Systemic and Idiosyncratic Sovereign Debt Crises

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Abstract

The theoretical literature on sovereign defaults has focused on adverse shocks to debtors' economies, suggesting that defaults are of an idiosyncratic nature. Still, sovereign debt crises are also of a systemic nature, clustered around panics in the financial center such as the European Sovereign Debt Crisis in the aftermath of the U.S. Subprime Crisis in 2008. Crises in the financial centers are rare disasters and thus, their effects on the periphery can only be captured by examining long episodes. This paper examines sovereign defaults from 1820 to the Great Depression, with a focus on Latin America. We find that 63% of the crises are of a systemic nature. These crises are different. Both the international collapse of liquidity and the growth slowdown in the financial centers are at their core. These global shocks trigger longer default spells and larger investors' losses.

Keywords: Sovereign debt crises, debt restructuring, defaults, default spells, debt reduction rates, debt sustainability, liquidity crises, systemic and idiosyncratic crises.

JEL Codes: F30, F34, F65

1. Introduction

Pervasive sovereign defaults in the early 1980s triggered a flourishing theoretical literature on sovereign debt crises. As stressed in Eaton and Gersovitz's (1981) seminal paper, in this literature, defaults occur following adverse shocks to the economy of the borrowing country. In this model, with lack of debtors' commitment, payment is enforced by the threat of financial autarky.

With calmer international capital markets in the late 1980s and early 1990s, interest in this literature languished. The bailout packages to Mexico in 1995 and the Asian countries in 1997, the Russian default in 1998, Argentina's default in 2001, and especially the Euro crisis in 2010 have, however, rekindled interest in the topic. While the theoretical literature still focuses on adverse shocks to the debtor's economy as the trigger of defaults, the center of attention of this recent literature has shifted in two directions. The first branch of this literature examines what type of shocks can explain the frequency of sovereign debt crises and the countercyclical behavior of interest rates in emerging markets. For example, the calibration exercise in Aguiar and Gopinath (2006) shows that while sovereign defaults occur in bad times, adverse transitory shocks to economic activity rarely trigger defaults. Only permanent adverse shocks to output can explain the frequency of defaults observed in the data. The second branch of this literature examines the debt restructuring process, including the default spells and the losses of investors once an agreement is reached. Again, the focus of attention is on country-specific shocks to the debtor's economy. As examined in this literature, delays in debt restructuring can be beneficial. Restructuring when the debtor economy recovers allows the sovereign to allocate more resources to service the debt and regain access to capital markets. During upturns in the debtor's economy, investors are able to recover a larger part of their assets (see Bi, 2008). Moreover, once recoveries start, the debtor will be more likely to comply with the terms of the debt restructuring, generating a higher surplus for both creditors and debtors (see Benjamin and Wright, 2009).

Still, both old and new models have only country-specific shocks to the debtor's economy at the core of defaults and restructurings despite the fact that many of these crises are of a systemic nature such as the Debt Crisis in the early 1930s following the financial crises in New York and London in 1929 and the European Sovereign Debt Crisis in 2010 following the Subprime Crisis in the United States in 2008. With just country-specific factors, these models cannot explain clusters of crises. There is one essential ingredient missing. In these models,

international investors are always ready to lend to countries at risk free rates if they evaluate that the sovereigns are committed to repay their debt and at higher rates if creditors think the sovereigns might not honor their contracts. None of these models have paid attention to fragilities in the financial centers despite the fact that many sovereign defaults in the periphery are clustered around panics and crises in the financial center. It is at those times that international liquidity disappears and even non-defaulters cannot borrow. When world capital markets are in disruption, sovereigns will have more incentives to default since, even if they do not default, they will not be able to borrow. If persistent, this crash in liquidity will lead to longer default spells. The bargaining power of investors will decline since they cannot offer new credit. If an agreement is reached, this loss of bargaining power of investors will impact adversely on debt recovery rates.[1]

The systemic nature of sovereign debt crises is ubiquitous and spanning two centuries as the Standard & Poor's reports on sovereign defaults show. Still, most empirical literature has ignored the waves of systemic crises. Notable exceptions are Reinhart and Rogoff (2011) who study serial defaults over a period of about two centuries and bring to the attention the bunching of defaults as well as banking and currency crises. Also, economic historians have identified episodes of systemic crises. See, for example, the important chronology of crises in Bordo and Murshid (2000) as well as studies by Bordo and Eichengreen (1999), Eichengreen and Portes (1986), and Marichal (1989) among others.

In this paper, we aim to fill this void in the literature and examine the role of panics in the financial center on sovereign debt crises in the periphery. Importantly, while sovereign debt crises in the periphery happen fairly often, crises in the financial center are rare disasters. Only longer episodes can help us understand the scope of a systemic crisis such as the current European Debt Crisis. As we will examine later, systemic crises come on the heels of international capital flow bonanzas, thus, our study is just confined to episodes of financial globalization. This study examines the evidence from the first episode of financial globalization

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[1] All models of default include positive shocks to world interest rates (a global shock) as a trigger of defaults in the periphery. However, this research does not incorporate disruptions in international capital markets following panics in the financial center and persistent liquidity crashes. These models do not shed light on what explains the historical waves of defaults. A recent exception is Arellano and Bai (2013) who develop a multi-country model in which default in one country triggers default in other countries. Countries are linked to one another by borrowing from and renegotiating with common lenders. In this model, a foreign default increases incentives to default at home because it makes new borrowing more expensive and defaulting less costly.

starting at the end of the Napoleonic Wars and ending with the Great Depression. This period is witness to panics in London, Paris, New York, Frankfurt, and Berlin, the financial centers of those times. These more than one hundred years of crises allow us to untangle the effects of fragilities in the periphery and in the financial center. Our study focuses on sovereign debt crises in Latin America. During this period, there are sixty seven defaults. Of those crises, 63% are systemic, clustered together around a crisis in the financial center, while the remaining 37% are isolated events in the midst of tranquil international capital markets. To explain these two varieties of crises, we construct a chronology of defaults and restructurings, calculate default spells, and estimate investors' losses following each default. We also examine the types of shocks that trigger these two varieties of crises as well as the various shocks that affect debt reduction rates and default spells. These estimations allow us to assess whether, in fact, systemic and idiosyncratic crises are different.

Our main results indicate that:

First, systemic crises are different. While both systemic and idiosyncratic crises occur following adverse shocks to the domestic economy, systemic sovereign debt crises are also triggered by panics in the financial center. Massive disruptions in international capital markets follow these panics. In the midst of an international liquidity crash, all countries in the periphery are unable to access international capital markets with sovereign defaults increasing.

Second, the panics in the financial center and the disruption of capital markets fuel sharp economic contractions in the financial centers as well as episodes of deflation. In turn, the slowdown in the financial center leads to a more dramatic slowdown in the sovereign economies in the periphery, leading to insolvency problems, which in turn further reduce the ability of sovereigns to tap international capital markets. Vicious cycles of global liquidity crashes and sharp economic contractions are activated. The number of defaults multiplies.

Third, the collapse in international liquidity not only triggers defaults in the periphery but also, if persistent, prolongs default spells and leads to smaller debt recovery rates. With international capital markets in disruption, creditors cannot entice sovereigns to settle the default and default spells become more protracted. With the inability of investors to offer new loans, investors' bargaining power declines. If the sovereigns still restructure their debt, recovery rates decline. We find that default spells following systemic crises are 25% longer than those

following idiosyncratic crises. Similarly, we find that debt reductions rates following systemic crises are 22 percentage points higher than those following idiosyncratic crises.

The rest of this paper is organized as follows. Section 2 documents our newly constructed database on sovereign defaults, macro indicators for Latin American countries, and various indicators capturing global shocks. Section 3 presents the anatomy of systemic and idiosyncratic crises. This section reports event studies to examine whether the shocks that trigger systemic and idiosyncratic crises are different. It also presents our estimates of default spells and of investors' losses following each debt restructuring. In addition, this section includes a test of whether the resolutions of systemic and idiosyncratic crises are different. Section 4 uses logit estimations to identify the various shocks leading to the defaults, duration analysis to explain the causes of long and short default spells, and regression analysis to explain small and large debt reduction rates. Section 5 discusses the findings and possibilities for future research.

2. The Data

To study sovereign debt crises from 1820 to the Great Depression, we need to construct a new database with various macroeconomic and financial indicators for the sovereign borrowers and the financial centers. We identify the year of the defaults of *all* Latin American countries and use that information to classify crises into systemic and idiosyncratic. Because of lack of complete data on macroeconomic indicators and on sovereign renegotiations of some of the smaller countries, the analysis of the triggers of defaults, the causes of long and short default spells, and the determinants of large and small debt reductions is limited to the defaults of the seven largest borrowing countries: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay. The financial centers include France, the United Kingdom, and the United States. The database we construct spans the period 1800 to 1960 so that we are able to capture the antecedents of the crises of the mid-1820s as well as to explain the long default spells following the Great Depression. We also need to construct a chronology of defaults, renegotiations, and the characteristics of the defaulted bonds as well as those of the new bonds issued to replace the defaulted bonds to estimate debt reduction rates. Appendix A describes the sources of all the data and the construction of the various indicators.

2.1 Macroeconomic and Financial Indicators

As we described in the introduction, all models of sovereign defaults have at their core adverse shocks to domestic economic activity. In contrast, we argue in the introduction that since most of the sovereign debt crises are systemic and occur at times of crises in the financial center, global vulnerabilities are also at the heart of defaults in the periphery. Thus, we construct a variety of indicators to capture both country-specific and global shocks.

To capture country-specific fragilities, we use two indicators: exports and the terms of trade of the Latin American countries. Since defaults in Latin America start in the early 19th century and the data on GDP start later in the 20th century, we capture economic activity using exports. Even data on exports are not readily available for the earlier part of the sample. In many cases, we construct the data on exports using the data on imports from the most important trade-partner countries.[2] Exports are measured in British pounds. We use exports in nominal terms because both the decline in the volume of exports and the drop in export prices affect adversely the sovereigns' ability to repay their debt. Figure 1 shows the evolution of country exports in our sample.

For the terms of trade, we collect data on the prices of the most important exports of each of the countries in our sample and construct an export price index with weights capturing the time-varying share of each commodity exports in total exports. We use the wholesale price index of the United Kingdom to capture prices of imports. The terms-of trade data allow us to capture fluctuations in fiscal revenues of these commodity exporter countries. There is ample evidence that terms of trade fluctuations have a dramatic impact on government revenues in resource abundant countries now [3] and even more during the first episode of financial globalization when most fiscal revenues are related to taxes on international trade.[4] Booms in

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[2] We use import data of France, the United Kingdom, and the United States for the earlier part of the sample when most of the trade (exports and imports) of Latin American countries is concentrated in these three countries. France, the United Kingdom, and the United States identify all imports from each of the countries with whom they trade with the exception of imports of gold and silver. Gold and silver imports are considered specie rather than commodities and are not reported in the import data by country of origin. In our sample, Colombia, Mexico, and Peru are important producers of gold or silver. We construct series of exports of gold and silver using a variety of sources (detailed in Appendix A) and add them to the data on imports of France, the United Kingdom, and the United Sates from each of the Latin American countries.

[3] See, for example, the Inter-American Development Bank *2007 Annual Report* (entitled *All that Glitters May Not Be Gold)* and Kaminsky (2010).

[4] For example, Mexico's exports of silver during the 19th century are about 85% of total exports. Exports of silver during that period are taxed at rates between 2% and 6%. See, for example, Miguel Lerdo de Quejada (1853).

commodity prices increase fiscal revenues and relax government liquidity constraints but trigger liquidity crashes when commodity prices collapse. It is in times of adverse shocks to the terms of trade that sovereigns may not be able to service their debt. For example, the collapse of the price of coffee in the late 1890s and the sharp decline in the price of rubber in the early 1910s, Brazil's main exports at those times, contribute to fiscal vulnerabilities and liquidity squeezes of the central and state governments in Brazil, explaining in part the defaults of 1898 and 1914. Thus, in the absence of continuous series on government revenues during the 19th and early 20th centuries, we will use terms of trade data to mimic government revenues. Figure 1 also shows the evolution of the terms of trade for the seven countries in the sample.

Country-specific fragilities, captured by adverse shocks to exports and the terms of trade, may explain defaults in Latin America. Still, the evidence that most of the sovereign debt crises during this period are systemic crises, with a large number of countries defaulting all at once, suggests that global shocks may be at the core of these crises. As we will examine later on, most of the sovereign debt crises in Latin America cluster around the London panic in 1825, the Vienna Stock Market crash in 1873, the Baring Brothers crisis in London in 1890, and the London and Wall Street panics in 1929. These crises, as we will examine shortly, rapidly lead to crashes in international liquidity, the so-called "Sudden Stops," and can trigger systemic defaults in the periphery since defaults may help countries to avoid sharp contractions in spending when international capital markets crash.

To capture fluctuations in international liquidity, we first construct a series of real interest rates in the financial center. While real interest rates in the financial center have traditionally been used in all empirical studies of crises to capture the global factor, this indicator may not provide an accurate measure of persistence of the disruptions in capital markets in the midst of panics in the financial center. For instance, to have a modern example, hikes in interest rates in the United States precede the Subprime U.S. Crisis starting in 2007. At the signs of the first financial fragilities in mid-2007, the Federal Reserve starts to reduce the Fed Funds rate quite aggressively from 6.25% in August 2007 to 0%-0.25% in December 2008. Even with negative real rates, the collapse in capital markets continues, especially in the banking sector. The dislocation of the bank credit market is quite protracted, lasting several years after the onset of the crisis, as shown in Adrian, Colla, and Shin (2013). Financial panics in the 19th and early 20th centuries have similar features. For example, the Federal Reserve also raises aggressively

interest rates in 1928 (from 3% to 6.25%). This triggers an immediate slowdown in international bonds floated in New York and also overall vulnerabilities in financial markets with money market rates even reaching 12% in 1928. In 1929, the instability increases further, with money market rates reaching 20%. The stock market collapses in October 1929 and international issuance in New York declines by 50%. The Federal Reserve reacts and reduces the rediscount rate to 3% in 1930 and to 1.5% by mid-1931. Still, financial stability continues to erode as banking crises, currency crises, and sovereign defaults multiply.

A better indicator to measure global liquidity is the evolution of international capital flows. We could look at the evolution of international capital flows to Latin American countries around the time of defaults. Still, the inability of those countries to tap international capital markets may just reflect the defaults. To have a yardstick of international liquidity not contaminated by the defaults in Latin America, we examine the fluctuations in international capital flows to the non-Latin American periphery. In particular, we construct a series of gross primary international issuance of four European countries: Denmark, Italy, Russia, and Spain, and three members of the Commonwealth: Australia, Canada, and New Zealand.

Finally, to capture global shocks to growth, we construct an indicator of world imports, which we capture with total imports of France, the United Kingdom, and the United States. We look at the value of imports in British Pounds. This allows us to capture the two adverse shocks to debt sustainability in the periphery after a crisis in the financial center: the collapse in real global demand for goods produced in the periphery as well as the increase in the real burden of the sovereigns' debts due to falling commodity prices.

The evolution of these three indicators is shown in Figure 2. In all the panels, the vertical lines identify the major panics in the financial centers in our sample. The top panel shows the U.K. real bank rate. This panel clearly shows that panics are in part triggered by increases in interest rates. Note, however, that these hikes in interest rates are transitory and even start to decline (as we will show later) before the waves of defaults start. The middle panel shows international issuance. Note that international issuance is shown as a percent of exports of the United Kingdom to correct for the size of the world economy in the more than one hundred years of our sample.[5] The four global crises in our sample are all preceded by an international capital

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[5] Exports are volatile. Thus, since we only want to control for the scale of the world economy, we use trend exports (obtained using the Hodrick-Prescott filter) to normalize international liquidity throughout the paper.

flow bonanza that crashes following panics in the financial centers. In contrast to interest rates, the collapse in international issuance is far more protracted. The more drastic crashes in international liquidity are those following the 1825 and 1929 crises. It takes six years following the crisis in 1825 for international capital markets to recover. The effects of the crisis in 1929 are even more persistent as barriers to trade and capital flows are erected around the world, with capital markets recovering again only in the late 1970s and 1980s. While still large, the decline in international liquidity after the panics in the financial centers in 1873 and 1890 is less pronounced. Still, it takes several years for world capital markets to recover. The bottom panel shows the evolution of world imports. As with international liquidity, panics in the financial center are followed by persistent declines in world imports. It takes 10 and 14 years respectively for world imports to recover to the pre-crisis level following the panics of 1825 and 1931. Not as long lasting, but still protracted, are the shocks to world imports following the crises of 1873 and 1890. It takes 7 and 8 years respectively for world imports to reach pre-panic levels after these crises. Importantly, part of the collapse of world imports reflects the long-lasting deflation following these crises, with import prices falling for at least 10 years.

