)
Final Official Nom. Haircut (-1)	0.008 (1.049)	0.024*** (4.219)			0.001 (0.095)	0.021 (1.369)
Final Official Nom. Haircut (-2)	0.004 (0.882)	0.019*** (2.889)			-0.008 (-0.707)	0.016 (0.908)
Final Official Nom. Haircut (-3)	-0.001 (-0.372)	0.010* (1.711)			-0.014 (-1.126)	0.007 (0.431)
Final Official Nom. Haircut (-4 & 5)	-0.001 (-0.382)	0.011*** (3.201)			-0.010 (-0.824)	0.034*** (2.779)
Final Official Nom. Haircut (-6 & 7)	-0.002 (-0.677)	0.003 (1.043)			-0.007 (-0.855)	0.015 (1.271)
Final Priv. Nom. Haircut Dummy (-1)			-3.335*** (-4.428)	-3.353*** (-4.556)	-1.677* (-1.871)	-2.198 (-1.539)
Final Priv. Nom. Haircut Dummy (-2)			-2.153*** (-3.873)	-2.037*** (-3.459)	-0.507 (-0.876)	-0.021 (-0.030)
Final Priv. Nom. Haircut Dummy (-3)			-1.001*** (-3.294)	-0.795** (-2.354)	-0.018 (-0.038)	0.637 (1.388)
Final Priv. Nom. Haircut Dummy (-4 & 5)			-0.590** (-2.302)	-0.556* (-1.914)	0.370 (0.976)	0.860** (2.525)
Final Priv. Nom. Haircut Dummy (-6 & 7)			-0.195 (-0.790)	-0.231 (-1.076)	0.766** (2.042)	0.951*** (3.185)
Final Off. Nom. Haircut Dummy (-1)			0.417 (1.378)	1.679*** (4.184)	0.529 (0.580)	0.053 (0.045)
Final Off. Nom. Haircut Dummy (-2)			0.258 (1.093)	1.278*** (4.002)	0.985 (0.978)	-0.007 (-0.006)
Final Off. Nom. Haircut Dummy (-3)			-0.155 (-0.630)	0.715*** (2.743)	1.028 (0.939)	0.106 (0.092)
Final Off. Nom. Haircut Dummy (-4 & 5)			-0.216 (-0.830)	0.618** (2.225)	0.737 (0.620)	-2.068** (-2.292)
Final Off. Nom. Haircut Dummy (-6 & 7)			-0.231 (-1.208)	0.201 (0.825)	0.377 (0.524)	-1.124 (-1.453)
GDP real growth (-1)		0.043*** (3.054)		0.047*** (3.198)		0.044*** (3.123)
Primary balance to GDP (-1)		0.023 (1.345)		0.019 (1.078)		0.024 (1.356)
Current Account to GDP (-1)		-0.047*** (-4.841)		-0.046*** (-4.700)		-0.051*** (-5.250)
Reserves to imports (-1)		0.005 (1.573)		0.005 (1.582)		0.005 (1.620)
Public debt to GDP (-1)		-0.049*** (-5.270)		-0.047*** (-4.799)		-0.049*** (-5.015)
Inflation (-1)		-1.650 (-1.026)		-1.430 (-0.876)		-1.975 (-1.207)
Law and Order (-1)		0.198 (1.329)		0.188 (1.229)		0.160 (1.081)
IMF Net loans (-1)		-0.077 (-1.132)		-0.114 (-1.585)		-0.084 (-1.185)
Constant	13.046*** (18.512)	15.117*** (11.780)	13.107*** (18.459)	14.820*** (11.254)	13.062*** (18.366)	15.231*** (11.628)
Observations	57,984	43,614	57,984	43,614	57,984	43,614
R-squared	0.124	0.330	0.116	0.320	0.130	0.338
Number of Pair	454	363	454	363	454	363
Pair FE	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES

