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Abstract

Default is as old as sovereign debt. Since 1820, sovereigns have spent 18% of time in a state of default. Despite the scale of the problem, the causes and consequences of defaults are still imperfectly understood. In this paper we quantify the aggregate cost of defaults, based on a sample of 50 sovereigns between 1870 and 2010. Since defaults are endogenous to the business cycle, we use the narrative approach to identify plausibly exogenous episodes. We find significant and persistent costs of defaults starting at 1.6% of GDP and peaking at 3.3% before recovering to the pre-crisis level after five years. Moreover, we identify a large heterogeneity of costs by the cause of default. Higher costs are associated with defaults initiated by negative supply shocks, political crises, or adverse terms of trade. In contrast, domestic demand shocks have a moderate effect that is quickly reversed.

I. Introduction

Since 1820 sovereign countries have spent 18% of time in a state of default (Tomz and Wright, 2013). On four occasions, more than 30% of the world's debtors defaulted: the 1820s debt crisis, the 1873 crisis, the Great Depression and the 1980s crisis. Despite the scale of the global sovereign debt problem, its causes and consequences are still imperfectly understood. In this paper, we investigate the

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economic consequences of sovereign crises for a large panel of countries since 1870. We also show how these consequences vary with the underlying causes of the debt crises. In doing so we have to engage with a number of important empirical challenges.

The first is heterogeneity. Long-run default chronologies scale crises equally, but some episodes are bound to be more severe than others. Failing to account for this can cause attenuation bias if there are small mistakes in the classification (Romer and Romer, 2017). The first source of heterogeneity has to do with the type of nations. Across the whole period surveyed by Tomz and Wright (2013), the unconditional probability of default is 1.7%. However, this averages out the experience of developed nations that rarely defaulted with that of developing nations that defaulted repeatedly. Concentrating only on countries defaulting at least once, the probability of default increases to 3% or 3.8% if we restrict ourselves to the period since 1980 (Tomz and Wright, 2013). Another source of heterogeneity is the circumstances of default. Paraphrasing Tolstoy, “every unhappy country is unhappy in its own way,” and in this paper we investigate whether the economic severity of defaults depends on the nature of the shocks underlying them.

The second challenge is the endogeneity of sovereign default. Most sovereign debt models assume that defaults result in a loss of a fraction of the country’s output (Panizza et al., 2009). The latter proxies for many possible costs of default, including disruptions to international trade (Rose, 2005), a domestic credit crunch (Sandleris, 2014), sanctions in international relations (Mitchener and Weidenmier, 2010) and reputational spill overs that depress FDI and other foreign capital inflows into the country (Arteta and Hale, 2008; Esteves and Jalles, 2016). However, countries do not usually stop paying their debts on a whim – defaults can be forced on them by large recessions, which sap their ability to collect taxes and repay their debts. In other words, defaults have a large endogenous component, because recessions are both a cause and consequence of defaults. Tomz and Wright (2007) found that at least one third of defaults since 1820 had occurred in “good times”, in the sense that they were not preceded by a recession. According

to the authors, this underscores the importance of strategic motives for default (unwillingness to pay).¹ Since the remaining two thirds were associated with below-trend GDP deviations, it is unclear whether defaults have any real penalty over and above the recessions that cause them in the first place. There is disagreement in the empirical literature on the scale of default costs. Some authors found large and persistent negative effects (De Paoli et al., 2009, Reinhart and Rogoff, 2009; Furceri and Zdzienicka, 2012; Gornemann, 2014; Kuvshinov and Zimmermann, 2019), while others do not find any costs or only short-term costs (Borensztein and Panizza, 2009; Levy-Yeyati and Panizza, 2011).

We contribute to this debate on two levels. First, we embrace the heterogeneity of defaults. Rather than attempting to estimate an “average cost” of default, we will distinguish default costs by their main cause. Second, in order to overcome endogeneity, we use the narrative approach to try and distinguish between endogenous and plausibly exogenous defaults. The narrative approach has been used extensively in other contexts, including fiscal policy (Ramey and Shapiro, 1998; Romer and Romer, 2010; Ramey, 2011; Cloyne, 2013; Crafts and Mils, 2013, 2015; Ramey and Zubairy, 2018), monetary policy (Romer and Romer, 2004; Cloyne and Hürtgen, 2016; Lennard, 2018) and banking crises (Jalil, 2015; Kenny et al., 2021). To our knowledge, we are the first to apply it to sovereign default.

To implement this method, we read contemporary reports from creditor and international organizations and the specialized financial press such as the *Economist* and the *Financial Times*. Based on these sources we classify crises in seven categories. We then use the classification to code a dummy variable distinguishing between plausibly exogenous crises – such as those caused by external political disturbances – from more endogenous ones – those driven by the economic cycle.

¹ However, Panizza (2021) argues that the fraction of defaults during “good times” may be inflated by imprecise detrending techniques.

Our dataset includes 174 default episodes involving 50 sovereigns between 1870 and 2010. To estimate the causal effects of sovereign debt crises, we run panel lag-augmented local projections models (Jordà, 2005; Montiel Olea and Plagborg-Møller, 2021), regressing various economic outcomes on an indicator of sovereign debt crises, using the exogenous dummy variable as an instrument. In our regressions, we control for a number of possible confounders, such as political instability and terms of trade shocks.

Our estimates range between 1.6 and 3.3% of pre-crisis GDP and, more importantly, we find that the effect was persistent. GDP only reverts to the pre-crisis level five years after the start of a default. These effects are in line with recent empirical evidence (Reinhart and Rogoff, 2009; Trebesch and Zabel, 2017; Kuvshinov and Zimmermann, 2019). However, these averages hide a large heterogeneity in outcomes across the seven types of default in which we classified the narrative evidence.

The rest of the paper is organized as follows. Section II restates the empirical challenges of estimating the economic costs of defaults and introduces our narrative approach. Section III describes the local projections model and discusses its results, both on average and broken down by cause of debt crisis. Section IV subjects the main results to a variety of robustness checks. Section V concludes.

II. Identifying Sovereign Debt Crises

II. A. The Identification Problem

Identifying the macroeconomic effects of sovereign debt crises is challenging. Crises may not only affect but may be affected by the economy. Consequently, endogeneity will bias econometric estimates of the impact of sovereign debt crises on the macroeconomy. To illustrate, consider a simple model of the determinants of output:

$$y_{i,t} = \beta CRISIS_{i,t} + e_{i,t} \tag{1}$$

where the subscripts i and t index countries and time, respectively. $y_{i,t}$ is output, $CRISIS_{i,t}$ is a series of sovereign debt crises and $e_{i,t}$ is an error term. This residual captures all other factors that affect output, such as monetary and fiscal policy. Now consider a model of the determinants of sovereign debt crises:

$$CRISIS_{i,t} = \lambda e_{i,t} + u_{i,t} \quad (2)$$

where $u_{i,t}$ is an error term that captures the determinants of $CRISIS_{i,t}$ over and above $e_{i,t}$. Equation (2) shows that crises might be determined by output shocks and other unrelated factors.²

Because crises are determined both by factors that are related and unrelated to output, simple estimation of equation (1) may lead to biased estimates of the parameter of interest, β . This can be seen by combining (1) and (2):

$$y_{i,t} = \beta(\lambda e_{i,t} + u_{i,t}) + e_{i,t} \quad (3)$$

Equation (3) highlights that debt crises are likely to be correlated with the error term, which violates the Gauss-Markov assumptions. The asymptotic bias is given by:

$$\text{plim}\hat{\beta} = \beta + \frac{\text{Cov}(CRISIS_{i,t}, e_{i,t})}{\text{Var}(CRISIS_{i,t})} \quad (4)$$

Equation (4) shows that the estimated parameter is equal to the true parameter plus the bias. It is reasonable to expect that negative output shocks to $e_{i,t}$ raise the likelihood of crises, that is $\lambda < 0$ or $\text{Cov}(CRISIS_{i,t}, e_{i,t}) < 0$. If sovereign debt

² These crises might be the one in three that occur in “good times” (Tomz and Wright, 2007).

episodes have a negative impact on the macroeconomy ($\beta < 0$), then estimation of equation (1) using OLS will overestimate the true economic costs of defaults. However, it need not be so if, for example, debt restructurings relieve nations from unbearable debt burdens that dissuade investment and capital inflows (Reinhart and Trebesch, 2016). Given this heterogeneity in the causes of crises, the direction of bias is uncertain. Furthermore, even if there is a bias, it may be quantitatively small if the association between debt crises and output shocks (λ) is weak (Tomz and Wright, 2007). However, without tackling the bias it is unclear whether OLS estimates are too high, too low or about right.

II.B. The Narrative Approach

Our identification strategy follows the narrative approach to identify a subset of crises $z_{i,t} \subset CRISIS_{i,t}$ that are exogenous to domestic economic conditions ($e_{i,t}$) and which we use as an instrument. To capture dynamic causal effects, we ensure that the instrument satisfies the following three conditions (Stock and Watson, 2018):

- (i) $Cov(z_{i,t}, CRISIS_{i,t}) \neq 0$
- (ii) $Cov(z_{i,t}, e_{i,t}) = 0$
- (iii) $Cov(z_{i,t}, e_{i,t+h}) = 0$ for $h \neq 0$

where h is the horizon. Condition (i) is the relevance condition, which states that the instrument should covary with $CRISIS_{i,t}$. Since the instrument is a subset of $CRISIS_{i,t}$, this should not be an issue as long as there are a sufficient number of exogenous crises. Condition (ii) is the contemporaneous exogeneity condition, which means that the instrument should not covary with the error term contemporaneously. Condition (iii) is the lead/lag exogeneity condition and requires that the instrument should not covary with past and future values of the error term. Together, conditions (ii) and (iii) imply that exogenous crises are not associated with past, present or future economic shocks.

In order to identify the subset of exogenous defaults, we analyse contemporary reports from newspapers, such as the *Economist* and the *Financial Times*, and

from creditor organizations, such as the Corporation of Foreign Bondholders and the Foreign Bondholders Protective Council. No single source provides the information for all countries at all times. Therefore, we incorporate as much information as possible, using judgement to weight competing explanations. Furthermore, in a second stage, we cross-check our classification against the available secondary literature and investigate any discrepancies between contemporary opinion about the origins of each crisis and its reconstruction by later authors. This step is mostly relevant for the earlier part of the sample. Many standard macroeconomic concepts and models were only introduced in the post-war period which means that we have to interpret the language of the sources in accordance with these models. Since these cases required more interpretation on our part of the narrative account, we compare our classification to what specialists in the period or countries involved have written about the crises.

Before we describe our classification, it is important to acknowledge that other authors have addressed the endogeneity of output costs with different methods. Some papers have resorted to GMM (Furceri and Zdzienicka, 2012; Esteves and Jalles, 2016), while Kuvshinov and Zimmermann (2019) deal with the endogeneity of the default decision by conditioning on observables using an inverse propensity score weighted regression adjustment (IPSWRA). Finally, while the narrative approach has not been applied to sovereign debt crises before, other identification strategies used in the literature are nested within it as special cases, such as focusing on centrally orchestrated moratoria (Reinhart and Trebesch, 2016) or on natural experiments, such as unexpected court rulings (Hébert and Schreger, 2017).

Table 1 summarizes our classification system. We consider two type of endogenous crises (N), driven by aggregate demand (AD) and aggregate supply (AS) shocks.

[Insert Table 1 about here]

Aggregate demand shocks (AD) can be a major cause of sovereign debt crises. This type of shock reduces both output and prices, which has negative implications for fiscal sustainability, impinging on growth, the real interest rate and the budget. An example of this type of crisis is the Argentinean default of 1890, which contemporary opinion described as caused by a credit boom: “everyone can see that the growth has to a very large extent been a forced and unhealthy growth. Reckless borrowing and reckless expenditure have been the order of the day both with the Government and with the people, and the readiness with which European investors have responded to the never-ending appeals for new loans has done little credit to their intelligence. But the speculative bubble has now been pricked” (*The Economist*, 8 August 1890, p. 984).

Aggregate supply shocks (AS) reduce output and raise prices, which can lead to sovereign default. For example, Chile defaulted in 1961 as natural disasters inflicted “severe but not total damage [...] upon the region’s basic industry – agriculture” (*Financial Times*, 31 May 1960, p. 2) combined with labour unrest in the copper sector as “The companies are being pressed by workers who demand higher wages and a government which relies on copper for part of its revenue and demands a high rate of expansion in output” (*The Economist*, 19 August 1961, p. 742).

We include five classes of exogenous (*X*) debt crises or restructurings: centrally orchestrated moratoria (*CM*), contagion (*C*), legal (*L*), political (*P*) and the terms of trade (*T*).

Centrally orchestrated moratoria (CM) are programmes of debt relief for a group of indebted countries.³ There have been a number of debt relief initiatives throughout history, such as the 1931 Hoover Moratorium and the Baker and Brady plans of 1985 and 1989, respectively. To the extent that the relief is independent of country-specific economic conditions, these moratoria are exogenous.

³ Even though these cases do not count as debt crises, as such, moratoria can be effective solutions to restructure unsustainable debt burdens (Reinhart and Trebesch, 2016).

Contagion (C) occurs when a financial shock in one economy spills over into others. As a result, debt becomes more expensive and/or difficult to rollover. Whilst it is difficult to identify pure cases of contagion, the press was unanimous in attributing the Paraguayan and Uruguayan defaults of 2003 to the fallout from the 2001 Argentinean debt crises.

Legal (L) disputes over sovereign defaults have been on the rise in recent decades (Schumacher et al., 2021) and some authors have used their outcomes as external sources of variation for explaining debt crises. For example, after Argentina defaulted in 2001 on debt issued under New York law, holdout creditors took the case to US courts, which ruled against Argentina, precipitating a technical default in 2014 (Hébert and Schreger 2017).⁴

Political (P) events may be the cause of sovereign debt crises (Citron and Nickelsburg, 1987; Brewer and Rivoli, 1990; Balkan, 1992; Kohlscheen, 2007; Van Rijckeghem and Weder, 2009; Oosterlinck, 2016). This occurs when a new political regime declares that the debt from the previous regime is odious, because it was raised or spent illegitimately or because of a change in ideology. The change in regime may happen through the democratic process or through military events, such as coups, revolutions and wars. This type of default occurred in Russia in 1918, when the official repudiation stated that all state loans raised by the “Governments of the Russian Landlords and Russian bourgeoisie, are hereby repudiated” (Fitch, 1918, p. 332). Using changes in ideology and military events as exogenous shocks follows a long tradition in the fiscal policy literature (Ramey and Shapiro, 1998; Romer and Romer, 2010; Ramey, 2011; Cloyne, 2013; Crafts and Mils, 2013, 2015; Ramey and Zubairy, 2018).

Terms of trade (T) shocks may be another cause of sovereign debt crises, resulting from a general fall in the price of exports relative to imports or from the collapse (spike) in the price of one of the main commodities exported (imported). If these

⁴ This use of court rulings as an exogenous shock has been applied elsewhere, e.g., in the context of identifying the macroeconomic effects of fiscal policy (Cloyne 2013).

commodities are fiscally or economically important, then terms of trade shocks can undermine fiscal sustainability. For example, in 1898 a slump in the price of coffee pushed Venezuela into default (*Financial Times*, 14 September 1897, p. 2). The assumption that the terms of trade are exogenous is “universally embraced by the related literature whether empirical or theoretical” (Schmitt-Grohé and Uribe, 2018).⁵

Contagion, political shocks and the terms of trade are a subset of exogenous crises that may only be exogenous conditional on controls (Stock and Watson, 2018). These events may affect economic outcomes not only indirectly through default but also directly, which could violate the contemporaneous exogeneity condition (ii). For example, a change of government from democratic to autocratic may reduce growth by itself, irrespective of being associated with a default (Acemoglu et al., 2019). Therefore, it will be important to control for these factors.

A final word about how we deal with cases with less-than-clear classification. Whenever there was joint evidence pointing to endogenous and exogenous causes, we conservatively classified the crises as endogenous. We show later in the paper (Section III.E) that this classification is likely to bias down our estimates.⁶ In four cases there was no sufficient evidence to classify them either way and we grouped them in a category of unclassified (*U*).

Appendix A provides descriptions and evidence for our classifications of 174 sovereign debt crises since 1870.

II.C. Why Nations Default

Much has been written about the causes of defaults with leading theoretical models emphasizing economic (Aguilar and Gopinah, 2006; Arellano, 2008) and non-economic (Cuadra and Sapriza, 2008) factors. The literature also traditionally distinguishes between situations of inability and unwillingness to pay, which

⁵ See also Blattman et al. (2007) and Aghion et al. (2010).

