Argentina's Default and Debt Restructuring:
Was the "haircut" excessive?

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ABSTRACT

I use data on 180 sovereign debt restructurings to analyze, from a comparative perspective, Argentina's debt exchange of 2005. In particular, I ask whether the haircut imposed on investors (75%) was excessively high. The regressions indicate that, in general, "haircuts" depend on the severity of external shocks faced by borrowers. The results also suggest that Argentina's debt exchange of 2005 produced unusually high losses for bondholders. A haircut in the vicinity of 44% to 55% would have been in line with the empirical model; this is significantly lower than the actual haircut of 75%. I also discuss debt restructuring episodes in Chile, Uruguay and Greece.

Key Words: Debt, sovereign, default, restructuring, repudiation, investors' losses, haircut, Argentina, excusable default, recovery rate.

JEL Classification: F340, F410, F650, G150

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1. Introduction

In February 2005, Argentina restructured its sovereign debt, and paid its creditors 25 cents on the dollar. A number of investors (the "holdouts") argued that the haircut was excessively high, and decided to use the courts' system to get a better treatment. In June 2014, the U.S. Supreme Court left in place a lower court ruling that mandated Argentina to make payments to the "holdouts."[1] After some frantic negotiations, Argentina decided not to comply with the court's order, and on August 1, 2014, the country was, once again, in default.[2]

In this paper I investigate whether Argentina's haircut of 2005 was "unusual" and "excessively high," as claimed by the holdouts, or if, as argued by Argentina, it was fair and in line with recent international experiences. The analysis is in the spirit of the "excusable default" model developed by Grossman and Van Huyck (1986). According to this work, in a world with rational lenders and borrowers, and reputational constraints, sovereign debt is never repudiated. It is restructured when the debtor faces (very) bad states of the world. In this setting, investors may lose some of their money, but never all of it. The extent of losses depends on the severity of external shocks that hit the sovereign debtor.

In order to investigate if Argentina's haircut was "unusually high" I follow a two parts strategy. As a first step I estimate a number of haircut regressions using a cross-country data set for 180 sovereign restructurings between 1978 and 2010. In the second step I analyze the regressions' residuals to determine if the Argentine episode of 2005 conforms to the predictions of the empirical model. If it does conform to the model, then it is possible to argue that the losses incurred by investors in the 2005 Argentine exchange were in line with the international experience. If, on the contrary, Argentina 2005 is identified as an "outlier" observation (that is, one that has a very large residual), it is possible to argue that investors' losses were unusually high.

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[1] There were two main cases stemming from investor holdouts: The first one was in U.S. Federal Court and its principal claimant was NML Capital. The second was an arbitration case in front of the ICSID and involved a number of Italian retail investors that had purchased Argentine securities in 2000 and 2001 (*Abaclat and others vs. Argentine Republic*). For greater details on the restructuring, see Sturzenegger and Zettelmeyer (2006). On the Argentine crisis and default see IMF (2004), and Edwards (2010).

[2] The government of Argentina claimed that it had *not* defaulted in late July 2014. The reason, according to Argentina, was that it had made a deposit covering the July 2014 coupon payment to new bondholders in the Bank of New York. Judge Thomas Griesa, however, forbade the bank from paying these investors if Argentina was unwilling to pay the holders of old bonds that had brought the case to court.

The rest of the paper is organized as follows: In Section 2 I provide some background on Argentina's default and debt restructuring, and I compare Argentina's 2005 debt exchange to 179 sovereign restructurings that took place between 1978 and 2010. In Section 3, I present regressions' estimates for a number of "haircut" equations. The results indicate that, with other things given, losses depend on the state of the world faced by the debtor; the more severe the shocks that hit the sovereign, the higher the haircut. These results are robust to the time period, variables' definition, and equations' specification. In Section 4 I analyze the regressions' residuals to determine whether some episodes are "outliers." This analysis suggests that, given Argentina's circumstances, the 2005 haircut (approximately 75%) was "unusually high." According to the results, an appropriate haircut – that is, a haircut in line with the predictions of the empirical model -- would have been in the 44% to 56% range. In this Section I also discuss two restructurings included in the sample (Chile 1984-1990 and Uruguay 2003), and one that is not in the sample (Greece 20102). Finally, in Section 5 I present some concluding remarks, and I provide some political economy reasons that help explain why Argentina treated foreign investors so harshly. I also discuss directions for future research. There are two appendixes: in Appendix A I present the model; Appendix B contains some additional regression estimates and information on data sources.

2. Argentina's default and debt restructuring: Background and preliminary international comparisons

2.1 Default and restructuring: Historical background

On December 23, 2001, Argentina defaulted on its debt. Two weeks later the peso was devalued by 30%, and a ten-year experiment with a currency board and a fixed exchange rate (one peso equal to one dollar) came to an end. During the years leading to the crisis the Argentine economy was subject to a number of severe external shocks: the terms of trade declined, global interest rates increased, and capital inflows slowed down significantly as a result of contagion stemming from the Russian 1998 crisis.[3] The road to devaluation and default was traumatic: throughout 2001 there were massive demonstrations, riots, bank runs, a suspended IMF program, and a deposit freeze. On December 9, 2001, President Fernando de la Rúa

[3] For details on the Argentine crisis of 2001-02 see, for example, Bluestein (2005), and IMF (2004). Most of these shocks were temporary. When considered from an Argentine historical perspective, some of these shocks (i.e. the terms of trade decline), were not particularly large. See the discussion in Edwards (2010),

resigned. He had been abandoned by his own political party, and was under considerable pressure from Congress, the civil society, and the opposition Peronist Party. Five months later, Nestor Kirchner, the former Governor of the province of Entre Ríos, was elected president. When he took over, Argentina was facing a deep economic and political crisis: growth was negative, unemployment exceeded 20%, the public debt was in arrears, relations with the IMF were severely strained, and the currency had lost two thirds of its value.[4]

Soon after taking office, Kirchner decided to restructure the external government debt. In September 2003 the Argentine government made an offer to investors to exchange defaulted bonds for new ones. This proposal became known as the "Dubai Guidelines," and implied an average reduction of the face value of the debt of approximately 75%. Investors balked at the stiff losses, and asked for better conditions. A new offer was formally made in June 2004 under the moniker of "Dubai Plus." The terms of this proposal were very similar to the original ones, and implied losses (in present value terms) for bondholders of approximately 75%.[5]

Investors had until February 28, 2005 to exchange their old securities for new ones. Three new bonds were available: (1) A "Par Bond" with the same face value as the old bonds, but significantly longer maturity (35 years). These bonds were available in a number of currencies – US Dollars, Euros, Yen, and Argentine pesos indexed to the local consumer price index (CPI). The initial coupon was very low, but would increase gradually through time (from 1.33% to 5.25%). Amortization was expected to begin in 2029.[6] (2) A "Discount Bond" with a significant face value reduction. These securities were also available in US Dollars, Euros, Yen, and Argentine pesos indexed to the local consumer price index (CPI). They had 30 years maturity and amortization would begin in 2024. The exchange would take place at 33.7% of the original face value.[7] The coupon was 8.28% for the USD-denominated bonds and 5.83% for the (inflation adjusted) peso-denominated bonds. And (3), a "Quasi Par" bond that, for all practical purposes, was a combination of the other two bonds. These securities had a 42 year maturity, were exchanged for 69.6% of the original face value and had a coupon rate of 3.31% that was

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[4] For details on the Argentine crisis of 2001-02 see, for example, Bluestein (2005), Edwards (2010), and IMF (2004).
[5] See Section 2 for details on the estimation of the magnitude of the "haircut." See IMF (2004) for a detailed timeline of events.
[6] Amortization refers to the paying back the principal to investors.
[7] This fact led the popular press to report that investors' haircut amounted to 66.3%. This computation, however, is based in the incorrect methodology for the reasons discussed in the text.

capitalized during the first ten years. Amortization was to begin in 2036. These Quasi Par bonds were only available in (inflation adjusted) pesos. Under the "Dubai Plus" scheme past due interest (PDI) was only recognized partially. Interest coupons not paid before the default date of December 23, 2001 were included in the exchange offer. However, PDI corresponding to the December 2001-December 2003 period was excluded. All three exchange options were subject to a GDP growth "kicker." Starting in 2006, bond holders could receive an extra payment in the eventuality that GDP growth exceeded a predetermined threshold.[8]

When the exchange window closed on February 28, 2005, 76.2% of bondholders had tendered their defaulted bonds and had accepted new bonds in exchange. This rate of participation (76.2%) was low from a comparative perspective; in the seventeen sovereign debt restructurings/exchanges between 1999 and 2010, 96% of investors had accepted the new terms suggested by the sovereign. At the time of the exchange Argentina's congress passed a law prohibiting the government from making better offers in the future to those investors that had not tendered their defaulted bonds. This legislation was known as "*ley candado*" (lock-in or clam-down law). The provision forbidding better offers to holdouts was also introduced as a clause in the new bonds – the so called *RUFO* clause. The prohibition for better offers and the RUFO clause were to expire on December 31, 2014.[9]

In 2010, Argentina reopened the bond exchange and offered identical terms as in 2005 to those that had not tendered their defaulted securities. An additional group of investors decided to exchange their bonds. The main reason for accepting the offer five years later was the realization that Argentina's congress was not going to amend the "*ley candado*" that prohibited the government from improving the terms of the exchange. But not everyone came into the fold: bondholders representing approximately 7% of the original debt decided to hold on to the old securities and to press for better terms. There were two types of holdouts: retail investors, and funds specialized in distressed debt and that had been buying defaulted bonds in the secondary market. Two of these funds took Argentina to court in the U.S., arguing that the haircut was unusually high, and that the country had the ability to make improved payments. The case slowly

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[8] Two additional pre-conditions had to be met for this payment to kick in: growth in the preceding year had to exceed 3% and total payments could not exceed 48% of the original value of each bond. See, Sturzenegger and Zettelmeyer (2006). According to Cruces and Trebesch (2013), investment banks were not sure how to value this GDP kicker. In November 2005, six months after the exchange had taken place, the GDP-linked warrants were to become detachable.