2.2 Defaults

As is traditional in the literature, we identify sovereign debt crises by a suspension of coupon or amortization payments or outright defaults with both suspension of coupon and sinking fund (amortization) payments. To construct the database of sovereign defaults, we need information on the characteristics of the bonds in default and the terms of the agreement following defaults as well as the characteristics of new bonds issued after the renegotiation. The data on bond characteristics are from the Kaminsky (2012) database on international issuance. Most of the information on the defaults and restructurings is obtained from *Moody's Municipal and Government Manuals*, the *Annual Reports of the Council of the Confederation of Foreign Bondholders* (United Kingdom), and the *Annual Reports of the Foreign Bondholders Protective Council, Inc.* (United States). This information is complemented with a large number of country studies on sovereign debt cited in Appendix A. We focus only on defaults of the central government since it is mostly impossible to obtain the terms of all the defaulted bonds issued by provinces, states, and municipalities.

To classify crises into systemic and idiosyncratic, we identify the year of all the defaults of *all* the countries in Latin America. On total, there are sixty seven defaults. Figure 3 shows

the percent of countries in Latin America defaulting in each year. This figure only identifies the first year of the default. It is clear from this figure that a large number of crises bunch together. For example, 68% of the countries default in the mid-1820s. Similarly, 75% of the countries default around the 1929 crises in London and New York.

Because we were unable to collect a complete database on macroeconomic indicators and on sovereign renegotiations of some of the smaller countries, the empirical estimation of the triggers of defaults and the determinants of default spells as well as debt reductions is limited to the defaults of Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay. There are in total 27 defaults of these seven countries. Argentina defaults twice: 1828 and 1891. Brazil defaults four times: 1828, 1898, 1914, and 1931. Chile defaults three times: 1827, 1879, and 1931. Colombia defaults seven times: 1821, 1826, 1848, 1873, 1879, 1900, and 1932. Mexico defaults four times: 1827, 1854, 1914, and 1928. Peru defaults three times: 1826, 1876, and 1931. Uruguay defaults four times: 1875, 1891, 1915, and 1931.

3. The Anatomy of Systemic and Idiosyncratic Sovereign Debt Crises

We start our anatomy of sovereign debt crises by defining the criterion to classify crises into systemic and idiosyncratic. We continue by examining the events and shocks leading to the onset of these two varieties of sovereign debt crises. We end with our estimations of default spells and debt reduction rates for the two types of crises. These estimations provide evidence that systemic crises are different in terms of origins and resolution.

3.1 Definition of Systemic and Idiosyncratic Sovereign Debt Crises

To identify systemic crises, we use a threshold of (at least) one third of the countries defaulting in any episode of at most five years. We apply this yardstick to the sixty seven defaults of *all* Latin American countries. Using this criterion, there are four episodes of systemic crises. The first one follows the panic in London in 1825 (68% of countries default), the second occurs in the midst of the 1873 Vienna Stock Market crisis (42% of countries default), the third is fueled by the near-bankruptcy of Baring Brothers in London in 1890 (37% of countries default), and the fourth one occurs in the midst of the 1929 stock market crashes in London and

New York (75% of countries default). Using this threshold, there are 42 systemic crises and 25 idiosyncratic crises.[6]

3.2 What Triggers Crises?

To examine the triggers of crises, we first construct a chronology of the sixty seven defaults of *all* Latin American countries, both systemic and idiosyncratic. Afterwards, we examine in greater detail the onset of systemic and idiosyncratic defaults of the seven largest economies of Latin America using event studies.

Table 1 describes the antecedents and the mechanisms of transmission of systemic crises as well as the countries that default in each episode. It is important to point out that systemic crises are all preceded by capital flow bonanzas as shown in Figure 2 (middle panel). In some episodes, capital flow bonanzas are triggered by positive supply shocks, such as the increase in liquidity in the financial centers in the 1820s in the aftermath of the Napoleonic Wars. In other episodes, increases in liquidity are mostly triggered by demand shocks, such as the need to finance the construction of railways around the world during 1880s.

Hikes in interest rates in the financial centers are at the core of the end of most capital flow bonanzas as shown in Figure 2 (top panel). For example, the boom of the early 1820s ends in the summer of 1825 when the Bank of England raises its discount rate to stop the drain of reserves triggered by England's import boom and the outflow of capital. Capital flow bonanzas also end with the collapse of major banks, such as the case of the near failure of Baring Brothers (London) in 1890, a major underwriter of debt of Latin American and European countries. The end of these capital flow bonanzas are followed by global contractions in economic activity, crashes of stock markets, terms of trade deterioration in the periphery, and overall deflation.

Defaults also occur in times of booms in the global economy, with fragilities just emerging in the periphery. It is in those episodes that we observe idiosyncratic crises in various countries in Latin America. Table 2 shows those defaults with idiosyncratic patterns, such as Chile's default in 1879 in the midst of the War of the Pacific, Colombia's default in 1900 in the

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[6] If we adopt a less stringent criterion to identify systemic crises (at least 20% of countries with sovereign debt crises during an episode of at most 5 years), we also identify the crises around the onset of the First World War as systemic crises. As expected, a more stringent criterion accentuates the differences between systemic and idiosyncratic crises. This is because with a more stringent criterion we only identify the more severe panics in the financial center and those with more global reach. We think this more stringent criterion captures better the essence of *rare disasters*.

midst of the Thousand Days' War, and Brazil's default in 1898 following the collapse in the price of coffee.

We now provide a higher resolution picture for the twenty seven sovereign debt crises of Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay. For these countries, we identify seventeen systemic crises and ten idiosyncratic crises.

To shed light on whether systemic and idiosyncratic sovereign debt crises may have different roots, we first examine the evolution of the fundamentals around the time of crises. We chose the variables in our analysis in light of theoretical considerations. The models of sovereign defaults (see, for example, Eaton and Gersovitz, 1981, Arellano, 2008, and Aguiar and Gopinath, 2006) indicate that defaults occur following adverse shocks to the domestic economy. However, not all adverse shocks trigger defaults. The calibration exercise in Aguiar and Gopinath (2006) indicates that only adverse shocks to the permanent component of output can explain the frequency of defaults observed in the data. Thus, our analysis will look at both transitory and permanent changes in both exports and the terms-of-trade. We also examine the behavior of the global factors shown in Figure 2: the real interest rate in the United Kingdom, international liquidity as captured by international primary issuance of the non-Latin-America periphery (as a percent of U.K exports), and the growth of world imports.

The eight panels in Figure 4 capture country-specific vulnerabilities around the time of default. The left panels examine the onset and aftermath of systemic crises while the right panels show their behavior around the time of idiosyncratic crises. The indicators reflect the evolution of permanent and transitory components of exports and the terms of trade.[7] Each panel portrays a different variable. In each panel, the horizontal axis records the number of years before and after the time of default. We look at the behavior of each indicator for an interval of 10 years around the year of the sovereign default in each country (*t*). For the growth rate of trend exports and the terms of trade (the permanent components), the vertical axis records the percentage-point difference between the growth rate during "crisis" years and the average growth rate during "tranquil" times, with "tranquil" times defined as the sample years excluding the years when the countries are in default. For the transitory components of exports and the terms of trade, the vertical axis records the transitory component as a percent of the trend. In each figure, the solid

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[7] We identify permanent components (the trends) using the Hodrick-Prescott filter.

line represents the average behavior of each indicator across all defaults while the dotted lines denote plus/minus one-standard-error bands around the average.

The first two panels show the behavior of the growth rate of trend exports around the time of default. Both systemic and idiosyncratic crises occur in times of adverse permanent shocks to exports, suggesting that defaults reflect in large part the unsustainability of the debt. The growth rates of trend exports in the years leading to the systemic defaults oscillate between 4 and 5 percentage points below the growth rates observed during "tranquil" times. While idiosyncratic defaults also occur following a slowdown in the growth rate of trend exports, the decline is milder (2 to 3 percentage points below the average growth rate during "tranquil" times) and it is far less persistent, suggesting that panics in the financial center with their global reach are at the core of the more dramatic downturn of the economies in the periphery during systemic crises. The next two panels show the evolution of the growth rate of the trend of the terms of trade. As with exports, the growth rate of the trend of the terms of trade during "crisis" times declines relative to the average during "tranquil" times, indicating that the sharp decline in the growth rates of exports (in British pounds) is a toxic combination of sluggish real growth of exports and the deflationary impact of lower export prices. Interestingly, the decline in the growth rates of the trend of the terms of trade in the midst of systemic crises is more persistent than the drop during idiosyncratic crises.

The next four panels show the transitory shocks to both exports and the terms of trade during systemic and idiosyncratic crises. Adverse transitory shocks to exports are not at the core of either systemic or idiosyncratic crises, supporting the findings in the Aguiar and Gopinath (2006) calibrating exercise. While both systemic and idiosyncratic crises are preceded by a transitory boom in the terms of trade going bust, these transitory shocks are, on average, small and mostly not statistically significant.

Figure 5 shows the evolution of global factors around the time of defaults of the Latin American periphery. The top four panels show the evolution of international liquidity around the time of sovereign debt crises. The first two panels show international issuance/U.K. exports during the ten years around the time of default relative to its sample average. These panels show that a crash in international issuance is at the core of systemic crises. Before these defaults occur, international issuance is booming on average across countries, with international issuance/U.K. exports peaking at about 10 percentage points above the sample average ratio. It

collapses to 2 percentage points below the average of the sample at the onset of these crises and continues to fall to 4 percentage points below the average of the sample after the crises start. In contrast, international issuance/U.K. exports even increases at the onset of the idiosyncratic sovereign debt crises.

The middle two panels show the evolution of the real interest rate in the United Kingdom during both systemic and idiosyncratic crises. The panel on the left shows the evolution of real interest rates around panics in the financial center. The year of the panic in the financial center is denoted by *t* and it is shown in the first column of the table. The last column of this panel shows what we dub "Liquidity Crash Index," which is estimated as the average of the U.K. real interest rate in the year of the panic (*t*) and the following two years relative to the average U.K. real interest rate in the two years before the panic. It is around these panics that systemic crises erupt. Note that all the panics in the financial centers occur in the midst of a sharp increase in real interest rates, oscillating between 3 to 13 percentage points. Note, however, that in the aftermath of the panics, real interest rates tend to decline somewhat as central banks reduce interest rates to stabilize financial markets. Since systemic defaults mostly tend to occur in about two to three years after the panic, real interest rates have declined from their peak by the time the defaults erupt. The right panel shows the evolution of the real interest rate around the year of idiosyncratic defaults shown in the first column of the table. Most idiosyncratic defaults occur during episodes of declining real interest rates. On average, across all idiosyncratic crises, the "Liquidity Crash Index" is almost minus 7 percentage points.

The bottom two panels show the evolution of the growth rate of world imports (relative to the sample average growth rate) both during systemic and idiosyncratic crises in the periphery. Again, these panels show that systemic and idiosyncratic crises are different. Systemic crises occur in the midst of not just a slowdown in the defaulting countries but also of a profound slowdown in the world economy. The growth rate of world imports declines to 11 percentage points below the sample growth rate and it does not recover to the sample growth rate for more than 5 years. In contrast, idiosyncratic crises occur even in the midst of normal growth conditions in the global economy.

3.3 Default Spells and Debt Reduction Rates

Figure 6 summarizes the differences between systemic and idiosyncratic crises in relation to default spells and debt reduction rates. The top panel in this figure shows the classification of

sovereign debt crises for *all* Latin American countries into systemic and idiosyncratic. The middle panel shows the default spells of the seven largest Latin American countries. We estimate the default spells using both general sources as well as country studies as detailed in Appendix A. We identify a default spell as the years during which the country has suspended coupon or sinking fund (amortization) payments or is in outright default with both coupon and sinking fund payments suspended. Default spells vary substantially across defaults. For example, Mexico's default in 1854 lasts 33 years. In contrast, Uruguay's default in 1891 lasts just one year. This middle panel also shows the average default spells across systemic and idiosyncratic crises. Importantly, on average, systemic sovereign debt crises have longer default spells (15 years) than those of idiosyncratic crises (12 years). Default spells following systemic crises are on average 25% longer than those following idiosyncratic crises. Still, these differences are only statistically significant at a 0.24 p-value.

The bottom panel in Figure 6 shows the debt reduction rates of both systemic and idiosyncratic crises for the seven largest Latin American countries. As in the literature on sovereign defaults, we estimate these rates by comparing the present value (PV) of the remaining contractual payments of the old instruments, including missing sinking fund payments or coupon arrears, and the present value of the future payments of the new instruments at the moment of the agreement.

The PV of the old bond at the time of the agreement is estimated as follows:

$$PV_{ta}^{old} = \sum_{t=td}^{ta-1} S_t^{old} (1 + r_{td})^{(ta-t)} + \sum_{t=ta}^{tm} S_t^{old} (1 + r_{ta})^{-(t-ta)} \tag{1}$$

Where *td* is the year of the default, *ta* is the year of the agreement, *tm* is the year of the maturity of the bond, and *r* is the discount rate. *S* captures the service of the bond (sinking fund and interest payments) during the life of the bond. The first component measures the capitalization of the missing payments (sinking fund and coupons) from the time when the payments are due to the time of the agreement. The second component measures the value of the post-agreement remaining payments of the old instrument discounted to the time of the agreement.

The PV of the new bond at the time of the agreement is estimated as follows:

$$PV_{ta}^{new} = \sum_{t=ta}^{tm} S_t^{new} (1 + r_{ta})^{-(t-ta)} \tag{2}$$

With the debt reduction rates estimated as follows:[8]

$$Debt\ Reduction\ Rate_{ta} = 1 - \frac{PV^{new}(r_{ta})}{PV^{old}(r_{td}, r_{ta})} \qquad (3)$$

As shown in Figure 6 (bottom panel), debt reduction rates vary greatly across defaults. The average debt reduction rate for systemic crises is 56% while that for idiosyncratic crises is 34%. On average, debt reduction rates following panics in the financial centers are 65% higher than those in times of calm international capital markets, with these differences being statistically significant at a 0.06 p-value. These results jointly with those of the event studies indicate that systemic and idiosyncratic crises are different both in terms of origins and resolution.

4. Econometric Estimations

The stylized facts discussed in the previous section indicate that systemic crises are more severe than idiosyncratic crises. During systemic crises, the collapse in the debtor's economy is more drastic and protracted, with this collapse in part being fueled by a global downturn. The disruption in international capital markets following the panics in the financial center adds to the severity of the adverse shocks. This toxic mix of adverse liquidity shocks and profound downturns seem to contribute to longer default spells and larger debt reduction rates. In this section, we investigate these stylized facts more systematically.

While the event studies in the previous section provide us with a first analysis of the shocks fueling defaults, they cannot account for the interactions of the different shocks in explaining these crises. To disentangle the effects of all the shocks on the likelihood of a

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[8] Debt reduction rates calculated using Present Value (PV) estimates are sensitive to the choice of the discount rate. The rates of discount of creditors and debtors may differ. For example, the rate of discount of the sovereign is linked to the cost of obtaining a new loan in the market. After a restructuring, the sovereign will expect to access the international capital market at "non-crisis" interest rates. In a world with asymmetric information, investors may ask for a higher yield to compensate for the likelihood of a new default. Thus, at the time of exit from default, investors' rates and sovereigns' rates may differ substantially because the reputation of the sovereign has deteriorated and investors' asking yield will reflect this loss of confidence. From the point of view of the investor, the discount rate may reflect more closely a "crisis" rate. We use normal-time ("non-crisis") discount rates at the time of the agreement to capture the so-called *Debt Relief* to the sovereign committed to the repayment of the debt. We use exit yields ("crisis-time" discount rates) to estimate the so-called *Investors' Haircuts*. See Sturzenegger and Zettelmeyer (2005, 2007) and Cruces and Trebesch, (2013) for estimates of debt reduction rates for the 1980-2010 defaults. For a more detailed description of our estimates and the characteristics of the restructurings, see Appendix B. The debt reduction rates shown in Figure 6 are the average of our estimates of *Debt Relief* and *Investors' Haircuts*.

sovereign debt crisis, we estimate a logit model. Also, using the implicit probabilities in the logit model, we test the hypothesis that systemic and idiosyncratic crises have different origins. In addition, we examine econometrically what determines long and short default spells. We use both risk management methodologies as in Garcia and Rigobon (2005) and duration analysis to explain delays in debt renegotiations. Finally, we use regression analysis to estimate the effects of global and idiosyncratic shocks on debt reduction rates.