⁶ We also checked the robustness of our results against classification errors below in Section IV.B.

aligns roughly with our classification of defaults as exogenous and endogenous to the business cycle.

Table 2 shows the distribution of defaults by cause between 1870 and 2010, according to our classification. Political events are the leading cause of default and account for 1 in 3 episodes. The political origins of sovereign debt crises are consistent with a large body of empirical and theoretical research (Citron and Nickelsburg, 1987; Brewer and Rivoli, 1990; Balkan, 1992; Kohlscheen, 2007; Cuadra and Sapriza, 2008; Van Rijckeghem and Weder, 2009; Oosterlinck, 2016). Other leading causes are shocks to aggregate demand and supply, which together contributed to a further third of defaults. The economic nature of these crises is also in line with a great deal of research (Tomz and Wright, 2007; Arellano, 2008). Exogenous terms of trade shocks were present in 1 in 5 defaults. Centrally orchestrated moratoria, contagion and legal crises have been less frequent. Overall, we classify 35.6% of defaults as endogenous, 61.5% as exogenous and 2.9% as unclassified. The significant share of endogenous crises suggests that simple OLS estimates of default costs could be materially biased. The evolution of endogenous, exogenous and unclassified defaults is plotted in Figure 1. One particularly clear pattern in the Figure is the clustering of exogenous crises around major international financial crises, such as 1873, 1890, 1929-33, 1982-83 and 1997, and the two world wars. Such coincidence indirectly validates our narrative approach. Given the worldwide nature of these crises, it is natural to expect to find more debt episodes around them that are exogenous to each country's phase of the cycle.

[Insert Table 2 about here]

[Insert Figure 1 about here]

III. The Macroeconomic Effects of Sovereign Debt Crises

III.A. Model

In order to estimate the macroeconomic effects of sovereign debt crises, we run a lag-augmented local projections model (Jordà, 2005; Montiel Olea and Plagborg-Møller, 2021):

$$y_{i,t+h} = \alpha_{i,h} + \gamma_{t,h} + \beta_h CRISIS_{i,t} + \theta_h W_{i,t} + e_{i,t+h} \quad (5)$$

The subscripts i , t and h index countries, time and horizon, respectively. $y_{i,t+h}$ is an economic outcome of interest. $\alpha_{i,h}$ are country fixed effects and $\gamma_{t,h}$ are time fixed effects. $CRISIS_{i,t}$ is a series of sovereign debt crises that equals 1 in the first year of a credit event and 0 otherwise. We define sovereign crises by their initial year because the duration of defaults is itself endogenous (Benjamin and Wright, 2009). Finally, $W_{i,t}$ is a vector of controls. β_h is the treatment effect at each horizon.

As discussed before, because sovereign debt crises may be a cause, as well as a consequence, of economic outcomes, the estimate of the parameters of interest, β_h , could be biased. As a result, we estimate equation (5) using instrumental variables, where $CRISIS_{i,t}$ is instrumented using the new series of exogenous defaults, $z_{i,t}$.

Why not use the instrument, $z_{i,t}$, in place of $CRISIS_{i,t}$ and estimate equation (5) by OLS? The reason is that this reduced form – the regression of outcomes on the instrument – does not yield the treatment effect but rather the product of the treatment effect and the first stage parameter on the instrument.⁷ However, because the first stage parameter is close to 1, the reduced-form and 2SLS estimates are very similar.⁸

⁷ Angrist and Pischke (2015, pp. 98-146).

⁸ The first stage parameter is equal to the difference in crisis probabilities when $z_{i,t} = 1$ (crises that were exogenous) and $z_{i,t} = 0$ (endogenous crises, unclassified crises and non-crises). Because the probability of a crisis is 1 when $z_{i,t} = 1$ and the probability of crisis is close to 0 when $z_{i,t} = 0$ as endogenous and unclassified crises are rare relative to non-crises, the coefficient on the instrument in the first stage is close to 1.

We include a series of controls for three reasons: first, to increase efficiency (Stock and Watson, 2018). Second, we suspect that a number of the exogenous categories of default included in the instrument may only be exogenous conditional on controls, such as contagion (*C*), politics (*P*) and the terms of trade (*T*). While caused by plausibly random events, defaults of this kind may affect economic outcomes through channels other than sovereign debt, violating the exclusion restriction. Therefore, it is important to control for these effects. Another way of saying this is to remember that some variables are potential confounders that might affect both the onset of a debt crisis and its outcomes. Failing to control for them would lead to omitted variable bias (Pearl, 2009). We describe the list of controls in the next section. Third, the potential issue of non-stationary is obviated by including lags as controls (Montiel Olea and Plagborg-Møller, 2021).

III.B. Data

To investigate the economic impact of sovereign debt crises, we assembled a dataset of outcome, treatment and control variables for 50 defaulting economies since the nineteenth century. The variables, sources, description and coverage are detailed in Appendix B and summarized in Table 3.

[Insert Table 3 about here]

The economic outcome variables are GDP, exports and imports in constant prices.⁹ We restrict ourselves to these key variables because of data limitations. Other potentially interesting outcomes such as the components of GDP, labour market quantities and fiscal measures have sparse coverage the further back in time we go.

⁹ A valid concern with historical data is reliability. Although we have tried to use the best available data in each instance, there are thought to be large margins of error associated with national accounts prior to the Second World War, even for advanced economies (Solomou and Weale, 1991). As these data are used as outcomes, measurement error will increase the standard errors but will not affect the estimated coefficients.

The treatment variable is based on the chronology of sovereign debt crises by Reinhart and Rogoff (2011). This is the most up-to-date long-run chronology publicly available. The authors define external debt crises as involving the “outright default on payment of debt obligations incurred under foreign legal jurisdiction, including non-payment, repudiation, or the restructuring of debt into terms less favourable to the lender than in the original contract.”

As controls we include lags of the dependent and treatment variables, as well as current and lagged measures of debt-to-GDP, the log change in the terms of trade, Polity scores, wars and contagion. The first is included to capture the impact of differences in the pre-crisis debt burden on the economic consequences of defaults. Terms of trade can also have an impact on economic activity independent of precipitating an external debt crisis. Similar reasoning led us to include markers of institutional quality (Polity), political instability (wars) and contagion.

As our measure of contagion is a proxy, it deserves some discussion. This variable is included to control for the possible economic impact of spill overs in one country from defaults in other countries (even when those spill overs do not lead to a local default). As two potential channels of contagion are capital and trade flows, which are known to be highly correlated with distance (Frankel and Rose, 2002; Martin and Rey, 2004; Portes and Rey, 2005), we construct a measure based on distance from other defaults. Specifically,

$$Contagion_{i,t} = \sum_{j=1}^J \omega^{Distance_{i,j}} Default_{j,t} \text{ for } i \neq j \quad (6)$$

where $Default_{j,t}$ is a dummy variable indicating whether country j is in default (Reinhart and Rogoff, 2011), ω is a discount factor that is set to 0.999, and $Distance_{i,j}$ is the great circle distance between the capital cities of countries i and j (Mayer and Zignago, 2011). This measure has a number of useful properties: (i) if there are no crises, $Contagion_{i,t} = 0$; (ii) the more crises, the higher $Contagion_{i,t}$ is; (iii) crises that are near are associated with higher $Contagion_{i,t}$ than those that

are far; (iv) $Contagion_{i,t}$ is a concave up decreasing function of distance, so that more local crises have a disproportionate impact compared to more distant crises. The discount factor is set so that $Contagion_{i,t}$ does not decline to zero at short distances.

The sample period begins in 1870, when macroeconomic data becomes increasingly available, and ends in 2010, when the series of sovereign debt crises stops (Reinhart and Rogoff, 2011). Where possible, we collect data several years before and after to allow us to include the leads and lags in equation (5). For countries that gained independence after 1870, the sample begins in the year of independence. Overall, the sample consists of 5,476 country-years.

III.C. Relevance and Exogeneity

To estimate dynamic causal effects, an instrument must satisfy the relevance and exogeneity conditions. In this section, we discuss the performance of the instrument along these dimensions.

Instrument relevance.— A weak instrument that is poorly correlated with the endogenous regressor can bias two-stage least squares in the direction of ordinary least squares. In order to investigate the strength of our instrument, we report the Kleibergen and Paap (2006) and Montiel Olea and Pflueger (2013) F -statistic, which is robust to heteroskedasticity and autocorrelation.¹⁰ The null hypothesis of a weak instrument is rejected for large values of this statistic (Montiel Olea and Pflueger, 2013). The F -statistic for our instrument is 7,492, which far exceeds the critical value of 23.1 (Montiel Olea and Pflueger, 2013). As expected, there is little risk of a weak instrument problem as the instrument is a subset of the endogenous regressor.

¹⁰ These tests are identical in the just identified case.

Instrument exogeneity.— We separate our investigation of the exogeneity of the instrument into lag exogeneity and contemporaneous/lead exogeneity. In order to investigate lag exogeneity, we run two logit models of the form:

$$\ln \frac{p_{i,t}^c}{1 - p_{i,t}^c} = \alpha_i + \gamma_t + \sum_{k=1}^3 \varphi_k \Delta y_{i,t-k} + \sum_{k=1}^3 \phi_k \pi_{i,t-k} + v_{i,t} \quad (7)$$

where $p_{i,t}^c$ is either the probability of an endogenous or exogenous crisis in country i at time t , α_i and γ_t are country and time fixed effects, $\Delta y_{i,t-k}$ is lagged real GDP growth and $\pi_{i,t-k}$ is inflation (measured as a dummy variable that switches on if the annual inflation rate is 20% or higher (Reinhart and Rogoff, 2011)).¹¹ The results are shown in Table 4. The endogenous series is highly predictable from lags of economic growth and inflation. A slump in output or a bout of inflation significantly raise the probability of default in the following year. The exogenous series, however, is not predictable.¹²

[Insert Table 4 about here]

Although it is not possible to test contemporaneous or lead exogeneity in just identified models, we follow Gabaix and Koijen (2020) and partition the instrument into multiple instruments, which allows us to calculate J -statistics for overidentifying restrictions.¹³

To do so, we consider two alternatives. The first is to use the granularity of the default classification to partition the instrument by cause: exogenous crises due to political shocks, $z_{1,i,t}$, and exogenous crises due to all other causes, $z_{2,i,t}$. Because political shocks account for about half of all exogenous crises, this partition achieves the most balanced distribution of exogenous crises across the two

¹¹ We use this dummy variable because it is available for the full sample, whereas the level of inflation has much more limited coverage.

¹² This conclusion holds irrespective of the number of lags included in the model.

¹³ The J -statistics we calculate are robust to heteroskedasticity.

instruments. The second is to use the randomness of defaults falling on odd and even years to partition the instrument by year: exogenous crises falling on odd years, $z_{3,i,t}$, and exogenous crises falling on even years, $z_{4,i,t}$.¹⁴

We collect the results of these tests in Table 5. Irrespective of partitioning the instrument by cause of default or by year, the p -values for the null hypothesis that the instruments are exogenous are well above conventional levels. These results suggest that our instrument meets the contemporaneous and lead exogeneity conditions (Stock and Watson, 2018).

[Insert Table 5 about here]

As mentioned, some of the defaults may only be conditionally exogenous. Defaults associated with contagion, politics and the term of trade may only be exogenous if we control for the effect of these factors on economic outcomes, otherwise the exclusion restriction could be violated. The importance of these controls is clear when they are dropped from the overidentifying restrictions tests as the instruments are no longer exogenous at some horizons ($h = 5$ when partitioning by cause and $h \geq 3$ when partitioning by year).

III.D. Results

Armed with the new instrument, we estimate equation (5) using two-stage least squares (2SLS) and with one lag of the control variables.¹⁵ The solid line of Figure 2 plots the estimated response of real GDP at year $t + h$ to a default in year t . The shaded area represents the 90% confidence interval based on heteroskedasticity robust standard errors.¹⁶ In the aftermath of sovereign default there is a moderate but statistically significant contraction in economic activity. On impact, output falls by 1.6% ($t = -1.9$), declining to 3.2% in year 1 ($t = -2.6$) and to 3.3% in year

¹⁴ This is similar in spirit to Gabaix and Koijen’s (2020) partition of granular instrumental variables by odd- and even-numbered entities.

¹⁵ We think that a low lag is appropriate given that we only have annual data, but we confirm the robustness of our headline results to lag length below.

¹⁶ It is not necessary to correct the standard errors for autocorrelation in lag-augmented local projections models (Montiel Olea and Plagborg-Møller, 2021).

two ($t = -2.6$). However, the effect is no longer statistically different from zero by year five.

[Insert Figure 2 about here]

It is important to pause at this point and compare our estimates with those in the literature. It is fair to say that our results are on the lower end of those studies that find significantly negative and persistent effects of debt crises on GDP. Among the papers covering periods as long as ours, Reinhart and Rogoff (2009) estimate a larger loss than we do, starting at 3% on impact and rising to 5% over the medium run. Our results are higher than the unconditional estimates of Tomz and Wright (2007) who calculated a GDP deviation of approximately 1.5% from trend in the wake of external debt crises. Two other papers concentrate on the post-1970 period. Furceri and Zdzienicka (2012) estimate costs of 6% of GDP on impact and 10% in the medium run, while Kuvshinov and Zimmermann (2019) found a loss of 3% on impact, peaking at 4.4% after 5 years, and reverting thereafter. To more easily compare with these two papers, we re-estimate the model for the period of 1970 to 2010. The estimates reported in Table 6 are closer to Kuvshinov and Zimmermann's (2019) as output falls by 2.1% on impact and peaks at -4.1% after 3 years. The fact that our results are consistent with what other authors have found using different methods is indicative of the external validity of our approach over the longer time horizon.

[Insert Table 6 about here]

Apart from comparing our results to the existing literature, we are also interested in investigating potential mechanisms for the aggregate economic loss following defaults. The literature on sovereign debt considers several mechanisms connecting crises in the sovereign sector to disruption to the whole economy. A first consequence of default could be a reduction in international trade, either because trade credit might tighten or because creditors punish defaulters with worse trade conditions (Rose, 2005; Antràs and Foley, 2015). A second mechanism operates

through a spill over of increased sovereign risk (as measured by spreads) on access to outside finance by the corporate sector either through price rationing (Kaminsky and Schmukler, 2002; Reinhart and Rogoff, 2004; Das et al., 2010) or credit rationing (Arteta and Hale, 2008; Esteves and Jalles, 2016). Theory provides several arguments for this mechanism. Bulow and Rogoff's (1989) model justifies this with the overall penalty imposed on the sovereign. Other authors do not assume a reputational penalty from default but emphasize instead balance-sheet effects (Guembel and Sussman, 2009; Broner and Ventura, 2010) or a negative revision of expectations about the growth potential of the economy in the context of a model with incomplete information (Cole and Kehoe, 1998; Andrade, 2009; Sandleris, 2014).

Although it is challenging to test these many mechanisms with historical data, we investigate two of them here. First, we check directly for trade retrenchment by re-estimating equation (5) substituting GDP for trade flows as the dependent variable. The results are listed in Table 6 and plotted in Figure 3. There is a strong reaction of imports, which contract by 7.9% on impact, peak at -11.6% after one year, and revert to zero after four years. The decline in exports is weaker: -2.1% on impact and -6.1% after 5 years. However, unlike the response of imports, the fall in exports is not statistically significant at conventional levels. This implies that default brings on a current account reversal required to balance the external account, which is consistent with a number of other studies (Asonuma et al., 2016; Kuvshinov and Zimmermann, 2019). In line with these papers, the brunt of the adjustment is taken by imports. This squeeze could reflect either a fall in the volume of final goods or intermediate inputs imported by consumers and firms. Even if export levels are not significantly affected by a debt crisis, there is abundant evidence that defaults harm the export sector (Rose, 2005; Borensztein and Panizza, 2010). If a default is followed by tighter credit constraints on firms (Arteta and Hale, 2008; Sandleris, 2014; Esteves and Jalles, 2016), they will have trouble acquiring imported inputs, reducing their efficiency and production (Mendonza and Yue, 2012).

[Insert Figure 3 about here]

We then test for a second mechanism, domestic credit crunches, this time indirectly. We investigate the relationship between systemic banking crises and defaults. Kuvshinov and Zimmermann (2019) found that systemic banking crises that are triggered by defaults amplify the macroeconomic costs of debt crises.¹⁷ We follow these authors in concentrating on banking crises that start after defaults or that coincide with defaults that were not caused by the banking crises themselves. This is to avoid situations where defaults were triggered by fiscal interventions to shore up issues in the banking sector. In other words, these estimates are not plagued by the endogeneity from the ‘diabolic loop’ that often ties in sovereigns and the domestic banking sectors (Brunnermeier et al., 2016). This is only an indirect test of the mechanism as we restrict ourselves to extreme cases of disruption resulting in systematic banking crises. Nevertheless, the impact on the estimates is large and significant. While the short run costs of defaults associated with systemic banking crises are smaller than in the baseline estimates, the impulses are larger in economic and statistical terms from year three, underscoring the concern that sovereign crises may destabilize the domestic financial sector.

