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# Sovereign Defaults during the Great Depression: the Role of Fiscal Fragility

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# Sovereign Defaults during the Great Depression: the Role of Fiscal Fragility[1]

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## Abstract

The debt crisis of the early 1930s was probably the largest and most widespread in history. The defaults of national and sub-national governments were pivotal events of the Great Depression and contributed to shaping post-World War II finance in the United States and worldwide. I study the role of a so-far largely unexplored factor - fiscal fragility - in the crisis. In order to do this, I construct and analyse a dataset comprising a new measure of default size and new estimates of the size and composition of public debts for around 25 countries. The data accounts for maturity structures, sub-national borrowing as well as other key characteristics of debt burdens. I show econometrically that the severe deterioration in public revenues experienced by national and sub-national governments in a number of countries was a key determinant of the defaults above and beyond the Great Depression income shock. Countries hardest hit by the slump were more likely to renege on their external debts at both the national and sub-national level, but countries whose public revenues fell more moderately were able avoid or limit the size of default. I furthermore show that the collapse in public revenues was not part of an explicit strategy to counter the slump through an active fiscal policy. On the contrary, the evidence indicates that fiscally weak countries saw their public expenditures collapse alongside revenues.

**Keywords:** Great Depression; Sovereign Defaults; Public Debt; Local Borrowing; Fiscal Development

**JEL Codes:** N10; N20; E32; F34; H63; H74

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# 1 Introduction

After a large, but short-lived lending boom in the second half of the 1920s, the onset of the Great Depression in 1929 kick-started the (arguably) largest debt crisis in history. Between 1931 and 1936, national and sub-national governments around the globe interrupted interest and principal payments on their foreign loans. Following Reinhart and Rogoff (2013)'s definition of external default[1] - almost 45% of countries in their sample of 70 countries were in default in the first half of the 1930s.

The debt crisis had widespread domestic and international repercussions. Germany - the largest international debtor of the interwar period - epitomizes this. Ritschl (2002) argues that the country's external default was crucial for its recovery from the Depression in the 1930s. Ritschl and Sarferaz (2014) provide evidence that the German default also significantly contributed to the severity of the Depression in the United States through financial channels. By studying the London merchant banks, Accominotti (2012) shows that the German default was furthermore instrumental in putting pressure on the British financial system and in speeding up the UK's exit from the Gold Standard. Given that most defaults were concentrated in a short time span in the early 1930s, the compounded impact of all these episodes is likely to have had large effect on the American, British and other creditor nations' economies, as well as on the defaulters.

The importance of the defaults is not restricted to the 1930s. In establishing the institutional set-up of the post-WWII Bretton Woods system, policy-makers - following a classical trilemma framework - decided to forgo the free movement of capital rather than either fixed exchange rates or an independent monetary policy (Obstfeld and Taylor, 1998). This decision was informed by the events of the interwar years: monetary policy's importance had been demonstrated by the inability of countries tied to the Gold Standard to respond to the deflationary shocks that hit the world economy, while capital flows were seen with great suspicion in light of their perceived speculative nature and of the massive debt crisis that followed them. In the United States, the debt crisis was furthermore seen as the result of the failure of banks to manage their conflicts of interests. This was used as a key justification for the division of investment and commercial banking embedded in the 1933 Glass-Steagall Act (Carosso, 1970; Benston, 1990; Flandreau, Gaillard, and Panizza, 2010).

Although there is substantial research on the consequences of the 1930s defaults, there is surprisingly scant research on their causes. The most common narrative around the time of the defaults was that, once the Depression hit, the international lending of the 1920s was revealed as misguided and excessive and this, in turn, led to widespread defaults (Harris, 1935; Madden, Nadler, and Sullivan, 1937; Lewis, 1938; Lary, 1943). More recent research highlights the element of "bad luck"

[1] The failure to meet an interest or principal payment on the due date or within the specified grace period. The episodes also include instances where rescheduled debt is ultimately extinguished in terms of less favourable than the original obligations.

in the defaults. Diaz-Alejandro (1983) and Fishlow (1986), for example, stress the magnitude of the external economic shock of the Great Depression as the main contributor to default. By carrying out a micro study of single bond issues on the New York Stock Exchange, Flandreau, Gaillard, and Panizza (2010) argue that the distortions in international financial markets and the conflicts of interests of underwriters were not as pervasive as previously thought. The authors take this as evidence that "bad luck" played the leading role in the defaults.

A partial challenge to this view is represented by Eichengreen and Portes (1986) who find that both political and economic factors mattered. The authors show that terms of trade deterioration and the foreign debt-to-income ratio were related to the extent of default, but so was the degree to which countries reduced the budget deficit following the onset of the Great Depression, which is at least partially the result of political choices and constraints.[2]

In this paper, I revisit the causes of the defaults by introducing substantial innovations on the data and methodological side compared to previous studies. On the methodological side, I employ panel data methods, which offer clear advantages compared to previous approaches. Panel data techniques allow to control for unobserved (and unobservable) time-invarying heterogeneity across countries. Country characteristics such as institutional quality, default history, demographic structure, financial development, are all likely to affect the probability of defaults. Moreover, there is substantial evidence that serial defaulters tend to have distinctive characteristics, as demonstrated by their tendency to default at low levels indebtedness (Winkler, 1933; Eichengreen and Lindert, 1989; Reinhart, Rogoff, and Savastano, 2003; Oosterlinck, 2013).

The focus on the interwar era allows me to study a large number of defaults in a relatively short time span. This presents both advantages and drawbacks from an econometric point of view. The main drawback lies in potential problems of generalisation of the results to other episodes of sovereign debt crises i.e. its external validity. The advantage of this paper over studies aggregating many default episodes over long stretches of history is that the latter may be unable to adequately control for the time-varying historical international context in which the defaults took place. Thus, this paper counterbalances the shortcomings of a smaller sample size by keeping the common international economic institutions and political arrangements in which the debt crisis unfolded relatively stable.

On the data side, I provide a wealth of new information, which allows me to test econometrically for the first time a range of channels that have been proposed in the literature on sovereign defaults in general and on the Great Depression debt crisis in particular. Most importantly, I provide a more complete and sophisticated dataset on public debts than available until now (Reinhart and Rogoff, 2009; Abbas, Belhocine, El Ganainy, and Horton, 2010), which accounts for maturity structures

[2]The authors also find that their estimates over-predicted the extent of default in Australia, and they linked this to the importance of international political and economic relations, in particular the close ties of the country to its main creditor: the United Kingdom.

and sub-national borrowing for almost 30 countries worldwide.[3]

The principal finding of the paper is that the deterioration in public revenues that accompanied the Depression was a key determinant of default. This result emerges clearly both from a simple visual analysis of the data and from rigorous econometric testing. Moreover, the effect is identified strongly and separately from the direct impact of the Depression gauged by indicators of macroeconomic health, such as GDP and trade. The finding is in line with most theoretical models of default, which treat default as a response to "bad times" in the presence of incomplete asset markets. It also supports suggestions advanced in empirical and recent theoretical research that "bad times" might be captured more effectively by looking at fiscal revenues rather than GDP (Tomz and Wright, 2007; Arellano and Bai, 2016).

However, the result also shows that the reaction of fiscal systems to economic shocks - or "bad times" - can be vastly different across countries. This suggests that structural factors can play an important role. I show that the collapse in fiscal revenues was not connected to expansionary fiscal policies; on the contrary, the evidence indicates that fiscally weaker countries saw both their public revenues and expenditures collapse, and that these countries were more likely to undergo large defaults. The result also holds for sub-national governments, which experienced severe contractions in their revenues as well. Supported by additional evidence presented in Papadia (2016), I argue that different degrees of public revenue loss during the Depression reflected different degrees of fiscal development and structural constraints, rather than explicit policy choices.

Several further results emerge from the analysis. Contrary to suggestions in the historiography and in the theoretical economics literature, I find no relationship between external defaults and the maturity structure of public debts at the national-provincial level. For municipal defaults, instead, the liquidity pressure associated with a high share of short term debts is linked to default size. For national-provincial defaults, I find that the size of the public debt burden contributed to triggering defaults, consistently with most models of sovereign default. A greater reliance on the external sector of the economy in terms of both trade and finance, instead, is negatively associated with national-provincial defaults, in line with the predictions of reputational models. None of these variables, however, is as robustly associated with default as public revenue deterioration.

The "bad luck" versus "opportunism" debate introduced above boils down to two fundamental questions. First, were the defaults the result of misjudgment on the part of creditors and opportunistic behaviour by borrowers or the inevitable result of factors beyond the control of borrowing countries? Second, to what extent were the factors leading to default global in nature or specific to individual countries? Recasting my results in terms of this debate, it is evident that a univocal answer does not do justice to the magnitude and complexity of the 1930s debt crisis. A deep

[3]At the national level, the sample includes Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, United Kingdom, Uruguay and Venezuela; at the local level data is unvaiable on a consistent basis for Austria, Chile, Czechoslovakia, Greece, Romania and Venezuela, but is available for Yugoslavia.

economic and fiscal crisis, which hit countries with different intensities, interacted with political choices, particularly where governments were forced to give preference to domestically or externally oriented sectors of the economy. Thus, Eichengreen and Portes' conclusion that both politics and economics mattered is confirmed, although I find the mechanisms that led countries to default to be substantially different from those identified by the authors.

The rest of the paper is structured as follows. Section 2 summarises the most relevant part of the immense empirical and theoretical literature on sovereign debt and default. Section 3 offers a historical overview of the lending boom and debt crisis of the interwar period. Section 4 provides details on the newly assembled data-set. Section 5 presents the empirical strategy and discusses the results. Section 6 concludes.

## 2 Sovereign defaults: theory and evidence

Sovereign defaults take place when national governments are either unwilling or unable to repay their debts. Distinguishing between inability and unwillingness to repay is often a difficult exercise as political and economic constraints interact in practice.

A key feature of sovereign defaults is that creditors have no or limited ability to recover their loans through courts or through the seizure of assets. This means that when the debtor is located in another country with respect to the creditor, the status of sovereign defaulter can be extended from national governments to sub-national governments and even private debtors, who can be, although not necessarily are, shielded by their country's sovereignty.

A further distinction can be drawn within defaults triggered by the inability to repay. Following Arellano and Bai (2016), one can distinguish between *fiscal* and *aggregate* defaults. The former occur when the government is unable to raise tax rates in order to collect the necessary resources for repayment. The latter take place because of an economy-wide resource constraint, which entails that even by raising tax rates the debtor is unable to repay its debt. Inability-related defaults are usually seen as rational responses to adverse shocks in the presence of asset market incompleteness. Under these circumstances a default can be considered "excusable" , in the sense that it should not lead to any reputational consequences for the defaulter (Grossman and Van Huyck, 1985).

The lack of an authority able to enforce payments is at the root of the limited commitment problem underlying sovereign debt and of unwillingness-related defaults. This has led researchers to investigate why sovereigns would ever repay their debts. When the choice is indeed available, it presumably hinges on its benefits and costs. Early theoretical contributions stressed the role of direct sanctions, as well as reputation and future access to financial markets as enforcement mechanisms for sovereign debt. An important evolution in reputation-based models is Cole and Kehoe (1998)'s argument that the reputational consequences of default are not limited to future access to borrowing, but can lead to the defaulting party being seen as untrustworthy in all relationships. Until recently, empirical research had not found strong evidence for reputational costs (Panizza,

Sturzenegger, and Zettelmeyer, 2009; Oosterlinck, 2013), but by measuring the severity of defaults rather than using simple binary default/no default indicators, Cruces and Trebesch (2013) show that larger defaults have indeed led to longer exclusions from capital markets and to higher borrowing costs. Their insight is simple, but powerful: defaults vary greatly in size and duration and so should their consequences.

Default episodes are indeed vastly heterogeneous. In his review of the historical literature, Oosterlinck (2013) highlights the difference between different types of contract breach, with mild defaults - involving only interest payments and possibly sinking funds - on one hand of the spectrum and complete repudiations on the other. The theoretical literature, however, has only recently started catching up with the notion of partial defaults (Arellano, Mateos-Planas, and Rìos-Rull, 2013).[4] Defaults can also be selective and involve only certain categories of debts or creditors. Erce (2012) identifies three types of default episodes: 1) neutral, 2) discriminatory against foreign creditors, 3) discriminatory against domestic creditors.[5] Historically, the most common type of discrimination has been between domestic and foreign creditors (Reinhart and Rogoff, 2011). However, there can also be discrimination between different classes of domestic and foreign creditors. As Eichengreen and Portes (1988) show, US creditors were treated less favourably than their British counterparts in several cases during the interwar period. A prominent example of this is the German default, in which political pressure from the UK government and the non-interventionist attitude of the US led to a more favourable settlement for British nationals.

At least since the work of North and Weingast (1989), institutions have been identified as a key factor in mitigating the limited commitment issue and thus making sovereign borrowing possible. In this vein, the work of Bordo and Kydland (1995) and Bordo and Rockoff (1996) highlights the importance of the pre-WWI Gold Standard in providing a *good housekeeping seal of approval* for member countries, which lowered sovereign risk and served as a guide to lenders. Bordo, Edelstein, and Rockoff (1999) extend the analysis to the interwar Gold Standard finding that this also served as a commitment mechanisms, particularly for countries, which returned to Gold at pre-WWI parities.[6]

[4]Oosterlinck also points out that what might not be considered default by jurists might be so for creditors. The clearest case of this is the repayment of international debts through the printing and debasing of currency. Naturally this applies only to countries able to borrow in their own currency. The inability to do so has been dubbed "original sin" by Eichengreen and Hausmann (1999). For the purpose of this paper, however, I focus on default in the classic sense: the one in which a government suspends payments on external obligations, given that vast majority of international lending was carried out in just two currencies: dollar and sterling.

[5]This classification is based on a number of indicators such as amounts involved, haircuts and the timing of involvement. Erce finds that the foreign or domestic origin of the "liquidity pressure" - i.e. difficulty in rolling over short-term debts - plays an important role in selective defaults. A weak banking sector - due, for example, to a recent banking crisis - instead, leads to a lower probability of domestic default, presumably to avoid further strain on domestic banks. Finally, Erce argues a stronger reliance on foreign finance for the functioning of the economy would make creditors more reluctant to undergo an external default.

[6]Obstfeld and Taylor (2003) confirm that adherence to Gold lowered borrowing costs before Wold War I, but find no significant effect for the interwar period, suggesting that investors were - reasonably - skeptical about the solidity of the system. The results for the Classical Gold Standard have also been contested by many authors including Flan-

The possibility of disruptions in trade are another reason why countries might wish to honor their sovereign debts. While these disruptions have traditionally been linked to direct sanctions (Rose, 2005), recent research suggests that default can have broad-based negative consequences on the international economic activity of countries - including foreign direct investment - not connected to explicit punishment (Fuentes and Saravia, 2010; Martinez and Sandleris, 2011). In practice, defaults often precede large decreases in trade (Rose, 2005; Martinez and Sandleris, 2011), as well as current account reversals and capital flights (Mendoza and Yue, 2012). Default is also often accompanied by other large macroeconomic events, such as financial crises (Reinhart and Rogoff, 2009).

Models normally predict that countries will default in "bad times". Tomz and Wright (2007) analyze the empirical content of this prediction and find only a weak negative relationship between default and output in a sample of 175 sovereign borrowers from 1820 to 2005. The authors conclude that a difficult economic situation is neither a sufficient nor necessary condition for sovereign default.[7] Tomz and Wright offer some suggestions on how to reconcile theory and empirics. Importantly for this paper, they argue that "bad times" might need to be defined differently. Good candidates in signaling impending difficulties in debt repayments are large decreases in exports and government revenues, as well as high world interest rates.[8]

For all the research that has been produced, the determinants of external defaults are not firmly established in the empirical literature. They tend to vary across different time periods and samples of countries. As emerges clearly from the discussion above, defaults are complex phenomena and are often part of larger episodes in which many things happen at the same time. This requires the testing of several channels at once to avoid omitted variable bias.

For this reason, I have collected a large amount of new data in order to perform this type of analysis. Moreover, in line with the empirical evidence, I construct a new measure of default that allows me to capture partial defaults. Furthermore, I allow explicitly for the possibility of default having feedback effects on other variables by employing a dynamic structure in my estimations. Finally, following suggestions in the literature, I measure "bad times" in different ways. In particular I analyze the impact of output contractions, fiscal crises and trade collapses. This turns out to be crucial: sharp falls output and tax revenues emerge as key and complementary causes for national-provincial defaults.

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dreau and Zumer (2004), Alquist and Chabot (2011), Ferguson and Schlularick (2006) and Accominotti, Flandreau, and Rezzik (2011).

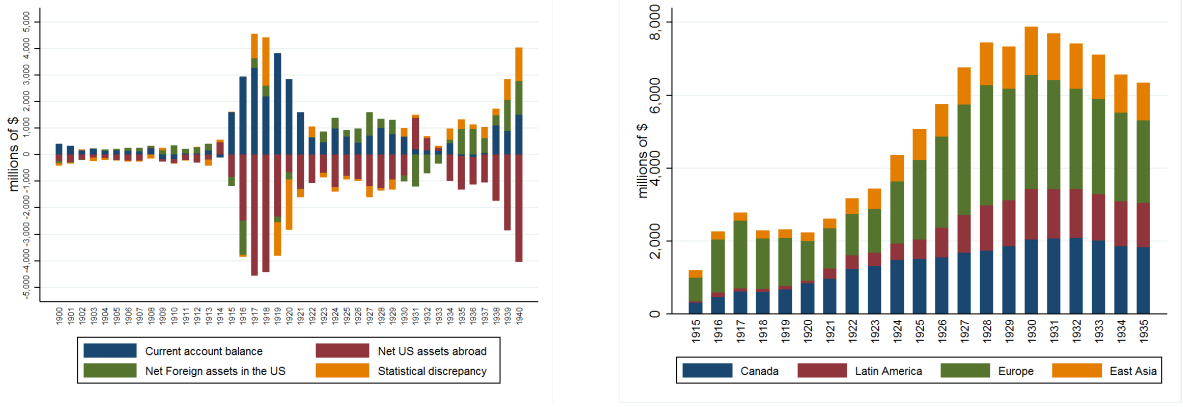
[7] The authors show that sovereigns defaulted when output was below trend only 60% of the time, and that the average deviation of output from trend at the start of a default was only -1.6%. Calibrated default models, instead, predict default almost exclusively when GDP is below trend and when this deviation is on average -8%. The authors' results are consistent with further research on different time periods, samples of countries and approaches to measuring trends in output (Durdu, Nunes, and Sapriza, 2013).

[8] Time aggregation might also cloud the results of this type of empirical exercise if default is caused by large albeit short-lived declines in output not captured by annual data (Tomz and Wright, 2013).

# 3 Setting the stage: borrowing, lending and defaulting in the interwar period

Sovereign debt has constituted a very important share of financial assets since at least the 19th century, although its preeminence has been gradually diminished by the rise of corporate securities. Sovereign debt went from being 76% of all securities on the London Stock Exchange in 1853 to 35% right before WWI. However, sovereign debt traded in London and other markets climbed back up to 59% of total assets in 1933, 21% of which were colonial and foreign public debt (Tomz and Wright, 2013).

Post-WWI international lending was boosted by the lift of the ban on foreign branching for US banks embedded in the Federal Reserve Act of 1913, which accompanied the transition of the US from an essentially closed economy to a more open one (see Figure 1). US banks set up branches abroad to gather intelligence in order to start underwriting and selling foreign bonds (Eichengreen, 1989) and by 1929, the dollar had overtaken sterling as the leading international currency in international finance (Chitu, Eichengreen, and Mehl, 2014). In this paper, I focus on dollar-denominated loans given the US's predominance in this period and because of the evidence of discrimination between different categories of foreign creditors at the default stage.