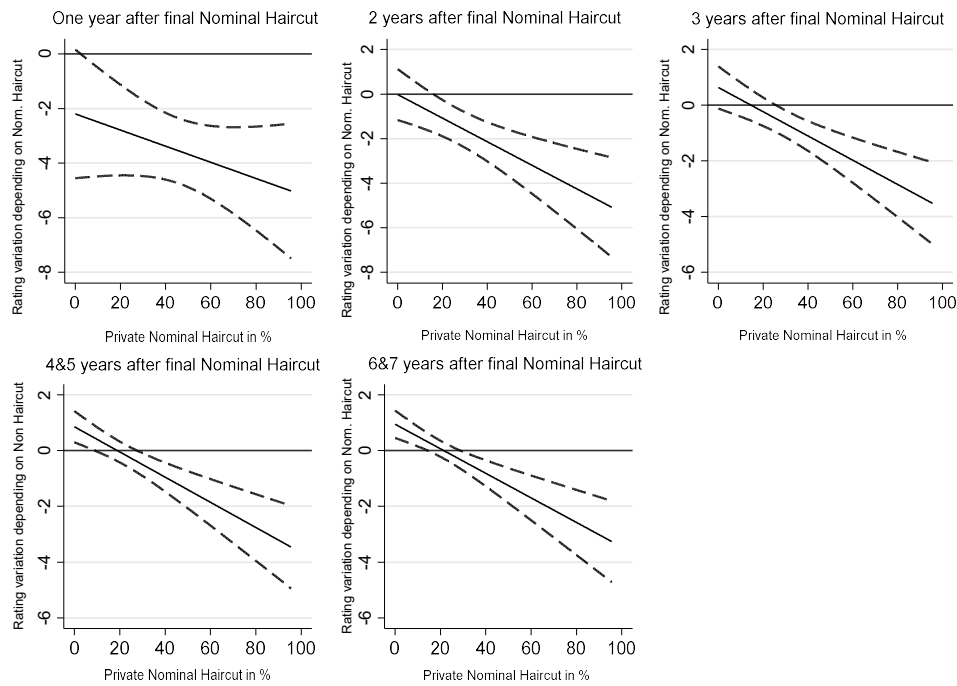
Notes: This table shows coefficients of an unbalanced panel data regression with OLS fixed effects at the agency-country-period-level. Agency-country and period-fixed effects are included. Standard errors are clustered at the agency-country-level, t statistics are in parentheses. Significance levels: *0.10, ** 0.05, *** 0.01.

Table C4: Private and official haircut and agency rating, 1990-2013, robustness checks

