Bank Crises and Sovereign Defaults: Exploring the Links[1]

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This paper documents the main mechanisms through which sovereign and bank problems feed into each other, using a large sample of emerging economies over three decades. While the feed-back between sovereign and bank distress have long been recognized, the large theoretical and empirical literature looking at how different types of crises occur and combine (the so-called "twin crises" literature) has not, until recently, studied the links between sovereign and banking crises in a systematic way. We first define twin crises as either those banking crises that end up in sovereign debt crises ("twin bank-debt" crises), or vice-versa ("twin debt-bank" crises). We then ask what differentiates "single" episodes from "twin" ones. To answer this question we use an event analysis methodology: we focus on a time window of six years around crisis episodes and study the behavior of a set of variables describing the cross-exposures of banking and public sector, the banking sector, the state of public finances, and the macroeconomic context. We find that there are systematic differences between single and twin crises, across all these dimensions. We thus provide evidence that crisis episodes are far from being uniform events: distinguishing between "single" and "twin" events is important, as is taking into account the proper sequence of crises that compose twin events.

KEYWORDS: Banking crises, Sovereign Defaults, Feedback Loops, Balance Sheets.

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1. Introduction

Due to the expansion of balance sheets, product innovation and falling capital ratios, risks in the banking system have increased steadily in the last decades, leading to an increase in the frequency and scale of public intervention after financial crises (Alessandri and Haldane, 2009). These interventions can, in turn, severely strain governments and threaten public debt sustainability (Reinhart and Rogoff, 2011). Still, the transmission of distress has often gone in the opposite direction, with situations of acute fiscal stress triggering episodes of systemic banking crises (Caprio and Honohan, 2008).

Unsurprisingly, this two-way relationship between the banking and public sectors has attracted increasing attention lately, as the still ongoing crisis has engulfed a number of advanced economies into a perverse feedback loop of fiscal and financial distress. On the one hand, a number of countries faced severe banking crises which triggered fiscal troubles, due to the magnitude of bank rescue operations. Arguably, this is what happened to Iceland, where the materialization of contingent claims stemming from the banking crisis in the form of deposit guarantees brought havoc to the sovereign's balance sheet.[4] On the other hand, pro-cyclical fiscal policy and a lack of competitiveness, among other factors, led to a sovereign debt crisis in Greece in early 2010. As foreign investors withdrew, banks became major holders of public debt. Successive sovereign downgrades, ending in a private sector involvement operation, contributed to the collapse of the Greek banking sector.[5]

While these recent developments have sparked growing interest in the nature of feedback loops between the sovereign and banking sector[6], intertwined fiscal and financial crises are nothing new, as emerging economies know too well. Ecuador (in the mid-nineties) and Dominican Republic (in the early 2000s) accumulated so much debt trying to sort out a sequence of bank troubles that were forced to restructure their sovereign debt obligations. In turn, during the Argentinean (2001) and Russian (1998) crises, governments relied heavily on domestic banks as a source of financing. Their eventual defaults led the heavily exposed banking systems to suffer large losses, triggering bank crises.[7]

Against this background, it is surprising that the large literature looking at how different types of crises occur and combine (the so-called "twin crises" literature) has only recently began to focus on the links between fiscal and financial distress. Indeed, while many papers focus on one direction of transmission or the other, only a few papers address the two-way nature of the relationship. Regarding emerging economies, there are two notable exceptions: Panizza and Borenzstein (2008) and Reinhart and Rogoff (2011). Panizza and Borenzstein (2008) study a sample of 149 countries during the period 1975-2000 and find that the probability of a banking crisis conditional on a default is much higher than the unconditional probability of a banking

[4] In Iceland, bank failures directly increased net public debt by 13% of GDP (Carey, 2009).
[5] Showing the relevance of balance sheet linkages, fears of an international contagion were raised, due to the high exposure to Greece of some European banks (Bolton and Jeanne, 2010).
[6] See Mody and Sandri (2011), Acharya et al. (2013), Alter and Meyer (2013) or Moody's (2014).
[7] Diaz-Cassou et al. (2008) and Erce (2013) provide detailed accounts of these episodes.

crisis, while the probability of a default conditional on a banking crisis is just slightly higher than the unconditional one. Reinhart and Rogoff (2011) analyze the cycles underlying serial debt and banking crises using long time-series on public and external debt. They obtain exactly the opposite result: it is the banking crises which turn out to be significant predictors of sovereign debt distress, but not the other way around.[8] One drawback of these studies is that, although they provide a discussion of the possible channels through which distress transmits both ways, they don't study them formally. A similar criticism applies to the growing literature focusing on the existence of perverse feedback loops between sovereign and financial risk in the Euro-Area. These recent contributions study the two-way relationship between fiscal and financial stress by modelling the common dynamics of banks' and sovereigns' *Credit Default Swaps*.[9]

While the various time series methodologies used in the literature present interesting ways to measure the extent to which sovereign stress drives bank stress and vice versa, they do not incorporate macroeconomic and financial variables and, thus, fail to explain the drivers of the feedback relation. Our paper tries to address this gap by studying a larger set of macro-financial variables through which the feedback loop of fiscal and financial stress may materialize. We also present a detailed analysis of the balance sheet data of domestic depository institutions and keep track of the balance sheet interrelation between banks and the public sector (Central Bank and Government) around periods of fiscal and/or financial stress.

New to the literature, we isolate the following types of events: (i) "single" banking crises i.e. banking crises that are not followed by sovereign distress; (ii) "single" sovereign debt crises i.e. sovereign defaults not followed by banking crises; (iii) "twin bank-debt" crises, that start with a banking crisis, followed by a sovereign one and (iv) "twin debt-bank" crises, where a sovereign crisis is followed by a banking one. We ask what differentiates "single" crises from episodes that degenerate into twin crises. Our aim is to identify those factors that are systematically linked to one or the other type of crises.