[9] Cruces and Trebesch (2013).

made its way through the U.S. Judicial System, and in mid-2014 it reached the Supreme Court. On June 16, 2014 the Supreme Court refused to hear the case, and left in place a lower court ruling mandating Argentina to make a payment to the "holdouts." The argument by the lower court was that the *pari passu* clause required Argentina to treat all (new and old) investors equally: if the holders of exchanged bonds received a coupon payment, those holding old bonds should also be paid.[10] After the Supreme Court decision, frantic negotiations between the holdouts and the Argentine government began. By July 30, 2014, the deadline imposed by the Court, no agreement had been reached, and on August 1, 2014, Argentina was declared by the ISDA to be in default.[11]

Throughout this protracted process Argentina's position was that given the shocks faced by the country in the late 1990s and early 2000s, and the hardship suffered by the Argentine people after the January 2002 devaluation, the Dubai terms were reasonable, and the country would not improve its offer. For Argentina, the 2001 default was, to use the terminology of Grossman and Van Huyk (1986), "excusable," and the terms of the exchange were fair and in line with the historical experience on debt restructurings under similar conditions. This view became patently clear on June 22, 2014, when the Presidency of Argentina published a full page ad in the New York Times, titled "Argentina wants to continue paying its debts but they won't let it."

2.2 The magnitude of the "haircut": An international comparison

In this Section I use data on 180 sovereign defaults between 1978 and 2010 to put Argentina's case in a historical perspective.[12] The data set includes 162 bank loan restructurings and 18 bond exchanges. The sovereigns involved are from all parts of the world: Africa (60), Asia (8), Europe (25, mostly former communist nations), Latin America (72), and the Middle

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[10] A number of news media stories have covered, in detail, the Supreme Court decision and the implications of the lower court ruling. See, for example, http://www.bloomberg.com/news/2014-06-16/argentina-rejected-by-u-s-high-court-on-defaulted-bonds.html

[11] The government of Argentina claimed that it had *not* defaulted in late July 2014. The reason, according to Argentina, was that it had made a deposit covering the July 2014 coupon payment to new bondholders in the Bank of New York. Judge Thomas Griesa, however, forbade the bank from paying these investors if Argentina was unwilling to pay the holders of old bonds that had brought the case to court. This ruling has generated significant discussion among economists regarding the future of sovereign restructurings.

[12] The basic data were assembled by Cruces and Trebesch (2013). This is the largest data set on restructurings and haircuts. Benjamin and Wright (2009), for example, used a data set with 90 episodes in their analysis on restructuring delays. For an even more comprehensive list of sovereign defaults, see Beers and Naduau (2014). This data set, however, dos not have data on recovery rates.

East (1). Twelve of these 180 restructurings included a terms of trade or GDP-linked component or warrant.[13]

The loss – or "haircut"– incurred by an investor as a consequence of a debt restructuring is usually defined as: [14]

$$(1) \qquad Haircut = 1 - \left(\frac{PV\ New\ Security}{PV\ Old\ Security}\right)$$

Where "$PV\ New\ Security$" and "$PV\ Old\ Security$"are the present values of the new and old securities (bank loans or bonds), respectively. The present value of the "old security" is calculated under the assumption that the debtor abides by the terms of the original contract. The "yield at exit," or rate of return of the new security at the date of the exchange, is used to discount the income streams of both securities. In equation (1) investor losses are calculated on the date of the exchange.

Using this approach, Cruces and Trebesch (2013) estimated that the average losses (across different bonds) incurred by investors that participated in Argentina's 2005 exchange amounted to 76.8%. This figure is similar to calculations made by other authors: Sturzenegger and Zettelmeyer (2006), estimated a haircut for the Argentina 2005 exchange ranging from 71% to 75%, Bedford et al (2005) calculated investors' losses of 70%, and according to Díaz-Cassou et al (2008) the Argentina 2005 haircut ranged between 71% and 75%, depending on the type of debt exchanged.

A limitation of equation (1) is that it ignores the (possible) value of warrants or contingent "kickers" that are triggered after certain variable (export prices, terms of trade, or GDP) surpass a predetermined threshold. Cruces and Trebesch (2013, p 65) justify ignoring the kickers in their computations as follows: "[T]he portion of state contingent payments is usually not very large… [Historically,] some clauses paid…and others did not… [A]fter the Bradies the only relevant case is Argentina in 2005… Against this backdrop, and to avoid bias, we decided

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[13] If the country's terms of trade or GDP increased past a certain threshold, the creditor would receive additional payment. The 12 cases are Honduras 1989, Costa Rica 1990, Mexico 1990, Venezuela 1990, Nigeria 1991, Uruguay 1991, Bolivia 1993, Bulgaria 1994, Ecuador 1995, Bosnia 1997 Cote d'ivoire 1998, and Argentina 2005. . According to a number of authors, with the exception being Argentina, these contingent claims had no value (see the discussion in Sandleris and Wright 2013 for further details). I deal with this issue in further details below.

[14] See the discussion in Sturzenegger and Zettelmeyer (2006) on alternative ways of measuring losses..

to disregard state contingencies in our haircut calculations." Although this is correct for most episodes, it is not so for the Argentine exchange of 2005. In this instance the warrants were detachable from the new bonds six months after the exchange, and they could be traded independently of the underlying securities – this was not the case in any of the other restructurings with contingent payments.[15] Starting in late 2004 investment banks developed models to value the Argentine warrants, and by February 2005, when the exchange was coming to an end, there was generalized agreement that their value was approximately 2 cents on the dollar.[16] In November 2005, when they became detachable, the warrants were traded in the vicinity of 3 cents on the dollar. Eventually, however, and due to Argentina's fast rate of growth, their price increased significantly. Given these facts, in this paper I adjust the Cruces and Trebesch (2013) estimate of Argentina's 2005 haircut downward by the consensus value of the warrants at the time of the exchange (2 cents on the dollar). Consequently, in the analysis that follows I will use 74.8% as the basic estimate for Argentina's 2005 haircut. Following Cruces and Trebesch (2013) own line of argument, I have not made adjustments to the other 11 episodes that included contingent payments. In Section 3.3, on extensions, however, I discuss alternative ways of addressing this issue.

In Table 1 I present the list of countries in the data set. I include the date of the restructuring and the magnitude of the "haircut." Episodes with losses in excess of Argentina's 2005 haircut appear in italics. As may be seen, there are 25 such cases; I discuss this subsample below. In Table I 2 provide summary statistics on haircuts for the complete sample, and for a number of subsamples (by type of debt and by region). I also include the estimate for the Argentina 2005 haircut. As may be seen, losses foisted on Argentine investors were significantly higher than the mean and median across all episodes (37% and 32% respectively).[17]

In Figure 1 I present a histogram for the 180 haircuts. The value of the Argentine 2005 haircut (74.6%) is shown with a vertical black line. An analysis of Figure 1 and of the data behind it shows the following: (a) the distribution is "bimodal," suggesting that the data may

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[15] See Miyajima (2006).
[16] See, for example, Costa, Chamon and Ricci (2008), Miyajima (2006), HSBC's "EM Portfolio Strategy (July 21, 2005), and Sandleris and Wright (2013).
[17] To put things into perspective, analyses of the Greek sovereign restructuring of 2012 based on the same methodology indicate that the aggregate haircut (across all restructured bonds) was of the order of 60%. See Zettelmeyer, Trebesch and Gulati (2013).

come from two different populations.[18] (b) There are only 25 episodes with haircuts in excess of that imposed by Argentina in 2005. These countries appear in italics in Table 1. (c) Countries with very high haircuts – that is, in excess of Argentina's 74.8% -- are very different from Argentina. Eighteen of them correspond to very poor African countries, another five are among the poorest nations in Central and South America – Bolivia, Guyana, Honduras and Nicaragua --, and many of them were subject to wars and/or major civil conflicts (Iraq, Bosnia and Herzegovina).[19]

3. Explaining "haircuts": A regression analysis

In this Section I use the cross country data set described above to estimate a series of haircut regressions. These estimates are then used to evaluate whether the Argentine restructuring of 2005 resulted in "unusual" and "excessively high" losses to investors. Within this framework, a haircut would be "excessive" if that episode's observation is an "outlier." On the other hand, a haircut would conform to the historical evidence if fitted values from the regression analysis are not significantly different from the actual haircut.