(a) US balance of payments, 1900-1940

(b) Net outstanding US loans by area, 1915-35

Figure 1: The internationalization of the US Economy in the interwar period
Source: the BoP data is from Edelstein (2006) and the data on US loans is from Lewis (1938).

Cycles of international lending and default were hardly a new phenomenon at the time of the Great Depression, but never had the scale of defaults been so large and their incidence so widespread (Winkler, 1933; Eichengreen, 1991). Up to this day, such rampant insolvency is unique with the potential exception of World War II and its direct aftermath. With specific reference to US lending abroad, the scale of the defaults is demonstrated by the fact that, although international lending was a relatively small share of all capital issues in interwar US, default on foreign bonds was so pervasive as to represent one of the largest - if not the largest - bond default item of the first half

of the 1930s (see Table 1).

| Year | Railroads | Industrial | Public Utilities | Real Estate | Foreign |
|---|---|---|---|---|---|
| 1930 | 841 | 134,994 | 96,344 | 128,158 | 708 |
| 1931 | 213,228 | 443,560 | 201,722 | 556,908 | 632,015 |
| 1932 | 201,739 | 699,034 | 593,136 | 543,579 | 581,385 |
| 1933 | 1,087,909 | 482,228 | 363,933 | 416,052 | 1,104,748 |
| 1934 | 310,251 | 206,435 | 150,244 | 83,266 | 256,601 |
| 1935 | 761,701 | 92,275 | 149,128 | 46,785 | 9,064 |
| Total | 2,575,669 | 2,058,526 | 1,554,507 | 1,744,848 | 2,584,521 |

Table 1: Annual bond defaults: principal amounts in thousands of dollars, 1930-1935
Source: Standard Statistics Co., Standard Bond Investmnets, Weekly Advisory Section, Jan 11, 1936 p. 2,913 as cited by Madden, Nadler, and Sullivan (1937). As pointed out by these authors, the data in this table has several limitations: it does not represent all bond defaults, but only those large enough to be known by securtiy markets and the compilers of the data.

Most of the interwar defaults took place in the early 1930s, the exception being a few episodes in the early post-war years (e.g. Brazil, Mexico). The temporal concentration of these episodes has led to the search for a common cause. Contemporary commentators were quick to judge the international lending of the 1920s as highly speculative and misguided (Lewis, 1938; Lary, 1943; Harris, 1935). Their narrative is one of little or no discrimination between good and bad borrowers by the creditors and of the sudden realisation of the unsoundness of investments compounded by the Great Depression shock (Eichengreen, 1991). Feinstein and Watson (1995) document John Maynard Keynes' doubts on whether American lending to Europe in the 1920s followed the same patterns and principles of UK lending during the Classical Gold Standard era. The underlying conviction was that both lenders and borrowers were driven by distorted incentives, partial or false information, or downright irrationality. Subsequent research has substantiated some of these claims. With regard to German borrowing, for example, Ritschl (2012) argues that perverse incentives due to the Dawes Plan of 1924 contributed to creating moral hazard on both the borrower and lender side by making reparations junior with respect to commercial debts, leading to excessive borrowing. This set up was then reversed by the Young Plan of 1930, which contributed to a sudden stop and to plunging Germany into economic chaos. The unorthodox practices of some brokers and bankers in placing the loans revealed by contemporary commentators and the investigations of the US Congress (Flandreau, Gaillard, and Panizza, 2010) also demonstrate that some degree of malpractice was clearly present.

However, the overall picture is not as dire as contemporaries made it to be. Tables 2 and 3 show the aggregate outcome of foreign investment in the interwar period for US investors. There is ample evidence of discrimination at the lending stage (Eichengreen, 1989; Eichengreen and Portes, 1990) and subsequent satisfactory rates of return for foreign creditors (Madden, Nadler, and Sullivan,

| | Latin America | Europe | East Asia | Total |
|---|---|---|---|---|
| Total bond investment | 1,935,612 | 3,380.625 | 869,783 | 6,186,091 |
| Interest received | 692,822 | 1,708,100 | 479,523 | 2,880,445 |
| Principal repayments | 693,189,00 | 1,485,946 | 395,876 | 2,575,011 |
| Market value of outstanding bonds | 491,108 | 1,449,007 | 564,985 | 2,505,200 |
| Balance | -58,493 | 1,262,428 | 570,601 | 1,774,536 |

Table 2: Outcome of US lending by geographical area in thousands of dollars, 1920-1935
Source: Madden, Nadler, and Sullivan (1937), Table 24 page 147.

| Year | Latin America | Europe | East Asia |
|---|---|---|---|
| 1920 | | 7.67 | |
| 1921 | 7.38 | 7.77 | 7.07 |
| 1922 | 7.64 | 7.79 | 6.39 |
| 1923 | 6.79 | 7.41 | 6.35 |
| 1924 | 6.97 | 7.67 | 6.64 |
| 1925 | 6.9 | 7.66 | 6.45 |
| 1926 | 7.01 | 7.54 | 6.48 |
| 1927 | 7 | 7.3 | 6.33 |
| 1928 | 7.34 | 7.5 | 6.15 |
| 1929 | 6.71 | 7.44 | 6.15 |
| 1930 | 6.23 | 7.44 | 6.36 |
| 1931 | 4.5 | 6.52 | 5.86 |
| 1932 | 1.98 | 5.47 | 5.68 |
| 1933 | 1.34 | 4.27 | 6.02 |
| 1934 | 1.14 | 4.91 | 19.20 |
| 1935 | 1.78 | 3.93 | 6.09 |
| Average | 5.41 | 6.77 | 7.15 |

Table 3: Rate of return on US foreign investments by geographical area, 1920-1935
Source: Madden, Nadler, and Sullivan (1937), Table 29 page 157.

1937; Eichengreen and Portes, 1988; Jorgensen and Sachs, 1988). In a comprehensive study of bond issues in the 1920s, Eichengreen and Portes (1988) show that ex-ante yield spreads over risk free domestic options - treasury bills in the US and consols in the UK - more than compensated British investors and almost compensated US investors for the losses of default. By studying all New York bond issues of the 1920s, Flandreau, Gaillard, and Panizza (2010) conclude that the desire to maintain their good reputation meant that underwriters carefully screened and selected loans, leading to less malfunctioning in the international financial markets than previously thought.

Nonetheless, defaults did impact creditors. Jorgensen and Sachs (1988), for example, find large differences in rate of returns between Latin American countries: continuously serviced Argentinean loans yielded higher returns than US Treasury bills, while default in Bolivia, Chile, Colombia and

Peru translated into losses for foreign investors. In general, the profitability of single bond issues depended strongly on when they were issued. Those issued during the early 1920s enjoyed unbroken service for a number of years. Later issues only provided remuneration for a a limited amount of time before default hit in the early 1930s.

Defaults also had large aggregate impact on the American and other creditor economies. Financial transmission channels working through banks exposed abroad contributed to the diffusion and severity of the global slump and accelerated the UK's departure from the Gold Standard, as shown by Ritschl and Sarferaz (2014) and Accominotti (2012) respectively for the German case. For these channels, the distribution and timing of losses from defaults, rather than their cumulative amounts, are of central importance.

For debtors, the consequences of default were also non-trivial. Eichengreen and Portes (1990) find that defaulting countries on average recovered faster from the Depression, even after controlling for the severity of the slump. The authors argue that the countries which continued to service their foreign debts had to enforce contractionary policies in order to generate the necessary foreign exchange. Restrictive fiscal policies were needed to raise funds to transfer abroad, while loss of gold and foreign exchange reserves led directly to decreases in the money supply, given that foreign exchange was needed for debt repayments. Dealing specifically with the case of Germany, Ritschl (2002) argues that the default was instrumental in the country's recovery in the 1930s.

While not disputing these general findings, I find no evidence of the systematic differences in fiscal policy between defaulters and non-defaulters highlighted by Eichengreen and Portes (1990), as shown in Section 4 and 5. What emerges from my analysis, instead, is that countries which experienced a more severe contraction their revenues also drastically reduced their public expenditures. These countries also happened to be overwhelmingly defaulters. I argue that, rather than an explicit policy choice, this reflects different constraints between fiscally strong and fiscally weak countries.

# 4 Data and descriptive statistics

## 4.1 New data and sources

I have transcribed a large amount of of new data from historical sources for this paper. In the econometric analysis of Section 5, I also rely on data collected by researchers over the years. I discuss these data and their sources in detail in Appendix A.

The principal data contribution of this paper is a new public debt data set, which includes local debt and accounts for maturity structures. Local level data was left out of previous work presumably due to its very scattered nature. To the best of my knowledge, I am the first to provide information on sub-national public debt on a systematic basis for a sample of almost 30 countries for the interwar period. The overall sample covers over 90% of US net outstanding foreign loans

for the whole period.

The countries included are Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Japan, the Netherlands, Norway, Peru, Poland, Romania, Sweden, Switzerland, the United Kingdom, Venezuela and Yugoslavia. However, not all time series are available for all countries (see Appendix A) so that some of the countries drop out in some specifications of the econometric analysis (see Section 5). In particular, sub-national debt figures are not available on a continuous basis for Austria, Bolivia, Chile, Czechoslovakia, Estonia, France, Greece, Peru Romania and Venezuela.

In correspondence with the recent European debt crisis, there has been a renewed push to understand the role of public debt in the economic performance of countries. Several authors have employed long-run historical data to study this issue. Reinhart and Rogoff (2009) and Abbas, Belhocine, El Ganainy, and Horton (2010) represent two recent efforts to reconstruct public debt statistics over the very long run. For the interwar period, they both rely on data collected by the League of Nations and later included in a United Nations volume (United Nations, 1948), which is also the starting point of my work. However, the compilers of the volume were very transparent about the limitations of their data, which pose a serious challenge to international comparability.

The data in the volume is limited to central government and central government guaranteed debts.[9] The UN volume further breaks down central government debt into domestic debts - long-term and short-term - and foreign debts. Less complete data on debt service are also reported. The debt figures normally include the debt of state-owned enterprises, but there are some exception as in the case of the railways of Canada and Switzerland. More generally, the budgetary methods and accounting practices varied significantly across countries. Debt is sometimes shown as gross, sometimes as net with no consistent definition of these two terms across countries. Generally, net debt is the gross debt minus whatever claims against creditors - often the Central Bank - are held by the Treasury.

No consistent definition of short term debt existed either. The compilers of the volume settled for classifying debts with maturity of two years or less as short term debts. I retain this definition in the paper. The distinction between domestic and foreign debt was also often not the same across countries. Some classified their debts based on the currency of issues, some on the place of issuance, while other based it on the domicile of the creditors, whenever this was known. Conversions from foreign currency into domestic currency were also carried out in different ways. In most cases, the parities at which the debt was issued were used. In a few cases, current exchange rates were used, while in others the parity was adjusted periodically. Finally, in some instances war debts are included in the figures, while in others they are excluded. The inclusion or exclusion of these particular debts depended on the recognition of these obligations by the debtor state.

[9]Government guaranteed debts, normally constituted a small share of total public debts, a notable exception being Australia, where the commonwealth took over all the outstanding debts of the states on 1 July 1929.

Appendix A provides details of these issues on a country by country basis. Whenever this was possible, the comparability of the data was improved by including or excluding certain items, but the overall picture is that of imperfect comparability across countries. On the positive side, however, the different reporting techniques used reflect the perception of the public debt held by the statistical offices and presumably the governments of the debtor countries. For the purpose of a study on the causes of default, this should be the key variable of interest. The problem of imperfect comparability is further mitigated by the use of panel data methods. These rely on the time series variation of variables rather than on the cross-sectional comparison of levels (see Section5). In this aspect, my paper has a similar approach to Schlularick and Taylor (2012), who face commensurate issues of cross-country comparability in their study of credit booms and busts.

The principal sources for the local public debt data are the Yearbooks of the German Imperial Statistical Office (Statistisches Reichsamt, 1936b, 1938, 1939/40). For some countries (e.g. Argentina), these sources are integrated by the publications of various bodies, such as the Institute for International Finance - established by Bankers Association of America in cooperation with New York University as response to the interwar debt crisis- the Corporation of Foreign Bondholders - created by private British holders of foreign government securities in 1886 to protect their interests - and rating agency Moody's investment manuals (for details, see Appendix A).

These data reveal that the compilers of the UN volume were not fully aware of the size of local level borrowing. Their claim that central government debt made up the dominant item of public debt is unsubstantiated for a considerable number of countries. Figure 2 shows that local public debts constituted on average around 25% of total public debts. The relative importance of local debts varied greatly across countries. Figure 3 illustrates this point. Nations with federal structures and/or large and independent cities were characterised by major borrowing at the local level. Examples of these type of countries are Brazil, with an average share of local debt over total debt of 71.7% between 1928 and 1934, and Germany, with an average of 49.8% between 1927 and 1936. In more centralised and less sizable countries, local borrowing was much smaller. Belgium and Bulgaria, for example, had an average local share of debt of 0.8% and 4.5% between 1927 and 1936 respectively.

The local debt data reveals that the comparative debt burden picture is seriously distorted by the exclusion of sub-national public debts. Whether national, provincial or municipal, public debt is serviced though tax and other public revenues. In case of debt denominated in foreign currencies, debt service further relies on the availability of foreign exchange. Both public revenues and foreign exchange are generated by the productive activities of the economy and, thus, central and local governments rely on the same "base" to produce the resources needed to meet their obligations. A holistic picture of public debts is thus essential in order to acquire a precise measure of the burden faced by countries.

Another important data contribution of this paper is constructing a new measure of default for the interwar period. Table 4 and 5 illustrate my default size estimates for National-Provincial and

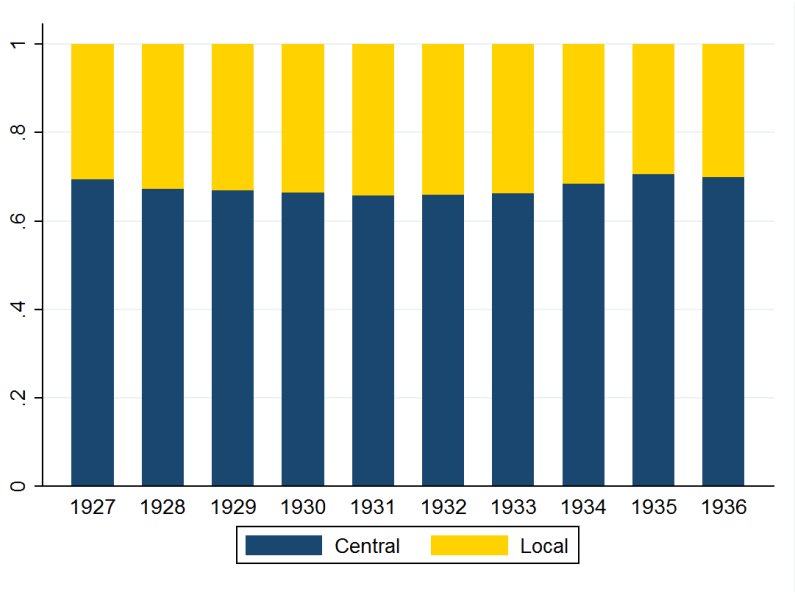



Figure 2: Average shares of central and local debt over total debt, 1927-1936
Unweighted average. Countries included: Belgium, Bulgaria, Denmark, Finland, Germany, United Kingdom, Ireland, Italy, Netherlands, Norway, Poland, Sweden, Switzerland, Argentina, Brazil, Colombia, Uruguay, Australia, Japan, Canada, New Zealand
Source: author's estimates based on data in United Nations (1948), Moody's (1931, 1934, 1935), Institute of International Finance (1927), Corporation of Foreign Bondholders (1929), Statistisches Reichsamt (1936b, 1939/40),Werhahn (1937), Francese and Pace (2008). See text and Appendix A for details

Municipal administrative units. This variable is the main outcome of interest of the econometric exercise of Section 5 below. Unfortunately, no distinction can be drawn at this stage between national and provincial defaults due to incomplete disaggregated annual information on outstanding dollar debts for all countries.

Default size is measured as the share of the principal of dollar bonds in default compared to the principal of all outstanding dollar bonds. I argue that this ratio represents the best measure of default size at the time of the actual defaults. Given the uncertainty and length of renegotiations following the 1930s defaults, using ex-post haircuts would be inadequate. Given the protracted time of negotiations, haircuts reflect a situation that is potentially unrelated to economic and political conditions of countries at the time of their default. Furthermore, they are a static measure and do not reflect the dynamic process of default that is, instead, evident in my default size measure.

The data demonstrates that partial defaults were common at both the national-provincial and municipal levels and often preceded complete defaults. However, some defaults remained partial as in the case of Austria, Argentina and Czechoslovakia. In Brazil, although the central and most local governments defaulted, some municipalities - most notably the city of Porto Alegre - continued to service part of their debts. In Poland and Bulgaria, municipal governments did not follow the central government into default at all. As the econometric analysis demonstrates, national-provincial and municipal defaults shared only part of their underlying causes.

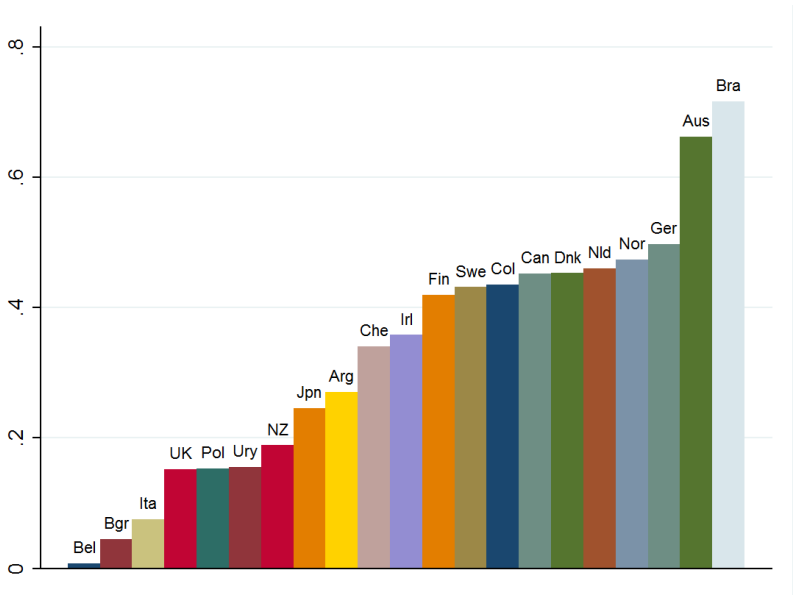



Figure 3: Average shares of local debt over total debt, 1927-1936
Source: author's estimates based on data in United Nations (1948), Moody's (1931, 1934, 1935), Institute of International Finance (1927), Corporation of Foreign Bondholders (1929), Statistisches Reichsamt (1936b, 1939/40),Werhahn (1937), Francese and Pace (2008). Bel=Belgium, Bgr=Bulgaria, Ita=Italy, UK=United Kingdom, Po=Poland, Ury=Uruguay, NZ= New zealand, Jpn=Japan, Arg=Argentina, Che= Switzerland, Irl=Ireland, Fin=Finland, Swe=Sweden, Col=Colombia, Can=Canada, Dnk=Denmark, Nld=Netherlands, Nor=Norway, Ger=Germany, Aus=Australia, Bra=Brazil. See text and Appendix A for details

| Year | Austria | Bulgaria | Czechoslovakia | Germany | Hungary | Poland | Romania | Yugoslavia | Argentina | Bolivia | Brazil | Chile | Colombia | Peru | Uruguay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1930 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.03 | 0 | 0 | 0 | 0 |
| 1931 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 0.78 | 0 | 1 | 0 |
| 1932 | 0.24 | 1 | 0 | 0 | 0.62 | 0 | 0 | 1 | 0.02 | 1 | 1 | 1 | 0.53 | 1 | 1 |
| 1933 | 0.28 | 1 | 0 | 0.39 | 1 | 0 | 1 | 1 | 0.2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1934 | 0.34 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0.26 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1935 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0.28 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1936 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0.25 | 1 | 1 | 1 | 1 | 1 | 1 |

Table 4: Share of the principal of national and provincial dollar bonds in default, 1930-1936
Source: Data on outstanding loans is from Lewis (1938) and data on the defaults is from Moody's (1933, 1934, 1935, 1936, 1937)

| Year | Austria | Bulgaria | Czechoslovakia | Germany | Hungary | Poland | Romania | Yugoslavia | Argentina | Bolivia | Brazil | Chile | Colombia | Peru | Uruguay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1930 | 0 | 0 | 0 | 0 | 0 | 0 | - | - | 0 | - | 0 | 0 | 0 | 0 | 0 |
| 1931 | 0 | 0 | 0 | 0 | 0 | 0 | - | - | 0 | - | 0.5 | 0.14 | 0.46 | 0 | 0 |
| 1932 | 1 | 0 | 0 | 0 | 1 | 0 | - | - | 0.6 | - | 0.83 | 1 | 1 | 1 | 1 |
| 1933 | 1 | 0 | 0 | 1 | 1 | 0 | - | - | 0.67 | - | 0.75 | 1 | 1 | 1 | 1 |
| 1934 | 1 | 0 | 0 | 1 | 1 | 0 | - | - | 0.82 | - | 0.77 | 1 | 1 | 1 | 1 |
| 1935 | 0 | 0 | 0.24 | 1 | 1 | 0 | - | - | 0.6 | - | 0.72 | 1 | 1 | 1 | 1 |
| 1936 | 0 | 0 | 0.23 | 1 | 1 | 0 | - | - | 0.82 | - | 0.72 | 1 | 1 | 1 | 1 |

Table 5: Share of the principal of municipal dollar bonds in default, 1930-1936
Source:Data on outstanding loans is from Lewis (1938) and data on the defaults is from Moody's (1933, 1934, 1935, 1936, 1937)

### 4.2 Some descriptive statistics

Keeping in mind the data issues described above, which limit the reliability of raw comparisons across countries, it is nonetheless useful to explore some characteristics of the newly assembled data. In particular, I will illustrate how these data fit with arguments made in both the theoretical literature and the historiography.