A major motivation of our narrative analysis is that the true cost of default is uncertain because of endogeneity. Therefore, a natural exercise is to compare the results of estimation of equation (5) by 2SLS and OLS. Figure 4 suggests that the qualitative result is the same, regardless of how the model is estimated: sovereign defaults lead to moderate and time-limited economic costs.¹⁸ However, the 2SLS point estimates are more negative at short horizons (see the last row in Table 6). The maximum difference between the two sets of estimates falls on year two when the 2SLS impulse response is larger by 1.1% of GDP. Why are the OLS estimates

¹⁷ They fail to find an amplification effect from currency or political crises.

¹⁸ This is not due to the imprecision of the 2SLS estimates, recently highlighted by Young (2021). In our case, the 2SLS are more precise (narrower confidence intervals) than the OLS ones.

smaller? One possible explanation that follows from Section II.A is that not all defaults are alike. It is to this question of heterogeneity that we now turn.

[Insert Figure 4 about here]

III.E. Does the Cause of the Crisis Matter?

Sovereign debt episodes are costly. But are these costs contingent on the underlying driver of the default? For example, centrally orchestrated moratoria are not designed to inflict economic damage but to lighten the burden of debt. A natural starting point is to estimate a variant of equation (5) that disaggregates the various sub-categories of default on the right-hand side:

$$\begin{aligned}
 y_{i,t+h} = & A_{i,h} + \Gamma_{t,h} + B_{1,h}AD_{i,t} + B_{2,h}AS_{i,t} + B_{3,h}C_{i,t} + B_{4,h}CM_{i,t} + B_{5,h}L_{i,t} + B_{6,h}P_{i,t} \\
 & + B_{7,h}T_{i,t} + B_{8,h}U_{i,t} + \Theta_h W_{i,t} + \varepsilon_{i,t+h}
 \end{aligned}
 \tag{8}$$

We plot the estimates of the coefficients associated with these sub-categories in Figure 5. Starting with endogenous crises, crises initiated after *AD* or *AS* shocks have the same immediate impact on GDP but differ markedly from year two. Whereas the path of GDP after *AD*-related crises recovers the initial losses, the aftermath of *AS* crises is consistently negative and possibly cumulative. As these shocks are endogenous, however, the results should be interpreted with caution.

[Insert Figure 5 about here]

In terms of the exogenous crises, the most salient division is between debt restructurings initiated in the context of general moratoria and all other types of exogenous crises. As expected, moratoria have a consistently positive effect on economic activity, with output rising by 4.2% on impact and growing by 9.1% after 5 years.¹⁹ Debt crises after legal events have a wide amplitude of effects at different

¹⁹ This result is similar to Reinhart and Trebesch (2016), who find that GDP per capita rises by 11% and 20% in emerging and advanced countries, respectively, five years after debt relief.

horizons; however, the estimates are based on a very limited number of cases. All other types of exogenous crises show a characteristic pattern of immediate and persistent negative impact, although the time pattern varies. Crises after terms of trade shocks, for instance, frontload economic costs relative to political crises, where output losses build up over time. Interestingly, unclassified (U) defaults are typically associated with rising output.

The impact of each type of episode in the estimate of β_h in equation (5) is a conflation of the individual coefficients in equation (8) and the relative frequency of each type of episode in the sample. In Appendix C we derive a decomposition of the OLS estimates of β_h in equation (5) as a weighted-average of the cause-specific effects:

$$\begin{aligned} \beta_h = & B_{1,h} \frac{\overline{AD}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{2,h} \frac{\overline{AS}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{3,h} \frac{\overline{C}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{4,h} \frac{\overline{CM}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{5,h} \frac{\overline{L}_{i,t}}{\overline{CRISIS}_{i,t}} \\ & + B_{6,h} \frac{\overline{P}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{7,h} \frac{\overline{T}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{8,h} \frac{\overline{U}_{i,t}}{\overline{CRISIS}_{i,t}} + \vartheta_h \end{aligned} \quad (9)$$

where the weights are the cause-specific contribution to the frequency of defaults and ϑ_h is a residual component that captures the effects of covariates in the model. In Figure 6 we show the contribution of each type of episode to the OLS coefficient in the main specification at different horizons. At short horizons, this decomposition shows that the larger share of the negative OLS coefficient is due to exogenous shocks (political and terms-of-trade). The contrarian effect of moratoria and AD shocks is also evident, although the later only from the second year. At longer horizons, however, the negative impact of crises initiated by AS shocks outweighs singlehandedly the positive effect of other causes and accounts for more than half of the size of the OLS estimate. This is the combined result of the persistent negative effect of these crises (Figure 5) and of their high frequency

in the sample (Table 2).²⁰ Since we classified AS shocks as endogenous, this decomposition also explains why OLS estimates are smaller, in absolute value, than the 2SLS ones up to four years after a debt crisis (Figure 4).

In general, this decomposition underlines the heterogeneity of debt crises by their causes. Apart from moratoria, which have an expected positive impact, we find that crises initiated by pure demand shocks lead to relatively mild contractions, which are quickly reversed. Shocks that affect domestic productivity or that impair the competitiveness of the traded sector have more negative and persistent effects.

[Insert Figure 6 about here]

IV. Robustness

In this section, we investigate whether our results are sensitive to sample composition, crisis classifications, crisis chronologies and control variables.

IV.A. Alternative Samples

A constant concern of econometric analysis is that the results are influenced by outliers. In large samples, such as ours, the risk is reduced but remains. In order to address this concern, we start by plotting the partial association between real GDP and the fitted values from the first stage regression at various horizons. We do so by estimating the following series of regressions (Romer and Romer, 2017):

1. Regress real GDP ($y_{i,t+h}$) on the fixed effects, $\alpha_{i,h}$ and $\gamma_{t,h}$, and the set of controls, $W_{i,t}$, for each horizon; extract the residuals.
2. Regress defaults ($CRISIS_{i,t}$) on the instrument, $z_{i,t}$, the fixed effects, $\alpha_{i,h}$ and $\gamma_{t,h}$, and the set of controls, $W_{i,t}$; extract the predicted values.
3. Regress $\widehat{CRISIS}_{i,t}$ on the fixed effects, $\alpha_{i,h}$ and $\gamma_{t,h}$, and the set of controls, $W_{i,t}$, for each horizon; extract the residuals.

²⁰ In contrast, the contribution of rare events, such as crises driven by legal decisions, moratoria or contagion, is correspondingly small.

Figure 7 plots the results for horizons of 0, 2 and 4 years. The real GDP residuals from step 1 are plotted on the y -axis, the crisis residuals from step 3 are on the x -axis. As $CRISIS_{i,t}$ is a dummy variable, the points are scattered around 0 and 1 along the x -axis. The largest outliers are labelled to help identify the most extreme times and places.

[Insert Figure 7 about here]

In order to systematically explore how outliers might influence our results, we estimate a number of additional specifications. The first drops the outlier cases labelled in Figure 7. The second removes the common outlying countries: Chile, Greece and Nicaragua. The third and fourth omit potential outlying periods: the World Wars (1914-8 and 1939-45) and the Great Depression (1931-3). The results are reported in Table 7. Excluding extreme observations slightly reduces the estimated maximum effects. Excluding outlying countries and the World Wars does not alter the peak losses. Interestingly, excluding the Great Depression increases the estimated peak impact. This may be a confirmation of Lindert and Morton's (1989) conclusion that the costs of defaults are lower when countries default together, rather than in isolation. The 1930s had the largest concentration of defaults in the sample period.²¹ Despite these variations, the impulse responses are statistically significant at most horizons in all cases.

[Insert Table 7 about here]

Moratoria are, by their very origin, different from other debt crises. Indeed, moratoria can avert debt crises and decrease the aggregate costs from debt restructuring. Despite the fact that debt crises associated with moratoria are included in all the standard default chronologies, we attempt here to separate the two. If we exclude defaults involved in centrally orchestrated moratoria from the sample, we obtain estimates that are larger than the baseline results by 0.5 to 0.9

²¹ Between 1930 and 1931, 42% of countries defaulted on their external debts.

percentage points (last row of Table 7), consistent with the positive impact of moratoria on GDP that we identified in Figure 5.

IV.B. Alternative Classifications

An important question is how accurate our classification is. One possibility is that we have misclassified an unknown subset of crises. As the classification is the basis for an instrumental variable, this should not be problematic as the 2SLS assumptions merely require that the instrument be correlated with the true shock, whereas if the classification is interpreted as a direct observation of the true shock, then OLS estimation requires that the correlation be perfect (Mertens and Ravn, 2013). In order to explore any bias associated with this possibility, we reclassify a random fraction of crises to be exogenous or endogenous.²² Figure 8 shows the distribution of estimated impulse responses for horizons 0, 2 and 4. At years 0 and 4, the distribution is centred around the baseline estimates. While there is more mass to the right of the baseline estimate at year 2, the vast majority of the estimates of β are negative.

[Insert Figure 8 about here]

Another possibility is that the errors in our classification are not random but systematic. It could be argued that by focusing on American and British sources, the reporting may be biased in favour of the creditors. This may translate into an inability to pay (an endogenous crisis) being misreported as an unwillingness to pay (an exogenous crisis). For example, if a draught caused a severe recession and, with it, the inability of the government to honour its debt commitments, the foreign press, pandering to western creditors, could interpret default as a political choice. This is an unlikely possibility for several reasons. First, sources such as the *Economist* and the *Financial Times* are independent (Butler and Freeman, 1968) and because of that remained trusted news outlets for financial market participants, who have an incentive to seek unbiased information (Hanna et al.,

²² We start by assuming that the fraction of misclassified crises is uniformly distributed between 5% and 95%.

2020). In our thought experiment, investors would have little to gain from being misled about the underlying fiscal capacity of the defaulter. Second, we have cross-referenced the accounts from primary sources with those from secondary sources. Third, Table 4 suggests that exogenous crises are unpredictable, while endogenous crises are highly predictable, which implies that the crises are not systematically misclassified. In any case, it is possible to bring further evidence to bear on the matter. Therefore, we randomly reclassify a random fraction of exogenous crises to be endogenous. Figure 9 shows that the distribution of impulse responses is once more centred on the baseline estimates.

[Insert Figure 9 about here]

A final possibility is that certain sub-categories of exogenous default may violate the contemporaneous and lead exogeneity conditions. As mentioned in Section III.C, this problem arises if the shocks causing default affect the economy through channels beyond default. This is a plausible concern in the cases of defaults caused by contagion, political changes or the terms of trade. In our preferred model, we accounted for this by explicitly controlling for these confounders. As a further exercise, we re-run equation (5) leaving one exogenous sub-category out at a time from the instrument. Table 8 shows that the results are robust to all of these exclusions.

[Insert Table 8 about here]

IV.C. Alternative Chronologies

A reliable record of crises is vital to estimate the macroeconomic effects of defaults. In the baseline model, we have used Reinhart and Rogoff's (2011) latest chronology. In the process of our narrative analysis, however, we noticed a number of instances where the news of default was reported prior to the date recorded by Reinhart and Rogoff (2011). A potential concern is that if a default was anticipated, the economic effects may begin in advance, potentially biasing the impulse response functions. To address this, we adjust the timing of $CRISIS_{i,t}$ and $z_{i,t}$ to

match the narrative record. As shown in the second row of Table 9, the impact of crises is slightly lessened in the short run but increases thereafter.

[Insert Table 9 about here]

In our study, we adopted the default chronology compiled by Reinhart and Rogoff (2011), but other long-run chronologies are available: Reinhart and Rogoff (2009), Lindert and Morton (1989), Purcell and Kaufman (1993) and Suter (1992). Appendix D provides a discussion and comparison of these chronologies. As each cover different countries and times, we re-estimate equation (5) substituting the crises dates from Reinhart and Rogoff (2011) with these alternatives over a common sample of 35 countries between 1870 and 1985 to enable comparison. For each run of the model, $CRISIS_{i,t}$ changes but the instrument, $z_{i,t}$, is fixed. The third row of Table 9 reports the results for the baseline chronology for this restricted sample for comparison, the fourth row downwards summarizes the effects associated with the other series.

The estimates in the restricted sample imply larger peak losses. Comparing the first and third rows in Table 9, the maximum GDP costs rise from 3.3 to 3.7%. However, these larger responses revert faster than in the baseline sample, with all point estimates insignificant from year three. The shorter contraction is common to the estimates based on the four alternative chronologies, but we find large variation in the estimated sizes. The peak drop in the four cases ranges from of 4.1% based on Reinhart and Rogoff (2009) to 8.4% using Lindert and Morton (1989). Such a wide amplitude is a cautionary tale for empirical studies that somehow truncate the relevant sample of defaulting countries.

IV.D. Alternative Control Variables

An econometric model must strike a balance between possible omitted variable bias and the lost degrees of freedom arising from saturation. In this section, we investigate how variations in $W_{i,t}$ influence our results. Specifically, we experiment with three changes to the vector of controls: dropping controls, adding new

controls, and changing the definition of the only constructed control (contagion). In the last case we tried varying the weight on distance (to $\omega = 0.975$ and $\omega = 0.9999$) and substituting geographical distance with alternative proxies for distance, namely, sharing a common official or primary language, a border or a past colonial relationship.²³ In the models with extended controls, we experimented with increasing the lag length to 2 years and 5 years (based on the minimization of the Akaike and Bayesian information criteria), and with controlling for other crises (banking, currency, domestic debt and inflation), which could be twinned with sovereign debt crises and associated with economic fluctuations.²⁴

The results are presented in Table 10. In almost all variants the point estimates are smaller. The only exceptions are when we set $\omega = 0.9999$ and when we omit all controls. In most cases, the differences are small and the responses are economically and statistically significant in the aftermath of sovereign debt crises.

[Insert Table 10 about here]

V. Conclusion

In this paper we provide new evidence on the aggregate costs of sovereign debt episodes. As others before us, we use a long dataset of defaults (1870-2010) explored at annual frequency across 50 nations. To our knowledge, we are the first to address the endogeneity of default using the narrative method. Our qualitative results are in line with other studies that find significant output costs from debt episodes reverting to the pre-crisis level after five years. The consistency of our results with what other authors have found using different methods is indicative of the external validity of our approach. Even so, our estimates are at the lower bound of other papers finding a significant impact of defaults on economic activity.

²³ Values of ω below 0.975 result in estimates of contagion that are zero for all countries. Values above 0.9999 result in no variation in contagion across countries.

²⁴ We decided against including these twin crises markers in the main specification to prevent an issue of bad controls (Angrist and Pischke, 2009).

Output loss starts at 1.6% of GDP on impact, rises to 3.3% after two years and returns to zero after five years. One reason for our lower estimates is the time horizon of our estimation. Consistent with some recent papers, we find larger losses for defaults occurring since 1970. However, it is not clear whether more recent defaults are more costly than historical ones. First, because the confidence intervals of the two IRFs overlap, making it unclear whether the two sets of estimates are significantly different or not. Second, reconstructed GDP series for historical periods are probably more accurate at tracing growth trends than the amplitude of business cycles (Bolt et al., 2018). To the extent that historical GDP series may be excessively smooth at business cycle frequencies, this could bias down our estimates.

An advantage of the narrative approach is that it has fewer data requirements than alternative methods used in the literature to control for the endogeneity of debt crises, such as GMM or propensity score matching. Consistent and reliable narrative sources are available from early on and allow us to extend the time coverage of our study as far back as the available series of real GDP for the 50 nations included in the sample.

A second advantage is that the narrative approach allows us to explore the heterogeneity of debt episodes. Our classification of defaults reveals a large heterogeneity of costs by the cause of default. Higher costs are associated with defaults initiated by shocks to the underlying productivity or competitiveness of an economy (domestic supply shocks, political crises, adverse terms of trade shocks). At the other extreme, countries that default as part of centrally orchestrated moratoria experience a significant boost to their output up to five years after, which is consistent with the debt relief aim of these programmes. Between these extremes, we found that defaults associated with aggregate demand shocks, legal rulings or contagion have moderately negative or no effect on the path of GDP post default. Considering how difficult it is to identify pure cases of contagion, our negative estimates from this type of crisis are worthy of further investigation.

