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# **Sovereign Debt Relief and its Aftermath**

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# Sovereign Debt Relief and its Aftermath

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## Abstract

This paper studies sovereign debt relief in a long-term perspective. We quantify the relief achieved through default and restructuring in two distinct samples: 1920-1939, focusing on the defaults on *official* (government to government) debt in advanced economies after World War I; and 1978-2010, focusing on emerging market debt crises with *private* external creditors. Debt relief was substantial in both eras, averaging 21% of GDP in the 1930s and 16% of GDP in recent decades. We then analyze the aftermath of debt relief and conduct a difference-in-differences analysis around the synchronous war debt defaults of 1934 and the Baker and Brady initiatives of the 1980s/1990s. The economic landscape of debtor countries improves significantly after debt relief operations, but only if these involve debt write-offs. Softer forms of debt relief, such as maturity extensions and interest rate reductions, are not generally followed by higher economic growth or improved credit ratings.

JEL classification: E6, F3, N0 and H6

Keywords: Sovereign Default, Debt Overhang, Debt Forgiveness, Crisis Resolution

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# 1 Introduction

Should countries with a heavy debt burden and little prospect of repayment receive debt forgiveness? This is an old question with modern resonance.<sup>1</sup> Despite the policy relevance and controversy surrounding this issue, surprisingly little is known about the characteristics and the economic impact of sovereign debt relief. The literature has mostly focused on the occurrence of debt crises, but not on their resolution.<sup>2</sup> We contribute towards filling this gap by studying two 20th century instances of debt relief that encompassed a substantial number of countries. These include the protracted debt overhangs in many advanced economies in the 1920s and 1930s and those of developing countries in the 1980s and early 1990s.

The paper is organized around two main contributions. In the first part, we document the process and magnitude of debt relief achieved through default and restructuring of external sovereign debt in 48 crisis spells. We focus, in particular, on the debt overhang that resulted from World War I, which was dominated by *official* external sovereign debt (i.e., debts owed to government creditors). This episode has been largely missed in previous empirical research, which has almost exclusively focused on sovereign defaults on private creditors. Its comparative obscurity is baffling given that intergovernmental war debts were regarded as one of the central economic challenges at the time (see, for example, Moulton and Pasvolsky 1932).<sup>3</sup> The official debt overhang of the 1930s is also reminiscent of the situation in periphery Europe today, where much of the debts are now also in the hands of official creditors.<sup>4</sup>

To analyze the 1930s defaults on official debts, we collect the details on official lending and debt relief events in a large network of war-related loans owed by 18 advanced debtor countries to the two main creditor countries during WWI and the 1920s, the United States and the United Kingdom. We next compare this intra-war episode to the better-documented emerging market

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<sup>1</sup>See Ahamed (2010) for a discussion of the recurring international debates on debt relief during the 1920s and 1930s and Sachs (1990) and Cline (1995) on the debt overhang debate of the 1980s and 1990s. In the current context, the IMF emphatically called for further debt relief for Greece (Financial Times, May 5, 2015), while Larry Summers argued for a deep debt reduction for war-torn Ukraine (Summers 2015).

<sup>2</sup>Recent work focusing on debt crisis resolution and renegotiation includes Benjamin and Wright (2009), Pitchford and Wright (2012), Aguiar and Amador (2013), Hatchondo et al. (2014), Kaminsky and Vega-Garcia (2014), and Asonuma and Trebesch (2015). In addition, a small body of empirical work has shed light on specific debt relief episodes, such as the 16 Brady debt reduction deals of the 1990s (Cline 1995, Rieffel 2003, and Arslanalp and Henry 2005), or the debt forgiveness for highly indebted poor countries (HIPCs) (Depretis Chauvin and Kraay 2005, 2007, and Dias et al. 2013). However, a comprehensive picture on debt relief from the perspective of middle- and high-income debtor countries is missing. See Tomz and Wright (2013) for a survey.

<sup>3</sup>Eichengreen and Portes (1986, 1990) and Eichengreen (1992) study the interwar defaults on external debt owed to private foreign bondholders.

<sup>4</sup>Arslanalp and Tsuda (2014) document the sharp migration of periphery sovereign debt from private to public hands. The importance of official creditors is even higher if one takes into account the holdings of central banks.

(EM) debt crises of recent decades. These were dominated by defaults on *private* creditors, notably foreign banks and bondholders. For the modern sample, we rely on earlier estimates of haircuts in middle-income emerging markets between 1978 and 2010. However, we are the first to compute various measures of debt relief for a representative group of crises and countries.<sup>5</sup> We also document the process of crisis resolution in detail.

Our second contribution is to examine the economic performance of debtor countries during and after sovereign debt relief operations. Theory is ambiguous as to whether debt relief is beneficial or not. Krugman (1988), Sachs (1989), and Obstfeld and Rogoff (1996) emphasize the potential welfare benefits of forgiving debt in a situation of debt overhang. In these models, both creditors and debtors can gain from a partial debt-write-down, since an excessive debt stock and the prospect of large future debt repayments act as a tax on domestic investment and depress the present value of claims held by investors.<sup>6</sup> On this basis, a reduction in the debt level should be followed by a period of higher growth.<sup>7</sup> However, a substantial related literature suggests that a default or restructuring can cause reputational damage and trigger sanctions and output losses (e.g., Eaton and Gersovitz 1981, Bulow and Rogoff 1989, Cole and Kehoe 1998, Aguiar and Gopinath 2006, and Arellano 2008). In addition, debt relief may reduce the incentives to implement economic reforms (Easterly 2002), and debt renegotiations can give rise to collective action problems and inefficient delays that reduce output (Benjamin and Wright 2009 and Pitchford and Wright 2012). Determining the overall (net) impact of debt relief is, in the end, an empirical question.<sup>8</sup>

We study the aftermath of debt relief by tracing the evolution of real per capita GDP, sovereign credit ratings, debt servicing costs, and the level of government debt (external and total) in a 10-year window around the relief event.<sup>9</sup> We describe stylized facts for the episodes and run difference-in-differences regressions by comparing the performance of countries that received debt relief to a control group that did not.

There are (at least) two challenges in assessing the impacts of debt relief – both of which we

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<sup>5</sup>Sturzenegger and Zettelmeyer (2006, 2008), Benjamin and Wright (2009) and Cruces and Trebesch (2013) estimate the scope of credit losses (“haircuts”) in past sovereign defaults from an investor’s perspective. Sturzenegger and Zettelmeyer (2007) and Zettelmeyer et al. (2013) compute debt relief to GDP for seven recent crisis spells.

<sup>6</sup>Also in Aguiar et al. (2009) debt relief can be beneficial for governments with large debt stocks, although it is never a Pareto improvement and not necessarily beneficial for investors. In Fernandez and Martin (2014) creditors benefit from a debt restructuring if it is designed “correctly”.

<sup>7</sup>This prediction is broadly in line with the literature linking debt and growth, which has established a negative correlation between the level of public debt and economic performance. This literature is surveyed in Panizza and Presbitero (2013).

<sup>8</sup>There is a nascent literature studying the effects of debt relief for households (Dobbie and Song 2015).

<sup>9</sup>See Tomz and Wright (2007) for a related historical study on sovereign default and output.

address. First, the timing of debt relief may be endogenous, since countries often renegotiate their debt only after they start to recover (Kovrijnykh and Szentes 2007, Benjamin and Wright 2009). To account for this concern, we build on the identification strategy of Arslanalp and Henry (2005) and focus on episodes of debt reduction that were centrally orchestrated and, thus, synchronously applied across debtor countries, irrespective of their individual economic circumstances. In the interwar years, two such episodes emerge: the Hoover Moratorium of 1931 and the generalized war debt defaults of the summer of 1934, which occurred simultaneously in more than 15 debtor countries. In the modern period, we stress the two debt relief initiatives that were spearheaded by the United States: (i) the Baker plan of 1986, which granted debt relief by reducing interest rates and by lengthening the maturity of selected developing country debts; and (ii) the Brady initiative of 1990, which set the stage for face value debt reduction. These four events are useful for identification purposes, since debtor countries did not choose the timing of relief in an idiosyncratic manner. The approach alleviates, but does not necessarily eliminate, potential endogeneity.

A second challenge in analyzing the “before and after” of debt relief, is the possible role of omitted variables and confounding factors. To address this, we include country and time fixed effects, in line with the empirical strategy in Mian et al. (2014), which takes care of any time-invariant variation and common trends. This approach also accounts for global factors that might have influenced the dating choice of the (synchronous) debt relief events. Finally, we account for time-varying confounders by running a battery of robustness checks, in particular by adding controls for inflation, banking crises, currency crises, wars and conflicts, and major political shocks. The results are robust, but they should nevertheless be interpreted with caution as our controls are not exhaustive.

With these caveats in mind, the evidence is clearly consistent with the notion that debt relief has beneficial economic effects for debtor countries. We can summarize the findings as follows.

Sovereign debt relief averaged 21% of GDP and 43% of external government debt for advanced economies crises in the 1930s, and 16% of GDP and 36% of external debt in middle-high-income emerging markets from 1978 to 2010. These estimates represent a lower bound of the true magnitude of relief. The results for emerging markets are quite similar to those of advanced economies, and relief estimates are not clustered in a particular range. More generally, like Gourinchas and Obstfeld (2012), we find striking parallels in the crisis resolution process of

the two periods and country groups.

Regarding the aftermath of debt relief, we find that per capita GDP increases 11 and 20% during the five years following decisive debt relief, for emerging markets and advanced economies, respectively. Decisive here refers to the last debt reduction in a sequence, meaning the debt operation that allowed countries to exit the default.<sup>10</sup> We also find a strong increase in average ratings for emerging markets. The Institutional Investor rating (IIR) index improves by 21% after two years following a decisive debt relief operation, and 40% after five years. In contrast, for the interwar years, there is no notable improvement in ratings. Regarding debt levels, we observe a strong decline following the crisis exit in both episodes. Within five years, total government debt/GDP falls by 27 percentage points across emerging market episodes and by 22 percentage points in the interwar sample. Also, the debt service burden (amortizations plus interest payments) decreases in the aftermath of debt relief, but the average decline is less pronounced than in the debt stocks.

These descriptive findings call into question theoretical models that assume credit events cast a long shadow. The difference-in-differences regressions amplify this message. The patterns revealed by the data suggest that economic activity picks up following a debt relief operation, with one important caveat: we only find significant improvements in growth and ratings if the deal involves face value debt reductions. Rescheduling operations with maturity extensions and interest reductions were *not* followed by a significant improvement in economic growth, once we control for time and country fixed effects and conduct a counterfactual analysis. The regression results also point to a significant decline in debt stocks to GDP after decisive debt relief, but the results are less robust than with regard to growth and ratings. More surprisingly, we find no significant correlation of debt relief and subsequent debt servicing burdens. The decline we observe in the raw data seems to be due to a common trend in borrowing costs.

The paper proceeds as follows. In Section 2, we summarize the crisis and debt relief experiences of advanced economies and emerging markets that are the centerpiece of the paper. Section 3 studies the aftermath of debt relief, by showing stylized facts across all event spells, while Section 4 presents the methodology and results of our difference-in-differences analysis. Section 5 concludes and discusses avenues for future research.

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<sup>10</sup>In a significant number of instances there is only a single restructuring. However, there are numerous default spells where the number of restructurings ranges from two to eight. In the interwar years, the “decisive” event is the 1934 summer default which was followed by a cancellation of the war debts across Europe.

## 2 Two Eras of Default and Relief: World War I Debts and Emerging Market Crises

In this section, we introduce the restructuring and default episodes that are the centerpiece of our study and compute the magnitudes of debt relief for each case. In both eras, we focus on external debt, meaning debt that is predominantly (but not exclusively) issued under foreign law, denominated in a foreign currency, and held by non-residents. Our aim is to quantify the magnitude of external debt relief of the entire debt crisis spell in each country, rather than just individual restructuring agreements.

### 2.1 The World War I Debt Overhang and its Resolution

For the 1920s and 1930s, we confine our attention to official World War I debt, where both the borrower and the lenders were sovereign governments. War debt is somewhat of a misnomer, since for most borrowers with the exception of the United Kingdom, much of the official debt was contracted after the war had ended and had the character of reconstruction and stabilization loans.<sup>11</sup> We focus, in particular, on official debts owed to the two main creditors of the interwar period: the United States, which was the largest creditor and did not have outstanding debts to any other sovereign connected with the war or its aftermath, and the United Kingdom, which also had lent large amounts to other European countries and owed significant amounts to the United States (see Moulton and Pasvolsky 1932, for an overview).

While our main focus are the war debt relief events of the early and mid-1930s, and, in particular, the 1934 summer defaults and the subsequent debt cancellations, we document how the payment irregularities on the war debt began much earlier. Table A.1 in Appendix A (online) presents a detailed country-by-country chronology of official credit events and related milestones. It is evident from these country timelines that the debt overhang episode was very protracted, spanning more than a decade.<sup>12</sup> The first defaults on the war debt occurred in the early 1920s and these were quickly followed by a series of rescheduling agreements with the US and the UK.

In chronological order, the United States rescheduled its war debt with Finland (May 1923),

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<sup>11</sup>See Bailey (1950), Lloyd (1934), United States Treasury (1920) and (1933).

<sup>12</sup>The same is true for the debt overhang on non-World War I public and private debts, which stretched into the post-World War II era. For example, Austria and Germany were in default through 1952; Italy was in default 1940-1945; Greece and Hungary had even longer stints in default status through 1964 and 1967, respectively. See Reinhart and Rogoff (2009).

Great Britain (June 1923), Hungary (April 1924), Lithuania (September 1924), Poland (November 1924), Belgium (August 1925), Latvia (September 1925), Czechoslovakia (October 1925), Estonia (October 1925), Italy (November 1925), Romania (December 1925), France (April 1926), Yugoslavia (May 1926), Greece (May 1929), and Austria (May 1930). Similarly, the United Kingdom arranged debt rescheduling settlements with Belgium (December 1925), Romania (1925), Italy (January 1926), France (July 1926), Portugal (December 1926), Greece (April 1927), and Yugoslavia (August 1927).

The terms of these agreements were favorable for debtor countries, since the projected repayment periods were long, often exceeding 50 years, so that principal would only extinguish in the mid-1980s. The (nominal) interest rates charged were typically at or below 3.5% of principal outstanding. The detailed terms and repayment streams of each agreement were mainly gathered from the original documents reprinted in the authoritative study by Moulton and Pasvolsky (1932) and corroborated by documents from the US Treasury (see Table A.2 in the Appendix for details). In effect, the concessionary terms on the official war debt agreed in the crisis years of the 1920s very closely resemble the rescheduling terms of the Greek official debt in 2010. The restructured Greek debt to the European official institutions also features repayment periods of 30 years and more and interest rates as low as 2.5% (see Zettelmeyer et al. 2013).

After the rescheduling agreements of the mid- and end-1920s, most countries continued to honor their scheduled interest and principal payments, at least partially. This state of affairs came to an end with the moratorium announced by President Hoover on June 20, 1931, and approved by 15 creditor and debtor nations on July 6, 1931. Initially, Hoover's plan was to grant a suspension of interest and principal payments on all inter-allied war debts as well as Germany's reparations payments for one year, i.e. until late 1932.<sup>13</sup> However, at the end of this temporary moratorium in 1932, scheduled payments did not resume in uniform and regular fashion. While the United Kingdom, Italy, Czechoslovakia, Finland, Greece, Latvia, Lithuania, Romania, and Yugoslavia made the scheduled December 15 payment on war debt, France, Belgium, Poland, Estonia and Hungary did not.<sup>14</sup> In addition, the European countries suspended their war debt payments to the United Kingdom after the Lausanne war debt conference of July 1932, as did

<sup>13</sup>For brevity, we do not delve into the complex issue of the German reparation debts, which have been studied at length elsewhere. These debts originated in the Treaty of Versailles in 1919, were restructured under the Dawes Plan in 1924, restructured again under the Young Plan in 1929, and ultimately defaulted on during 1932-1934. For details, see e.g. Ritschl (2012).

<sup>14</sup>League of Nations, World Economic Survey (1932/1933, p. 332).



Australia and New Zealand.

The repayment irregularities came to a head in June 1934, with the announcement of full suspension of payments. All debtor countries except Finland, which fully repaid, suspended all payments on the war debt owed to the US and the UK, and, at various point in time removed this debt from their books.<sup>15</sup> The 1934 defaults can thus be interpreted as a decisive “crisis exit” event of this period, in the sense that it was understood that those debts would not be repaid anytime in the foreseeable future. In retrospect, the summer defaults of 1934 thus brought to a close the war debt overhang episode of the 1920s and 1930s, against the strong opposition of the United States.<sup>16</sup>

What was the scope of debt relief achieved through the 1934 defaults and debt cancellations? Table 1 lists 18 countries that, as of 1934, owed debt to the US and the UK governments from World War I and its aftermath (Australia, New Zealand, and Portugal only owed debt to the United Kingdom). Finland, the only country to fully honor its war debt obligations to the United States, will drop out from the debt-relief list. To encompass the range of “credit events” in the advanced economies at that time, we add to this list the default spell of Germany (which applied to all external debts, affecting both private and public creditors) and the United States’ 1934 haircut that resulted from the abrogation of the gold clause, which mostly affected domestic private creditors (Table A.3, Appendix A provides the details of this episode). This brings the total number of 1930s episodes to 19.<sup>17</sup>

The first column of Table 1 gives the amount of debt outstanding plus interest arrears at the time of the generalized default in June 1934. These amounts owed to the US and the UK vary somewhat across sources. For instance, the unpaid obligations that are recorded in the United Nations 1948 publication, *Public Debt, 1914 – 1946*, and in Baily (1950, p. 701) are not strictly the same as those shown in Table 1, which are taken from the annual financial reports by the US Treasury Department and from the Moody’s Manuals on Foreign Securities (although all numbers are quite close). Discrepancies may also arise from the exchange rate used to convert

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<sup>15</sup>Some countries formally canceled their debt only years after 1934. For example, France removes the UK and US war debt from its books in 1938. Others, like Belgium and the United Kingdom keep the war debt in their official debt figures until the end of World War II. Nevertheless, in 1934, it became generally recognized that the war debts would not be serviced for years to come.

<sup>16</sup>In reaction to the European payment suspensions, the US Congress enacted the Johnson Debt Default Act of 1934, which banned US citizens from granting loans to countries that had defaulted on their war debt to the US. Moreover, the US Treasury still lists the unpaid 1934 war debt obligations in its financial accounts until today.

<sup>17</sup>In the various empirical exercises that follow, these countries are incorporated to the extent that the data permits. The core episodes with the most complete profile are: Austria, Belgium, France, Germany, Greece, Italy and the United Kingdom.

Table 1: The 1934 Summer Defaults: Unpaid Allied Wartime and Postwar Debt Owed to the United States and the United Kingdom

	<i>Owed to US</i>	<i>Owed to UK</i>	<i>Total to US and UK</i>	<i>Debt relief to GDP (in %)</i>		<i>Debt relief as</i>
	Debt outstanding	Debt outstanding	Debt outstanding	Face value	Present value	% of external
	in US\$ (w/ arrears)	in US\$ (w/ arrears)	in US\$ (w/ arrears)	(upper bound)	(lower bound)	public debt
	(1)	(2)	(3)	(4)	(5)	(6)
United Kingdom	4,714,345,235	.	4,714,345,235	24.5	19.5	91.9
France	3,980,735,112	3,361,387,861	7,342,122,972	52.2	25.1	.
Italy	2,009,555,036	1,123,494,772	3,133,049,808	36.4	11.5	.
Belgium	413,430,000	64,631,010	478,061,010	4.1	2.7	11.3
Poland	226,248,308	17,107,860	243,356,167	.	.	.
Czechoslovakia	165,409,455	0	165,409,455	.	.	48.1
Yugoslavia	61,625,000	146,572,822	208,197,822	.	.	36.1
Romania	63,883,007	140,836,167	204,719,173	.	.	.
Greece	32,789,344	99,384,805	132,174,148	43.4	21.4	44.0
Austria	23,822,492	0	23,822,492	1.7	1.6	5.3
Estonia	18,079,383	1,432,045	19,511,429	.	.	95.8
Finland (fully repaid)	8,711,996	0	8,711,996	0.2	0.2	.
Latvia	7,435,784	6,222,619	13,658,403	.	.	97.8
Lithuania	6,650,080	.	6,650,080	.	.	.
Hungary	2,086,096	0	2,086,096	.	.	0.6
<i>Australia</i>	0	337,777,250	337,777,250	6.2	.	14.8
<i>New Zealand</i>	0	110,966,579	110,966,579	10.5	.	10.0
<i>Portugal</i>	0	99,459,373	99,459,373	10.3	.	66.6
Memorandum items:						
	Total owed the US:	US GDP		Owed/GDP (US)		
	11,734,806,327	66,800,000,000		17.6		
	Total owed the UK:	UK GDP		Owed/GDP (UK)		
	5,509,273,162	19,264,825,087		28.6		

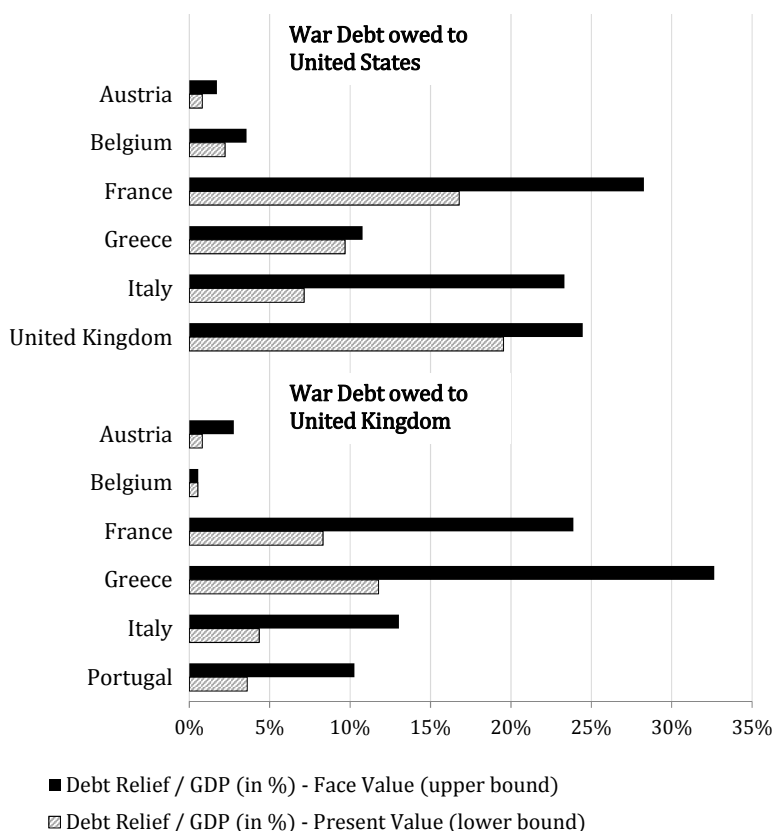
Sources : See Appendix Table A.2.

the debt into local currency, to construct a measure of debt relief relative to GDP. Our point estimates of debt relief (column 4) are based on the nominal GDP and exchange rates shown in Appendix Table A.2, using 1934 values, since that year uniformly dates the “de jure” debt relief event towards the US and the UK. The 1934 date is also appropriate for the domestic debt default of the United States case, since the abrogation of the gold clause came into force instantly.