A prominent argument in the historiography is that he maturity structure of international capital flows played an important role in the interwar debt crisis. Feinstein and Watson (1995), among many others, emphasize the unusually large size of short-term flows of the 1920s. Moreover, Germany and South American countries - some of the most prominent defaulters of the interwar era - relied heavily on short-term borrowing (Jorgensen and Sachs, 1988; Ritschl, 2012, 2013). However, Figure 4 demonstrates that the share of short-term debts in domestic public debts debt was not generally higher amongst defaulters than amongst non-defaulters. In the crucial period between 1924 - which is around the time when international lending from the US started to take off - and the start of the Depression in 1929, it was actually marginally lower. Unfortunately, no information is available on the maturity structure of foreign debts, and our best assumption is that this was similar to that to that of domestic borrowing. If anything it was probably lower given that domestic sources of short-term borrowing - particularly central banks - were ample, whereas most foreign borrowing took place through floating bonds.

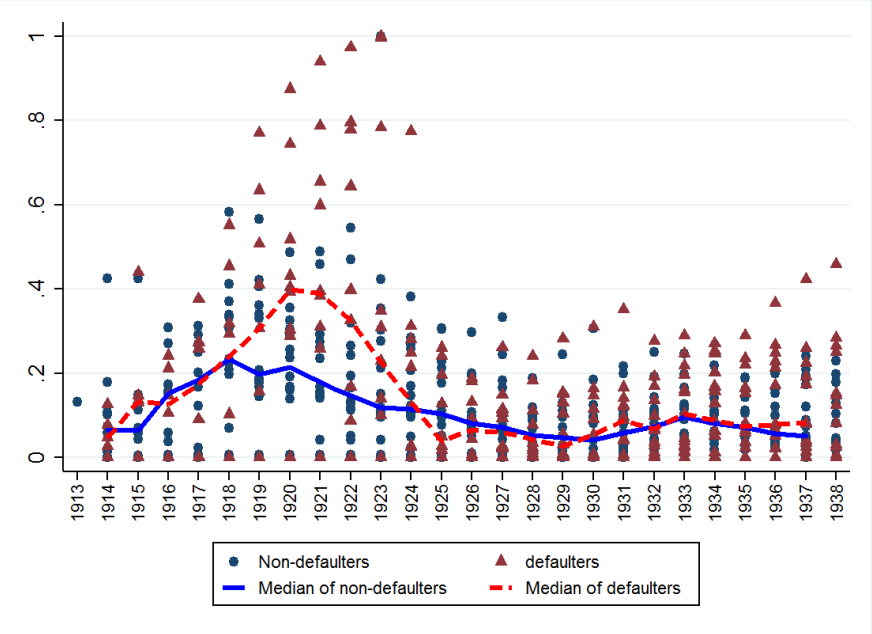



Figure 4: Short-term debt as a share of central government debt, 1914-1938
Source: author's calculations based on data in United Nations (1948). Short-term debts are those with maturity of up to two years. Data on the maturity structure of debts is available for to domestic debts only. See Appendix A for details

The high incidence of short-term borrowing in the immediate post-WWI period in countries that would later default in the 1930s is extremely interesting in its own right, but it is not the topic of this paper. What is clear, however, is that the incidence of default does not appear to be related to differential reliance on short term debts between defaulters and non-defaulters. This is confirmed by the econometric analysis below for national-provincial defaults.. For municipal defaults, instead, I find that when other factors are appropriately controlled for, the share of short term public debts emerges as a reliable predictor of default.

Another striking aspect of the new data is that no relationship is evident between the size of the public debt burden - whether this is just the central government debt (Figure 5), or it includes the borrowing of local authorities (Figure 6) - and default. Unsurprisingly given their heavy involvement in WWI, France and the UK emerge as clear outliers with huge debt burdens. That these countries did not default attests to the tenuous unconditional relationship that exists between debt burdens and default. However, even excluding the clearly special case of these two countries, it is still impossible to find a relationship between debt size and default. If anything non-defaulters, had larger debts compared to the size of their economy than non-defaulters. The econometric analysis reveals that this result is not robust to the inclusion of variables that affected both the ability to borrow and the probability of default. Indeed, I find that the public debt burdens were an important factor in national-provincial defaults.

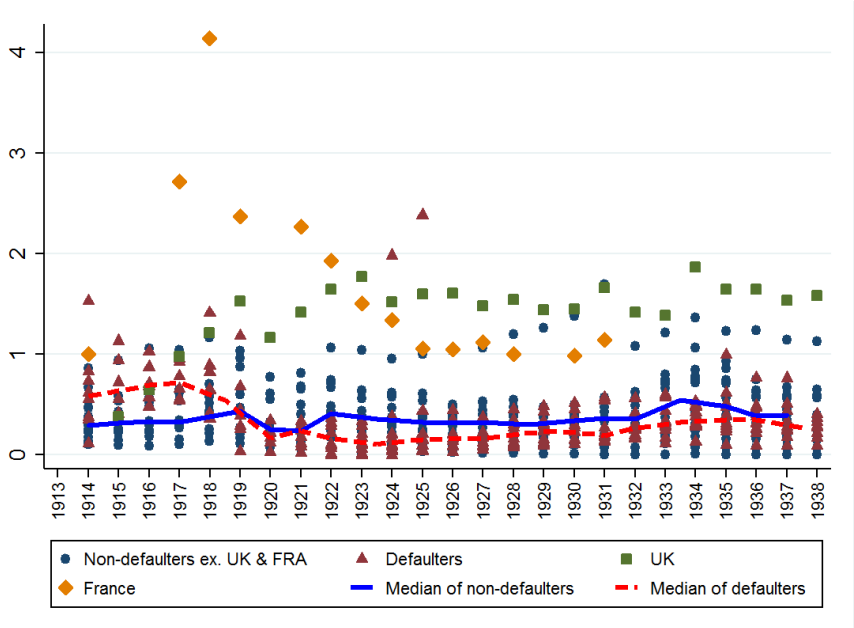



Figure 5: Central government debt as a share of GDP, 1914-1938
Source: author's calculations based on data from United Nations (1948) for public debts and Klasing and Milionis (2014) for nominal non-PPP adjusted GDP. See Appendix A for details

What emerges clearly directly from the raw data, instead, is that defaulters relied dispropor-

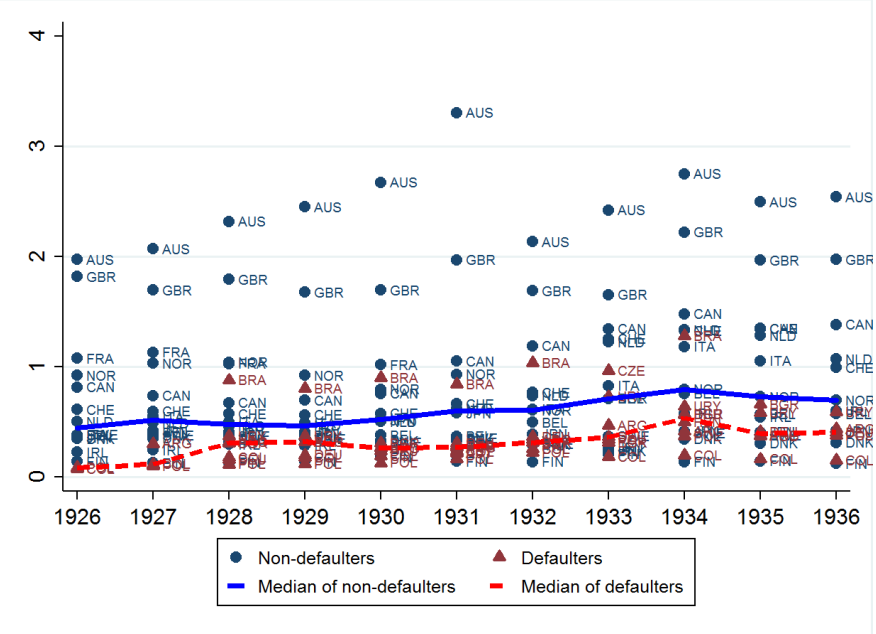



Figure 6: Central and local government debt as a share of GDP, 1914-1938
Source: author's calculations based on data from United Nations (1948), Moody's (1931, 1934, 1935), Institute of International Finance (1927), Corporation of Foreign Bondholders (1929), Statistisches Reichsamt (1936b, 1939/40),Werhahn (1937), Francese and Pace (2008) for public debts and Klasing and Milionis (2014) for nominal non-PPP adjusted GDP. See Appendix A for details

tionately more on foreign borrowing compared to non-defaulters (Figure 7). The difference is very significant: for defaulters the median share of foreign debts as a share of central government debt hovered between 60 and 80% between 1926 and 1938 and reached its peak in 1929. It then declined during the 1930s as international capital flows came to a grinding halt and domestic sources of finance gained importance. However, the econometric analysis once agin reverses the result of this raw comparison. Once country characteristics are controlled for, the relationship between default and foreign borrowing turns negative. The result implies that reliance on external sources of finance made countries more reluctant to renege on their foreign payments and face the possibility of being cut off from international financial markets.

The final piece of evidence in this section regards the relationship between default and public revenues. As outline above, the deterioration of fiscal revenues can be an indicator of bad economic times, and thus a cause of default. However, a fall in tax revenues is not necessarily simply a reflection of a slump. The reaction of tax revenues to a fall in income can vary strongly across countries. One reason is that fiscal policy can be different in different countries. Some governments might react strongly to a slump, cutting taxes and/or raising expenditures, while others might remain passive or even raise more tax revenues to, for example, attempt to continue servicing debts. Another reason is that factors such as the structure of the economy and fiscal institutions can influence the reaction of tax revenues in the face of economic shocks. In related work (Papadia,

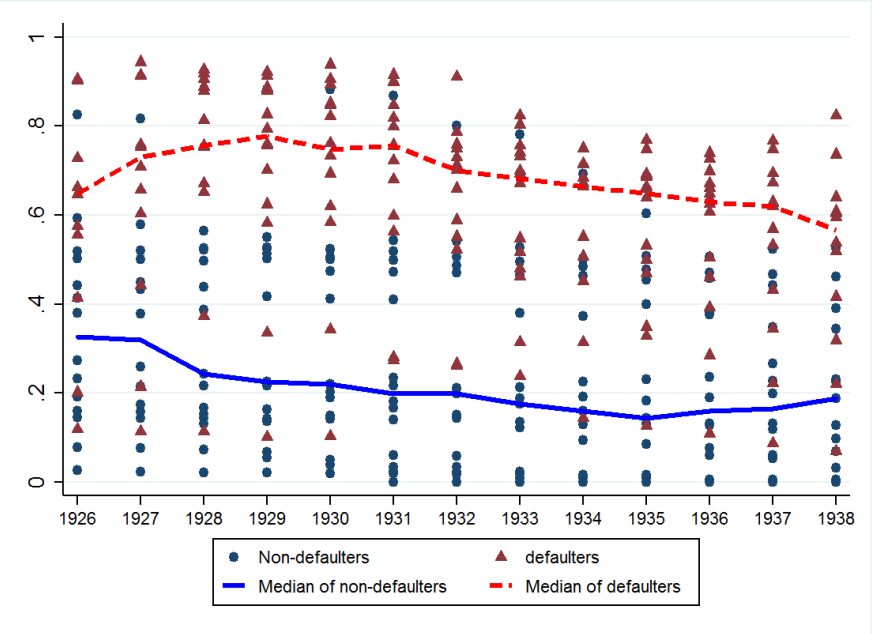



Figure 7: Foreign debt as a share of central government debt, 1926-1938
Source: author's calculations based on data in United Nations (1948). See Section 4 and Appendix A for details

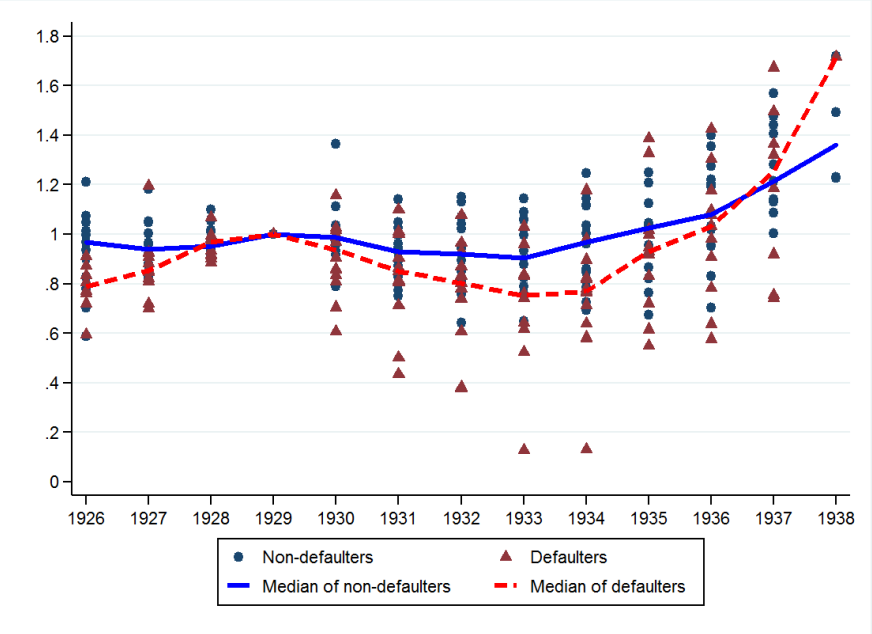



Figure 8: Central government tax revenues 1914-1938, 1929=1
Source: author's calculations based on data from Papadia (2016).

2016), I show that the level of development of the fiscal system, as measured by fiscal capacity, strongly influenced the ability of countries to prevent their government financing from collapsing

during then Depression. The key channel for this was a better access to borrowing in terms of both magnitude and cost.

Figure 8 shows that defaulters saw their central government tax revenues contract significantly more than non-defaulters. The picture for local governments is very similar. Whereas the defaulters experienced a median cumulative contraction of more than 20% in their tax revenues between 1929 and 1933, non-defaulters's public revenues contracted by less than 7%. The analysis below reveals that even after controlling for a wide array of factors the relationship between fiscal contraction and default remains statistically significant and quantitatively important. Moreover, defaulters do not appear to have reduced tax revenues in order to boost their economy. As Figure 9 shows, public expenditure for defaulters fell together with tax revenues after 1930. Non-defaulters, instead, actually expanded their public expenditure consistently after 1929. Combined with evidence presented in Papadia (2016), this evidence suggests that countries possessing more resilient fiscal institutions were able to avoid both a collapse in their public revenues and default.

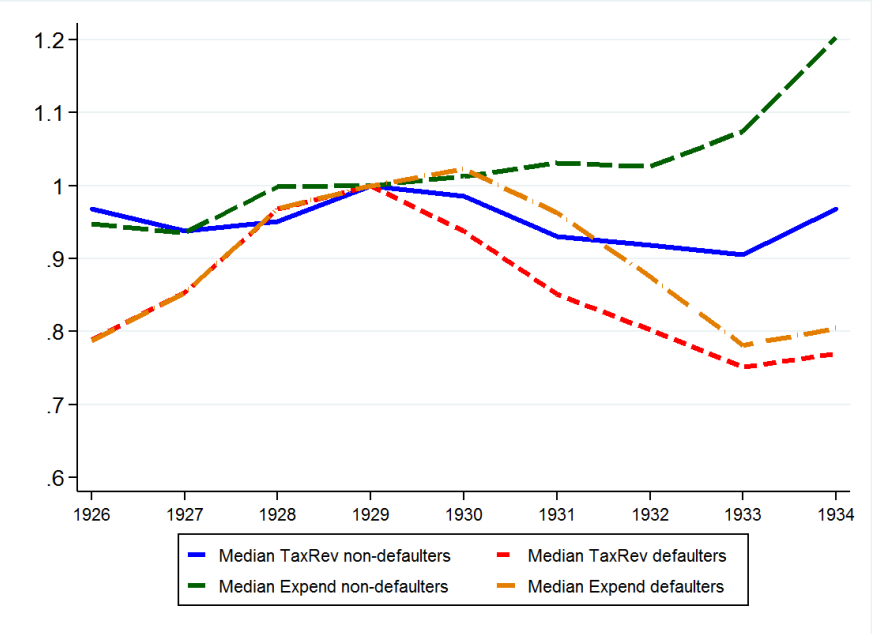



Figure 9: Tax revenues and public expenditure 1926-1934, 1929=1
Source: author's calculations based on data from Papadia (2016).

## 5 Econometric analysis

In this section, I study the determinants of default size, defined as the share of the principal of public sector foreign Dollar bonds in default with regard to either interest and/or principal payments. The reasons for this choice are outlined in Section 4 above. The analysis is conducted separately at the national-provincial and municipal levels. Section 5.1 outlines my methodology, while Section 5.2

illustrates the findings.

Although the primary focus of the analysis is gauging the impact of public revenue loss on default, the complex and multifaceted nature of defaults means that I have to account for a variety of factors concomitantly in order to avoid omitted variable bias. Therefore, after showing that fiscal fragility and default are correlated, no matter what estimator is used, I introduce four sets of controls both independently and combined. First, I test whether the severity of the slump had an effect on the probability and size of default, and whether this explains away the effect of the contraction in public revenues. Second, I test whether default is correlated with potential external penalties such as a decrease in trade or future borrowing by controlling for countries' reliance on the external sector in terms of trade and finance. Third, I study the influence of the size and composition of public debts and of the debt service on default. Finally, I test whether the fiscal and monetary policies carried out by governments had any traction in affecting the default outcome.