Two implications derive from the heterogeneity of outcomes that we identify. First, heterogeneity has an obvious bearing on policy. Recognizing that not all defaults are created alike can potentially improve the targeting of policy intervention ex post to smooth the impact of, or prevent spill overs from, debt crises. Intervention following debt crises initiated by demand shocks is probably less warranted than in the case of defaults leading to more persistent consequences. Second, our results underscore that heterogeneity may be a greater obstacle to benchmarking the costs of defaults than endogeneity. This can be particularly relevant for theoretical research that calibrates the typical costs of defaults from particular debt episodes.

Exploring the heterogeneity of defaults also allows us to break down the sources of the potential endogeneity bias in the estimation of the aggregate costs of debt episodes. Other methods correct the bias but do not allow for its decomposition. We found an endogeneity bias averaging 0.4% of GDP over the five years after a default (with a maximum of 1.1% after two years). Contrary to expectation, OLS underestimates the aggregate costs of a default up to four years after each episode. Whereas it is intuitive to expect that endogenous defaults would bias the estimates up, the evidence is mixed. Our analysis shows that this is due to the backloading of the impact of endogenous AS shocks. Unlike other shocks, crises initiated in the domestic supply side have cumulative effects that dominate the impulse response from year four after a default. In terms of mechanisms, we identify a distinct current account reversal lasting five years, on average. Consistent with previous research, we also find that default episodes that trigger subsequent banking crises have larger aggregate costs, underscoring the concern that debt crises can destabilise domestic banks and lead to credit crunches.

Finally, our results survive a number of robustness checks: sample composition, outliers, choice of covariates, classification of crises and chronologies of defaults. Perhaps the most interesting result from these is the significant impact of sample composition and of the dating of defaults on the estimates. All else equal, restricting the sample to a group of 35 nations covered by all available chronologies increases the maximum GDP loss by 12% relative to our baseline results. This

points to a moderate sample selection issue, as smaller defaults seem to have been left out of the restricted sample. However, differences in dating the crises within the restricted sample have a much larger impact on the estimates than the sample composition. Depending on the chronology, we found a uniform increase in the estimates ranging from 24% to 154% of our baseline results of the peak loss. Part of this discrepancy comes down to different definitions of defaults (Tomz and Wright, 2013). Arguably, more restrictive definitions will tend to censor moderate episodes, biasing the resulting estimates up. But another fraction of the difference is due to timing issues. As argued by Romer and Romer (2017), coding crises as a binary variable can introduce measurement error. If the error is randomly distributed it can lead to attenuation bias. In our work with narrative sources, we came across a number of instances where the news of default was reported prior to the date recorded in the standard chronologies. Such cases are bound to influence the estimate of the impulse responses. Further research on how to define and date sovereign debt episodes is needed.

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Table 1. A Classification of Sovereign Debt Crises

Classification
<i>Endogenous (N)</i>
Aggregate demand shocks (<i>AD</i>)
Aggregate supply shocks (<i>AS</i>)
<i>Exogenous (X)</i>
Centrally orchestrated moratoria (<i>CM</i>)
Contagion (<i>C</i>)
Legal (<i>L</i>)
Political (<i>P</i>)
Terms of trade (<i>T</i>)
<i>Unclassified (U)</i>

Notes: This table presents a classification of sovereign debt crises.

Table 2. The Causes of Sovereign Debt Crises, 1870-2010 (%)

	1870-1945	1946-2010	1870-2010
<i>Endogenous (N)</i>	21.3	47.9	35.6
Aggregate demand (<i>AD</i>)	12.5	10.1	11.2
Aggregate supply (<i>AS</i>)	8.8	37.8	24.4
<i>Exogenous (X)</i>	77.5	47.9	61.5
Centrally orchestrated moratoria (<i>CM</i>)	1.9	2.1	2.0
Contagion (<i>C</i>)	1.9	5.9	4.0
Legal (<i>L</i>)	3.5	0	1.6
Political (<i>P</i>)	46.7	21.3	33.0
Terms of trade (<i>T</i>)	23.5	18.6	20.9
<i>Unclassified (U)</i>	1.3	4.3	2.9

Notes: This table summarizes the causes of sovereign debt crises in a sample of 50 defaulting countries between 1870 and 2010.

Source: Appendix A and Reinhart and Rogoff (2011).

Table 3. Data Sources

Variable	Source	Description	Coverage (%)
Real GDP	Bértola and Ocampo (2012), Bolt et al. (2018) and World Bank (2020)	\$ thousands (2011 prices)	84.46
Real GDP per capita	Barro and Ursúa (2008), Bértola and Ocampo (2012) and Bolt et al. (2018)	\$ (2011 prices)	87.45
Population	Bolt et al. (2018)	Thousands	87.76
Real imports	Federico and Tena-Junguito (2019), United Nations (2020), World Bank (2021)	\$ (2010 prices)	78.69
Real exports	Federico and Tena-Junguito (2019), United Nations (2020), World Bank (2021)	\$ (2010 prices)	79.73
Sovereign debt crises	Reinhart and Rogoff (2011)	{0,1}	100
Contagion	Constructed from Mayer and Zignago (2011) and Reinhart and Rogoff (2011)	Measures based on distance, contiguity, colonial relationships and common languages	100
Polity	Marshall et al. (2019)	-10 to 10	97.44
Terms of trade	Blattman et al. (2007), Federico and Tena-Junguito (2019), International Monetary Fund (2020a), United Nations (2020)	2012 = 100	86.16
Wars	Sarkees and Wayman (2010)	{0,1}, intra-state, inter-state and extra-state wars	100
Inflation crises	Reinhart and Rogoff (2011)	{0,1}	100
Debt-GDP ratio	Reinhart and Rogoff (2011), International Monetary Fund (2020b)	%	73.69
Independence	Reinhart and Rogoff (2011)		100

Notes: This table details the data used in Section III.

Table 4. Predicting Endogenous and Exogenous Crises

	Endogenous	Exogenous
<i>Real GDP growth</i>		
Lag		
1	-8.25 (2.71)	-2.31 (1.92)
2	-4.12 (2.90)	1.31 (2.29)
3	0.82 (2.07)	2.72 (2.34)
<i>Inflation</i>		
Lag		
1	1.80 (0.51)	-0.07 (0.42)
2	0.11 (0.57)	0.07 (0.48)
3	-0.77 (0.52)	-0.39 (0.45)
<i>F</i> -statistic	32.95	4.49
<i>N</i>	2,694	4,013

Notes: This table shows the results of a logit model of endogenous or exogenous defaults for 50 defaulting countries between 1870 and 2010 based on estimation of equation (7). Standard errors are in parentheses.

Table 5. Tests of Overidentifying Restrictions

Instruments		Horizon					
		0	1	2	3	4	5
(1)	Exogenous by cause	0.96	0.67	0.99	0.27	0.57	0.24
(2)	Exogenous by year	0.23	0.55	0.86	0.20	0.33	0.46
(3)	Exogenous by cause excluding controls	0.94	0.96	0.71	0.12	0.21	0.10
(4)	Exogenous by year excluding controls	0.47	0.94	0.44	0.04	0.04	0.05

Notes: This table shows the *p*-values from tests of overidentifying restrictions based on 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010.

Table 6. The Effect of Sovereign Default on Economic Outcomes

Specification	Horizon					
	0	1	2	3	4	5
(1) Baseline	-1.6 (0.9)	-3.2 (1.2)	-3.3 (1.3)	-2.7 (1.5)	-3.0 (1.6)	-2.1 (1.7)
(2) 1970-2010	-2.1 (1.1)	-3.5 (1.4)	-3.5 (1.6)	-4.1 (1.8)	-3.7 (2.0)	-3.9 (2.1)
(3) Exports	-2.1 (2.1)	-4.4 (2.9)	-0.6 (3.4)	-2.7 (3.7)	-6.4 (4.1)	-6.1 (4.3)
(4) Imports	-7.9 (2.0)	-11.6 (2.9)	-7.3 (3.4)	-8.6 (3.8)	-7.5 (4.1)	-6.6 (4.3)
(5) Banking crises $\pm$ 1 year of default	-0.5 (1.2)	-2.8 (1.8)	-3.5 (2.2)	-4.6 (2.6)	-6.6 (2.9)	-4.8 (3.2)
(6) OLS	-1.5 (0.7)	-2.3 (0.9)	-2.2 (1.2)	-1.9 (1.4)	-2.6 (1.6)	-2.8 (1.7)

Notes: This table shows the response of real GDP (columns 1, 2, 5 and 6) or real trade flows (3 and 4) to sovereign default based on estimation of equation (5). Robust standard errors are in parentheses.

Table 7. The Effect of Sovereign Default on Real GDP: Alternative Samples

Specification	Horizon					
	0	1	2	3	4	5
(1) Baseline	-1.6 (0.9)	-3.2 (1.2)	-3.3 (1.3)	-2.7 (1.5)	-3.0 (1.6)	-2.1 (1.7)
(2) Excluding outliers	-0.6 (0.6)	-1.9 (0.9)	-2.5 (1.1)	-2.6 (1.1)	-3.0 (1.3)	-2.4 (1.5)
(3) Excluding Chile, Greece and Nicaragua	-2.1 (0.9)	-3.0 (1.1)	-3.3 (1.2)	-2.3 (1.5)	-2.7 (1.5)	-2.1 (1.7)
(4) Excluding World Wars	-1.7 (0.9)	-3.3 (1.2)	-3.3 (1.3)	-2.8 (1.6)	-2.9 (1.6)	-2.2 (1.7)
(5) Excluding the Great Depression	-1.8 (0.9)	-3.3 (1.2)	-3.7 (1.4)	-4.4 (1.5)	-4.4 (1.6)	-4.2 (1.7)
(6) Excluding moratoria	-2.1 (0.9)	-3.7 (1.3)	-3.9 (1.3)	-3.3 (1.6)	-3.8 (1.6)	-3.0 (1.7)

Notes: This table shows the response of real GDP to sovereign default based on 2SLS estimation of equation (5) and alternative samples. Robust standard errors are in parentheses.

Table 8. The Effect of Sovereign Default on Real GDP: Alternative Classifications

Specification	Horizon					
	0	1	2	3	4	5
(1) Baseline	-1.6 (0.9)	-3.2 (1.2)	-3.3 (1.3)	-2.7 (1.5)	-3.0 (1.6)	-2.1 (1.7)
(2) Excluding contagion	-1.3 (0.9)	-2.9 (1.3)	-3.0 (1.4)	-2.5 (1.7)	-2.7 (1.7)	-1.6 (2.9)
(3) Excluding moratoria	-2.1 (0.9)	-3.8 (1.3)	-4.0 (1.3)	-3.3 (1.6)	-3.8 (1.6)	-3.0 (1.7)
(4) Excluding legal	-1.6 (0.9)	-3.3 (1.3)	-3.2 (1.3)	-2.4 (1.6)	-2.8 (1.6)	-2.2 (1.7)
(5) Excluding political	-1.4 (0.9)	-3.7 (1.6)	-3.2 (1.5)	-1.1 (2.1)	-2.2 (2.1)	-0.3 (2.3)
(6) Excluding terms of trade	-1.0 (1.4)	-1.8 (1.7)	-2.3 (1.9)	-3.9 (2.0)	-3.1 (2.1)	-3.4 (2.2)

Notes: This table shows the response of real GDP to sovereign default based on 2SLS estimation of equation (5), alternative classifications and a sample of 50 defaulting countries between 1870 and 2010. Robust standard errors are in parentheses.

Table 9. The Effect of Sovereign Default on Real GDP: Alternative Chronologies

Specification	Horizon					
	0	1	2	3	4	5
(1) Baseline	-1.6 (0.9)	-3.2 (1.2)	-3.3 (1.3)	-2.7 (1.5)	-3.0 (1.6)	-2.1 (1.7)
(2) Reinhart and Rogoff (2011): Alternative timing	-1.5 (0.6)	-3.6 (0.9)	-4.1 (1.2)	-3.4 (1.4)	-3.5 (1.5)	-3.4 (1.7)
(3) Reinhart and Rogoff (2011): 35 countries, 1870-1985	-1.9 (1.3)	-3.6 (1.7)	-3.7 (1.6)	-1.8 (2.1)	-2.1 (2.1)	-0.7 (2.2)
(4) Lindert and Morton (1989): 35 countries, 1870-1985	-4.0 (2.9)	-8.0 (4.0)	-8.4 (3.8)	-4.0 (4.8)	-4.7 (4.5)	-1.8 (4.8)
(5) Purcell and Kaufman (1993): 35 countries, 1870-1985	-2.6 (1.9)	-5.1 (2.5)	-5.2 (2.5)	-2.5 (3.1)	-3.0 (3.0)	-1.0 (3.1)
(6) Reinhart and Rogoff (2009): 35 countries, 1870-1985	-2.0 (1.4)	-4.0 (1.9)	-4.1 (1.9)	-1.9 (2.4)	-2.3 (2.3)	-0.8 (2.4)
(7) Suter (1992): 35 countries, 1870-1985	-3.4 (2.5)	-6.8 (3.6)	-6.8 (3.4)	-3.1 (4.3)	-3.6 (4.1)	-1.0 (4.3)

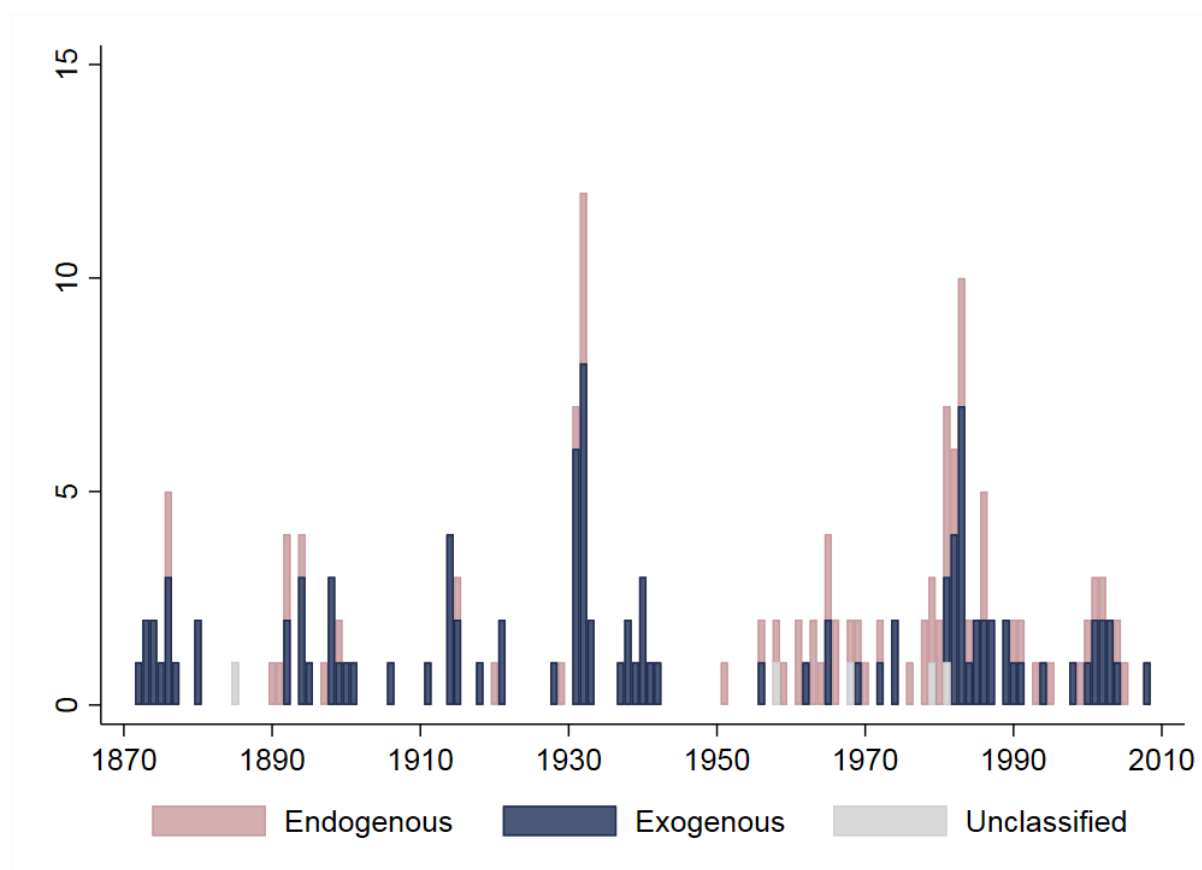
Notes: This table shows the response of real GDP to sovereign default based on 2SLS estimation of equation (5) and alternative samples. Robust standard errors are in parentheses.

