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 US 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. In this paper, we examine 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 losses for investors. (JEL: F30, F34, F65)

1. Introduction

Pervasive sovereign defaults in the early 1980s triggered a flourishing theoretical literature on sovereign debt crises. As stressed in the seminal paper by Eaton and Gersovitz (1981), defaults occur following adverse shocks to the economy of the

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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. However, 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 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).

Yet 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 has 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 nondefaulters cannot borrow. When world capital markets are in disruption, sovereigns will have more incentives to default because, 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 as they cannot offer new credit. If an agreement is reached, this loss of bargaining power of investors will adversely affect debt recovery rates.[1]

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

The systemic nature of sovereign debt crises is ubiquitous and spans two centuries, as the Standard & Poor's reports on sovereign defaults show. Yet 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 examine 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 occur fairly often, crises in the financial center are rare disasters. Only longer episodes can help us to understand the scope of a systemic crisis such as the current European Debt Crisis. As we 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 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 100 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 67 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 the following.

- 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.

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 multicountry 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.

- 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. In this section, we report event studies to examine whether the shocks that trigger systemic and idiosyncratic crises are different. We also present our estimates of default spells and of investors' losses following each debt restructuring. In addition, we include a test of whether the resolutions of systemic and idiosyncratic crises are different. In Section 4, we use 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. In Section 5, we discuss 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 the 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 1800–1960 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. The Online Appendix describes the sources of all the data and the construction of the various indicators.

2.1. Macroeconomic and Financial Indicators

As we have 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 because 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. Because 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 commodity prices increase fiscal

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 the Online Appendix) 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 Annual Report of the Inter-American Development Bank (2007) 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).