For national-provincial defaults, public revenue loss emerges as a leading factor in the defaults throughout the analysis. This effect is identified strongly and separately from that of the income shock of the Great Depression. It survives the inclusion of a wide variety of controls and the use of different specifications and estimators. For municipal defaults, the result is less statistically robust due principally to a smaller sample size, but is both quantitatively and qualitatively similar to that of national-provincial defaults.

Some additional results also emerge from the analysis. However, unlike the fiscal deterioration result, these are not robust to different specifications. For national provincial-defaults, I find evidence that a higher degree of trade openness and a higher share of foreign public debts - both proxies for reliance on the external sector- are negatively related to default size. The public debt burden, instead, appears to be positively related to default, suggesting excessive public borrowing. The magnitude of the economic slump, however measured, also emerges as a strong predictor of national-provincial defaults. For municipal defaults, once again results are less clear cut. However, the incidence of short term public debts emerges as a robust predictor of default, confirming the hypothesis put forward in the historiography.

### 5.1 Methodology

The basic model in my estimations is outlined in Equation 1.

$$defaultsize_{i,t} = \alpha + \theta CumulRevLoss_{i,t-1} + \mathbf{x_{i,t-1}}\beta + \epsilon_{i,t} \tag{1}$$

where $\mathbf{x}$ is a vector of controls and $\epsilon$ is the idiosyncratic error term . To reduce the risk of reverse causality, all regressors are entered with a lag.

Assuming all the usual Gauss-Markov conditions are met, OLS yields consistent estimates of the marginal effects of the explanatory variables on default size, even if the dependent variable is constrained in the 0-1 interval. However, the linear model suffers from well known problems deriving

from the fact that the conditional mean of the dependent variable is assumed to be linear in the regressors. This means that the predicted default size can lie outside the 0-1 interval. Nonetheless, a linear model represents a good starting point for two reasons: 1) straight forward interpretation of the coefficients 2) the possibility of including fixed effects in a simple way.

To overcome the issues associated with linearity, I also run this basic model using the Probit and Tobit estimators. Tobit is often called a censored model, even though it does not actually imply any censoring in the data. Wooldridge (2010) defines it as a corner solution response model since the response variable is bounded by one or two corner values and can have positive probability mass at these. In my case the corners are 0 and 1. Like all non linear models, the estimated Probit and Tobit coefficients cannot be interpreted as marginal effects as one would do with OLS or other linear models. The marginal effects need to be computed for each level of the explanatory variables, but their sign and significance can be interpreted just as in the linear case. I also employ the Pseudo Poisson Maximum Likelihood (PPML) estimator designed by Santos Silva and Tenreyro (2006) to deal with the nonlinearity introduced by having logarithms in the estimation.

The results of the these estimations are vulnerable to omitted variable bias, since I cannot control for potentially crucial unobserved country characteristics. I tackle this issue by employing standard and dynamic panel data methods. Specifically, I employ the within (FE) and first differences (FD) estimators, as well as the difference (Arellano and Bond, 1991) and system (Blundell and Bond, 1995) Generalized Method of Moments (GMM) estimators.[10]

The model takes the following general form:

$$defaultsize_{i,t} = \alpha + \mathbf{A}(\ell)\{defaultsize_{i,t-1} + CumulRevLoss_{i,t-1} + \mathbf{x_{i,t-1}}\} + c_i + l_t + \epsilon_{i,t} \quad (2)$$

where $\mathbf{A}$ is a matrix of polynomials in the lag operator, $\ell$ is an aribitrary number of lags, and $c$ and $l$ are country and time fixed effects respectively.

Another important feature of panel data methods is that they exploit the time-series rather than cross-sectional variation. This is an attractive feature in the context of this paper. Different accounting and reporting standards across countries make the data imperfectly comparable across

[10]With a dynamic structure, standard fixed and random effects estimators are biased since the lagged dependent variable is correlated with the differenced error term. For this reason, a GMM estimator is necessary. This type of estimator uses longer lags of the variables to instrument the lagged variables. For this strategy, it is essential that the error be serially uncorrelated. Standard tests exist to verify whether this condition is met. I employ the widely the used difference GMM estimator (Arellano and Bond, 1991), which exploits the moments conditions generated by instrumenting differenced variables with longer lags of their levels without losing any observations (apart from the first) in the process. This is achieved by changing the number of instruments with the lags available. The second estimator used is the Blundell-Bond (a.k.a system) GMM (Blundell and Bond, 1995). The estimation in this case is performed in levels with the lagged differenced variables used as instruments for the regressors. Compared to the difference estimator, this model uses some additional orthogonality conditions which improve the precision of the estimates when the autoregressive parameter (i.e. the coefficient of the lagged dependent variable) is close to one. However, this comes at the cost of additional assumptions. In particular, one has to assume that the dependent variable is mean stationary.

countries. By exploiting the time series variation, all one needs for consistent estimation is that accounting standards do not change over time for the same country (see Section 4 above).

The dynamic element is also important given that persistence in the case of default is a natural assumption. A country could be in default in a certain period simply because it was in default during the last period. The debt renegotiations that follow sovereign defaults are notoriously lengthy: even in the face of improving economic conditions a country might seek to restructure its obligations to obtain a reduction in the debt, while creditors might hold-up hoping for a better deal. The interwar period was no exception; some defaults were only fully resolved after World War II. The German one, for example, was eventually settled by the London Debt Agreement of 1953.

Including a lagged dependent variable in the estimation also drastically reduces the risk of omitted variable bias. Defaults tend to have large macroeconomic repercussions, which would impact the other variables in the estimation. Therefore, the other regressors are very likely to be correlated with the lagged default indicator. A drawback of this strategy is that time-invarying explanatory variables are lost and slow-moving ones are subject to a drastic reduction in their variability, leading to imprecise estimates and possibly to coefficients appearing to be statistically insignificant when in fact they are not. Moreover, these models - like OLS - are linear and suffer from the shortcomings outlined above. As Wooldridge (2010) argues, both the linear and nonlinear approaches have advantages and drawbacks which at the the current state of statistical knowledge cannot be overcome. He suggests reporting and drawing inference from both, as I do here.

I illustrate the results at the national-provincial level first and at the municipal level second. Balancing the pros and cons of the various estimators, I use the standard within fixed effects estimator as the baseline and the dynamic system GMM as a robustness check.

In Appendix B.1, I replicate the analysis of Eichengreen and Portes (1986), which still represents the reference paper for cross-country studies of default during the Great Depression. Apart from issues related to their econometric methodology, stemming principally from their cross-sectional approach, I demonstrate that not all their results are robust to changes in the composition of the sample.

## 5.2 Baseline Results

### 5.2.1 National-Provincial Defaults

In Table 6, I show that, no matter what estimator is used, the size of national-provincial defaults and the cumulative public revenue loss - measured as the natural logarithm of the lagged level of tax revenues compared to 1929 - are strongly negatively correlated. Countries that saw their tax revenue deteriorate the least compared to the pre-cirisis year of 1929 were less likely to default and to undergo larger defaults.

Column 1 features the basic OLS estimate, column 2 and 3 contain the non-linear Probit

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | OLS | Probit | Tobit | PPML | FE | FD | DiffGMM | SysGMM |
| NatProvDefaultSize | | | | | | | | |
| L.NatProvDefaultSize | | | | | | | 0.881*** | 0.771*** |
| | | | | | | | (0.0857) | (0.0502) |
| L.LnCentTax/CentTax29 | -0.595*** | -2.283*** | -8.514* | -1.321*** | -0.438*** | -0.172* | -0.330*** | -0.226*** |
| | (0.133) | (0.742) | (4.782) | (0.308) | (0.129) | (0.0882) | (0.0826) | (0.0537) |
| Constant | 0.109*** | -1.067*** | -3.753* | -1.975*** | 0.128*** | 0.0406*** | | 0.0121 |
| | (0.0391) | (0.243) | (1.963) | (0.268) | (0.0155) | (0.0119) | | (0.0126) |
| Observations | 249 | 249 | 249 | 249 | 249 | 221 | 244 | 249 |
| R-squared | 0.171 | | | 0.095 | 0.107 | 0.030 | | |
| Number of countries | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| Country fixed-effects | | | | | YES | YES | YES | YES |
| Robust standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 6: National-provincial defaults and tax revenues, 1927-36
Countries included are: Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Peru, Poland, Romania, Sweden, Switzerland, United Kingdom, Yugoslavia. For the GMM estimations I use the 3rd, 4th and 5th lag of the explanatory variables as instruments. I also use the small sample correction, the twostep estimator and the orthogonal to minimise the loss o observations in the presence of gaps in the data.

and Tobit models. Column 4 contains the PPML estimator . Columns 5 to 8 contain the panel estimators: columns 5 and 6 feature the within (FE) and first differences (FD) estimators, while columns 7 and 8 present the dynamic difference and system GMM estimators.

In Table 7 and 8, I retain the within estimator, which balances efficiency and robustness, and insert the lagged controls one at a time. The cumulative tax revenue loss indicator continues to be strongly negatively correlated with default. Moreover, the coefficient is quantitatively similar across all specifications: a 10% larger ratio of current tax revenues compared 1929, is associated with 2-5 percentage points smaller default. Given that for defaulters tax revenues in 1933 were on average 0.7 of their 1929 level, a 10% smaller decrease in revenues translates into a 0.07 larger ratio of current tax revenues compared to 1929, well within the observed variation in the data, which is between 0.13 and 1.2.

The controls included follow the four categories outlined above. The severity of the slump (columns 1-3) is measured in three different ways: the cumulative loss of nominal GDP, the cumulative loss in real GDP per capita and the cumulative loss of trade, all relative to 1929. As expected all three indicators are negatively correlated with default size: countries whose economic outlook deteriorated the least, were less likely to default. However the nominal GDP and trade coefficients are more precisely estimated than the real GDP one, as evidenced by their strong statistical significance.

The impact of countries' reliance on the external sector is assessed in columns 4-6. In column

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| NatProvDefaultSize | | | | | | | | |
| L.LnCentTax/CentTax29 | -0.219** | -0.332*** | -0.176* | -0.380*** | -0.326*** | -0.220** | -0.378*** | -0.481*** |
| | (0.0933) | (0.108) | (0.0935) | (0.107) | (0.0932) | (0.100) | (0.117) | (0.128) |
| L.LnNGDP/NGDP29 | -0.626*** | | | | | | | |
| | (0.223) | | | | | | | |
| L.LnGDPPC/GDPPC29 | | -0.469 | | | | | | |
| | | (0.309) | | | | | | |
| L.LnTrade/Trade29 | | | -0.339*** | | | | | |
| | | | (0.0976) | | | | | |
| L.ForDebtShare | | | | -1.617*** | | | | |
| | | | | (0.361) | | | | |
| L.lnDollarDebt/GDP | | | | | 0.111* | | | |
| | | | | | (0.0552) | | | |
| L.Openness | | | | | | -0.441*** | | |
| | | | | | | (0.129) | | |
| L.ShortDebtShare | | | | | | | 0.580 | |
| | | | | | | | (0.510) | |
| L.ShortDollarDebtShare | | | | | | | | -1.247* |
| | | | | | | | | (0.662) |
| Constant | 0.0488* | 0.101*** | 0.00608 | 0.880*** | 0.467** | -0.496*** | 0.0367 | 0.147*** |
| | (0.0242) | (0.0172) | (0.0319) | (0.170) | (0.179) | (0.178) | (0.0853) | (0.0137) |
| Observations | 225 | 233 | 225 | 227 | 223 | 225 | 217 | 247 |
| R-squared | 0.157 | 0.100 | 0.257 | 0.247 | 0.112 | 0.258 | 0.130 | 0.124 |
| Number of countries | 26 | 27 | 26 | 27 | 26 | 26 | 27 | 29 |
| Country fixed-effects | YES | YES | YES | YES | YES | YES | YES | YES |
| Robust standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 7: National-provincial defaults, tax revenues and controls - fixed effects estimation, 1927-36 Part 1

Countries included in columns 1,3,5,6 are Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, UK and Yugoslavia; column 2 additionally includes Peru; compared to column 1, columns 4,7 include Bolivia and Peru and, but exclude Yugoslavia; compared to column, column 8 includes Bolivia, Estonia, Peru.

4, I control for the foreign share of the public debt. In column 5, instead, I control for the total borrowing of the economy in dollars - this includes both the public and the private sectors - normalized by GDP. Finally, in column 6 I control for the country's openness to trade, measured as the share of trade in GDP. The prior regarding the sign of the coefficients is unclear. On one hand, a higher reliance on the foreign sector should dissuade countries from defaulting due to the higher cost associated with being cut off from foreign markets for goods, services and capital. On the other hand, a higher share of foreign debt would translate into a larger welfare gain due to more foregone payments abroad. The evidence lends some support to both channels, but is stronger for the former. Openness and the foreign debt share are strongly negatively associated with default size. However the dollar debt-to-GDP ratio is positively associated with default, potentially pointing to excessive

| NatProvDefaultSize | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| L.LnCentTax/CentTax29 | -0.279*** | -0.277* | -0.301*** | -0.313*** | -0.434*** | -0.448*** | -0.336*** | -0.496** |
| | (0.0506) | (0.151) | (0.0772) | (0.0981) | (0.129) | (0.110) | (0.115) | (0.196) |
| L.LnCentralDebt/GDP | 0.271*** | | | | | | | |
| | (0.0942) | | | | | | | |
| L.LnTotalDebt/GDP | | 0.217** | | | | | | |
| | | (0.0902) | | | | | | |
| L.LnDebtService/GDP | | | -0.0503 | | | | | |
| | | | (0.0808) | | | | | |
| L.LnDomYieldSpread | | | | 0.0229 | | | | |
| | | | | (0.0330) | | | | |
| L.Polity2 | | | | | -0.0101 | | | |
| | | | | | (0.0223) | | | |
| L.FiscBalance/GDP | | | | | | -0.741 | | |
| | | | | | | (0.788) | | |
| L.OnGold | | | | | | | -0.267*** | |
| | | | | | | | (0.0710) | |
| L.LnGoldReserves/GDP | | | | | | | | -0.0450 |
| | | | | | | | | (0.0383) |
| Constant | 0.411*** | 0.211*** | -0.0940 | 0.111*** | 0.165* | 0.0420 | 0.282*** | -0.114 |
| | (0.105) | (0.0554) | (0.311) | (0.0227) | (0.0838) | (0.0307) | (0.0443) | (0.136) |
| Observations | 209 | 172 | 207 | 187 | 249 | 205 | 249 | 192 |
| Country fixed-effects | YES | YES | YES | YES | YES | YES | YES | YES |
| R-squared | 0.183 | 0.136 | 0.085 | 0.093 | 0.115 | 0.169 | 0.254 | 0.119 |
| Number of countries | 25 | 22 | 24 | 24 | 29 | 26 | 29 | 22 |
| Robust standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 8: National-provincial defaults, tax revenues and controls - fixed effects estimation, 1927-36 Part 2

Countries included in column 1 are Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Romania, Sweden, Switzerland and UK; column 2 excludes Austria, Chile and Greece and Romania; compared to column 1, column 3 excludes Romania while column 4 excludes Bulgaria and Ireland but includes Yugoslavia; compared to column 1, column 5,7 includes Bolivia, Estonia, Peru and Yugoslavia while column 6 includes just Yugoslavia; column 8 compared to column 1 excludes Chile, Greece and Romania.

borrowing from abroad contributing to default. The result, however, is only weakly significant.

The impact of the public debt burden on default is assessed using six different indicators starting from column 7 in Table 7 and ending with column 4 in Table 8 . The short-term public debt and short-term dollar debt as shares of their respective totals are used to investigate whether difficulties in rolling over the debt - or liquidity pressure - contributed to triggering default. Feinstein and Watson (1995), among many others, have highlighted the large size of short-term flows in the interwar period. Germany and South American countries - the largest defaulters of the interwar era - relied heavily on short-term borrowing (Jorgensen and Sachs, 1988; Ritschl, 2012, 2013). However, short term borrowing does not appear to be systematically positively associated with

default. On the contrary, it appears to be weakly negatively associated in the case of short-term dollar debts. The central and total (central plus local) public debt, instead, are positively associated with default. This finding is in line with theory and the conventional wisdom regarding default. However, it disappears in the dynamic analysis below casting doubts on its robustness. Neither the public debt service as a share of GDP nor the (domestic) yield spread vis-a-vis the USA are associated with default. These results may appear surprising at first: one would expect the debt service and one of its main components - the yield - to be positively associated with default. However, the debt service naturally decreases with default given that the latter implies by its very definition a reduction in the former. Inserting the variable with a lag is not enough to account for this source of reverse causality. However, when the feedback loop between default and debt service is properly accounted for, as in the dynamic estimation below, where the coefficient has the expected sign. In the case of the spread, the sign is correct but the coefficient is insignificant.

Before moving to fiscal and monetary policies, column 5 of Table 8 shows that no systematic differences in defaults existed between more or less democratic countries, as determined by the Polity2 score from the Polity IV database (Marshall and Jaggers, 2005). Fiscal policy is accounted for in column 7 using the fiscal balance as a share of GDP, while monetary policy is controlled for using gold standard membership (column 7) and the amount of gold reserves as a share of GDP (column 8). The direction of fiscal policy does not seem to be robustly associated with default. Gold standard membership instead helps to reliably predict default. This is unsurprising: a default while still on gold would almost certainly have led to capital flight. Countries, instead, tended to go off gold, particularly by introducing exchange controls, before defaulting. Dwindling gold reserves, often cited as a leading indicator of the inability to service foreign debts, while possessing the right sign are not strongly enough associated with national provincial defaults to appear as significant.

In Table 9, I combine the variables that emerged as statistically related to default. In all specifications, the cumulative revenue loss still emerges as strongly negatively associated with default. The size of the coefficient is also similar to the estimation above: a 10% smaller deterioration in revenues led to a 2-3 percentage points smaller default. In a counterfactual world where revenues in 1933 were at the same level as in 1929, national-provincial defaults could have been up to 10% smaller, everything else equal. Imagining a world where both taxes and trade were back at their 1929 levels in 1933, the size of defaults could have been around 30 percentage points smaller on average.