These numbers are a conservative estimate of the true scope of the war debt relief of the 1930s for two main reasons. First, when in doubt about the best source on exchange rates, debt amounts, or GDP, we have always opted for the values that would yield the more conservative estimates of debt relief. Second, and more importantly, the defaults and debt write-downs of 1934 were not limited to debt owed the United States and the United Kingdom (which are the only ones we quantify here). Large amounts of governmental debt were also owed to France, Italy, and Belgium and these amounts are not part of our calculations.<sup>18</sup>

<sup>18</sup>Belgium, France, and Italy were each owed total war debts of more than \$1bn 1933 US dollars, see Moulton and Pasvolsky (1932).

Figure 1: Debt Relief of Major European Countries as Share of GDP in 1934



*Note:* Estimates of war debt relief in % of debtor country GDP. Figures are shown for debt owed to the US and to the UK separately. The sources are the same as in Table 1,. The present value estimates use an annual discount rate of 5% and the contractual debt service streams of the original agreements as in Moulton and Pasvolsky (1932).

Methodologically, our preferred debt relief estimate for 1934 is simply the outstanding face value of war debts as a share of GDP, because the entire debt stock was written off and no new debt was issued, in contrast to almost all emerging market debt restructurings, which involved an exchange of old loans or bonds against new ones. As an alternative, however, we also computed debt relief estimates in present value, based on the terms of the debt rescheduling agreements vis-à-vis the UK and the US of the 1920s.<sup>19</sup> To discount future payments in this exercise, we use a 5% annual rate, which follows the approach chosen in Moulton and Pasvolsky (1932). Figure 1 shows the results and compares them to our baseline numbers, focusing on the seven largest debtor countries: Austria, Belgium, France, Greece, Italy, Portugal and the United Kingdom. Unsurprisingly, the present value relief estimates are often considerably below the face value estimates, especially for France and Italy. Nevertheless, the magnitudes of debt

<sup>19</sup>We could not gather details on the agreements of Australia and New Zealand, and Portugal on their debt owed to the United Kingdom. We are therefore not able to compute present value debt relief estimates for these cases.

relief are large with either method, exceeding 10% of GDP even in present value terms in most cases. Moreover, it should be kept in mind that these war loans would have long fallen due before 1934 had this debt not been rescheduled under very generous terms in the 1920s. The present value relief estimates for 1934 are therefore artificially small, while the face value debt reduction amounts are a more appropriate assessment of the true scope of relief during this period.

## 2.2 External Sovereign Debt Crises in Emerging Markets since 1978

We now turn to a second significant era of sovereign debt relief of the past 100 years: the defaults and restructurings of emerging market debts vis--vis private creditors (foreign banks or bondholders). Our analysis is restricted to the middle-to-high income emerging markets. We rely on the Cruces and Trebesch (2013) database, which provides detailed information on the near-universe of sovereign debt restructurings with foreign banks and bondholders over 1978-2010, including data on the amount of debt affected as well as estimates on the size of creditor losses (haircuts) agreed upon in each deal. Their approach to estimate haircuts closely follows Sturzenegger and Zettelmeyer (2006, 2007 and 2008), who estimate investor losses for eight emerging market crises.

The information on haircuts in individual debt restructurings allows us to compute a cumulative haircut measure for the entire default spell, thus summarizing the outcome of individual restructuring agreements that are sequentially connected. The detailed approach and data inputs to compute the individual and cumulative haircuts are summarized in Appendix B, as well as in the original paper by Cruces and Trebesch (2013). The haircut estimate used here compares the present value of the old defaulted debt to the present value of the new restructured debt using the same market rate to discount future cash flows (the actual or imputed “exit yield”). To define a default spell, we use dating provided in Reinhart and Rogoff (2009). Table 2 lists 35 debt relief episodes in 30 middle- and high-income countries, as well as the start and end dates of each crisis spell.<sup>20</sup>

The final column of Table 2 calculates debt relief as a percent of GDP based on the cumulative haircut estimates that are also shown. The main take away is that the average debt relief estimate in this sample is 15.7% of GDP, with a large variation across events, ranging from a

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<sup>20</sup>As was the case with the advanced economies interwar sample, not all episodes can be documented to the same extent. In particular the transition economies and smaller island nations lack data on ratings or GDP.

Table 2: Debt Relief in Middle-High Income Emerging Market Episodes, 1978-2010

<i>Country</i>	<i>Full episode</i>	<i>Debt affected</i>	<i>Debt affected/ GDP</i>	<i>Full episode haircut (C&amp;T)</i>	<i>Debt relief as % of external public debt</i>	<i>Debt relief to GDP (in %)</i>
	(1)	(2)	(3)	(4)	(5)	(6)
Algeria	1991-1996	4,657	9.9	0.054	0.9	0.5
Argentina	1982-1993	67,891	28.7	0.477	80.1	24.0
Argentina	2001-2005	60,572	33.4	0.425	25.7	14.2
Bosnia and H.	1992-1997	1,300	24.6	0.896	n.a.	22.1
Brazil	1983-1994	130,493	23.9	0.375	59.9	14.3
Bulgaria	1990-1994	7,910	98.7	0.563	45.9	55.6
Chile	1983-1990	21,731	64.8	0.379	n.a.	35.6
Costa Rica	1983-1990	2,433	42.6	0.791	59.9	43.4
Croatia	1992-1996	858	3.7	0.11	n.a.	0.4
Dominican Rep.	1982-1994	1,910	13.6	0.731	42.2	13.3
Dominican Rep.	2005	1,280	3.8	0.016	0.3	0.1
Dominica	2003-2005	144	39.9	0.54	34.6	21.6
Ecuador	1982-1995	12,714	54.3	0.512	83.1	31.2
Ecuador	1999-2000	6,700	35.9	0.334	16.8	12.0
Ecuador	2008-2009	3,190	5.5	0.528	16.7	2.9
Gabon	1986-1994	226	5.3	0.054	0.5	0.3
Grenada	2004-2005	210	30.2	0.339	20.5	10.2
Jamaica	1978-1993	1,452	31.1	0.516	24.4	24.4
Jordan	1989-1993	1,289	23.3	0.227	4.1	5.3
Macedonia, FYR	1992-1997	229	6.1	0.346	9.2	2.1
Mexico	1982-1990	177,771	61.8	0.42	105.1	36.2
Panama	1983-1996	4,967	53.3	0.389	52.3	22.9
Peru	1980-1997	11,320	19.1	0.64	40.4	13.8
Poland	1981-1994	30,912	29.8	n.a.	n.a.	15.1
Romania	1981-1986	2,965	6.2	0.158	6.5	0.9
Russia	1991-2000	68,683	26.4	0.495	n.a.	11.3
Serbia & Montenegro	2003-2004	2,700	11.5	0.709	23.1	8.1
Seychelles	2008-2010	320	32.9	0.562	25.4	18.5
Slovenia	1992-1996	812	3.9	0.033	n.a.	0.1
South Africa	1985-1993	23,400	17.9	0.377	n.a.	9.2
Trinidad & Tobago	1988-1989	446	10.3	0.155	n.a.	1.6
Turkey	1978-1982	5,067	5.8	0.316	18.0	0.9
Uruguay	1983-1991	5,913	47.8	0.46	n.a.	34.3
Uruguay	2003	3,127	26.0	0.079	n.a.	2.1
Venezuela	1983-1990	60,230	124.5	0.387	105.9	41.6
<b>Averages</b>		<b>20,738</b>	<b>30.2</b>	<b>0.39</b>	<b>36.1</b>	<b>15.7</b>

Sources: Cruces/Trebesch (2013), Reinhart/Rogoff (2009, 2011), Appendix Table B.1 and sources cited therein.

Note : Debt relief to external debt can exceed 100% since public debt numbers often do not include arrears.

high of around 56% to nil.<sup>21</sup>

We also find a large variation in the number of restructurings before countries exited a crisis spell. In total, we count 97 restructuring deals in the 35 crises listed in Appendix B, Table B.1. This is a ratio of almost three to one, which suggests that in the average experience, prior to a “final” restructuring that allowed countries to exit default and re-access capital markets, there were two preliminary or “insufficient” restructuring efforts. Countries with the highest number

<sup>21</sup>For completeness, we also calculate comparable debt relief estimates for lower-income countries. On the whole, debt relief estimates for the poorer countries run lower despite higher haircuts. The share of affected debt is smaller both in absolute dollar amounts and relative to domestic GDP, as private lending is limited and official sources and aid play a more prominent role.

of serial restructurings include Poland, with seven agreements before their “final” one in 1994, as well as Brazil, Mexico and Jamaica, which each had six restructuring operations before the crisis exit in the mid-1990s.

Also noteworthy, these “final” restructurings (those at the end of a sequence) typically implied more debt relief than previous interim agreements. This was the case for the “final” Brady deals, for example, which resulted in actual debt write-offs, unlike almost all preceding restructurings of the 1980s, which typically only implied maturity extensions. While the average duration of the full default spells for the 35 episodes is a high 7.3 years, many crises took more than 10 years to resolve, in line with the war debt experience of the 1920s. In the recent sample, the longest cumulative default spells were for Peru and Jamaica and lasted 18 and 16 years, respectively.

### 2.3 Two Eras of Debt Relief: A Comparison

Figure 2 presents a synopsis of 46 debt relief episodes in advanced and emerging market episodes, where the scope of relief to GDP is marked by dark and pale bars, respectively. For the interwar sample, Figure 2 shows nine of the 18 countries defaulting on war debt to the US and the UK in the 1930s, because nominal GDP data was not available for the other nine cases (Finland is excluded since it fully repaid). The figure also includes the haircut associated with the abrogation of the gold clause in the United States. The average debt relief/GDP for this interwar sample of 10 is 20.6%.

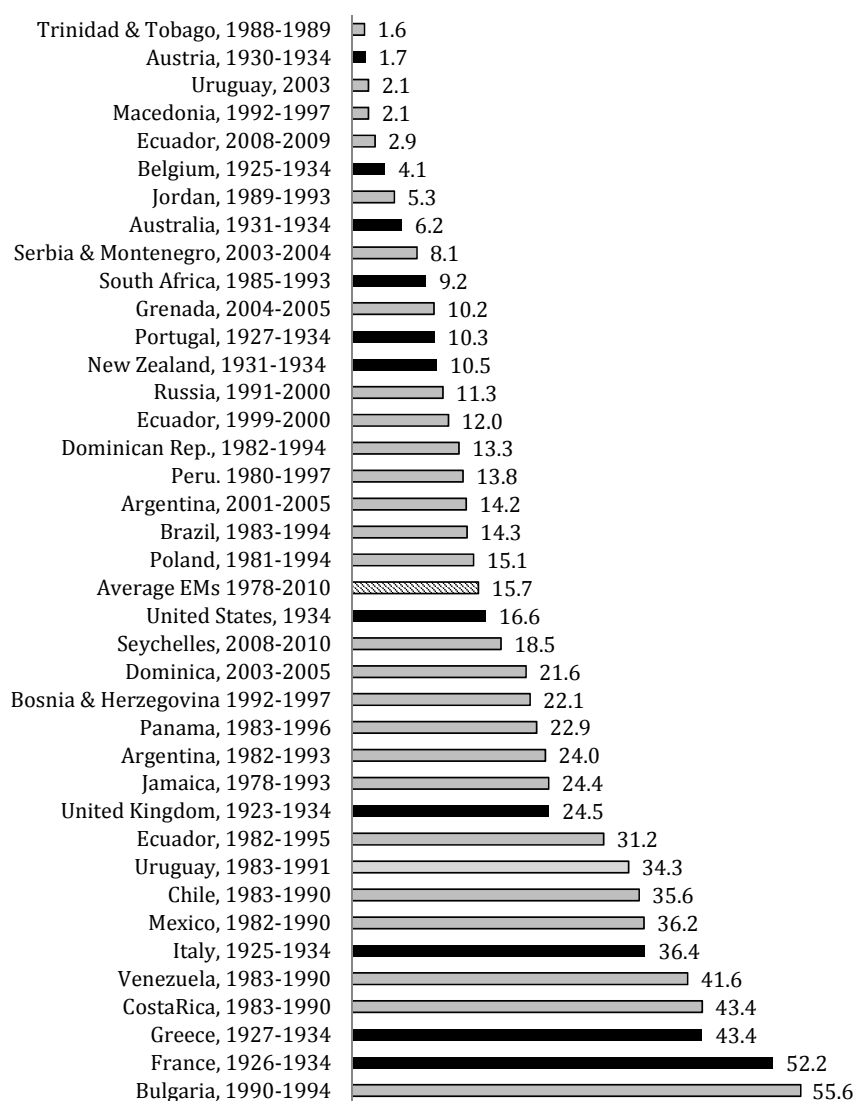
In the sample of 35 middle-high income emerging market episodes, the average debt relief estimate is about four percentage points lower, at 15.7%, as reported above. Also the range of variation is much higher than for the 1930 episodes. For example, we find seven emerging market episodes in which debt relief amounted to less than one percent of GDP. These cases are not shown in Figure 2 but they are included in the reported average (marked by a black bar).<sup>22</sup> At the same time, there are cases such as Chile, Bulgaria, Mexico, Uruguay and Venezuela in the 1990s where the total debt relief granted was very large, exceeding 30% of GDP.

We also compute debt relief as a share of debt stocks outstanding for both episodes. Tables 1 and 2 show that the debt write-downs in the 1930s amounted to an average of 43% of external government outstanding in 1934, or 25% of total government debt (domestic + external). For

<sup>22</sup>The episodes are Algeria 1991-1996, Croatia 1992-1996, Dominican Republic 2005, Gabon 1986-1994, Romania 1981-1986, Slovenia 1992-1996, and Turkey 1978-1982.

the EM episodes 1978-2010, debt relief accounted for 36% of external government debt, on average, or 25% of total external debt (see Appendix Table B.1).

Figure 2: Default, Restructuring, and Debt Relief: World War I Debt to the US and the UK, 1934, Emerging Markets, 1978-2010, United States, 1934. *Debt Relief as % of GDP*



*Notes:* The figure compares debt relief as % of GDP across episodes. We use the face value estimates for the 1934 events. For details on debt relief calculations in EMs see Appendix B. Seven EM restructuring episodes where debt relief was below 1% of GDP are not shown, but are included in the reported EM average in this figure, as well as in Table 2. The episodes are Algeria 1991-1996, Croatia 1992-1996, Dominican Republic 2005, Gabon 1986-1994, Romania 1981-1986, Slovenia 1992-1996, Turkey 1978-1982. *Sources:* Cruces and Trebesch (2013), Reinhart and Rogoff (2009), Appendix Tables A.2, A.3 and B.1, sources cited therein and authors' calculations.

The main conclusions drawn from this analysis is that the debt relief, averaging 16-21% of GDP or 36-43% of external government debt, was a quantitatively significant factor in helping governments resolve chronic debt overhangs. Furthermore, the orders of magnitude of the advanced economy debt write-downs are quite similar to the magnitudes seen in the modern

vintage emerging market defaults and restructurings. It is also evident that the magnitude of the US debt relief arising from devaluation and the abrogation of the gold clause relative to GDP is about 16-17% (Table A.3, Appendix A), a comparable order of magnitude to the amount it cost the US to forgive European debts (see lower part of Table 1). Against this backdrop, the abrogation of the gold clause in the US appears as a transfer of resources largely from private domestic holders of US debt to the defaulting governments of Europe.

### 3 The Aftermath of Sovereign Debt Relief: Stylized Facts

How does debt relief change the economic landscape of debtor countries? To address this question we examine the evolution of: (i) per capita GDP (levels and growth rates), (ii) sovereign credit ratings, (iii) debt servicing burdens, and, (iv) levels of external and total debt, following debt relief events in the modern and interwar sample. This descriptive component of our analysis should not be (mis-)interpreted as indicating causal relationships, an issue we address explicitly in Section 4. Data sources and definitions are presented in Appendix C.

The starting point is a review of the performance of these indicators around the date of a “decisive” debt relief event, denoted in all figures and tables by  $T$ . Decisive debt relief events are those that allowed the borrower country to exit from a debt crisis. For the World War I and reconstruction debt defaults in advanced economies,  $T$  is 1934. This is the year of the generalized default (in June) on outstanding official debt obligations to the UK and US, with debtor countries subsequently writing these off. For emerging markets, the main event year  $T$  is simply that of the “final” restructuring in a series the agreement that ended each of the debt crisis spells listed in Appendix Table B.1. In reviewing past experiences, it is straightforward to identify ex post the “decisive” debt operation that ends the debt crisis spell. In real time, such certainty is usually not possible as it is often difficult to ascertain whether a restructuring proposal will succeed.

Our baseline figures show a five-year window around the debt relief event  $T$ . The second leg,  $T$  to  $T+5$  is our main period of interest, while the first leg,  $T-5$  to  $T$  provides a sense of the antecedents to debt relief. However, in many long lasting default spells, the  $T-5$  to  $T$  window does not allow us to fully capture the conditions prior to a default. Thus, our analysis and results are not to be comingled with the literature on early warnings of debt crises (e.g. Manasse and Roubini, 2009), which focuses on economic indicators in the run-up to the initial default, not



in run-up to a crisis exit. Subject to data availability, we compare the average performance around 18 interwar debt relief in advanced economies (excluding the US case) to that of 30 debt relief episodes in middle-income emerging markets. To avoid bias, we excluded the five recent debt restructurings of the former Yugoslav Republics (Bosnia Herzegovina, Croatia, Macedonia, Serbia and Montenegro, and Slovenia). These cases differ from all others in the sample since they overlap with the dissolution of a state and subsequent war and, at any rate, data availability is limited. Moreover, we exclude the US abrogation of the gold clause, as this was a haircut on domestic privately-held debt and distinct from the other cases.

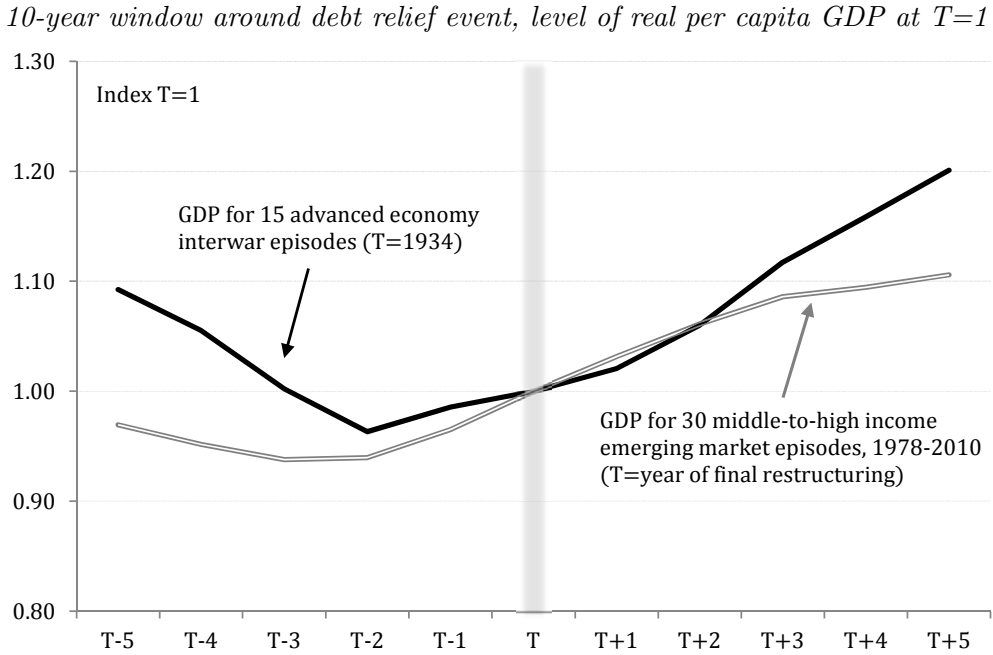
**Income:** Figure 3 plots average real per capita GDP levels (normalized to 1 at time T). The pale line shows averages around all 30 emerging markets debt relief events, while the dark line shows the comparable average for 15 of the 18 war debt default cases around 1934.<sup>23</sup> For the 1930s average, 1932 marks the trough in per capita GDP with little change through 1934. After 1934 there is a sharp rebound (cumulative growth is 20% from T to T+5). Recovery notwithstanding, it takes eight years to recoup the real per capita income level recorded in T-5. The emerging market countries show a relatively flat per capita GDP path during the default spell (through T) but a substantial increase thereafter (cumulative growth is 11% from T to T+5).

Beyond these averages, there is broad evidence of a marked pick-up in economic activity following debt relief episodes. This can be seen by examining the episodes individually and is also evident in the measures of dispersion reported in Appendix C, Table C.2 and in Figure C.1, which plots median GDP and the 25th and 75th percentile in both episodes. The evolution of median GDP per capita paints a similar picture. Moreover, at each quartile, the level of GDP is higher in T+5 compared to T (although the difference is very small for the 25th percentile in EMs). In total, we find that 38 out of 46 cases were accompanied by an increase in real per capita GDP over T to T+5. In the 1930s, only Portugal had a negative growth performance post-relief, while for the EM episodes, we find six events with a negative cumulative growth record between T and T+5 (Ecuador 1995, Gabon 1994, Grenada 2005, Jamaica 1993, Mexico 1990, and, by far, the worst growth record, Romania after 1986). Four out of the six poor EM performers entered another financial crisis in the T to T+5 period (Ecuador, Mexico, Gabon, and Grenada). On the positive spectrum, there are EM countries like Chile, Dominican Republic, Poland, Russia and Uruguay, which witnessed a per capita. GDP increase of more than 30 percentage points

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<sup>23</sup>For the interwar years, we have no GDP data for the three Baltic countries Estonia, Latvia and Lithuania.