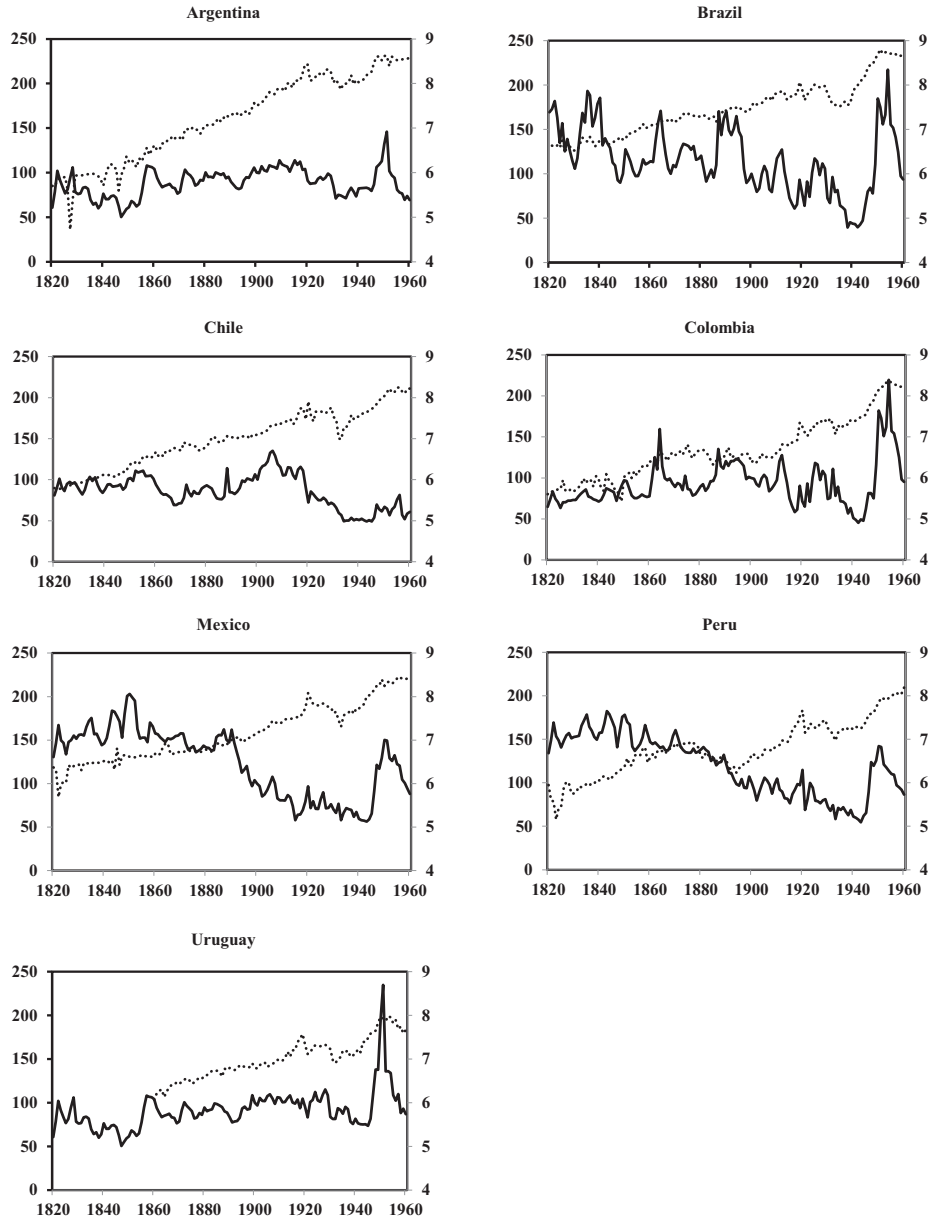


FIGURE 1. Country-specific indicators: exports and terms of trade. The dotted lines are the logarithms of exports in British pounds. The solid lines are the terms of trade indices with base 1900 = 100. Exports are measured on the right axis and the terms of trade are measured on the left axis. See the text for the definitions of the indicators and the Online Appendix for the sources.

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, contributed 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 help 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 examine shortly, rapidly lead to crashes in international liquidity, the so-called Sudden Stops, and can trigger systemic defaults in the periphery as 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 preceded the Subprime US Crisis starting in 2007. At the signs of the first financial fragilities in mid-2007, the Federal Reserve started 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 continued, especially in the banking sector. The dislocation of the bank credit market was 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 had similar features. For example, the Federal Reserve also aggressively raised interest rates in 1928 (from 3% to 6.25%). This triggered 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 increased further, with money market rates reaching 20%. The stock market collapsed in October 1929 and international issuance in New York declined by 50%. The Federal Reserve reacted and reduced the rediscount rate to 3% in 1930 and to 1.5% by mid-1931. Yet financial stability continued to erode as banking crises, currency crises, and sovereign defaults multiplied.

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. Yet 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 UK 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 show later) before the waves of defaults start. The middle panel shows international issuance. Note that international issuance is shown as a percentage of exports of the United Kingdom to correct for the size of the world economy in the more than 100 years of our sample.[5] The four global crises in our sample are all preceded by an international capital 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 seven and eight 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 ten years.