4.1. Untangling the Triggers of Systemic and Idiosyncratic Defaults

The empirical literature of the determinants of sovereign defaults is large and still growing.[9] This literature has highlighted both debt unsustainability (captured by high debt/GDP or debt service/export ratios) as well as lack of liquidity (identified by a high short-term debt/foreign exchange reserve ratio) as the major triggers of sovereign defaults. It has also focused on indicators capturing the strength of the domestic economy, such as real GDP growth, and also on external shocks, such as fluctuations in the U.S. real interest rates. Our estimations build on this literature with a twist: with a database of more than one hundred years, we can capture several major panics in the financial centers and thus can test whether sovereign debt crises in the aftermath of *rare disasters* are different. This has not been possible so far because all previous empirical studies examine sovereign debt crises in samples that only cover at most thirty years. Our goal is to assess the role of country-specific and global shocks on the onset of systemic and idiosyncratic crises. Thus, our explanatory variables are the four country-specific indicators and the three global indicators already examined in the event studies in Figures 4 and 5. Naturally, we also need to control for debt sustainability. Thus, we construct series of the central government external debt service, which includes amortization and coupon payments for our seven countries and calculate the debt service/export ratio.[10] Appendix A describes the sources for this indicator.

We estimate the relative contribution of each of these factors to sovereign defaults using logit techniques. Our dependent variable takes a value of either "1" when the default occurs or "0" during "non-crisis" times. As is traditional in these estimations, we exclude all the

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[9] See for example, Catão and Sutton (2002) and Manasse, Roubini, and Schimmelpfennig (2003) for estimations and useful surveys of the empirical literature on sovereign defaults.

[10] We compute the debt service/export ratio using trend exports because sustainability is mostly affected by shocks to the permanent component of exports and not by transitory shocks. We compute trend exports using the Hodrick-Prescott filter.

observations following the default until the year when the debt is renegotiated to preclude reverse causality running from the country's decision to default to the behavior of the explanatory variables. Our sample includes 422 observations, of which 27 are default events.

Since we want to test whether the origins of systemic and idiosyncratic crises are different, we estimate two models. *Model 1* includes only country-specific indicators. *Model 2* includes both country-specific and global indicators. We use the estimated probabilities of these two models to test this hypothesis.

The results of the logit estimations are reported in Table 3.[11] The top panel shows the results of estimating the two models. Since we just have 27 default events, we need to have a parsimonious model. Thus, our final models in this table include only the variables statistically significant. For *Model 1*, the only statistically significant country-specific indicators for predicting the likelihood of defaults are the growth rate of trend exports and the debt service/export ratio. They also have the expected signs, with the likelihood of defaults declining with higher growth of trend exports and lower debt service/export ratio. For *Model 1*, the pseudo-R^2 of the regression is 0.15, indicating that the model still does not explain an important part of the variation in the default probability.

For *Model 2*, the only statistically significant country-specific indicators for predicting the likelihood of defaults are still the growth rate of trend exports and the debt service/export ratio. They also have the expected signs. The only statistically significant global indicators are the international issuance/U.K. export ratio and the growth rate of world imports. The likelihood of a default increases with a decline in both international issuance/U.K. exports and the growth rate of world imports, indicating that both global liquidity crashes and a collapse in world growth are also at the core of sovereign debt crises.[12] The pseudo-R^2 of this regression is 0.22 indicating that global factors help in predicting defaults.

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[11] As is standard in the literature, all the country-specific indicators are lagged one-period so as to mitigate possible endogeneity. The global indicators are introduced contemporaneously.

[12] We not include the U.K. real interest rate in our final estimates of the logit equation to prevent reverse causality. In all the estimations, hikes in real interest rates are negatively correlated with the odds of sovereign debt crises. As we discussed in Section 2, hikes in interest rates predate most panics in the financial center. But as worldwide capital markets deteriorate rapidly, with countries defaulting and entire banking sectors collapsing, monetary authorities in the financial center rapidly lower interest rates. The negative sign of the U.K. real interest rate in the logit equation just captures this reaction of the monetary authorities.

Model 1 and *Model 2* are estimated using data on both episodes of systemic and idiosyncratic crises. We find that global shocks in *Model 2* help to predict crises better. However, as indicated by the events studies, global shocks are only at the origin of systemic crises. To test this hypothesis using our logit estimations, we compare the implicit probabilities of crises of both models at the time of the default. Our hypothesis is that global factors cannot explain idiosyncratic crises but they help to predict better systemic crises. That is,

$$\text{Prob(Idiosyncratic Crises }|\textit{Model 2}) = \text{Prob(Idiosyncratic Crises }|\textit{Model 1})$$
$$\text{Prob(Systemic Crises }|\textit{Model 2}) > \text{Prob(Systemic Crises }|\textit{Model 1})$$

The bottom panel in Table 3 shows the average probabilities of the two types of crises (the probabilities at the onset of the default) implicit in both models. Note that the model with global factors helps to predict systemic crises but not idiosyncratic ones. For systemic crises, the probabilities at the time of default implicit in the model with country-specific and global factors are, on average, 11 percentage points higher than those from the model with just country-specific factors. For idiosyncratic crises, the probabilities at the time of default implicit in the model with country-specific and global factors are, on average, only 3 percentage points higher than those from the model with just country-specific factors. To assess the statistical significance of these results, we report the t-test of the difference in means. Our results indicate that systemic crises are better predicted with *Model 2* at a 0.08 confidence level. In contrast, we cannot reject the hypothesis that idiosyncratic crises are only predicted by country-specific shocks at any conventional significance level.

This test on the determinants of systemic and idiosyncratic crises jointly with the tests on debt reduction rates and default spells of systemic and idiosyncratic crises reported in Figure 6 indicate that these two varieties of crises are different both in terms of origins and resolution.

4.2 Default Spells

As we described in the introduction, there is a newly flourishing theoretical literature trying to explain default spells and debt reduction rates. At the core of this literature is that delays in debt restructuring may be efficient. As examined in Bi (2008), delays in debt restructuring are inefficient only under very strict assumptions: In a world with no uncertainty, the sovereign and the creditors know exactly all future shocks and hence they can reach an agreement immediately after the default. Since most defaults occur under adverse conditions and

countries in default are excluded from international capital markets when they need them the most, waiting will be inefficient for the sovereign. Note that creditors lose too since while the default persists, they do not share any resources of the sovereign. Similarly, waiting will be inefficient in a world with uncertainty if sovereigns and investors can write state-contingent repayment contracts. In contrast, there could be benefits from delaying a restructuring if the future stream of output of the sovereign is uncertain and markets are incomplete. If the default is preceded by a collapse in economic activity, few resources are available for repayment. It is beneficial for borrowers and lenders to wait and examine the evolution of economic activity. If the recovery starts, borrowers will be able to allocate more resources to service the debt and investors will be able to recover a larger part of their assets.

Benjamin and Wright (2009) also examine delays in renegotiations. In that paper, delays arise from the same commitment problems that lead to default. As in Bi (2008), a debt re-structuring generates a surplus for both creditors and debtors at the time of the agreement and in the future. But Benjamin and Wright (2009) point out that the ability of the creditor to share the surplus in the future is limited by the risk that the sovereign will not comply with the terms of the agreement. They show that sovereigns and creditors will delay renegotiations until the future risk of default on the agreement is low, that is, when economic activity recovers.

As with models of sovereign defaults, theoretical models on renegotiations focus on adverse country-specific shocks in debtor countries. In these models, international investors are always ready to lend to all sovereigns, at risk free rates to the sovereigns committed to repay and at higher rates to those that may default to compensate for possible debt reductions. That is, in those models, it is assumed that there is always liquidity in international capital markets. In fact, the incentive for the sovereign to restructure its debt is its ability to re-access credit markets. What if international liquidity collapses and even non-defaulters cannot borrow? In this case, countries will have more incentives to default and delays in restructuring should persist. The bargaining power of investors will decline since they cannot offer new credit. If an agreement is reached, this loss of investors' bargaining power will impact adversely the debt recovery rates.

In this section, we examine whether restructurings occur when the economy recovers. We also examine whether global shocks affect default spells.[13] First, we deal with the role of

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[13] We only examine the role of economic fundamentals (global and country-specific) on default spells and debt recovery rates. Future work on this topic should also pay attention to the role of institutions, such as bondholders

economic recoveries. We interpret economic recoveries leading to restructurings as those that guarantee that the debt burden can be stabilized. We compute the debt burden as the debt/export ratio.[14] We use the risk management approach to debt sustainability proposed by Garcia and Rigobon (2005) to estimate the likelihood that a recovery can help to stabilize the debt burden. Second, we also deal with global slowdowns and international capital market disruptions. We use duration analysis to examine the role of all these factors in delaying/accelerating an agreement.

4.2.1 The Role of Recoveries

Garcia and Rigobon (2005) use risk management techniques to assess the sustainability of the debt. We modify this methodology to explain delays in debt renegotiations. To estimate the timing of the restructuring, we examine the stochastic properties of the debt dynamics during the duration of the default for the seven countries in our sample.

As in all the literature on debt sustainability, our analysis focuses on the debt accumulation equation with a twist. We just examine the evolution of the debt to exports ratio during default episodes when countries basically do not have access to international capital markets. The debt dynamics is:

$$(1 + g_{t+1})d_{t+1} = (1 + r)d_t - f_t \tag{4}$$

Where d is the debt to exports ratio, r is the interest rate on the debt, g is the growth rate of exports, and f captures the debt service to exports ratio (if any) during the default.[15] In equation (4) sovereigns mostly rollover the principal and accumulate coupon arrears.[16] During defaults, when coupons and sinking fund are not paid, the debt grows at the interest rate of the loans

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committees. See, for example Esteves (2013) on the role of the Confederation of Foreign Bondholders and Flandreau (2013) on the role of the London Stock Exchange Court of Arbitration. See, also Mitchener and Weidenmier's (2010) and Tomz (2007) on the role of supersanctions.

[14] We compute the debt/export ratio using trend exports because sustainability is mostly affected by shocks to the permanent component of exports and not by transitory shocks.

[15] As we explained before, we use trend exports to measure the debt burden of the economy. Thus, g and f are the growth rate of trend exports and the debt service to trend exports, respectively. We estimate trend exports using the Hodrick-Prescott filter.

[16] In some rare cases, countries can tap international capital markets even while being in default (for example, Brazil in the aftermath of the 1898 default). Even when they tap the market while in default, their ability to borrow falls dramatically. In those cases, we also include the new bonds issued in our estimates of the evolution of the debt.

contracted before the default. This interest rate is known. However, the debt/export ratio is uncertain since the growth rate of exports is stochastic.

As described before, theoretical models of debt renegotiation emphasize that during defaults both investors and the sovereigns try to assess the gains from exiting default and the odds that the sovereigns will comply with the restructuring. These gains from exiting default and the ability of the debtor not to renege on the terms of the restructuring do not just depend on the state of the economy at the time of the renegotiation but also on the future path of the sovereign's economy and the ability of the debtor to stabilize its debt burden. Thus, to assess sustainability in any year, not only do we look at the debt/export ratio in that year but we also estimate the evolution of the debt/export ratio over the following n years.

We compute the various paths of the debt/export ratio by estimating an autoregressive process (AR) for the growth rate of exports. In particular, we estimate:

$$g_t = \bar{g} + B(L)g_t + \varepsilon_t$$
$$\varepsilon_t \sim N(0, \sigma^2)$$

(5)

where ε is an *iid* shock. Using the estimated AR process, the distribution of ε, and Monte Carlo simulations with 1,000 repetitions, we calculate the various paths of the debt/export ratio and obtain the probability that the debt burden will stabilize within n years. This process is repeated for each year of the default episode, incorporating the new information on exports as it becomes available. The probability of stabilizing the debt burden for each year during the default spell will be our yardstick to test whether default spells end when the economy is expected to recover and the future default risk is low.

The question is what is the threshold that makes the debt sustainable? The answer to this question remains elusive. Thus, we do not estimate the probability that the debt/export ratio reaches a certain threshold. Instead, our criterion for restructuring in year t is that future recoveries are large enough to keep the debt burden in period t stable within the following n years. In other words, our debt/export ratio target is time-varying. In particular, we interpret recoveries leading to restructurings as those recoveries that trigger a reduction of the debt/export ratio by 10% within 5 years. Since most of the defaults in our sample are outright defaults, with

no payment of coupons or amortization, recoveries leading to "stabilizing the debt burden" imply a growth rate of exports larger than the average interest rate on the debt.[17]

The results on the likelihood of renegotiating the debt are reported in Table 4. In this table, the first probability is the probability of reducing the debt burden by 10% within five years as assessed during the first year of the default. The next row shows the same probabilities but using information up to the second year of the default episode. More generally, the probability in year t is the estimated probability that the debt burden can be reduced by 10% within 5 years using information up to period t. The last probability for each default episode shown in Table 4 is the probability in the year of the restructuring of the sovereign debt.

We can summarize the results as follows:

First, during the first year of the default spell, most countries cannot stabilize the debt burden according to our metric. The probabilities of "stabilizing the debt burden" in the first year of the default spell are only high in less than 20% of the default episodes. Even in these episodes, the probabilities are mostly high not because of recoveries but because the sovereigns only suspend principal and not coupon payments, such as Brazil during the default starting in 1898.

Second, recoveries matter. Overall, 50% of all the default spells end when the economy starts to recover and the probabilities of stabilizing the debt burden are increasing. Interestingly, the long default spells following the London panic in 1825 are driven by the persistent Latin America economic slowdown. None of the probabilities of stabilizing the debt burden are positive until about 16 years after the default. Brazil's probabilities become positive after 16 years of default, Peru's after 15 years, and Argentina's after 26 years. Importantly, at the heart of Argentina's and Peru's ability to stabilize their debt burden during this episode is the high growth of exports starting in the mid-1840s. Brazil's stabilization of its debt burden is due in part to Brazil's ability (or willingness) to continue paying the interest on its debt.

Third, recoveries do not guarantee the exit from default. Sometimes it takes many years after the recoveries start for an agreement to be reached. This is the case of the defaults in the midst of the Great Depression. The defaults spells are quite long, lasting on average 15 years. The first country to restructure is Uruguay after 8 years of default, followed by Colombia after

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[17] To examine the robustness of this result, we also estimate the probabilities that the debt burden remains constant within five years. This assumption does not affect our results. The results are available upon request.

11 years, Mexico after 15 years, Brazil after 16 years, Chile after 19 years, and Peru after 23 years. Interestingly, while the crisis in 1931 devastates the economies of these countries in the early 1930s, growth resumes sharply within years, mostly with the onset of the Second World War. As shown in Table 4, the probabilities of restructuring the debt (reducing the debt burden by 10%) increase sharply in the late 1930s. By 1940, the probabilities of restructuring the debt for basically all the countries are above 50%. Only Uruguay restructures its debt in 1937. All other countries continue to be in default even after 10 years of sharp increases of their exports. A possible explanation about the reluctance of the debtor countries to settle their debt is the missing "carrot." Without international liquidity, there are no benefits from paying back foreign debts. Renegotiations take longer and haircuts become larger.

While the results in Table 4 suggest that recoveries matter, there are many defaults that end with no recoveries and other defaults that end after many years of sustained strong growth. These results suggest that there are other factors at work in explaining default spells. We examine the role of other shocks using duration analysis in the next section.

4.2.2 Duration Analysis

This section examines the role of recoveries as well as other global and country-specific shocks on the duration of defaults using the Cox proportional hazard model. As in all duration model estimations, we only look at the years of default and the year when the country exits default. The dependent variable in our estimations is a dummy variable equal to "0" in the years the country is in default and equal to "1" in the year when the country exits default. The estimations include the data of the 27 default spells of Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay.

In addition to studying the role of recoveries on default spells, we also examine the role global factors, as captured by international issuance/U.K. export ratio, the growth rate of world imports, and the real interest rate in the financial center. Finally, we also study whether the debt/export ratio at the time of the default affects the default spell.

Since we have only 27 defaults, we estimate a parsimonious model. Table 5 shows the results. As with the logit estimation, the estimates in Table 5 include only the statistically significant indicators.[18] Only two indicators explain default spells. We find that the debt/export

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[18] We also examine whether terms of trade shocks affect default spells but we do not find any significant effect.

ratio in the year of the default does not affect the default spell but that recoveries that help to stabilize the debt burden (shown in Table 4) continue to explain default spells. Importantly, the results in Table 5 show that international liquidity also matters. This table shows the coefficients of a Cox proportional hazard model in Column 1 and the corresponding p-value in Column 2. A positive coefficient indicates that a higher value of that variable is associated with a shorter duration of the default spell. To estimate the percent change in the probability of exiting default in response to a change in variable X_i we need to transform the corresponding coefficient as follows:

$$percent\ response\ of\ the\ probability\ of\ renegotiation_i = (\,e^{coeff_i \times \Delta X_i}\, -1\,) \times 100 \qquad (6)$$

The responses to a one-percentage point increase of the different variables are shown in Column 3. The coefficient for the indicator capturing international liquidity shows that a one-percentage point increase in international issuance (as a share of U.K. exports) is associated with a 9.17% increase of the probability of a renegotiation of the default while a one-percentage point increase in the probability of recoveries leading to stabilizing the country debt/export ratio leads to a 0.91% increase in the probability of ending the default spell. The coefficients of these two variables are significantly different from zero at conventional significance levels. To have a sense of the economic importance of economic recoveries and international liquidity on default spells, this table also shows the responses to a one-standard deviation shock in the two variables.