3.1 The empirical model

In an important paper, Grossman and Van Huyck (1986) argued that in a world where reputation is valuable, sovereign loans should be seen as state contingent claims.[20] Creditors know that under (very) bad states of the world the borrower will have an excuse to restructure its debts, and will act accordingly. Sovereigns, on the other hand, recognize that if they incur in a non-justifiable default they will ruin their reputation and will not be able to borrow in the future. In this setting there is no outright debt repudiation, only restructurings.[21] But not all restructurings are alike; in some cases the losses are very high, while in others the haircuts are relatively low. The actual level of the haircut depends on how devastating is the bad state of the world. The more severe the negative shocks, the higher will be the fraction of the debt that will be forgiven (in present value) and, thus, the higher will be the haircut. See Appendix A for a discussion of the main implications of this model.

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[18] The Jarque-Bera tests are 13.3 and 7.8 respectively, rejecting the hypothesis of normality at a very high significance level.
[19] These four countries, plus Haiti, form the "poorest five" group in Latin America and the Caribbean.
[20] For recent work along these lines see, for example, Yue (2010). See, also, Alfaro and Kanczuk (2009).
[21] Restructurings may be delayed and take some time, but they eventually occur. See Benjamin and Wright (2009) for an analysis on delays.

Consider the following empirical model that captures the key implications of the Grossman and Van Huyck (1986) analysis:

$$(2) \qquad haircut_i = \alpha + \sum \beta_i x_i + \sum \delta_i y_i + \sum \gamma_i z_i + \sum \theta_i q_i + u_i.$$

α, the $\beta_i s$, the $\gamma_i s$, and the $\theta_i s$ are regression coefficients to be estimated. The x_i are (one or more) explanatory variables in the spirit of Grossman and Van Huyck (1986) that capture the severity of the shocks that hit country i; these are the "excusable" shocks related to bad states of the world. The y_i's are variables that capture other circumstances of country i in the period immediately preceding the restructuring, such as its debt to GDP ratio. The $z_i's$ are characteristics of the debt exchange itself that may affect the magnitude of the haircut. The $q_i s$ are variables that summarize the conditions of the global economy at the time of each exchange. u_i is a (possibly heteroskedatic) error term.

In order to construct an indicator of "bad states of the world" I inquired if at any time during the six years preceding the debt restructuring the country in question was subject to any of the following shocks:[22] (1) War, a civil conflict, a coup d'état, or a coup attempt. (2) A major GDP contraction of at least 8%. (3) A major deterioration in its terms of trade, of at least 15%. And (4) a severe currency crisis that implied a devaluation of, at least, 20%.[23] The "bad states of the world" indicator x_i was then defined as the sum of the number of shocks suffered by each county. This index is equal to 0 if none of these shocks took place during the six years preceding the restructuring, and takes the value of 4 if all four shocks were present. Its regression coefficient is expected to be positive in equation (1): countries that have been subject to a succession of severe (excusable) shocks will tend to receive a more lenient treatment during restructuring processes.

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[22] A number of historical analyses, including Reinhart and Rogoff (2010), have concluded that these four shocks considered here have usually been present during major debt crises. A six year window covers, in the vast majority of cases, the default itself and the restructuring. For 108 episodes with data the mean time elapsed between default and restructurings was 6.2 years.

[23] More specifically, a devaluation crisis is defined as an abrupt increase in the value of foreign currency (the U.S. dollar) of at least 20% that takes place after a period of relative exchange rate stability That is, large annual devaluations stemming from the adoption of a crawling peg or other type of managed currency regime are not considered to be a crisis.

I included the following y_i's variables that capture each country's circumstances at the time of the restructuring:

- *Debt to GDP ratio:* This variable is defined as the ratio of the restructured debt to the country's GDP. Its coefficient is expected to be positive: with other things given, countries with a higher debt burden will require large debt relieve to move to a sustainable situation. Thus, they will tend to have a higher haircut.
- *Poor:* This variable takes the value of 1 if the country in question is among the poorest in the world. These include countries in South Saharan Africa, the four poorest nations in Central and South America – Bolivia, Honduras, Guyana, and Nicaragua --, Pakistan and Vietnam.[24] Its coefficient is expected to be positive. Payment difficulties in poor counties are easier to qualify as "excusable."

The following variables (q_i) that capture the state of the global economy at the time of each restructuring episode were included in the estimation:

- *Recession*: This variable takes a value of 1 if during the year of the restructuring the U.S. economy was in recession.
- *Global interest rates*: The yield on the 10 year U.S. Treasury note during the month of the restructuring was included. A higher yield implies tighter global financial conditions. It is expected that the coefficient of this variable will be negative.
- *Nineties:* This is a dummy that takes the value of 1 after the year 1990. This is meant to capture the fall of the Berlin Wall, and the fact that in the years that followed a number of former communist countries began to reform their economies, sought global financing, and restructured their old debts.

In some of the regressions I also included z_i variables that summarize the nature of the debt exchange/restructuring; these data were obtained from Cruces and Trebesch (2013):

[24] The cutoff point is a GDP per capita of four thousand PPP dollars in 2010. Most of these nations, however, have a GDP per capita below two thousand PPP dollars. Many of these countries -- but not all of them -- eventually became eligible for the IMF and World Bank's *HIPC* debt relief program.

- *New Money*: This variable takes the value of 1 if the restructuring package included new moneys provided by creditors as a way of easing the liquidity crunch suffered by the indebted countries. New money was an important feature of some of the bank loan restructurings of the 1978's and 1990s. Its coefficient is expected to be negative, as aid in the form of new money is a substitute for larger debt forgiveness.
- *Bond Exchange*: Takes a value of 1 if the restructuring was a bond exchange and 0 otherwise (bank loan restructuring). Its sign is not defined a priori.[25]
- *Fallen due*: This variable captures if the all the debt being restructured was already due by the time the exchange takes place. Its sign is expected to be positive, as countries with debt in arrears face greater difficulties, and are able to argue that they qualify for "excusable" treatment.
- *Previously Restructured Debt (PRD)*: Takes the value of 1 if the exchanged debt includes debt that has been restructured in the past. That is, it indicates if this is a repeated restructurings. Its sign is not determined a priori; it would be negative if serial defaulters are "punished" by creditors; on the other hand, it would be positive if repeated restructurings are a sign of having faced very bad states of the world.
- *Brady deal*: This reflects if the exchange in question was part of the Brady deal from the early 1990s. Its coefficient is expected to be positive, since at the time of the Brady agreements the official and private sectors were committed to make significant concessions in order to solve the debt problem that had paralyzed many poor and middle income countries for up to a decade.
- *Donor funded*: Takes a value of 1 if the donor community provided funds to facilitate the exchange. The difference between this variable and *New Money* is that in the latter the new financing is provided by private sector creditors, while "donor" funded refers to aid organizations. We expect its coefficient to be positive. Countries that receive donor funding are usually considered to be in very deep difficulties.

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[25] Ideally, different equations would be estimated for bond exchanges and bank loan restructurings. Unfortunately, there are only 18 observations on bond defaults. This variable is expected to capture if there are basic differences between bond and bank loans haircuts. It was also introduced interactively. In Edwards (1986) I compare the pricing of emerging markets' bonds and bank loans in the 1970s and early 1980s.

3.2 *Basic results*

In Table 3 I present the basic regression results; White heteroskedasticity-consistent standard errors are reported.[26] Equations (3.1) and (3.2) are for the complete data set and exclude covariates related to the nature of the restructuring. Equations (3.3) and (3.4) are for 1978-2010 and include the three type of regressors discussed above. Equation (3,5) is for 1988-2010, and excludes earlier episodes with questionable data. Finally, equation (3.6) is for 1988-2010 and excludes other observations that Cruces and Trebesch (2013) consider to have low quality data.[27]

Overall, these results are satisfactory. First, the coefficient of the "bad state of the world" is always significantly positive, as expected. This is consistent with the Grossman and Van Huyck (1986) view that countries subject to a larger number of (very) negative shocks have a greater "excuse" for defaulting on their debts, and will tend to obtain better terms when restructuring them. The coefficients of the *Debt to GDP* and *Poor* variables are also positive, as expected, and in most regressions they are significant. With other things given, poorer countries get higher debt forgiveness (and creditors get a stiffer haircut), as do countries with a higher debt burden. The coefficients of the global economy variables suggest that haircuts are lower when global liquidity is tighter. Also, and after controlling for other factors, haircuts have tended to be higher if the restructuring takes place during a global recession. The "nineties" variable, which appears in only one regression, is not significant. The results in Table 3 indicate that only some of the characteristics of restructuring operations are related in a significant way to the magnitude of the "haircut"; this is mostly due to the high degree of collinearity between these variables. The only one that is consistently significant is *Donor Funded*. The variables *New Money* and *Brady Deal* are significant in some of the regressions. Interestingly, the variable that identifies bond exchanges (as opposed to bank loans' restructurings) is not significant in any of the specifications. It is also worth noting that the R-squared are quite high for this type of data set. When regional dummy variable are added to the analysis, the R-squared improves marginally, but the main conclusions are not altered. These results are available on request.