5. Exports are volatile. Thus, because 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.

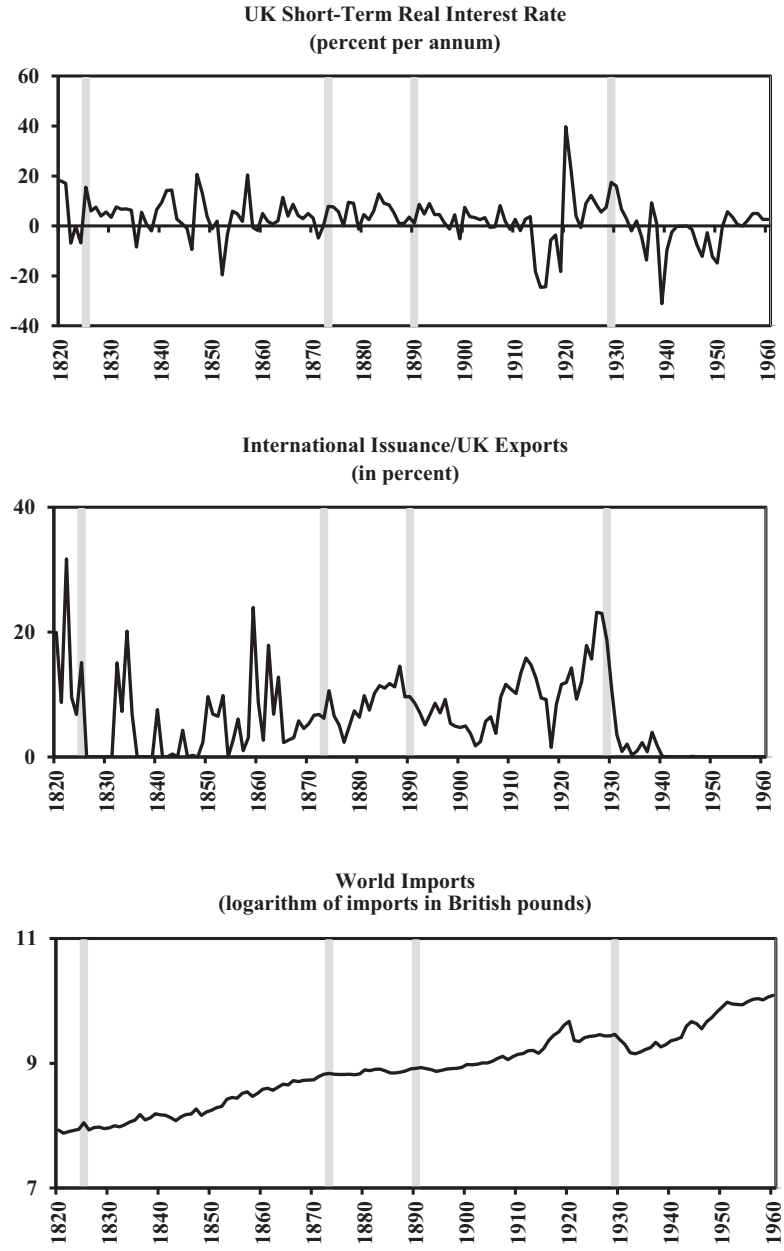


FIGURE 2. Global indicators. The UK short-term interest rate is the Bank rate. To estimate the UK short-term real interest rate, we use the rate of change of the UK wholesale price index. International issuance captures international issuance of the non–Latin American periphery and is the issuance of 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 the Online Appendix for the sources.

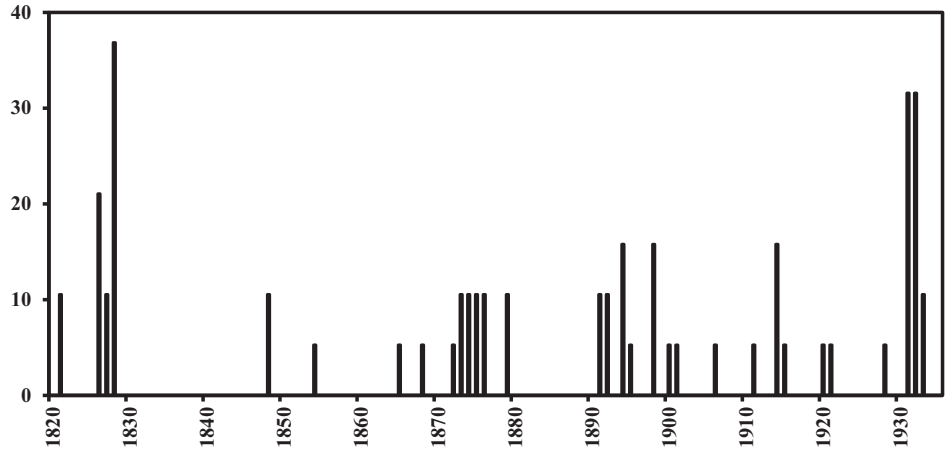


FIGURE 3. Sovereign debt crises in Latin America. The bars indicate how many countries default each year (in percent of all countries). Only the beginning of the default episodes is identified.

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 the Online Appendix. We focus only on defaults of the central government as 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. In total, there are 67 defaults. Figure 3 shows the percentage 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 67 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 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 67 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

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 five 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*.

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

Note: 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, 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

(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 the 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 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 27 sovereign debt crises of Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Uruguay. For these countries, we identify 17 systemic crises and 10 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; Aguiar and Gopinath 2006; Arellano 2008) 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 percentage of UK 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 ten 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 percentage of the trend. In each figure, the solid 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.