Table 10. The Effect of Sovereign Default on Real GDP: Alternative Control Variables

	Specification	Horizon					
		0	1	2	3	4	5
(1)	Baseline	-1.6 (0.9)	-3.2 (1.2)	-3.3 (1.3)	-2.7 (1.5)	-3.0 (1.6)	-2.1 (1.7)
(2)	No controls	-3.3 (3.7)	-4.8 (3.8)	-4.5 (3.8)	-5.2 (3.8)	-6.3 (3.9)	-6.6 (3.9)
(3)	2 lags	-1.7 (0.9)	-3.2 (1.2)	-3.1 (1.3)	-2.6 (1.6)	-2.6 (1.6)	-2.0 (1.7)
(4)	5 lags	-1.6 (0.9)	-3.1 (1.2)	-3.0 (1.3)	-2.4 (1.6)	-2.5 (1.7)	-1.8 (1.8)
(5)	Contagion: $\omega = 0.975$	-1.7 (0.9)	-3.3 (1.2)	-3.3 (1.3)	-2.8 (1.5)	-3.1 (1.6)	-2.4 (1.7)
(6)	Contagion: $\omega = 0.9999$	-1.9 (0.9)	-3.6 (1.2)	-3.8 (1.3)	-3.1 (1.6)	-3.3 (1.6)	-2.5 (1.7)
(7)	Contagion: Common language	-1.7 (0.9)	-3.3 (1.2)	-3.3 (1.3)	-2.8 (1.6)	-3.1 (1.6)	-2.3 (1.7)
(8)	Contagion: Contiguous	-1.6 (0.9)	-3.2 (1.2)	-3.2 (1.3)	-2.6 (1.6)	-2.9 (1.6)	-2.0 (1.7)
(9)	Contagion: Past colonial relationship	-1.5 (0.9)	-3.1 (1.2)	-3.1 (1.3)	-2.6 (1.6)	-2.9 (1.6)	-2.1 (1.7)
(10)	Controlling for other economic crises	-1.2 (0.9)	-2.6 (1.2)	-2.7 (1.3)	-2.2 (1.6)	-2.4 (1.6)	-1.4 (1.7)

Notes: This table shows the response of real GDP to sovereign default based on 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010. Robust standard errors are in parentheses.

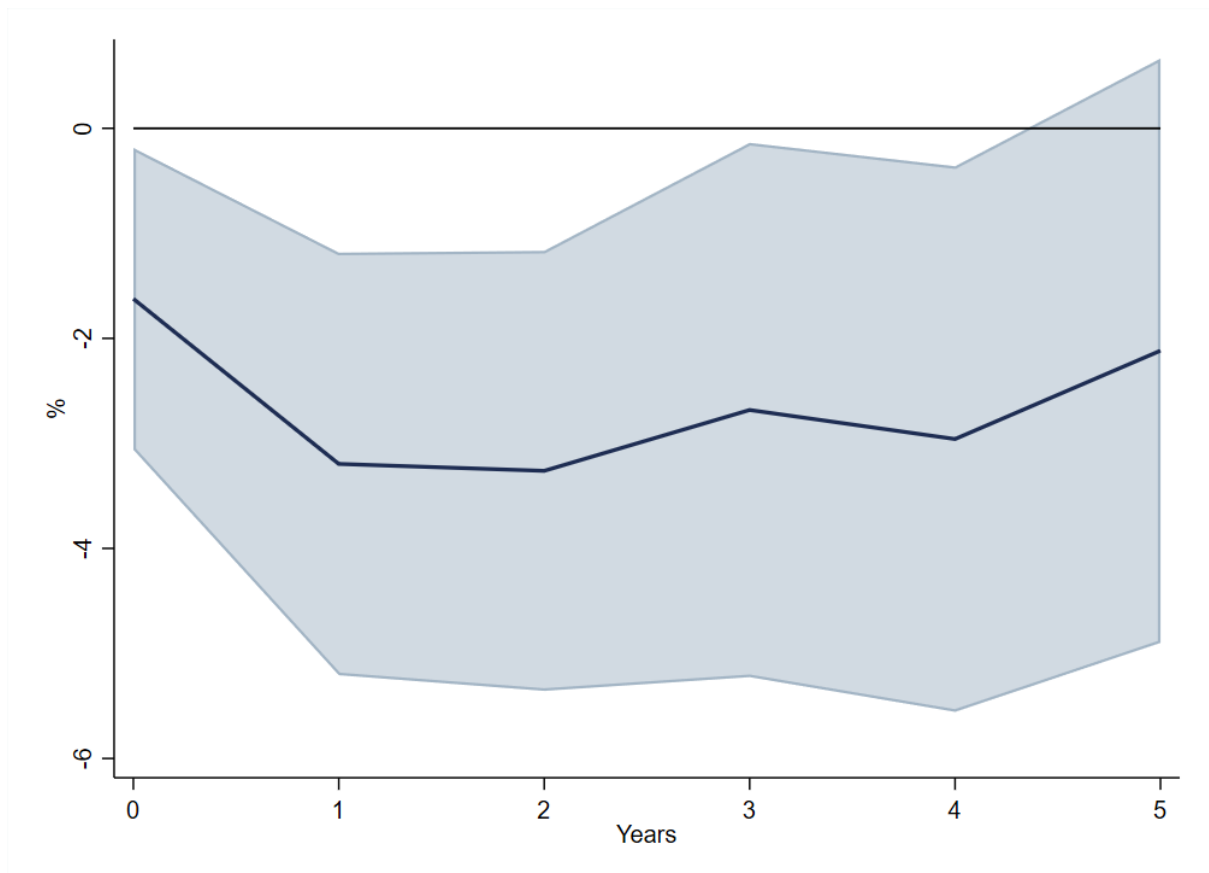
Figure 1. A Decomposition of Sovereign Debt Crises, 1870-2010



Notes: This figure shows a decomposition of sovereign debt crises into endogenous, exogenous and unclassified categories for 50 defaulting countries between 1870 and 2010.

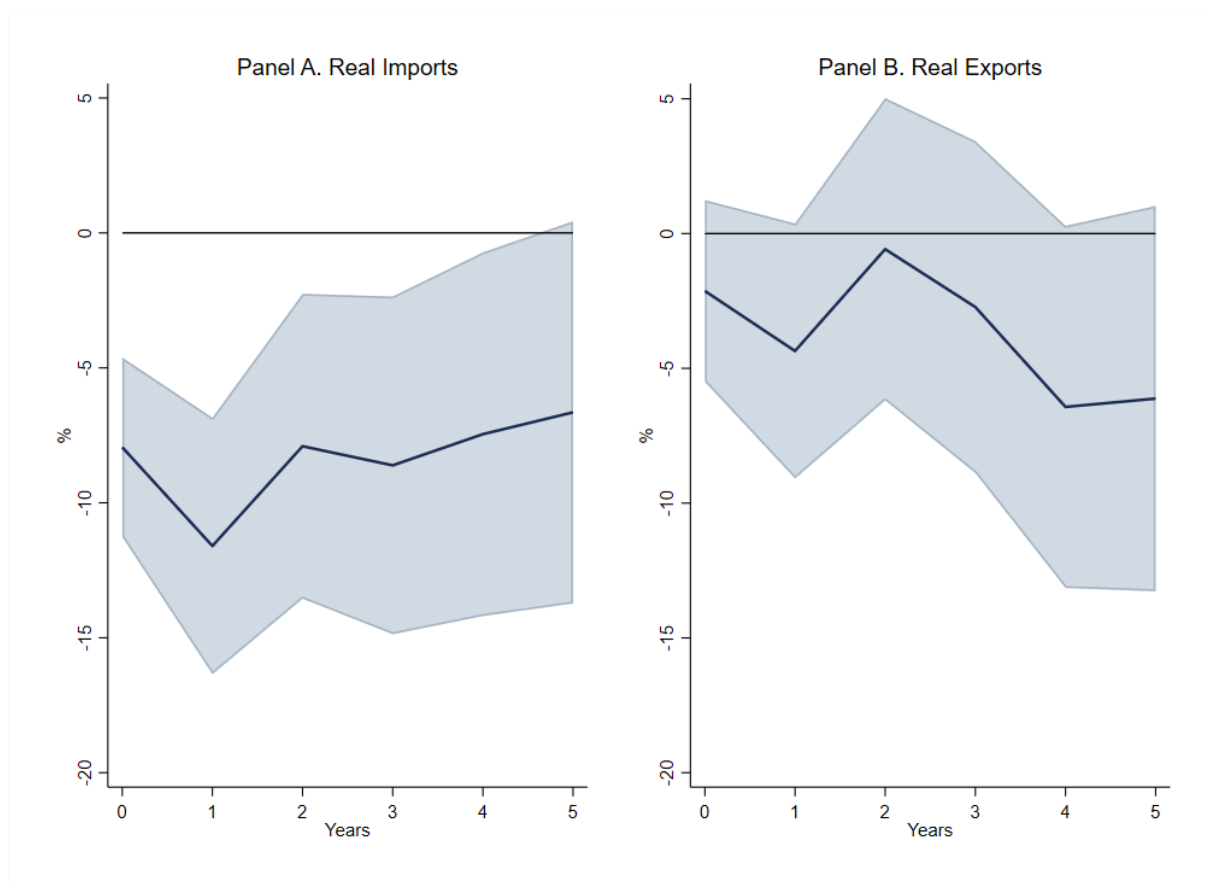
Sources: Appendix A and Reinhart and Rogoff (2011).

Figure 2. The Effect of Sovereign Default on Real GDP



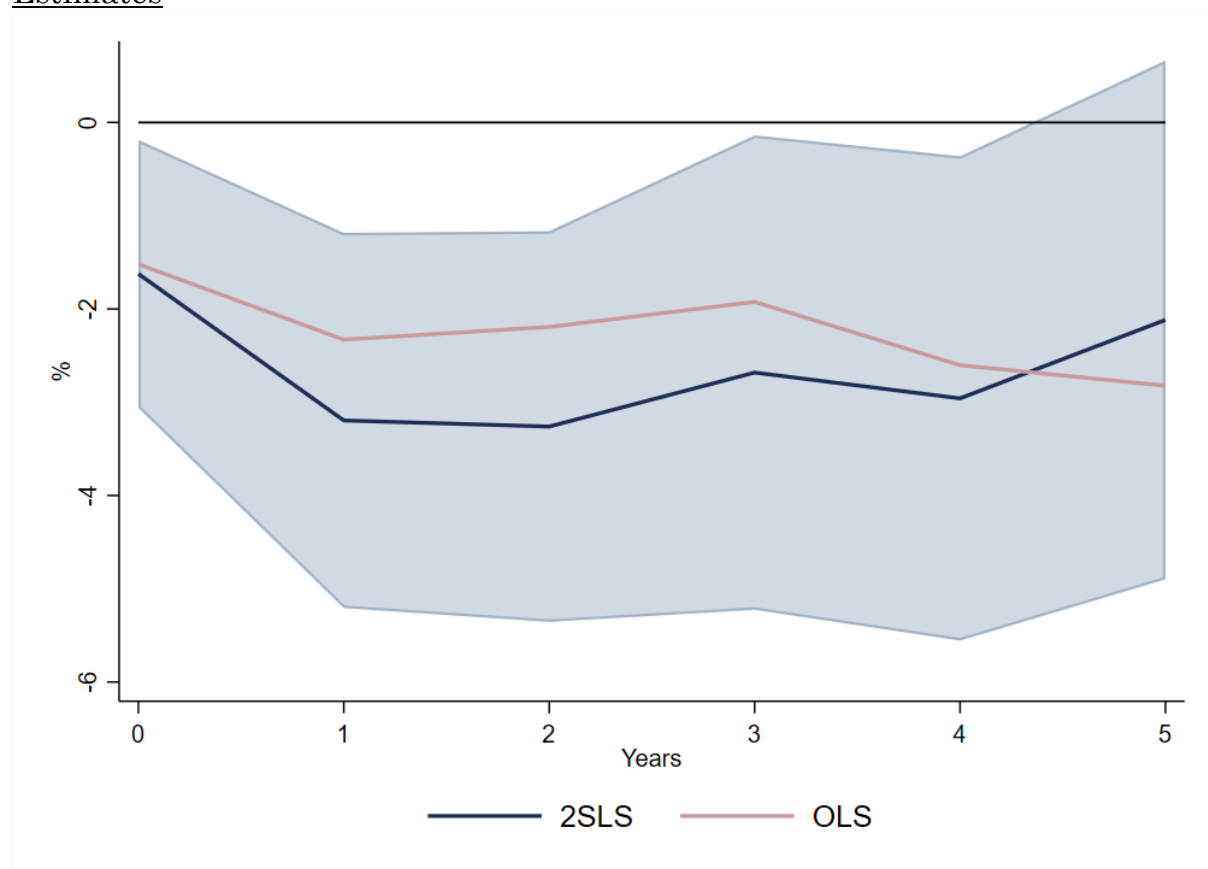
Notes: This figure shows the response of real GDP to sovereign default based on 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010. The shaded area spans the 90% confidence interval based on robust standard errors.

Figure 3. The Effect of Sovereign Default on International Trade



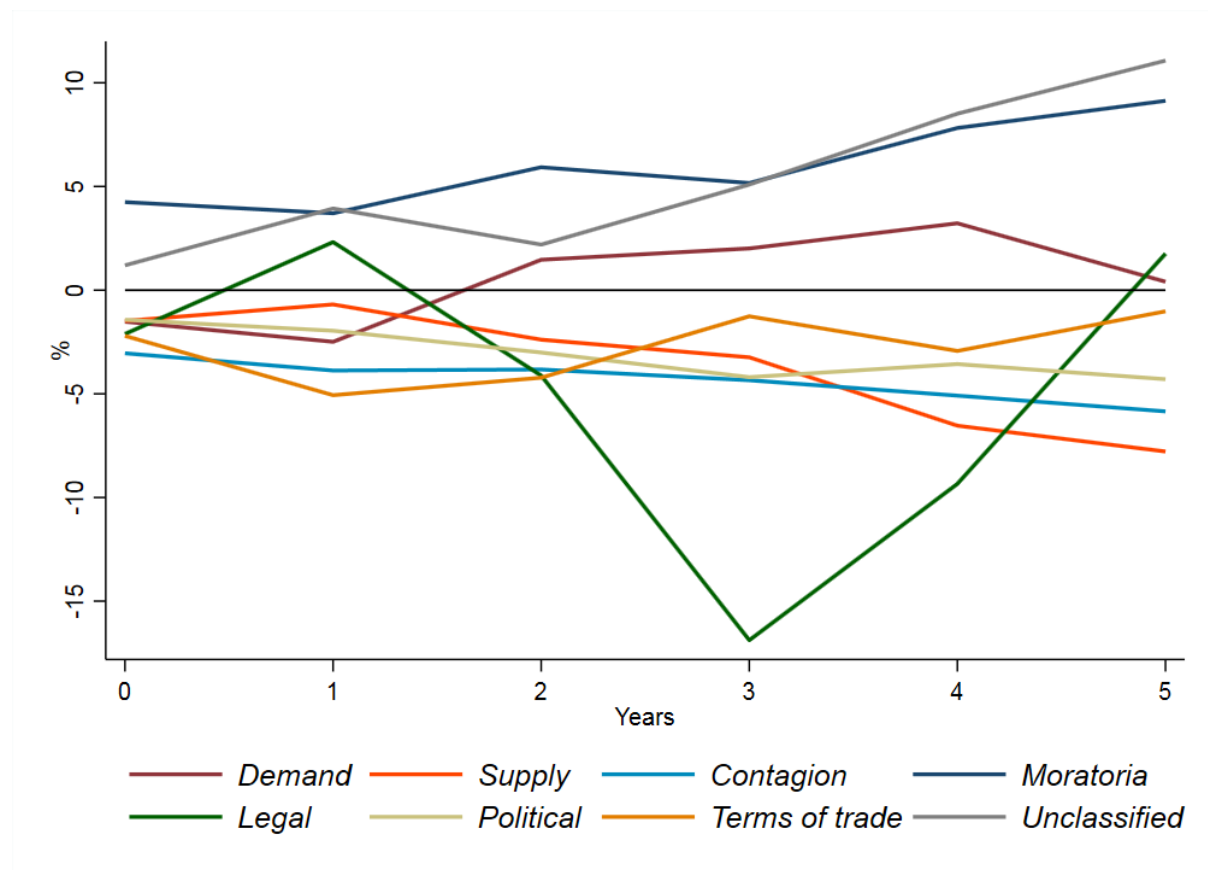
Notes: This figure shows the response of real imports and exports to sovereign default based on 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010. The shaded areas span the 90% confidence interval based on robust standard errors.