	(1)	(2)	(3)	(4)	(5)
Final Private Haircut (-1)	-1.824*** (-4.017)	-3.372*** (-4.271)	-2.226*** (-3.278)	-2.148*** (-3.114)	-1.994** (-2.601)
Final Private Haircut (-2)	-1.193*** (-2.999)	-2.320*** (-3.162)	-1.372** (-2.342)	-1.273** (-2.089)	-1.164 (-1.328)
Final Private Haircut (-3)	-0.930*** (-2.672)	-1.786** (-2.364)	-0.896 (-1.603)	-0.883 (-1.510)	-1.017 (-1.167)
Final Private Haircut (-4 & 5)	-0.539 (-1.627)	-0.652 (-0.952)	-0.376 (-0.662)	-0.382 (-0.656)	-0.552 (-0.693)
Final Private Haircut (-6 & 7)	-0.117 (-0.391)	-0.004 (-0.007)	-0.038 (-0.076)	-0.040 (-0.076)	-0.056 (-0.081)
Final Official Haircut (-1)	-0.024* (-1.695)	-0.006 (-0.306)	-0.009 (-0.618)	-0.009 (-0.631)	-0.020 (-0.782)
Final Official Haircut (-2)	-0.018 (-1.593)	-0.005 (-0.339)	-0.010 (-0.725)	-0.009 (-0.699)	-0.026 (-1.080)
Final Official Haircut (-3)	-0.003 (-0.434)	0.008 (0.648)	-0.003 (-0.291)	-0.002 (-0.207)	-0.009 (-0.551)
Final Official Haircut (-4 & 5)	-0.006 (-0.883)	-0.007 (-0.562)	-0.009 (-0.868)	-0.008 (-0.754)	-0.009 (-0.604)
Final Official Haircut (-6 & 7)	-0.010 (-1.613)	-0.013 (-1.100)	-0.011 (-1.127)	-0.010 (-1.004)	-0.017 (-1.251)
Final Priv. Haircut Dummy (-1)	-1.090* (-1.955)	-2.520** (-2.209)	-0.653 (-0.598)	-0.775 (-0.696)	-1.653 (-0.930)
Final Priv. Haircut Dummy (-2)	-0.922* (-1.796)	-2.337** (-2.389)	-0.873 (-0.926)	-0.894 (-0.930)	-1.340 (-0.982)
Final Priv. Haircut Dummy (-3)	-0.588 (-1.476)	-1.626** (-2.309)	-0.674 (-1.028)	-0.721 (-0.962)	-0.585 (-0.495)
Final Priv. Haircut Dummy (-4 & 5)	-0.706** (-2.408)	-1.398*** (-2.751)	-0.707 (-1.511)	-0.765 (-1.534)	-0.572 (-0.624)
Final Priv. Haircut Dummy (-6 & 7)	-0.217 (-1.436)	-0.536** (-2.114)	-0.544** (-2.220)	-0.405* (-1.828)	-0.027 (-0.068)
Final Off. Haircut Dummy (-1)	0.031*** (4.319)	0.063*** (4.446)	0.021 (1.643)	0.023* (1.762)	0.033 (1.571)
Final Off. Haircut Dummy (-2)	0.024*** (3.480)	0.051*** (3.878)	0.018 (1.570)	0.019 (1.610)	0.020 (1.250)
Final Off. Haircut Dummy (-3)	0.015** (2.502)	0.034*** (3.086)	0.011 (1.216)	0.013 (1.230)	0.007 (0.460)
Final Off. Haircut Dummy (-4 & 5)	0.014*** (2.931)	0.026*** (3.112)	0.012 (1.658)	0.013* (1.772)	0.011 (0.872)
Final Off. Haircut Dummy (-6 & 7)	0.007* (1.725)	0.012** (2.136)	0.011** (2.460)	0.008* (1.794)	0.005 (0.959)
GDP real growth (-1)	0.176*** (3.179)	0.039** (1.979)	0.035 (1.527)	0.039 (1.628)	0.038 (1.114)
Primary balance to GDP (-1)	0.022 (1.322)	0.045 (1.602)	0.029 (1.177)	0.037 (1.431)	0.038 (1.056)
Current Account to GDP (-1)	-0.048*** (-4.937)	-0.082*** (-4.625)	-0.046*** (-3.318)	-0.046*** (-3.329)	-0.062*** (-3.026)
Reserves to imports (-1)	0.004 (1.404)	0.003 (0.614)	0.003 (0.644)	0.004 (0.746)	0.007 (1.167)
Public debt to GDP (-1)	-0.044*** (-4.685)	-0.078*** (-5.592)	-0.039*** (-2.832)	-0.038*** (-2.731)	-0.040** (-2.097)
Inflation (-1)	-1.563 (-0.974)	-4.651 (-1.505)	-1.066 (-0.411)	-1.267 (-0.502)	-0.657 (-0.202)
Law and order (-1)	0.165 (1.087)	0.376 (1.447)	0.114 (0.441)	0.137 (0.534)	0.088 (0.290)
IMF Net Loans (-1)	-0.103 (-1.464)	-0.157 (-1.549)	-0.161 (-1.333)	-0.170 (-1.389)	-0.163 (-0.917)
Change in government	-0.246*** (-2.686)				
Population	0.000 (0.036)				
Growth	-0.129** (-2.485)				
Constant	14.544*** (11.503)		13.750*** (7.452)	13.894*** (7.564)	14.033*** (5.442)
Observations	43,422	43,614	12,937	12,903	10,502
R-squared	0.337		0.338	0.326	0.309
Number of pair/country id	359		84	83	77