7. We identify permanent components (the trends) using the Hodrick–Prescott filter.

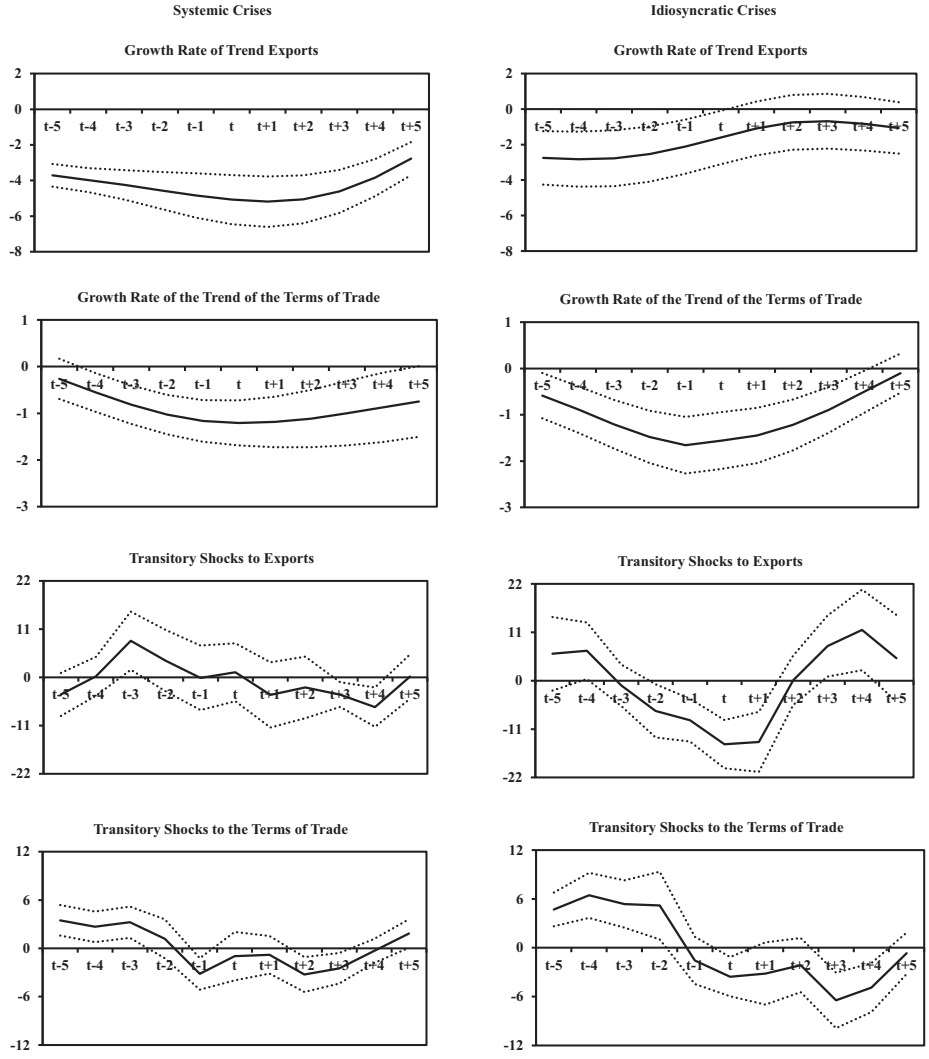
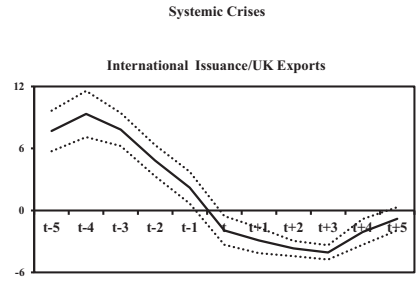
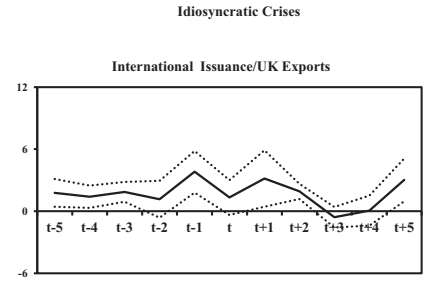


FIGURE 4. What triggers systemic and idiosyncratic sovereign debt crises? Country-specific shocks. The growth rates of the trend (permanent component) of exports and of the terms of trade are shown relative to their values in "non-crisis" times (in percentage points). The transitory shocks to exports 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 the Online Appendix for the sources.

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.

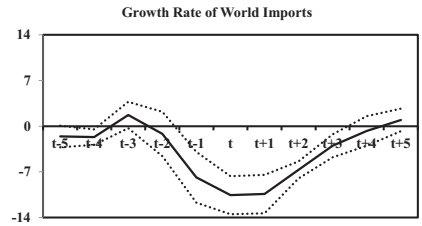
The next four panels show the transitory shocks to both exports and the terms of trade during systemic and idiosyncratic crises. Adverse transitory shocks to exports are not at the core of either systemic or idiosyncratic crises, supporting the findings in the Aguiar and Gopinath (2006) calibrating exercise. While both systemic and





Year	UK 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	UK 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**



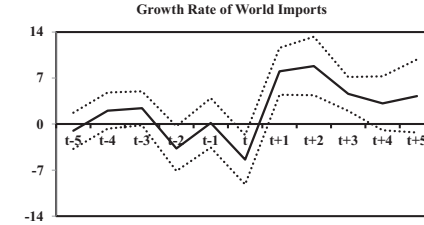


FIGURE 5. What triggers systemic and idiosyncratic sovereign debt crises? Global shocks. International issuance/UK exports and the growth rate of world imports are shown relative to their average value in the sample (in percentage points). The Liquidity Crash Index in the middle panels captures the average increase in UK 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 the Online Appendix for the sources.