Figure 4. The Effect of Sovereign Default on Real GDP: 2SLS versus OLS Estimates



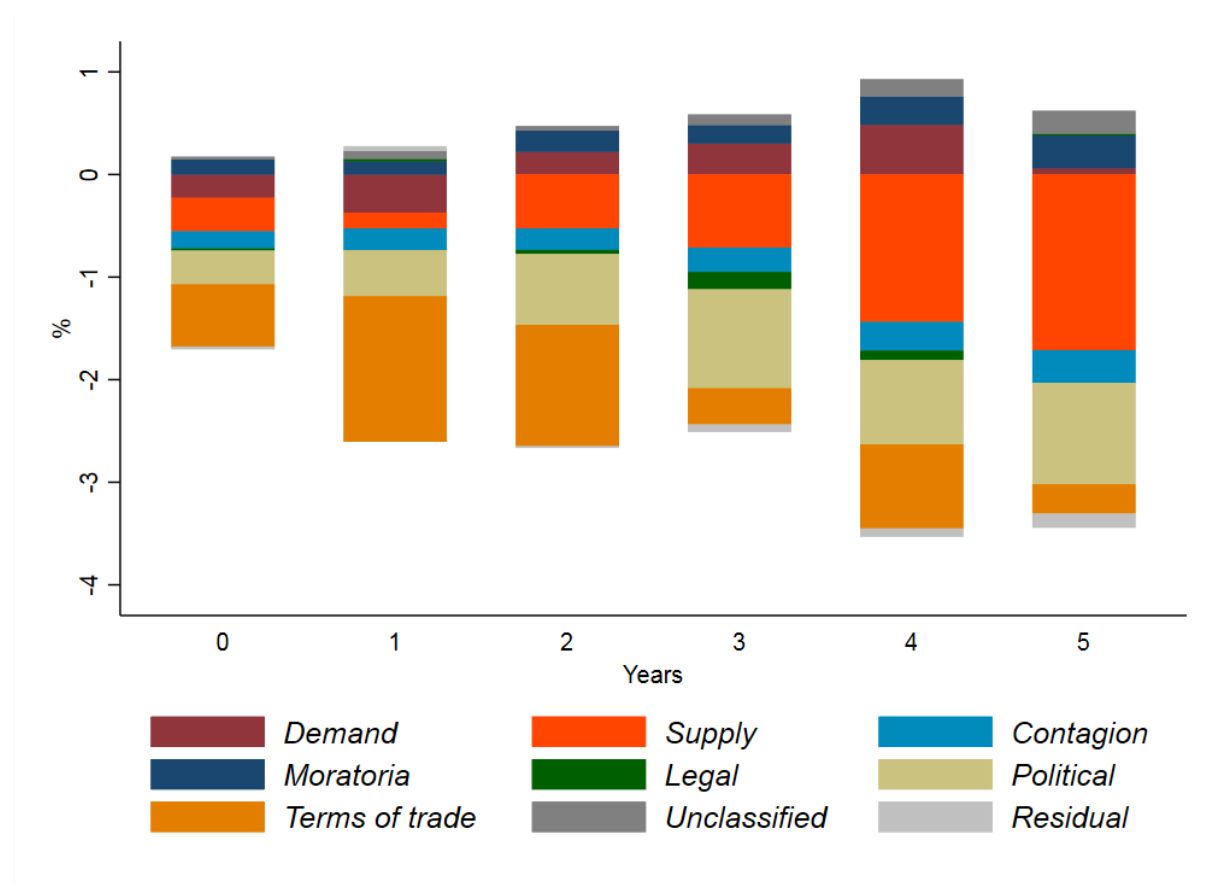
Notes: This figure shows the response of real GDP to sovereign default based on estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010. The navy line is the 2SLS estimates. The pink line is the OLS estimates. The shaded area spans the 90% confidence interval based on the baseline model and robust standard errors.

Figure 5. The Effect of Sovereign Default on Real GDP: Heterogeneity



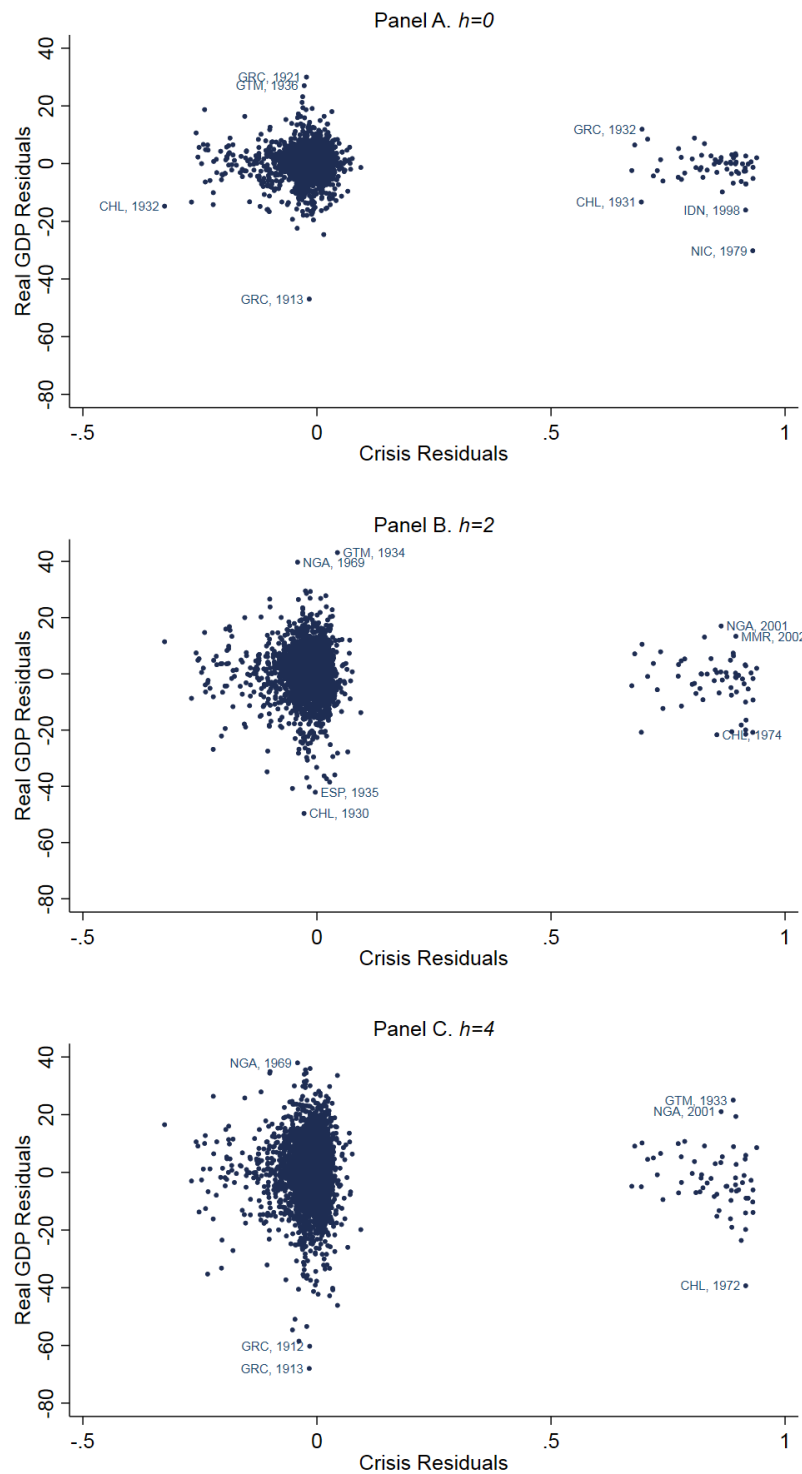
Notes: This figure shows the response of real GDP to sovereign default by cause based on OLS estimation of equation (8) and a sample of 50 defaulting countries between 1870 and 2010.

Figure 6. Decomposition of the OLS Estimates of β_h



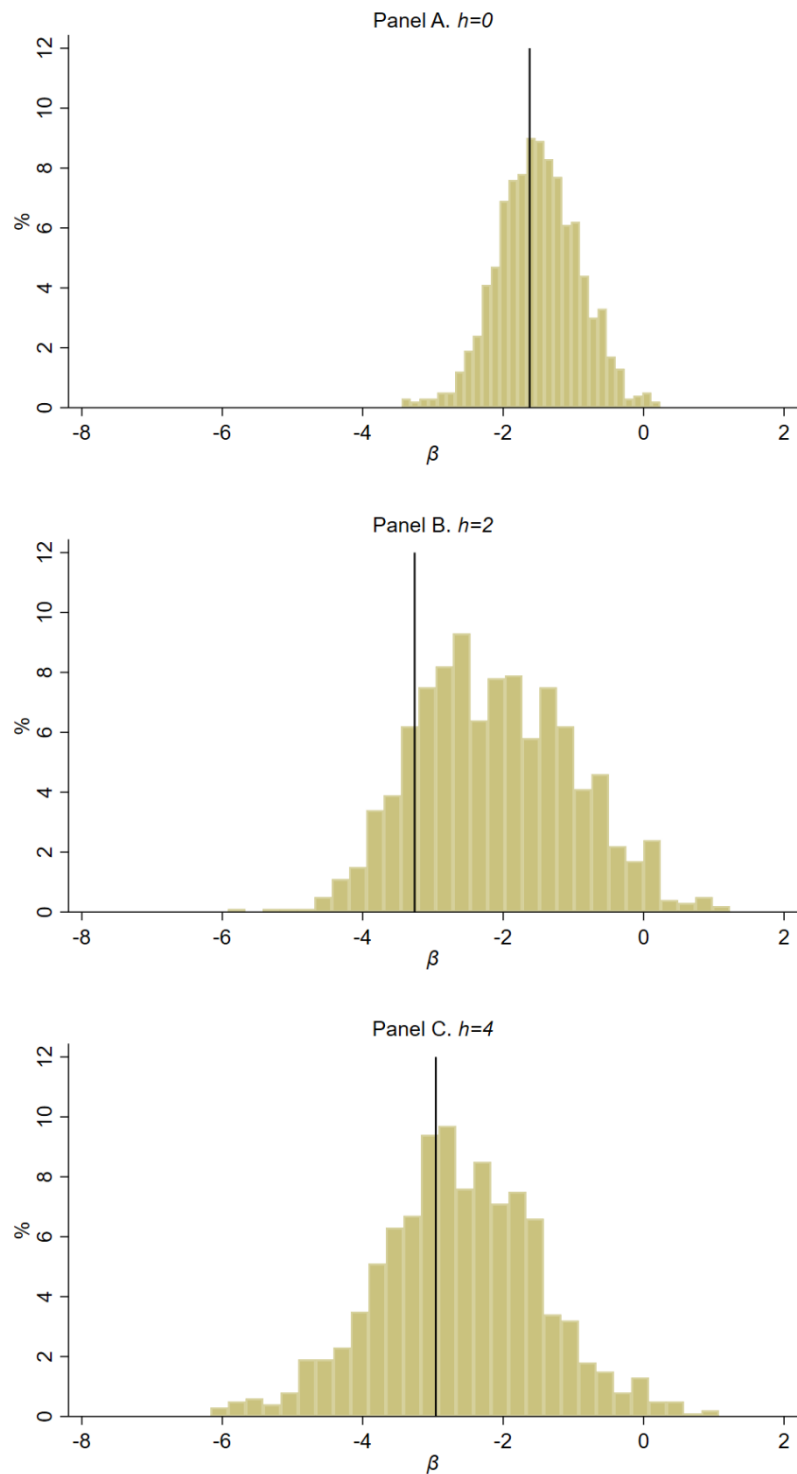
Notes: This figure shows a decomposition of the OLS estimates of β_h by cause based on equations (5), (8) and (9) and a sample of 50 defaulting countries between 1870 and 2010.

Figure 7. Partial Association of Real GDP and Crises



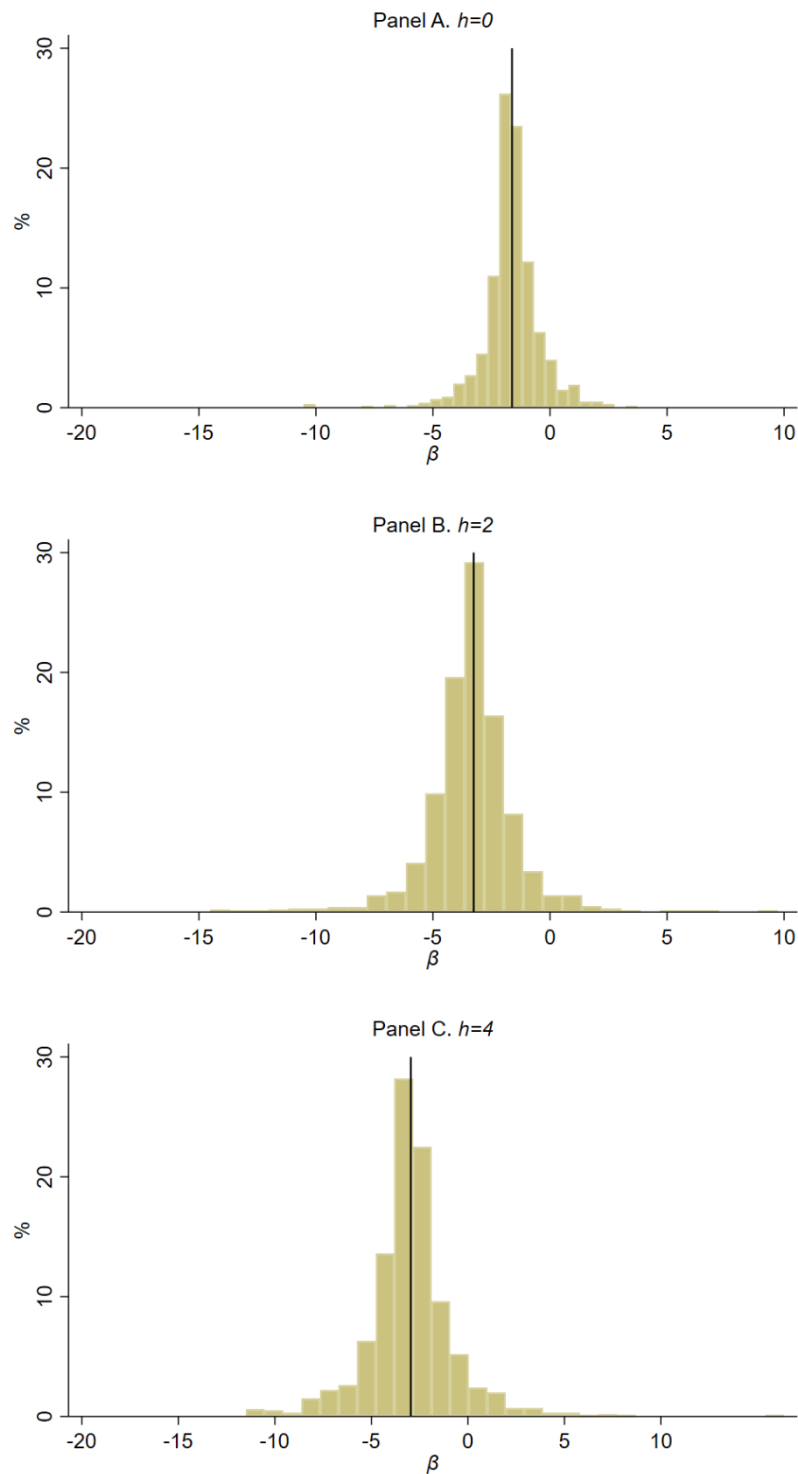
Notes: This figure shows the partial association between real GDP at horizons $t + h$ and sovereign debt crises at time t based on variants of 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010.

Figure 8. The Distribution of β : Two-way Reclassification



Notes: This figure shows the distribution of β from 1,000 runs, where $z_{i,t}$ is randomly reclassified from endogenous to exogenous or from exogenous to endogenous, based on 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010. The black line is the baseline estimate.

Figure 9. The Distribution of β : One-way Reclassification



Notes: This figure shows the distribution of β from 1,000 runs, where $z_{i,t}$ is randomly reclassified from exogenous to endogenous, based on 2SLS estimation of equation (5) and a sample of 50 defaulting countries between 1870 and 2010. The black line is the baseline estimate.

Appendix A. A Narrative Analysis of Sovereign Debt Crises

To be published separately.

Appendix B. Data

This appendix details the variables, coverage, sources and transformations for each country in the sample.