We use a sample of 117 emerging and developing countries over three decades, from 1975-2007 and perform event analyses with panel data as in Broner et al. (2013) and Gourinchas and Obstfeld (2011) to study the behavior of key variables before and after our different types of crisis events. We focus on a six-year time window around each crisis episode and track the dynamics of key variables capturing the cross-balance sheet exposures of the banking and the public sectors, banking sector characteristics, the state of public finances and the macroeconomic context. We find systematic differences between single crises and twin events across all these dimensions. Importantly, we also find that considering the sequence of the events, that is, taking

[8] These diverging results might be partly explained by the use of different samples and econometric strategies. In a narrower sample, Erce (2012) documents both types of feedback episodes.

[9] Moody's (2014) study the dynamic relation between sovereign and bank CDS spreads is analysed by means of a Markov switching VAR methodology. Similarly, Alter and Beyer (2013), following Diebold and Yilmaz (2009), show a growing interdependence between fiscal and financial risks. Broto and Perez-Quiros (2013) use a dynamic factor model, decompose the sovereign CDS spreads into a common factor, a factor driven by peripheral countries and an idiosyncratic component. In turn, Heinz and Sun (2014) use a vector correction model.

into account whether the trigger of a twin crisis is a debt crisis or a banking one, matters.

Our results point to the following stylized facts. Banking systems are significantly larger and deeper around banking crises that bring down the sovereign, than around "single" banking crises. This suggests that the former events are more likely to require larger government support and cause more damage to the economy (and thus to the sovereign), as well as that the government has more incentives to intervene and prop up the banking sector. It is interesting that banks in single episodes start sizing down already a year ahead of the crisis and continue to do so as the crisis unfolds. In contrast, in twin episodes, not only does asset downsizing start in the third year the banking crisis, but also the process is more gradual. This could indicate that the policy response to the unfolding crisis is to try to keep the banking sector afloat, postponing deleveraging until the crisis has already engulfed the public sector as well.

Ahead of "single" banking crises, low amounts of government claims in banks' balance sheets combine with high liquidity support supplied by the central bank, while in the aftermath, liquidity support falls quickly and claims on government start rising. In twin bank-debt crises, the fast and substantial accumulation of claims on government ahead of the banking crisis combines with no liquidity support from the central bank, while in the aftermath, the accumulation of claims on government moderates and central bank support shoots up.

While the two events occur against similar initial debt and budget positions, diverging patterns of public finances emerge once banking crises are underway. Indeed, banking crises that are part of twin bank-debt events are associated with a sharper increase in budget deficit, on the account of shoot-up in public spending. In terms of public debt, the flat dynamics ahead and after single banking crises contrast with the large accumulation in twin bank-debt crises, which starts during the year of the banking crisis and continues unabated up to the sovereign default – another indication that these banking crises put more strains on government finances.

Finally, while the macroeconomic environment ahead of "single" banking events is characterized by low growth and high inflation, the economy rebounds already by the second year of the crisis. In contrast, growth collapses and inflation shoots up following those banking crises that are part of twin events. Growth rates then remain depressed, and inflation rates remain high, as the sovereign heads into default. Banking crises that end up in defaults are also associated with a larger loss in foreign investors' confidence, reflected in a sudden stop in portfolio inflows and a sharp change in the composition of foreign debt toward short-term liabilities. Such loss of credibility most likely transfers to the sovereign.

Regarding the differences between "single" debt and twin debt-bank crises, we find that the average banking sector ahead of twin episodes is more exposed to the government, and that the pace of increase in claims on government in the run-up to the default is faster. The amount of liquidity support provided by the central bank around the two defaults is significantly larger than in non-crisis times, suggesting that banking sector tensions accompany both defaults, including "single" events.

Nevertheless, the liquidity support provided by the central bank is flat throughout "single" events, whereas it increases dramatically during twin ones, suggesting that defaults that are part of twin events cause more damage to banks' balance sheets. Banking sector in twin events are, on average, smaller than those in "single" default events.

While the state of public finances is roughly similar ahead of the two events, expenditure is cut more drastically and public debt drops faster in the aftermath of twin defaults, which may indicate a lack of fiscal space, or the adoption of a more austere stabilization package, both of which may negatively affect the banking sector and the economy in the short run.

The defaults associated with twin events have a larger immediate negative impact on growth, while the recovery in the aftermath is slower. These growth dynamics are accompanied by inflation rates that fall more markedly during twin events than during single ones – a further indication of a tight austerity package implemented in the aftermath of twin defaults. Finally, twin defaults are accompanied by a sharp drop in portfolio capital flows and a shift in the composition of foreign borrowing towards shorter maturities, reflecting a large loss of credibility suffered by the sovereign.

We believe this event study is useful in terms of uncovering important stylized facts, particularly in revealing nonlinear relationships. Moreover, by distinguishing between single and twin events, we find that a number of empirical facts usually associated with either "bank" or "debt" crises in general are to be found in twin events only, and not in single crisis episodes. Still, the results should not be interpreted as having any causal implications. To take up the issue of causality more seriously, a structural model is needed, which is the next step on our research agenda.

The paper is organized as follows. The following section provides a discussion on the main channels through which bank distress transmits to the sovereign, and vice-versa, as identified so far in the literature. This will guide the choice of variables for our event analysis. Section 3 introduces the data and methodology, while section 4 discusses the main results of this paper. Section 5 concludes.

2. How does distress transmit? An overview of the literature

In order to guide our choice of variables, we briefly discuss the main channels though which financial stress may lead to public stress, and vice versa. These channels include the direct balance sheet interconnection, both through public debt holdings and rescue operations, as well as other indirect ways through which underlying vulnerabilities in either the banking or public sector may materialize into twin crises.

As argued above, only a couple of references have focused on the analysis of feedback loops between fiscal and financial stress focusing on emerging countries, while for the Euro-Area more evidence has recently been provided. According to Moody's (2014), the Euro Area did not suffer one financial crisis, but a variety of crises,

each of them with its own specificities. According to their analysis, only Ireland has witnessed a spill over of financial stress into sovereign stress. Instead, the opposite occurred in Greece and Italy, with sovereign stress being the stepping stone into a financial crisis. For the rest of the countries analysed, the article finds evidence of a two-way relationship, with stress feeding back in both directions. According to Alter and Beyer (2013), in Spain, the nationalization of Bankia was accompanied by an increase in spillovers to the sovereign. According to Broto and Perez-Quiros (2013), risk contagion has played a non-negligible role in the European peripheral countries.