Our estimates in Table 5 indicate that the disappearing international capital markets following the international crisis in 1931 are at the core of the long default spells following the defaults in the early 1930s and outweigh the effect of economic recoveries. Note that while adverse shocks to economic activity in Latin America are colossal in the early 1930s, so are the economic recoveries across the region starting with the Second World War. The probabilities of stabilizing the debt/export ratio increase on average 64 percentage points from the average in the early 1930s to the average at the end of the defaults, leading to an increase in the probability of ending the default of about 79%. However, there is also a dramatic and persistent decrease in international liquidity following the crises in London and New York. International issuance (as a share of U.K. exports) that averages about 15% during the 1920-1930 period declines to 1% on average from 1931 to 1950. This 14 percentage-point decline in international issuance leads to a

decrease in the probability of restructuring the debt of 71%, basically offsetting the effect of the economic recoveries.

In contrast, the long default spells following the defaults of the 1820s are mostly explained by the protracted slowdown in economic activity. While international liquidity crashes following the London crisis in 1825, international issuance restarts in the early 1830s to collapse in the early 1840s, and surge again in the late 1840s and 1850s. The increase in international liquidity in the 1830s does not lead to any restructurings. Only by the mid-1840s, economic activity starts recovering in Argentina, Brazil, and Peru. The probabilities of stabilizing the debt/export ratio for these countries increase on average by 46 percentage points in the last five years of the default spell, leading (according to the estimates in Table 5) to an increase in the likelihood of an agreement of 52%. At that time, the increase in international liquidity also contributes to the increase in the likelihood of restructuring the debt. The average international issuance (as a share of U.K. exports) increases by 5 percentage points during the late 1840s and 1850s. According to our estimates in Table 5, this increase in international liquidity leads to an increase in the probability of restructuring the debt of 55%.

To conclude, our results indicate that at the core of long default spells there is always a missing ingredient. The culprit is not always the same. In some cases it is an absence of economic recoveries while in others is lack of international liquidity. For debtors and creditors to agree to restructure the debt with no delays, both economic and financial liquidity recoveries are essential.

4.3 Debt Reduction Rates

Economic recoveries are at the heart of models of debt restructurings, with recoveries leading to shorter default spells and lower debt reduction rates (Benjamin and Wright, 2009, and Bi, 2008). Yue (2010) also contributes to this literature. She also incorporates sovereign defaults and renegotiations into a dynamic equilibrium model. The focus of this paper is on the links between the debt/GDP ratio at the time of default, interest rates at which sovereigns can borrow, and debt reduction rates. Importantly, the paper also examines the effects of changes in bargaining power of creditors and debtors. She finds that debt reduction rates are larger the higher the debt/GDP at the time of default is. She also demonstrates that changes in bargaining power of creditors have a great impact on debt reduction rates. As expected, lower creditors' bargaining power results in larger debt reduction rates. Still, this paper does not model what

fundamentals affect creditors' bargaining power. Using regression analysis, we now examine the effects of the debt burden, economic recoveries, and bargaining power of creditors on debt reduction rates. In our estimations, we link investors' bargaining power to international liquidity and examine whether capital markets disruptions lead to lower bargaining power of investors and to higher debt reduction rates.

Table 6 shows the results. The dependent variable of the regression is the debt reduction rate shown in Figure 6 (bottom panel). Because our sample only includes 27 defaults, Table 6 only reports the most parsimonious model, including only the statistically significant indicators.[19] Column 1 shows our benchmark estimation. As concluded in Yue (2010), our findings indicate that debt sustainability matters. An increase of the debt/export ratio at the time of default leads to higher investors' losses. This effect is not only statistically significant but also economically significant. A one-standard deviation increase in the debt/export ratio at the time of default leads to a 15 percentage-point increase in investors' losses. International liquidity in the 5 years before each restructuring (our proxy for the bargaining power of investors) is also both statistically and economically significant. A one-standard deviation decline in international issuance/U.K. exports leads to a 16 percentage-point increase in the debt reduction rate.

The third indicator in Table 6 captures the effect of economic recoveries. Our benchmark regression in Column 1 captures the effects of economic recoveries with the average probability of stabilizing the debt burden in the last 5 years of the default spell (or with average during the default spell if it lasts less than 5 years). Note, that in contrast to the models of debt restructurings, recoveries do not seem to affect debt reduction rates. We next examine whether recoveries matter only during episodes with no capital market disruptions, that is, during episodes when investors can offer new loans to entice the sovereign to restructure the debt with smaller losses for investors. The results are shown in Column 2. We construct two international liquidity dummies. The high (low) international liquidity dummy is equal to "1" when international liquidity is higher (lower) than the median value in our sample of defaults and "0" otherwise. The international liquidity dummies are interacted with the probabilities of stabilizing the debt burden. We find that economic recoveries that stabilize the debt/export ratio

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[19] In preliminary regressions, we also examine whether other country-specific indicators, such as the terms of trade, and global indicators, such as world imports, matter. We find those indicators are not statistically significant.

only lead to lower haircuts in times of high international liquidity. In times of high international liquidity, a one-standard deviation increase in the probability of stabilizing the debt burden leads to a 15 percentage-point decline in the debt reduction rate. In contrast, when there is an international liquidity crash, a higher likelihood of recoveries has no effect on debt reduction rates. It is in these times of capital markets disruptions that international investors lose bargaining power. The sovereigns have nothing to gain from restructuring the debt in episodes in which even non-defaulters cannot tap international capital markets, and thus, investors' losses increase.[20] This last result jointly with our results on default spells in the previous section suggest that restructurings with short default spells and low debt reduction rates occur in the midst economic and international liquidity bonanzas.

5. Conclusions

We have examined the empirical regularities and the sources of the problems leading to sovereign defaults in Latin American during the first episode of financial globalization. For these defaults, we have also examined what triggers long and short default spells as well as large and small debt reduction rates at the time of the restructuring of the debt. We find that while defaults occur following adverse shocks to the sovereign's economy, these shocks cannot explain why sovereign debt crises cluster together. Panics in the financial centers that lead to disruptions in international capital flows and overall slowdown of the center economies are at the epicenter of these systemic crises in the periphery. In contrast, idiosyncratic crises are only triggered by country-specific vulnerabilities. We also find that systemic crises are not just different in their origins but also in their resolution. Overall, default spells following systemic crises tend to be more protracted. Also, systemic crises end with larger debt reductions.

While we just study sovereign debt crises in Latin America, the bunching of sovereign debt crises is not just a Latin American phenomenon. As emphasized in Bordo and Murshid

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[20] To examine the sensitivity of our results, we conduct an extra robustness test. Although not shown in Table 6, we also examine whether the debt/export ratio at the time of the agreement helps to improve our estimates in Column 1. We calculate the debt at the time of the agreement using the debt in the year of the default, capitalizing the unpaid coupons, including new bonds if the sovereign taps the capital market during default, and reducing the debt when the sovereign makes amortization payments. The results indicate that a higher debt burden at the time of the agreement leads to higher debt reductions, with a one-standard deviation positive shock to this indicator leading to a 15 percentage-point increase in the debt reduction rate. Also, as in our estimations in Column 1, international liquidity matters, with a one-standard deviation decline in international liquidity (as a percent of U.K. exports) leading to a 17 percentage-point increase in investors' losses. As captured by the Adjusted R-squared in this last regression, these two specifications perform equally well. We thank one referee for this suggestion.

(2000) and Reinhart and Rogoff (2011), the cluster of defaults is also a global phenomenon. Moreover, this phenomenon is not just a feature of the 19th and early 20th centuries. For example, the Debt Crisis in the 1980s erupts amidst a banking crisis in the United States[21] and the European Sovereign Debt Crisis erupts in the aftermath of the 2008 U.S. Subprime Crisis. These global crises are hardy perennials. We need to understand their triggers, the mechanisms of transmission, and the causes fueling repeated waves of defaults. The current theoretical literature on sovereign debt crises does not provide a satisfactory explanation of this phenomenon. A promising area of research to explain waves of defaults is that of Arellano and Bai (2014) who develop a multicountry model in which a default in one country triggers defaults in other countries and Kovrijnykh and Szentes (2007) who model economies with default cycles.

The current theoretical literature on defaults only focuses on sovereign borrowing cycles. But sovereign borrowing does not capture the whole story. Defaults come on the heels of capital flow bonanzas that include not just sovereign borrowing but mostly private borrowing. Some of these private capital flow bonanzas end with financial fragilities and banking problems, which in turn lead to further increases in government borrowing to rescue the failing financial institutions, increasing the odds of a sovereign default. These cycles of private borrowing, bankruptcies, sovereign borrowing, and default suggest that models of sovereign debt crises should be combined with models of capital flows booms and busts in the presence of distortions, such as, Schneider and Tornell (2000).

The results presented in this paper constitute a first step in examining the links between panics in the financial center and sovereign debt crises in the periphery. We have not examined for example, the links between panics in the financial center, defaults, currency problems, and the stability of currency unions. Still, many sovereign defaults during the first episode of financial globalization are accompanied by countries in the periphery exiting the gold standard. The question is how these two crises interact. Did this mix of financial panics, defaults, and abandonment of the gold standard in the periphery lead to larger debt overhangs, further slowdown of the global economy, more defaults, and the overall collapse of the gold standard? In view of the current Euro crisis, it is important to examine the lingering effects of financial panics on the breakdowns of currency systems.

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[21] The U.S. commercial banking crisis that starts in 1980, in the midst of a recession and with collapsing real estate prices, leads to about 1,400 bank failures (see Boyd and Gertler, 1993 and 1994, for an analysis of this crisis).

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Table 1
Systemic Sovereign Debt Crises

Year of the Start of the Episode	Origin of the Shock	The Background	Mechanism of Transmission	Defaulting Countries
1825	Bank of England raises the discount rate	The crisis is preceded by an international capital flow bonanza, triggered in part by the end of the Napoleonic Wars and the reduction in government spending in Great Britain. Interest rates in Great Britain sharply decline.	The Bank of England raises the discount rate in 1825 to avoid the loss of foreign exchange reserves. The stock market crash in London leads to a banking panic in England. The crisis spreads to continental Europe. Countries in the periphery lose access to international capital markets	Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru, Venezuela
1873	Stock Market Collapse in Vienna	This crisis is preceded by a surge in capital flows from England and continental Europe to finance the construction of railroads in Latin America and the periphery. The crash in 1873 also follows a speculative land boom in Germany and Austria fueled by the French war reparation payments to Prussia.	The Austrian-German boom collapses in a dramatic stock market crash in Vienna in May 1873. Stock markets in Europe and America also crash. Economic activity worldwide collapses and is followed by defaults in Europe, Latin America, and the Middle East.	Bolivia, Colombia, Costa Rica, Guatemala, Honduras, Paraguay, Peru, Uruguay
1890	Baring Crisis	The crisis culminates a major lending boom from London, Paris, Frankfurt, and Berlin in the 1880s to finance railroads and other infrastructure worldwide. Capital flows also trigger a boom in land prices.	The international crisis is fueled by the collapse of Baring Brothers on November 8, 1890. The Bank of England prevents a panic by arranging an operation to re-capitalize Baring Brothers. Capital flows to Latin America and the rest of the periphery contract sharply.	Argentina, Ecuador, Guatemala, Nicaragua, Paraguay, Uruguay, Venezuela
1928	Federal Reserve raises the rediscount rate	The 1920s experience major stock market booms associated with massive investment in new technologies, including electricity, automobiles, communications, and petrochemicals. International issuance reaches a peak in 1927.	Starting in January 1928, the Federal Reserve raises the rediscount rate from 3.5% to 6%. The call rate reaches 12% in 1928. London and New York stock markets crash in 1929. A worldwide depression, banking crises, and the collapse of the Gold Standard follow.	Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Nicaragua, Mexico, Panama, Paraguay, Peru, Uruguay

Notes: Systemic sovereign debt crisis episodes are defined as five-year episodes with defaults of at least one-third of the countries in Latin America.

Table 2
Idiosyncratic Sovereign Debt Crises

Year	Defaulting Countries
1821	Colombia, Venezuela
1848	Colombia
1848	Venezuela
1854	Mexico
1865	Venezuela
1868	Ecuador
1872	Dominican Republic
1879	Chile, Colombia
1895	Costa Rica
1898	Brazil, El Salvador, Venezuela
1900	Colombia
1901	Costa Rica
1906	Ecuador
1911	Nicaragua
1914	Brazil, Ecuador, Mexico
1915	Uruguay
1920	Paraguay
1921	El Salvador

Table 3
Are Systemic and Idiosyncratic Sovereign Debt Crises Different?

Logit Estimates of Default Probabilities

Indicators	Model 1 Model with Country-Specific Shocks		Model 2 Model with Country-Specific and Global Shocks	
	coefficient	p-value	coefficient	p-value
Country-Specific Indicators				
Debt Service/Exports	8.39	0.00	6.94	0.02
Growth Rate of Trend Exports	-16.29	0.00	-17.05	0.00
Global Indicators				
International Issuance/U.K. Exports			-14.57	0.00
Growth Rate of World Imports			-2.89	0.12
Number of Observations	422		422	
Pseudo-R²	0.15		0.22	

Is the Origin of Systemic and Idiosyncratic Sovereign Debt Crises Different?
Hypothesis Tests

Type of Crisis	Estimated Average Probabilities in the Year of the Default with Model:		t-test p-value
	With Country-Specific Shocks	With Country-Specific and Global Shocks	
Systemic	0.20	0.31	0.08
Idiosyncratic	0.06	0.09	0.17

Notes: The top panel shows the coefficients of two logit models. Model 1 includes only country-specific indicators while Model 2 includes both country-specific and global indicators. The dependent variable is a dummy variable equal to "0" in the years the country is not in default and equal to "1" in the year when the country defaults. To test whether the origins of these two varieties of crises are different, we compare the estimated probabilities in the year of the default using the two models. The bottom panel shows the average probabilites for the two models and reports the p-values of the t-tests of the difference in means. See the text for the definitions of the indicators and Appendix A for the sources.

Year in Default	Argentina		Brazil				Chile			Colombia							Mexico				Peru			Uruguay			
	1828	1891	1828	1898	1914	1931	1827	1879	1931	1821	1826	1848	1873	1879	1900	1932	1827	1854	1914	1928	1826	1876	1931	1875	1891	1915	1931
1	0	0	n.a.	29	9	0	0	55	0	0	0	0	2	0	0	0	20	0	65	0	5	0	0	0	0	80	0
2	0	0	n.a.	58	21	0	0	63	0	0	0	18		0	0	0	15	0	68	0	3	0	0	0		80	0
3	0	0	n.a.	64	36	0	0	61	0		0	62		0	0	0	12	0	76	0	0	0	0	0		79	0
4	0		n.a.	75	41	0	0	68	0		0	76		0	0	0	1	0	76	0	0	0	0	0		60	0
5	0		n.a.	78	36	0	0	57	0		0	75		0	0	0	0	1	65	0	0	0	0			32	0
6	0		n.a.	79	36	0	0	44	0		0	78		0	0	0	0	1	48	0	0	0	0			0	0
7	0		n.a.	78	28	48	0		0		0	80		0		1	0	4	1	0	0	0	0			0	1
8	0		n.a.	80	23	100	0		8		0	80		0		44	0	1	0	0	0	0	0			0	30
9	0		n.a.	70	19	100	0		38		0	80		0		76	0	1	0	8	0	0	1				
10	0		1	70	13	100	0		74		0	71		0		80	0	1		28	0	0	5				
11	0		0	61	5	100	0		70		0	70		0		100	0	0		77	0	0	37				
12	0		0	60	0	100	0		71		0	66		0			0	0		80	0	0	69				
13	0		0	52	0	100	0		73		0	62		0			0	0		95	0	0	68				
14	0		0	37	0	100	0		80		0	53					0	0		85	0	0	78				
15	0		0			95	0		80		0			0			0	0		85	0		80				
16	0		0			100	0		79		0			0			0	0			1		90				
17	0		16						78		0			0			0	0			1		90				
18	0		30						75		0			0			0	0			8		80				
19	0		59						71		0						0	0			6		77				
20	0		68								0						0	0			44		79				
21	0		71														0	0			56		66				
22	0		80														0	0			60		28				
23	0		80														0	0			65		42				
24	0		80														0	0			60						
25	0																0	0									
26	0																	0									
27	1																	0									
28	9																	0									
29	5																	1									
30	24																	12									
31																		11									
32																		6									
33																		1									

Notes: To assess the role of economic recoveries on shortening default spells, we examine whether recoveries help to stabilize the sovereign's debt burden estimated as debt/exports. The probability of stabilizing the debt burden is the probability that the country is able to reduce the debt/export ratio in each period by 10% within five years.