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[26] Jarque-Bera tests on the residuals from OLS estimates reject the null of homoskedastic errors. The same test indicates that the use of White-corrected estimates solve the problem.

[27] Cruces and Trebesch (2013) develop a "data quality" index that goes from 1 to 5, with higher numbers signifying better data. In equation (3.4) I exclude episodes with an index value of 1 and 2.

3.3 *Robustness*

In this section I deal with robustness, and I discuss whether the results are sensitive to the definition of certain variables, time periods, and equation specification. Some of the regression results alluded to are presented in the Appendix.

Alternative measures of investors' losses: The analysis presented above relied on equation (1) to compute of investors' losses. An alternative measure of haircuts compares the *face value* of the old debt to the *market value* of the new debt. In the literature, this alternative approach to computing investors' losses has received the name of "market haircut," and is equivalent to discounting the old debt flows by the coupon interest rate, and the new debt by the "yield at exit." In many instances the differences between the two measures are small; in others, however, they can be quite significant. For the complete sample the difference between both measures is -3.0%, and the median is 0. When the haircut regressions in Tables 3 are re-estimated using the market haircut as a dependent variable the results don't change in any significant way. In particular, it is still the case that there is a positive association between the severity of the shocks and the magnitude of the haircuts. I present the results in the first two columns of Table B-1 in Appendix B.

Alternative measure of bad state of the worlds: The "bad states of the world" variable used above is additive, in the sense that having two negative shocks is twice as bad as having one, and facing four shocks is twice as bad as facing two. It is possible to argue, however, that the effect of major shocks is more than additive, and that countries that experience many of these shocks simultaneously go through significant hardship. In order to explore whether the definition of this variable affects the results I constructed an exponential "bad states of the world indicator" as follows: $Bad\ Exp = e^n$. Where n is the number of shocks that affected this particular country in the six year window prior to the restructuring. The results obtained when this definition of "bad states" is used, confirm those reported above, and provide support to the "excusable" default model. (See columns 2 and 3 in Table B-1, Appendix B).

Deconstructing the bad states indicator: In the regressions reported in Tables 3 the indicator for bad sates of the world is defined as the sum of four major shocks. An interesting question refers to the individual contribution of each of these shocks to the explanation of haircuts. Regressions with each "excusable" shock entered separately confirm the results reported above: countries that experience major negative shocks tend to impose more severe

haircuts. The most important "bad state of the world" shock is *Wars and civil conflicts*. Its coefficient is the highest and it is always significant at the 5% or 1% levels. Interestingly, the coefficient for currency crises is not significant. A possible explanation is that large devaluations have been quite common among developing countries, and that on their own – that is, when not accompanied by major output collapses or armed conflict – they are not considered to be an "excusable" shock by creditors. See Table B-2 for details.

Nonlinearities and interactive terms: In an effort to understand better the determinants of investors' losses in debt restructurings I explored whether higher order terms of the bad state of the world variables were significant, and whether interactive terms played a role. In particular, I investigated if interactions between the *Bond Exchange* and other covariates played a significant role. The answers to both of these questions are negative; I found no role for interactions or nonlinearities.

Face value reduction: Some debt restructurings imply a reduction in the face value of the debt – or face value haircut --, while others are confined to extending maturity, reducing coupon rates, and/or defining a grace period with no payments of principal. Fifty seven of the 180 episodes in this paper included face value reductions. Argentina 2005 is one of them, with an average (across bonds) face value reduction of 29.4%. For the complete sample the mean face value reduction is 16.1%, and the median is zero. I estimated a number of probit regressions to investigate whether the bad states of the world index(es) help explain if, in a particular restructuring, there was face value reduction. These regressions indicate that countries with more severe shocks, a higher debt burden and poor have a higher probability of having a reduction in the face value of the debt.

Warrants and kickers: As noted above, most authors have ignored the value of GDP and terms of trade-contingent kickers in their calculations of haircut rates. Some authors, such as Cruces and Trebesch (2013), have made the point that in the vast majority of cases these claims had a very low (or zero) value at the moment of the exchange; other authors have ignored them without much explanation. In this paper, in contrast, I explicitly subtracted the value of the Argentina 2005 GDP-linked warrant when calculating the haircut magnitude for that episode. However, I assigned a value of zero to kickers in the other 11 cases that included them in the restructuring agreement. In order to explore the robustness of the results, I considered two alternative approaches: (1) I followed Cruces and Trebesch (2013) and others, and ignored

contingent components in all cases[28]; and (2) I made an effort to assign values to kickers in the other 11 episodes that included them -- for Argentina I still used 2 cents on the dollar.[29] The results obtained, confirm those discussed above: haircuts tend to be higher in countries that are subject to more severe bad state of the world, have higher debt burdens, and are poorer (results available on request).

4. Was Argentina's 2005 haircut excessive? A residuals' analysis

In this Section I use two "influence statistics" to investigate whether Argentina is an outlier in the regressions reported above: the R-student standardized test, and the DFFITS test. If the answer is positive, and Argentina is indeed an outlier with very large positive residuals, it is possible to argue that the 75% haircut was "excessively high." On the other ahnd, if the residuals are small, then it is possible to assert that the Argentina 2005 episode is in line with the international evidence of sovereign debt restructurings. In order to provide some context I also analyze the residuals from debt restructuring episodes in two of Argentina's neighbors: (1) Chile in 1984-1990, and (2) Uruguay in 2003; I also discuss, briefly and in light of these results, the Greek restructuring of 2012.

Residuals' analysis: The R-student standardized residual test for episode *i* is defined as follows:

$$e_i^S = \frac{e_i}{S(i)\sqrt{1-h_i}}.$$

The DFFITS test, on the other hand, is defined as:

$$DFFITS_i = \left(\frac{e_i}{S(i)\sqrt{1-h_i}}\right)\left(\frac{h_i}{1-h_i}\right)^{1/2},$$

where, e_i is the original residual for episode *i*, $S(i)$ is the variance of the residuals if the observation corresponding to episode *i* is excluded from the analysis, and h_i is the *i*-th diagonal element of the $x_i(X'X)^{-1}x_i$ matrix. In the benchmark analysis I use the residuals from equation

[28] See, Chamon, Costa and Ricci (2008), and Sandleris and Wright (2013).
[29] See, for example, Miyajima (2006).

(3.4) to calculate these two tests; when other regression specifications are used the results are very similar.[30]

Each of these tests identified ten "outlier" observations, or observations with unusually (and significantly) large residuals (positive or negative).

According to the R-student standardized test the following episodes correspond to outliers: Argentina 2005, Bolivia 1988, Bosnia and Herzegovina, Costa Rica 1990, Cote d'Ivoire 1998, Ecuador 2009, Honduras 1989, Iraq 2006, Ukraine 1998, and Uruguay 2003. Of these episodes, only three have negative residuals: Cote d'Ivoire, Ukraine, and Uruguay.

The ten outliers identified by the DFFIT test are: Argentina 2005, Belize 2007, Bolivia 1988, Bosnia and Herzegovina, Costa Rica 1990, Cote d'Ivoire 1998, Ecuador 2009, Iraq 2006, Peru 1980, and Peru 1997. The episodes with negative residuals: Belize 2007, Cote d'Ivoire, and Peru 1980.

Inspection of these two outliers lists shows that they include the Argentina 2005 episode; moreover, both lists are strongly dominated by Latin American nations and/or countries that at the time of the crisis were affected by wars or civic conflicts; in addition, only one of the outliers corresponds to a pre-1988 episode. In an effort to account for this regularity, I estimated a new equation that separates the *Wars* covariate from the other "bad state of the world" indicators. In addition, this new equation incorporates a Latin America dummy variable, and concentrates on the 1988-2010 period.

Figure 2 contains the R-Student and DFFITS statistics for this specification. The bands indicate the critical values for the two tests. As may be seen, according to the R-Student test, only 3 out of the 90 episodes are now outliers: Argentina 2005, Bosnia and Herzegovina, and Uruguay 2003. The DFFITS test identifies 6 outliers only: Argentina 2005, Bosnia and Herzegovina, Costa Rica 1990, Cote d'Ivoire 1998, Ecuador 2009, and Iraq. As may be seen, Argentina appears in both lists, providing additional evidence that the haircut imposed on investors in in 2005 was "unusual" and "unusually high" from a comparative perspective.