Figure 3: Real Per Capita GDP Around Debt Relief Events (Exit from Default) in Middle-High Income Emerging Markets (1978-2010) and Advanced Economies (1934).



*Sources:* Conference Board, Total Economy Database, Maddison (personal web page), World Bank: World Development Indicators. See Appendix C for references and details.

following relief. In the interwar years, the best performers include Austria, Germany, and New Zealand, with a cumulative GDP increase of more than 30 percentage points after 1934.

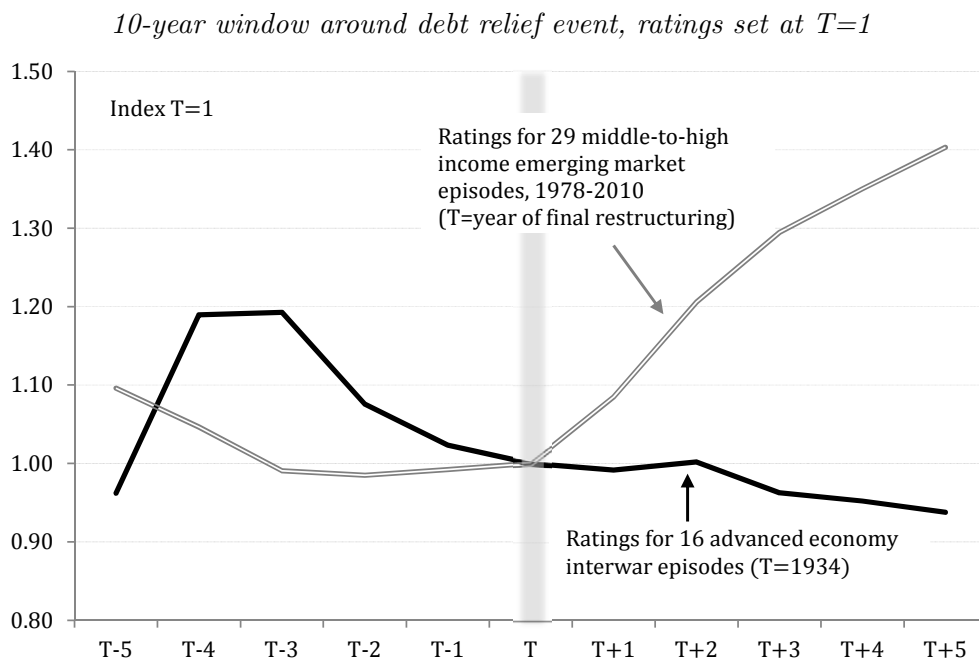
***Sovereign Ratings:*** Sovereign credit ratings can be interpreted as a forward-looking summary indicator of macroeconomic and (often) political conditions, as these affect repayment prospects and borrowing capacity. For the interwar period, we use Moody’s ratings and recode these to a numerical scale from a minimum of 1 to a maximum of 9.<sup>24</sup> For each country, we compute averages of all sovereign bond ratings reported in the Moody’s Manuals on Foreign Securities as well as from Gaillard (2012), who also summarizes the rating methodology of the time. Table C.3 in Appendix C shows the average Moody’s interwar ratings for each country and compares them to the available Fitch ratings. For the emerging market episodes, we rely on the widely used Institutional Investor ratings (IIR), which are compiled twice a year and are based on information provided by economists and sovereign risk analysts at leading global banks and securities firms. The ratings grade each country on a scale from a minimum of 0 to a maximum 100.<sup>25</sup> The first ratings were published in 1979 and they cover almost all emerging

<sup>24</sup>A value of 1 corresponds to a C rating (defined as “practically worthless” according to the Moody’s definitions of the time) to a maximum of 9 for an Aaa rating (defined as borrowers with “intrinsic strength and security”).

<sup>25</sup>For details of the survey see <http://www.institutionalinvestor.com/Research/4142/Overview.html>. Although not critical to our analysis, one can interpret the ratings reported in each semiannual survey as capturing the near-term risk of default within one to two years.

markets in our sample. This stands in contrast to Moody's and Standard & Poors, which do not report rating data for most emerging market sovereigns prior to the late 1990s. Figure 4 shows the evolution of country credit ratings, normalized to 1 around T and using data for 16 of the 18 war debt defaulters as well as 29 of the 30 EM episodes.<sup>26</sup>

Figure 4: Credit Ratings Around Debt Relief Events (Exit from Default) in Middle-High Income Emerging Markets (1978-2010) and Advanced Economies (1934).



Sources: Institutional Investor, Moody's, and authors' calculations. See Appendix C for details.

The figure shows striking differences between the two episodes. In the interwar years, sovereign credit ratings drifted steadily lower through most of the 1930s in Europe and elsewhere. They also decline, on average, after the financial crisis and Hoover Moratorium of 1931 (corresponding to T-3) and the defaults on private external creditors after 1932 in a number of cases. But ratings do not recover following the generalized 1934 default, despite the substantial debt relief received by the war debt defaulters and despite their positive GDP performance after 1934 (Figure 3).<sup>27</sup> Emerging markets, in contrast, see a large variation in ratings both within and across debtor countries. For almost all sovereigns, the debt relief and crisis exit year is

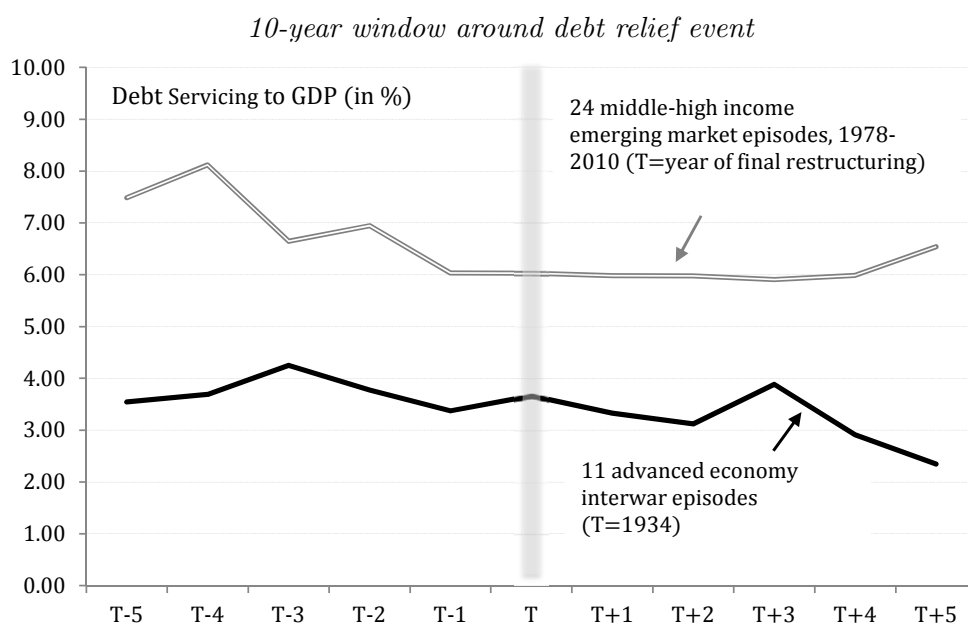
<sup>26</sup>We have no interwar Moody's data for Latvia and Yugoslavia, and no IIR data for Dominica, 2003-2005.

<sup>27</sup>As shown in Appendix C, Table C.3, the ratings are generally high and show little changes over time, at least when compared to ratings of today's crisis countries. For example, it is puzzling that France and the UK could retain a rating of Aa or Aaa, despite defaulting on war debt exceeding 20 percent of their GDP. Similarly, it is surprising that Greece and Germany managed to retain a B rating from Moody's when both had defaulted on all debts towards all creditors. Perhaps there was optimism in the recovery rates on German or Greek debt. Another possibility is that credit ratings at this time were simply not very informative, as suggested by Flandreau et al. (2011).

followed by a significant rebound in ratings. The average increases in the IIR index are 21% after two years and 40% after five years.<sup>28</sup>

**Debt servicing:** One of the expected benefits of debt relief is that it reduces the cost of debt servicing, thus increasing the “fiscal space” available to debtor governments (Ghosh et al. 2013). To examine this possibility, we gathered data on debt servicing outlays in both eras. For the interwar years, we compiled League of Nations data on central government total debt service (interest payments plus amortizations for both domestic and foreign public debt) and computed ratios to GDP and to government revenues. This was possible for 11 out of the 18 war debt default cases. For emerging markets, we use total external debt servicing to GDP (in %) from the World Bank’s International Debt Statistics (IDS) database, which was available for 22 of the 30 EM episodes.<sup>29</sup>

Figure 5: Total Debt Service to GDP (in %) Around Debt Relief Events (Exit from Default) in Middle-High Income Emerging Markets (1978-2010) and Advanced Economies (1934)



*Sources:* For EMs World Bank: World Development Indicators and International Debt Statistics. For interwar years League of Nations (1936), United Nations (1948), and authors’ calculations. See Appendix C for details.

Figure 5 shows that there is a gradual decline in debt servicing costs in the 10 year window

<sup>28</sup>This solid pattern of recovery is broadly consistent with Gelos, Sahay, and Sandleris (2011) and Cruces and Trebesch (2013), who find that most countries are able to reaccess international capital markets within two to three years after exiting default. Some of the emerging market debt relief events were even followed by exceptionally large capital inflows (compared to the historical average), or “capital flow bonanza”. Using the data and definition of such “bonanzas” from Reinhart and Reinhart (2009), we find that seven out of the 30 countries (22 percent) experienced a bonanza over T to T+4.

<sup>29</sup>For the interwar years, we lack data on Czechoslovakia, Estonia, Latvia, Lithuania, Poland, Romania and Yugoslavia. For EMs, we lack data around the debt relief events of Chile 1990, Poland 1994, Romania 1986, Russia 2000, Trinidad and Tobago 1989, Uruguay 1991, Uruguay 2003, and South Africa 1993.

around debt relief events in both eras. In the interwar period, debt servicing drops from a high of 4.2% to GDP in T-3 to just 2.4% of GDP in T+5 (a 45% reduction). In EM episodes, the cost of debt servicing is generally higher and it declines from around 8% of GDP in T-4 to 6% of GDP in T+4 (a 25% reduction). Despite this overall declining trend, there is little to suggest a significant decline at time T (the debt relief year). While this may appear counterintuitive, it is the case that by the time debt relief operations come to a close, many countries had implemented intermediate restructurings that reduced the interest and principal payments in the short and medium run.<sup>30</sup> Moreover, crisis exits are often followed by new bouts of borrowing, as capital markets reopen, especially in today's EM episodes. The reduction of debt payments due to debt relief can thus be offset by payments on any newly issued debt.<sup>31</sup>

**Debt Stock Reduction:** A successful debt relief operation should appreciably reduce the level of sovereign indebtedness. We have already shown that the average scope of debt relief corresponded to about 40% of external government debt – a notable reduction of the debt burden in the short-run (see Section 2.3). Can this debt reduction effect also be observed in the medium- and long-run?<sup>32</sup> To address this question, we use long time series on total, domestic and external central government debt assembled in Reinhart and Rogoff (2009, 2011) as well as data on total government debt to GDP from Abbas et al. (2010). Moreover, we use data on total external debt of emerging markets from the World Bank, which aggregates public, publicly guaranteed, and private debts of each country. Following World Bank convention, we show this measure as a ratio to GNI and exports.

Figure 6 shows that public debt ratios decline markedly after debt relief operations of both eras.<sup>33</sup> In the interwar period, the average debt/GDP level peaked at above 100% in T-2 and drops to a low of 71% in T+3. In emerging markets of recent decades, the average ratio is highest in T-1, at 80%, and declines to 53% after year T+3. We also find the median, and the upper and lower quartiles, to decline after period T (see Appendix C). The drop in year T is more pronounced for the EM sample, while the decline is more gradual around 1934. One

<sup>30</sup>Indeed, the ongoing Greek debt crisis illustrates this point, as debt servicing after the initial restructuring accounts for less than 3% of GDP.

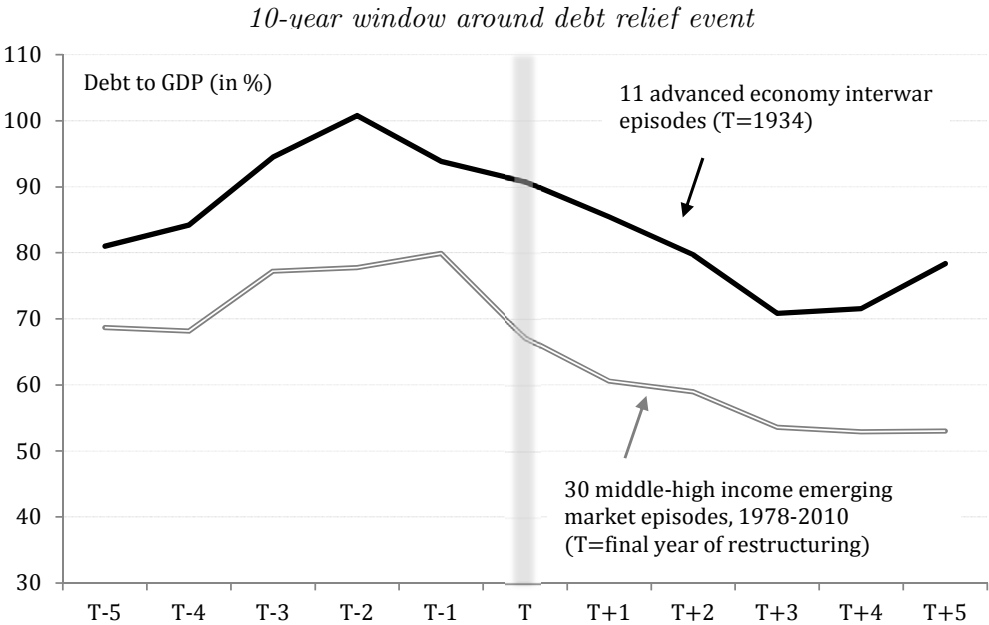
<sup>31</sup>Figures C2 and C3 in Appendix C complement the evidence in Figure 5 and trace debt servicing trends for the full sample of 1920-1939 and 1970-2011, both as shares of GDP and government revenues. The main take away is that both periods see a declining trend in debt service burdens over time. For emerging markets, this is partly owed to the strong decline in US real interest rates (also plotted in Figure C3).

<sup>32</sup>A common form of restructuring involves exchanges of short-term debt for longer maturities or exchanges of marketable debt for nonmarketable instruments that pose lower rollover risks. Analyzing to what extent these compositional changes materialize is beyond the scope of this paper.

<sup>33</sup>For the interwar years, we lack debt/GDP (mostly GDP) data on Czechoslovakia, Estonia, Latvia, Lithuania, Poland, Romania and Yugoslavia. The data for EMs episodes is missing for Romania.

explanation for this is that some countries, like Australia or the UK, did not immediately write the war debts off their books after 1934, but only years later. The debt relief of 1934 therefore takes time to show up in the cross-country averages.

Figure 6: Debt to GDP (in %) Around Debt Relief Events (Exit from Default) in Middle-High Income Emerging Markets (1978-2010) and Advanced Economies (1934)



Sources: Abbas et al. (2010) and authors' calculations. See Appendix C for details.

To shed further light on the evolution of debt burdens, Figure C.4 in the Appendix shows a bar chart on the scale of deleveraging or debt build-up around episodes of debt relief. There are four main take away points. First, the figure illustrates a large variation in the debt outcomes, ranging from a cumulative debt reduction of 92% of GNI to a debt build-up of 37% of GNI. Second, the number of countries, which experienced deleveraging is considerably higher (27 episodes) than those ending up with a higher level of external debt (7 episodes). Third, it is evident that the observations corresponding to the advanced economies are not clustered in a particular range and, indeed, their experience is distributed similarly to that of emerging markets. Finally, there are three yellow bars flagging countries where debt ratios decreased between T-4 and T, but increased again strongly post-crisis (between T to T+4). In two of the three cases, Argentina and Ecuador, this ended in a new default soon afterwards.

## 4 Difference-in-Differences Analysis

In this section we address causality by comparing “treated” countries (those granted debt relief) to a control group, and by running difference-in-differences type regressions for the main debt relief episodes of interest. The main identification challenge we face is that the timing of debt relief and restructurings could potentially be endogenous to the economic situation of crisis countries. This concern closely relates to recent theory work, in particular Kovrijnykh and Szentes (2007) and Benjamin and Wright (2009), who argue that debt restructurings and debt reductions are more likely to occur after a sequence of good shocks. The intuition behind is that both the sovereign and its creditors have an incentive to “wait for a larger cake” and, thus, to delay the haircut and crisis exit until output recovers. The positive growth performance around debt relief episodes which we observe above may thus not be the outcome of relief, but rather a precursor to the renegotiation.

### 4.1 Statistical Design and Event Timing

In our research design, we make use of the aforementioned four episodes of debt relief which were synchronous across countries.<sup>34</sup> All four debt relief operations were centrally orchestrated and simultaneously affected a large group of debtor countries. This makes the timing of these events exogenous (at least in principle) and not obviously dependent on country-specific economic conditions.

Most importantly, the starting date of these initiatives was not the outcome of an idiosyncratic debt renegotiation process between creditors and sovereign debtors, as is usually the case in debt relief operations. For example, at the start of the Hoover Moratorium, more than 15 highly indebted countries interrupted their war debt servicing at the same time, with barely any payments made between 1931 and 1933, thus resembling a “temporary stay.” We have also shown that the 1934 default occurred simultaneously across 18 advanced countries, irrespective of the specific economic situation in each of these countries.

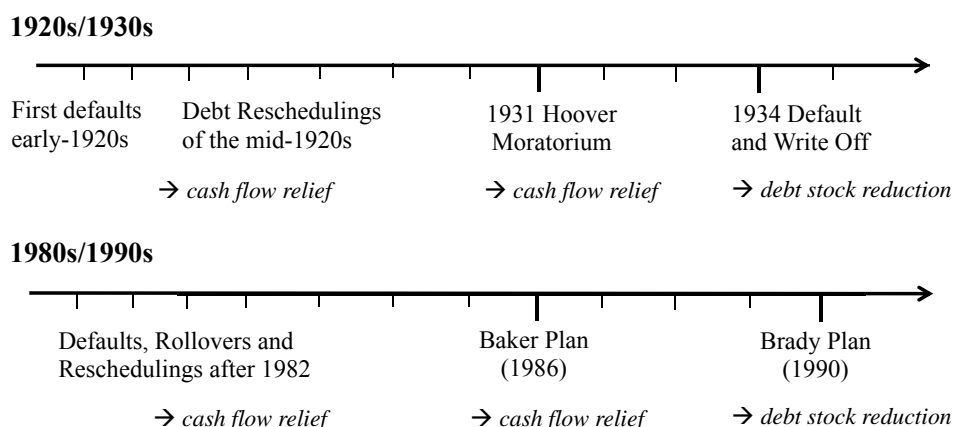
As to the Baker and Brady debt relief initiatives of the 1980s and 1990s, both plans were introduced by US Secretaries of Treasury (James Baker and Nicolas Brady), both were coordinated with more than 100 countries, and they were both financially supported by the US government and the IMF (see Cline, 1995, and Rieffel, 2003, for details). The Baker plan of

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<sup>34</sup>To reiterate, these are the 1931 Hoover Moratorium and the 1934 defaults and debt write-offs, as well as the Baker initiative of the mid-1980s and the Brady initiative of the early 1990s.

the mid-1980s aimed to encourage voluntary capital inflows and structural reforms in the crisis countries. It also involved large sums of new preferential lending from commercial banks and multilateral institutions, as well as a series of rescheduling agreements that extended debt maturities by up to 15 years. According to Cline (1989), the Baker initiative failed to spur growth and voluntary capital flows, but it did provide debt servicing relief to the target countries. Due to the limited success of the Baker initiative, Secretary Brady announced a more ambitious plan in March 1989, which took another year to form shape. The Brady plan also aimed to spur growth, capital flows and reforms, but contrary to the Baker plan it involved deep face value haircuts. Moreover, all outstanding bank loans were to be swapped into more widely held sovereign bonds. In February 1990, Mexico became the first country to implement a Brady deal and thus became a blueprint for 16 subsequent restructuring agreements.

Figure 7: Stylized crisis timeline of the 1920s/1930s and 1980s/1990s



Sources: The authors based on Appendix A, Table A.1, Cline (1989 and 1995) and Rieffel (2003).

We also make use of variation in the type of debt relief granted across events. While the Hoover and Baker operations implied *debt flow relief* via rescheduling and delayed repayments, the 1934 and Brady operations implied *debt stock relief* and reduced the nominal value of outstanding debt. This heterogeneity allows us to compare the effect of debt relief within the same countries over time and, hence, to shed light on the aftermath of intermediate versus decisive debt relief. Figure 7 shows a stylized timeline for the two main episodes covered by our regression analysis and the type of debt relief involved.

Methodologically, we exploit the cross-sectional variation between target and non-target countries and use the same intervention year in each of these episodes. This allows us to apply



a classic difference-in-differences (DiD) regression of the following type:

$$Y_{it} = \beta_0 + \beta_1 after + \beta_2(treat * after) + \delta_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where  $i$  denotes countries and  $t$  the year of observation with  $t \in \{\tau_i - 5, \dots, \tau_i - 1, \tau_i, \tau_i + 1, \dots, \tau_i + 5\}$ ,  $treat$  is a dummy variable that takes on the value of one for treated countries (the debt relief group) and zero otherwise,  $after$  is a dummy that turns one after the treatment occurs (e.g. post-1934), and  $\varepsilon_{it}$  is the error term.<sup>35</sup> The coefficient of interest,  $\beta_2$ , captures the effect of debt relief. For instance, if the debt forgiveness induces an economic recovery (an increase in real per capita GDP), then,  $\beta_2 > 0$ . The country fixed effects  $\delta_i$  allow for unobserved, time-invariant country heterogeneity, such as differences in institutions, openness, etc., while the time effects  $\gamma_t$  capture a common time trend, which can reflect the global business cycle and the economic and financial conditions of the main creditor country (the US). Allowing for a common trend is important, as it takes into account the potential endogeneity of the US-driven debt relief initiatives (the Hoover moratorium or the Brady and Baker plans).<sup>36</sup> We employ an 11-year window, as we use observations from 5 years before until 5 years after the treatment years.