2.1. Channels through which banking crises may affect the sovereign

Regarding the potential impact of financial turmoil on the sovereign, this is nicely described by Reinhart (2009) as the four *deadly D's*: *"*Sharp economic downturns follow banking crises; with government revenues dragged down, fiscal deficits worsen; deficits lead to debt; as debt piles up rating downgrades follow. For the most fortunate, the crisis does not lead to the deadliest D: default, but for many it has*"*. Reinhart and Rogoff (2011) present a set of four stylized facts. First, private and public debt booms ahead of banking crises. Second, banking crises, both home-grown and imported, usually accompany or lead sovereign debt crises. Third, public borrowing increases sharply ahead of sovereign debt crises, and, moreover, it turns out that the government has additional "hidden debts"[10] (domestic public debt and contingent private debt).[11] Fourth, the composition of debt shifts towards the short-term before both debt and banking crisis. Furthermore, a default may also take place if the financial crisis ignites a currency crash that impairs the sovereign's ability to repay foreign currency debt. Indeed, according to Buiter (2008), the risk of a triple banking-currency-sovereign crisis is always there for small countries with a large internationally exposed banking sector, a currency that is not a global reserve currency and limited fiscal capacity.[12]

According to Candelon and Palm (2010) there are four main channels of transmission from banking sector to the sovereign. First, rescue plans may impair the sustainability of public finances.[13] These can include bailout money, government deposits, liquidity provisioning by the central bank, public recapitalization and the execution or materialization of public guarantees.[14] Second, if contingent liabilities materialize, fiscal costs are likely to be substantial. Next, the risk premium increases even if guarantees are not exercised, raising borrowing costs for both the sovereign and the

[10] Hidden debt might include (i) explicit guarantees, (ii) implicit guarantees which could extend to all kinds of private sector debts, (iii) central bank debt, (iv) off-balance sheet debts that arise from transactions in derivative markets and (v) any liability of the government not included in official debt statistics.
[11] In fact keeping domestic debt in the picture explains why governments default at low external debt levels or resort to inflation to reduce the debt burden (Reinhart and Reinhart, 2009).
[12] http://blogs.ft.com/maverecon/2008/11/how-likely-is-a-sterling-crisis-or-is-london-really-reykjavik-on-thames/
[13] Rosas (2006) studies the drivers of government intervention after banking crises. He finds that authorities are more likely to bailout failing institutions in open and rich economies or if financial turmoil was caused by regulatory issues. On the other hand, electoral constraints and central bank independence seem to favor bank closure.
[14] The direct fiscal costs of banking crises are well documented (see Feenstra and Taylor (2008), Reinhart and Rogoff (2010) or Arellano and Kocherlakota (2008)).

private sector (sovereign ceiling).[15] Last, the downturn originated by the credit crunch accompanying the financial crisis can deepen the recession, leading to further falls in public revenues, deepening the deficit and driving up debt. King (2009) provides an event analysis on the impact of government guarantees on the banking system using the battery of bank rescues that took place in late 2008. According to his results, the bailouts benefited the banks' creditors, as reflected in falling bank CDS spreads, at the expense of equity holders, given that banks' stock underperformed vis-a-vis the market.

Direct fiscal costs include bailout money, government deposits, liquidity provisioning by the central bank, public recapitalization and the execution or materialization of public guarantees and contingent liabilities. These costs can be exacerbated by the impact of the crisis on tax collection and public expenditure and, thus, public deficits and debt, as the financial turmoil has a negative impact on asset prices, unemployment and output. Reinhart and Rogoff (2010) and Baldacci and Gupta (2009) argue that sovereign debt distress (deterioration of the fiscal position) after a banking crisis is likely to occur due to a combination of lower revenues and higher expenditures (assistance to troubled banks and outlays associated with the economic downturn). These effects are specific to each episode, but estimated fiscal costs of the median systemic banking crisis stand at 15.5% of GDP (Honohan, 2008). According to Honohan (2008), banking crises last 2.5 years on average and public debt increases by around 30% of GDP during these episodes.

According to Baldacci and Gupta (2009) using fiscal policy may lead, even in a favorable external environment, to sharp rises in debt and deficit.[16] Similarly, distress can transmit even if ex-ante levels of debt are relatively low. Over half of the default episodes surveyed by Reinhart and Reinhart (2009) took place with debt levels below 60% of GDP. As argued in Goldstein (2003), a low debt to GDP level is not indicative of sustainable debt positions because it fails to take into account contingent liabilities.

The transmission of bank distress to the broader economy and the fiscal and monetary authorities will partially occur as a result of the credit crunch created by the banking crises. As credit falls or becomes more expensive, the economy is likely to suffer a drop in GDP growth. The output loss after a banking crisis is determined by pre-crisis conditions and by the size of the shocks (WEO, 2009)[17]. This might put additional pressure on the fiscal position through its impact on tax revenues, likely to be lower as activity falls.[18]

Relatedly, Laeven and Valencia (2011) focus on the impact of financial sector interventions on the capacity of the financial system to provide credit. Their results

[15] Laeven and Valencia (2008b) show that blanket guarantees increase the fiscal costs of banking crises, but this can also be due to the fact that they are set in place during big crises.
[16] Baldacci and Gupta (2009) argue that the composition of fiscal stimulus determines the length of financial crises. Fiscal expansions do not improve the growth outlook by themselves and lead to higher interest rates on long-term government debt. The authors identify a trade-off between boosting aggregate demand (short-run) and productivity growth (long-run).
[17] Cecchetti et al. (2009) find that output losses are lower in twin banking-sovereign crises than in sovereign-currency ones.
[18] See De Paoli et al. (2009) or Feenstra and Taylor (2008).

show that firms dependent on external financing benefited significantly from bank recapitalization operations. Kollmann et al. (2012) focus on the impact of bank rescues as well. Their message is positive and highlights the ability of bank rescue operations to improve macroeconomic performance. Still, while they show that bank rescues raise investment, in line with the evidence in Broner et al. (2014) and Popov and Van Horen (2013), they find that sovereign debt purchases by domestic banks lead to a crowding out of private investment. Gray and Jobst (2013) present a less benign exercise, showing the potentially high impact on fiscal risk associated with the existence of contingent liabilities.[19]

Additionally, banking crises may ignite a currency crash that makes public authorities unable to repay foreign currency debt (Reinhart and Rogoff, 2010, Feenstra and Taylor, 2008, De Paoli et al., 2009, European Commission, 2009). This is more likely to happen if the central bank uses reserves to finance bailouts. Significant exchange rate corrections could be expected if the government uses monetization to overcome the crisis. Moreover this could come at the cost of higher inflation. Finally, if confidence in the country is reduced or uncertainty augments significantly, the crisis could lead to a drop in external financing or sudden stop of capital inflows.