Algeria (DZA)

Real GDP: 1970-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1970-2016 (Bolt et al., 2018)

Population: 1970-2016 (Bolt et al., 2018)

Real imports: 1960-2019 (World Bank, 2021)

Real exports: 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1962-2018 (Marshall et al., 2019)

Terms of trade: 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1964-2010 (Reinhart and Rogoff, 2011)

Independence: 1962 (Reinhart and Rogoff, 2011)

Angola (AGO)

Real GDP: 1975-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1975-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 2000-18 (World Bank, 2021)

Real exports: 2000-18 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1975-2018 (Marshall et al., 2019)

Terms of trade: 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1995-2018 (International Monetary Fund, 2020b)

Independence: 1975 (Reinhart and Rogoff, 2011)

Argentina (ARG)

Real GDP: 1875-1900 (Bértola and Ocampo, 2012). 1900-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1875-1900 (Bértola and Ocampo, 2012). 1900-2016 (Bolt et al., 2018)

Population: 1875-1900 (real GDP divided by real GDP per capita). 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011). 1866 linearly interpolated as missing

Independence: 1816 (Reinhart and Rogoff, 2011)

Austria (AUT)

Real GDP: 1870-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1870-2016 (Bolt et al., 2018)

Population: 1870-2016 (Bolt et al., 2018)

Real imports: 1920-37 (Federico and Tena-Junguito, 2019). 1948-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)

Real exports: 1920-37 (Federico and Tena-Junguito, 2019). 1948-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1948-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1880-2010 (Reinhart and Rogoff, 2011). 1914-23 and 1938-47 missing

Bolivia (BOL)

Real GDP: 1900-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1890-2016 (Bolt et al., 2018)
Population: 1900-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a). 1939-61 missing
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1914-2010 (Reinhart and Rogoff, 2011). 1945-6 linearly interpolated as missing. 1953-69 missing
Independence: 1825 (Reinhart and Rogoff, 2011)

Brazil (BRA)

Real GDP: 1870-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1870-2016 (Bolt et al., 2018)
Population: 1870-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1945-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a). 1950-61 missing
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011)
Independence: 1822 (Reinhart and Rogoff, 2011)

Central African Republic (CAF)

Real GDP: 1955-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1955-2016 (Bolt et al., 2018)
Population: 1955-2016 (Bolt et al., 2018)
Real imports: 2009-2019 (World Bank, 2021)
Real exports: 2009-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1960-2018 (Marshall et al., 2019)
Terms of trade: 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1970-2018 (International Monetary Fund, 2020b)
Independence: 1960 (Reinhart and Rogoff, 2011)

Chile (CHL)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1865-2016 (Bolt et al., 2018)
Population: 1865-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011)

Independence: 1818 (Reinhart and Rogoff, 2011)

China (CHN)

Real GDP: 1890-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1890-1950 (Barro and Ursúa, 2008). 1950-2016 (Bolt et al., 2018)

Population: 1890-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1982-2009 (Reinhart and Rogoff, 2011)

Colombia (COL)

Real GDP: 1870-1900 (Bértola and Ocampo, 2012). 1900-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1870-1900 (Bértola and Ocampo, 2012). 1900-2016 (Bolt et al., 2018)

Population: 1870-1900 (real GDP divided by real GDP per capita). 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1899-2010 (Reinhart and Rogoff, 2011)

Independence: 1819 (Reinhart and Rogoff, 2011)

Costa Rica (CRI)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1920-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1900-2010 (Reinhart and Rogoff, 2011). 1974 linearly interpolated as missing

Independence: 1838 (Reinhart and Rogoff, 2011)

Côte d'Ivoire (CIV)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 2008-19 (World Bank, 2021)

Real exports: 2008-19 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1960-2018 (Marshall et al., 2019)
Terms of trade: 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1970-2018 (International Monetary Fund, 2020b)
Independence: 1960 (Reinhart and Rogoff, 2011)

Dominican Republic (DOM)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1950-2016 (Bolt et al., 2018)
Population: 1950-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019). 1914-24 missing
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1914-2010 (Reinhart and Rogoff, 2011). 1953-60 missing. 1963-5 linearly interpolated as missing
Independence: 1844 (Reinhart and Rogoff, 2011)

Ecuador (ECU)

Real GDP: 1900-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1900-2016 (Bolt et al., 2018)
Population: 1900-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1914-2010 (Reinhart and Rogoff, 2011)

Independence: 1830 (Reinhart and Rogoff, 2011)

Egypt (EGY)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1960-2018 (World Bank, 2021)

Real exports: 1960-2018 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1922-2018 (Marshall et al., 2019)

Terms of trade: 1865-1949 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011). 1944-69 missing

El Salvador (SLV)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1920-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1965-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1965-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1914-63 and 1970- 2010 (Reinhart and Rogoff, 2011). 1963-70 (International Monetary Fund, 2020b)

Independence: 1838 (Reinhart and Rogoff, 2011)

Germany (DEU)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1865-2016 (Bolt et al., 2018)

Population: 1865-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1868-2018 (Marshall et al., 2019). 1949-1989 West Germany. 1945-8

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1880-2010 (Reinhart and Rogoff, 2011). 1914-24 and 1939-50 missing

Ghana (GHA)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 2006-2019 (World Bank, 2021)
Real exports: 2006-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1960-2018 (Marshall et al., 2019)
Terms of trade: 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1952-62 (Reinhart and Rogoff, 2011). 1962-2018 (International Monetary Fund, 2020b)
Independence: 1957 (Reinhart and Rogoff, 2011)

Greece (GRC)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1865-2016 (Bolt et al., 2018)
Population: 1865-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1951-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1951-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019). 1916-9 missing
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011). 1914-8 and 1940-9 missing
Independence: 1829 (Reinhart and Rogoff, 2011)

Guatemala (GTM)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1920-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1922-50 (Reinhart and Rogoff, 2011). 1950-2018 (IMF, 2020). 1926 linearly interpolated as missing
Independence: 1838 (Reinhart and Rogoff, 2011)

Honduras (HND)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1920-2016 (Bolt et al., 2018)
Population: 1900-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1953-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019). 1907, 1912, 1919 and 1924 linearly interpolated as missing
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1914-50 (Reinhart and Rogoff, 2011). 1950-2018 (International Monetary Fund, 2020b). 1958 linearly interpolated as missing
Independence: 1838 (Reinhart and Rogoff, 2011)

Hungary (HUN)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020). 1921-3 and 1943-5 linearly interpolated as missing

Real GDP per capita: 1920-2016 (Bolt et al., 2018)

Population: 1920-2016 (Bolt et al., 2018)

Real imports: 1920-38 (Federico and Tena-Junguito, 2019). 1958-91 (United Nations, 2020). 1991-2019 (World Bank, 2021)

Real exports: 1920-38 (Federico and Tena-Junguito, 2019). 1958-91 (United Nations, 2020). 1991-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019). 1944 and 1956 linearly interpolated as missing

Terms of trade: 1920-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1989-2018 (International Monetary Fund, 2020b)

Independence: 1918 (Reinhart and Rogoff, 2011)

India (IND)

Real GDP: 1884-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1884-2016 (Bolt et al., 2018)

Population: 1865-2016 (Bolt et al., 2018)

Real imports: 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Real exports: 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1950-2018 (Marshall et al., 2019)

Terms of trade: 1947-1962 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011)

Independence: 1947 (Reinhart and Rogoff, 2011)

Indonesia (IDN)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1865-1941 and 1949-2016 (Bolt et al., 2018). 1941-9 (Barro and Ursúa, 2008)

Population: 1865-2016 (Bolt et al., 2018)

Real imports: 1960-2019 (World Bank, 2021)

Real exports: 1960-2019 (World Bank, 2021)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1945-2018 (Marshall et al., 2019)

Terms of trade: 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1972-2018 (International Monetary Fund, 2020b)

Independence: 1949 (Reinhart and Rogoff, 2011)

Italy (ITA)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1865-2016 (Bolt et al., 2018)

Population: 1865-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011)

Japan (JPN)

Real GDP: 1870-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1870-2016 (Bolt et al., 2018)

Population: 1865-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-70, 2019 (United Nations, 2020). 1970-2018 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-70, 2019 (United Nations, 2020). 1970-2018 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019). 1945-51 missing

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1951-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a). 1950 linearly interpolated as missing

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1872-2010 (Reinhart and Rogoff, 2011). 1882 linearly interpolated as missing. 1940-52 missing

Kenya (KEN)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1960-2019 (World Bank, 2021)

Real exports: 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1963-2018 (Marshall et al., 2019)

Terms of trade: 1958-1962 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1963-2018 (International Monetary Fund, 2020b)

Independence: 1963 (Reinhart and Rogoff, 2011)

Mexico (MEX)

Real GDP: 1895-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1895-2016 (Bolt et al., 2018)

Population: 1870-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1917-1950 (Reinhart and Rogoff, 2011). 1950-2018 (International Monetary Fund, 2020b). 1946, 1968-9 and 1981 linearly interpolated as missing

Independence: 1821 (Reinhart and Rogoff, 2011)

Morocco (MAR)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1949-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Real exports: 1949-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1949-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1965-2010 (International Monetary Fund, 2020b)

Independence: 1956 (Reinhart and Rogoff, 2011)

Myanmar (MMR)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)

Real imports: 2010-2018 (World Bank, 2021)

Real exports: 2010-2018 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1948-2018 (Marshall et al., 2019)

Terms of trade: 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2008 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1970-2018 (International Monetary Fund, 2020b). 1981-8 missing. 1995-7 linearly interpolated as missing

Independence: 1948 (Reinhart and Rogoff, 2011)

Nicaragua (NIC)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1920-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019). 1926-7 linearly interpolated as missing

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1914-1997 (Reinhart and Rogoff, 2011). 1997-2018 (International Monetary Fund, 2020b). 1946-69 missing

Nigeria (NGA)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1981-2018 (World Bank, 2021)

Real exports: 1981-2018 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1960-2018 (Marshall et al., 2019)

Terms of trade: 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1968-2018 (International Monetary Fund, 2020b)

Independence: 1960 (Reinhart and Rogoff, 2011)

Panama (PAN)

Real GDP: 1906-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1906-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)

Real imports: 1906-38 (Federico and Tena-Junguito, 2019). 1960-2018 (World Bank, 2021)

Real exports: 1906-38 (Federico and Tena-Junguito, 2019). 1948-60 (United Nations, 2020). 1960-2018 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1903-2018 (Marshall et al., 2019)

Terms of trade: 1906-38 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1914-2009 (Reinhart and Rogoff, 2011). 1917, 1922, 1977 and 1979 linearly interpolated as missing

Independence: 1903 (Reinhart and Rogoff, 2011)

Paraguay (PRY)

Real GDP: 1939-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1939-2016 (Bolt et al., 2018)

Population: 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1970-2010 (International Monetary Fund, 2020b)

Independence: 1811 (Reinhart and Rogoff, 2011)

Peru (PER)

Real GDP: 1870-1900 (Bértola and Ocampo, 2012). 1900-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1870-1900 (Bértola and Ocampo, 2012). 1900-2016 (Bolt et al., 2018)

Population: 1870-1900 (real GDP divided by real GDP per capita). 1900-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1948-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019). 1881-2 missing

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1883-2010 (Reinhart and Rogoff, 2011). 1959 and 1961-2 linearly interpolated as missing. 1968-71 and 1973-9 missing
Independence: 1821 (Reinhart and Rogoff, 2011)

Philippines (PHL)

Real GDP: 1946-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1946-2016 (Bolt et al., 2018)
Population: 1900-2016 (Bolt et al., 2018)
Real imports: 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021). 1958-9 missing
Real exports: 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021). 1958-9 missing
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1944-2018 (Marshall et al., 2019)
Terms of trade: 1941-9 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1948-2009 (Reinhart and Rogoff, 2011)
Independence: 1946 (Reinhart and Rogoff, 2011)

Poland (POL)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1950-2016 (Bolt et al., 2018)
Population: 1946-2016 (Bolt et al., 2018)
Real imports: 1922-38 (Federico and Tena-Junguito, 2019). 1947-95 (United Nations, 2020). 1995-2019 (World Bank, 2021)
Real exports: 1922-38 (Federico and Tena-Junguito, 2019). 1947-95 (United Nations, 2020). 1995-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1922-38 (Federico and Tena-Junguito, 2019). 1960-2 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1986-2018 (International Monetary Fund, 2020b)
Independence: 1918 (Reinhart and Rogoff, 2011)

Portugal (PRT)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1865-2016 (Bolt et al., 2018)
Population: 1865-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1946-70 (United Nations, 2020). 1970-2019 (World Bank, 2021). 1960-9 missing
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1946-70 (United Nations, 2020). 1970-2019 (World Bank, 2021). 1960-9 missing
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1957-62 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011)

Romania (ROU)

Real GDP: 1920-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1920-2016 (Bolt et al., 2018). 1949 linearly interpolated as missing
Population: 1920-2016 (Bolt et al., 2018)
Real imports: 1870-1938 (Federico and Tena-Junguito, 2019). 1990-2019 (World Bank, 2021). 1914-9 missing
Real exports: 1870-1938 (Federico and Tena-Junguito, 2019). 1990-2019 (World Bank, 2021). 1914-9 missing
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019). 1916 linearly interpolated as missing
Terms of trade: 1870-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a). 1914-9 missing

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1995-2010 (International Monetary Fund, 2020b)

Independence: 1878 (Reinhart and Rogoff, 2011)

Russia (RUS)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1865-1960 (Barro and Ursúa, 2008). 1960-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1990-2019 (World Bank, 2021)

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1990-2019 (World Bank, 2021). 1919 missing

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1865-2018 (Marshall et al., 2019)

Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1992-2019 (International Monetary Fund, 2020a). 1919 linearly interpolated as missing

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2008 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1992-2018 (International Monetary Fund, 2020b)

South Africa (ZAF)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1924-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1905-38 (Federico and Tena-Junguito, 2019). 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Real exports: 1905-38 (Federico and Tena-Junguito, 2019). 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1910-2018 (Marshall et al., 2019)
Terms of trade: 1905-38 (Federico and Tena-Junguito, 2019). 1946-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-1950 (Reinhart and Rogoff, 2011). 1950-2018 (International Monetary Fund, 2020b)
Independence: 1910 (Reinhart and Rogoff, 2011)

Spain (ESP)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1865-2016 (Bolt et al., 2018)
Population: 1865-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1946-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1946-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-40 (Blattman et al., 2007). 1946-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011). 1936-9 missing

Sri Lanka (LKA)

Real GDP: 1870-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1870-2016 (Bolt et al., 2018)
Population: 1870-2016 (Bolt et al., 2018)
Real imports: 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Real exports: 1946-60 (United Nations, 2020). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1948-2018 (Marshall et al., 2019)

Terms of trade: 1943-8 (Blattman et al., 2007). 1948-62 (United Nations, 2020). 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1865-1951 (Reinhart and Rogoff, 2011). 1951-2018 (International Monetary Fund, 2020b). 1915-49 missing

Independence: 1948 (Reinhart and Rogoff, 2011)

Independence: 1948 (Reinhart and Rogoff, 2011)

Tunisia (TUN)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1965-2013 (World Bank, 2021)

Real exports: 1965-2013 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1959-2018 (Marshall et al., 2019)

Terms of trade: 1962-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1970-2010 (International Monetary Fund, 2020b)

Independence: 1956 (Reinhart and Rogoff, 2011)

Turkey (TUR)

Real GDP: 1923-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1865-1923 (Barro and Ursúa, 2008). 1923-2016 (Bolt et al., 2018)

Population: 1923-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1970-87 (United Nations, 2020). 1987-2019 (World Bank, 2021). 1914-21 missing

Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1970-87 (United Nations, 2020). 1987-2019 (World Bank, 2021). 1914-21 missing
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019). 1918-21 missing
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a). 1914-21 missing
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-1958 (Reinhart and Rogoff, 2011). 1958-2018 (International Monetary Fund, 2020b). 1916-24 missing

United Kingdom (GBR)

Real GDP: 1865-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1865-2016 (Bolt et al., 2018)
Population: 1865-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1946-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1946-70 (United Nations, 2020). 1970-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1865-2010 (Reinhart and Rogoff, 2011)

Uruguay (URY)

Real GDP: 1870-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)
Real GDP per capita: 1870-2016 (Bolt et al., 2018)
Population: 1870-2016 (Bolt et al., 2018)

Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1960-2019 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1938-49 (Blattman et al., 2007). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1871-1990 (Reinhart and Rogoff, 2011). 1990-2018 (International Monetary Fund, 2020b). 1947-69 missing
Independence: 1811 (Reinhart and Rogoff, 2011)

Venezuela (VEN)

Real GDP: 1870-2016 (real GDP per capita multiplied by population)
Real GDP per capita: 1865-2016 (Bolt et al., 2018)
Population: 1870-2016 (Bolt et al., 2018)
Real imports: 1865-1938 (Federico and Tena-Junguito, 2019). 1973-2014 (World Bank, 2021)
Real exports: 1865-1938 (Federico and Tena-Junguito, 2019). 1973-2014 (World Bank, 2021)
Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)
Polity: 1865-2018 (Marshall et al., 2019)
Terms of trade: 1865-1938 (Federico and Tena-Junguito, 2019). 1962-2019 (International Monetary Fund, 2020a)
Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)
Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)
Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)
Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)
Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)
Debt-GDP ratio: 1914-50 (Reinhart and Rogoff, 2011). 1950-2014 (International Monetary Fund, 2020b)
Independence: 1829 (Reinhart and Rogoff, 2011)