As with any DiD analysis, the timing of events is crucial. Here, the treatment years in the interwar period are 1931 and 1934, since both the Hoover Moratorium and the summer defaults of 1934 went into effect immediately. For the Baker initiative, the treatment year is 1986, since the plan was initiated in early that year, after having been announced in October of 1985. The Brady initiative started four years later, in 1990, the first year with an actual Brady agreement.

Our timing choices are as conservative as possible. This can be seen when comparing our research design to that of Arslanalp and Henry (2005), who also study the effects of the Brady initiative. We adopt 1990 as the uniform treatment year for all Brady countries, while they use the date of the actual Brady debt renegotiations, which differ country by country and were sometimes concluded only in the mid-1990s.<sup>37</sup> Choosing the years of each Brady deal is problematic, since the conclusion of the Brady negotiations is clearly a choice variable by

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<sup>35</sup>Note that the  $treat$  coefficient is a country-specific constant and will therefore be absorbed by the fixed effect.

<sup>36</sup>Sachs (1990) argues that the timing of the Brady initiative can be largely explained by political and financial consideration in the United States. By 1988, US banks were recording record profits and had considerably reduced their exposures to developing country debts. For the first time since 1982, face value debt write-offs in Latin America no longer threatened the solvency of the US financial system, so that debt forgiveness became a viable political option. We control for these considerations (including the state of the US financial system) by including year dummies in each regression.

<sup>37</sup>Most restructurings were completed between 1990 and 1995, but Peru took until 1997 to close its deal.

the government and its creditors. Indeed, after early 1990 all target countries *could* request Brady debt relief based on the Mexican blueprint deal. As a result, the treatment year becomes endogenous, and the interpretation of the results is more challenging. We therefore prefer using the uniform treatment year of 1990. It is not a surprise that the point estimate of the debt relief coefficient,  $\beta_2$ , in the subsample of treated countries is typically larger if we consider the actual years of the Brady agreements. In this sense, our Brady estimation results can be interpreted as a lower bound. Nevertheless, we conducted a variety of robustness checks on our results by altering the treatment year and estimation windows in various ways.

A second fundamental issue in DiD analyses is the choice of treatment and control group. In the interwar years, we are constrained by data availability and by the relatively small number of independent countries at the time. The treatment group in the 1930s includes all 18 war debt default cases, 16 of which are European countries. We compare the performance of this target group to two control groups, subject to data availability. As a baseline approach, we use a relatively homogenous group of other advanced economies as counterfactual, which broadly resemble the treatment group. Specifically, we include all European countries that did not default or receive debt relief in the 1930s and for which GDP data was available. This list is comprised of Ireland, Spain, Switzerland and the Nordic countries of Denmark, Finland, Norway and Sweden.<sup>38</sup> As part of our sensitivity analysis, we also broaden the treatment group in various ways and make it more heterogeneous, by adding non-European countries and by mixing defaulters and non-defaulters. One control group also includes all Asian countries that were independent in the 1930s and for which GDP was available (China, Russia, Japan, Thailand and Turkey) as well as Bulgaria, a European country that had defaulted on its private creditors. Another version includes all South American countries for which GDP data is available (Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay and Venezuela). Of these, all but Argentina had defaulted on their private creditors in the 1930s. We estimate the parameters of interest using various combinations of these sub-groups and show results using both the small European counterfactual and the largest counterfactual possible, i.e. including European, Asian and South American countries alike.

In the contemporaneous sample, the Brady target group includes all middle-income EMs

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<sup>38</sup>We do not include the US, since it is a creditor country and because the abrogation of the gold clause in 1934 was a domestic default and thereby differs from the external defaults in the sample. We also exclude Canada, due to the unclear status of its war debt payments to the UK. However, the main results are robust when either country is added to the counterfactual group of advanced economies.

with a Brady deal, namely Argentina, Brazil, Bulgaria, Costa Rica, Dominican Republic, Ecuador, Jordan, Mexico, Panama, Peru, Poland, Uruguay, and Venezuela. The Baker country sample is the same, plus Chile and Morocco, which were target countries in the mid-1980s, but were not part of the “Brady bunch”. Again, our baseline counterfactual includes all middle- and high-income countries that did not default nor received debt relief in this period and for which we have data, namely China, Colombia, Czech Republic, Egypt, Hungary, India, Israel, Malaysia, Mauritius, Singapore, South Korea, Taiwan, Thailand and Turkey. For robustness, we also ran regressions with the exact same counterfactual used by Arslanalp and Henry (2005), which includes defaulters and non-defaulters<sup>39</sup>, and also check results with other counterfactual choices, such as Latin American countries only.

Taken together, the DiD design and the inclusion of fixed effects allow for much tighter identification of debt relief effects compared to the descriptive before-and-after analysis described in Section 3. However, we cannot exclude the possibility that omitted variables may be biasing the estimates of treatment coefficient. To address this remaining concern, we run robustness checks by controlling for other types of financial crises (banking and currency crises) and inflation (based on data from Reinhart and Rogoff 2009), as well as wars and conflicts (Correlates of War dataset) and major political shocks (government crises, revolutions, and riots from the Arthur Banks dataset). Despite this, it is beyond the scope of this paper to apportion a precise number to the debt relief effect per se. Many factors shaped GDP, borrowing patterns and ratings of the crisis countries and we cannot account for all of them in an encompassing manner.<sup>40</sup>

## 4.2 Difference-in-Differences Results: 1931 and 1934

We start with the Hoover Moratorium of 1931 and take a preliminary view of the data in Figure 8 below and Figure C.5 in the Appendix. The figures compare the development of our main economic indicators for treatment and control groups, where the control groups is our baseline sample of European non-defaulters. Figure 8 (left panel) shows that the growth performance of

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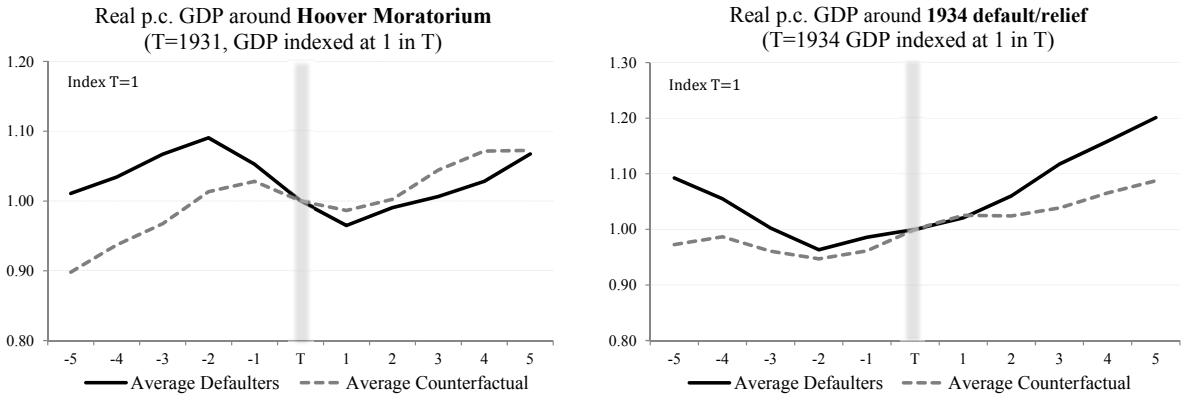
<sup>39</sup>Their counterfactual includes Chile, China, Colombia, Czech Republic, Greece, Hungary, India, Indonesia, South Korea, Malaysia, Pakistan, South Africa, Sri Lanka, Thailand, Turkey and Zimbabwe.

<sup>40</sup>For example, regarding the 1930s episodes, Eichengreen (1992) stressed the importance of stimulus provided by exits from the gold standard. However, these exits from the golden fetters were spread over a five-year period, from the early British and Greek exits in 1931 to the French exit five years later in 1936. In contrast, the defaults and debt write-downs were tightly clustered in 1934. On the fiscal front, public works programs were also initiated after 1934, but as with monetary policy there was considerable dispersion in their timing. For emerging markets, the currency depreciations that often accompany debt crises may have been an additional powerful force influencing growth and ratings (we do control for currency crises later on).

the treatment group is significantly worse than that of the counterfactual around 1931. Average real per capita GDP declines 6 percentage points between T-3 and T+3 for the defaulters, while it increases for the counterfactual group in this same spell. Panel A in Figure C.5 accounts for country heterogeneity by showing residuals from a regression of annual real p.c. growth on a constant and country-specific dummies. Residual growth declines markedly for both groups prior to 1931 and recovers strongly afterwards, but there is no evidence that treatment countries perform better than the counterfactual. The picture is similarly bleak with regard to Moody's credit ratings, which decline across the board after 1931, with no notable difference between the two groups (Panel B). Similarly, the debt/GDP level does not decline significantly more for the target countries (Panel D). Only the debt servicing burden improves, as payments to revenue drop relatively more than those countries not receiving relief.<sup>41</sup>

Figure 8: GDP Trends Around 1931 and 1934: Target vs. Counterfactual Groups

*10-year window around debt relief event*



Notes: See Appendix Figures C.6 and C.7 and Table C.1 for sources and further details.

The aftermath of the 1934 defaults looks more favorable for the defaulter group, at least with regard to GDP. The treatment group sees significantly higher real per capital growth rates compared to non-defaulters, particularly between T+2 and T+5. Figure C.6 shows the same when using residual growth rates (Panel A). In addition, we find that the average debt servicing costs continues to decline across the board. Over the entire spell (1928-1938), the debt servicing to revenue drops from 31% to just 21% for the treated countries. Furthermore, Panel D shows that the debt/GDP ratio declines after 1933, in particular for the target countries. However,

<sup>41</sup>In this section, we focus on the debt service to revenues as opposed to GDP (as in Section 3), since revenue data for the interwar years is available for more countries than nominal GDP series, especially for the counterfactual.

the rating performance continues to look unfavorable for both groups.

The regression results in Tables 3 and 4 broadly confirm the descriptive evidence. In Table 3, we find few significant treatment coefficients post-1931. The only  $\beta_2$  coefficients (marked in grey) that are marginally significant are those of GDP and of credit ratings (at the 10% level). However, both results are not robust, as the coefficients turn insignificant once we change the counterfactual or add additional controls. Thus, we find no convincing evidence that the Hoover Moratorium significantly altered the economic trajectory of countries receiving relief.

Table 3: 1931 Hoover Moratorium - Difference-in-Differences Regressions

Dependent Variable	Growth, real p.c.	Growth, real p.c.	Credit Ratings (change)	Debt Service to Revenue	Debt Service to Revenue	Total Public Debt/GDP	Total Public Debt/GDP	External Debt/GDP
Counterfactual	small (Europe)	large (World)	small (Europe)	small (Europe)	large (World)	small (Europe)	large (World)	small (Europe)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-Intervention Dummy (after 1931)	-2.51* (1.47)	-0.47 (1.21)	0.09 (1.59)	-0.45 (1.41)	-6.00* (3.44)	4.54* (2.70)	2.59 (3.12)	-1.65 (1.63)
<b>Treatment (moratorium) x post-intervention dummy</b>	2.60* (1.36)	0.86 (1.33)	-4.31* (2.39)	-3.39 (2.34)	-5.65 (4.20)	7.31 (6.94)	3.82 (6.90)	-0.51 (5.61)
Constant	3.03*** (1.11)	4.31*** (0.96)	23.80*** (1.07)	22.10*** (0.86)	-1.57 (2.95)	65.22*** (3.41)	53.78*** (2.59)	28.22*** (1.64)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	237	373	223	326	230	172	248	167
Countries	22	35	23	21	31	18	27	16
Adjusted R <sup>2</sup>	0.237	0.206	0.043	0.062	0.185	0.166	0.199	0.007

Notes: the table shows results from a difference-in-differences fixed effects panel regression as in equation (1). All specifications include country and year fixed effects. The dependent variable in Columns 1 and 2 are annual real growth rates based on the Maddison dataset; column 3 credit ratings (yoy changes in %) using Moody's ratings and transforming these to a numerical scale from 0 (lowest) to 9 (highest, Aaa); columns 4 and 5 external debt service to government revenue from various sources (see Appendix C); columns 6 and 7 total public debt to GDP from Abbas et al. (2010); and in column 8 external debt to GDP from Reinhart and Rogoff (2009, 2011). Robust standard errors clustered on the country level in parentheses. \*\*\*/\*\*/\* indicates significance at a 1%, 5%, and 10% level.

The results are more notable for the 1934 debt relief spell. Table 4 indicates that real per capita growth is 4.7 percentage points higher for treated countries in the post-1934 period, with a highly significant coefficient (column 1). Moreover, the debt levels decrease significantly (columns 6 and 8), compared to the counterfactual on European non-defaulters. We find no significant coefficient for debt servicing (column 4) and a highly significant negative coefficient for ratings. These results, however, are rather sensitive to the choice of counterfactual, as can be seen in columns 2, 5 and 7, which use the “World” counterfactual including European, Asian and South American countries. The treatment coefficient for debt servicing becomes highly significant and large, while the coefficient for debt/GDP turns insignificant. Notably, however,

the growth coefficient remains large and significant across all counterfactuals chosen, albeit sometimes only at the 10% level.

Table 4: 1934 Default/Relief - Difference-in-Differences Regressions

Dependent Variable	Growth, real p.c.	Growth, real p.c.	Credit Ratings (change)	Debt Service to Revenue	Debt Service to Revenue	Total Public Debt/GDP	Total Public Debt/GDP	External Debt/GDP
Counterfactual	small (Europe)	large (World)	small (Europe)	small (Europe)	large (World)	small (Europe)	large (World)	small (Europe)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-Intervention Dummy (after 1934)	-1.91 (1.32)	6.54*** (1.42)	-1.42 (2.98)	-4.76** (1.98)	-22.19** (9.81)	2.06 (3.37)	0.37 (5.42)	-4.59 (3.29)
<b>Treatment (debt relief) x post-intervention dummy</b>	4.66*** (1.44)	2.21* (1.24)	-6.03** (2.99)	-2.74 (2.93)	-8.18*** (2.66)	-12.21** (5.67)	-7.93 (6.18)	-9.51** (3.83)
Constant	2.40*** (0.64)	-4.48*** (1.16)	23.09*** (0.95)	20.93*** (0.94)	27.24** (10.63)	72.20*** (3.14)	59.49*** (2.08)	25.87*** (1.75)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	237	378	216	324	249	175	258	162
Countries	22	35	23	21	31	18	27	16
Adjusted R <sup>2</sup>	0.270	0.226	0.167	0.153	0.199	0.283	0.243	0.342

*Notes:* the table shows results from a difference-in-differences fixed effects panel regression as in equation (1). All specifications include country and year fixed effects. The dependent variable in columns 1 and 2 are annual real growth rates based on the Maddison dataset; column 3 credit ratings (yoy changes in %) using Moody's ratings and transforming these to a numerical scale from 0 (lowest) to 9 (highest, Aaa); columns 4 and 5 external debt service to government revenue from various sources (see Appendix C); columns 6 and 7 total public debt to GDP from Abbas et al. (2010); and in column 8 external debt to GDP from Reinhart and Rogoff (2009, 2011). Robust standard errors clustered on the country level in parentheses. \*\*\*/\*\*/\* indicates significance at a 1%, 5%, and 10% level.

We conduct an extensive list of additional robustness checks regarding our key result of post-debt relief growth effects after 1934 (column 1 in 4). First, we add controls for inflation, banking and currency crises, wars and conflicts and government crises, revolutions and riots. Second, we assess the role of timing choice by varying the estimation time window from +/- 5 years in the baseline to +/- 3, 4 and 6 years around 1934; by excluding the treatment year (1934); by dropping the time fixed effects; and by conducting a placebo regression with 1933 as pseudo-treatment year. Third, we address country heterogeneity by dropping special cases, in particular Germany and all Eastern European countries; by constraining the sample to European countries only (i.e. dropping Australia and New Zealand); by excluding the three best GDP performers between 1934 and 1939 (Austria, Germany, New Zealand) and the three worst GDP performers (Belgium, Greece, Portugal), respectively; by dropping the three countries with the highest war debt relief to GDP (France, Greece, Italy) and those with the lowest relief to GDP (Austria, Australia, Belgium), respectively; and by running quantile regressions at the median. The main insight of these exercises is that the coefficient for the interaction term on growth

remains statistically significant at the 1% or 5% level in all specifications and samples, and with a size ranging between 2 and 5. Moreover, we find the coefficient to be insignificant when using the pseudo-treatment year 1932, giving further assurance that we are not just picking up the effects of the post-1932 recovery.

Overall, the results for the interwar period are therefore consistent with the view that a debt write-down operation such as that of 1934 is followed by an improvement of growth and debt sustainability.

### 4.3 Difference-in-Differences Results: Baker Plan (1986) and Brady Plan (1990)

We now study the economic performance before and after the Baker and Brady initiatives. Figure 9 (left Panel) and Figure C.7 in the Appendix shows that output growth was anemic for the highly indebted crisis countries before and after 1986, especially when compared to the group of non-crisis economies. Furthermore, we find that the average credit ratings see a drastic decline after the outbreak of the crisis in 1982 and remain at this low level in the following years (Panel B of Figure C.7), while debt/GDP continues to *increase* for countries targeted by the Baker plan (Panel D). Only the debt servicing burden<sup>42</sup> of target countries shows signs of betterment compared to the control group.

Appendix Figure C.8 shows the corresponding indicators for the Brady episode. After 1990, the crisis countries see a remarkable pick-up in real per capita GDP growth. While the non-default emerging markets see a continuation of their prolonged output boom, the “Brady bunch” now starts to catch up (right panel of Figure 9). The uptick is even more pronounced for country credit ratings. On average, the Brady treatment group see an increase in the IIR index of more than 40% until T+5, compared to just 15% in the control group. Also the average debt servicing burden continues to decline for Brady countries (to below 20% of exports), as does the debt/GDP burden, especially after 1992. However, these trends in the debt burden are similar for the non-defaulter counterfactual.

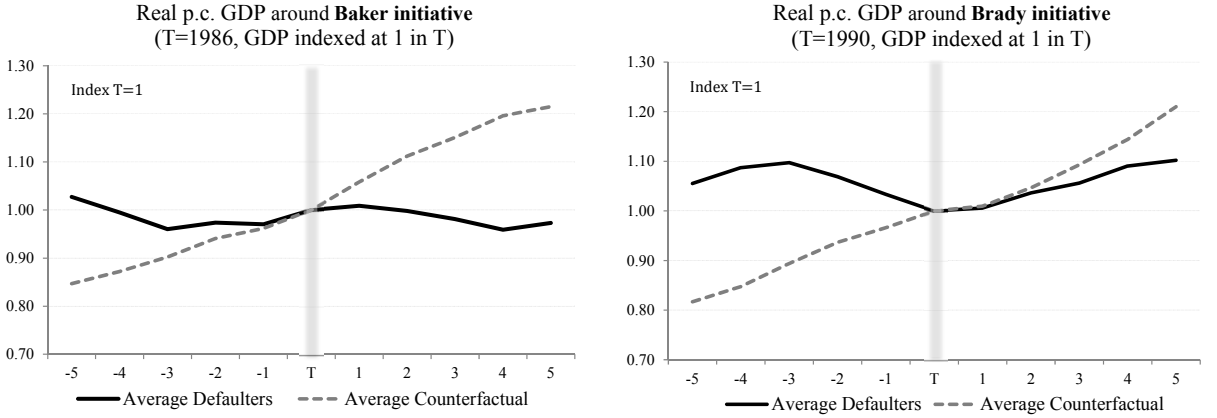
Another forward looking measure we can look at during this era are secondary market prices for developing country loans (see Figure C.9 in the Appendix). These had fallen to new lows

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<sup>42</sup>Due to the lack of revenue data for many developing countries, we use (external) debt servicing to exports as the preferred debt servicing measure, since this measure is readily available in the IDS dataset and is also widely used in analytical work by the World Bank. The results are very similar when using debt servicing to GDP.

Figure 9: GDP Trends Around Baker and Brady Initiatives:: Target vs. Counterfactual Groups

*10-year window around debt relief event*



Notes: See Appendix Figures C.8 and C.9 and Table C.1 for sources and further details.

before and during the Baker plan period 1986-1988, but recover markedly after the Brady plan had been announced. The fact that the market value of sovereign debt increases after the announcement of a restructuring plan with deep creditor losses is puzzling, but consistent with the notion that both creditors and debtors may benefit from debt relief in a situation of a debt overhang.

The regression Tables 5 and 6 support the descriptive findings. In Table 5, the treatment coefficient for output growth is negative and insignificant for the Baker episode. Also debt/GDP continues to grow post-treatment. On the positive side, we find evidence that the credit ratings of the Baker countries increase significantly more than the counterfactual (also because the time window includes the 1990/1991 Brady years). Moreover, the treatment coefficient for debt servicing is negative and marginally significant, indicating that the Baker plan indeed brought cash flow relief.