All these can be worsened by too much foreign debt and too much short term debt. Indeed, as argued by Obstfeld (2011) when discussing the role of international liquidity in the recent debt crisis, "…gross liabilities, especially those short-term, are what matter". Indeed, Reinhart and Rogoff (2008a) argue that banking crises are often preceded by credit booms and high capital inflows. Moreover, they find that periods of high international capital mobility gave rise to banking crises in the past. The probability of a banking crisis conditional on a capital flow bonanza is higher than the unconditional probability in 61% of the countries they cover (for the period 1960-2007). Cavallo and Izquierdo (2009) provide further evidence showing that, after financial crises in emerging markets, capital flows may collapse for months or years potentially triggering a solvency crisis. Van Rixtel and Gasperini (2013) show that borrowing strains in foreign currency for banks affect the creditworthiness of the sovereigns.

2.2. Channels through which sovereign distress may affect the banking sector

When considering the transmission channels of a fiscal crisis to the broader economy, a number of them can be traced through the domestic financial system .[20] Whenever assets need to be written off, rescheduled or simply marked-to-market banks are usually the first in line to take a hit. Noyer (2010), among others, argue that banks' holdings of defaulted government bonds might lead to large capital losses and threaten the solvency of different elements of the banking sector. In addition, authorities often react to debt problems by coercing domestic creditors to hold government bonds (frequently in non-market terms), aggravating the situation in the event of a default (Díaz- Cassou et al., 2008). For instance, prior to the 2001 crisis half

[19] See also Gray et al. (2013).
[20] See IMF (2002), Reinhart and Rogoff (2010), Erce (2012) or Acharya et al. (2013).

of Argentina's bank assets were public sector liabilities. In Russia, the severe banking crisis had a much weaker effect on overall wealth and activity than what could have been expected in more typical cases because financial intermediation was so small. Indeed, focusing on emerging market crises, Erce (2012) suggests that the degree of bank intermediation strongly affects a debt restructuring's ripple effect on the real economy. The disruptions caused by Ecuador's bigger and more developed banking system were comparatively larger. In contrast, one could expect a smaller effect in financial systems where firms rely to a larger extent on non-bank sources of financing.

Reinhart and Rogoff (2008c) show that defaults often go hand in hand with inflation, currency devaluations and crashes, and banking crises. De Paoli et al. (2009) find that two thirds of sovereign defaults overlap with banking crises, and almost half of these episodes overlap with both banking and currency crises. The probability of a banking crisis occurring in the same year or after a default is 0.46 in their sample of crises. Output losses after a default last about 10 years, and are larger in the event of a triple crisis.

IMF (2002) provides a comprehensive overview of the effects of four sovereign restructurings (Ecuador, Pakistan, Russia and Ukraine) on the domestic banking sector. The paper documents the extent of direct losses from banks' holdings of government securities, an increase in the interest rates on liabilities, due to the higher risk, not matched by increased returns on assets (on the contrary, in this context government securities usually offer non-market rates), and an increase in the rate of nonperforming loans increases, as higher financing costs lead to corporate bankruptcies. While this keeps borrowing costs low, a government default may trigger a banking crisis. Indeed, according to IMF (2002), in past crises, banks did not hold capital against sovereign risk. The prudential regulation in place treated government bonds as risk-free, despite default expectations being not zero. Dreschle et al. (2013) present a similar argument regarding the current situation in the Euro Area. According to them, the fact that both capital regulation and the collateral policy of the ECB give Euro-Area government bonds a preferential treatment, provided incentives to banks to load up on such bonds, setting the stage for the appearance of perverse feedback loops through increased balance sheet interconnections.

A few theoretical papers have highlighted the channels through which sovereign distress may translate into financial distress. For instance, Acharya et al. (2013) present a model in which, if the sovereign becomes overburdened, the value of any public guarantees it may have provided falls, deepening on the interconnection of stress between the government and the financial sector. Additionally, some papers have recently started to focus on the impact of a default on other agents in the economy. Corporate borrowers and banks may face a sudden stop after a sovereign default even if they are not overexposed to government bonds. Brutti (2008) focuses on the role of financial institutions as major holders of government debt. The government's incentive to repay ex-post is largely given by the risk of triggering a financial crisis. Gennaioli et al. (2010) show that sovereign defaults tend to trigger capital outflows and credit crunches. In their view strong financial institutions amplify

the costs of default, disciplining the government. Erce (2012) shows how sovereign defaults can be designed to minimize their impact on domestic banks. In Livshits and Schoors (2009), when public debt becomes risky, the government has incentives to not adjust prudential regulation. While this keeps borrowing costs low, a government default may trigger a banking crisis.[21] In Darraq-Pires et al. (2013) the positive connection between fiscal and financial risk in the Eurozone is due to the fact that banks invest in government securities in order to hedge about future liquidity shocks.