Regarding the different specifications, in column 1 I control for the deterioration of trade and nominal GDP simultaneously. The former emerges as the stronger predictor of default. In column 2, I also control for gold standard membership, which is confirmed to be negatively associated with default. In column 3, instead, I combine information about the reliance of the economy on the external sector by controlling simultaneously for the foreign share of the public debt, the size of the dollar debt relative to GDP and the trade openness. In column 4, I add the on gold indicator. These variables retain the signs found above. A greater openness and reliance on foreign capital, decrease

| NatProvDefaultSize | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| L.LnCentTax/CentTax29 | -0.195* | -0.206** | -0.184** | -0.176** | -0.302*** | -0.244*** | -0.247*** |
| | (0.0974) | (0.0974) | (0.0688) | (0.0673) | (0.0518) | (0.0517) | (0.0795) |
| L.LnNGDP/NGDP29 | 0.234 | 0.192 | | | | | |
| | (0.230) | (0.247) | | | | | |
| L.LnTrade/Trade29 | -0.401*** | -0.257** | | | | | 0.479* |
| | (0.130) | (0.119) | | | | | (0.261) |
| L.ForDebtShare | | | -1.225** | -0.984** | | | -0.844 |
| | | | (0.486) | (0.466) | | | (0.548) |
| L.lnDollarDebt/GDP | | | 0.0858** | 0.0905* | | | 0.0824* |
| | | | (0.0413) | (0.0463) | | | (0.0429) |
| L.Openness | | | -0.347** | -0.198 | | | -0.743** |
| | | | (0.133) | (0.117) | | | (0.317) |
| L.ShortDollarDebtShare | | | | | -0.569 | -0.618* | -0.218 |
| | | | | | (0.368) | (0.361) | (0.491) |
| L.LnCentralDebt/GDP | | | | | 0.267*** | 0.154* | 0.211 |
| | | | | | (0.0910) | (0.0773) | (0.125) |
| L.OnGold | | -0.173** | | -0.158** | | -0.238*** | -0.142** |
| | | (0.0745) | | (0.0747) | | (0.0755) | (0.0631) |
| Constant | 0.00952 | 0.150** | 0.445 | 0.647* | 0.420*** | 0.429*** | 0.201 |
| | (0.0306) | (0.0582) | (0.369) | (0.368) | (0.104) | (0.0933) | (0.473) |
| Observations | 225 | 225 | 205 | 205 | 207 | 207 | 202 |
| R-squared | 0.262 | 0.308 | 0.340 | 0.379 | 0.191 | 0.331 | 0.417 |
| Number of countries | 26 | 26 | 25 | 25 | 25 | 25 | 25 |
| Country fixed-effects | YES | YES | YES | YES | YES | YES | YES |
| Robust standard errors in parentheses | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | |

Table 9: National-provincial defaults, tax revenues and controls combined - fixed effects estimation, 1927-36

Countries included in columns 1,2 are Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, UK and Yugoslavia; columns 3-7 exclude Yugoslavia.

the size of default, while more economy-wide dollar borrowing is associated with larger defaults. However, the openness indicator becomes insignificant when I introduce the on gold indicator. In columns 5 and 6, I control simultaneously for the short term-share of dollar denominated debts and the size of central government debts relative to GDP; in column 6 I also control for gold standard adherence. The debt burden continues to be positively associated with default, while the short term dollar share is weakly negatively associated with default when gold standard membership is controlled for. In column 7, I combine all controls, except the nominal GDP indicator, which emerged as insignificant in previous estimations. The cumulative revenue loss indicator still emerges as a powerful predictor of default. Gold standard membership, openness and the debt burden also all emerge as key factor in the incidence and size of national-provincial defaults.

### 5.2.2 Municipal Defaults

The structure of the analysis for municipal defaults mirrors that of national-provincial defaults. I first test the correlation between revenue loss and default. I then introduce the controls one at a time and finally combine them. In this section the cumulative revenue loss is measured as the natural logarithm of the level of local government financing compared to 1929. I use government financing - which includes non tax revenue and long term (over 1 year) borrowing - rather than just tax revenues due to a much wider availability of the former compared to the latter. In principle, the two should be very closely related, particularly after the widespread collapse of financial markets after 1929, which curtailed the availability of borrowing.

Unfortunately, the municipal debt data is still less complete that the national-provincial data. This is partly due to data availability, and partly due to the fact that in some countries, such as the United Kingdom and Italy, local governments did not borrow in dollars in this period. This reduces the number of countries analyzed to 16-19 compared to the 22-29 above.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | OLS | Probit | Tobit | PPML | FE | FD | DiffGMM | SysGMM |
| MunDefaultSize | | | | | | | | |
| L.MunDefaultSize | | | | | | | 0.605*** | 0.752*** |
| | | | | | | | (0.123) | (0.0887) |
| L.LnLocGovFin/LocGovFin29 | -0.370* | -2.239*** | -3.769*** | -3.483*** | -0.302 | -0.0984 | -0.324* | -0.235 |
| | (0.198) | (0.859) | (0.988) | (0.929) | (0.175) | (0.114) | (0.172) | (0.157) |
| Constant | 0.0703** | -1.524*** | -2.532*** | -2.969*** | 0.0749*** | 0.0454** | | 0.0329* |
| | (0.0282) | (0.234) | (0.960) | (0.408) | (0.0118) | (0.0195) | | (0.0179) |
| Observations | 140 | 140 | 140 | 140 | 140 | 128 | 126 | 140 |
| R-squared | 0.105 | | | 0.059 | 0.083 | 0.008 | | |
| Number of countries | 19 | 19 | 19 | 19 | 19 | | 19 | 19 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Municipal defaults and local government financing, 1927-36

Countries included are: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Japan, Netherlands, Norway, Poland, Switzerland. For the GMM estimations I use all lags after the 2nd of the explanatory variables as instruments. I use the twostep estimator and the collapse orthogonal option to minimise the loss o observations in the presence of gaps in the data and reduce the number of instruments, see Roodman (2009).

Table 10 demonstrates that revenue loss and default were related also at the municipal level. This result is obtained using both linear - OLS - and non-linear methods - Probit, Tobit, PPML - as well as standard and dynamic panel data methods - fixed effects, first differences, difference and system GMM. Although the coefficients are not always significant at conventional levels, their magnitudes are remarkably similar across specifications and also relative to the national-provincial estimates above. This suggests that the smaller number of observations might be the cause of the lack of significance, while the true relationship between the variables is qualitatively and quantita-

tively similar to the one identified above.

The same observation holds for Tables 11 and 12, in which I introduce the controls one at a time. The local finance coefficient is negative in all specifications and remarkably stable in magnitude.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| MunDefaultSize | | | | | | | | |
| L.LnLocGovFin/LocGovFin29 | -0.217 | -0.243 | -0.204 | -0.372** | -0.281 | -0.228* | -0.297* | -0.310* |
| | (0.159) | (0.185) | (0.127) | (0.158) | (0.174) | (0.122) | (0.165) | (0.178) |
| L.LnNGDP/NGDP29 | -0.603** | | | | | | | |
| | (0.263) | | | | | | | |
| L.LnGDPPC/GDPPC29 | | -0.732* | | | | | | |
| | | (0.393) | | | | | | |
| L.LnTrade/Trade29 | | | -0.278** | | | | | |
| | | | (0.0964) | | | | | |
| L.ForDebtShare | | | | -1.220 | | | | |
| | | | | (0.852) | | | | |
| L.lnDollardebt/GDP | | | | | 0.0902 | | | |
| | | | | | (0.0766) | | | |
| L.Openness | | | | | | -0.360** | | |
| | | | | | | (0.128) | | |
| L.ShortDebtShare | | | | | | | 1.626*** | |
| | | | | | | | (0.486) | |
| L.ShortDollarDebtShare | | | | | | | | -1.450 |
| | | | | | | | | (1.358) |
| Constant | 0.0211 | 0.0440* | -0.00668 | 0.664 | 0.343 | -0.399** | -0.157* | 0.0897*** |
| | (0.0323) | (0.0248) | (0.0369) | (0.407) | (0.218) | (0.177) | (0.0802) | (0.0158) |
| Observations | 134 | 132 | 134 | 130 | 134 | 134 | 125 | 140 |
| R-squared | 0.216 | 0.163 | 0.295 | 0.173 | 0.101 | 0.279 | 0.396 | 0.102 |
| Number of numid | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 19 |
| Robust standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 11: Municipaql defaults, local government financing and controls - fixed effects estimation, 1927-36 Part 1

Countries included in column 1-7 are Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Poland, Switzerland; column 8 addtionally includes Estonia.

Similarly to the national-provincial results above, column 1-3 of Table 11 demonstrate that the cumulative loss of nominal GDP, real GDP per capita and trade contributed to default separately from the cumulative loss of local government finance to default. Instead, although the signs of the coefficient is in line with those found above, no statistically significant relationship can be identified between the foreign share of the debt and default (column 4). The same goes for the dollar dominated debt as a share of GDP (column 5). However, trade openness (column 6), as in national-provincial case, emerges as strongly negatively associated with default at the municipal level. Thus, reliance on the external sector might have been an important driver of the decision to

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| MunDefaultSize | | | | | | | | |
| L.LnLocGovFin/LocGovFin29 | -0.298 | -0.235 | -0.313 | -0.286 | -0.329* | -0.225* | -0.306** | -0.189 |
| | (0.202) | (0.163) | (0.183) | (0.187) | (0.175) | (0.127) | (0.131) | (0.155) |
| L.LnLocalDebt/GDP | 0.0988 | | | | | | | |
| | (0.0782) | | | | | | | |
| L.lnTotalDebt/GDP | | 0.189 | | | | | | |
| | | (0.136) | | | | | | |
| L.LnDebtService/GDP | | | -0.00197 | | | | | |
| | | | (0.0873) | | | | | |
| L.LnDomYieldSpread | | | | -0.0114 | | | | |
| | | | | (0.0289) | | | | |
| L.Polity2 | | | | | -0.0151 | | | |
| | | | | | (0.0310) | | | |
| L.NatProvDeafultSize | | | | | | 0.508** | | |
| | | | | | | (0.204) | | |
| L.OnGold | | | | | | | -0.244** | |
| | | | | | | | (0.0926) | |
| L.LnGoldReserves/GDP | | | | | | | | -0.0810*** |
| | | | | | | | | (0.0271) |
| Constant | 0.284 | 0.209** | 0.0726 | 0.101*** | 0.157 | 0.0394** | 0.217*** | -0.230** |
| | (0.166) | (0.0957) | (0.339) | (0.0162) | (0.172) | (0.0171) | (0.0492) | (0.106) |
| Observations | 119 | 119 | 133 | 110 | 140 | 140 | 140 | 128 |
| R-squared | 0.139 | 0.168 | 0.086 | 0.075 | 0.107 | 0.328 | 0.310 | 0.167 |
| Number of countries | 16 | 16 | 18 | 17 | 19 | 19 | 19 | 17 |
| Robust standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 12: Municipal defaults, local government financing and controls - fixed effects estimation, 1927-36 Part 2

Countries included in columns 1,2 are Australia, Belgium, Brazil, Bulgaria, Canada, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Poland and Switzerland; columns 3,4 additionally include Austria and Chile, but column 4 excludes Bulgaria; compared to column 1, columns 5,6,7 include Austria, Chile and Estonia; compared to column 1, column 8 includes Austria.

renege on foreign obligations for municipal authorities, presumably due a reputational mechanisms that would imply higher costs of being excluded from foreign markets following default. Column 7, suggests that the maturity structure of debts also played a role in the default. Countries with a higher share of short term public debt were more likely to undergo larger municipal defaults. No similar effect can be found by looking at the short term share of economy-wide dollar dominated debt (column 8).

In columns 1-4 of Table 12, I assess the impact of the debt burden on default, by controlling for for the size of local public debts as a share of GDP, the size of central plus local public debts as a share of GDP, the incidence of the debt service in GDP and the domestic yields spread (which serves as a proxy for the foreign yield spread, for which significantly less data is available). None of these indicators provide statistically significant additional information on the incidence of default.

The same goes for the level of democracy, as measured by the Polity 2 score in column 5.

When I control for the incidence of national-provincial defaults in column 6, instead, I find that these help predict municipal defaults. This finding suggests some degree of spillover from the former to the latter. A fully fledged explanation is beyond the scope for this paper, but it is likely that, following the default of a higher level political entity - the national and/or provincial government - the reputational repercussions of default would be muted for municipalities in case they also defaulted. Another potential explanation is contagion in the form of higher yield spreads or capital flight.

As for national-provincial defaults, I find that countries tended to go abandon the gold standard before defaulting (column 7). Finally, in column 8 I find that the magnitude of gold reserves - normalized by GDP - helps to predict default. This result contrasts with the one for national-provincial defaults for which reserves had no impact. This discrepancy is not difficult to rationalize given the historical context. Gold reserves were predominantly at the disposal of central governments and only subordinately of local governments. The seniority of national-provincial debts with respect to municipal debts was certified by renegotiations following default. It was common practice to prioritize the repayment of central and - to a lesser extent - provincial government debt compared to municipal debt. This is exemplified by the renegotiation of Brazilian public debts in the 1930s. These were divided in categories commanding different degrees of seniority, with national and important provinces' debts occupying the top positions. Senior bond issues would be allocated pre-determined amounts of foreign exchange, while less senior ones would be assigned residual amounts.

In Table 13, I combine the regressors that emerged as significant in the previous estimations. The coefficient on local government financing deterioration is once again stable across specification and comparable to previous estimations. However, it is statistically significant at conventional levels only in three specifications. It should be noted, however, that the coefficient does not lose its significance because of the inclusion of other statistically significant regressors. This suggests a simple issue of noise in the data combined with a relatively small number of observations and, potentially, some multicollinearity.

In column 1, I control simultaneously for all indicators of economic contraction - nominal GDP, real per capita GDP and trade. As for national-provincial defaults, trade emerges as the most reliable predictor of default and is retained for the successive specifications. In column 2, I add trade openness and the share of short term public debts. Confirming the result above, I find that the latter is a strong predictor of municipal defaults. In column 3, I control for Gold Standard membership and in column 4 I add the national-provincial default measure. While the former has the expected sign, it is not statistically significant. The default indicator, instead, is weakly significant. In column 5, I control for gold reserves as a share of GDP and in column 6 I combine all controls. The only control that is consistently significant across all specifications is the share of short term debts, indicating that liquidity pressure played an important role in municipal defaults.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| MunDefaultSize | | | | | | |
| L.LnLocGovFin/LocGovFin29 | -0.212 | -0.234* | -0.255* | -0.223* | -0.178 | -0.191 |
| | (0.143) | (0.134) | (0.130) | (0.119) | (0.128) | (0.129) |
| L.LnNGDP/NGDP29 | 0.183 | | | | | |
| | (0.381) | | | | | |
| L.LnGDPPC/GDPPC29 | -0.236 | | | | | |
| | (0.594) | | | | | |
| L.LnTrade/Trade29 | -0.309** | -0.261 | -0.231 | -0.195 | -0.164 | -0.148 |
| | (0.115) | (0.212) | (0.221) | (0.175) | (0.187) | (0.186) |
| L.Openness | | 0.0456 | 0.0583 | 0.0867 | 0.0531 | 0.0707 |
| | | (0.256) | (0.257) | (0.206) | (0.222) | (0.229) |
| L.ShortDebtShare | | 1.338*** | 1.216*** | 1.182** | 1.257** | 1.172** |
| | | (0.409) | (0.418) | (0.424) | (0.441) | (0.454) |
| L.OnGold | | | -0.0657 | -0.0358 | | -0.0484 |
| | | | (0.0647) | (0.0542) | | (0.0584) |
| L.NatProvDeafultSize | | | | 0.269* | 0.199 | 0.184 |
| | | | | (0.147) | (0.124) | (0.129) |
| L.LnGoldReserves/GDP | | | | | -0.0290 | -0.0331 |
| | | | | | (0.0206) | (0.0239) |
| Constant | -0.0106 | -0.143 | -0.0600 | -0.0424 | -0.223 | -0.169 |
| | (0.0363) | (0.293) | (0.285) | (0.230) | (0.235) | (0.239) |
| Observations | 132 | 125 | 125 | 125 | 119 | 119 |
| R-squared | 0.307 | 0.519 | 0.526 | 0.579 | 0.519 | 0.523 |
| Number of countries | 18 | 18 | 18 | 18 | 17 | 17 |
| Robust standard errors in parentheses | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | |

Table 13: Municipal defaults, tax revenues and controls combined - fixed effects estimation, 1927-36
Countries included in columns 1-4 are Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Poland and Switzerland. Columns 5 and 6 exclude Chile

## 5.3 Robustness: dynamic estimation

In this section, I rerun the analysis above using dynamic panel data methods. The advantages and disadvantages of this methodology are outlined above. Here it is sufficient to say that this estimations are very tough tests to determine whether public revenue loss did indeed have a causal effect on defaults in the interwar period.

### 5.3.1 National-Provincial Defaults

I first run the analysis introducing one control at a time (not shown here), as above. From the results, is is immediately clear that defaults are, indeed, persistent. The autoregressive parameter is large - between 0.714 and 0.921 - and strongly statistically significant. However, it is statistically different from 1 indicating that the dynamic process of default requires additional information to be fully explained, even after default has already started. In any case, throughout the analysis I

employ the system GMM estimator due to its greater efficiency, particularly when the autoregressive parameter is close to 1.

In Table 14, I combine the regressors that emerged as significant in this previous estimation. I also include statistically significant regressors from the fixed effects estimation above. Moreover, I include time fixed effects to further test the robustness of the results.

The cumulative revenue loss coefficient actually emerges as substantially larger from this exercise. The impact of a 10% smaller contraction in tax revenues compared to 1929 is now estimated to a have led to a 4-8 percentage points smaller national-provincial default on average. No other regressor consistently and reliably helps to predict default. Even the autoregressive coefficient is not statistically significant in all specifications. Thus, the results once again strongly support the idea that fiscal fragility, as identified by the loss of public revenue experienced by countries during the Depression, was a leading cause of default. Notwithstanding different estimators, controls, specifications and the noisy raw data, this result emerges clearly throughout the whole analysis.

### 5.3.2 Municipal Defaults

In Table 15, I combine control variables, which emerged as significant in previous municipal estimations. As outlined above, the results for municipal defaults are less robust, presumably due to the lower number of observations. However, once again the public revenue loss coefficient is consistent in magnitude across specifications and similar to the results for both municipal and national-provincial defaults presented above. Moreover, it is only insignificant when all controls are added at the same time, while none of them are significant either. The hypothesis that a small sample size is behind the lack of significance is strengthened by the finding (not shown here) that when the cumulative loss of local public revenues is proxied by the central government's tax revenue loss, for which data is more widely available, the coefficient is consistently statistically significant across specifications and similar in magnitude to all other estimations.

In column, 1 I control for the deterioration of economic conditions using the ratio of real GDP per capita relative to 1929, while also controlling for gold standard membership. In column 2, I add the short term share of public debts and the amount of gold reserves relative to GDP. In column 3, I retain the GDP and reserves controls and add the degree of trade openness, while in column 4 I retain the GDP variable while controlling for the incidence of national-provincial defaults. Finally, in column 5 I introduce all controls at once. None of these additional variables emerges as consistently associated with default in a dynamic framework.

## 6 Conclusion

In this paper, I revisit a crucial event of the Great Depression and one of the most important economic events of the 20th century: the sovereign debt crisis of the early 1930s. My study helps to fill an important gap in our understanding of the event by rigorously testing the most important

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| NatProvDefaultSize | | | | | |
| L.NatProvDefaultSize | 1.117*** | 0.317 | 0.640 | 1.343*** | 0.868*** |
| | (0.365) | (0.252) | (1.272) | (0.456) | (0.214) |
| L.LnCentTax/CentTax29 | -0.794** | -0.444* | -0.585** | -0.656** | -0.436*** |
| | (0.360) | (0.244) | (0.244) | (0.285) | (0.135) |
| L.LnTrade/Trade29 | 0.355 | -0.377*** | -1.107 | 0.363 | -0.103 |
| | (0.240) | (0.143) | (0.795) | (0.349) | (0.423) |
| L.LnDebtService/GDP | 0.835 | 0.541 | 0.194 | 0.682 | 0.540** |
| | (0.582) | (0.436) | (0.330) | (0.791) | (0.250) |
| L.ForDebtShare | | 0.774* | | | 0.226 |
| | | (0.423) | | | (0.271) |
| L.Openness | | | 1.744 | | 0.00242 |
| | | | (1.928) | | (0.604) |
| L.LnCentralDebt/GDP | | | | 0.285 | -0.405 |
| | | | | (0.837) | (0.303) |
| Constant | 3.482 | 1.647 | 2.907 | 3.128 | 1.473 |
| | (2.574) | (1.309) | (3.726) | (2.770) | (1.367) |
| Observations | 207 | 197 | 207 | 202 | 197 |
| Number of countries | 24 | 24 | 24 | 24 | 24 |
| Country fixed effects | YES | YES | YES | YES | YES |
| Time fixed effects | YES | YES | YES | YES | YES |
| Standard errors in parentheses | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | |

Table 14: National-provincial defaults, tax revenues and controls combined, system GMM estimation 1927-36

Countries included in columns 1-3 and 6 Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Sweden, Switzerland, United Kingdom; column 4 excludes Bulgaria and Ireland, while columns 5 and 7 exclude Chile and Greece. I use the 3rd, 4th and 5th lag of the explanatory variables as instruments. I use the twostep estimator and the collapse orthogonal option to minimise the loss o observations in the presence of gaps in the data and reduce the number of instruments, see Roodman (2009). Standard errors are clustered at the country level.

explanations for the defaults put forward in the historiography, as well as recent hypothesises found in empirical and theoretical economics.