Table 5
Default Spells: The Effects of Country-Specific and Global Shocks
Duration Analysis

| Indicators	Coefficient	p-Value	Percent Response of the Probability of Renegotiation to a One-percentage point Increase in Variable:	Percent Response of the Probability of Renegotiation to a One-Standard Deviation Increase in Variable:
Country-Specific Indicators Probability of Stabilizing Debt/Exports	0.91	0.12	0.91	33.85
Global Indicators International Issuance/U.K. Exports	8.77	0.01	9.17	61.93
Number of Defaults: 27 Number of Observations: 369				

Notes: This table shows the coefficients of a Cox proportional hazard model. The dependent variable is a dummy variable equal to "0" in the years the country is in default and equal to "1" in the year when the country exits default. This table includes as explanatory variables only those with coefficients statistically different from zero. The probability of stabilizing debt/exports is from Table 4. A positive coefficient indicates that a higher value of that variable is associated with a shorter duration of the default spell. See the text for the definitions of the indicators and Appendix A for the sources.

Table 6
Debt Reduction Rates: The effects of Country-Specific and Global Shocks
Regression Analysis

Indicators	Coefficients (p-Values)	
Constant	0.51	0.43
	(0.00)	(0.00)
International Issuance/U.K. Exports	-3.16	-2.28
	(0.01)	(0.09)
Debt/Exports at the Time of Default	0.08	0.09
	(0.01)	(0.00)
Probability of Stabilizing Debt/Exports	-0.10	
	(0.54)	
Probability of Stabilizing Debt/Exports in Times of Low International Liquidity		0.02
		(0.91)
Probability of Stabilizing Debt/Exports in Times of High International Liquidity		-0.45
		(0.14)
R²	0.42	0.46
Adjusted R²	0.34	0.37
Number of observations	27	27

Notes: The dependent variable is the average debt reduction rate in Figure 6. The estimates only include as explanatory variables those with coefficients significantly different from zero. The probability of stabilizing debt/exports is from Table 4. In our estimates above, we capture recoveries with the average probabilities of stabilizing debt/exports in the last five years of the default spell. If the default lasts less than five years, we use the average during the default spell. International issuance/U.K. exports is calculated as the average of the five years before the agreement.   In column 2, we allow for non-linear effects of the probability of stabilizing debt/exports. We divide the observations of international issuance/U.K. exports according to whether the observations are below or above the median of the sample. We create two dummies: (1) The low international liquidity dummy is equal to "1" during episodes of low liquidity, "0" otherwise.   (2) The high international liquidity dummy is equal to "1" during episodes of high liquidity, "0" otherwise.   We use these dummy variables as interaction terms to estimate the effects of recoveries, as captured by the probability of stabilizing the debt/export ratio, on debt reduction rates during international liquidity booms and crashes. See the text for the definitions of the indicators and Appendix A for the sources.

Figure 1
**Country-Specific Indicators**
Exports and Terms of Trade
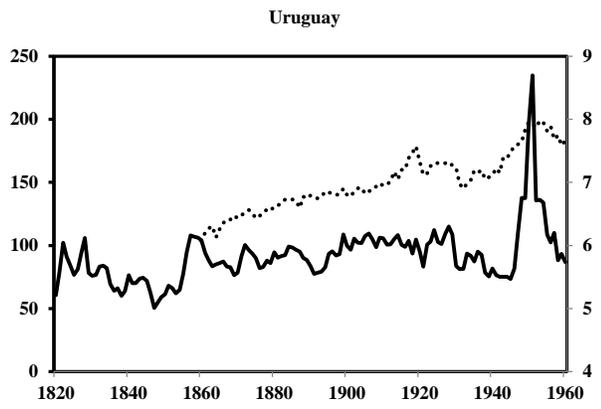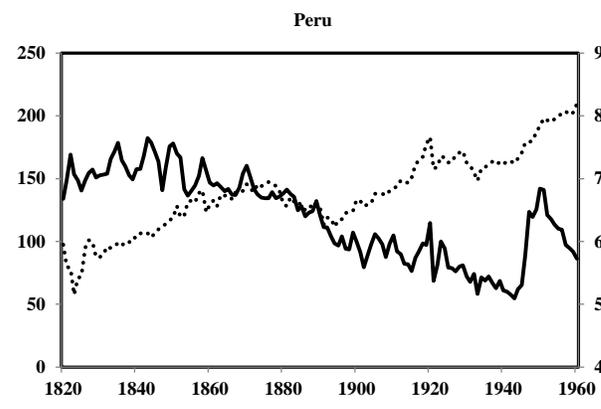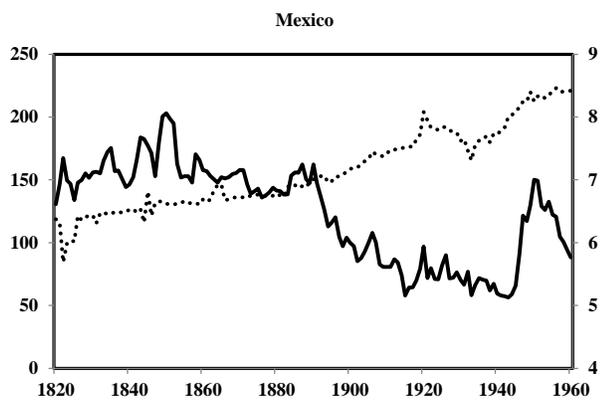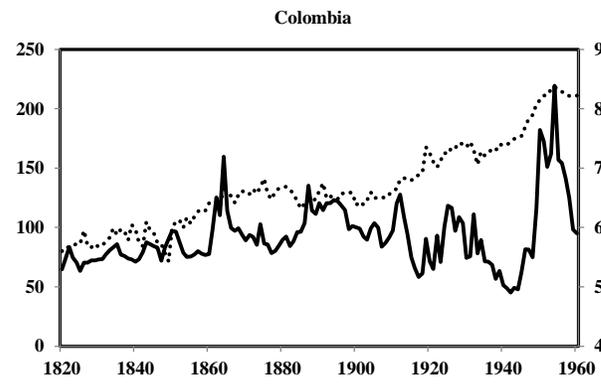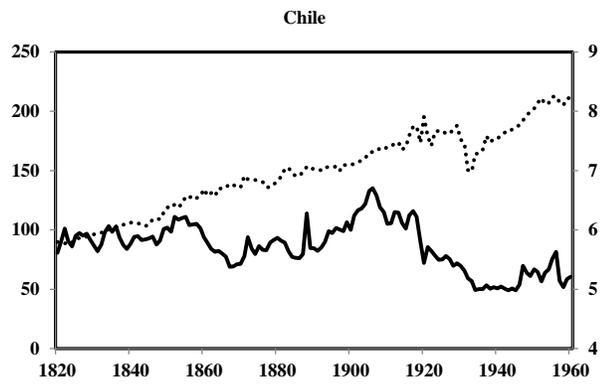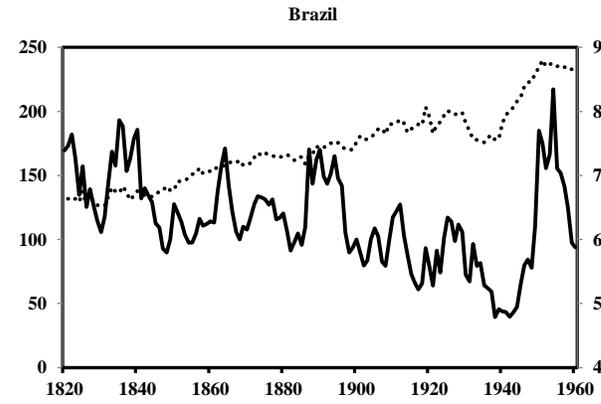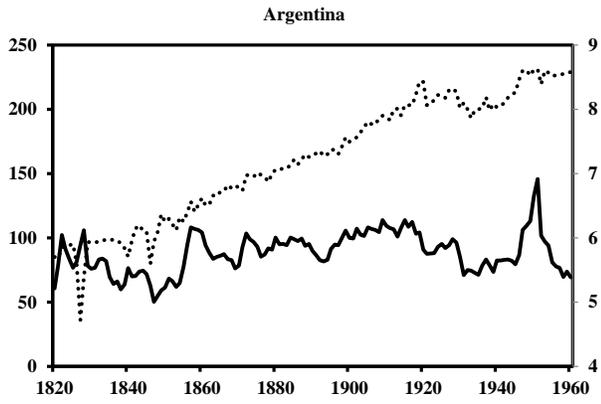
Notes:
The dotted lines are the logarithms of exports in British pounds. The solid lines are the terms of trade indices with base 1900=100. Exports are measured in the right axis and the terms of trade are measured in the left axis.
See the text for the definitions of the indicators and Appendix A for the sources.
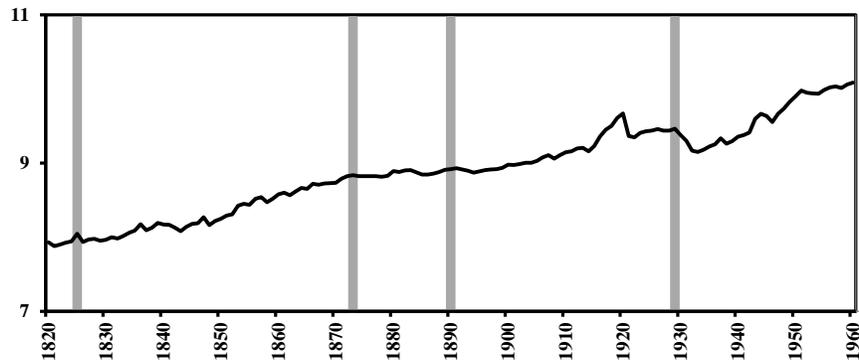
Figure 2
Global Indicators

U.K. Short Term Real Interest Rate
(Percent Per Annum)
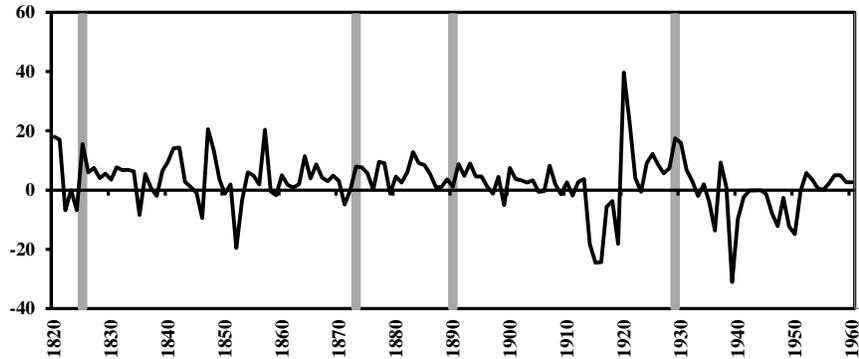
**International Issuance/U.K. Exports**
(in Percent)
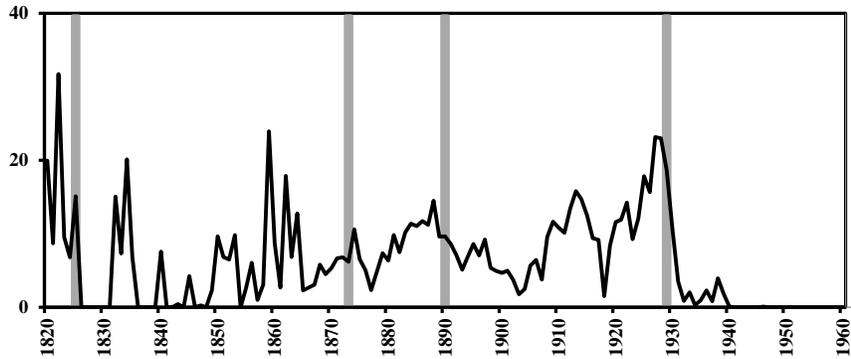
World Imports
(Logarithm of Imports in British Pounds)

Notes: The U.K. short-term interest rate is the Bank rate. To estimate the U.K. short-term real interest rate, we use the rate of change of the U.K. wholesale price index. International issuance captures international issuance of the Non-Latin American periphery and is the issuance of four European countries (Denmark, Italy, Russia, and Spain) and three Commonwealth Countries (Australia, Canada, and New Zealand). World imports in the bottom panel are the imports of France, the United Kingdom, and the United States in British pounds. The vertical lines identify the years of crisis in the financial center. See the text for the definitions of the indicators and Appendix A for the sources.
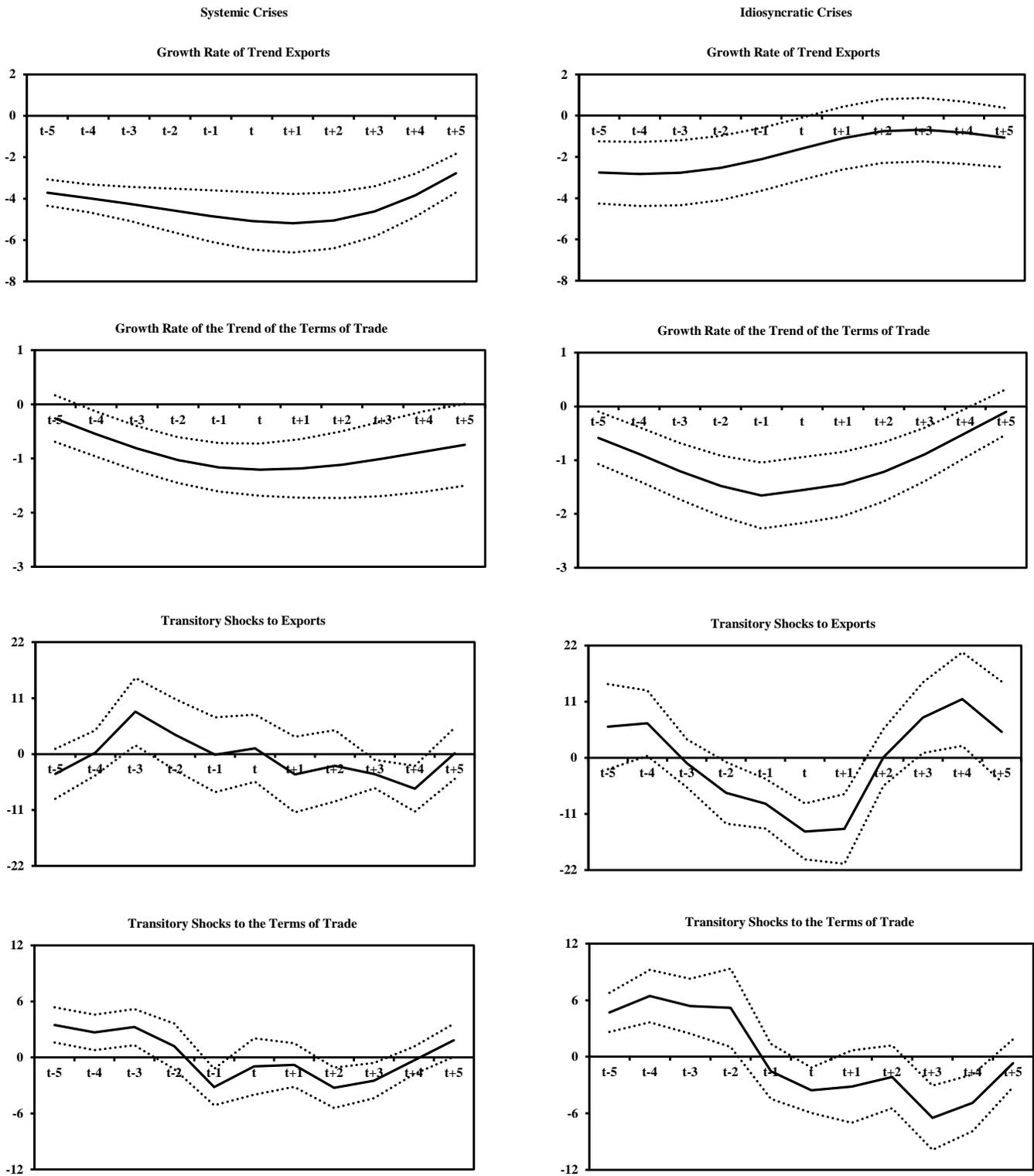
Figure 3