Along these lines, Angeloni and Wolff (2012) empirically assess the impact of sovereign bond holdings on the performance of banks during the Euro Area crisis using individual bank data and sovereign bond holdings. Acharya et al. (2013), using EBA data on sovereign debt holdings, document the high exposure of the banks in their sample to their own sovereign, which, according to their theory should be a main channel through which stress feeds back.[22]

Beyond this direct balance sheet effect, the ensuing fiscal contraction may lead to reduced activity affecting banks' profits and further damaging the financial system situation. Moreover, the economic downturn may be reinforced by a credit crunch, as banks reduce lending due to capital losses and to the increase in uncertainty that comes with a sovereign default (Panizza and Borenzstein, 2008). Popov and Van Horen (2013) focus on the feedback form sovereign risk into banking risk by assessing the extent to which increasing holdings of distressed sovereign bonds limit banks' ability to extend loans to the private sector, thus amplifying the vicious feedback loop by limiting the growth potential of the economy. They document a stronger reallocation away from domestic lending in the periphery. A similar crowding out effect is present in Broner et al. (2014), who present a battery of stylized facts for the Euro Area, including both an increase in sovereign bond holdings by banks and a simultaneous drop in financing to the private sector.[23] Corporate borrowers and banks may face a sudden stop after a sovereign default even if they are not overexposed to government bonds. Gennaioli et al. (2010) and Das et al. (2011) empirically show that sovereign defaults curtail access to foreign capital both for public and private entities, and ignite domestic credit crunches.

Still, an additional pressure to curtail lending might come from the fact that uncertainty regarding the economic prospects may lead to a run on the banks' deposits (as it happened in Argentina ahead of the "corralito"), or a collapse of the inter-bank market (Panizza and Borenzstein, 2008). The banking system also is not able to operate normally if the government imposes deposit freezes. Meissner and Bordo (2006) look at the composition of a country's debt. They find that foreign currency debt *per se*

[21] As identified in Diaz-Cassou et al. (2008), this may also occur when governments facing debt troubles force or coerce banks to hold bonds in non-market terms. IMF (2002) also found that banks did not hold capital against sovereign credit risk. Prudential regulation in place considered government bonds risk-free even when default expectations were not zero.

[22] Among other things, the paper assesses the extent to which reduced sovereign ratings affected the banks CDS through its effect on the explicit and implicit guarantees from the public sector.

[23] While these papers present a nuanced view of domestic purchases of sovereign bonds, other papers have found positive feedback effects of these purchases. For instance, according to Andritzky (2012) estimates, domestic bank purchases of sovereign bonds limit increases in the spreads, helping to stabilize the funding needs of the sovereign.

leads to a higher likelihood of debt and banking crisis. However, financial fragility can be reduced by sound institutions and a strong reserve position.

Finally, sovereign ratings downgrades further limit banks' access to foreign financing, leading to sudden stops or higher borrowing costs (Reinhart and Rogoff, 2010) and, as argued by Acharya et al. (20013), reduce the value of any guarantees provided by the public sector to financial institutions.

3. Data and methodology

Our sample contains 117 emerging and developing countries and covers three decades, from 1975 to 2007. Data is of annual frequency. We have excluded from our analysis all banking and sovereign episodes linked to the current global crisis.

3.1. Definition and incidence of events

To identify and date sovereign debt crises we rely on the information provided by Standard & Poor´s (S&P). S&P defines sovereign defaults as situations where: (i) the government does not meet scheduled debt service on the due date or (ii) creditors are offered either a rescheduling (bank debt) or a debt exchange (bond debt) in less favorable terms than the original issue.[24] With regard to banking crises, we use the "systemic" events identified by Laeven and Valencia (2008) as situations in which: (i) a country's corporate and financial sectors experience a large number of defaults; (ii) and firms and financial institutions face great difficulties repaying contracts on time. Thus, this definition does not include minor banking events, in which only isolated banks are in distress. Because ending dates of both sovereign and banking crises are hard to establish, we mark the first year of each crisis only. Crises of the same type that occur at less than three years of distance are considered a single event. Finally, we define "twin crises" as pairs of debt and banking crises that take place at intervals of less than three years.

Accordingly, we isolate the following types of events: (i) "single" banking crises i.e. banking crises that are not followed by sovereign distress; (ii) "single" sovereign debt crises i.e. sovereign defaults that are nor followed by banking crises; (iii) "twin bank-debt" crises, that start with a banking crisis, followed by a sovereign one during the following three years; and (iv) "twin debt-bank" crises, where a sovereign crisis is followed by a banking one during the following three years.

Using these definitions we obtain 121 sovereign debt crises and 113 banking crises. Of these, 36 are twin events - that is, around 30% of either banking or debt crises compound into twin crises. Further distinguishing the twin crises according to the sequence of events, we find that 17 are "twin bank-debt" crises and 19 are "twin debt-bank". Tables 1(a) and (b) in Appendix 1 list the twin episodes. Table 2 offers an overview of all episodes. Single episodes account for the bulk of our crises; there are

[24] While there are situations in which defaults may either take the form of high inflation episodes or be averted through an IMF intervention, we take a tougher view and focus on explicit defaults.

77 single banking crises and 87 single sovereign defaults. All countries in our sample experienced at least one crisis of some kind. About half experienced only one crisis, whereas one third experienced two crises; four countries (Argentina, Bolivia, Venezuela and Nigeria) experienced four crises each. A quarter of our sample countries went through at least one twin event.

Figure 1 in Appendix 1 shows that most of the crises took place during the 1980s and the 1990s. Banking crises were rare in the 1970s, due to heavy financial regulation worldwide and then again in the 2000s, up until 2007. In turn, they were heavily bunched in the 1990s, when almost 60% of the banking crises in our sample took place. Sovereign episodes are slightly more smoothly distributed than banking crises, with a peak in 1980s, when about half of them took place. Crises were more likely to combine into twin events during the 80s and 90s, a feature resurfacing nowadays. About 30% of the sovereign crises and more than half of the banking crises occurring during the 1980s compounded into twin events. In the following decade, 40% of the sovereign defaults, but only 18% of the banking crises, were part of twin events.

Finally, in Table 3 we compute the unconditional probabilities of banking and debt crises, as well as the conditional probability of one type of crisis given the other up to three years before. The unconditional probability of a banking crisis is 2.9%, whereas the unconditional probability of a default is 3.1%. In turn, the conditional probability of a banking crises taking place within three years of a sovereign crisis is 15.7%, whereas the conditional probability of a sovereign crisis given a banking one stands at 15%.