The most notable change between the Baker and Brady regression results (Tables 5 and 6 is in column 1. The treatment coefficient for real per capita GDP growth turns positive and highly significant, indicating that the Brady debt relief operation translated into 3 percentage point higher growth, compared to the counterfactual of non-crisis emerging markets. This is a sizable coefficient, which resembles that of the 1934 episode (Table 4). Also the credit ratings of Brady countries see a large improvement relative to the counterfactual (of 7 IIR index points, on average), while government debt levels drop significantly more (by 15 percentage points). Surprisingly, however, we find no significant effect on debt servicing or for total external



Table 5: Baker Initiative (1986) - Difference-in-Differences Regressions

Dependent Variable	Growth, real p.c.	Credit Ratings (change)	Debt Service to Exports	Total Public Debt/GDP	External Debt/GNI
	(1)	(2)	(3)	(4)	(5)
Post-Intervention Dummy (after 1986)	1.86 (1.32)	-5.97** (2.33)	6.71** (3.25)	-10.25 (10.20)	-3.61 (5.38)
<b>Treatment (Baker plan) x post-intervention dummy</b>	-1.92 (1.33)	6.31** (3.12)	-9.05* (4.72)	22.99** (9.36)	17.43 (10.80)
Constant	2.55*** (0.65)	1.70 (1.44)	27.85*** (1.23)	65.26*** (4.59)	61.66*** (2.35)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	275	279	189	226	199
Number of countries	28	28	19	26	20
Adjusted R <sup>2</sup>	0.077	0.170	0.106	0.203	0.145

*Note:* the table shows results from a difference-in-differences fixed effects panel regression as in eq. (1). All specifications include country and year fixed effects. The dependent variable in Column 1 are annual real growth rates based on the Maddison, TED, and WDI datasets; in column 2 country credit ratings from the Institutional Investor magazine (min=0, max=100); in column 3 debt service to exports (in %) from IDS; in column 4 total public debt to GDP from Abbas et al. (2010); in column 5 external debt to GNI from IDS. Robust standard errors clustered on the country level in parentheses. \*\*\*/\*\*/\* indicates significance at a 1%, 5%, and 10% level.

debt/GDP, possibly because the actual Brady restructurings took place with a lag in many countries, as discussed above.

We again conduct a large number of robustness checks, focusing on our main findings on post-Brady growth and credit ratings (columns 1 and 2 of Table 6). We again control for banking and currency crises, inflation, wars, conflicts and political events; we again alter the treatment window (2, 3 and 6 years around 1990); we again drop the treatment year; and we again run a placebo regression using 1988 as a pseudo-treatment year (yielding an insignificant coefficient). To address the problem of country heterogeneity, we drop all Eastern European countries from the sample; we drop the fast growing “Asian Tigers” (Malaysia, Taiwan, Thailand, South Korea Singapore) and China from the counterfactual; we check the results without the top three (and the three worst) performers on GDP growth and ratings, respectively; and we check results without the three countries with the highest (and the lowest) scale of debt relief to GDP. We also drop the subset of early-movers, i.e. the countries which received a Brady deal in 1990/1991 (Costa Rica, Mexico, Uruguay, Venezuela).

Table 6: Brady Initiative (1990) - Difference-in-Differences Regressions

Dependent Variable	Growth, real p.c.	Credit Ratings (change)	Debt Service to Exports	Total Public Debt/GDP	External Debt/GNI
	(1)	(2)	(3)	(4)	(5)
Post-Intervention Dummy (after 1990)	-4.09*** (1.44)	-4.68* (2.60)	-11.18*** (2.81)	-2.31 (5.58)	4.16 (3.40)
<b>Treatment (Brady plan) x post-intervention dummy</b>	3.09*** (1.05)	6.99** (3.09)	-1.57 (3.54)	-14.51** (7.38)	-1.82 (10.68)
Constant	5.28*** (0.80)	1.82 (1.50)	33.43*** (2.38)	69.28*** (2.43)	62.42*** (4.21)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	270	270	190	233	200
Number of countries	27	27	19	26	20
Adjusted R <sup>2</sup>	0.099	0.213	0.259	0.242	0.041

*Notes:* the table shows results from a difference-in-differences fixed effects panel regression as in eq. (1). All specifications include country and year fixed effects. The dependent variable in column 1 are annual real growth rates based on the Maddison, TED, and World Bank WDI datasets; in column 2 country credit ratings from the Institutional Investor magazine (min=0, max=100); in column 3 debt service to exports (in %) from World Bank IDS; in column 4 total public debt to GDP from Abbas et al. (2010); in column 5 external debt to GNI from World Bank IDS. Robust standard errors clustered on the country level in parentheses. \*\*\*/\*\*/\* indicates significance at a 1%, 5%, and 10% level.

For all these robustness checks, we find that the treatment coefficients for GDP growth and ratings remain significant and large, although they vary in size depending on the specification chosen. We also find the results to be little affected by the counterfactual chosen. The coefficients look very similar when dropping the various groups of countries above or when using the exact same counterfactual as in Arslanalp and Henry (2005). The results also hold in a sample with only Latin American countries, even if that counterfactual includes a more heterogeneous group of low-income and lower-middle income Latin American countries, such as Guatemala, Haiti or Honduras. The only regression that yields an insignificant treatment coefficient for GDP growth is a quantile regression at the median. At closer inspection, this seems to be due to the Mexican crisis of 1995 that led to turbulence in many other emerging markets, so that the dispersion in growth outcomes is particularly large in that year. The growth coefficient turns significant again once we shorten the treatment period to 4 years or less in the median regressions, thus excluding the EM bust of 1995. Moreover, the credit rating variable continues to show a highly significant DiD coefficient, including in the quantile regressions.

Overall, these results confirm our previous conclusion that “kicking the can down the road” via cash flow relief and debt rescheduling does not facilitate economic recovery in debtor countries. In protracted crises, growth only picks up after deeper debt relief, such as after the Brady plan and after 1934.

In a final step, we assess whether the magnitude of debt relief is correlated with economic performance post-crisis. For this purpose, we replace the treatment dummy in the difference-in-differences regressions with a continuous measures of debt relief to GDP (in %). The resulting treatment coefficient is insignificant in our main regressions post-1934 and post-1990. We only find significant coefficients when using debt relief as a share of public external debt for the Brady debt relief episode.<sup>43</sup> One interpretation of this finding is that it is important to reach a decisive restructuring agreement (crisis exit) for growth to materialize, while the scope of debt relief matters only indirectly, e.g. by helping to avoid a follow-up default or restructuring.

## 5 Conclusion

A central finding of this paper is that the resolution of debt overhangs in advanced and emerging market economies has much in common – even when they are separated by more than half a century. Both developed and less developed countries resorted to default and restructuring in economically hard times, and the magnitudes of debt relief delivered are comparable. We also find that the debt crises in both advanced and emerging countries have been protracted and cumbersome, often spanning more than 10 years.

In both eras, debtor countries experimented with “soft” and “hard” forms of crisis resolution. The 1920s saw more than a dozen rescheduling agreements, involving new lending, interest rate reductions and maturity extensions. Similarly, there were almost 100 rescheduling and debt roll-over deals over the course of the 1980s in developing countries all of which failed in solving the debt overhang. However, the crisis exit in both episodes came only after deep face value debt write-offs had been implemented, in particular after the debt cancellations of 1934 and the Brady debt relief initiative of 1990. These experiences speak to the current debate concerning countries such as Greece and Ukraine.

Our emphasis on debt reduction via restructuring and default is not meant to suggest that

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<sup>43</sup>For the Brady deal specification, the interaction term using debt relief as a share of ext. public debt is significant at the 10% level in the growth regression and at the 5% level in the credit ratings regression. The coefficient size is economically large in both cases. Yet, the analogous regression does not show a significant coefficient for the 1934 episode.

other forms of debt reduction were not quantitatively important in dealing with challenging debt overhangs as well. Fiscal retrenchment, structural reform, financial repression, and (in the case of domestic currency denominated debt) inflation often co-existed in these episodes of debt write-offs (see e.g. Bordo 2012). However, we show here that the magnitude of debt relief was often large (even by conservative estimates) and contributed importantly in solving debt overhang situations of the past.

We also study the aftermath of debt relief and conduct difference-in-differences regressions for several centrally orchestrated debt relief initiatives. We find that the economic panorama tends to improve in terms of growth, ratings and debt sustainability. This is particularly the case after debt operations that imply face value debt reduction, such as in the mid-1930s and early 1990s. In contrast, we find that softer forms of crisis resolution, such as debt rescheduling, temporary payment standstills, and bridge lending operations were not generally followed by higher growth and better ratings. These crisis resolution tools were ineffective in solving debt crises that had been dragging on for several years.

Research could delve deeper into disentangling to what extent the post-crisis improvement in the economy is attributable to debt relief per se and what role other factors have played. We also see ample scope for research on the fiscal effects of debt restructurings, which remain understudied. Here, we find no significant effect of debt relief on the subsequent cost of debt servicing, which is puzzling. More micro-level data on fiscal expenses could shed light on how much fiscal space was really achieved in past debt relief operations. Finally, it could be rewarding to conduct a comparison of sovereign debt relief towards private and official creditors for a larger sample than we gathered here, so as to further inform the current debate on what to do about the large-scale debt overhang in Europe and elsewhere.

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**Online Appendix to the Paper “Sovereign Debt Relief and its Aftermath”  
by Carmen M. Reinhart and Christoph Trebesch**

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## Appendix A: Debt Relief in the 1920s and 1930s: Country Chronologies, Data, and Sources

Table A.1. Chronology of Events Leading Up to the Defaults of 1934

<b>International</b>	
August 1924	Dawes Plan lays out German reparations of 1 billion marks a year, rising to 2.5 billion in five years. It was a restructuring of the terms that were agreed to in the 1919 Treaty of Versailles.
June 1929	The Young Plan was designed to ease the terms of the reparation payments made by Germany, making a substantial share of the repayment state contingent. It is a second restructuring.
June 20, 1931	Hoover Moratorium on payments of WWI and other war and reconstruction debts, including interest payments.
July 9, 1932	Lausanne Conference: the European powers including the United Kingdom, France, Belgium, and Italy agree to suspend all war debt payments among themselves subject to a revision of their debts to the United States. The UK, by far the most important creditor country in Europe, only has outstanding debt obligations to the United States.
June 15, 1934	Default of all debtors (except Finland) announced in the US popular press. (See New York Times, June 15, 1934)
<b>Austria</b>	
May 8, 1930	Agreement to reschedule war debt with the United States.
May 11, 1931	Kreditanstalt failure: Despite the Austrian government's guaranty to cover the bank's foreign debt, the bank failure quickly spread through Europe and international capital markets.
October 9, 1931	Foreign exchange controls and depreciation.
May 1933	Payments to the Bank of International Settlements, for the service of the League of Nations loan, are suspended. (A default on an official creditor)
August 1933	Standstill agreement of Austrian banks prolonged until January 1934.
<b>Australia</b>	
December 1929	Suspension of Gold Standard.
July 1932	Suspension of war debt payments to the UK following the Lausanne Conference.
<b>Belgium</b>	
August 18, 1925	Agreement to reschedule war debt with the United States.
December 31, 1925	Agreement to reschedule war debt with the United Kingdom
March 18, 1935	Foreign exchange controls reintroduced; devaluation of 28%.
June 15, 1934	Government notifies US of decision to defer payment on war debt installment.
<b>Czechoslovakia</b>	
October 1931	Controls on foreign exchange.
June 15, 1934	Government notifies US of decision to defer payment on war debt installment.
<b>Estonia</b>	
October 28, 1925	Agreement to reschedule war debt with the United States.
October 1931	Controls on foreign exchange.
<b>Finland</b>	
May 1, 1923	Agreement to reschedule war debt with the United States (maturity extension and interest rate reduction only).
June 1934	Only country to pay its war debt installment to the US in full and on time.

Table A.1. Chronology of Events Leading Up to the Defaults of 1934 (continued)

<b>France</b>	
April 29, 1926	Agreement to reschedule war debt with the United States.
July 12, 1926	Agreement to reschedule war debt with the United Kingdom.
December 1932	Chamber rejected the government's proposal to meet the War debt payment to the US scheduled for mid-December.
June 15, 1934	Government notifies US of decision to defer payment on War debt installment.
<b>Germany</b>	
December 1922	Reparations Commission declares Germany in default, culminating in the French occupation of the Ruhr.
July 13, 1931	Following the Kreditanstalt crisis in Austria, foreign exchange controls are introduced; a variety of blocked Mark accounts are created through mid-1933.
February 1932	Moratoria on external commercial debt payments (i.e. default on private creditors).
August 1932	Reparation payments under the Young Plan cancelled but other payments continued.
May 1933	Unilateral and generalized default and widespread capital controls.
July 1, 1934	General moratorium on transfers abroad.
December 1, 1936	Death penalty for capital flight.
<b>Greece</b>	
April 9, 1927	Agreement to reschedule war debt with the United Kingdom.
May 10, 1929	Agreement to reschedule war debt with the United States.
Sept. 28, 1931	Control on foreign exchanges; 49% currency depreciation.
April 1932	Moratoria on all external sovereign debt service (i.e., as with other cases noted below, this is a default on private creditors).
June 15, 1934	Postpones for six months payment to US of interest on war debt due July 1 <sup>st</sup> .
<b>Hungary</b>	
April 25, 1924	Agreement to reschedule war debt with the United States.
September 1931	Controls on foreign exchange.
December 1931	Moratoria on all external sovereign debt service.
January 1933	Standstill agreement renewed.
<b>Italy</b>	
Nov. 14, 1925	Agreement to reschedule war debt with the United States.
January 12, 1926	Agreement to reschedule war debt with the United Kingdom.
September 1931	Re-introduction of some foreign exchange controls.
May 26, 1934	De facto suspension of convertibility; controls on exportation of bank notes.
June 15, 1934	Government notifies US of decision to defer payment on War debt installment.
<b>Latvia.</b>	
Sept. 24, 1925	Agreement to reschedule war debt with the United States.
October 1931	Controls on foreign exchange.
April 1932	Moratoria on external sovereign debt service.
June 15, 1934	Government notifies US of decision to defer payment on War debt installment.
<b>Lithuania</b>	
Sept. 29, 1924	Agreement to reschedule war debt with the United States.
June 15, 1934	Government notifies US of decision to defer payment on War debt installment.
<b>New Zealand</b>	
December 1929	Currency parity with British Sterling is abandoned.
July 1932	Suspension of war debt payments to the UK following the Lausanne Conference.
January 20, 1933	Depreciation by 25% vis-à-vis British Sterling.
<b>Poland</b>	
November 14, 1924	Agreement to reschedule war debt with the United States.
July 1932	Control on foreign exchanges.
June 15, 1934	Government notifies US of decision to defer payment on War debt installment.

Table A.1. Chronology of Events Leading Up to the Defaults of 1934 (concluded)

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<b>Portugal</b>	
June 3, 1924	Introduction of foreign exchange controls.
December 31, 1926	Agreement to reschedule war debt with the United States.
January 1, 1932	Suspension of fixed exchange rate to British Sterling.
<b>Romania</b>	
October 19, 1925	Agreement to reschedule war debt with the United Kingdom.
December 4, 1925	Agreement to reschedule war debt with the United States.
August 1933	Transfer moratorium declared.
September 1933	Negotiation with private foreign bondholders to discuss debt service reduction.
July 1934	Foreign debt agreement with private creditors reached.
<b>United Kingdom</b>	
June 19, 1923	Agreement to reschedule war debt with the United States.
Sept. 21, 1931	Abandonment of gold standard.
June 1934	Government notifies US of decision to defer payment on War debt installment June 15.
<b>United States</b>	
June 20, 1931	Hoover Moratorium on payments of WWI and other War debts, including interest payments. Approved by Congress in December.
November 1932	The US refuses postponement of war debt payments due December 15. France and the UK had made such a request.
December 15, 1932	UK, Italy, Czechoslovakia, Finland, Greece, Latvia, Lithuania, Romania, and Yugoslavia make the scheduled payment on War debt; France, Belgium, Poland, Estonia and Hungary do not pay.
March 6, 1933	Roosevelt Proclamation resulting in embargo on gold and establishment of foreign exchange controls. Bank holiday.
March 9, 1933	Suspension of gold convertibility.
April 5, 1933	Compulsory surrender of gold (more than \$100) held by individuals.
June 15, 1933	The governments of Britain, Czechoslovakia, Italy, Latvia, Lithuania, and Romania do not make full war debt payments to the United States and offer symbolic token payments instead.
January 30, 1934	Gold Reserve Act: Abrogation of the gold clause.
January 31, 1934	Devaluation of 40.94%: from 1 troy ounce of gold = 20.67 US dollars to 1 troy ounce of gold = 35.00 US dollars.
June 1934	Places embargo on export of silver.
<b>Yugoslavia</b>	
May 3, 1926	Agreement to reschedule war debt with the United States.
August 9, 1927	Agreement to reschedule war debt with the United Kingdom.
October 1931	Control on foreign exchanges.
March 1932	Moratoria on external commercial debt payments.
April 1932	Moratoria on external public debt service.
October 1932	Default on two loans.
June 1934	Government notifies US of decision to defer payment on war debt installment June 15.

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Table A2. Debt Relief in 1934: Extension of Table 1 and Data Sources

	<i>Total to US and UK</i>		<i>Debt relief to GDP (in %)</i>		Central government	External debt in	Population	<i>Debt relief to</i>	<i>Debt relief to</i>	<i>Debt relief</i>
	Debt outstanding	Nominal GDP	Face value	Present value	debt in US\$, 1934	US\$, 1934		<i>central gov.</i>	<i>external debt</i>	<i>per capita</i>
	in US\$ (w/ arrears)	US\$, 1934	(upper bound)	(lower bound)				<i>debt (FV, in %)</i>	<i>(FV, in %)</i>	<i>in US\$</i>
United Kingdom	4,714,345,235	19,264,825,087	24.5	19.5	38,684,470,821	5,128,585,559	46,666,000	12.2	91.9	101.0
France	7,342,122,972	14,075,257,038	52.2	25.1	21,041,780,305	.	41,950,000	34.9	.	175.0
Italy	3,133,049,808	8,615,540,538	36.4	11.5	12,951,015,107	.	42,093,000	24.2	.	74.4
Belgium	478,061,010	11,583,547,147	4.1	2.7	11,124,315,725	4,235,226,688	8,262,000	4.3	11.3	57.9
Poland	243,356,167	.	.	.	955,633,270	.	29,771,000	25.5	.	8.2
Czechoslovakia	165,409,455	.	.	.	1,644,385,780	343,973,694	14,282,000	10.1	48.1	11.6
Yugoslavia	208,197,822	.	.	.	679,605,516	576,571,960	15,228,000	30.6	36.1	13.7
Romania	204,719,173	.	.	.	20,425,162,907	.	14,924,000	1.0	.	13.7
Greece	132,174,148	304,405,322	43.4	21.4	400,185,812	300,244,594	6,688,000	33.0	44.0	19.8
Austria	23,822,492	1,387,212,440	1.7	1.6	660,578,872	451,723,102	6,760,000	3.6	5.3	3.5
Estonia	19,511,429	.	.	.	22,160,099	20,371,757	1,126,000	88.0	95.8	17.3
Finland (fully repaid)	8,711,996	3,942,561,336	0.2	0.2	73,922,766	51,185,034	3,549,000			
Latvia	13,658,403	.	.	.	16,054,926	13,958,988	1,950,000	85.1	97.8	7.0
Lithuania	6,650,080	.	.	.	.	.	.	.	.	.
Hungary	2,086,096	.	.	.	454,610,034	376,906,830	8,919,000	0.5	0.6	0.2
<i>Australia</i>	337,777,250	5,424,000,000	6.2	.	4,701,538,462	2,281,538,462	6,682,000	7.2	14.8	50.6
<i>New Zealand</i>	110,966,579	1,053,955,882	10.5	.	2,274,283,009	1,112,388,535	1,552,000	4.9	10.0	71.5
<i>Portugal</i>	99,459,373	969,163,822	10.3	.	326,982,585	149,413,500	7,127,000	30.4	66.6	14.0
<b>Averages</b>			<b>21.0</b>					<b>24.71</b>	<b>43.52</b>	<b>39.96</b>

*Notes:* The list of sources is shown on the next page. Australia, New Zealand and Portugal are in italics since they only owed debt to the UK.

## List of Sources to Table A.2

*War debt amounts:* Debt amounts owed to the US are from the Annual Report of the Secretary of the Treasury (1935, pp. 391), which covers the fiscal year of 1934. The war debt figures therein are given for Nov 15, 1934. We add to this the amount of arrears, i.e. overdue payments under the debt restructuring agreements of the 1920s. Debt amounts owed to the UK are from the Moody's Manual of Investments and Securities Rating Service: Foreign and American Government Securities, 1935, p. 1927. Debt figures are given for March 31, 1934, plus arrears. To compute present values (column 4) we use the terms shown in the original loan documents, as reprinted in Moulton and Pasvolsky (1932), and using a 5% annual rate (following their approach). Debt under the broad category of WWI debt includes, especially for Eastern Europe, debts taken on after the war in connection with reconstruction. The breakdown is given for each debtor country in Reinhart and Rogoff (2014). Further good sources on WWI debt amounts include Bailey (1950), Lloyd (1934) and United Nations (1948).

*Population:* Data on population size are from Mitchell for Estonia and Latvia. For the remaining countries: Maddison-Project, <http://www.ggdgc.net/maddison/maddison-project/home.htm>, 2013 version.

*Debt stocks:* total and external public debt come from following sources: France, Czechoslovakia, Yugoslavia, Estonia, and Latvia: Moody's Manual of Investments and Securities Rating Service: Foreign and American Government Securities (1934); Austria, Australia, Finland, Greece, Hungary, Poland, Romania, United Kingdom: League of Nations; Italy: Francese and Pace (2008); Belgium: BNB, Centre d'études économiques de la KUL; New Zealand: Statistics New Zealand, Portugal: Estadísticas Históricas Portuguesas.

*Exchange rates:* exchange rates are from "Historical Statistics of the United States" and United Nations (1948).

*Nominal GDP:* for Australia: Global Financial Data and Haig (2001), 1852-1948; Austria, Global Financial Data, 1924-1937; Belgium, 1835-2005, BNB, Centre d'études économiques de la KUL; Finland and France, Historical National Accounts Database (HNAD), 1860-2001 and 1815-1938, respectively <http://www.rug.nl/research/ggdgc/data/historical-national-accounts>; Greece, Kostelenos (2003), 1830-1939; Italy, Francese and Pace (2008) 1861-2006; New Zealand: Statistics New Zealand, 1900-1947; Portugal: Estadísticas Históricas Portuguesas, 1851-1952; US and UK from Measuring Worth, <http://www.measuringworth.com/datasets/>.