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/UK exports during the ten years around the time of default relative to its sample average. The left panel shows 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/UK 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, as shown in the right panel, international issuance/UK exports even increases at the onset of the idiosyncratic sovereign debt crises.

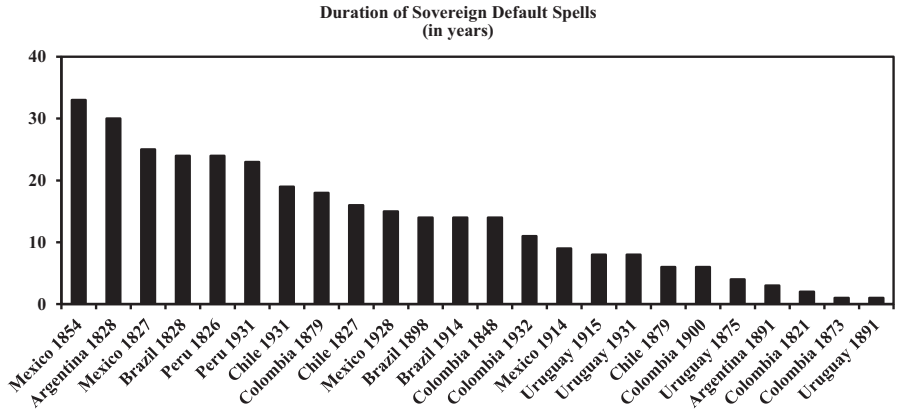
The middle two panels show the evolution of the real interest rate in the United Kingdom during both systemic and idiosyncratic crises. The panel on the left shows the evolution of real interest rates around panics in the financial center. The year of the panic in the financial center is denoted by t and it is shown in the first column of the table. The last column of this panel shows what we dub the Liquidity Crash Index, which is estimated as the average of the UK real interest rate in the year of the panic (t) and the following two years relative to the average UK 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. Because systemic defaults mostly tend to occur 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 five 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

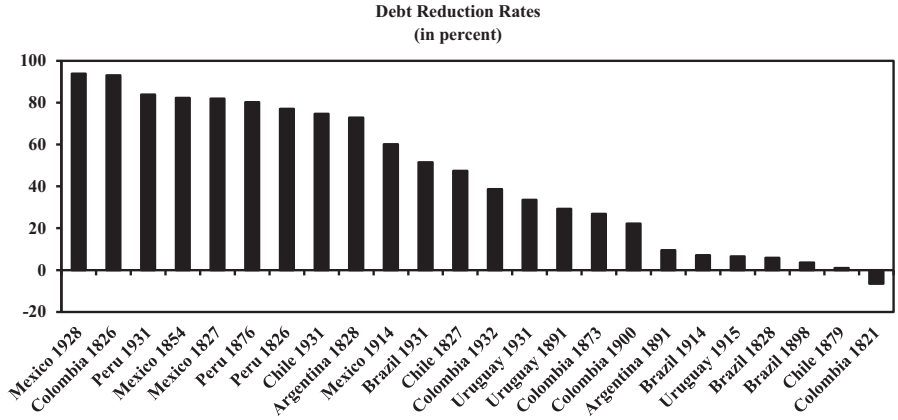
Figure 6 summarizes the differences between systemic and idiosyncratic crises in relation to default spells and debt reduction rates. The top panel in this figure shows the classification of sovereign debt crises for *all* Latin American countries into systemic and idiosyncratic. The middle panel shows 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 the Online Appendix. 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

Sovereign Debt Crises	
Type	Number
All	67
Systemic	42
Idiosyncratic	25



Sovereign Debt Crises	
Type	Years in Default
Systemic	15
Idiosyncratic	12

t-test *p*-value: 0.24



Sovereign Debt Crises	
Type	Reduction Rates
Systemic	56
Idiosyncratic	34

t-test *p*-value: 0.06

FIGURE 6. Systemic and idiosyncratic sovereign debt crises: characteristics. 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 the Online Appendix for our estimations of the debt reduction rates.