3.2. Variables: definitions and sources

To uncover the balance sheet interrelations between the public and banking sectors of the economy we use balance sheet data of domestic depository institutions and the public sector (the central bank and the general government). As a first step, Table A.4 describes in a simple and stylized way the standard banking sector balance sheet as reported in the IMF's International Financial Statistics.[25] Table A.4 shows how the balance sheet interconnection between the banking system and the Central Bank can be decomposed in two parts. On the asset side of the balance sheet we find:

- Reserves: Including domestic currency holdings and deposits with the Central Bank (line 20); and
- Claims on Monetary Authorities, which comprise Securities and Claims other than reserves (lines 20c and 20n).

On the liability side of the balance sheet:

- Credit provided by monetary authorities to the banking system (line 26g).[26]

This last entry is likely to reflect much of the financial aid that banks get from the Central Bank during turbulent times.

[25]The balance sheet information is not based on SRF. Long time series are unavailable under this new methodology.
[26] This can be observed from the perspective of the Central Bank balance sheet (Claims on Deposit Money Banks, IFS line 12e). For robustness, we measure banks´ liabilities to the Central Bank using their own balance sheet data, but the two measures should be similar. Differences may be due to coverage issues, recording transactions at different times or errors.

In turn, the balance sheet connections between the banking system and the general government are given by the following series. On the asset side of the aggregate banking sector balance sheet:

- Banks' holdings of claims on Central Government (line 22a)
- Banks' holdings of claims on State and Local Governments (line 22b)
- Banks' holdings of claims on non-financial Public Enterprises (line 22c).

On the liability side:

- Central Government Deposits (line 26d).[27]

Banking system's exposure to the government is computed as the sum of all bank claims on the Central, State and Local governments and non-financial public enterprises. In turn, the banking system exposure to the Central Bank is computed as the sum of reserves and claims on Monetary Authorities. Similarly, the exposure of the Central Bank to the banking system is simply reflected by the line 26g, Credit provided by monetary authorities to the banking system, and the exposure of the Government by line 26d, Central Government Deposits. There are two important categories which cannot be recovered from out dataset, recapitalization expenditures and the provision of guarantees.

Unfortunately there is no comprehensive cross-country dataset on banks recapitalization costs, is one of the main public outlays during banking crises. Public recapitalization of troubled banks can come from the Central Bank or the Central Government, and consist of loans or buying of new shares.[28] In Laeven and Valencia's (2008a) sample, bank recapitalization accounts for around half of the fiscal costs. The other half is made up of assets purchases and debt relief programs.

Each of this balance sheet measures can be measured against either indicators of the banks' size or indicators of the country size. When measured against banking sector's assets or liabilities, this indicator provides an idea of the Central Bank involvement in terms of the size of the banking system. When measured in terms of GDP, it provides a measure of the cost for the sovereign.

Given that our aim is to identify those factors that are systematically linked to one or the other type of crises, we also study the behavior around crises of variables describing the macroeconomic context, the financial sector and government finances. Table A.5 lists all variables we use, together with their definitions and sources. Specifically, we are interested in four categories of variables. Primarily, we are interested in balance sheet variables capturing the linkages between the banking sector and the sovereign, as discussed above (see the first panel of table 5).

[27] This comprises working balances and similar funds placed by units of the central government with deposit money banks. Capital owned by the Government is not included here.

[28] A significant amount of this cash is accounted for in some of the balance sheet items we use in the analysis. Notice that, following a recapitalization, the balance sheet of the banking system will record an increase in assets, in the form of higher: (i) deposits at the CB, (ii) holdings of CB securities, (iii) cash or (iv) holdings of central government securities. On the liability side, "loans from the Central Bank/Government" or "shares and other equities" will increase.[28] Unfortunately there is no way to discern what part of the increase in this last line is due to public recapitalization and what reflects private recapitalization.

Secondly, we are interested in following the evolution of the banking sector around crises. Therefore, we add measures of banks' total assets and foreign liabilities, as well as credit to the private sector and deposits. Thirdly, we gather information on public finances and policy stance: budget balances, government revenues and spending, as well as public debt and its composition. Fourthly, we complement our dataset with key macroeconomic variables: real output growth, inflation, and capital flows.

Monetary and financial variables come from the IMF's *International Financial Statistics database (IFS)*. Fiscal variables come mainly from the Economist Intelligence Unit (EIU), which is the most complete cross-country database on government revenues and expense. However, this dataset only starts in 1980. Therefore, for those countries with crises before 1980 or for countries with missing EIU data, we collect data from a variety of alternative sources: the IFS; Mitchell's (2007) series on "International Historical Statistics"; World Economic Outlook; and individual Article IV reports. Data on debt and debt composition come from the World Bank's *World Development Indicators (WDI)*. Finally, our macroeconomic variables come from either *WDI* or *IFS*.

3.3. Methodology

Following the work of Broner et al. (2011) and Gourinchas and Obstfeld (2011) we implement an event analysis methodology, which allows us to perform comparisons both across countries and across time, while controlling for common and country specific characteristics by using adequate controls (country fixed effects and country trends). Specifically, we estimate how the conditional expectation of each variable depends on temporal distance from each of our crises types, given the proximity of other crises.

Consider a variable of interest Z_{it}, where subscripts *i* and *t* refer to the country and the period respectively. Our approach is to estimate its conditional expectation as a function of the temporal distance from various types of crises, relative to a "tranquil times" baseline. Our panel specification looks as follows:

$$Z_{it} = \alpha_i + \sum_{e=\{B,D,BD,DB\}} \sum_{p=-3}^{p=3} \beta_{ep} \cdot D_{ei(t+p)} + \varepsilon_{it}$$

In the equation above, $D_{ei(t+p)}$ denotes a dummy variable equal to 1 when country *i* is *p* periods away from a crisis of type *e* in period *t*. The index *e* denotes, respectively, debt crises (D), systemic banking crises (B), twin debt-bank crises (DB) and twin bank-debt crises (BD). The event window around crisis episodes is set to seven years – three years before and three years after a crisis. The regression allows for country fixed effects, α_i and, in some specifications, for country-specific trends. The error term e_{it} captures all the remaining variation.