Table A.3 United States: The Abrogation of the Gold Clause and Devaluation, January 30-31, 1934

Fiscal Year	Debt outstanding	Dollar devaluation relative to gold (haircut, percent)	Amount of haircut		Nominal GDP	Debt relief (haircut/GDP)
30.06.1934	27,053,141,414	40.94	11,075,556,095	1934	66,800,000,000	16.6
30.06.1933	22,538,672,560	40.94	9,227,332,546	1933	57,200,000,000	16.1

*Sources:* Debt amounts from [http://www.treasurydirect.gov/govt/reports/pd/histdebt/histdebt\\_histo3.htm](http://www.treasurydirect.gov/govt/reports/pd/histdebt/histdebt_histo3.htm) (Historical Debt Outstanding - Annual 1900 – 1949). For devaluation details see Pick and Sedillot (1971, p. 110). Nominal GDP from Measuring Worth, <http://www.measuringworth.com/usgdp/>.

*Notes:* January 1934 devaluation details are: from 1 troy ounce of gold = 20.67 US dollars to 1 troy ounce of gold = 35.00 US dollars. We provide the debt and nominal GDP figures for 1933 and 1934 to bracket the size of the debt reduction. According to the League of Nations, the United States had no foreign currency debt in 1934, as such, there is no offsetting "cost" from a higher burden of foreign currency debt following the devaluation. See also Kroszner (1999).

## Appendix B: Debt Relief in Emerging Markets 1978-2010: Methods and Data

### Note on Methodology: Computing Cumulative Haircuts in EMs 1978-2010 (Cruces/Trebesch 2013):

The cumulative effective haircut can be interpreted as the compound losses of a passive investor who held a face value-weighted basket of all the country's securities and whose debts are restructured sequentially in each deal up to and including the final deal. For the final deal  $i$  this measure is:

$$(1) \text{ Cumulative Effective } H^i = 1 - \prod_{j=1}^{J^i} WCR^{i,j}$$

Where  $WCR_{SZ}^{i,j}$  is the wealth conservation ratio in restructuring  $j$ , and  $J^i-1$  is the number of non-final deals preceding final deal  $i$ .  $WCR^{i,j}$  is defined as:

$$(2) WCR^{i,j} = \frac{\text{Debt Affected}^{i,j}}{\text{Total Debt}_{t-1}^i} (1 - H^{i,j}) + \left(1 - \frac{\text{Debt Affected}^{i,j}}{\text{Total Debt}_{t-1}^i}\right) = 1 - \text{Effective } H^{i,j}$$

The wealth conservation ratio is 1 minus the effective haircut and draws on GFD data to private creditors.

To calculate debt relief for a full spell (up to and including the final restructuring),  $DR_i$ , we calculate the following two ratios, which we refer to as Method 1 and 2, respectively:

$$(3) DR_{i,METHOD 1} = \text{Cumulative Effective } H^i \frac{\text{Debt Affected}^{i,j}}{\text{Nominal GDP}_i}$$

Method 2, rather than scaling by final period GDP (which could bias downward the relative importance of earlier restructuring deals assuming nominal GDP is rising over the spell), would be:

$$(4) DR_{i,METHOD 2} = \text{Cumulative Effective } H^i \sum_{j=1}^{J^i} \frac{\text{Debt Affected}^j}{\text{Nominal GDP}_j}$$

A sample calculation for Argentina 1982-1993 is available upon request.

### Discounting Methodology for EM Haircuts:

Cruces and Trebesch (2013) use a procedure to impute market rates for each restructuring, so as to mimic the discounting approach with “exit yields” proposed by Sturzenegger and Zettelmeyer (2008), even if no liquid secondary market prices exist. The imputed discount rates combine information on the debtor country at the time of the restructurings with information on the global level of risk aversion (the credit risk premium). Quoting from Cruces and Trebesch (2013, p. 91): “the procedure can be summarized as follows. We start from secondary market yields on low-grade US corporate bonds which we group by credit rating category. We then convert these corporate yields into discount rates on sovereign debt by first linking corporate and sovereign secondary market yields and then imputing yield levels for each sovereign based on its credit rating at the time of restructuring. In the spirit of Sturzenegger and Zettelmeyer, we then use these imputed discount rates at the exit from default to discount the cash flows of the old and new debt.” The Appendix of that paper provides a very detailed summary of the methodology and data used.



Table B.1 Middle-High Income External Debt Restructuring Episodes, 1978-2010

Country / Case	Month/ Year	Debt affected (m US\$)	Haircut (Cruces/ Trebesch)	GDP in millions US\$	GDP full episode year (Method 1)	Total external debt in mn US\$	Public external debt in mn US\$	Populatio n in mn	Debt affected/ GDP	Full restructuring episode	Full episode haircut (C&T)	Full episode debt relief to GDP, in % (Method 1)	Full episode debt relief to GDP, in % (Method 2)	Full episode debt relief to GDP, in % (Method 3)	Full episode debt relief to GDP, in % (Method 4)	Full episode debt relief to total external debt, in %	Full episode debt relief to public ext. debt, in %	Full episode debt relief per capita, in US\$
Algeria	03 / 1992	1,457	0.087	49,217	1996	28,490	26,256	26.9	3.0	1991-1996	0.1	0.5	0.5	2.0	2.0	0.8	0.9	9
Algeria	07 / 1996	3,200	0.235	46,941		33,052	31,313	29.3	6.8									
Argentina	08 / 1985	9,900	0.303	88,193	1993	49,061	26,904	29.9	11.2	1982-1993	0.5	13.7	24.0	n.a.	n.a.	56.1	80.1	1,020
Argentina	08 / 1987	29,515	0.217	108,731		52,688	41,196	30.8	27.1									
Argentina	04 / 1993	28,476	0.325	236,520		68,606	47,871	33.5	12.0									
Argentina	04 / 2005	60,572	0.768	181,357	2005	164,915	100,056	38.3	33.4	2001-2005	0.4	14.2	14.2	n.a.	n.a.	15.6	25.7	672
Bosnia and Herzegovina	12 / 1997	1,300	0.896	5,281	1998	n.a.	n.a.	3.5	24.6	1992-1997	0.9	22.1	22.1	n.a.	n.a.	n.a.	n.a.	334
Brazil	02 / 1983	4,452	-0.098	146,702	1994	94,429	53,271	127.5	3.0	1983-1994	0.4	9.0	14.3	6.7	8.3	41.3	59.9	333
Brazil	01 / 1984	4,846	0.017	145,992		99,022	60,604	130.5	3.3									
Brazil	09 / 1986	6,671	0.192	268,846		104,174	72,998	136.2	2.5									
Brazil	11 / 1988	62,100	0.184	326,902		109,645	81,073	144.5	19.0									
Brazil	11 / 1992	9,167	0.270	390,586		121,331	85,944	152.2	2.3									
Brazil	04 / 1994	43,257	0.293	546,487		144,595	92,053	157.0	7.9									
Bulgaria	06 / 1994	7,910	0.563	8,013	1994	12,178	9,693	8.5	98.7	1990-1994	0.6	55.6	55.6	55.6	55.6	36.6	45.9	526
Chile	11 / 1983	2,169	0.007	21,016	1990	n.a.	n.a.	11.5	10.3	1983-1990	0.4	24.6	35.6	17.7	23.3	n.a.	n.a.	667
Chile	01 / 1984	1,160	0.084	20,437		n.a.	n.a.	11.7	5.7									
Chile	04 / 1986	6,007	0.317	18,839		n.a.	n.a.	12.1	31.9									
Chile	06 / 1987	5,901	0.143	22,219		n.a.	n.a.	12.3	26.6									
Chile	12 / 1990	6,494	0.170	33,546		n.a.	n.a.	13.0	19.4									
Costa Rica	09 / 1983	609	0.394	3,147	1990	3,767	2,514	2.5	19.4	1983-1990	0.8	33.7	43.4	29.0	30.8	44.7	59.9	691
Costa Rica	05 / 1985	440	0.356	3,923		4,112	3,293	2.6	11.2									
Costa Rica	05 / 1990	1,384	0.719	5,710		4,676	3,625	3.0	24.2									
Croatia	07 / 1996	858	0.110	23,380	1996	n.a.	n.a.	4.7	3.7	1992-1996	0.1	0.4	0.4	0.4	0.7	n.a.	n.a.	20
Dominican Rep.	02 / 1986	823	0.499	7,883	1994	3,573	2,762	6.5	10.4	1982-1994	0.7	9.9	13.3	n.a.	n.a.	32.9	42.2	196
Dominican Rep.	08 / 1994	1,087	0.505	14,094		4,957	3,889	7.7	7.7									
Dominican Rep. (Bond)	05 / 2005	1,100	0.047	33,533	2005	7,812	6,643	9.2	3.3	2005	0.0	0.1	0.1	n.a.	n.a.	0.2	0.3	2
Dominican Rep (Bank)	10 / 2005	180	0.113	33,533					0.5									
Dominica	09 / 2004	144	0.540	361	2005	307	225	0.1	39.9	2003-2005	0.5	21.6	21.6	21.6	21.6	25.3	34.6	1,111
Ecuador	10 / 1983	970	0.063	15,431	1995	7,808	3,989	8.3	6.3	1982-1995	0.5	27.8	31.2	n.a.	n.a.	58.9	83.1	660
Ecuador	08 / 1984	350	0.057	16,423		7,693	5,644	8.5	2.1									
Ecuador	12 / 1985	4,224	0.154	19,206		8,400	6,650	8.7	22.0									
Ecuador	02 / 1995	7,170	0.422	23,427		15,011	10,495	11.1	30.6									
Ecuador	08 / 2000	6,700	0.383	18,685	2000	16,075	13,329	12.3	35.9	1999-2000	0.3	12.0	12.0	n.a.	n.a.	13.9	16.8	182
Ecuador	06 / 2009	3,190	0.677	57,859	2009	15,818	10,095	14.5	5.5	2008-2009	0.5	2.9	2.9	n.a.	n.a.	10.6	16.7	116
Gabon	12 / 1987	39	0.079	3,535	1994	1,944	1,431	0.8	1.1	1986-1994	0.1	0.3	0.3	0.8	0.8	0.4	0.5	12
Gabon	05 / 1994	187	0.162	4,265		3,861	2,933	1.1	4.4									
Grenada	11 / 2005	210	0.339	695	2005	433	347	0.1	30.2	2004-2005	0.3	10.2	10.2	n.a.	n.a.	16.4	20.5	693
Jamaica	09 / 1978	63	0.022	n.a.	1990	1,698	988	2.1	n.a.	1978-1993	0.5	16.1	24.4	14.7	17.8	24.4	24.4	24
Jamaica	04 / 1979	149	0.035	n.a.		1,438	1,093	2.1	n.a.									
Jamaica	06 / 1981	89	0.152	2,817		1,926	1,444	2.1	3.2									
Jamaica	06 / 1984	165	0.181	2,119		3,472	2,483	2.2	7.8									
Jamaica	09 / 1985	369	0.317	1,993		3,616	2,665	2.3	18.5									
Jamaica	05 / 1987	285	0.328	2,672		4,238	3,308	2.3	10.7									
Jamaica	06 / 1990	332	0.440	4,663		4,545	3,731	2.4	7.1									
Jordan	12 / 1993	1,289	0.546	5,532	1993	7,967	7,078	3.7	23.3	1989-1993	0.2	5.3	5.3	n.a.	n.a.	3.7	4.1	78
Macedonia, FYR	03 / 1997	229	0.346	3,735	1997	1,818	856	2.0	6.1	1992-1997	0.3	2.1	2.1	2.1	2.9	4.4	9.2	40
Mexico	08 / 1983	18,800	-0.002	172,160	1990	86,275	51,745	73.4	10.9	1982-1990	0.4	25.9	36.2	13.1	19.5	78.1	105.1	942
Mexico	03 / 1985	28,600	0.022	215,443		95,017	69,913	76.4	13.3									
Mexico	08 / 1985	20,100	0.054	215,443		95,017	69,913	76.4	9.3									
Mexico	03 / 1987	52,300	0.181	163,581		101,083	76,020	79.4	32.0									
Mexico	03 / 1988	3,671	0.563	200,119		109,653	84,542	81.0	1.8									
Mexico	02 / 1990	54,300	0.305	287,803		94,016	76,293	84.3	18.9									

Table B.1 (continued). Middle-High Income External Debt Restructuring Episodes, 1978-2010

Country / Case	Month/ Year	Debt affected (m US\$)	Haircut (Cruces/ Trebesch)	GDP in millions US\$	GDP full episode year (Method 1)	Total external debt in mn US\$	Public external debt in mn US\$	Populatio n in mn	Debt affected/ GDP	Full restructuring episode	Full episode haircut (C&T)	Full episode debt relief to GDP, in % (Method 1)	Full episode debt relief to GDP, in % (Method 2)	Full episode debt relief to GDP, in % (Method 3)	Full episode debt relief to GDP, in % (Method 4)	Full episode debt relief to total external debt, in %	Full episode debt relief to public ext. debt, in %	Full episode debt relief per capita, in US\$
Panama	10 / 1985	579	0.120	5,402	1996	4,365	3,181	2.2	10.7	1983-1996	0.4	20.7	22.9	16.9	19.8	32.9	52.3	724
Panama	08 / 1994	452	0.151	7,734		6,712	3,644	2.7	5.8									
Panama	05 / 1996	3,936	0.349	9,322		6,105	3,788	2.8	42.2									
Peru	01 / 1980	340	-0.046	20,649	1997	9,417	6,165	16.9	1.6	1980-1997	0.6	12.2	13.8	11.4	11.5	27.9	40.4	305
Peru	07 / 1983	380	0.063	19,291		10,871	7,127	18.2	2.0									
Peru	03 / 1997	10,600	0.639	59,214		29,033	20,293	24.4	17.9									
Poland	04 / 1982	1,957	0.406	65,187	1994	n.a.	n.a.	35.9	3.0	1981-1994	n.a.	n.a.	15.1	15.1	17.7	n.a.	n.a.	336
Poland	11 / 1982	2,225	0.629	65,187		n.a.	n.a.	35.9	3.4									
Poland	11 / 1983	1,192	0.525	75,406		n.a.	n.a.	36.2	1.6									
Poland	07 / 1984	1,390	0.269	75,507		n.a.	n.a.	36.6	1.8									
Poland	09 / 1986	1,970	0.375	73,677		n.a.	n.a.	37.2	2.7									
Poland	07 / 1988	8,441	0.244	68,612		n.a.	n.a.	37.7	12.3									
Poland	07 / 1989	206	0.120	66,895		n.a.	n.a.	37.8	0.3									
Poland	10 / 1994	13,531	0.490	103,683		n.a.	n.a.	38.5	13.1									
Romania	12 / 1982	1,598	0.329	54,819	1983	10,447	8,071	22.4	2.9	1981-1986	0.2	0.9	0.9	1.5	1.6	5.1	6.5	21
Romania	06 / 1983	567	0.317	47,915		10,003	7,797	22.5	1.2									
Romania	09 / 1986	800	0.123	51,765	1986	7,008	5,805	22.8	1.5									
Russia	12 / 1997	30,500	0.262	404,938	2000	n.a.	n.a.	148.2	7.5	1991-2000	0.5	13.1	11.3	9.6	11.1	n.a.	n.a.	230
Russia (GKO)	03 / 1999	4,933	0.460	195,907		n.a.	n.a.	147.7	2.5									
Russia (MinFin3)	02 / 2000	1,307	0.515	259,716		n.a.	n.a.	147.2	0.5									
Russia (PRINs/LANs)	08 / 2000	31,943	0.508	259,716		n.a.	n.a.	147.2	12.3									
Serbia & Montenegro	07 / 2004	2,700	0.709	23,537	2004	14,260	8,277	7.5	11.5	2003-2004	0.7	8.1	8.1	8.1	8.4	13.4	23.1	256
Seychelles	02 / 2010	320	0.562	973	2010	1,707	708	0.1	32.9									
Slovenia	06 / 1995	812	0.033	20,971	1995	n.a.	n.a.	2.0	3.9	1992-1996	0.0	0.1	0.1	0.1	0.5	n.a.	n.a.	13
South Africa	03 / 1987	10,900	0.085	85,792	1993	n.a.	n.a.	32.1	12.7									
South Africa	10 / 1989	7,500	0.127	95,979		n.a.	n.a.	33.7	7.8	1985-1993	0.4	6.8	9.2	2.9	2.9	n.a.	n.a.	263
South Africa	09 / 1993	5,000	0.220	130,448		n.a.	n.a.	36.7	3.8									
Trinidad & Tobago	12 / 1989	446	0.155	4,323	1989	n.a.	n.a.	1.2	10.3	1988-1989	0.2	1.6	1.6	1.6	2.0	n.a.	n.a.	57
Turkey	06 / 1979	429	0.222		1982	14,855	6,490	42.0										
Turkey	08 / 1979	2,269	0.195			14,855	6,490	42.0		1978-1982	0.3	1.8	0.9	1.1	1.5	9.6	18.0	37
Turkey	08 / 1981	100	0.086	95,496		19,131	15,040	43.9	0.1									
Turkey	03 / 1982	2,269	0.170	86,766		19,236	15,272	44.9	2.6									
Uruguay	07 / 1983	575	0.007	5,609	1991	n.a.	n.a.	3.0	10.3									
Uruguay	07 / 1986	1,958	0.243	6,470		n.a.	n.a.	3.0	30.3	1983-1991	0.5	22.0	34.3	n.a.	n.a.	n.a.	n.a.	892
Uruguay	03 / 1988	1,770	0.203	8,375		n.a.	n.a.	3.0	21.1									
Uruguay	01 / 1991	1,610	0.263	12,376		n.a.	n.a.	3.1	13.0									
Uruguay	05 / 2003	3,127	0.098	12,046	2003	n.a.	n.a.	3.3	26.0									
Venezuela	02 / 1986	20,307	0.099	60,878	1990	35,344	17,748	17.3	33.4	1983-1990	0.4	48.2	41.6	19.6	27.9	68.4	105.9	1,278
Venezuela	09 / 1988	20,338	0.043	60,379		34,577	25,015	18.3	33.7									
Venezuela	12 / 1990	19,585	0.367	48,393		32,380	25,170	19.3	40.5									
<b>Averages</b>		<b>7,889</b>	<b>0.270</b>	<b>79,299</b>		<b>33,557</b>	<b>23,310</b>	<b>33.8</b>	<b>13.8</b>		<b>0.39</b>	<b>13.6</b>	<b>15.7</b>	<b>11.7</b>	<b>13.3</b>	<b>25.3</b>	<b>36.1</b>	<b>425</b>

*Sources:* Individual episodes dates, debt affected, haircut, full episode haircut from Cruces and Trebesch (2013); full episode haircut not previously published. GDP in US dollars from World Economic Outlook, April 2013; full restructuring episode and total public debt from Reinhart and Rogoff (2009, 2011); total external debt, public external debt and population size from World Bank/World Development Indicators, January 2015. Debt relief calculations from the authors, where debt relief as % of debt outstanding always uses lagged debt stocks (T-1, the year prior to the final restructuring) and Method 2 (our baseline approach, see above).

## Appendix C: Stylized Facts / Regression Analysis: Supplementary Material and Data

Table C.1 List of Variables and Sources

### Dependent variables:

#### *GDP levels & growth rates (real, per capita):*

- 1978-2010: Total Economy Database. Gaps filled with data from WDI database 2014 (WB).
- Interwar: Maddison and Total Economy Database.

#### *Sovereign ratings:*

- 1978-2010: Institutional Investor Magazine. Annual average ratings.  
<http://www.institutionalinvestor.com/Research/4142/Overview.html>.
- Interwar: Moody's ratings from Moody's Manuals of Foreign Securities and Gaillard (2012).

#### *Debt stocks:*

- Time series on total, external, and domestic central government are from Reinhart and Rogoff (2009, 2011), including calculations to GDP. Total debt/GDP is from Abbas et al. (2010). See also sources cited therein. External Debt/GNI for emerging markets is from IDS database 2014 (WB).

#### *Debt service:*

- 1978-2010: All debt service numbers and ratios to GDP and exports from IDS database 2014 (WB)
- Interwar: Debt service figures for Lithuania, Romania and Yugoslavia come from Moody's Manual of Foreign Government Securities (various issues). Debt service figures for all other countries (Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Mexico, New Zealand, Norway, Peru, Poland, Portugal, Spain, Sweden, Switzerland, Thailand, Turkey, UK, US) are from the League of Nations (various issues), and United Nations (1948).

#### *Interwar Nominal GDP (to compute debt service to GDP)*

- For 1934 defaulters see sources to Table A.2. In addition (counterfactual): For Argentina, Australia, Brazil, Bulgaria, Canada, Denmark, Finland, Ireland, Japan, Norway, Sweden, Switzerland, Yugoslavia we use Mitchell (1998 and 2003). For Austria and Germany Global Financial Data. For Mexico and Peru: Oxford Latin America Database <http://moxlad-staging.herokuapp.com/home/en>. Nominal GDP data for the remaining countries come from following sources: Belgium: BNB, Centre d'études économiques de la KUL, Colombia: Junguito and Rincón (2004), France: Historical National Accounts Database (HNAD), Greece: Kostelenos (2003); Hungary: Dincecco and Prado (2013); Italy: Francese and Pace (2008); New Zealand: Statistics New Zealand; Portugal: Instituto Nacional Estadística; Sweden: Fregert and Gustafsson, (2008); Spain: Dincecco and Prado (2013); Turkey: Turkstat; United Kingdom: Williamson (2015); United States: Johnston and Williamson (2015).

*Interwar Revenues (to compute debt service to revenues):*

- For Estonia, Ireland, Lithuania, and Spain we use Moody's Manual of Foreign Government Securities (various issues), For Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Mexico, New Zealand, Norway, Peru, Poland, Portugal, Sweden, Switzerland, Thailand, Turkey, UK, US, Yugoslavia we use Mitchell. Total Debt Service to revenue ratios are based on own calculations besides for the following country and years: Canada, 1921-1925; Chile 1920-1939; Hungary 1927-1929; Mexico: 1920-1925; Hungary: 1927-1939. For these spells we use Mauro et al. (2013).

Control variables:

*Internal and external military conflicts:* Correlates of War dataset (dummy variables on Intra-state Wars, Inter-state wars). Data and definitions: <http://www.correlatesofwar.org/data-sets/COW-war>.

*Currency crises and banking crises:* Reinhart and Rogoff (2009) and updates at [www.carmenreinhardt.com](http://www.carmenreinhardt.com), year dummies.

*Inflation:* Reinhart and Rogoff (2009) and updates at [www.carmenreinhardt.com](http://www.carmenreinhardt.com), annual yoy change.