Sovereign Debt Crises in Latin America
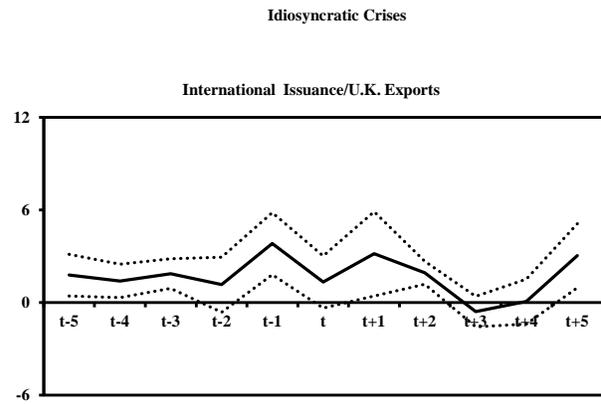**(in Percent of Countries)**
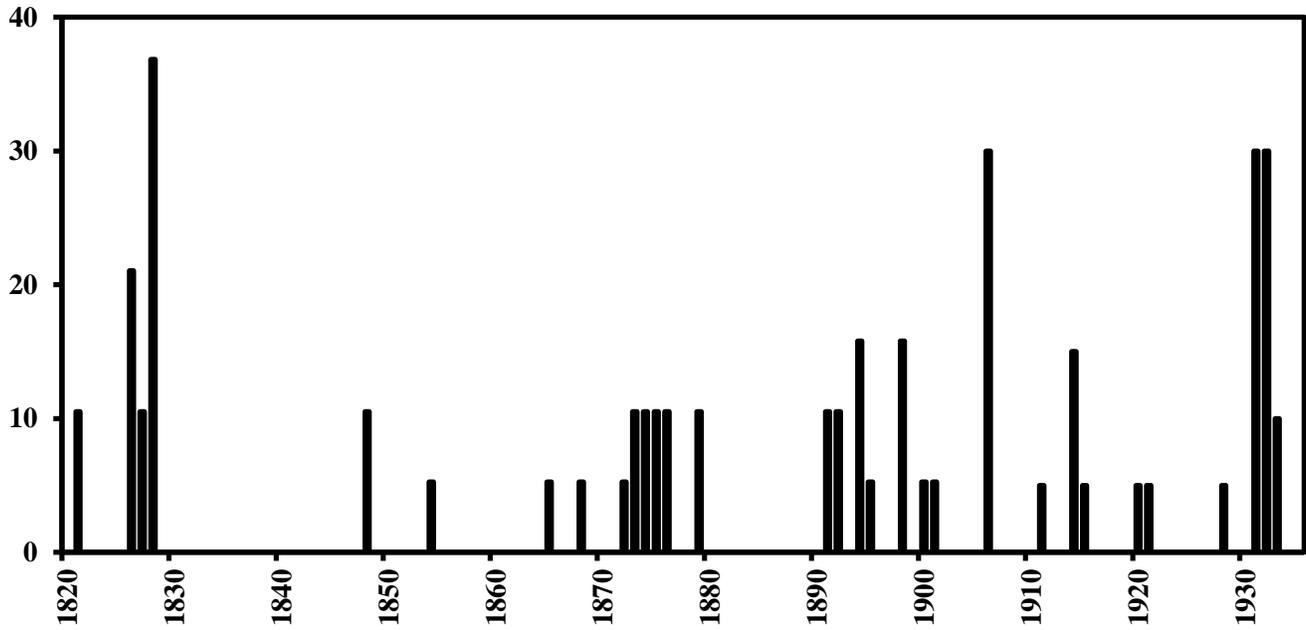
Note: The bars indicate how many countries default each year (in percent of all countries). It only identifies the beginning of the default episodes.

Figure 4
What Triggers Systemic and Idiosyncratic Sovereign Debt Crises?
Country-Specific Shocks

Systemic Crises

Growth Rate of Trend Exports

Idiosyncratic Crises

Growth Rate of Trend Exports

Growth Rate of the Trend of the Terms of Trade

Growth Rate of the Trend of the Terms of Trade

Transitory Shocks to Exports

Transitory Shocks to Exports

Transitory Shocks to the Terms of Trade

Transitory Shocks to the Terms of Trade

Notes: The growth rates of the trend (permanent component) of exports and of the terms of trade are shown relative to their values in non-crisis times (in percentage points). The transitory shocks to exports and the terms of trade are shown as a percent of their trend. Year *t* is the year of the default. The solid line is the average behavior of each indicator across all defaults. The dotted lines are the plus/minus one-standard error bands around the average. See the text for the definitions of the indicators and Appendix A for the sources.

Figure 5
What Triggers Systemic and Idiosyncratic Sovereign Debt Crises?
Global Shocks

Systemic Crises   **Idiosyncratic Crises**

International Issuance/U.K. Exports   **International Issuance/U.K. Exports**
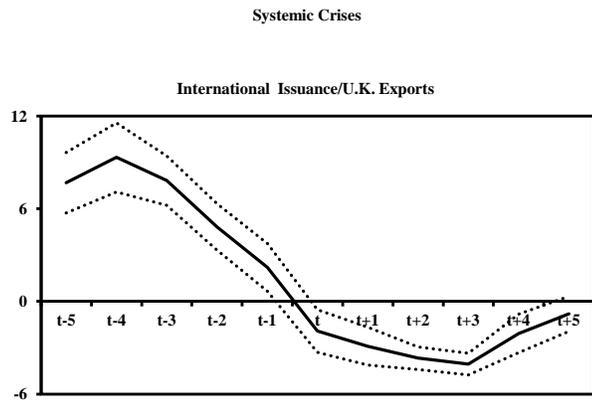
Year	U.K. Short-Term Real Interest Rate					Liquidity Crash Index
	t-2	t-1	t	t+1	t+2	
1825	-0.1	-6.8	15.6	6.0	7.5	13.1
1873	-4.9	0.1	7.9	7.7	5.7	9.5
1890	1.0	3.6	1.2	8.7	4.8	2.6
1929	5.6	7.4	17.5	15.9	6.7	6.9
Average	**0.4**	**1.1**	**10.5**	**9.6**	**6.2**	**8.0**

Crises	U.K. Short-Term Real Interest Rate					Liquidity Crash Index
	t-2	t-1	t	t+1	t+2	
Brazil 1898	1.2	-1.3	4.5	-5.1	7.4	2.3
Brazil 1914	2.8	3.8	-18.2	-24.5	-24.4	-25.6
Chile 1879	9.5	9.1	-1.2	4.6	2.6	-7.3
Colombia 1821	15.2	18.0	17.0	-6.9	-0.1	-13.3
Colombia 1848	-9.5	20.6	13.5	3.6	-1.2	-0.3
Colombia 1879	9.5	9.1	-1.2	4.6	2.6	-7.3
Colombia 1900	4.5	-5.1	7.4	3.7	3.3	5.1
Mexico 1854	-19.6	-3.4	6.0	4.9	1.9	15.7
Mexico 1914	2.8	3.8	-18.2	-24.5	-24.4	-25.6
Uruguay 1915	3.8	-18.2	-24.5	-24.4	-5.7	-11.0
Average	**2.0**	**3.6**	**-1.5**	**-6.4**	**-3.8**	**-6.7**

Growth Rate of World Imports   **Growth Rate of World Imports**
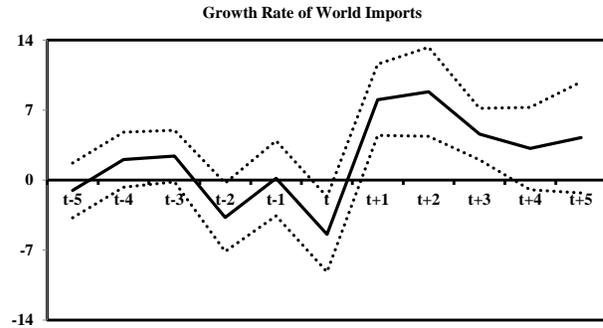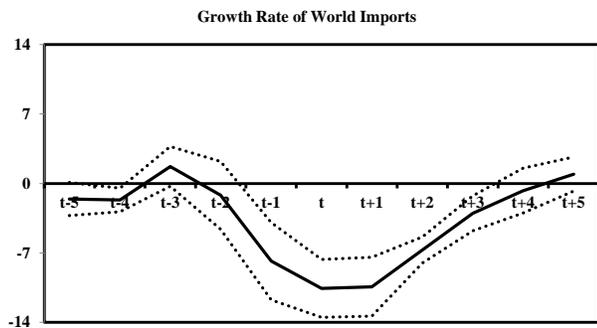
Notes: International issuance/U.K. exports and the growth rate of world imports are shown relative to their average value in the sample (in percentage points). The Liquidity Crash Index in the middle panels captures the average increase in U.K. short-term real interest rates when the crisis erupts and its immediate aftermath. In particular, it is the average real interest rate from period t to t+2 relative to the average from period t-2 to t-1. With the exception of the panel showing evolution of real interest rates during systemic crises, year *t* indicates the year of the default. For the panel showing the evolution of real interest rates during systemic crises , year *t* shows the year of crisis in the Financial Center. See the text for the definitions of the indicators and Appendix A for the sources.

Figure 6
Systemic and Idiosyncratic Sovereign Debt Crises: Characteristics

Sovereign Debt Crises	
Type	Number
All	**67**
Systemic	**42**
Idiosyncratic	**25**

Duration of Sovereign Default Spells
(in Years)
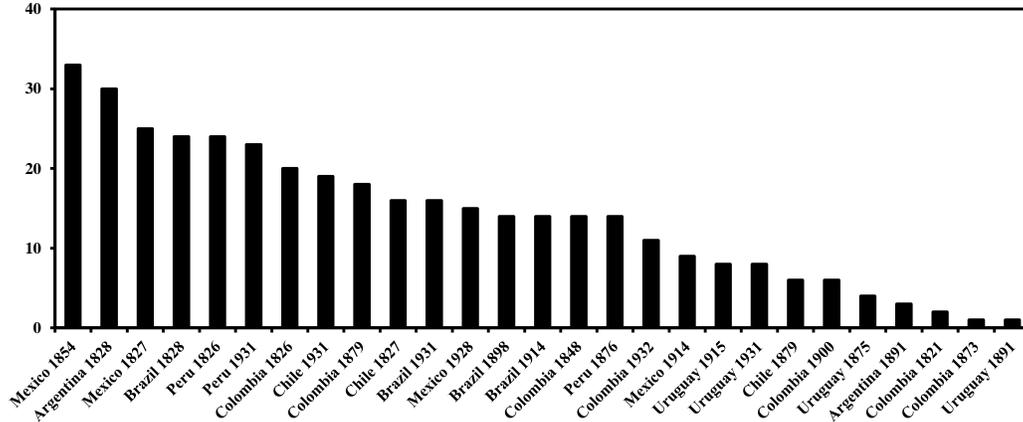
Sovereign Debt Crises	
Type	Years in Default
Systemic	**15**
Idiosyncratic	**12**

t-test p-value: 0.24

Debt Reduction Rates
(In Percent)
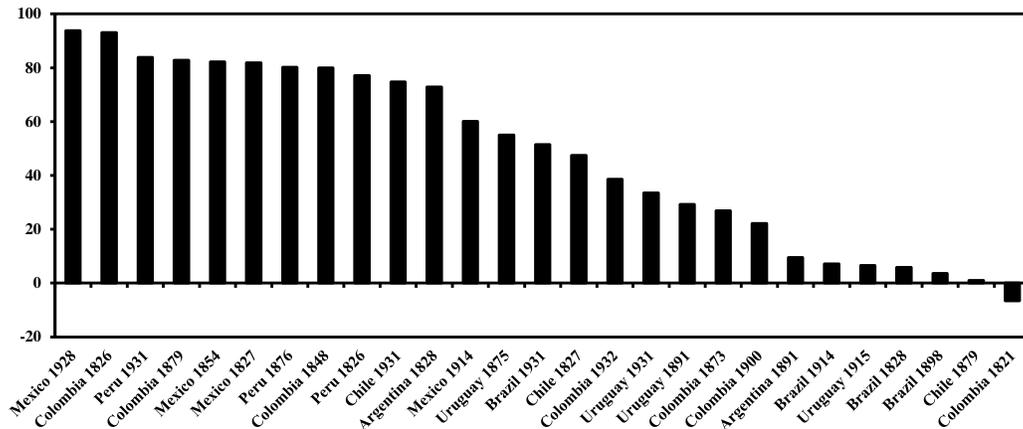
Sovereign Debt Crises	
Type	Reduction Rates
Systemic	**56**
Idiosyncratic	**34**

t-test p-value: 0.06

Notes: We test whether default spells and debt reduction rates of systemic crises are larger than those of idiosyncratic crises. The t-test p-value below the tables of duration of the default spells and debt reduction rates for both systemic and idiosyncratic crises show the p-value at which we can reject the Null Hypothesis of equal default spells and equal debt reduction rates of systemic and idiosyncratic crises. See Appendix B for the estimations of the debt reduction rates

Appendix A
Data Sources

The database we construct spans the period 1800 to 1960 to be able to capture the antecedents of the crises of the mid-1820s as well as to explain the long default spells following the Great Depression.

I. Exports

We construct annual series of exports for the period 1800 to 1960. We collect data on exports from a variety of sources both domestic and international. We convert the data to British pounds to compare with government international indebtedness (also in British pounds) and assess the ability of those countries to service their debt. Some countries, like Argentina, Brazil, and Chile have publications with export data starting in the early 19th century. The data from Colombia, Peru, Mexico, and Uruguay had to be complemented with data from the main trading partners for the 19th century.   We use import data of France, the United Kingdom, and the United States for the earlier part of the sample when most of the trade (exports and imports) of Latin American countries is concentrated in these three countries. France, the United Kingdom, and the United States identify all imports from each of the countries with whom they trade with the exception of imports of gold and silver.   Gold and silver imports are considered specie rather than commodities and are not reported in the import data by country of origin.   In our sample, Colombia, Mexico, and Peru are important producers of gold or silver. We construct series of exports of gold and silver using a variety of sources and add them to the data on imports of France, the United Kingdom, and the United Sates from each of the Latin American countries. Not only do we use the country trading-partner data to extend the domestic series, but also to check the data published in domestic statistical abstracts.

The sources for the data are as follows:

Argentina:

1810-1960 : *Dos Siglos de Economía Argentina 1810-2004. Historia Argentina en Cifras,* Orlando Ferreres, Table 8.1.1

Brazil:

1821-1960 *Estatísticas Históricas do Brazil: Séries Econômicas, Demográficas e Sociais de 1550 a 1988,* Fundação Instituto Brazileiro de Geografia e Estatistica. Sector Externo: Gustavo Henrique Barroso Franco (Departamento de Economia, Pontificia Universidade Catolica PUC-RJ). Table 11.1

Chile:

1810-1960: *Economía Chilena 1810-1995 Estadísticas Históricas*; Matias Braun, Ignacio Briones, and Jose Diaz, in www.economia.puc.cl. Table V.I.1

Colombia:

1800-1822: We construct data on Colombia's exports of gold based on production data from *Memoria sobre la Monedación de Oro I Plata* by Jose Manuel Restrepo. Serie "Amonedación Oro en la Casa de Moneda Santa Fe (Bogota), Cuadro Número I (page 25).

1822-1834: We combine the data from France, the United Kingdom, and the United States on (non-gold) imports from Colombia with our estimates of Gold Exports. Our estimates of Colombia's gold exports are based on production data from *Memoria sobre la Monedación de Oro I Plata* by Jose Manuel Restrepo. Serie "Amonedación Oro en la Casa de Moneda Santa Fe (Bogota), Cuadro Número I (page 25).

1834-1910: *Compendio de Estadísticas Históricas de Colombia*, Miguel Urrutia and Mario Arrubla, Universidad Nacional de Colombia, Bogota, 1970. Page 108. This Table reports both exports of goods and gold.

1910-1960: Official exports of goods and gold. *Compendio de Estadísticas Históricas de Colombia*, Miguel Urrutia and Mario Arrubla, Universidad Nacional de Colombia, Bogota, 1970. Table IX. Page 209.

Mexico:

1800-1820: *Estadísticas Históricas de México Tomo II*, Instituto Nacional de Estadistica, Geografia e Informatica, INEGI. Table 18.1

1821-1824*: El Comercio Exterior de México 1821-1873*, Inés Herrera Canales, 1977.

1825-1875: The data for exports of goods are estimated using imports from Mexico to France, the United Kingdom, and the United States. The data do not include imports of silver from Mexico. We estimate Mexico's exports of silver using data on Acuñaciones de Moneda de Plata from *Estadisticas Históricas de México Tomo II*, Instituto Nacional de Estadística, Geografía e Informática, INEGI, Table 20.3; *El Comercio Exterior de México 1821-1873*, Inés Herrera Canales, 1977, and *Comercio Esterior de México desde la Reconquista hasta Hoy*, Miguel Lerdo de Tejada. Mexico, 1853

1876-1877: Our Estimates.

1878-1913: *Estadísticas Históricas de México Tomo II*, Instituto Nacional de Estadistica, Geografia e Informatica, INEGI. Table 18.1

1914-1916: University of Oxford, *Oxford Latin American Economic History Database*

1917-1960: *Estadísticas Históricas de México Tomo II*, Instituto Nacional de Estadística, Geografía e Informática, INEGI. Table 18.1

Peru:

1800-1821: We construct a series of exports of silver based on production of silver from *Compendio de Historia Económica del Perú,* Carlos Contrera (Editor), Banco Central de la Reserva del Perú, 2010. We also check the data with on Peru's annual production of Silver during Colonial times from the Archivo General de Indias (1751 to 1820 and collected by J.J Tepaske and in Richard Garner's webpage (http://www.insidemydesk.com/hdd.html).