Our sample is very heterogeneous. In order to minimize its effect and that of the most extreme observations, we normalize our variables by dividing each series by country-

specific standard deviations. Due to significant data gaps, we excluded from the sample all low-income countries (39, mostly African, countries).

The coefficients β_{ep} measure the conditional effect of a crisis of type e on variable Z over the event window, relative to "tranquil times". Since the "tranquil times" baseline is common to all types of crisis, the coefficients measure the impact of different crises relative to a common reference level, which makes the comparison among coefficients straightforward.

This allows us to plot the estimated coefficients throughout the crisis window and compare the dynamics of variables across different types of crises. Given that we are working with normalized data, a transformation is necessary so as to be able to gauge the economic significance of the regression coefficients. Similar to the approach in Broner et al. (2011) we depict the economic significance of our coefficients, defined as the product of the estimated coefficient and the median standard deviation of the non-standardized version of the dependent variable across countries with the same type of crisis.

A caveat of the event analysis methodology is that, while this can be very useful in terms of uncovering important stylized facts – particularly revealing nonlinear relationships- the results should not be interpreted as having any causal implications.

4. Banking crises and sovereign defaults: exploring the links

In this section we provide a set of stylized facts on the behavior of key economic variables around each of the four types of crisis events we define above. Data permitting, we focus on the variables identified in section 2 as capturing direct and indirect channels through which distress transmits between the banking sector and the sovereign.

In Appendix 2, we plot the estimated coefficients obtained from each regression and contrast the behavior of our variables of interest around the different types of crisis events[29]. First, we look at the dynamics around bank crises, distinguishing between "single" systemic ones and those that degenerate into sovereign debt crises. We then repeat the analysis for our set of debt crises, distinguishing between "single" debt crises and those that compound into twin debt-bank ones.

We are particularly interested in four sets of variables describing: the bank-public balance sheet interconnection; the characteristics of the banking sector; the state of public finances; and the overall economy (including its external sector).

[29] Appendix 3 contains the regression results, as well as a table with a sample of tests used to contrast the levels and behavior of our variables around the different types of crises (the whole set of tests is available upon request).

4.1. Banking crises versus twin bank-debt crises

Balance sheet relations

Figures 2 and 3 in Appendix 2 show the dynamics of credit provided by the central bank to the domestic banking sector, scaled by the GDP and bank assets, respectively. Figure 2 shows that the liquidity support provided by the central bank is larger than "tranquil" levels well ahead of B events, peaks at the time of the crisis, and falls quickly and significantly afterwards, approaching non-crisis levels from t+2 onwards. In contrast, no significant liquidity support is provided ahead of BD crises (in fact, this is the only type of crisis ahead of which the central bank does not offer liquidity support that is significantly larger than in "tranquil" times). Liquidity support then significantly jumps during the first year of the banking crisis, and, unlike in B, remains at levels larger than "tranquil" times for the subsequent years. On average, levels ahead of B are significantly higher than ahead of BD, while the opposite is true after T. The story is similar when looking at support scaled by the size of the banking sector (figure 3).

These different patterns could be due to differences in the size and timing of the initial shock to the banking sector, policy choices by the central bank and government, structural features of the banking sector or, most likely, a combination of all these factors. Indeed, it is difficult to say whether the large amounts of central bank support provided ahead of B, but not ahead of BD, are due to differences in the shocks hitting the banking sector (i.e. high and persistent tensions and a gradual deterioration of the banking sector in B versus a sudden, unexpected, shock, such as an external one, to an otherwise healthy system in BD), the size and complexity of the banking sector, strategies chosen to deal with banking sector tensions (i.e. support given through other channels in BD), or mere mismanagement of banking problems (i.e. authorities not recognizing the extent of banking sector problems early enough in BD). Similarly, our analysis cannot discern what is behind the markedly diverging dynamics in the aftermath of the two banking crises. These could be due to differences in the severity of the banking crisis (i.e. tensions in the banking system recede after B, but remain high after the banking crisis in BD and ahead of the ensuing default), resolution strategies more focused on bank restructuring, instead of continuing to extend official credit to keep the system afloat, or the size of the fiscal space available (i.e. the "late" response from the central bank in BD crises could due to the government running out of resources in its initial attempt to sustain the banking sector and the central bank stepping in as the sovereign goes into default).

Additional insights into the differences between the two types of banking crises could be obtained from the analysis of Laeven and Valencia (2008) in their study on the fiscal costs of banking crises. We map our definition of crises into their dataset and obtain the following static indicators describing the severity of banking crises:

Table 1. Intensity of banking crises. LV (2008) static indicators

Crises types	NPL at peak	Change in number of banks (T to T+3)	Fiscal costs	Recap. costs (Gross)	Recap. costs (Net)
Bank crises	27.59	-18.90	12.99	6.06	4.87
Bank to Debt crises	35.34	-22.00	25.51	14.22	9.33
Total average *	30.02	-23.31	14.21	6.94	5.24

* Source Laeven and Valencia (2008). The total average includes episodes identified as being originated by a Sovereign default.

According to Laeven and Valencia (2008), the difference between B and BD episodes seems to be not that much in the intensity of the banking sector problem, as non-performing loans and bank closures were similar in both types of events. The main difference is in the fiscal costs of solving the crisis. Fiscal costs corresponding to BD crises are almost double those of B crises, including a much higher amount deployed to recapitalize the banks. The difference in fiscal and recapitalization costs could be due either to differences in the available fiscal space, or different strategies for resolving banking crises.

Further insight into the balance sheet interconnection between the banking and public sectors can be obtained from looking at the amounts of claims on government in banks' balance sheets around the two crisis episodes, whose behavior is depicted in figures 4 (scaled by GDP) and 5 (scaled by bank assets). While banks' exposure to the government is actually significantly lower than in "tranquil" times ahead of both events, it does increase significantly during both crises windows. The main difference nevertheless lies in the pattern of these increases. Banks' exposure to the sovereign increases both before and after the banking crisis in BD (particularly accelerating ahead of T), while in B the increase occurs entirely in the aftermath. Thus, what differentiates BD from B is the fast accumulation of claims on government ahead of the banking crisis in the former event.