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

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

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, r is the discount rate, and 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

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

with the debt reduction rates estimated as[8]

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

8. Debt reduction rates calculated using 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 the Online Appendix. The debt reduction rates shown in Figure 6 are the average of our estimates of Debt Relief and Investors' Haircuts.

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 seems 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 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 US real interest rates. Our estimations build on this literature with a twist: with a database of more than 100 years, we can capture several major panics in the

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.

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 30 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] The Online Appendix 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 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.

Because 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. Because 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/UK export ratio and the growth rate of world imports. The likelihood of a default increases with a decline in both international issuance/UK exports and the growth rate of world imports, indicating

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.

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.

TABLE 3. Are systemic and idiosyncratic sovereign debt crises different?

Logit estimates of default probabilities				
Indicators	Model 1 with country-specific shocks		Model 2 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/UK exports			−14.57	0.00
Growth rate of world imports			−2.89	0.12
Number of observations	422		422	
Pseudo-R^2	0.15		0.22	

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 the Online Appendix for the sources.

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.

Models 1 and 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

12. We do not include the UK 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 pre-date most panics in the financial center. However, 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 UK real interest rate in the logit equation just captures this reaction of the monetary authorities.

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,

$$\text{Prob (Idiosyncratic Crises} \mid \text{Model 2)} \;=\; \text{Prob (Idiosyncratic Crises} \mid \text{Model 1)}$$

$$\text{Prob (Systemic Crises} \mid \text{Model 2)} \;>\; \text{Prob (Systemic Crises} \mid \text{Model 1)}\,.$$

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 the fact 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. Because 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 because 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, then 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 restructuring generates a surplus for both creditors and debtors at the time of the agreement and in the future. However, 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 nondefaulters 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 as they cannot offer new credit. If an agreement is reached, this loss of investors' bargaining power will adversely affect 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 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.

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 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 (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.

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/export 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/export ratio, r is the interest rate on the debt, g is the growth rate of exports, and f captures the debt-service/export 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 contracted before the default. This interest rate is known. However, the debt/export ratio is uncertain because 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 (AR) process for the growth rate of exports. In particular, we estimate

$$\begin{aligned} g_t &= \bar{g} + B(L)g_t + \varepsilon_t \\ \varepsilon_t &\sim N(0, \sigma^2), \end{aligned} \tag{5}$$

where ε is an i.i.d. 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.

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.

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 five years. Because 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 five 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 is 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

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.

TABLE 4. Do economic recoveries shorten default spells?

Year in default	Probabilities of stabilizing debt/exports																										
	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	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.

of default, followed by Colombia after 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/UK 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.

Because 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 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

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

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/UK 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 the Online Appendix for the sources.

response to a change in variable X_i we need to transform the corresponding coefficient as follows:

$$\text{percent response of the probability of renegotiation}_i = (e^{\text{coeff}_i \times \Delta X_i} - 1) \times 100. \tag{6}$$

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 UK 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 UK 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 does economic activity start 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 UK 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; Bi 2008). Yue (2010) also contributes to this literature. She also incorporates sovereign defaults and renegotiations into a dynamic equilibrium model. The focus of her 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. 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/UK 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)
R^2	0.42	0.46
Adjusted R^2	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/UK exports is calculated as the average of the five years before the agreement. In column 2, we allow for nonlinear effects of the probability of stabilizing debt/exports. We divide the observations of international issuance/UK 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 the Online Appendix for the sources.

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 five years before each restructuring (our proxy for the bargaining power of investors) is also both statistically and economically significant. A one-standard deviation decline

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.

in international issuance/UK 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 five years of the default spell (or with average during the default spell if it lasts less than five 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 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 disruptions to capital markets that international investors lose bargaining power. The sovereigns have nothing to gain from restructuring the debt in episodes in which even nondefaulters 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, suggests 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

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 percentage of UK exports) leading to a 17 percentage-point increase in investors' losses. As captured by the adjusted R^2 in this last regression, these two specifications perform equally well. We thank one referee for this suggestion.

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 (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 US 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. However, 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 in Schneider and Tornell (2004).

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. Yet 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

21. The US 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, 1994), for an analysis of this crisis.

Euro crisis, it is important to examine the lingering effects of financial panics on the breakdowns of currency systems.

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Online Appendix
Data and Codes