1822-1830: We add the data from France, the United Kingdom, and the United States on (non-silver) imports from Peru to our estimates of silver exports. Our estimates of Peru's silver

exports are based on production of silver from *Compendio de Historia Económica del Perú*, Carlos Contrera (Editor), Banco Central de la Reserva del Perú, 2010.

1830-1896: The data for exports of goods are estimated using imports from Perú to France, the United Kindgom, and the United States. The data do not include imports of silver from Perú. We add Perú's silver exports from *Price and Quantum Estimates of Peruvian Exports 1830-1962*, Shane J. Hunt, Princeton University.

1897-1899: *Historia de la República del Perú 1822-1933*, Jorge Basadre, Editorial Universitaria, 1965.

1900-1945: *Anuario Estadístico del Perú, 1944-1945*, Ministerio de Hacienda y Comercio. Dirección Nacional de Estadística.

1945-1948: Moody, John, *Moody's Analyses of Investments and Security Rating Books; Government and Municipal Investments,* New York, various issues.

1948-1960: International Financial Statistics, International Monetary Fund, CDROM

Uruguay:

1860-1899: *Anales Históricos del Uruguay*, Eduardo Acevedo, Casa A. Barreiro y Ramos, S.A., Montevideo, 1933

1900-1939: *Estadisticas Históricas del Uruguay 1900-1950*, Benjamín Nahum, Universidad de la República, 2007.

1940-1948: Moody, John, *Moody's Analyses of Investments and Security Rating Books; Government and Municipal Investments,* New York, various issues.

1948-1960: International Financial Statistics, International Monetary Fund, CDROM

Main Trading Partners:

The data on exports to major trading partners are obtained from the following sources:

France:

Tableau Genéral du Commerce de la France avec ses Colonies et les Puissances Étrangeres, Administration de Douanes, various issues

United Kingdom:

The House of Commons, Parliamentary Papers, 1801-1900

The Annual Statement of Trade and Navigation of the United Kingdom with Foreign Countries and British Possessions, Customs Establishment Statistical Office. Various issues.

United States:

Commerce and Navigation of the United States, Bureau of Statistics, Treasury Department, various issues.

II. Terms of Trade

We construct annual series of terms of trade for the 1820-1960 period.   The Export Price Index of each country is a time-varying weighted average of the prices of the most important exports.

Export Price Index:

The data on prices of commodities are obtained from the following sources:

Bezanson, R. D. Gray and M. Hussey (1937), *Wholesale Prices in Philadelphia 1784-1861: Series of Relative Monthly Prices.* Philadelphia: University of Pennsylvania Press.

Gayer, A.D., W.W. Rostow, and A.J. Schwartz (1953), *Microfilmed Supplement to Volumes I and II of The Growth and Fluctuation of the British Economy 1790-1850.* Oxford: Clarendon Press.

International Financial Statistics, International Monetary Fund, CDROM.

Jastram, Roy, 1981, *Silver The Restless Metal,* Wiley.

Sauerbeck, Augustus "Prices of Commodities and Precious Metals," *Journal of the Statistical Society of London*, various issues.

U.S. Department of Commerce, *Historical Statistics of the United States from Colonial Times to 1970,* Bureau of the Census.

Manthy, Robert and Joan R. Tron, *Natural Resources Commodities- A Century of Statistics: Prices, Output, Consumption, Foreign Trade, and Employment in the United States, 1870-1973.* Published for Resources for the Future by the Johns Hopkins University Press, 1978.

Import Price Index:

The price of imports is captured with the Wholesale Price Index of the United Kingdom. It is obtained from:

1820-1948: Mitchell, B. R., *International Historical Statististics Europe, 1750-1988.*

1948-1960: *International Financial Statistics,* International Monetary Fund, CDROM

Exports Shares:

The data on weights of the most important exports are from:

Mitchell, B. R., *International Historical Statististics America, 1750-1988.*

III. Debt Service

The data on debt service, including sinking fund and coupon rates are from:

Kaminsky, Graciela: New Database on International Issuance in London and New York for the first episode of financial globalization, 1820-1931.

IV. International Primary Issuance in London and New York

We construct data on international issuance for the period 1820-1960 from the following sources:

1820-1864 and 1915-1960:

Kaminsky, Graciela: New Database on International Issuance in London and New York for the first episode of financial globalization, 1820-1931.

For this project we also estimated international primary issuance for Australia, Canada, Denmark, Italy, New Zealand, Russia, and Spain from 1932 to 1960 using Prospectuses as well as data on government international issuance from:

Moody, John, *Moody's Analyses of Investments and Security Rating Books; Government and Municipal Investments,* New York, various issues.

1865-1914:

Stone, Irving, *The Global Export of Capital from Great Britain, 1865-191: A Statistical Survey,* MacMillan Press Ltd., 1999.

V. Interest Rates

The data on interest rates in the United Kingdom are from:

Homer, Sidney and Richard Sylla, 2005, *A History of Interest Rates,* Fourth Edition, John Wiley and Sons, INC. New Jersey. USA.

VI. World Imports

We construct an indicator of world imports using data on total imports of France, the United Kingdom, and the United States. The data are obtained from the following sources:

France:

Tableau Genéral du Commerce de la France avec ses Colonies et les Puissances Étrangeres, Administration de Douanes, various issues

International Historical Statistics 1750-2005: Europe, B.R. Mitchell, Palgrave MacMillan, 2007

United Kingdom:

The Annual Statement of Trade and Navigation of the United Kingdom with Foreign Countries and British Possessions, Customs Establishment Statistical Office. Various issues.

British Historical Statistics, B.R. Mitchell, Cambridge University Press, 2011

International Historical Statistics 1750-2005: Europe, B.R. Mitchell, Palgrave MacMillan, 2007

United States:

Commerce and Navigation of the United States, U.S. Bureau of Statistics, Treasury Department, various issues.

U.S. Department of Commerce, *Historical Statistics of the United States from Colonial Times to 1970,* Bureau of the Census.

Foreign Trade of the United States, United States Department of Commerce, various issues.

International Historical Statistics 1750-2005: The Americas, B.R. Mitchell, Palgrave MacMillan, 2007

VII.   Defaults, Renegotiations, and Agreements

All data on the characteristics of the defaulted and new bonds issued following the agreements are obtained from:

General Sources:

Annual Reports of the Council of the Confederation of Foreign Bondholder, London, various issues.

Annual Reports of the Foreign Bondholders Protective Council, Inc. New York, various issues.

Compendium of the English and Foreign Funds and the Principal Joint Stock Companies by Charles Fenn, various issues.

Kimber's Records on Government Debts and Other Foreign Securities, various issues.

Moody, John, *Moody's Analyses of Investments and Security Rating Books; Government and Municipal Investments,* New York, various issues.

Prospectuses of Bonds issued in the various financial centers.

Suter, Christian, 1992, *Debt Cycles in the World Economy: Foreign Loans, Financial Crises, and Debt Settlements, 1820-1990*, Westview Press, Inc.

Country Studies:

Bazant, Jan, 1968, *Historia de la Deuda Exterior de México, 1823-1946*, El Colegio de Mexico, Guanajuato, Mexico.

Bouças, Valentim, 1950, *História Da Dívida Externa*, Edições Financeiras S.A., Rio de Janeiro Second Edition.

Casasus, Joaquin Demetrio, 1885, *Historia de la Deuda Contraída en Londres*, Mexico Imprenta del Gobierno en Palacio.

Costeloe, Michael, 2007, *Deuda Externa de México: Bonos y Tenedores de Bonos, 1824-1888,* Fondo de Cultura Económica, Mexico.

Dawson, Frank Griffith, *The First Latin American Debt Crisis: The City of London and the 1822-25 Loan Bubble,* Yale University Press, New Haven and London, 1990.

De Castro Carreira, Liberato, 1980, *História Financeira e Orçamentária do Império no Brasil*, Fundação Casa de Rui Barbosa, Ministério da Educação e Cultura, Rio de Janeiro, Brasil

Fundação Instituto Brazileiro de Geografia e Estadistica, 1990, *Estatísticas Históricas do Brazil: Séries Econômicas, Demográficas e Sociais de 1550 a 1988,* Rio de Janeiro, Brazil, IBGE.

Ferrada Urzúa, Alfonso, 1948, *Historia Comentada de la Deuda Externa de Chile, 1810-1945*, Escuela de Derecho, Universidad de Chile, Santiago de Chile.

Nahum, Benjamín, 1994, *Deuda Externa Uruguaya, 1864-1930,* Ediciones de la Banda Oriental, Montevideo, Uruguay.

Nahum, Benjamín, 1995, *La Evolución de la Deuda Externa del Uruguay, 1875-1939,* Ediciones de la Banda Oriental, Montevideo, Uruguay.

Palacios Moreyra, Carlos, 1983, *La Deuda Anglo Peruana; 1822-1890*, Librería Studium, Lima, Perú.

Camacho, Vicente, 1914, *Resumen Histórico sobre la Deuda Exterior de Colombia del 3 por 100*, Imprenta Eléctrica, Bogota, Colombia.

Payno, Manuel, 1862, *México and Her Financial Questions with England, Spain, and France: Report by Order of the Supreme Constitutional Government of the Mexican Republic,* Printed by Ignacio Cumplido, Mexico

Peña, José, 1907, *Deuda Argentina: Copilación de Leyes, Decretos, Resoluciones, Notas y Contratos sobre al Deuda Publica Nacional*, Imprenta de Juan A. Alsina, Buenos Aires, Argentina.

Turlington, Edgar, 1930, *Mexico and Her Foreign Creditors*, Columbia University Press, New York.

Wynne, William, 1951, *State Insolvency and Foreign Bondholders, Selected Case Histories of Governmental Foreign bond Defaults and Debt Readjustments*, Volume II, Yale University Press.

Appendix B
Defaults, Debt Restructurings, and Debt Reduction Rate Estimations

As described in the paper, we estimate debt reduction rates by comparing the present value (PV) of the remaining contractual payments of the old instruments, including missing sinking fund payments or coupon arrears, and the present value of the future payments of the new instruments at the moment of the agreement.

The PV of the old bond at the time of the agreement is estimated as follows:

$$PV_{ta}^{old} = \sum_{t=td}^{ta-1} S_t^{old} (1+r_{td})^{(ta-t)} + \sum_{t=ta}^{tm} S_t^{old} (1+r_{ta})^{-(t-ta)} \tag{1}$$

Where td is the year of the default, ta is the year of the agreement, tm is the year of the maturity of the bond, and r is the discount rate. S captures the service of the bond (sinking fund and interest payments) during the life of the bond. The first component measures the capitalization of the missing payments (sinking fund and coupons) from the time when the payments are due to the time of the agreement. The second component measures the value of the post-agreement remaining payments of the old instrument discounted to the time of the agreement.

The PV of the new bond at the time of the agreement is estimated as follows:

$$PV_{ta}^{new} = \sum_{t=ta}^{tm} S_t^{new} (1+r_{ta})^{-(t-ta)} \tag{2}$$

With the debt reduction rates estimated as follows:

$$Debt\ Reduction\ Rate_{ta} = 1 - \frac{PV^{new}(r_{ta})}{PV^{old}(r_{td}, r_{ta})} \tag{3}$$

Debt reduction rates calculated using PV estimates are sensitive to the choice of the discount rate. The rate of discount of creditors and debtors may differ. For example, the rate of discount of the sovereign is linked to the cost of obtaining a new loan in the market. After the restructuring, if the new debt is sustainable, the sovereign will expect to access the international capital market at "non-crisis" interest rates. In a world with asymmetric information, investors may ask for a higher yield to compensate for the likelihood of a new default. Thus, at the time of exit from default, investors' rates and sovereigns' rates may differ substantially because the reputation of the sovereign has deteriorated and investors' asking yield will reflect this loss of confidence. From the point of view of the investor, the discount rate may reflect more closely a "crisis" rate. Sturzenegger and Zettelmeyer (2005) and Cruces and Trebesch, (2013) PV estimates are based on exit yields, a "crisis" rate, while Sturzenegger and Zettelmeyer (2007) PV estimates are based on yields in normal ("non-crisis") times.

We estimate the PV of future payments of the old and new bonds using both a measure of opportunity cost for the debtor and for the creditor. We use normal-time ("non-crisis") discount rates at the time of the agreement to capture the so-called *Debt Relief* to the sovereign committed to the repayment of the debt. The second estimate uses exit yields (the average of the yield during the year of the agreement) to capture "crisis-time" discount rates and thus captures the so-called *Investors' Haircuts*. If the year of the agreement is different from the year of the default, we capitalize the missed payments of the old bonds between the time of default and the time of the agreement at a "non-crisis" discount rate estimated at the time of the default. This rate captures the opportunity cost of investors as measured by the rate of return of lending to another country in the periphery. It also captures the opportunity cost of the sovereign as measured by the missing return from using borrowed funds to invest at home, which in equilibrium should be equal to the rate at which the sovereign can borrow if it is not in default. Defaults and restructurings mostly involve an extension of residual maturities. Since lower discount rates raise the present value of the longer-maturity new instrument more than that of the shorter-maturity old instrument, PV estimates using lower discount rates will provide a lower bound for savings for the sovereign and a higher bound for losses of investors following the restructuring. A few restructurings in this project also include payments-in-kind. This is the case of Colombia after the defaults of 1848 and 1873 in which some of the repayments are in land concessions. Similarly, Peru's restructuring after the default of 1876 includes concessions for the exploitation of transportation and communication systems. Our estimates of debt reduction rates do not include these repayments-in-kind because we could not evaluate the expected return of these assets at the time of the agreements. The only repayment-in-kind that we include in our estimations of debt reduction rates is the repayment in shipments of Guano agreed after the 1876 Peru's default. For this, we value the Guano payments using prices in London.

Table B-1 shows the characteristics of the defaults and the restructurings and Table B-2 shows our estimates of *Debt Relief* and *Investors' Haircuts*. The debt reduction rates shown in Figure 6 are the average of these two rates.