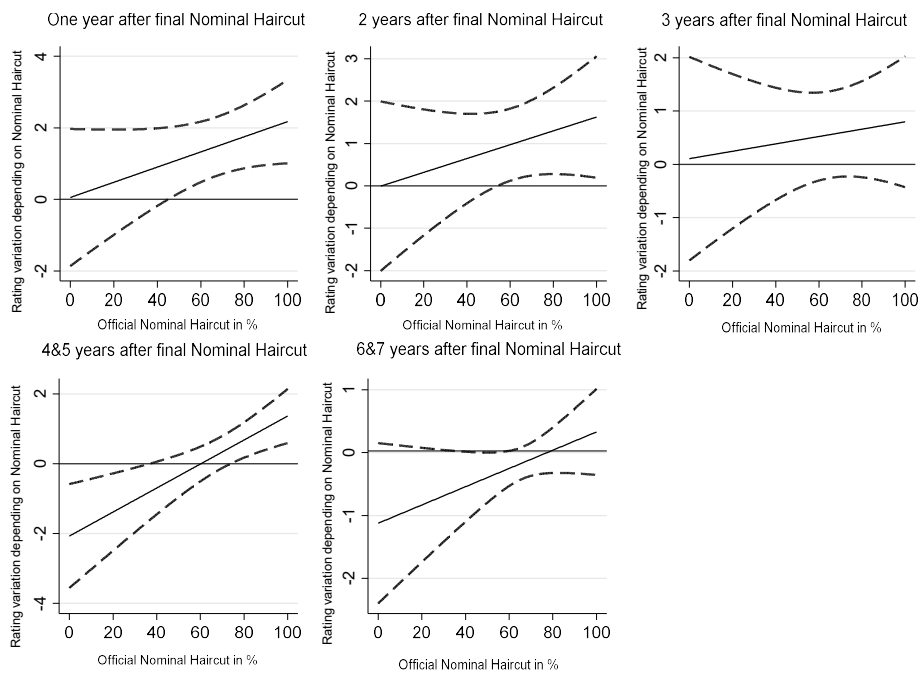
Notes: The dependent variables are the dyadic monthly rating (columns 1-2); the monthly mean of all agencies' rating (column 3); the monthly mean of the 4 North American Agencies, i.e., Standard & Poor's, Moody's, Fitch and DBRS (column 4); Moody's rating (column 5). In column 1 the regressions are estimated using fixed effects OLS at the agency-country-year-level, (s.e. are clustered at the agency-country-level). In column 2, the regression is estimated using an ordered-logit model (s.e. are clustered at the agency-country-level). In columns 3-5, the regressions are estimated using fixed effects OLS at the country-year-level (s.e. clustered at the country-level). All specifications include year and country fixed effects. t- statistics are in parentheses. Significance levels: *0.10, ** 0.05, *** 0.01. .

Figure C1a: Expected effect on agency rating for different levels of private nominal haircut



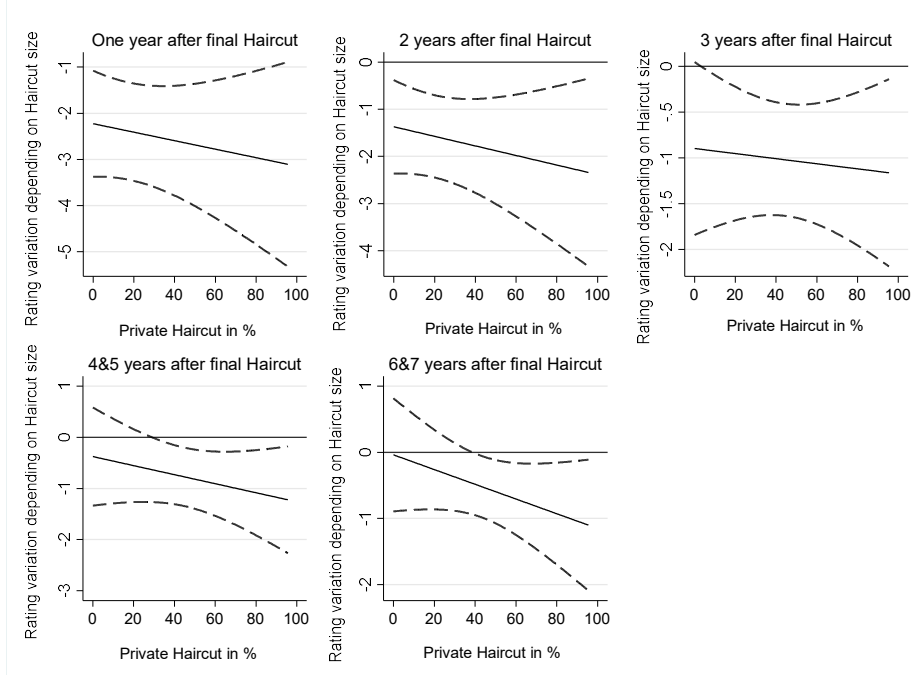
Notes: Each graph shows the marginal effect of private face value reduction on agency rating, for different face value reduction sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table C3, column 6. The rating contraction of a restructuring is statistically significant for levels of nominal haircut at which the upper confidence band is below the zero horizontal line. We can see that haircut greater than 20 percent (the mean of this sample being about 50 percent) can be associated with significantly lower ratings during the seven years after a restructuring.