In this work, I present two fundamental innovations with respect to previous research. First, I construct a new data set on public debts. This features, for the first time, sub-national bodies in a consistent manner for a substantial number of countries worldwide and allows me to study national-provincial and municipal defaults separately. The data are furthermore disaggregated into long-term, short-term and foreign components. Second, I employ a flexible and robust econometric strategy, including both standard and dynamic panel estimations, compared to the cross sectional approach of previous work.

The main finding of the paper is the relationship between fiscal fragility - epitomized by the

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| MunDefaultSize | | | | | |
| L.MunDefaultSize | 0.595*** | 0.582* | 0.860*** | 1.617*** | 0.552 |
| | (0.106) | (0.348) | (0.173) | (0.469) | (0.768) |
| L.LnLocGovFin/LocGovFin29 | -0.389*** | -0.245** | -0.259* | -0.205** | -0.235 |
| | (0.122) | (0.107) | (0.141) | (0.0932) | (0.194) |
| L.LnGDPPC/GDPPC29 | 0.0796 | -0.238 | -0.0619 | -0.325 | -0.0710 |
| | (0.221) | (0.455) | (1.008) | (0.844) | (0.721) |
| L.OnGold | -0.145 | -0.00734 | | | 0.0242 |
| | (0.0999) | (0.0577) | | | (0.124) |
| L.ShortDebtShare | | 1.458 | | | 1.174 |
| | | (1.078) | | | (0.929) |
| L.LnGoldReserves/GDP | | -0.0161 | -0.00393 | | 0.00534 |
| | | (0.0332) | (0.0233) | | (0.0708) |
| L.Openess | | | -0.0904 | | -0.0716 |
| | | | (0.118) | | (0.186) |
| L.NatProvDefaultSize | | | | -0.640* | -0.0415 |
| | | | | (0.383) | (0.479) |
| Constant | 0.109 | -0.249 | -0.124 | 0.00350 | -0.219 |
| | (0.0763) | (0.253) | (0.151) | (0.0439) | (0.345) |
| Observations | 132 | 117 | 126 | 132 | 117 |
| Number of countries | 18 | 17 | 17 | 18 | 17 |
| Country fixed-effects | YES | YES | YES | YES | YES |
| Standard errors in parentheses | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | |

Table 15: Municipal defaults public revenues and controls combined, system GMM estimation 1927-36

Countries included in columns 1 are Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, japan, Netherlands, Norway, Poland and Switzerland; column 2,3 and 5 exclude Chile. I use all lags of the explanatory variables as instruments staring from the 2nd, in combination with the collapse and principal component analysis options to reduce the number of instruments. I use the twostep estimator and orthogonal option to minimise the loss o observations in the presence of gaps in the data, see Roodman (2009). Standard errors are clustered at the country level.

severe deterioration in public revenues experienced by a number of countries - and default. I find this to be a quantitatively important and extremely robust factor in the interwar defaults.

Returning to the two key questions questions posed in the introduction of this paper:

1. Were the defaults the result of misjudgment on the part of creditors and opportunistic behaviour by borrowers or the inevitable result of the worldwide slump and other factors beyond the control of borrowing countries?

2. To what extent were the factors leading to default global in nature or specific to individual countries?

I show that both global shocks and specific country circumstances mattered. The Great Depression

was a global event, but the degree of its severity as well as the pre-existing conditions of countries facing it were wildly at variance. The depth of the crisis and the size of public debts seem to have been particularly important elements in triggering sovereign defaults at the national-provincial level. Countries' reliance on the external sector, both in trade and finance, instead, discouraged countries from defaulting. For municipal defaults, the liquidity pressure caused by the share of short-term borrowing played an important role.

Above all, however, the radically different responses of countries' fiscal systems to the slump determined the incidence and size of defaults at both the national-provincial and municipal level. Countries that saw the largest collapses in their public revenues as a consequences of the Depression experienced the largest defaults.

The first question is more difficult to answer. While it is the case that all the variables found to be relevant in explaining the defaults are economic, a number of them are the result of political decision-making processes in which a certain degree of discretion is involved, at least in theory.

In particular, the lower likelihood of default for countries with a strong dependence on the external sector might indicate a prioritization of the internationally oriented sectors of the economy compared to the internally oriented sectors. Thus, external shocks certainly played an important role, but so did the political choices and constraints underlying sovereign default decisions.

The comprehensive picture of the Great Depression debt crisis I offer in this paper suggests that monocausal interpretations of this event - which assign the key role to either "bad luck" or the irresponsible behaviour of borrowers, lenders and middle-men - should be taken with caution. The interwar debt crisis was a key event in the unfolding of the Great Depression, which influenced policy-makers, academics and the public opinion for decades thereafter. As could be expected, it was a highly complex affair in which exogenous shocks and discretionary choices all played a role.

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# A Data Sources

In this Appendix, I provide detailed information on all the data collected. The first issue regards how reliable the sources are; in particular the publications of the German Imperial Statistical Office (Statistiches Reichsamt) from which I extract a large share of the data. During the interwar period the collection of economic and social statistics underwent a significant development in many countries, and Germany was no exeption. As Adam Tooze argues:

> *In the aftermath of the First World War enthusiasm for statistics and economic research was not confined to Weimar Germany. Indeed, in its early years Wagemann's institute* [ The Institut für Konjunkturforschung, founded in 1925 ] *drew its inspiration mainly from abroad. The major influences were the Harvard Committee for Economic Research, the NBER in Washington, the statistical initiatives of Herbert Hoover's Department of Commerce, and the Soviet Conjuncture Institute. In France and Britain also, there were calls for the government to play a greater role in data gathering and economic research. In the early 1920s private institutes for business-cycle research had been established in London and Paris along similar lines. However, no other European service ever achieved the size or authority enjoyed by the Berlin institute. The Weimar republic was unique among west European states in the scale of its support for economic research which was not academic in character but designed specifically to supply information to government.*
>
> Tooze (1999)

Ernst Wagemann, the founder of the Institut für Konjunkturforschung, was also the head of the Statistiches Reichsamt from 1924 to 1933. The work of the institute and the Statistical Office were closely tied together. Even after Wagemann lost his position as the head of the Statistical Office, he retained his lead at the Institute, with Hitler's personal backing and support. Under the Nazis, both the Institut für Konjunkturforschung and the Statistiches Reichsamt enjoyed a sort of golden age in terms of manpower and resources (Tooze, 1999), which resulted in the collection of a huge array of domestic and international statistics, a small part of which are used in the current paper. Some of the original data reconstructions produced by the Institute were highly regarded and found their way into international publications, such as Moody's investment manuals (for example, the Institute reconstructed the international foreign debt position of a number of countries in 1932, and this was published in Moody's manuals unfailingly for a number of years thereafter).

However, the work of Rainer Fremdling (see, for example, Fremdling (2005, 2007)) has revealed that both the Institute and the Statistical Office worked under enrmous pressure from the authorities. This was mostly connected to the strategic planning for the war effort and the desire not to reveal too many details about the state of the German economy. For this reason, information was at times hidden through aggregation, misreported or not reported altogether. The data I use in this paper, however, would not be considered as sensitive information with regard to the war effort and is thus likely to be free of manipulation. Cross referencing with alternative, non-German sources (Moody's manuals in particular) has revealed no inconsistencies.

The United Nations (1948) volume, which I also use extensively, drew on the best available evidence of the time. The League of Nations regularly collected a wide range of international data in its Statistical Yearbooks, which the compilers of the UN volume organised and presented in a unified and coherent fashion. The issues with these data are discussed briefly in the text and in

more detail below. In any case, the volume represents a remarkable, and transparent, effort to reconstruct a precise picture of central government debt in the interwar years.

My last major source of data are private publications created for the benefit of clients and members of Moody's rating agency, the Institute for International Finance and the Corporation of Foreign Bondholders. The data found in these sources is often in agreement with data reported elsewhere. Moreover, the provision of accurate quantitative and qualitative information represented the core business of these institutions. Moody's, in particular, was the first company in the world to produce foreign government bonds ratings in 1918. These were based directly on the data collected, as the information provided by Gaillard (2012) shows.

## A.1 Common data sources

**Default size:** I compute default size as the share of the principal of dollar bonds in default with regard to interest and/or interest payments. I construct separate measures for national-provincial and municipal levels of governments. I collect information on the timing and magnitude of bonds in default from Moody's (1933) page a17 page for defaults up to 1932, Moody's (1934) page a44 for 1933, Moody's (1935) page a45 for 1934, Moody's (1936) page a47 for 1935 and Moody's (1937) page a41-a44 for 1936. Outstanding dollar debts, instead, are from Lewis (1938).
**Tax revenues and government financing:** are from Papadia (2016).
**Dollar denominated debts:** I collect information on total - public and private - dollar-denominated debts on a annual basis from Lewis (1938), Statistical Table 1, page 619-629.
**Gold Standard membership:** The dates in which countries return to and leave the Gold Standard - either by devaluing or by introducing exchange controls - are from Crafts and Fearon (2013).
**Nominal GDP:** I use the nominal, non-PPP-adjusted GDP figures estimated by Klasing and Milionis (2014) for the period 1870-1949. These are based on Maddison's GDP estimates and obtained using the so-called "short-cut method". This method has a long history; Prados de la Escosura (2000) offers a detailed description. In essence, it exploits the relationship between PPP adjusted and non-PPP-adjusted GDP determined by the relative prices of traded and non-traded goods and the relative income level of the country compared to the benchmark country. In doing this, it makes use of the Balassa-Samuelson theorem.
**GDP per capita:** GDP per capita is taken from the Maddison's Project's latest update (Bolt and van Zanden, 2013).
**Trade and openness:** Trade and openness figures are from Klasing and Milionis (2014). The authors obtain the openness figures by combining their estimates of nominal GDP with trade data from Barbieri, Keshk, and Pollins (2009).
**Polity score:** This is the Polity2 score from the POLITY IV database (Marshall and Jaggers, 2005). It is a combined score of autocracy and democracy (both measure between 0 and 10) and is obtained by subtracting the autocracy score from the democracy one. The two scores are weighed indicators of the competitiveness of political participation, the openness and competitiveness of executive recruitment and constraints on the chief executive.

## A.2 Country-specific sources

### A.2.1 Argentina

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 11 in millions of Pesos on 31 December 1914-1938. Data includes treasury

bills obligations. Foreign debt shown at legal parity except for some shown at contractual rates. In the original figures, bonds held by the treasury have been discounted since 1927, I have kept them in to improve cross-country comparability. Short term debts in 1927 do not include oustanding unpaid commitments. Original source: Memoria del Departemento de Hacienda; Memoria de la Contaduria de la Nacion; El Ajuste de Los Resultados Financieros de los Ejercisios de 1928 a 1936, Buenos Aires; Direccion general de Estadistica, Informe No. 6, Series F., No. 2, Buenos Aires, 1923, Revista de Economia Argentina.

**Local Government debt:** I gathered data from a variety of sources. No figure is available for 1928 and is interpolated as a the average between 1927 and 1929. No evident signs of jumps are present between the different series and the substantial overlap between the main data sources insures that the figures are consistent over time. The figure for 1927 is from Institute of International Finance (1927) - Credit Position of Argentina. and the 1929 figure is from Corporation of Foreign Bondholders (1929). The 1930 and 1931 figures are dervied as the difference between the total public debt reported in Moody's (1931) page 10 and Moody's (1934) page 1667 and the central government debt reported in Moody's (1935). The 1932-1934 figures are taken from Moody's (1935) page 1771. The figures from 1935 to 1937 are taken from Statistisches Reichsamt (1939/40). The sub-national bodies covered in all sources are essentially the same. Minor differences exist between Institute of International Finance (1927), which includes the following municipalities: Buenos Aires, Rosaio, Cordoba, Santa Fe, Bahia Blanca, San Juan; and provinces: Buenos Aires, Santa Fe, Cordoba, Mendoza, Tucuman, Entre Rios, Santiago del Estero, Corrientes, San Juan, Jujuy, San Luis, and the rest of the sources which include a number of additional minor bodies which, however, have a very small overall impact. These are the municipalities of: Rio Cuarto, Mendoza, Tucuman, Parana, Monteros, Santiago de Estero, Catamarca, Salta, La Rioja; and the provinces of: Salta, Catamarca, La Rioja and Jujuy. All figures are in millions paper Pesos.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 415, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.2 Australia

**Central and local Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 15 in millions of Pounds on 30 June 1914-1938. Australia is one of the few instances where the original data included both central government (Commonwealth) and State debts. These data is included throughout the period even though the Commonwealth took over the outstanding debts of the States only on July 1 1929 under the terms of the Financial Agreement between the Commonwealth and the States. In the analysis, I have separated the two types of debts in order to insure a better comparability across countries. The separate state debts data comes from Statistisches Reichsamt (1939/40) (30 June 1926-1938). Original sources: The Budget, Finance Bulletins - Summary of Australian Financial Statistics, the Treasure's Statements of Receipts and Expenditure, Official Year-Book of the Commonwealth of Australia.
**Gold reserves and notes in circulation:** 1920-1933 Statistisches Reichsamt (1936a) page 526, Jahreszahlen; 1930-33 including gold held abroad; 1934-1938 Statistisches Reichsamt (1939/40) page 258*-259*.

### A.2.3 Austria

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 19 in millions of Schillings on 31 December 1914-1938. Increase from 1930 partially due to the inclusion of some pre-1914 debts previously not recognised by the Austrian government. Original figures include some foreign loans issued in Austria, which I exclude to improve comparability across countries. Foreign debt data in foreign currency, 1924-31: converted into Shillings at the current exchange rates; 1932: converted at the official rate; 1933-37: converted at the average rates of private clearings on the respective dates. Debt service charged against ordinary revenue (excluding proceeds from loans). Original source: Bundes-Rechnungsabschluss der Republik Oesterreich, Statistiches Handbuch fuer die Republik Oesterreich.
**Local Government debt:** no continuous series is available, a single data point is available for 1932 from Statistisches Reichsamt (1935).
**Gold reserves:** 1924-1933, Statistisches Reichsamt (1936a) page 208, Jahreszahlen; 1934-1937 Statistisches Reichsamt (1939/40) page 258*-259*.

### A.2.4 Belgium

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 21 in millions of Francs on 31 December 1914-1938. Short term data includes medium term debt. Foreign debt data converted at current rates of exchange with the exception of francs 1932 and 1934 loans converted at parity rates before the devaluation of October 1936. Intergovernmental debts are included throughout. Increase from 1924 to 1925 is partly due to certain war debts for which Belgium previously did not hold itself responsible were included in accordance with an agreement with the US. Debt service represents total expenditure against ordinay expenditure. Up to 1930 it includes ex service men's fund and pensions, which cannot be separated from the rest.Original source: Office Central de Statistique, Annuaire Statistique, Evolution des Finances de l'Etat, 1931-40, Banque Nationale, Bulletin d'Information et de Documentation.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 31 December 1926-1937 in millions of Francs, data refers to provinces only.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 43, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40) page 298*-299*.

### A.2.5 Bolivia

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 25 in millions of Bolivianos on 31 December 1914-1938. Starting from 1933 arreas of interest, which accumulated since 1927 are included, the total amount on 31 december is 3.2 millions, but cannot be separated on a yearly basis. Foreign debt data includes arreas of interest throughout. Original sources: Oficinia Nacional: Estadistica Financiera, Estadistica Boliviana. Direccion General de Estadistica: Extracto Estadistico. Ministeirio de Hacienda, Direccion General de Estadistica: Finanzas. Banco Central de Bolivia: Boletin.
**Local Government debt:** not available.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 424, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.6 Brazil

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 27 in millions of Milreis on 31 December 1914-1938. The original short term debts figures included paper notes in circulation. These have been removed for better comparability. The debt service figure for 1933/34 is for 15 months ending 31 march 1934 and the debt service figyre for 1934 is for 9 months ending December 1934. The service of the foreign debt includes for 1931, 1934, 1937 and 1940-45 the portions not transferred but allocated to special accounts which forms part of the floating domestic debt. In september 1931, the payment on the foreign debt service was suspended. in march 1932 a plan for partial repayment of the service on the foreign debt was established for the period april 1934 to march 1938 and then suspended in 1937 again. Most of the foreign debt and a small part of the domestic debt are expressed in gold milreis. The gold milreis was a unit of account used starting from the 19th century to report certain items by the Brazilian government. The gold milreis figures have been converted into paper milreis at the official parity of 27 pence per gold milreis. The floating (short-term) debt has been converted into paper milreis at current rates of exchange. It is made up of promissory notes destined to liquidate frozen credits of foreign exporters in accordance with the commercial agreements between Brazilian government and foreign exporters. The decline from 1927 to 1928 is partly due to the fact that the French 5% 1908-09 Itapura-Corumba Railway Loan considered up to 1927 as being in gold francs was unilaterally converted into paper francs. Beginning with 1923, the funded (long term) domestic debt does not include obligations held by the Caixa de Amortizacao (1932: 32 millions paper milreis). Original sources: Contadoria Geral de la Republica: Balancos Gerais da Uniao (title varies slightly during period 1914-43), Anuario Estadistico do Brasil, Sir Otto Niemayer: report submitted to the Brazilian Government, 1931.
**Local Government debt:** Moody's (1936) between 1928 and 1934 in millions of paper milreis. Data is available only for external debt. The total debt figure is inferred by assuming that the proportion between internal and external debt is the same as the national one.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 426, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.7 Bulgaria

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page in millions of Leva on 31 December 1914-1926, 31 March 1928-1934, 31 December 1934-1938. Short term debt data include debts to national bank. Foreign debts converted at the appropriate parity for compatibility. Share of Ottoman debt owed by Bulgaria is not included throughout. Debt owed to Bulgaria due to property sequestrated and liquidated in the UK is also not included. Debt service includes reparations starting from 1928/29. During WWI, these payments were suspended and then resumed through agreements in 1920. 1925 and 1927 until further suspension in April 1932.
**Local Government debt :** Statistisches Reichsamt (1939/40) on 31 December 1926-1931 and 1935 and 31 March 1932-1934 in millions of Leva. Data includes Provinces and cities.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 43, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40) page 298*-299*.