Default Year	Agreements
	ARGENTINA
1828	**Default 1828:** Suspension of coupon and sinking fund payments. **Agreement 1857:** Issue of a new 1%-3% bond for 1,641,000 British pounds for the unpaid coupons (not capitalized). Principal amount of the bond remains unchanged. Reduced debt service through 1859.
1891	**Default March 1891**: Suspension of coupon and sinking funds payments of 10 government bonds. **Agreement April 1891:** Issue of a 6% funding loan of 1891 to service (sinking fund and coupons) the 10 bonds in default between 1891 and January 1st, 1894. It is agreed that there will be a full resumption of the debt service at par after 1894. A new agreement is reached in July 1893. **July 1893 (Romero's Agreement):** New bonds are added to the original 10 bonds in default. Interest rates of the 10 (first defaulted) bonds are reduced by 60% for 5 years. Interest rates of the bonds added in 1893 are reduced by 100 basic points for 5 years. Suspension of sinking fund payments of all bonds until 1901.
	BRAZIL
1828	**Default 1828**: Brazil unilaterally suspends the sinking fund payments of the Portuguese bond in 1828. It resumes the sinking fund payments in 1836 only to suspend them again in 1840. Again it resumes the sinking fund payments in 1843 to suspend them in 1844. Finally, it resumes the sinking fund payments of this bond in 1850. Brazil unilaterally suspends the sinking fund payments of the 1824-1825 bond in 1830 only to resume them in 1851. Still, Brazil continues to pay coupons on the debt over the period 1828-1950. **Agreement 1851:** Full resumption of suspended sinking funds payments in 1851.
1898	**Default July 1898:** Suspension of coupon payments for 3 years (1898-1901). Suspension of sinking fund payments for 13 years through June 1911. **Announcement July 1898:** Issue of a 5% funding loan to pay for missing coupon payments from 1898 to 1901. Coupon payments in cash are resumed in July 1901. Sinking fund payments are resumed in July 1911.
1914	**Default August 1914:** Suspension of coupon payments for 3 years (1914-1917). Suspension of sinking fund payments for 13 years through July 1927. **Announcement August 1914**: Issue of a 5% funding loan to pay for missing coupon payments from 1914 to 1917. Coupon payments in cash are resumed in August 1917. Sinking fund payments are resumed in August 1927.
1931	**Default 1931:** Suspension of coupon and sinking fund payments. Issue of a 5% funding loan with maturities of 20 and 40 years to pay missing coupons payments from October 15th, 1931 to October 15th, 1934. **1934:** Sinking fund payments continue to be suspended. Payments of coupons in cash are resumed but coupon rates are reduced. **November 1937:** Sinking fund payments continue to be suspended and coupon payments are suspended again. The funding loans of 1898, 1914, and 1931 are added to the list of defaulted bonds with both partial suspension of coupon and sinking fund payments. **1940:** Sinking fund payments continue to be suspended. Coupon payments in cash are resumed at the reduced rates announced in 1934. Further reductions in coupon rates. Coupon rates and sinking fund provisions of the 3 funding loans are reduced by 50% and 40%, respectively. **1940-1944:** The Brazilian government cancels part of the outstanding debt through bond purchases at market values. Prices of the funding loans oscillate between 37% and 80% of their par value while the prices of the rest of the bonds oscillate between 7% and 39% of their par value. **Agreement 1944-1946:** Two options are given to the bondholders: **Option A:** Interest of the original bonds ranging from 4% to 7% are reduced to rates ranging from 1.5% to 3.5% . The sinking fund provisions are also reduced for most of the bonds. New sinking fund provisions oscillate between 0.06% to 10.56% depending on the category of the bond. Principal amount of bonds remains unchanged. **Option B:** Issue of a new 3.75 % bond in exchange for the reduced principal of the old bonds. The reduction of the principal of the old bonds ranges between 20% and 50%, depending on the category of the bond. Part of the principal amount reduction is partially compensated by a cash payment. The new 3.75% bond has a higher sinking fund provision to shorten the maturity of the debt. The agreements for bonds issued in London, New York, and Paris become effective in January 1944, June 1944, and March 1946, respectively. As of July 24, 1945, bondholders of 60% of outstanding bonds have already accepted either Option A or B.
	CHILE
1827	**Default 1827:** Suspension of coupons and sinking fund payments. **Agreement 1842:** Issue of a new bond for the repayment of the principal at par value. This bond has similar characteristics to the one issued in 1822. Issue of a 3% bond for 758,287 British pounds for the unpaid coupons (not capitalized) . Coupon and sinking fund payments are resumed in September 1847.
1879	**Default 1879:** Suspension of sinking fund payments in the second semester of 1879 due to the war against Bolivia and Peru. **Announcement 1884:** Resumption of sinking fund payments in the second semester of 1884 after the victory of Chile in the war against Peru and Bolivia.
1931	**Default 1931:** Partial suspension of the debt service in July 1931 and complete suspension of coupon and sinking fund payments in August 1931. **Debt Service Adjustment 1935:** Partial resumption of coupon and sinking fund payments. Reduced coupon rates, with new rates ranging from 0.4% to 2%. Starting in 1935, while in default, the Chilean government cancels part of the outstanding debt through bond purchases at prices oscillating between 13% and 37% of their par value. **Agreement 1948-1949:** Issue of a new bond to convert at par the old defaulted bonds. The new bond pays interest rates increasing from 1.5% in 1948 to 3% in 1954, and remaining constant thereafte. The new bond has a 1% sinking fund rate yielding a maturity of 46 years. Similar offers are extended to holders of bonds issued in London, New York, and Switzerland. Offers for New York-issued bonds are extended in July 1948, the offers for London-issued bonds are extended on December 21, 1948, and those for Switzerland-issued bonds are extended in August 1949.

Default Year	Agreements
	COLOMBIA
1821	**Default 1821:** Suspension of coupon payments. **Agreement 1822**: Issue of a 10% bond to pay missing coupon payments in cash.
1826	**Default 1826:** Suspension of coupon and sinking funds payments. **Agreement 1845**: Issue of a new active bond to pay the outstanding debt principal at par. The interest rate on this new bond is set at 1% for 4 years, with increments of 0.25% per annum until the maximum 6% is reached. Issue of a deferred bond for the unpaid coupons (not capitalized). The deferred bond does not pay coupons for the first 16 years. The coupon rate is set at 1% for the 17th year with an annual increment of 0.125% per annum until 3% is reached. The service of the deferred bonds is guaranteed by the tobacco monopoly and customs receipts.
1848	**Default 1848**: Sinking fund payments are suspended in 1848. The last coupon of 1848 and the coupons of 1849 are paid with Treasury bills. Starting in 1850 all coupon payments are also suspended. **Agreement 1861**: Interest on the active and deferred bonds issued in 1845 remain as scheduled under the 1845 agreement. A new 2%-3% active debt bond is issued for the unpaid coupons (not capitalized) of the active bond of 1845. In addition, 30 hectares of land are offered to bondholders for each 100 British pound of holdings of the active bond of 1845 and 16 hectares of land for each 100 pound holdings of the deferred bond of 1845. The redemption of the three bonds is agreed to be made through market purchases. At the time of the agreement, the prices of these bonds are well below par, with the active bond of 1845 at 16%, the deferred bond of 1845 at 8%, and the new active bond of 1861 at 35% .
1873	**Default 1873:** A new arrangement for the unification of the external debt is reached in 1873. **Agreement 1873:** Issue of a new bond for 2,000,000 British pounds with coupon rates of 4.5% until 1878. From then on, rates are raised to 4.75% and remain at that level until custom revenues are above a certain minimum level when they increase to 5%. This bond is exchanged for the old bonds as follows: 1) Each 100 British pounds of the 1845 active bond is exchanged for 34 British pounds of the new bond; 2) Each 100 British pounds of the 1845 deferred bond is exchanged for 17 British pounds of the new bond. 3) Each 100 British pounds of the 3% 1861 new active bond is exchanged for 66 pounds of the new bond. 4) 2,000,000 hectares of land are given in compensation for the loss of interest payments agreed in the conversion of 1873.
1879	**Default 1879:** The coupon due in July 1879 is partially paid. Starting in October 1879 coupon payments are suspended. Sinking fund payments are also suspended. **Intermediate Renegotiations:** Bondholders submit a proposal in 1889 that is modified by the Government in 1890 and is rejected by bondholders in 1891. **Agreement 1896 (Roldan-Passmore Agreement):** A new 2,700,000 British pound bond is issued to pay the outstanding principal and unpaid coupons (not capitalized) of the 1873 bond. Coupon rates of this new bond are set at 1.5% on January 1st 1897, increasing by 0.5 % every 3 years until the rates reach 3%. The principal outstanding of the 1873 bond is converted at par while the unpaid coupons are converted at 43% of their nominal value. Sinking fund payments are agreed to start on January 1st, 1900. The sinking fund rate is set at 0.5% in 1900, increasing by 0.5% every 3 years until it reaches 1.5%. The sinking fund is applied to purchases in the market while the price is below par. When the price is at or above par, the sinking fund is applied to drawings at 60% when the coupon rate is below 3% and at 70% when the coupon rate is at 3%.
1900	**Default 1900:** Sinking fund and coupons payments are suspended in the midst of the Thousand Days' War (1899-1902). **Agreement 1905 (Holguin-Avebury Agreement)**: Coupon payments are agreed to be resumed starting on July 1st, 1905. Interest rates are the same as those agreed in 1896. Issue of certificates at par for the unpaid coupons (not capitalized). Payment of 50% of this amount by June 30th, 1907. The sinking fund payments are suspended until 1910 when they are resumed at the same rate as stated in the Agreement of 1896.
1932	**Default 1932:** Sinking fund payments are suspended in February 1932. Coupons from July 1933 to January 1934 are paid one third in cash and the balance in non-interest bearing scripts. Issue of 4% funding certificates to pay for the coupons between January 1934 to January 1935. All the payments are suspended from January 1935 to December 1939. Coupon payments are resumed on the two bonds issued in New York at 3% in 1940. London-issued bonds remain in default until April 1942. During the default, Colombia also purchases bonds in the market at prices oscillating between 15% and 36% of their par value. **Agreement 1941 - Bonds issued in New York**: Exchange of the 6% bonds for a new 3% bond at par with extended maturity. Issue of new 3% bond to pay for 50% of the unpaid coupons (not capitalized) from 1935 to 1939. **Agreement July 1942 - Bonds issued in London:** Conversion of the 6% and 5% bonds for a new 3% bond at par with extended maturity. Issue of a new 3% bond to pay for the 50% of the unpaid coupons (not capitalized) from June 1935 to December 1939 and for 60% of the unpaid coupons (not capitalized) between 1940 and March 1942.

Default Year	Agreements
	MEXICO
1827	**Default 182**7: Coupon and sinking fund payments are suspended. **Intermediate Renegotiations:** There are several renegotiations in 1831, 1837, and 1846 with exchanges of bonds and issues of deferred bonds to pay for coupons in arrears. All the arrangements fall through within months. In 1846 the total debt is consolidated into a 5% new bond of 10,241,650 British pounds. **Agreement 1851:** Coupons in arrears from July 1847 until the agreement total 1,871,276 British pounds. These arrears are cancelled with a payment of 2,500,000 US dollars (about 500,000 British pounds). Conversion at par of the outstanding 5% loan of 1846 into a 3% loan. 250,000 Mexican pesos are agreed to be sent annually to London to start paying the principal of this new 3% loan starting in 1857.
1854	**Default 1854:** Sinking fund and coupon payments are suspended. **Intermediate Renegotiation 1864:** Issue of a 3% loan for 4,864,800 British pounds to pay 9.5 years of unpaid coupons of the 3% 1851 loan with a 67% premium. **Agreement 1886**: Issue of a new 3% loan for the conversion at par of the 3% loan of 1851, for 50% of the 3% loan of 1864, for 15% of the interest in arrears of the 3% loan of 1851 from July 1866 to July 1886, and for 20% of other smaller unpaid debts. The principal of the 1886 bond is 14,626,279 pounds. The government has the right to amortize the 1886 bond with purchases in the market or to redeem them by drawings at the rate of 40% of their par value up to December 31, 1890. After that, the redemptions can be effected by purchases in the market by drawings at the rate of 50% of their par value.
1914	**Default 1914:** Sinking fund and coupon payments are suspended in July 1914. **Agreement 1922:** Unpaid coupons from 1913 to 1923 (not capitalized) are agreed to be paid at par over a period of 40 years starting in 1928. Coupons from 1923 to 1927 are agreed to be paid part in cash and part with 20-year scripts carrying 3% interest since 1928. The sinking fund and coupons are agreed to be resumed in cash in a date no later than January 1928. Debt service is guaranteed partially by taxes on oil exports and the revenue of the railway system. The National Railway System is privatized in 1925.
1928	**Default 1928:** Debt service agreed to be resumed in January 1928 is suspended. There are various failed attempts to settle the debt in 1930 and 1931. **Agreement November 1942:** Reduction of the outstanding principal to about 25% by converting all the debt at the rate of 1 US dollar = 1 Mexican peso and 1 British pound = 4.85 Mexican pesos (the market exchange rates at the time of the agreement are 1 US dollar = 4.85 Mexican pesos and 1 British pound = 19.4 Mexican pesos). All past due interest from 1923 to 1942 is agreed to be canceled at 1% of its face value in cash and the unpaid coupons maturing before 1923 are agreed to be canceled at 2.5% of their face value in cash.
	PERU
1826	**Default 1826:** Sinking fund and coupon payments are suspended in April 1826. **Agreement 1849:** Conversion of the two bonds for a new active bond with interest rates at 4%-6%. Twenty-five percent of the unpaid coupons is written off. Issue of a new passive bond in 1849 to pay the balance of unpaid coupons (not capitalized) with interest rates at 1%-3%. Coupons of this bond start to be paid in 1852.
1876	**Default 1876**: Suspension of sinking fund payments. Mandatory conversion of the 6% loan 1870 into 5% consolidated bonds of 1872 deposited in the Bank of England. Coupons from 1876 to 1878 are converted in new bonds carrying interest. **Agreement 1889 (Grace's Contract):** Cancelation of all the foreign bonds (principal and coupons) in exchange for 2 million tons of guano, with a value of approximately 11 million pounds in 1899. This agreement also includes the concession of the whole national railway system for 66 years, an annuity of 80,000 British pounds for 30 years, and the concession of the steamboat on Lake Titicaca. There are also compensations in land and the exploitation of the telegraph and telephone systems.
1931	**Default 1931:** Sinking fund and coupon payments are suspended in May 1931. Still, the government amortizes part of the debt with purchases in the market from 1931 to 1953. Prices of the bonds oscillate between 6 and 26 percent of the par value. **Agreement 1938:** The 1922 Guano loan is restructured. The interest rate is reduced to 4% and its sinking fund is increased from 1.5% to 2%. Accepting bondholders waive the right on any unpaid coupons before December 1937. The government also offers a partial payment of the unpaid coupons in 1931 and 1932 for the other bonds. **1947:** Peru makes a unilateral offer to renegotiate the debt . This offer includes: 1) To exchange at par the 7% loan of 1927, the 6% loan of 1927, the 6% loan of 1928 (issued in New York), and the 6% loan of 1928 (issued in London) for new bonds with lower interest rates (increasing from 1% to 2.5%) and sinking fund rates of 0.5%, maturing in January 1997. 2) All coupons arrears from 1932 to December 1936 are cancelled. At the end of 1949 about 50% of the outstanding amount has been exchanged under the new terms offered. **Agreement November 13th, 1951 - Bonds issued in New York** (Amended offer to Agreement 1947, effective January 1953)**:** Conversion of the old bonds into new 3% bonds. In addition, bondholders receive non-interest bearing scrip certificates in payment for 10% of unpaid coupons from January 1932 to December 1946. These scrip certificates are to be redeemed in annual installments during 15 years starting in January 1953. Upon conversion, bondholders have to waive any rights on previously unpaid coupons. By the end of 1955, about 95% of the bondholders have accepted this offer. **Agreement January 1953 - Bond issued in London** (Amended offer to Agreement 1947, effective January 1953)**:** Conversion of the outstanding debt at the rate of 1.74 British pounds of the new bond for each British pound of the original bond. The interest rate of the new bond is 3% with maturity in 2007. In addition, bondholders receive non-interest bearing script certificates in payment for 10% of the unpaid coupons between 1932-1947. The script certificates are to be redeemed in annual installments during 15 years starting in April 1954 and a one time payment in January 1954 of about 11% of the unpaid coupons between 1947-1953.
	URUGUAY
1875	**Default 1875:** Default is announced on March 27th, 1875. Funds deposited in London are used to meet the debt service until early 1876. Suspension of sinking fund and coupon payments afterwards. **Agreement 1878:** Issue of a new bond for 373,315 British pounds at 1.25% to pay for the unpaid coupons (not capitalized). The principal amount of the old bond remains unchanged. The interest rate on this bond is reduced from 6% to 2.5% for 5 years. The bond can be amortized through purchases in the market.
1891	**Default 1891:** Suspension of sinking fund and coupon payments. **Agreement 1891:** Issue of a new 3.5% bond to pay for coupons in arrears (not capitalized) and in exchange of the outstanding principal of 3 bonds including conversion premiums of 5%, 15%, and 13%. Total issue of the new 3.5% bond reaches 19,300,000 British pounds. The new bond has a 1% sinking fund. The government has the right to increase the amount devoted for redemption.
1915	**Default 1915:** The sinking fund is suspended until one year after the end of the First World War. Coupons are paid regularly. **Agreement 1921-22:** The sinking fund payments of the loans of 1905 and 1909 are resumed in July 1921 while the sinking fund payments of the consolidated loan of 1891 and of the loan of 1896 are resumed in August 1921 and January 1922, respectively. Coupons are paid as scheduled originally.
1931	**Default 1931**: Default announcement in May 1931. The sinking fund payments start to be suspended in December 1931. Interest rate of all the bonds are unilaterally reduced to 3.5% from October 1933 to October 1937. **Agreement September 1937 - Bonds issued in New York**: Balance of the partially paid coupons from 1933 to 1937 is waived. Interest rates on all bonds are reduced. New interest rates ranging from 3.5% to 4.5%. Maturities are extended. **Agreement November 1938 - Bonds issued in London and Paris:** Balance of the partially paid coupons from 1933 to 1937 is waived. Interest rates of all bonds are reduced to 3.5%. Assenting bondholders receive a cash compensation of 1% of the outstanding principal during the first 5 years. Maturities for most of the bonds are extended. By the end of 1939 about 95% of the bondholders have accepted these offers.

Table B.2
Debt Reduction Rates
(in percent)

Countries	Year of Default	Debt Relief	Investors' Haircuts	Average
Argentina	1828	71	74	73
	1891	3	16	9
Brazil	1828	4	8	6
	1898	4	3	4
	1914	6	8	7
	1931	50	53	52
Chile	1827	42	53	47
	1879	2	0	1
	1931	73	76	75
Colombia	1821	-7	-6	-7
	1826	89	97	93
	1848	76	84	80
	1873	25	29	27
	1879	77	89	83
	1900	18	27	22
	1932	37	41	39
Mexico	1827	74	90	82
	1854	79	85	82
	1914	58	62	60
	1928	90	97	94
Peru	1826	71	83	77
	1876	79	82	80
	1931	83	85	84
Uruguay	1875	46	64	55
	1891	27	32	29
	1915	6	7	7
	1931	32	35	34