Figure C1b: Expected effect on agency rating for different levels of official nominal haircut



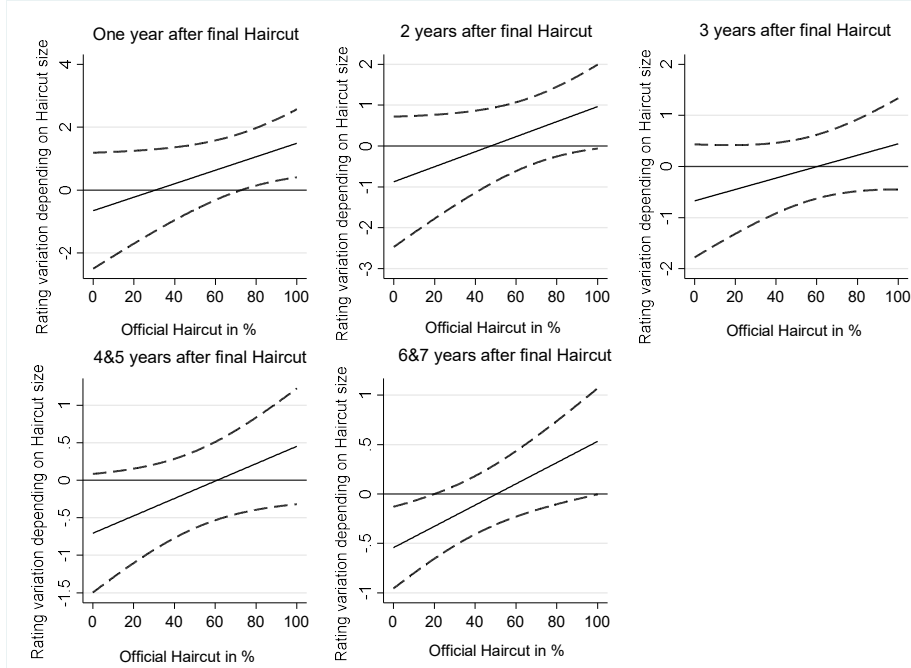
Notes: Each graph shows the marginal effect of official face value reduction on agency rating, for different face value reduction sizes and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table A3, column 6. The rating increase of a restructuring is statistically significant for levels of nominal haircut at which the lower confidence band is above the zero horizontal line. From year one to two years after the agreements, we can see that any haircut can be associated with significantly higher ratings. From year five to seven years after the agreements nominal haircut greater than 60 percent (which corresponds to mean of this sample) can be associated with significantly higher ratings.

Figure C2a: Expected effect on (mean of) agency rating for different levels of private haircut



Notes: Each graph shows the marginal effect of private haircut on (mean of) agency rating, for different haircut size and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table C4, column 3. The rating contraction of a restructuring is statistically significant for levels of nominal haircut at which the upper confidence band is below the zero horizontal line. We can see that haircut greater than 40 percent (the mean of this sample) can be associated with significantly lower ratings during the seven years after a restructuring.

Figure C2a: Expected effect on (mean of) agency rating for different levels of official Haircut



Notes: Each graph shows the marginal effect of official haircut on (mean of) agency rating, for different haircut size and at different lag lengths. The dashed lines show 90 percent confidence bands. The effects are calculated using the coefficients from Table C4, column 3. The rating increase of a restructuring is, generally, not statistically significant. Only one year after the agreement, we can see that only haircut greater than about 70 percent can be associated with significantly higher ratings (60 percent being the mean of this sample).