Why is Argentina an "outlier"? An important question is what makes Argentina 2005 an outlier observation. The answer is in three parts: (1) Argentina was hit by only two of the four bad states of the world shocks: output collapse, and currency devaluation. Even though the crisis

[30] See Baum (2006) for a simple and yet effective discussion of influence statistics in general, and these two tests in particular.

and the default were surrounded by considerable political instability, the country maintained constitutional rule and the institutions of the state continued to function. In addition, in the years preceding the crisis the terms of trade declined by only 9%. Although this is clearly a negative shock, it is not large enough to qualify as a "bad state of the world" shock. Indeed, in Argentina's modern history there have been numerous occasions where the terms of tarde have declined significantly more than 9%.[31] As a consequence, in the regression analysis the Bad States index takes a value of "2" for Argentina, while in many countries it was greater. (2) Argentina is not a poor country. It is true that this crisis was severe and resulted in a significant increase in the poverty headcount and unemployment, but even in 2002 Argentina was not a "poor country," as are many of the nations that were able to obtain significant debt relief when restructuring their debts. And (3), the amount of debt exchanged was not high enough as to justify a 75% haircut. The issue here is not whether this was a large and massive exchange – which, of course, it was –, but whether the debt to GDP ratio was high enough as to justified the magnitude of the haircut. At USD 65 billion, Argentina's 2005 sovereign restructuring was the second highest ever in absolute terms, and as a proportion of GDP it was the tenth highest in the modern history of sovereign restructuring. And yet, this was not high enough as to explain such a massive haircut. In the equations reported in Table 3 the fitted values for the Argentina 2005 episode range from 43% to 56%. These figures are significantly lower than the 74.8% actual haircut.

Chile and Uruguay: In order to provide context, I compare Argentina's episode to restructurings in two of its neighbors: Chile and Uruguay.

In 1982, and after an experiment with fixed exchange rates (the value of the U.S. dollar was rigidly fixed at 39 pesos), Chile faced a major crisis. Most banks went under, the currency lost two thirds of its value, output collapsed by 15%, and unemployment skyrocketed to 25%. In 1983 Chile defaulted on its sovereign debt, and long and protracted negotiations with the banks began. The restructuring was in stages and agreements with creditors were signed in 1984, 1986,

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[31] Argentina's terms of trade have historically been quite volatile, and a 9% decline is well within what is normal. Indeed, an analysis of Argentina's recent past provides strong support for the notion that declines in terms of trade are common, cyclical and temporary. For example, in 1974, Argentina's terms of trade deteriorated by 14%, and in 1975 they dropped further by 11%. In the next three years, however, the terms of trade improved by 23%, 15% and 8%, respectively. This terms-of-trade cycle repeated itself in the mid-1980s: in 1986, the price of Argentine exports relative to its imports declined by 21%, and in 1987 they dropped by an additional 11%. In each of the next three years they improved by 29%, 8% and 10%, respectively.

1987 and 1990. The haircuts were 8.4%, 31.7%, 14.7% and 17% respectively, and the weighted average for the complete episode was 27.3%. During this long process, debt equivalent to 95% of GDP was renegotiated. This was significantly higher than in Argentina 2005, when debt corresponding to approximately 40% of GDP was exchanged.[32] The influence statistics indicate that Chile is not an outlier; indeed, the fitted value for its haircut is remarkably similar to the actual haircut: 26.9% vs. 27.3%. The Chilean haircut was neither unusually high, nor unusually low.

During the late 1990s and early 2000s, Uruguay was affected by a number of negative shocks, similar to those that hit Argentina. In late 2002, and in the face of a run on the currency, output collapse, and severe contagion form Argentina, Uruguay declared a five days bank holiday. In April 2003, a restructuring proposal was presented to creditors. At the end of the process 93% of bondholders exchanged their bonds. In this operation, and in contrast with Argentina's restructuring two years later, there was no face value reduction. Due to its timing, to Uruguay's proximity to Argentina, and to the structural similarity of both countries, this episode has often been used as a comparison to the Argentine exchange. The influence statistics presented above – and in particular the R-student test – provides some evidence suggesting that in the case of Uruguay the haircut imposed on investors was "unusually low."[33]

Greece: An interesting question is what does this analysis, which relies on data up to mid-2010, says about the Greek restructuring of April 2012. Using the same present value methodology used in this paper, Zettelmeyer, Trebesch and Gulati (2013), calculated the haircut in this episode was 64%. For Greece the key covariates have the following values: "Bad States" indicator is equal to 1 (output collapse only), "Poor" is 0, "Debt to GDP" is 0.966, and "Ten Year" is equal to 2%. The rest of the regressors have a value of zero. A forecast using equation (3.4) gives an estimated haircut of 59.6%; the standard error of the forecast is 20.1%. This estimated Greek haircut is not too distant from the actual value of 64%.

5. Concluding Remarks

Most studies on debt restructurings and haircuts rely on the concept of "debt sustainability." The idea is that a restructuring process should reduce the debt to the point where

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[32] See Edwards and Edwards (1991).

[33] In fact, Uruguay suffered more severe terms of trade shock than Argentina. It experienced a currency crisis, and a GDP collapse similar to that of Argentina. See Edwards (2010).

the debt to GDP ratio is "sustainable." Roubinbi and Setser (2004, p. 171), for example, state that in order to achieve sustainability, "the overall debt burden has to be consistent with the country's overall capacity to make payments."[34] Even though these sustainability-based models are useful and are used profusely, they have some important limitations. The two most are: (a) It is not easy to determining the "capacity to make payments," to quote Roubini and Sester (2004, p.171). Is it the same for all countries? Does it change through time? What does it depend on? And (b), calculating the observed ratio of debt to GDP is not trivial. The basic problem is that this implies comparing a number expressed in foreign currency (foreign debt) to a number expressed in domestic currency (GDP). In most cases the current exchange rate is used to convert GDP in domestic currency into GDP in foreign currency (U.S. dollars). However, it is easy to see the problem with this approach: after a large devaluation – say from 1 peso equal to 1 dollar, to 3 pesos equal to 1 dollar – GDP denominated in dollars shrinks to one third of its value immediately prior to the devaluation. But this reduction in GDP in dollars is artificial. Output and economic activity doesn't decline by two thirds the minute after the devaluation.

There are several ways of dealing with these limitations of debt sustainability simulation models. For example, GDP in PPP dollars may be used. This is a significantly more stable figure that GDP converted using spot exchange rates. Another alternative is to use an estimate of the long run "equilibrium" real exchange rate to make the GDP conversion.

In this paper, however, I have used a different approach for evaluating the appropriateness of haircuts after a debt restructuring. I have used a data set that includes every sovereign restructuring between 1978 and 2010 to explain the extent of investors' losses. The regression results are broadly in agreement with the "excusable" default approach to restructurings: countries that have suffered very severe shocks – including wars, armed conflicts, coup d'état, output collapses, and major declines in the terms of trade – end up having larger haircuts than countries that have not faced these major disturbances. Very poor countries and nations with larger debt burdens also have larger haircuts. The residuals from these regressions

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[34] A simple version of this methodology may be described as follows: First, the analyst determines the country's "capacity to make payments." Say, interest payments should not exceed X% of GDP per year. Second, the debt to GDP ratio that is consistent with payments not exceeding X% of GDP is calculated. This is called the "sustainable" debt to GDP ratio. The "appropriate haircut" is then computed as the amount by which the current debt needs to be reduced in order to make the actual debt to GDP ratio equal to the "sustainable" ratio. In Edwards (2003), for example, I developed a model along these lines to analyze whether the proposed debt forgiveness for Nicaragua under the HIPC program would have generated a sustainable debt to GDP path into the future.

are then used to investigate whether in a particular episode the haircut was appropriate, in the sense that it conforms to the predictions from the empirical model. An analysis of the residuals from eleven regressions indicates, consistently, that the haircut imposed by Argentina in its 2005 restructuring was unusual and excessively high (in most regressions the residuals exceeded two times the standard error of the regression). The analysis presented here suggests that an "appropriate" haircut in the Argentine exchange of 2005 would have been in the vicinity of 44%, significantly lower than the actual "haircut" of 74.8%.

There are a number of possible directions for future research. First, it would be interesting to analyze the length of time that elapses between default and restructuring. Benjamin and Wright (2009) documented that during early restructurings – almost all of which were for syndicated bank loans – this time period was very long, exceeding, on average, 8 years. More recent bond restructurings, however, have been very quick. The Uruguay exchange of 2003, for example, took 63 days (in contrast, the Argentine exchange of 2005 took almost 1,300 days). A second direction for future research has to do with the potential role played by international reserves in the restructuring process. Defaults take place when international reserves are very low, but still positive.[35] For example, the Argentine default of December 23, 2001, took place when the country still had approximately USD 20 billion in reserves (equivalent to 7% of GDP at the pre-devaluation exchange rate and almost 20% of GDP at the post evaluation exchange rate). An interesting question is how the reserves position of a country affects the haircut losses incurred by investors. In principle, one would expect that the higher the reserves at hand, the lower the haircut and, thus the higher the recovery rate.

[35] See Aizenman and Lee (2007) for an analysis of the role of international reserves in debt crises. See, also, Reinhart and Rogoff (2010).