### A.2.8 Canada

**Central Government debt - long-term, short-term, foreign - and debt service :** United Nations (1948) page 34 in millions of Dollars on 31 March 1914-1938. Long term debt data, according to Canadian classification includes treasury bills and deposit certificates. Short-term floating debt consists of various demand liabilities. Total debt represents gross debt. Foreign debt is shown at parity. Original source: Public Accounts; Canada Year-Book.
**Local Government debt:** Statistisches Reichsamt (1939/40) between 1926 and 1936. The data includes provincial and municipal debt.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 377, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.9 Colombia

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 34 in millions of Pesos on 31 December 1927-1938. Domestic short term debt excludes state notes in circulation. The foreign debt is transformed in the national currency at parity $1=1 peso and 1=5 pesos. Redemption of foreign debtwas suspended since 1932 and interest payments since 1935, however some partial payments were made. Original Source: Informe Financiero de Contralor General, Anuario Estadistica, Boletin del departemento de Contraloria.
**Local Government debt:** Statistisches Reichsamt (1939/40) between 1926 and 1937 in millions of Pesos. The data includes the debt of municipalities and departments.
**Gold reserves and notes in circulation:** 1920-1933 Statistisches Reichsamt (1936a) page 453, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.10 Czechoslovakia

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 49 in millions of Kroner on 31 December 1918-1938. Long term domestic debt includes debt to national bank (state notes debt), except for for 1919-23. Part of the increase in the debt is due to the settlement and adjustment of pre-1914 and 1914-1918 war debts. The foreign debt 1920-1930 is converted into national currency at the rate ruling at the moment of inscription of the various loans in the debt ledger. Beginning with 1934, the debt in foreign currency has been converted at the rates of exchange on respective dates. Some of the original debt service figures do not include commissions, I have added them to improve comparability. The reduction in amortization and interest in foreign debts since 1931 was due to the Hoover Moratorium of June 1931 and the Lausanne conference of 1932. From 1933, the regular redemption of domestic debt was suspended, but bonds were accepted for payment of arreas of taxes and purchases of bonds were effected by the state. Original sources: Closed Accounts, Office National Statistique, Renseignements Statistique. Ministry of Finance, Dr. J. Dolansky, Vyklad k Rozpoctu Na Rok 1947 (budget Expose' 1947).
**Local Government debt:** No continuous series is available. a single data point for 1933 is present in Statistisches Reichsamt (1939/40).
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 293, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.11 Denmark

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 51 in millions of Kroner on 31 March 1914-1938. In 1933/34, the loss on exchange in repayment of the foreign debt is included with "interest". The short-term debt includes treasury bills and, up to 1931, also debts from unpaid interest. It does not include overdrafts on ther current account of the ministry of finance with the central bank and other banks which are normally more than offset by assets with those banks. Debt towards central bank is available but has not inculded for compatibility with other countries where it is reported on net. The foreign debt is shown at legal parity, except for some French loans. Beginning in 1925/26, interest payments as published by official accounts are offset by interest received from capital invested in real estate, plan equipment and by a percentage invested in capital for depreciation. The net balance is added or deducted from current receipts. Data on total interest received is available, but negligible. I also use real cost of redemption rather than the nominal one. Original Sources: Statsregnskab (closed accounts), Statistik Aarbog, Danske Staatslaan.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 31 March between 1926 and 1938 in millions of Kroner. The data includes the debt of municipalities and departments.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 62, Jahreszahlen; 1934-1938 Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.12 Finland

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 60 in millions of Finnish Marks on 31 December 1916-1938. Data excludes debts repurchased and held by public debt administration. Debts are shown at book value. For 1914-1931, the debt service is total expenditure charged against ordinary revenue (receipts exceeding proceeds from loans). For 1932-1945, the expenditure is charged against current receipts. Foreign interest payments include exchange losses. For 1932-1945, redemption payments are charged against capital receipts, which include proceeds from loans. Amounts therefore include conversions. Original Sources: Accounts, Bureau Central de Statistique, Annuaire Statistique de Finlande, Recueil de Statistique, Communication from Bank of Finland, Institute for Economic Research.
**Local Government debt :** Statistisches Reichsamt (1939/40) on 31 December between 1926 and 1936 in millions of Finnish Marks. The data includes the debt of municipalities and other local communities.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 62, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.13 France

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 64 in millions of Francs on 31 December 1917-1919 and 1922-38, 31 May 1920 and 31 March 1921. Debt figures up to December 1937 are in comptes generaux, yearly data, figures after 1937 are not directly comparable to earlier ones. Long term debt also includes medium term debt, mainly bonds of more than two years maturity at time of issuance (which are long term debt according to the UN classification used in their 1948 volume). For 1914-1935,short term debt includes advances from the cental bank, while for 36/37these are excluded and re-included starting from 1938. Foreign debt was converted in Francs at the exchange rate at the date in question. The

foreign debt was excluded from official statements from 31 march 1932 to 31 december 37. Starting from 1938, data excludes excludes interallied debts from WWI. The debt service data for 1920/21 are figures from 1920,. 1921/22 figures from 1921, 1929/30 from1929, for 1929 last 9 months only. 1927-32 are provisional figures. Original Sources: Closed Accounts (Comptes Generaux), Ministe're des Finances, Dette Publique (Situation Mensuelles), Inventaire de la Situation financie're (1913-1946).
**Local Government debt data:** Statistisches Reichsamt (1939/40) on 31 March between 1926 and 1930 in millions of Francs. The data includes the debt of municipalities and departments. The figures are very small compared to the central government debt (around 3% in 1930). For this reason they are assumed to be negligible for the empirical analysis.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 95, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.14 Germany

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 67 in millions of Reichsmarks on 31 March 1914-1938. Between 1913/14 and 1922/23 most of the debt (almost entirely internal in nature) was wiped out by the hyperinflation and the redemption of the paper mark Treasury bills held by the Reichsbank by payment in new Rentenmarks (1 rentenmark= 1 trillion paper marks). The increase from 1925 to 1926 was due to the fact that most "pre-stablisation" debts had been converted into the new "loan liquidation debt" which was shown for the first time in the public debt statement of 1 March 1926, this amounted to 5,500 millions RM. For 1919/20 to 1922/23, the long term includes debts taken over from the states (largely railway). For the same period, miscellaneous obligations and guarantees in the form of treasury bills are included. For 1932/33 to 1944 tax payment certificates are included. The foreign debt is shown at par until 31 march 1933. From march 1934 loans issued in US Dollar, Sterling an Swedish Kroner have been converted at the mean exchange rate of the respective years. The decrease from 1933 to 1934 is chiefly the result of the change in the conversion rates. The further gradual decline is due not only to actual transfers to the creditors abroad but has resulted also from amounts in marks deposited in favour of foreign creditors at the Reichsbank but not transferred due to the lack of foreign exchange, which have been deducted from the outstanding debt. These amounted on 30 sept. 1944 to Reichsmarks 150.4 million. Original sources: Closed Accounts, Reichs-und Staatsanzeiger, Statistiches Reichsamt, Statistiches Jahresbuch, Wirtschaft und Statistik.
**Local Government debt:** Statistisches Reichsamt (1936b) between 1928 and 1934 Statistisches Reichsamt (1938) in millions of Reichsmarks; 1935-1938 Statistisches Reichsamt (1938). The data includes the debt of States, Municipalities and Free Cities.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 16-17, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40) page 258*-259*.

### A.2.15 Greece

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 71 in millions of drachmae on 31 December for 1913-1918 and 31 March for 1913-1938. The foreign devt is shown in gold drachmae at pre 1914 parity for 1913-27. From 1928, it is shown at the new parity. The debt service is the total interest due on foreign loans. The

non-transfered portions are set off on the receipt side of the budget account as loans guaranteed by creditors. Redemptions include expenditure from loan receipts. Original sources: Annuaire Statistique de la Grece, Bulletin Mensuel Statistique.
**Local Government debt:** No continuous series is available.

**Gold reserves and notes in circulation:** No continuous series is available.

### A.2.16 Hungary

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 67 in millions of Peng on 30 June 1924-1938. Beginning with 30 june 1932 the monthly reports on the financial conditions of Hungary include ceratin items not shown in the original UN figures. These additional amounts are available and I have included them together with administrative liabilities. The foreign debt is shown at official rates of exchange on the corresponding dates. The decrease in 1932 has been due in part to the depreciation of the Sterling and US Dollar. The debt service figures do not include the amounts of debt service paid directly by the public undertakings. For 1926/27 and 1927/28 administrative expensive have been included. Since december 1931, the foreign debt service has been partly suspended and the Peng equivalents of the untransferred portion were paid into blocked accounts from where large amounts re-borrowed by the Hungarian government against treasury bills. Original sources: Closed accounts, Monthly Statements on Financial Conditions in Hungary.
**Local Government debt:** No continuous series is available. A single data point for 1931 is present in Statistisches Reichsamt (1939/40).
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 304. Jahreszahlen. Reserves only: 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.17 Ireland

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 87 in millions of Pounds on 31 March 1923-1938. In addition to amounts recorded in the UN volume there is a liability under the housing act of 1932 and also a liability under the damage of property act amounting on 31 March 1945 to £9.4 and £4.3 million respectively. The latter liability on which an annuity of £250,000 is payable for a sixty year period commencing in 1926 has been included since 1944/45 in the official debt statements. The debt redemption consists of net amortization payments out of ordinary revenue. Original Sources: Eire Finance accounts; Ireland Statistical Abstract.
**Local Government debt data:** Statistisches Reichsamt (1939/40) on 31 March between 1926 and 1937 in millions of Pounds. The data includes the debt of all local bodies.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 140. Jahreszahlen. Reserves only: 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.18 Italy

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 89 in millions of Lire on 30 June 1914-1938. The foreign debt was converted at old parity rates. The original foreign debt figures exclude the war debt 1914-1918, consisting chiefly of obligations to the governments of the UK and the US, I have included these to improve

comparability. I have also included interest payments on the war debt of 1914-1918. Redemptions include conversions. Original sources: Rendiconto Generale, Annuario Statistico Italiano, Compendio Statistico Italiano.
**Local Government debt:** The figures for 1926 and 1935 are from Statistisches Reichsamt (1939/40). The data in between is estimated using the shares of local and central government debt in Francese and Pace (2008) and the central government debt in United Nations (1948). All data is in millions of Lire and covers all local public bodies.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 144, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.19 Japan

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 92 in millions of Yen on 31 March 1914-1938. The figures include the debt incurred for the general as well as the special accounts. The figures presented under "other borrowings" in the UN volume represent "loans at various rates of interest" which could not be subdivided into domestic and foreign issues. I have added them to the domestic debt. The short term debt includes special exchequer notes, treasury notes, rice purchase notes and silk-purchase notes. The foreign debt was converted into yen at the gold parity rates (£1= 9.763 yen, $1= 2.006 yen, 1 French Franc = 0.387 yen). Original sources: Department of Finance, financial and economic annual of Japan, resume' statistique de l'empire du Japon, Bank of Japan, Economic Statistics of Japan, Oriental Economist, Supreme commander for the allied powers, Japanese economic statistics.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 31 March between 1926 and 1937 in millions of Yen.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 37, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.20 Netherlands

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 90 in millions of Guilders on 31 December 1914-1938. Total domestic debt does not include advances by the national bank guaranteed by the government against assets in Reichsmarks amounting to Gulden 4,500 million on 31 december 1944. The foreign debt, when present, is included in the amounts shown under "long term domestic debt". In 1922 two loans of Florins 125 million and in 1924 another loan of florins 100 million were issued in America. These loans were redeemed in 1932 and 1929 respectively. Total interest payments defrayed from ordinary receipts and up to 1933 inclusive also expenditure from Loan Fund. Receipts of the loan fund which was abolished in 1934 consisted chiefly of taxes additional to certain excise funds. The domestic redemption represents expenditure charged against ordinary revenue only. Certain extraordinary payments were made during 1920-1944. Original sources: Jaarcifers voor Nederland, Maandschrift van het Centraal Bureau voor de Statistiek.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 1 January between 1927 and 1938 in millions of Guilder. The data covers local communities and provinces.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 185, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.21 Norway

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 106 in millions of Kroner on 30 June 1914-1938. The long term debt figures after June 1932 do not include the loan from the invalidity fund amounting to kroner 4.5 million on the above mentioned date. The figures include the "unpaid capital by the state-guaranteed banks". From 30 June 1933, the item is not included with the debt proper but shown separately as a state liability in the official accounts. The foreign debt is shown at parity rates (£1=18.16 Kroner, 1 Franc=0.72 Kroner, $1 =3.73 Kroner, 1 Swedish Kroner= 1 Norwegian Kroner, 1 Swiss Franc= 0.72 Kroner with the exception of certain loans in Pounds converted at the rate £1=18.12, 18.16 or 18.18 Kroner and Swedish Kroner converted at the rate of 1 Swedish Kroner=1.02575 Norwegian Krone. Interest payments include commissions and other expenses. Redemption expenditure is charged against capital receipts (including proceeds from loans). Original sources: Closed Accounts; Statistique Officielle de la Norve'ge, Seire VIII; Statistical Year-books of Norway.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 30 June between 1926 and 1936 in millions of Kroner. The data covers municipalities and prefectures.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 197, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.22 Peru

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 113 in millions of Soles on 31 December 1918-1938. Non comparable data is available for the period 1914-1917. The foreign debt was converted into Soles at parity rates. The increase in foreign debt in 1930 and 1931 was chiefly due to the adoption of higher converson rates. As interest payments on the foreign debt were suspended in May 1931, arreas of interest were added to the outstanding capital. The service on the foreign debt was completely suspendeed with the exception of the stetling 7.5% guano loan. Interest payments on the foreign debt were partially resumed in 1937. Original sources: Balance y Cuenta de la Republica, Extracto Estadistico del Peru.
**Local Government debt:** figures are available for external debt only, between 1927 and 1933 from Werhahn (1937).
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 482, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*. Data also includes foreign exchange reserves.

### A.2.23 Poland

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 116 in millions of Zloty on 31 March 1919-1938. Short term debts for the period 1919-23 are in Polish marks and consist mostly of treasury bonds and loans by the central bank in form of large advances in paper money to the government. For the period 1924-39, short-term debts consist of treasury notes, non-interest bearing advances from the Bank of Poland and the remainder of bonds and notes matured. The foreign debt for the period 1919-23 is shown in Zloty at the rate of 5.183 zloty=$1. For 1924-1939, the foreign debt is shown at the rates of exchange on the respective dates with the exception of the dollar issue of the 7% stabilisation loan of 1927 and the debt taken over from the former Austrian monarchy, which have been converted at par. Original sources: Budgets, Closed Accounts, Annuaire Statistique de la Republique Polonaise,

the Statistical Bulletin of the Ministry of Finance, the Bulletin of the Bank of Poland, Central Statistical Office, Statistical News.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 31 March between 1926 and 1938 in millions of Zloty. The data covers all local public bodies.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 197. Jahreszahlen. Reserves only: 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.24 Romania

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 124 in millions of Lei on 31 March 1919-1938 except for 1923-31 on March 31. Long term debts since 1925 include consolidated debts owed to the central bank. or 1920-24 these were included in the short term debts. From 1933 short term debts include temporary advances from the central bank. For 1914 the foreign debts converted at the pre-1914 parity; for 1929-31 is is calculated at new parity rates. For 1933 the debt in sterling is converted at the rate £1=560 lei and $1=110 lei at at stabilization rates for other currencies. From 1935, war debts are excluded from the figures, I reintroduce them to improve comparability. Redemption of both foreign and domestic debt was suspended in 1933. Original sources: Budgets, Central Statistical Institute, Statistical Year-books, National Bank, Bulletin d'Information et de Documentation.
**Local Government debt:** Not available.
**Gold reserves:** Not available.

### A.2.25 Sweden

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 133 in millions of Kroner on 31 December 1914-1922 and 30 June 1923-28. The original figures of domestic long-term includes foreign debt starting from 30 June 1923. I have separated the two using foreign debt figures on 31 December of the same year. The foreign debt was converted into kroner at parity and consists solely of bonds in the hands of creditors resident abroad. The fall in foreign debt is partially due to repayments and repurchases by Swedish residents. The debt service represents total budgetary expenditure. Original sources: Closed Accounts, Year-books of the National Debt Office (Riksgaeldskontoret), Statistical Year-books of Sweden.
**Local Government debt data:** Statistisches Reichsamt (1939/40) on 31 December between 1926 and 1935 in millions of Kroner. The data covers municipalities and provinces.

**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 260, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.26 Switzerland

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 137 in millions of Francs on 31 December 1914-1938. The original figures for the public debt are those of the confederation, excluding the debt of the Cantons and the federal railways debt. I have included the railways debt. The debt service figures do not include railway debt. Administrative costs are included in redemptions up to 1923 and in interest payments from 1924. The debt service expenditure is charged against ordinary revenues (excluding expenditure from loan proceeds). Original source: Comptes d'Etat, Statistical Year-books of Switzerland.

**Local Government debt:** Statistisches Reichsamt (1936b) between 1925 and 1935 in millions of Francs. The data covers the cantons and municipalities.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 272, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.27 United Kingdom

**Central Government debt - long-term, short-term, foreign - and debt service:** United Nations (1948) page 147 in millions of Pounds on 31 March 1914-1938. The aggregate liabilities of the state do not include the funding loan and victory bonds tendered for death duties but not yet cancelled. The foreign debt is shown at par. The debt service includes not only appropration from revenue but also interest payments on national savings certificates paid in excess of the provision in the permanent debt change and interest met from receipts under section 1 (5) (b) of the defence loan act, 1937. Payments on the war debt of 1914-1918 have been suspended completely since 1934. Original source: Finance Accounts of the United Kingdom.
**Local Government debt:** Statistisches Reichsamt (1939/40) on 31 March between 1926 and 1936 in millions of Pounds. The data covers England, Wales and Northern Ireland, but not Scotland.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 123, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.28 Uruguay

**Central Government debt - long-term, short-term, foreign - and debt service** United Nations (1948) page 154 in millions of Pesos on 31 December 1914-1938. The domestic debt includes the so-called "international debt", consisting of two Brazilian issues, which are payable in Uruguayan Pesos and are held in Uruguay. No information is available for short-term debts between 1914 and 1928. The foreign debt was converted at old parity rates (4.7 Pesos=£1), 0.966 Pesos =$1, 0.1865 Pesos=1 gold Franc). In 1915 the redemption of the the foreign debt was suspended in agreement with the bondholders. In 1916, it was agreed to prolong the suspension until one year after the war. Redemption of the foreign debt was again suspended on 20 January 1931 and resumed partially on 1 January 1937 and completely on 1 January 1939. Domestic debt payments were suspended on 1 November 1932 and resumed on 27 February 1937. I have added/substracted exchange losses to the debt service in order to improve comparability. Original sources: Deuda Publica Nacional, Anuario Estadistico.
**Local Government debt:** the figures from 1928 to 1933 are from Moody's (1935) and from 1936 to 1928 from Statistisches Reichsamt (1939/40). The debt is recorded on 31 December in millions of Pesos.
**Gold reserves:** 1920-1933 Statistisches Reichsamt (1936a) page 490, Jahreszahlen; 1934-1938, Statistisches Reichsamt (1939/40)page 258*-259*.

### A.2.29 Yugoslavia

**Central Government debt - long-term, short-term, foreign - and debt service:** not available..

**Local Government debt:** not available.

**Gold reserves:** not available.

### A.3 Alternative data sources

Moody's manuals offer an excellent opportunity to cress check the data collected from other sources. While the manuals do not generally offer time series that are as complete and systematic as the German sources and the League of Nations, they contain a huge amount o information that the agency used for its own ratings (Gaillard, 2012) and thus was very careful in collecting.

The cross checking of the data is a very labour intensive activity given that, as mentioned the data in the Moody's manuals is quite saccterred, and is currently still under way.

The local debt debt has been carefully cross-checked whenever possible thanks to the sometimes substantial overlap between different sources. the picture is that of general agreement between the different sources.