*Political shocks:* number of major government crises, revolutions and riots from the Arthur Banks dataset 2014. Data and definitions: <http://www.databanksinternational.com>.

Table C.2 Dispersion of GDP and Rating Performance around Debt Relief Events (T)

## Panel A: Dispersion of real per capita GDP levels around 1934 default/relief

Year	Mean	Max	Min	25th percentile	Median	75th percentile	standard deviation
-5	1.092	1.329	0.903	0.981	1.069	1.163	0.123
-4	1.055	1.257	0.881	0.970	1.031	1.124	0.113
-3	1.002	1.153	0.860	0.916	0.994	1.075	0.097
-2	0.963	1.097	0.871	0.918	0.946	1.019	0.062
-1	0.986	1.045	0.922	0.960	0.994	1.004	0.031
<b>T (1934)</b>	1.000	1.000	1.000	1.000	1.000	1.000	0.000
<b>1</b>	1.021	1.088	0.935	0.987	1.026	1.051	0.041
<b>2</b>	1.060	1.225	0.854	1.015	1.064	1.090	0.081
<b>3</b>	1.117	1.280	0.956	1.073	1.109	1.180	0.084
<b>4</b>	1.158	1.370	0.979	1.065	1.133	1.248	0.118
<b>5</b>	1.201	1.436	0.980	1.115	1.176	1.286	0.135

## Panel B: Dispersion of real per capita GDP levels around EM Debt Restructurings, 1978-2010

Year	Mean	Max	Min	25th percentile	Median	75th percentile	standard deviation
-5	0.969	1.266	0.454	0.903	0.960	1.037	0.164
-4	0.952	1.193	0.460	0.912	0.954	1.030	0.141
-3	0.938	1.158	0.476	0.894	0.955	0.988	0.128
-2	0.940	1.112	0.483	0.903	0.962	0.985	0.113
-1	0.965	1.016	0.817	0.957	0.975	0.990	0.042
<b>T (restruct.)</b>	1.000	1.000	1.000	1.000	1.000	1.000	0.000
<b>1</b>	1.031	1.112	0.959	1.007	1.024	1.067	0.037
<b>2</b>	1.061	1.179	0.954	1.029	1.044	1.098	0.059
<b>3</b>	1.086	1.254	0.911	1.041	1.062	1.145	0.090
<b>4</b>	1.095	1.343	0.833	1.034	1.070	1.139	0.126
<b>5</b>	1.106	1.455	0.727	1.001	1.073	1.218	0.183

## Panel C: Dispersion of Ratings (IIR) around EM Debt Restructurings, 1978-2010

Year	Mean	Max	Min	25th percentile	Median	75th percentile	standard deviation
-5	1.096	2.305	0.422	0.727	0.944	1.399	0.470
-4	1.047	2.028	0.440	0.798	0.928	1.339	0.384
-3	0.991	1.576	0.557	0.799	0.928	1.229	0.275
-2	0.985	1.597	0.621	0.806	0.928	1.160	0.251
-1	0.992	1.465	0.784	0.884	0.945	1.042	0.163
<b>T (restruct.)</b>	1.000	1.000	1.000	1.000	1.000	1.000	0.000
<b>1</b>	1.085	1.465	0.815	1.006	1.084	1.144	0.125
<b>2</b>	1.206	1.799	0.920	1.075	1.179	1.266	0.193
<b>3</b>	1.295	1.934	0.878	1.124	1.267	1.400	0.273
<b>4</b>	1.350	2.281	0.896	1.175	1.323	1.455	0.313
<b>5</b>	1.403	2.563	0.777	1.151	1.376	1.549	0.388

Table C.3 Interwar Sovereign Credit Ratings: Moody's and Fitch, 1930-1939

Country	Also defaulted on private external debt - default year(s)	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
<b>US Dollar Ratings Assigned by Moody's</b>											
Australia		Aa	Aa	Baa	Baa	Baa	Baa	A	A	Baa	Baa
Austria	1932-1933, 1938, 1940-1952	Aa	Aa	A	Baa	Baa	Ba	Ba	Ba	Ba	B
Belgium		Aa	Aa	Aa	Aa	A	A	A	A	A	A
Czechoslovakia	1938-1946	A	A	Baa	Baa	Baa	Baa	Baa	Baa	Baa	
Estonia		Ba	Ba	Ba	Ba	Ba	Baa	Baa	Baa	Baa	Baa
France		Aa	Aa	Aa	Aa	Aa	Aa	Aa	A	A	A
Germany	1932-1952	Aa	Aa	Baa	Baa	Baa	B	B	B	B	B
Greece	1932-1964	Baa	Baa	Baa	B	B	B	B	B	B	B
Hungary	1932-1937, 1941-1967	A	A	Ba	Ba	Ba	Ba	Ba	Ba	Ba	Ba
Italy	1940-1946	A	A	Baa	Baa	A	A	A	Baa	Baa	Baa
Lithuania		Ba	Ba	Ba	Ba	Ba	Ba	Ba	Ba	Ba	Ba
New Zealand		Aaa	Aaa	A	Baa	Baa	A	A	A	A	A
Poland	1936-1937, 1940-1952	Baa	Baa	Baa	Baa	Baa	Baa	Baa	Ba	Ba	Ba
Portugal		Baa	Ba	Ba	Ba	Ba	Ba	Ba	B	B	B
Romania	1933-1958	B	Ba	Ba	Ba	B	B	B	B	B	B
United Kingdom		Aaa	Aaa	Aaa	Aaa	Aa	Aa	Aa	Aa	Aa	Aa
Yugoslavia	1933-1950	Ba	Ba	Ba	B	B	B	B	Ba	Ba	Ba
<b>US Dollar Ratings Assigned by Fitch</b>											
Austria	1932-1933, 1938, 1940-1952	AA	AA	A	BBB	BBB	B	B	B		
Belgium		AA	AA	A	A	A	A	A	A	A	A
Czechoslovakia	1938-1946	A	A	BBB	BBB	BBB	BBB	BBB	BBB		
Estonia		BBB	BB	B	B	B	B	B	B	BB	BB
France		AAA	AAA	AAA	AAA	AAA	AAA	AAA	A	A	A
Germany	1932-1952	AAA	A	BB	BB	BB	CCC				
Greece	1932-1964	BBB	BBB	CCC	CC	CC	CC	CC	CC	CC	CC
Hungary	1932-1937, 1941-1967	A	A	CCC	CCC	CC	CC	CC			
Italy	1940-1946	A	BBB	BBB	BBB	BBB	BBB	B	B		
Poland	1936-1937, 1940-1952	BBB	BBB	BB	BB	BB	BB	BB			
United Kingdom		AAA	AAA	AAA	AAA	AAA	AAA	AAA	AAA	AAA	AAA
Yugoslavia	1933- 1950	BB	BB	B	CC	CC	CC	CC	CC	CC	CC

Sources: Fitch Bond Books (various years), Gaillard (2012), and Moody's Manuals of Foreign Securities (various years). Default dates on private external debt from Reinhart and Rogoff (2009), updated at [www.carmenreinhardt.com](http://www.carmenreinhardt.com).

Figure C.1 Addressing Heterogeneity: Stylized Facts at the Median (and Upper and Lower Quartiles)

This figure complements the four main descriptive figures of Section 3 (“stylized facts”) by showing the evolution of real p.c. GDP, country credit ratings, debt service and debt stock ratios to GDP at the median and for the upper and lower quartile. The solid line represents the median, while the dotted lines show the 75<sup>th</sup> and 25<sup>th</sup> percentile, respectively. The upper panels (red lines) show statistics around the 1934 debt relief event, while the lower panels (green lines) show statistics around final emerging market debt restructurings. GDP and ratings are indexed at T=1. The sample of defaulting countries is the same as in Figures 3-6.

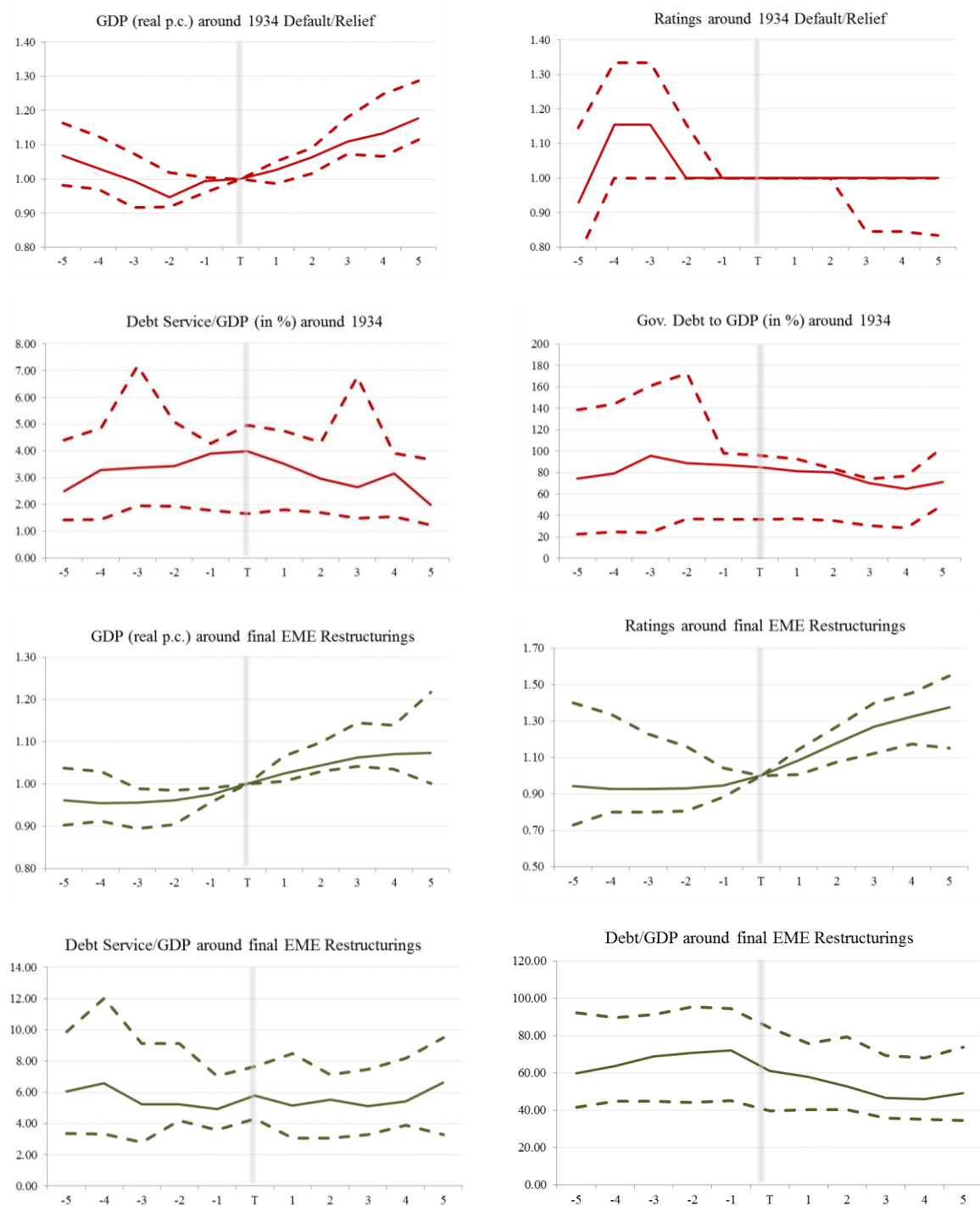
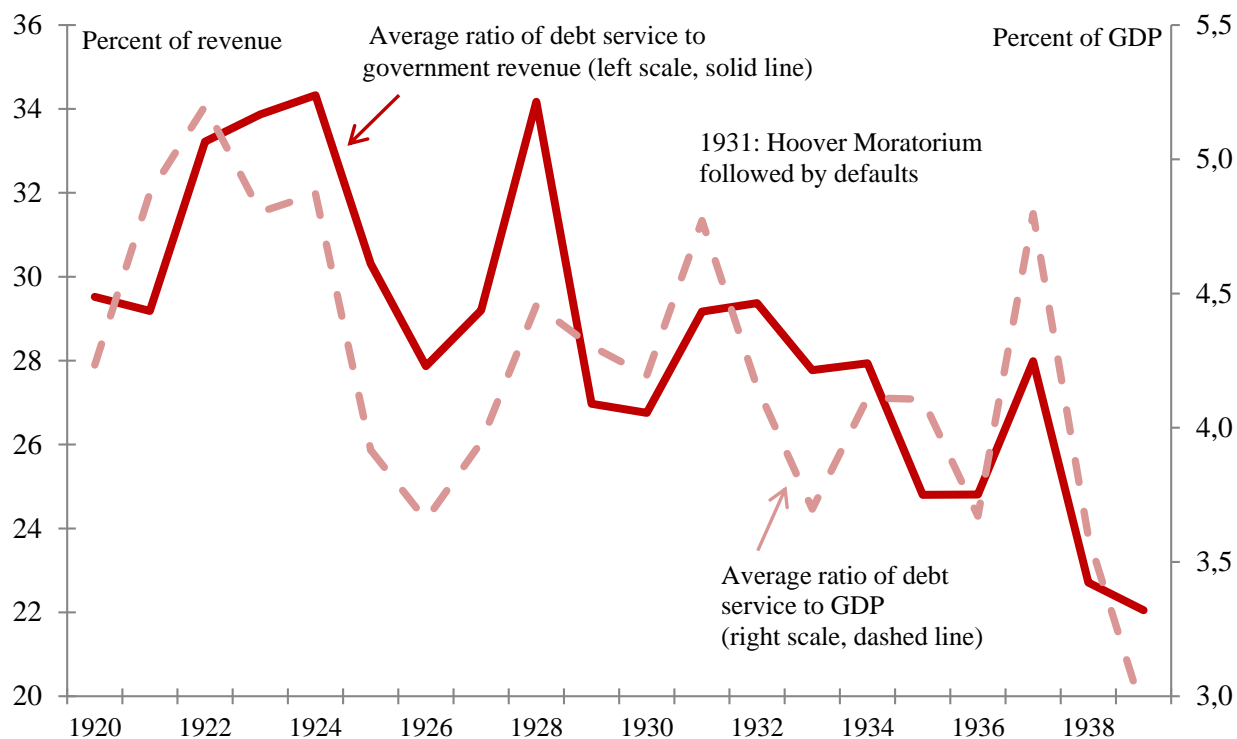


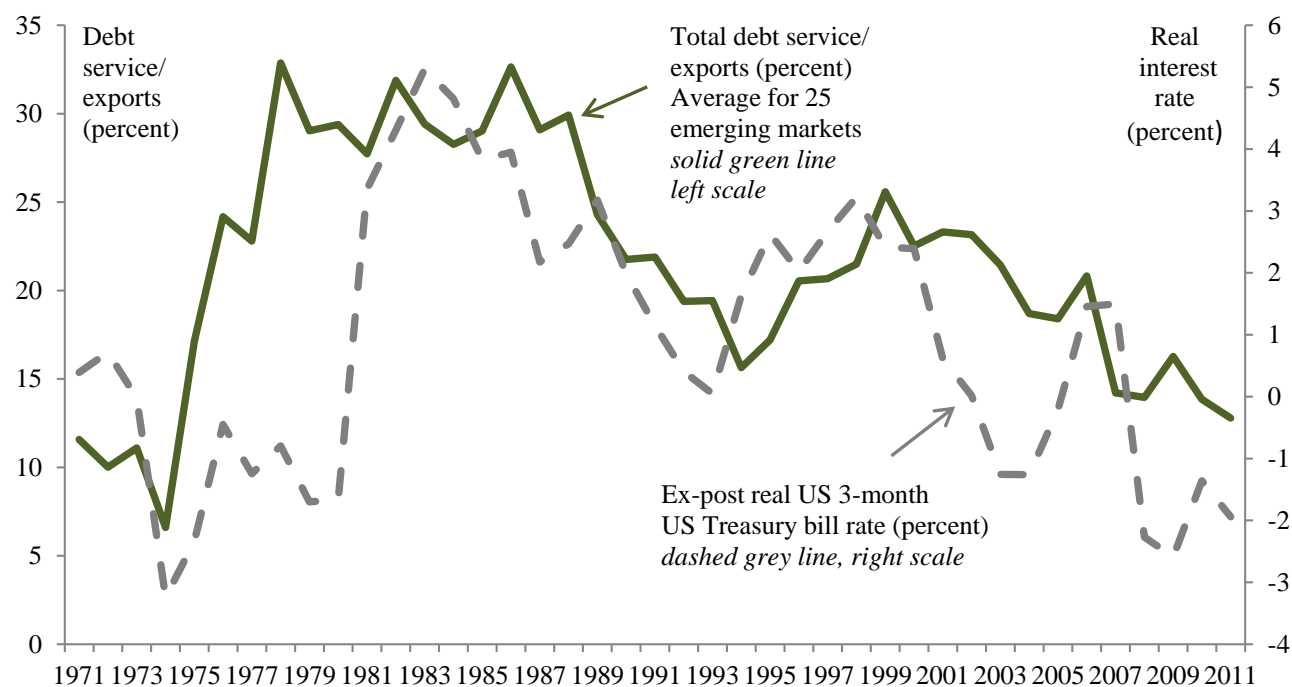
Figure C.2 Debt Service 1920-1939: Austria, Belgium, France, Germany, Greece, Italy, UK, US  
(as percent of central government revenue and as a percent of GDP)



Sources: The government debt servicing data come from the League of Nations (various years) and United Nations (1948). For nominal GDP and revenues see Table C.1 above.



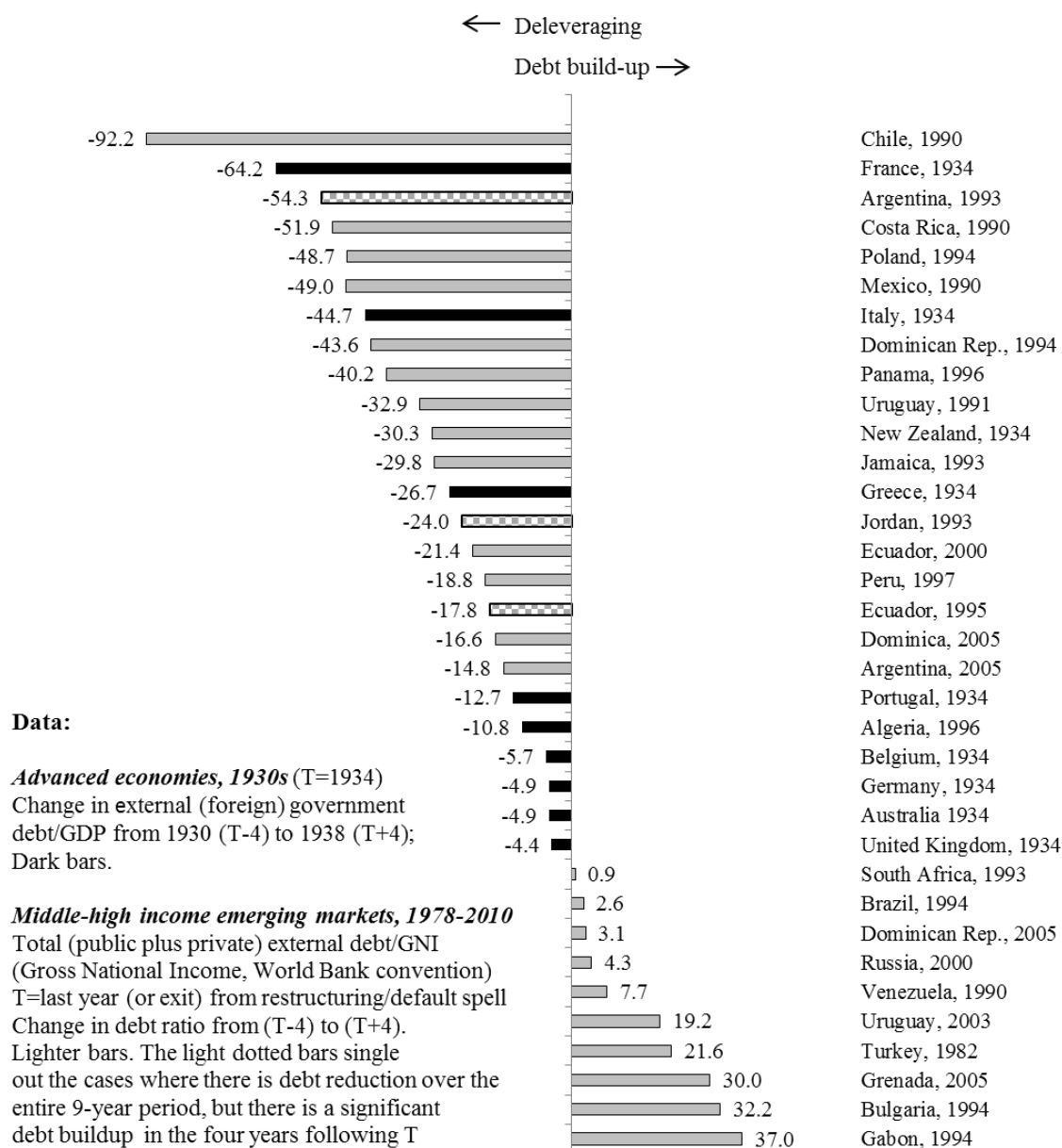
Figure C.3 Emerging Markets, 1970-2011: External Debt Servicing and US Interest Rates



*Sources:* International Debt Statistics, World Bank for the debt servicing ratios and International Financial Statistics, International Monetary Fund, for US Treasury bill 3-month real interest rates.

*Notes:* The debt service ratio to exports is a standard statistic reported by the World Bank in its work on debt.