Figure 1: <u>Haircuts Histogram: All Episodes</u>

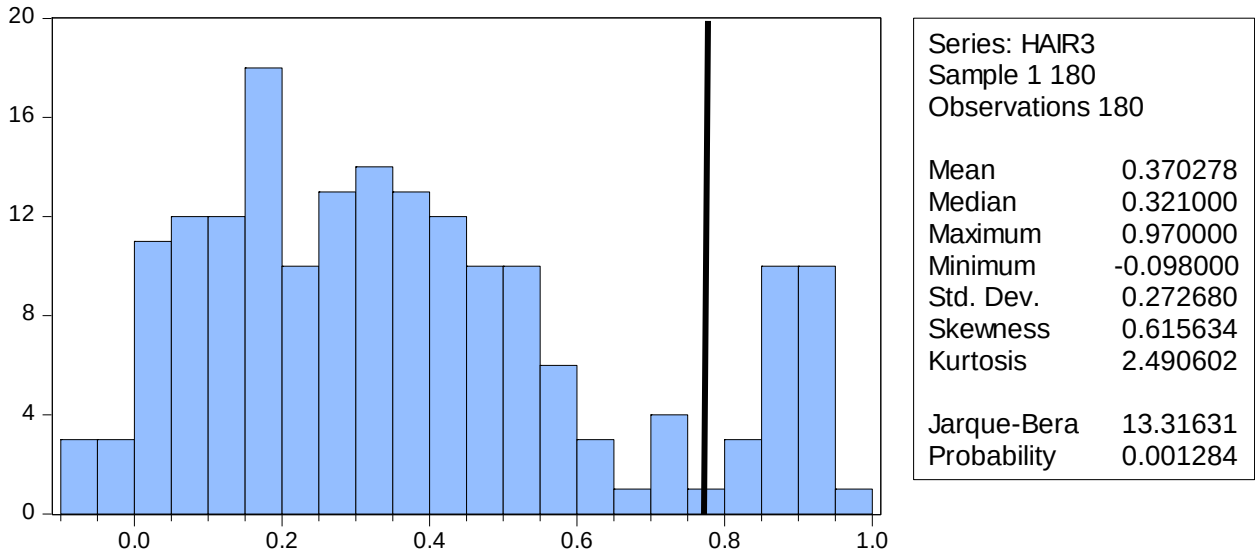

Figure 2: <u>Influence Statistics and Outliers</u>

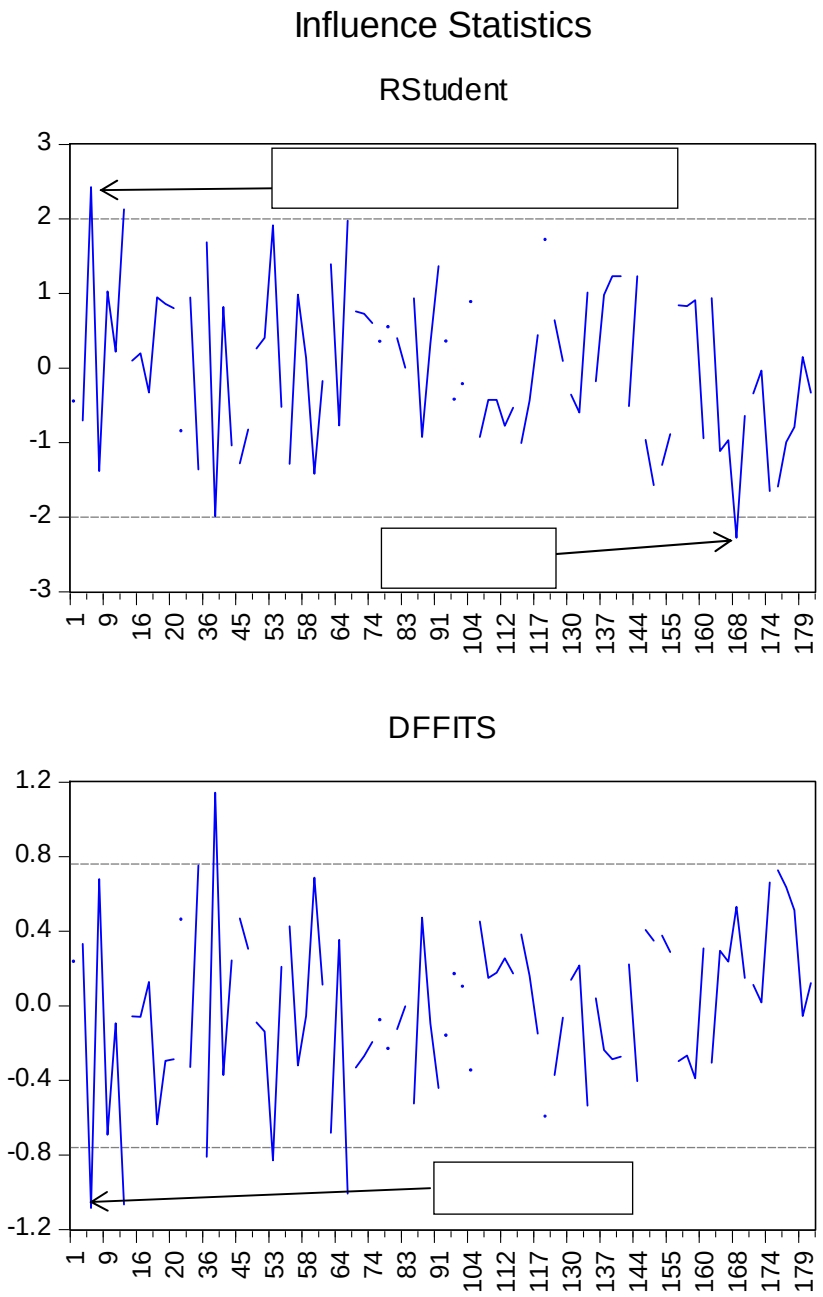

TABLE 1: Sovereign Restructurings, 1978-2010: Years and Estimated "Haircuts"

COUNTRY	YEAR	HAIRCUT	COUNTRY	YEAR	HAIRCUT
Albania	*1995*	*0.804*	***Dom. Rep (Bank)***	2005	0.113
Algeria	1992	0.087	**Dominica**	2004	0.540
Algeria	1996	0.235	**Ecuador**	1983	0.063
Argentina	1985	0.303	**Ecuador**	1984	0.057
Argentina	1987	0.217	**Ecuador**	1985	0.154
Argentina	1993	0.325	**Ecuador**	1995	0.422
Argentina (Global)	2005	0.748	**Ecuador**	2000	0.383
Belize	2007	0.237	**Ecuador**	2009	0.677
Bolivia	*1988*	*0.927*	*Ethiopia*	*1996*	*0.920*
Bolivia	*1993*	*0.765*	**Gabon**	1987	0.079
Bosnia and Herzegovina	*1997*	*0.896*	**Gabon**	1994	0.162
Brazil	1983	-0.098	**Gambia,The**	1988	0.493
Brazil	1984	0.017	**Grenada**	2005	0.339
Brazil	1986	0.192	**Guinea**	1988	0.261
Brazil	1988	0.184	*Guinea*	*1998*	*0.870*
Brazil	1992	0.270	*Guyana*	*1992*	*0.892*
Brazil	1994	0.293	*Guyana*	*1999*	*0.910*
Bulgaria	1994	0.563	**Honduras**	1989	0.732
Cameroon	*2002*	*0.855*	*Honduras*	*2001*	*0.820*
Cameroon	*2003*	*0.855*	*Iraq*	*2006*	*0.894*
Chile	1983	0.007	**Jamaica**	1978	0.022
Chile	1984	0.084	**Jamaica**	1979	0.035
Chile	1986	0.317	**Jamaica**	1981	0.152
Chile	1987	0.143	**Jamaica**	1984	0.181
Chile	1990	0.170	**Jamaica**	1985	0.317
Congo, Dem. Rep. (Zaire)	1980	0.296	**Jamaica**	1987	0.328
Congo, Dem. Rep. (Zaire)	1983	0.382	**Jamaica**	1990	0.440
Congo, Dem. Rep. (Zaire)	1984	0.301	**Jordan**	1993	0.546
Congo, Dem. Rep. (Zaire)	1985	0.370	**Kenya**	1998	0.457
Congo, Dem. Rep. (Zaire)	1986	0.354	**Liberia**	1982	0.357
Congo, Dem. Rep. (Zaire)	1987	0.268	**Macedonia, FYR**	1997	0.346
Congo, Dem. Rep. (Zaire)	1989	0.506	**Madagascar**	1981	0.190
Congo, Rep.	*2007*	*0.908*	**Madagascar**	1984	0.413
Costa Rica	1983	0.394	**Madagascar**	1987	0.137
Costa Rica	1985	0.356	**Madagascar**	1990	0.527
Costa Rica	1990	0.719	**Malawi**	1983	0.285
Cote d'Ivoire	1998	0.628	**Malawi**	1988	0.392
Cote d'Ivoire	2010	0.552	*Mauritania*	*1996*	*0.900*
Croatia	1996	0.110	**Mexico**	1983	-0.002
Cuba	1983	0.429	**Mexico**	1985	0.022
Cuba	1984	0.442	**Mexico**	1985	0.054
Cuba	1985	0.495	**Mexico**	1987	0.181
Dom. Rep.	1986	0.499	**Mexico**	1988	0.563
Dom. Rep.	1994	0.505	**Mexico**	1990	0.305
Dom. Rep. (Bonds)	2005	0.047	**Moldova**	2002	0.369