## B Further regression analysis

### B.1 Replicating Eichengreen and Portes

In what is still the reference cross-country study of defaults during the Great Depression, Eichengreen and Portes (1986) perform a pooled cross-sectional regression by pooling data from 1934 to 1938. Their main variable of interest is the combined default size of all public bodies as a share of total dollar and sterling denominated debts. My sample differs from theirs, in that it only up reaches 1936 and excludes Czechoslovakia, Colombia, Bulgaria, Mexico, Spain, Costa Rica and El Salvador, which are present in Eichengreen and Portes' sample. On the other hand, it includes major countries - Austria, Belgium, Canada, Ireland, Switzerland and the United Kingdom - which are absent from theirs. Argentina, Australia, Brazil, Chile, Denmark, Finland, Germany, Greece, Hungary, Italy, Japan, Netherlands, Norway and Sweden are common to both samples.

Another difference compared Eichengreen and Portes' analysis is that I only look at defaults in Dollar bonds. It is sensible to treat Dollar and Sterling defaults separately given that Eichengreen and Portes' own work (Eichengreen and Portes, 1988) shows that Sterling and Dollar bondholders were treated quite differently. The final difference with Eichengreen and Portes is that, lacking a a reliable measure of terms of trade deterioration, I use lagged deterioration in total trade instead. I also lack measures of notes in circulation and/or gold reserves for a number of countries , so I run the regressions without the gold coverage variable, but the qualitative results do not change if this variable is included. In any case, Unlike for Eichengreen and Portes, this variable has the expected negative sign.

Table 16 presents the results of the two specifications proposed by Eichengreen and Portes estimated by both OLS and Tobit. The two specifications differ in the definition of trade deterioration used. My results do not fully match those of Eichengreen and Portes. This is probably due to the differences in the sample outlined above, and could indicate that their results are not very robust. In any case, the estimates need to be taken with a grain of salt due to major potential issues of endogeneity.

Unlike Eichengreen and Portes, I do not find a robust positive relationship between a higher foreign debt burden and default size. However, in the estimations performed in the paper, this result is partially recovered: I show that the public debt burden as well as the dollar-denominated economy-wide debt burden were positively associated at the national-provincial level, but not at the municipal level.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | OLS | OLS | Tobit | Tobit |
| VARIABLES | DefaultSize | DefaultSize | DefaultSize | DefaultSize |
| ForDebt/GDP | 0.631 | 0.927** | -0.221 | 6.631 |
| | (0.481) | (0.447) | (5.047) | (4.865) |
| Trade31/Trade29 | -1.641*** | -8.343* | | |
| | (0.339) | (4.743) | | |
| Trade28/GDP | -0.602 | -19.99** | | |
| | (0.387) | (8.033) | | |
| %ΔDeficit29-31 | 0.0309*** | 0.0168*** | 2.642** | 2.289* |
| | (0.00439) | (0.00534) | (1.281) | (1.359) |
| SouthAmerica | 0.265*** | 0.335** | 2.748** | 2.564* |
| | (0.0824) | (0.147) | (1.231) | (1.299) |
| Australia | -0.714*** | -0.827*** | -10.84 | -14.29 |
| | (0.228) | (0.231) | (0) | (0) |
| L.Trade/Trade29 | | 0.0794 | | 5.870 |
| | | (0.357) | | (5.560) |
| L.Trade/GDP | | -2.163*** | | -42.15** |
| | | (0.618) | | (17.00) |
| Constant | 1.437*** | 0.592** | 9.449** | 2.234 |
| | (0.296) | (0.272) | (4.541) | (2.967) |
| Observations | 62 | 62 | 62 | 62 |
| R-squared | 0.530 | 0.509 | | |
| Robust standard errors in parentheses | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | |

Table 16: Replicating Eichengreen and Portes (1988)
Countries included in column 1 are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Sweden, Switzerland, United Kingdom

I also find that an adverse shock to trade has the right sign in the first specification (colums 1 and 3) - countries which experienced a larger deterioration in their trade compared to 1929 were more likely to default - but in the second specification (columns 2 and 4), the coefficient has an unexpected positive sign indicating that a smaller deterioration in trade was conducive to default. This counterintuitive result is confirmed to be unsubstantiated in the rest of the paper, with trade deterioration being positively associated with default size at both national and sub-national level.

Unlike Eichengreen and Portes, who find a positive and insignificant effect of openness on the probability of default, I find that more open countries were less willing to default in three specification out of four. This result is very much in line with economic theory and intuition and its interpretation is straightforward: countries whose GDP consisted for a greater share of imports and exports had more to lose from the fall in trade that normally accompanies defaults due to their direct (e.g. sanctions, embargoes) or indirect (lack of trade finance) effects.

I also find that my South America dummy (Eichengreen and Portes use a Latin America one, which they find to be insignificant) has explanatory power for default. Given the prevalence of default among South American nations, this is not surprising. The Australian dummy is also found to be significant, although with an opposite sign. Eichengreen and Portes, who also find this result, argue that this could be due to the political and economic ties between Australia and its main creditors - the UK and the USA - which, everything else equal, would decrase the incidence of

default.

Finally, Eichengreen and Portes find an inverse relation between default size and the change in the deficit, which would seem to indicate that an increase in "austerity" would be helpful for avoiding default. In my estimation, I find the opposite result, and this emerges quite strongly. This finding is supported by related work (Papadia, 2016), which shows hat "austerity" was - in many cases - not a choice but the only option for fiscally weak countries who were unable to borrow. These same countries, were more likely to default as demonstrated by the association between tax revenue deterioration and defaulted found throughout this paper.

In general, compared to Eichengreen and Portes's estimations, my analysis in this paper is superior in almost every way. First, the inclusion of major borrowers such as Canada, means that a much greater share of US lending abroad is included in the analysis. Second, the focus on dollar denominated bonds reduces noise associated with the different treatment different classes of creditors received, which cannot be captured except in a bilateral analysis. Similarly, the distinction between national-provincial and municipal defaults allows me to treat different classes of debtors separately. Third, my analysis captures the full dynamic process of default: the analysis starts in 1927 when all countries except Brazil had not yet defaulted and follows them all the way to 1936 when Poland - the last country to do so - defaults. Fourth, I bring to the table newly collected data on public debts, including their composition and sub-national magnitudes as well as tax and other public revenues at both the national and local level. I also have superior data on variables such as nominal GDP and Openness, coming from recent work by other researchers. Finally, my panel and dynamic analyses account for unobserved and unobservable country characteristics and feedback loops between default and the other controls, radically reduce the risk of endogeneity and, thus, biased estimates.

## B.2 Further robustness checks

In this section, I replicate the first part of the analysis on national-provincial and municipal defaults using dynamic GMM methods.

### B.2.1 National-Provincial Defaults

As above, I begin in In Tables 17 and 18 by introducing the controls one at a time. From the results, is is immediately clear that defaults are, indeed, persistent. The autoregressive parameter is large - between 0.714 and 0.921 - and strongly statistically significant. However, it is statistically different from 1 indicating that the dynamic process of default requires additional information to be fully explained, even after default has already started. In any case, throughout the analysis I employ the system GMM estimator due to its greater efficiency, particularly when the autoregressive parameter is close to 1.

Cumulative public revenues loss emerges once again as strongly significant in all specifications - except for two - and similar in magnitude to the standard panel estimation above. The results thus lend strong support to the hypothesis that differential reactions of countries' fiscal systems to the Depression, as captured by public revenue deterioration, were a leading cause of national-provincial defaults in the interwar period.

The only two instances where the coefficient is not significant is when the dollar debt as a share of GDP and the short term dollar debt are introduced in the regression. In these instances the coefficients of the revenue loss variable more than halve while the standard errors become larger.

This is puzzling because the variables have no statistically significant impact on default and are not strongly correlated with the revenue loss variable. It is therefore unclear why they would render it insignificant. Presumably this is simply an issue of noisy data.

Regarding the other regressors, the economic contraction indicators emerge once again as reliable predictors of default. Unlike above, the impact of the debt service emerges as positively and significantly correlated with default. No other controls are strongly enough correlated with default to emerge in a dynamic specification. In particular, the dollar debt, the public debt burden, the foreign debt share and the degree of trade openness all lose their statistical significance compared to the fixed effects estimation above, demonstrating the very high bar for causal estimation set by the GMM estimator.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| NatProvDefaultSize | | | | | | | | |
| L.NatProvDefaultSize | 0.775*** | 0.781*** | 0.736*** | 0.760*** | 0.906*** | 0.760*** | 0.725*** | 0.921*** |
| | (0.0594) | (0.0507) | (0.0821) | (0.0523) | (0.0610) | (0.0650) | (0.0597) | (0.0385) |
| L.LnCentTax/CentTax29 | -0.134*** | -0.110** | -0.183*** | -0.199*** | -0.0870 | -0.214*** | -0.202*** | -0.0526 |
| | (0.0506) | (0.0469) | (0.0444) | (0.0532) | (0.0724) | (0.0482) | (0.0482) | (0.0745) |
| L.LnNGDP/NGDP29 | -0.229** | | | | | | | |
| | (0.109) | | | | | | | |
| L.LnGDPPC/GDPPC29 | | -0.407** | | | | | | |
| | | (0.163) | | | | | | |
| L.LnTrade/Trade29 | | | -0.0915** | | | | | |
| | | | (0.0395) | | | | | |
| L.ForDebtShare | | | | 0.0406 | | | | |
| | | | | (0.0650) | | | | |
| L.lnDollardebt/GDP | | | | | 0.0245 | | | |
| | | | | | (0.0174) | | | |
| L.lnOpenness | | | | | | -0.0398 | | |
| | | | | | | (0.0271) | | |
| L.ShortDebtShare | | | | | | | 0.118 | |
| | | | | | | | (0.0853) | |
| L.ShortDollarDebtShare | | | | | | | | 0.461 |
| | | | | | | | | (0.373) |
| Constant | -0.0172** | -0.00678 | -0.0253*** | -0.0112 | 0.100 | -0.0518 | -0.00981 | 0.0301* |
| | (0.00852) | (0.00921) | (0.00888) | (0.0296) | (0.0610) | (0.0339) | (0.0121) | (0.0160) |
| Observations | 225 | 233 | 225 | 227 | 223 | 225 | 217 | 247 |
| Number of countries | 26 | 27 | 26 | 27 | 26 | 26 | 27 | 29 |
| Country fixed-effects | YES | YES | YES | YES | YES | YES | YES | YES |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 17: National-provincial defaults, tax revenues and controls, system GMM estimation 1927-36 - Part 1

Countries included in columns 1, 3, 5, 6 are Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, United Kingdom, Yugoslavia; columns 2, 4, 7 additionally include Peru; column 8 additionally includes Bolivia and Estonia. For the GMM estimations I use the 3rd, 4th and 5th lag of the explanatory variables as instruments. I employ the twostep estimator and the orthogonal option to minimise the loss o observations in the presence of gaps in the data, see Roodman (2009).

| NatProvDefaultSize | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| L.NatProvDefaultSize | 0.714*** | 0.845*** | 0.762*** | 0.719*** | 0.768*** | 0.786*** | 0.805*** | 0.781*** |
| | (0.0726) | (0.0963) | (0.0986) | (0.0869) | (0.0600) | (0.0980) | (0.0558) | (0.0658) |
| L.LnCentTax/CentTax29 | -0.184*** | -0.286** | -0.128** | -0.251*** | -0.144*** | -0.146** | -0.189*** | -0.129** |
| | (0.0351) | (0.135) | (0.0569) | (0.0560) | (0.0530) | (0.0631) | (0.0530) | (0.0640) |
| L.LnCentralDebt/GDP | -0.0121 | | | | | | | |
| | (0.0157) | | | | | | | |
| L.LnTotalDebt/GDP | | 0.0530 | | | | | | |
| | | (0.0338) | | | | | | |
| L.LnDebtService/GDP | | | 0.0354** | | | | | |
| | | | (0.0141) | | | | | |
| L.LnDomYieldSpread | | | | 0.01076 | | | | |
| | | | | (0.02468) | | | | |
| L.Polity2 | | | | | -0.000781 | | | |
| | | | | | (0.00479) | | | |
| L.FiscBalance/GDP | | | | | | -0.860 | | |
| | | | | | | (0.927) | | |
| L.OnGold | | | | | | | 0.000664 | |
| | | | | | | | (0.0170) | |
| L.LnGoldReserves/GDP | | | | | | | | -0.0209 |
| | | | | | | | | (0.0141) |
| Constant | -0.00733 | 0.0314 | 0.147*** | 0.001 | 0.0267 | -0.00451 | 0.00419 | -0.0654 |
| | (0.0194) | (0.0290) | (0.0550) | (0.0160) | (0.0263) | (0.0223) | (0.0101) | (0.0434) |
| Observations | 209 | 172 | 207 | 187 | 249 | 205 | 249 | 192 |
| Number of countries | 25 | 22 | 24 | 24 | 29 | 26 | 29 | 22 |
| Country fixed-effects | YES | YES | YES | YES | YES | YES | YES | YES |
| Standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 18: National-provincial defaults, tax revenues and controls, system GMM estimation 1927-36 - Part 2

Countries include in column 1 are Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, United Kingdom; compared to column 1, column 2 excludes Austria, Chile and Romania; column 3 only excludes Romania; compared to column 1, column 4 includes Yugoslavia and excludes Bulgaria and Ireland; compared to column 1, columns 5 and 7 additionally include Bolivia, Estonia, Peru and Yugoslavia; while column 6 only additionally includes Yugoslavia; compared to column 1, column 8 excludes Chile, Greece, Ireland and Romania. For the GMM estimations I use the 3rd, 4th and 5th lag of the explanatory variables as instruments. I also use the small sample correction, the twostep estimator and the orthogonal to minimise the loss o observations in the presence of gaps in the data, see Roodman (2009).

### B.2.2 Municipal Defaults

As outlined above, the results for municipal defaults are less robust, presumably due to the lower number of observations. The dynamic estimation confirms this: the coefficient for the cumulative revenue loss is statistically significant only in half of the specifications in Tables 19 and 20. However, once again the coefficient is consistent in magnitude across specifications and similar to the results for both municipal and national-provincial defaults presented above. The only exceptions are when the local and total debt variables are introduced in the regression, although these are not statistically significant themselves. In these instances the coefficient become much smaller. Presumably, the

explanation is in multicollinearity and noisy data, combined with a relatively small sample. The hypothesis that a small sample size is behind the lack of significance is strengthened by the finding (not shown here) that when the cumulative loss of local public revenues is proxied by the central government's tax revenue loss, for which data is more widely available, the coefficient is consistently statistically significant across specifications and similar in magnitude to all other estimations.

I find that no other variable introduced in the regressions is statistically associated with municipal defaults. Once again, this is probably due to the relatively small size of the sample.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| MunDefaultSize | | | | | | | | |
| L.MunDefaultSize | 0.691*** | 0.900*** | 0.722*** | 1.062* | 0.577*** | 0.652** | 0.766*** | 0.855*** |
| | (0.160) | (0.127) | (0.116) | (0.619) | (0.193) | (0.270) | (0.199) | (0.130) |
| L.LnLocGovFin/LocGovFin29 | -0.274*** | -0.196** | -0.349*** | -0.272 | -0.237 | -0.475*** | -0.321** | -0.241 |
| | (0.0921) | (0.0899) | (0.110) | (0.694) | (0.232) | (0.173) | (0.139) | (0.187) |
| L.LnNGDP/NGDP29 | -0.0250 | | | | | | | |
| | (0.118) | | | | | | | |
| L.LnGDPPC/GDPPC29 | | -0.0484 | | | | | | |
| | | (0.433) | | | | | | |
| L.LnTrade/Trade29 | | | -0.0584 | | | | | |
| | | | (0.0643) | | | | | |
| L.ForDebtShare | | | | -0.873 | | | | |
| | | | | (4.472) | | | | |
| L.LnDollarDebt/GDP | | | | | 0.131 | | | |
| | | | | | (0.133) | | | |
| L.Openness | | | | | | -0.0519 | | |
| | | | | | | (0.138) | | |
| L.ShortDebtShare | | | | | | | 0.720 | |
| | | | | | | | (0.671) | |
| L.ShortDollarDebtShare | | | | | | | | 1.067 |
| | | | | | | | | (0.983) |
| Constant | -0.0115 | -0.00504 | -0.0222 | 0.437 | 0.395 | -0.0560 | -0.0986 | 0.0123 |
| | (0.00732) | (0.0109) | (0.0138) | (2.273) | (0.357) | (0.160) | (0.0739) | (0.0268) |
| Observations | 134 | 132 | 134 | 130 | 134 | 134 | 125 | 140 |
| Number of countries | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 19 |
| | Standard errors in parentheses | | | | | | | |
| | *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | |

Table 19: Municipal defaults, local government financing and controls, system GMM estimation 1927-36 - Part 1

Countries included in columns 1-7 are Australia, Austria, Belgium Brazil, Bulgaria, Canada, Chile Colombia, Czechslovakia, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Poland and Switzerland; column 8 additionally includes Estonia. I use all lags of the explanatory variables as instruments staring from the 2nd, in combination with the collapse and principal component analysis options to reduce the number of instruments. I use the twostep estimator and orthogonal option to minimise the loss o observations in the presence of gaps in the data, see Roodman (2009). Standard errors are clustered at the country level.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| MunDefaultSize | | | | | | | | |
| L.MunDefaultSize | 0.627*** | 0.789*** | 0.823*** | 0.826*** | 0.590*** | 1.037*** | 0.682*** | 1.013*** |
| | (0.108) | (0.118) | (0.119) | (0.124) | (0.132) | (0.248) | (0.137) | (0.295) |
| L.LnLocGovFin/LocGovFin29 | -0.0518 | -0.0331 | -0.256*** | -0.217 | -0.169 | -0.199 | -0.522*** | -0.447** |
| | (0.0558) | (0.0697) | (0.0968) | (0.212) | (0.380) | (0.158) | (0.201) | (0.205) |
| L.LnLocalDebt/GDP | 0.0388 | | | | | | | |
| | (0.0413) | | | | | | | |
| L.LnTotalDebt/GDP | | 0.0840 | | | | | | |
| | | (0.0822) | | | | | | |
| L.LnDebtService/GDP | | | -0.0165 | | | | | |
| | | | (0.0436) | | | | | |
| L.LnDomYieldSpread | | | | 0.0392 | | | | |
| | | | | (0.0556) | | | | |
| L.Polity2 | | | | | 0.00251 | | | |
| | | | | | (0.0549) | | | |
| L.NatProvDefaultSize | | | | | | -0.0653 | | |
| | | | | | | (0.161) | | |
| L.OnGold | | | | | | | -0.129 | |
| | | | | | | | (0.0812) | |
| L.LnGoldReserves/GDP | | | | | | | | -0.00323 |
| | | | | | | | | (0.0577) |
| Constant | 0.103 | 0.0752 | -0.0509 | 0.0114 | -0.00107 | 0.00455 | 0.0870 | -0.0262 |
| | (0.0996) | (0.0709) | (0.179) | (0.0333) | (0.397) | (0.0164) | (0.0689) | (0.212) |
| Observations | 119 | 119 | 133 | 110 | 140 | 140 | 140 | 128 |
| Number of countries | 16 | 16 | 18 | 17 | 19 | 19 | 19 | 17 |
| Standard errors in parentheses | | | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 20: Municipal defaults, local government financing and controls, system GMM estimation 1927-36 - Part 2

Countries included in columns 1,2 are Australia, Belgium, Brazil, Bulgaria, Canada, Colombia, Czechslovakia, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Poland and Switzerland; columns 3,4 additionally includes Austria and Chile, but column 4 excludes Bulgaria; compared to column 1 columns 5-7 include Austria, Chile and Estonia while column 8 includes Austria only. I use all lags of the explanatory variables as instruments staring from the 2nd, in combination with the collapse and principal component analysis options to reduce the number of instruments. I use the twostep estimator and orthogonal option to minimise the loss o observations in the presence of gaps in the data, see Roodman (2009). Standard errors are clustered at the country level.