Zambia (ZMB)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1960-2010 (World Bank, 2021)

Real exports: 1960-2010 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1964-2018 (Marshall et al., 2019)

Terms of trade: 1965-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1970-2018 (International Monetary Fund, 2020b)

Independence: 1965 (Reinhart and Rogoff, 2011)

Zimbabwe (ZWE)

Real GDP: 1950-2016 (real GDP per capita multiplied by population). 2016-8 (World Bank, 2020)

Real GDP per capita: 1950-2016 (Bolt et al., 2018)

Population: 1950-2016 (Bolt et al., 2018)

Real imports: 1976-2018 (World Bank, 2021)

Real exports: 1976-2018 (World Bank, 2021)

Sovereign debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Contagion: Measures based on distance, contiguity, colonial relationships and common languages, 1865-2010 (Mayer and Zignago, 2011; Reinhart and Rogoff, 2011)

Polity: 1970-2018 (Marshall et al., 2019)

Terms of trade: 1965-2019 (International Monetary Fund, 2020a)

Wars: Intra-state, inter-state and extra-state wars, 1865-2014 (Sarkees and Wayman, 2010)

Banking crises: 1865-2010 (Reinhart and Rogoff, 2011)

Currency crises: 1865-2010 (Reinhart and Rogoff, 2011)

Domestic debt crises: 1865-2010 (Reinhart and Rogoff, 2011)

Inflation crises: 1865-2010 (Reinhart and Rogoff, 2011)

Debt-GDP ratio: 1964-2018 (International Monetary Fund, 2020b)

Independence: 1965 (Reinhart and Rogoff, 2011)

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Appendix C. Decomposing OLS Estimates of β_h

The objective of this decomposition is to account for the contribution of various cause-specific effects of default to the all-cause effect of default. The parameter to be decomposed is the OLS estimate of β_h in:

$$y_{i,t+h} = \alpha_{i,h} + \gamma_{t,h} + \beta_h CRISIS_{i,t} + \theta_h W_{i,t} + e_{i,t+h} \quad (1)$$

In order to decompose β_h , we re-estimate equation (1) but including cause-specific, as opposed to all-cause, default:

$$y_{i,t+h} = A_{i,h} + \Gamma_{t,h} + B_{1,h}AD_{i,t} + B_{2,h}AS_{i,t} + B_{3,h}C_{i,t} + B_{4,h}CM_{i,t} + B_{5,h}L_{i,t} + B_{6,h}P_{i,t} \\ + B_{7,h}T_{i,t} + B_{8,h}U_{i,t} + \Theta_h W_{i,t} + \varepsilon_{i,t+h} \quad (2)$$

To simplify matters, re-write the country fixed effects as $\alpha_{i,h} = \sum_{i=1}^I \alpha_{i,h} i_i$ and $A_{i,h} = \sum_{i=1}^I A_{i,h} i_i$, the time fixed effects as $\gamma_{t,h} = \sum_{t=1}^T \gamma_{t,h} t_t$ and $\Gamma_{t,h} = \sum_{t=1}^T \Gamma_{t,h} t_t$ and the controls as $\theta_h W_{i,t} = \sum_{m=1}^M \theta_{m,h} W_{m,i,t}$ and $\Theta_h W_{i,t} = \sum_{m=1}^M \Theta_{m,h} W_{m,i,t}$, where the i s and t s are dummy variables for countries and years. Inserting these sums into equations (1) and (2):

$$y_{i,t+h} = \sum_{i=1}^I \alpha_{i,h} i_i + \sum_{t=1}^T \gamma_{t,h} t_t + \beta_h CRISIS_{i,t} + \sum_{m=1}^M \theta_{m,h} W_{m,i,t} + e_{i,t+h} \quad (3)$$

$$y_{i,t+h} = \sum_{i=1}^I A_{i,h} i_i + \sum_{t=1}^T \Gamma_{t,h} t_t + B_{1,h}AD_{i,t} + B_{2,h}AS_{i,t} + B_{3,h}C_{i,t} + B_{4,h}CM_{i,t} + B_{5,h}L_{i,t} \\ + B_{6,h}P_{i,t} + B_{7,h}T_{i,t} + B_{8,h}U_{i,t} + \sum_{m=1}^M \Theta_{m,h} W_{m,i,t} + \varepsilon_{i,t+h} \quad (4)$$

Re-writing (3) and (4) in terms of the mean:

$$\bar{y}_{i,t+h} = \sum_{i=1}^I \alpha_{i,h} \bar{i}_i + \sum_{t=1}^T \gamma_{t,h} \bar{t}_t + \beta_h \overline{CRISIS}_{i,t} + \sum_{m=1}^M \theta_{m,h} \bar{W}_{m,i,t} \quad (5)$$

$$\bar{y}_{i,t+h} = \sum_{i=1}^I A_{i,h} \bar{i}_i + \sum_{t=1}^T \Gamma_{t,h} \bar{t}_t + B_{1,h} \overline{AD}_{i,t} + B_{2,h} \overline{AS}_{i,t} + B_{3,h} \bar{C}_{i,t} + B_{4,h} \overline{CM}_{i,t} + B_{5,h} \bar{L}_{i,t} \\ + B_{6,h} \bar{P}_{i,t} + B_{7,h} \bar{T}_{i,t} + B_{8,h} \bar{U}_{i,t} + \sum_{m=1}^M \Theta_{m,h} \bar{W}_{m,i,t} \quad (6)$$

Substituting $\bar{y}_{i,t+h} = \sum_{i=1}^I \alpha_{i,h} \bar{l}_i + \sum_{t=1}^T \gamma_{t,h} \bar{t}_t + \beta_h \overline{CRISIS}_{i,t} + \sum_{m=1}^M \theta_{m,h} \bar{W}_{m,i,t}$ from equation (5) into the left-hand side of equation (6):

$$\begin{aligned}
& \sum_{i=1}^I \alpha_{i,h} \bar{l}_i + \sum_{t=1}^T \gamma_{t,h} \bar{t}_t + \beta_h \overline{CRISIS}_{i,t} + \sum_{m=1}^M \theta_{m,h} \bar{W}_{m,i,t} \\
&= \sum_{i=1}^I A_{i,h} \bar{l}_i + \sum_{t=1}^T \Gamma_{t,h} \bar{t}_t + B_{1,h} \overline{AD}_{i,t} + B_{2,h} \overline{AS}_{i,t} + B_{3,h} \bar{C}_{i,t} + B_{4,h} \overline{CM}_{i,t} \\
&+ B_{5,h} \bar{L}_{i,t} + B_{6,h} \bar{P}_{i,t} + B_{7,h} \bar{T}_{i,t} + B_{8,h} \bar{U}_{i,t} + \sum_{m=1}^M \Theta_{m,h} \bar{W}_{m,i,t}
\end{aligned} \tag{7}$$

The goal is to solve for β_h :

$$\begin{aligned}
\beta_h \overline{CRISIS}_{i,t} &= \sum_{i=1}^I A_{i,h} \bar{l}_i - \sum_{i=1}^I \alpha_{i,h} \bar{l}_i + \sum_{t=1}^T \Gamma_{t,h} \bar{t}_t - \sum_{t=1}^T \gamma_{t,h} \bar{t}_t + B_{1,h} \overline{AD}_{i,t} \\
&+ B_{2,h} \overline{AS}_{i,t} + B_{3,h} \bar{C}_{i,t} + B_{4,h} \overline{CM}_{i,t} + B_{5,h} \bar{L}_{i,t} + B_{6,h} \bar{P}_{i,t} + B_{7,h} \bar{T}_{i,t} + B_{8,h} \bar{U}_{i,t} \\
&+ \sum_{m=1}^M \Theta_{m,h} \bar{W}_{m,i,t} - \sum_{m=1}^M \theta_{m,h} \bar{W}_{m,i,t}
\end{aligned} \tag{8}$$

$$\begin{aligned}
\beta_h \overline{CRISIS}_{i,t} &= B_{1,h} \overline{AD}_{i,t} + B_{2,h} \overline{AS}_{i,t} + B_{3,h} \bar{C}_{i,t} + B_{4,h} \overline{CM}_{i,t} + B_{5,h} \bar{L}_{i,t} + B_{6,h} \bar{P}_{i,t} + B_{7,h} \bar{T}_{i,t} \\
&+ B_{8,h} \bar{U}_{i,t} + \sum_{i=1}^I (A_{i,h} - \alpha_{i,h}) \bar{l}_i + \sum_{t=1}^T (\Gamma_{t,h} - \gamma_{t,h}) \bar{t}_t \\
&+ \sum_{m=1}^M (\Theta_{m,h} - \theta_{m,h}) \bar{W}_{m,i,t}
\end{aligned} \tag{9}$$

Dividing by $\overline{CRISIS}_{i,t}$:

$$\begin{aligned}
\beta_h &= B_{1,h} \frac{\overline{AD}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{2,h} \frac{\overline{AS}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{3,h} \frac{\bar{C}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{4,h} \frac{\overline{CM}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{5,h} \frac{\bar{L}_{i,t}}{\overline{CRISIS}_{i,t}} \\
&+ B_{6,h} \frac{\bar{P}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{7,h} \frac{\bar{T}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{8,h} \frac{\bar{U}_{i,t}}{\overline{CRISIS}_{i,t}} \\
&+ \sum_{i=1}^I (A_{i,h} - \alpha_{i,h}) \frac{\bar{l}_i}{\overline{CRISIS}_{i,t}} + \sum_{t=1}^T (\Gamma_{t,h} - \gamma_{t,h}) \frac{\bar{t}_t}{\overline{CRISIS}_{i,t}} \\
&+ \sum_{m=1}^M (\Theta_{m,h} - \theta_{m,h}) \frac{\bar{W}_{m,i,t}}{\overline{CRISIS}_{i,t}}
\end{aligned} \tag{10}$$

Which can be simplified to:

$$\begin{aligned}\beta_h = & B_{1,h} \frac{\overline{AD}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{2,h} \frac{\overline{AS}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{3,h} \frac{\overline{C}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{4,h} \frac{\overline{CM}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{5,h} \frac{\overline{L}_{i,t}}{\overline{CRISIS}_{i,t}} \\ & + B_{6,h} \frac{\overline{P}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{7,h} \frac{\overline{T}_{i,t}}{\overline{CRISIS}_{i,t}} + B_{8,h} \frac{\overline{U}_{i,t}}{\overline{CRISIS}_{i,t}} + \vartheta_h\end{aligned}\tag{11}$$

where $\vartheta_h = \sum_{i=1}^I (A_{i,h} - \alpha_{i,h}) \frac{\bar{i}_i}{\overline{CRISIS}_{i,t}} + \sum_{t=1}^T (\Gamma_{t,h} - \gamma_{t,h}) \frac{\bar{t}_t}{\overline{CRISIS}_{i,t}} + \sum_{m=1}^M (\Theta_{m,h} - \theta_{m,h}) \frac{\bar{w}_{m,i,t}}{\overline{CRISIS}_{i,t}}$.

Equation (11) shows that the OLS estimates of β_h in equation (1) are a weighted-average of the cause-specific effects, where the weights are the cause-specific contribution to the frequency of all-cause default, plus a term that accounts for the other variables in the model.

Appendix D. Long-run International Chronologies of Sovereign Debt Crises

This appendix describes and compares the leading long-run international chronologies of sovereign default of Lindert and Morton (1989), Suter (1992), Purcell and Kaufman (1993) and Reinhart and Rogoff (2009, 2011).

I. Description

IA. Lindert and Morton (1989)

Coverage: 157 countries between 1820 and 1986.

Definition: “A debt crisis exists if in the absence of a better offer, the debtor would rather impose unilateral nonrepayment than repay fully. While there may be some incentive to bluff in such matters, let us accept insistent statements by a debtor government that it ‘cannot’ repay fully without help or concessions from others as good prima facie evidence that it will not repay fully without such help. That is, as a rule of thumb, a debt crisis exists if the debtor says it does” (Lindert and Morton, 1989).

Sources: Bitterman (1973), Clarke (1879), Corporations of Foreign Bondholders (various), Dillon and Oliveros (1987), Foreign Bondholders’ Protective Council (various), Hardy (1982), International Bank for Reconstruction and Development (various), Moody’s (various), United Nations (1948), Watson et al. (1986) and Winkler (1933).

IB. Suter (1992)

Coverage: 42 defaulting countries between 1820 and 1985.

Definition: “The concept of ‘debt crisis’ as utilized in this study is defined as the incapacity or unwillingness of sovereign borrowers to meet their debt-service obligations.” (Suter, 1992).

Sources: Marichal (1989) and Suter (1990).

IC. Purcell and Kaufman (1993)

Coverage: 72 countries between 1800 and 1992.

Definition: “Identified extended periods (six months or more) where all or part of interest and/or principal payments due were reduced or rescheduled. Some of the defaults and reschedulings involved outright repudiation (a legislative or executive act of government denying liability) while others were minor and announced ahead of time by debtor nations in a conciliatory fashion. The end of each period of default or rescheduling was recorded when full payments resumed or a restructuring was agreed upon. Periods of default or rescheduling within five years of each other were combined” (Purcell and Kaufman, 1993).

Sources: Borchard (1951), Corporations of Foreign Bondholders (various), Foreign Bondholders’ Protective Council (various), Hardy (1982), International Monetary Fund (1992), Suter (1992) and Winkler (1933).

ID. Reinhart and Rogoff (2009)

Coverage: 66 countries between 1800 and 2008.

Definition: “A sovereign default is defined as the failure of a government to meet a principal or interest payment on the due date (or within the specified grace period). These episodes include instances in which rescheduled debt is ultimately extinguished in terms less favorable than the original obligation” (Reinhart and Rogoff, 2009, p. 11).

Sources: Lindert and Morton (1989), Macdonald (2006), Purcell and Kaufman (1993), Reinhart et al. (2003), Standard and Poor's (various) and Suter (1992).

IE. Reinhart and Rogoff (2011)

Coverage: 70 countries between 1800 and 2010.

Definition: “External debt crises involve outright default on payment of debt obligations incurred under foreign legal jurisdiction, including nonpayment, repudiation, or the restructuring of debt into terms less favorable to the lender than in the original contract.” (Reinhart and Rogoff, 2011).

Sources: Lindert and Morton (1989), Standard and Poor's (various), Suter (1992) and Tomz (2007).

II. Comparison

Table D1 presents some summary statistics (crises, country-years, probability and frequency) for the leading long-run chronologies of sovereign debt crises for a common sample of 35 countries between 1870 and 1985. The consensus is that crises occurred with an unconditional probability of around 3 per cent with an average frequency of one crisis every 30-44 country-years.

Table D1. Major Chronologies of Sovereign Debt Crises: Summary Statistics

	Crises	Country-years	Probability (%)	Frequency (Years)
Lindert and Morton (1989)	108	3,656	2.95	33.85
Purcell and Kaufman (1993)	87	3,656	2.38	42.02
Reinhart and Rogoff (2009)	121	3,656	3.31	30.21
Reinhart and Rogoff (2011)	122	3,656	3.34	29.97
Suter (1992)	84	3,656	2.30	43.52

Notes: This table shows the number of crises, country-years, probabilities and frequencies associated with alternative chronologies for 35 countries between 1870 and 1985.

Table D2 reports the concordance between chronologies. The upper triangular elements represent the unconditional probability of a crisis occurring in one of the row or column chronologies occurring in both the row and column chronologies. For example, 25 per cent of the crises that are recorded in either Lindert and

Morton (1989) or Purcell and Kaufman (1993) occur in both of these chronologies. The two chronologies with the least overlap are Lindert and Morton (1989) and Suter (1992), sharing 16 per cent of crises. The two with the most overlap are Reinhart and Rogoff (2009) and Reinhart and Rogoff (2011), which have 83 per cent of crises in common.

Table D2. Major Chronologies of Sovereign Debt Crises: Concordance

	Lindert and Morton (1989)	Purcell and Kaufman (1993)	Reinhart and Rogoff (2009)	Reinhart and Rogoff (2011)	Suter (1992)
Lindert and Morton (1989)	100	25.00	28.65	28.49	16.36
Purcell and Kaufman (1993)		100	60.00	58.33	52.68
Reinhart and Rogoff (2009)			100	82.71	60.16
Reinhart and Rogoff (2011)				100	57.25
Suter (1992)					100

Notes: This table shows the unconditional probability of a crisis occurring in one of the row or column chronologies occurring in both the row and column chronologies for 35 countries between 1870 and 1985.

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