(Table 1, Continuation)

COUNTRY	YEAR	HAIRCUT	COUNTRY	YEAR	HAIRCUT
Moldova (Gazprom)	2004	0.563	**Russian Federation**	1997	0.262
Morocco	1986	0.235	**Russia (GKOs.)**	1999	0.460
Morocco	1987	0.213	**Russia (MinFin3)**	2000	0.515
Morocco	1990	0.403	**Russia (PRINs & IANs)**	2000	0.508
Mozambique	1987	0.486	*Sao Tome and Principe*	*1994*	*0.900*
Mozambique	*1991*	*0.900*	**Senegal**	1984	0.288
Nicaragua	1980	0.261	**Senegal**	1985	0.313
Nicaragua	1981	0.485	**Senegal**	1990	0.357
Nicaragua	1982	0.563	*Senegal*	*1996*	*0.920*
Nicaragua	1984	0.417	**Yugoslavia**	1983	0.065
Nicaragua	*1995*	*0.920*	**Yugoslavia**	1984	-0.075
Niger	1984	0.374	**Yugoslavia**	1985	0.145
Niger	1986	0.458	**Yugoslavia**	1988	0.197
Niger	*1991*	*0.820*	**Serbia and Montenegro**	2004	0.709
Nigeria	1983	0.012	**Seychelles**	2010	0.562
Nigeria	1983	0.021	*Sierra Leone*	*1995*	*0.886*
Nigeria	1984	-0.028	**Slovenia**	1995	0.033
Nigeria	1987	0.193	**South Africa**	1987	0.085
Nigeria	1988	0.415	**South Africa**	1989	0.127
Nigeria	1989	0.301	**South Africa**	1993	0.220
Nigeria	1991	0.401	**Sudan**	1985	0.546
Pakistan (Bank)	1999	0.116	*Tanzania*	*2004*	*0.880*
Pakistan (Bond)	1999	0.150	**Togo**	1988	0.460
Panama	1985	0.120	*Togo*	*1997*	*0.923*
Panama	1994	0.151	**Trinidad and Tobago**	1989	0.155
Panama	1996	0.349	**Turkey**	1979	0.222
Paraguay	1993	0.292	**Turkey**	1979	0.195
Peru	1980	-0.046	**Turkey**	1981	0.085
Peru	1983	0.063	**Turkey**	1982	0.170
Peru	1997	0.639	*Uganda*	*1993*	*0.880*
Philippines	1986	0.426	**Ukraine (OVDPs)**	1998	0.118
Philippines	1987	0.154	**Ukraine (Chase)**	1998	0.147
Philippines	1990	0.428	**Ukraine (ING)**	1999	-0.083
Philippines	1992	0.254	**Ukraine (Global)**	2000	0.180
Poland	1982	0.406	**Uruguay**	1983	0.007
Poland	1982	0.629	**Uruguay**	1986	0.243
Poland	1983	0.525	**Uruguay**	1988	0.203
Poland	1984	0.269	**Uruguay**	1991	0.263
Poland	1986	0.375	**Uruguay**	2003	0.098
Poland	1988	0.244	**Venezuela**	1986	0.099
Poland	1989	0.120	**Venezuela**	1988	0.042
Poland	1994	0.490	**Venezuela**	1990	0.367
Romania	1982	0.329	**Vietnam**	1997	0.520
Romania	1983	0.317	*Yemen, Republic of*	*2001*	*0.970*
Romania	1986	0.123	*Zambia*	*1994*	*0.890*

Source: Based on Cruces and Trebesch (2013). Episodes with a haircut higher than 0.748 (Argentina's haircut in 2005) appear in italics.

Table 2: Summary Statistics for Haircuts: 1978-2010

	Mean	Median	Standard deviation
All episodes	37.0%	32.1%	27.3%
Bank loans	37.1%	37.6%	21.6%
Bond exchanges	36.9%	31.7%	27.9%
Africa	46.5%	39.5%	29.4%
Asia	32.6%	34.0%	17.9%
Europe	30.0%	19.7%	26.4%
Latin America	31.8%	28.1%	26.2%
Argentina 2005	74.8%	--	--

TABLE 3: Haircut equations; White-corrected standard errors: All episodes and years

Eq Name:	(3_1) 1978-2010	(3_2) 1978-2010	(3_3) 1978-2010	(3_4) 1978-2010	(3_5) 1988-2010	(3_6) 1988-2010
BAD STATE	0.044	0.038	0.036	0.037	0.066	0.057
	[2.330]**	[1.993]**	[1.984]**	[2.131]**	[2.806]***	[2.022]**
DEBT_GDP	0.378	0.349	0.260	0.224	0.273	0.385
	[3.274]***	[2.854]***	[1.725]*	[1.604]*	[1.489]	[2.181]**
POOR	0.282	0.274	0.132	0.134	0.143	0.142
	[8.081]***	[7.757]***	[3.639]***	[3.911]***	[2.827]***	[2.220]**
TEN_YR	-0.022	-0.051	-0.026	-0.028	-0.009	-0.008
	[-2.287]*	[-7.787]***	[-2.824]***	[-4.304]***	[-0.632]	[-0.399]
NINETY	0.183	0.101	0.019			
	[3.675]***	[2.244]**	[0.283]			
RECESSION	0.025		0.080	0.088	0.118	0.107
	[0.499]		[1.559]*	[2.145]**	[1.919]*	[1.320]
NEW_MONEY_INCL_			-0.045	-0.058	-0.056	-0.031
			[-1.229]	[-1.845]*	[-0.907]	[-0.404]
AFFECTS_PRD			0.002			
			[0.048]			
ALL_FALLEN_DUE			0.040			
			[1.144]			
BRADY_DEAL			0.095	0.107	0.085	
			[1.287]	[2.156]**	[1.460]	
BOND_EXCHANGE			-0.002			
			[-0.026]			
DONOR_FUNDED			0.390	0.418	0.411	0.378
			[5.746]***	[9.586]***	[7.446]***	[5.222]***
SHORT_TERM_DEBT			-0.028			
			[-0.657]			
C	0.244	0.568	0.356	0.399	0.245	0.256
	[2.265]**	[8.037]***	[3.429]***	[6.182]***	[2.348]**	[1.947]*
Observations:	153	153	153	153	90	71
R-squared:	0.520	0.480	0.664	0.660	0.642	0.508
F-statistic:	26.336	27.185	21.139	34.864	18.191	9.276

NOTES: t-statistics in brackets. * denotes significant at 10%; ** at 5%; and *** at 1%. Equation (4_4) contains “higher quality data.”

Appendix A

Sovereign borrowing and excusable default: A Conceptual framework

In this Appendix I discuss the Grossman and Van Huyck (1986) model of sovereign borrowing and default, which provides the conceptual bases for the empirical analysis in this paper. In this model there is no money and, thus, currency crises are ruled out. There is a risk free security with a rate of return ρ, and loans are for one period. There are no capital controls. Sovereign borrowers can invest in a risk free technology, or can purchase the risk free security. Lenders, on the other hand, face a competitive market and are risk neutral.

Borrowers maximize the present value of consumption. Their objective function is:

(A.1) $$\Omega = U(c_t) + \sum_{i=1}^{\infty} \frac{E(U(c_{t+i}))}{(1+\delta)^i}$$

Conventional notation is used. δ is the consumer's discount rate, and E(…) is the expectations operator, conditional on all available information. Consumption is given by the sum of three elements:

(A.2) $$c_t = F(b_{t-1}) + z_t - s_t.$$

Where $F(b_{t-1})$ is a function that captures the return from last period's borrowing (b_{t-1}); z_t is the stochastic component of income, and depends on the state of the world (see below for details); and s_t is debt service in period t. It is assumed that $s_t \geq 0$; that is, the borrower cannot buy insurance that will cover them if there is a very bad state of the world. Also, for simplicity, it is assumed that borrowing cannot be used for consumption; a relaxation of this assumption would not affect the results in a fundamental way. The F function has the following properties:

$F' > (1+\rho)$, and $F'' < 0$, if $b \leq B$.
$F' = (1+\rho)$, and $F'' = 0$, if $b > B$.

That is. the return from investing in the local technology exceed the opportunity cost up to a point B; from that point on the marginal productivity of output is equal to the world risk free rate of return ρ.

The z_t are drawn from a stationary probability distribution $p(z)$, with mean $\bar{z}$. The discreet z realizations range from a "good" state of the world Z to the worst possible state of the world ξ. Naturally, $p(Z) \gg p(\xi)$.