Figure C.4 External Debt around Debt Relief Events: Advanced and Emerging Market Economies  
(change in debt to income ratio from T-4 to T+4)

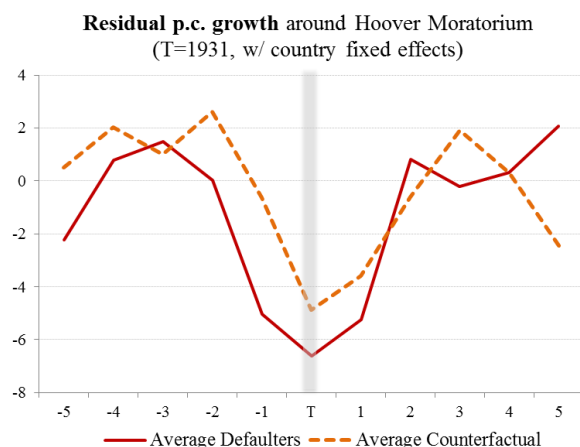


Sources: Cruces and Trebesch (2013), Reinhart and Rogoff (2009, 2011), World Bank (IDS), own calculations

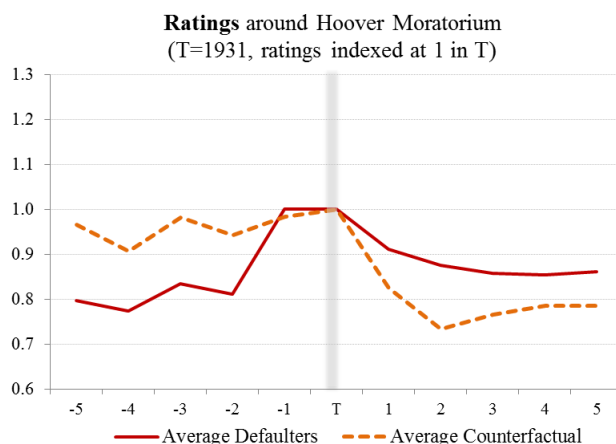
Figure C.5 Target vs. Counterfactual: Hoover Moratorium

This figure compares the evolution of real per capita GDP growth (residuals from a regression of annual real p.c. growth rates on a constant and country-specific dummies), country credit ratings (by Moody's, normalized to 1 in year T), debt service to government revenue (in %), and the level of public debt to GDP (in %) before and after the Hoover Moratorium (T=1931) for two groups (subject to data availability). The target group (red line) is a sample of 18 countries defaulting on the war debt towards the US and the UK (those listed in Table 1, except Finland, red line). The counterfactual is a group of European countries, which did not default namely Denmark, Finland, Ireland, Norway, Spain, Sweden, and Switzerland (dotted orange line). For sources and variable definitions see Table C.1. The corresponding figure for real per capita GDP (in levels) is shown in the main paper in Figure 8.

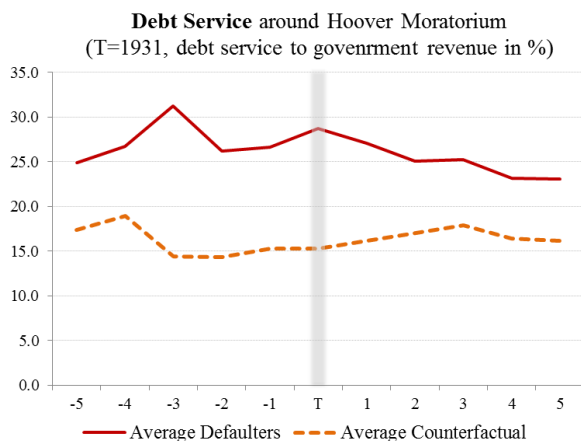
Panel A



Panel B



Panel C



Panel D

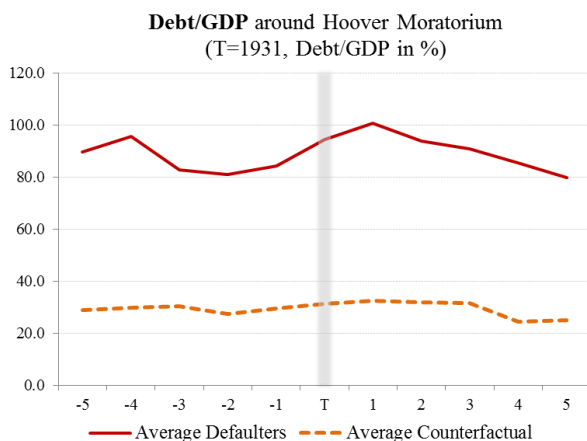


Figure C.6 Target vs. Counterfactual: 1934 Summer Defaults/Relief

This figure compares the evolution of real per capita GDP growth (residuals from a regression of annual real p.c. growth rates on a constant and country-specific dummies), country credit ratings (by Moody's, normalized to 1 in year T), debt service to government revenue (in %), and the level of public debt to GDP (in %) before and after the 1934 war debt default and associated debt write downs (T=1934) for two groups (subject to data availability). The target group (red line) is a sample of 18 countries defaulting on the war debt towards the US and the UK (those listed in Table 1, except Finland, red line). The counterfactual is a group of European countries, which did not default namely Denmark, Finland, Ireland, Norway, Spain, Sweden, and Switzerland (dotted orange line). For sources and variable definitions see Table C.1. The corresponding figure for real GDP per capita (in levels) is shown in the main paper in Figure 8.

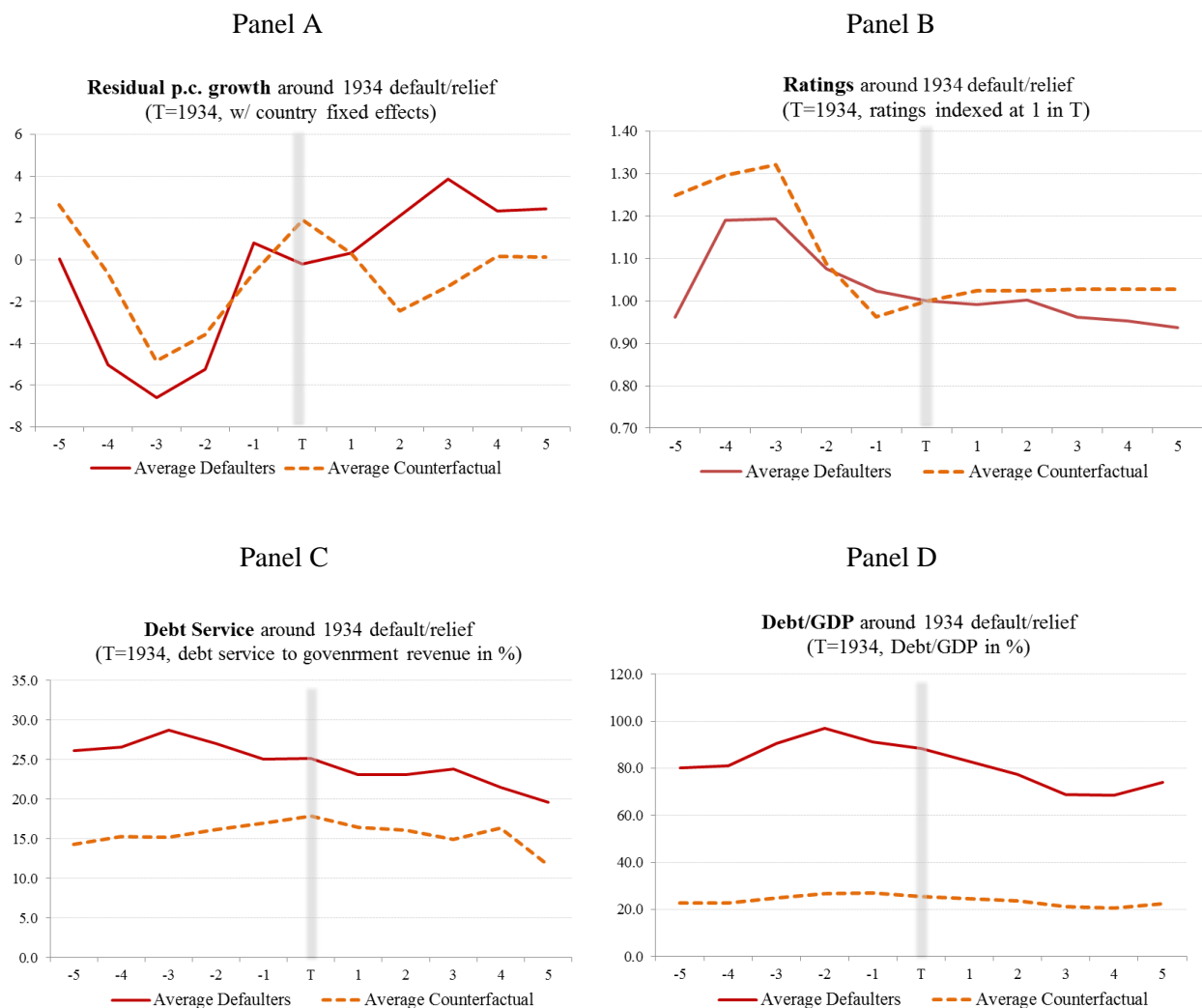


Figure C.7 Target vs. Counterfactual: Baker Plan (1986)

This figure compares the evolution of real per capita GDP growth (residuals from a regression of annual real p.c. growth rates on a constant and country-specific dummies), country credit ratings (Institutional Investor Ratings, normalized to 1 in year T), debt service to exports (in %), and the level of public debt to GDP (in %) before and after the start of the Baker initiative (T=1986) for two groups (subject to data availability). The target group (red line) includes the 15 middle-high-income countries that were part of the Baker initiative, namely Argentina, Brazil, Bulgaria, Chile, Costa Rica, Dominican Republic, Ecuador, Jordan, Mexico, Morocco, Panama, Peru, Poland, Uruguay and Venezuela (green line). The counterfactual group includes 14 middle-high-income developing countries that did not default nor received debt relief in the late 1980s or 1990s, namely China, Colombia, Czech Republic, Egypt, Hungary, India, Israel, Malaysia, Mauritius, Singapore, South Korea, Taiwan, Thailand and Turkey (dotted orange line). For sources and variable definitions see Table C.1. The corresponding figure for real per capita GDP (in levels) is shown in the main paper in Figure 9.

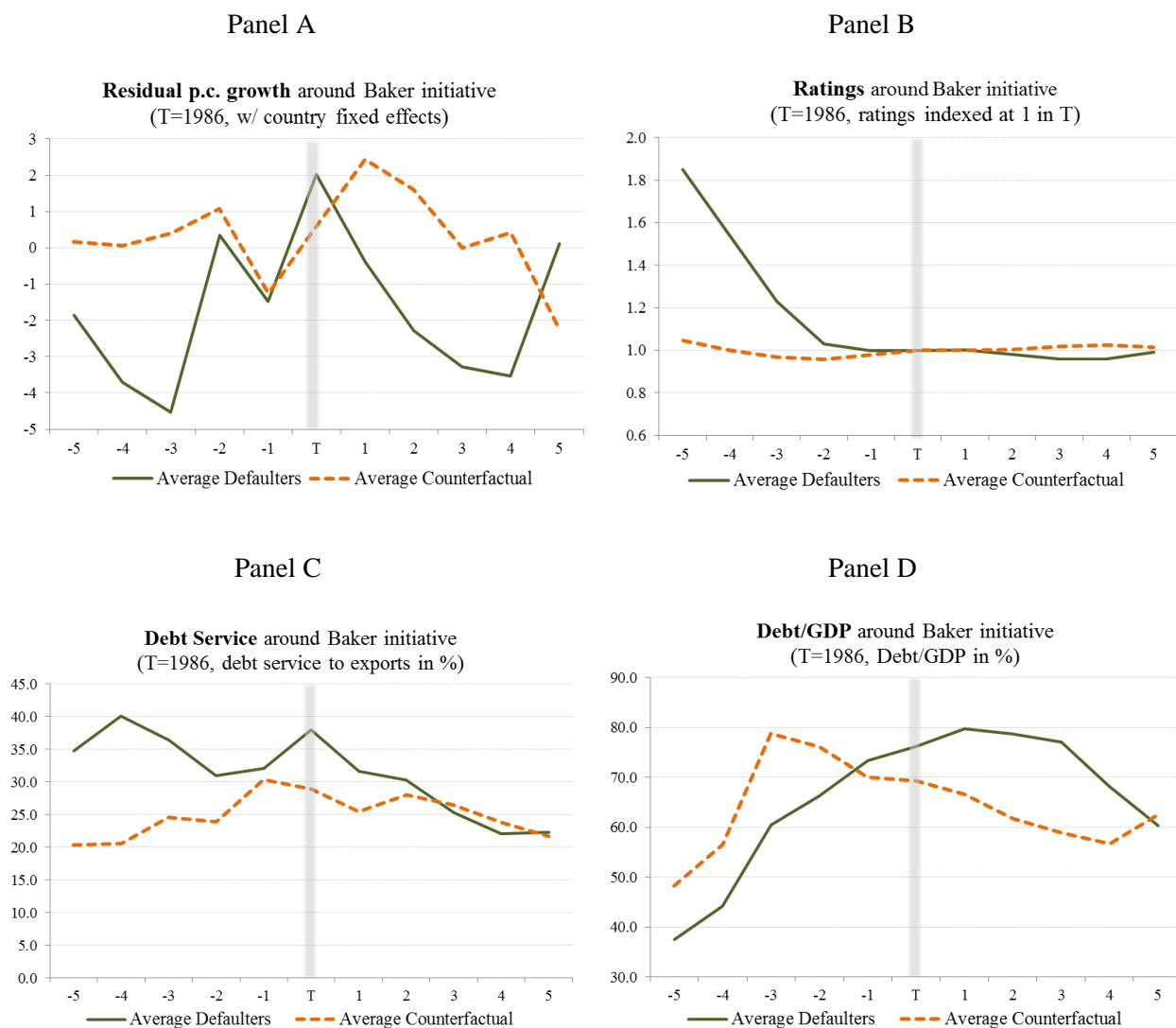


Figure C.8 Brady Plan (1990): Target vs. Counterfactual

This figure compares the evolution of real per capita GDP growth (residuals from a regression of annual real p.c. growth rates on a constant and country-specific dummies), country credit ratings (Institutional Investor Ratings, normalized to 1 in year T), debt service to exports (in %), and the level of public debt to GDP (in %) before and after the start of the Brady initiative (T=1990) for two groups (subject to data availability) for two groups (subject to data availability). The target group (red line) includes the 13 middle-high-income countries that were part of the Brady initiative, namely Argentina, Brazil, Bulgaria, Costa Rica, Dominican Republic, Ecuador, Jordan, Mexico, Panama, Peru, Poland, Uruguay and Venezuela (green line). The counterfactual group are 14 middle-high-income developing countries that did not default nor received debt relief in the late 1980s or 1990s, namely China, Colombia, Czech Republic, Egypt, Hungary, India, Israel, Malaysia, Mauritius, Singapore, South Korea, Taiwan, Thailand and Turkey (dotted orange line). For sources and variable definitions see Table C.1. The corresponding figure for real per capita GDP (in levels) is shown in the main paper in Figure 9.

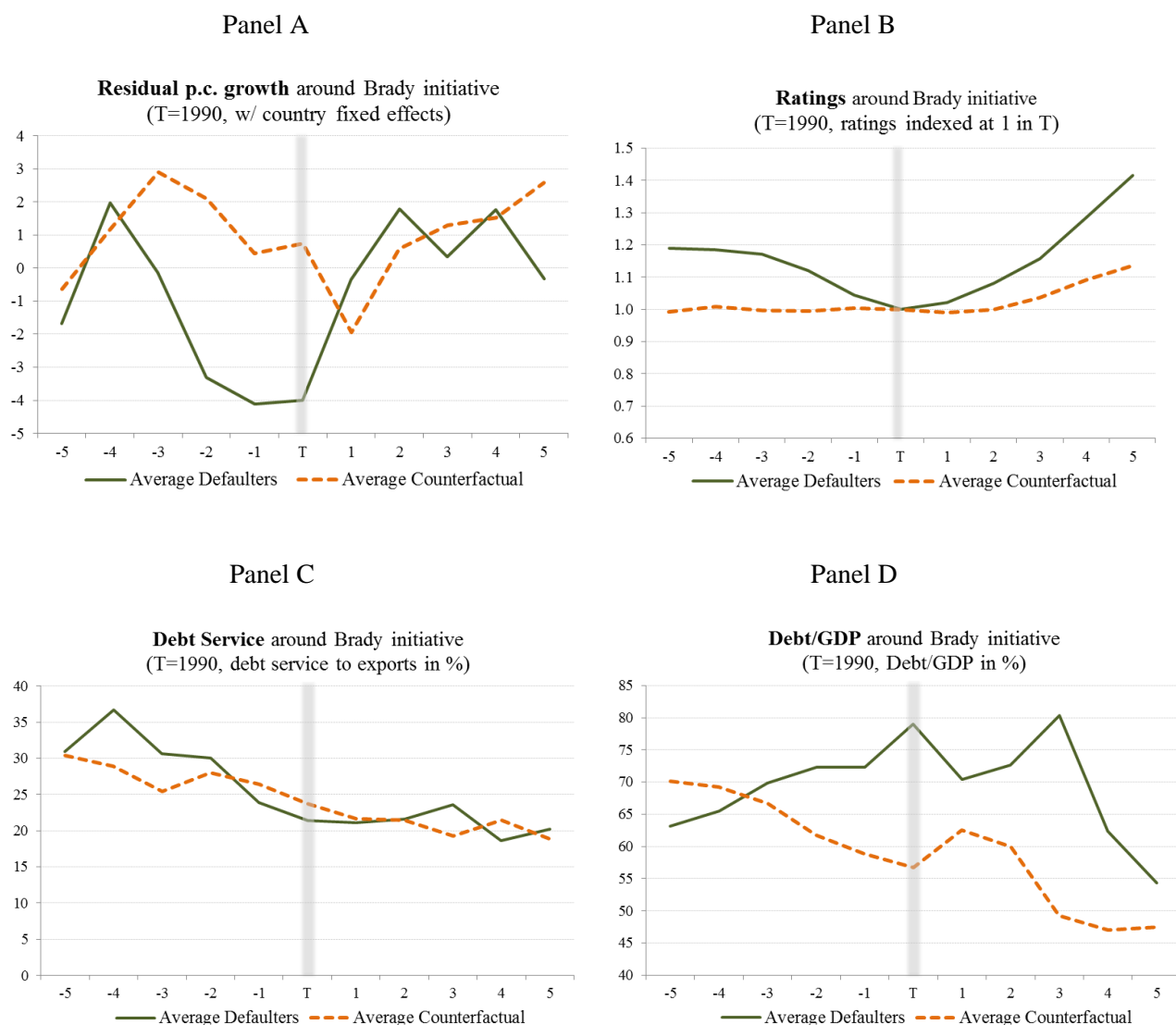
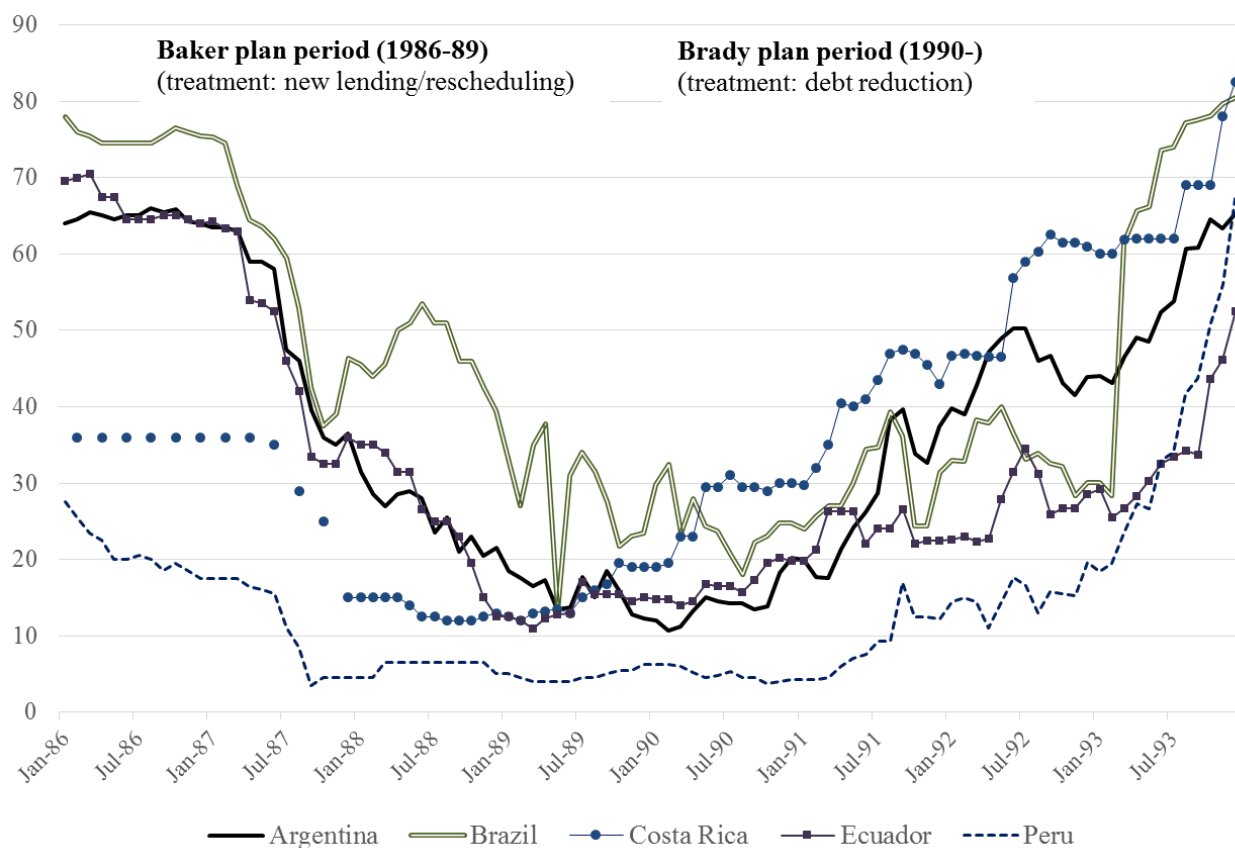


Figure C.9 Secondary Market Prices of Sovereign Debt (1986-1993)

This figures show monthly data of secondary market prices (as a percentage of par value) of developing country loans from January 1986 to December 1993 and aggregated on a country basis. The data is from Sawada (2001) who collected debt prices from the following sources: ANZ McCaughan Merchant Bank (Latin American Markets, various issues), Banco de Santander, Merrill Lynch Capital Markets (Latin American Markets, various issues), Nederlandsche Middenstendsbank N.V. (Euromoney, various issues), Shearson Lehman Hutton (Lehman Brothers), and Salomon Brothers.



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