In equilibrium, creditors' expected income across all states of the world – each of them with a probability $p(z)$ -- is equal to the risk-free return. Assuming that an amount b_t is lent in period t, this implies:

(A.3) $$\sum p(z)\{E\ [S_{t+1}(z_{t+1})]\} = (1 + \rho)b_t$$

$E\ [s_{t+1}(z_{t+1})]$ plays a key role in the model. It is the creditor's expectation of the sovereign's debt servicing decision for period t+1. It is assumed that in forming this expectation creditors know borrowers preferences and utility function – that is they know Ω --, and that they know the sovereign's payment plans into the future. Thus, lenders know sovereign's debt servicing plan $R_t\ (\ z_{t+1}\ )$, which is generally contingent on the state of the world. The actual solution of the model will depend on this $R_t\ (\ z_{t+1}\ )$ plan. Below I consider three cases for $R_t\ (\ z_{t+1}\ )$.

To summarize, a utility maximizing sovereign will have to make three simultaneous decisions: how much to borrow today (b_t), how much debt to service today (s_t), and what type of plan to adopt for future debt service payments. This payments plan R_t is contingent on the states of the world z_{t+1}. This payment decision will determine the nature of the equilibrium. In the rest of this appendix I consider three cases:

Case1: Precommitment. Assume that the sovereign can credibly precommit to follow a payment strategy that is strictly depending on the realization of the state of the world z_{t+1}. This plan is denoted as $\widetilde{R_t}\ (z_{t+1})$, which is equal to $\sum p(z)\{E\ [S_{t+1}(z_{t+1})]\}$. In this case there will be full risk shifting from the sovereign to the lender. Both the amount borrowed and the the payment plan will be time invariant:

(A.4) $$\tilde{b} = \max(\ B,\ \frac{\bar{z} - \xi}{1 + \rho}\ ),$$

(A.5) $$\tilde{R}\,(z_{T+1}) = z_{t+1} - \bar{z} + (1+\rho)\,\tilde{b}.$$

Actual debt service will depend on the sign of $(z_{t+1} - \bar{z})$. In the bad state of world $(\xi - \bar{z}) < 0$, and payment will be less than debt plus interest. This is the "excusable default" solution. In this case, the haircut will depend on the severity of the negative shocks, and will be equal to $(\bar{z} - \xi)$, the difference between the mean of the stochastic component of income and the bad state of the world realization.

Case 2: Repudiation: Assume now that instead of precommitting, the sovereign maximizes utility without any concern regarding its reputation or ability to borrow in the future.[36] The simple and myopic maximization of (A.1) implies, for all states of the world, that $s_t = 0$. If the creditor anticipates this plan, then $b_t = 0$, for all states of the world. This is a suboptimal outcome with no borrowing; if borrowing does happen, the debt would be fully repudiated.

Case 3: Reputation: Assume, finally, that although the sovereign cannot strictly precommit, it does care about its reputation. The creditor, in turn, takes into account the borrower's past behavior to elucidate its payment intentions in the future; creditors have rational expectations, and use information about the past to form its expectations about the future. In this case, it never pays for the borrower to mislead the creditor; that is, in every period $t+1$, the sovereign validates the expectations that the creditor formed about the contingent payment plan $R^*(z_{t+1})$. This plan, then, is the best plan within the class of incentive compatible payment plans. Under most values of δ, and sovereign's degree of risk aversion (curvature of the ultilty function), the reputational equilibrium implies an amount of borrowing lower than in the precommittment case, and incomplete risk shifting from the borrower to the lender. The payment function $R^*(z_{t+1})$ will be state contingent, and under bad states of the world (when $z_{t+1} = \xi$) debt service will fall short of the debt plus interest. That is, in a bad state of the world there is an "excusable" partial default. The magnitude of the default, or haircut, will depend on $(\bar{z} - \xi)$. That is, the haircut will be larger, the more severe are the negative shocks that affect the sovereign.

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[36] Whether sovereigns can actually precommit is an open question. Indeed, in the absence of international bankruptcy courts (or equivalent institutions), it is not possible.

Appendix B:

Data and Further Regression Results

In this Appendix I provide data sources and I present some regression results discussed in the Section 3.3 on extensions. In Table B-1 I report results using alternative measures of haircuts (market haircut), and an alternative index of "Bad states of the world" (*Bad Exp*). In Table B-2 I deconstruct the bad states of the world indicator, and I introduce each component separately.

Data Sources:

Wars and civil conflicts: Integrated Network for Social Conflict Research (http://www.systemicpeace.org/inscr/inscr.htm).

Coups and coups attempts: *Peace Research Institute of Oslo* (PRIO), Norway (http://www.prio.no/).

Output collapse: Constructed from raw data form the World Development Indicators.

Currency Crises: Constructed from raw data form the World Development Indicators.

Poor: Constructed from data form the World Development Indicators.

Recessions: Constructed from data on recessions from the National Bureau of Economic Research.

Ten year Treasury yield: Federal Reserve of St. Louis, FRED data base.

Haircuts: Basic data from Cruces and Trebesch (2013).

Characteristics of restructuring deals: Basic data from Cruces and Trebesch (2013).

TABLE B-1: Haircut equations; White-corrected standard errors: All episodes and years

Eq Name:	(5_1)	(5_2)	(5_3)	(5_4)
Dep. Var:	MARKET_H	MARKET_H	HAIRCUT	HAIRCUT
BAD STATES	0.0352	0.0326		
	[1.977]**	[1.875]*		
BAD_EXP			0.0099	0.0106
			[4.607]***	[5.886]***
DEBT_GDP	0.2518	0.2729	0.2442	0.2327
	[1.685]*	[1.943]*	[1.297]	[1.285]
POOR	0.1515	0.1468	0.1181	0.1318
	[4.030]***	[4.018]***	[2.427]**	[2.838]***
TEN_YR	-0.0271	-0.0293	-0.0101	-0.0140
	[-2.895]**	[-4.166]**	[-0.542]	[-1.011]
NINETY	0.0244		0.0016	
	[0.365]		[0.020]	
RECESSION	0.0777	0.1007	0.1129	0.1231
	[1.601]*	[2.460]**	[1.533]	[2.063]**
NEW_MONEY_INCL_	-0.0295	-0.0449	-0.0073	-0.0553
	[-0.804]	[-1.396]	[-0.103]	[-0.905]
AFFECTS_PRD	0.0241		0.0603	
	[0.583]		[0.930]	
ALL_FALLEN_DUE	-0.0152		0.1253	
	[-0.412]		[1.740]*	
BRADY_DEAL	0.1168	0.1473	0.0982	0.0915
	[1.655]*	[3.225]***	[1.199]	[1.765]*
BOND_EXCHANGE	-0.0350		0.0654	
	[-0.448]		[0.740]	
DONOR_FUNDED	0.3692	0.3771	0.4031	0.4148
	[5.204]***	[8.152]***	[5.347]**	[7.978]**
SHORT_TERM_DEBT_INC	-0.0434		-0.1004	
	[-1.016]		[-1.087]	
C	0.4137	0.4319	0.1900	0.3083
	[3.911]***	[6.383]***	[1.163]	[3.110]***
Observations:	153	153	153	153
R-squared:	0.638	0.631	0.684	0.667
F-statistic:	18.858	30.834	12.662	20.314

TABLE B-2: Haircut equations; White-corrected standard errors: Individual "excusable" shocks, 1988-2010

Eq Name:	(4_1)	(4_2)	(4_3)	(4_4)	(4_5)
COUP_WAR	0.199				0.196
	[2.840]***				[2.738]**
COLLAPSE8		0.113			0.068
		[2.540]**			[1.810]*
TOT_PENN			0.179		0.144
			[2.053]**		[1.959]*
CRISIS20				-0.006	-0.022
				[-0.138]	[-0.587]
DEBT_GDP	0.252	0.331	0.390	0.304	0.218
	[1.740]*	[1.766]*	[2.160]**	[1.514]	[1.300]
POOR	0.125	0.168	0.093	0.113	0.132
	[2.488]**	[2.931]***	[1.914]	[2.063]**	[2.533]**
TEN_YR	-0.019	-0.014	-0.019	-0.015	-0.014
	[-1.497]	[-1.034]	[-1.501]	[-1.108]	[-1.085]
RECESSION	0.082	0.111	0.105	0.083	0.114
	[1.285]	[1.752]*	[1.618]	[1.335]	[1.828]*
BRADY_DEAL	0.076	0.077	0.035	0.054	0.086
	[1.590]	[1.435]	[0.615]	[0.945]	[1.886]*
ALL_FALLEN_DUE	0.059	0.073	0.071	0.083	0.049
	[1.298]	[1.408]	[1.354]	[1.833]*	[0.996]
DON_FUNDED	0.303	0.374	0.411	0.380	0.327
	[4.594]***	[6.424]***	[7.291]***	[6.180]***	[4.739]***
C	0.373	0.263	0.347	0.347	0.300
	[3.913]***	[2.618]**	[3.743]***	[3.317]***	[3.119]***
Observations:	98	92	94	92	90
R-squared:	0.649	0.618	0.638	0.590	0.690
F-statistic:	20.607	16.761	18.741	14.958	15.805

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