These patterns could be indicative of the fact that, in B, no significant government bond buying by banks takes place before the crisis, whereas the significant post-crisis accumulation could be the result of either a recapitalization program (and thus the bank resolution strategies switch from providing liquidity support to repairing balance sheets), or, simply, lending decisions by banks, which prefer to retrench from the private sector and instead invest in safer assets. In BD, the fast accumulation both ahead and after the banking crisis could be due to either failed attempts by the government to strengthen the banking sector, or to banks buying bonds because incentivized or forced to sustain the government, or both.

To sum, the interplay between banks' and both central bank's and government's balance sheets reveals that there are systematic differences around the two episodes, which could reflect different pre- and post-crisis strategies to deal with banking sector problems, together with different banking sector characteristics and different initial shocks. Regarding the different strategies used to sustain the banking sector, figures 2 – 5 clearly show the shift in the composition of official support during the two

events. Ahead of B, low pre-crisis amounts of claims on government combine with high liquidity support, while in the aftermath liquidity support drops quickly and claims on government start rising. In BD, the fast and substantial accumulation of government paper ahead of the banking crisis combines with no liquidity support from the central bank, while in the aftermath of the banking crisis, the accumulation of claims on government moderates and central bank support shoots up.

The banking sector

We next study whether there are any systematic differences in the banking sectors characteristics around the two crisis episodes.

We start by looking at size, measured by the ratio of assets to GDP (figure 6). Several features stand out. Firstly, on average, banking sectors around BD episodes are larger than those around B episodes. The difference between the two narrows just ahead of the banking crisis, but widens again in the aftermath, due to the opposite dynamics discussed below.

Secondly, there is a substantial build-up in assets ahead of both episodes, but the increase ahead of B events is significantly steeper than the one ahead of BD crises. Thirdly, in B events, asset downsizing starts the year of the crisis, continues through the following years and is as large as the preceding build-up, such that the banking sector returns to its pre-crisis size rather quickly. In contrast, in BD events, not only does asset downsizing start two years after the banking crisis, but also the process is more gradual than in B. Even at (t+3), and as the sovereign defaults, the size of the BD banking sector is larger than both pre-crisis levels and “tranquil” times – BD is in fact the only type of crisis in which assets do not return to pre-crisis levels, but instead remain significantly above “tranquil” levels. This could indicate that the policy response to the unfolding crisis is to try to keep the banking sector afloat, postponing deleveraging until the crisis has already engulfed the public sector as well.

Figure 7 shows the evolution of credit extended to the private sector, as a share of GDP, which confirms that banking sectors in BD events are, on average, deeper than those around B crises – indeed, up to (t+1), credit-to-GDP is also larger than in “tranquil” times in BD. While credit expands ahead of both events, the increase is more pronounced ahead of B crises. In turn, the post-crisis fall in credit is similar in both crises.

The evolution of bank deposits to GDP is depicted in figure 8. In both events, a significant pre-crisis expansion is followed by a deposit run. Nevertheless, the increase is faster ahead of B, and the run in the aftermath is larger and occurs earlier in B than in BD. While in B, the run leads to post-crisis levels of deposit-to-GDP well below “tranquil” times, in BD, levels are larger than “tranquil” times both ahead and after the banking crisis.

Overall, our results show that the banking systems around BD events are significantly larger and deeper than the banking systems around B crises, which suggests that the former potentially need larger government support, while the government has more incentives to intervene and keep them afloat (as in Gennaioli et al, 2010). Larger and

deeper banking sector may also have a more damaging effect on the economy (and thus on the sovereign). This may thus be one explanation of the different official approaches to banking crises discussed above, which may have different consequences for the sovereign's financial strength.

Public finances

Figures 9–11 depict the behavior of budget balances, together with those of budget expense and revenues. Budget balance positions are similar ahead of the two events and both worsening throughout the crisis window, such that post-crisis levels are significantly lower than in "tranquil" times. In B, the worsening is gradual and most of it occurs pre-crisis, driven mainly by worsening budget revenues, as public spending stays flat. In BD, while pre-crisis dynamics are similar to B, there is a sharp deterioration in the immediate aftermath of the banking crisis, due to a large increase in public spending during (t+1).

The dynamics of public debt, depicted in figure 12, are even more diverging. The sharp increase in BD from (t-1) onwards stands out. This happens against initial levels that are actually lower than in "tranquil" times, and debt accumulates mainly as the banking crisis gets underway, such that, going into the sovereign crisis, public debt is much larger than in "tranquil" times. In contrast, government debt remains flat throughout the crisis window in B crises.

Thus, the banking crises in the two events occur against similar pre-crisis budget positions and dynamics, while public debt is actually lower ahead of BD than ahead of B crises. Once banking crises are underway however, diverging patterns of public finances emerge. While the worsening in budget balance moderates in B, there is a sharp increase in budget deficit in BD, on the account of shoot up in public spending after the banking crisis. The difference is even more apparent in terms of public debt, where flat dynamics ahead and after B contrast with the large accumulation in BD, which starts during the year of the banking crisis and continues unabated up to the sovereign default. This suggests that banking crises put more strains on government finances in BD crises, whereas any support for the banking sector that is offered in B crises is not significantly reflected in either government debt or deficit.

Domestic economy and the external sector

As detailed in the discussion of section 2, banking crises could potentially affect the sovereign indirectly, through the effect they have on the economy and investors' sentiment.

Figure 13 depicts the evolution of the real growth rate around the two events. Real growth is significantly below "tranquil" levels ahead of B and worsens immediately after the crisis. Nevertheless, the recovery is rather swift, as growth significantly exceeds pre-crisis rates already by (t+2). In contrast, growth collapses at time T and remains significantly lower than "tranquil" times in the aftermath of the BD banking crisis. This suggests that the banking crises that are part of BD events are more disruptive for the economy than the single banking crises. This growth pattern is

accompanied by a large jump in inflation in the aftermath of the banking crises in BD (see Figure 14). This might reflect the authorities' attempts to monetize the debt, or simply a run on the local currency, as the confidence in the sovereign is lost. In fact, inflation rates remain significantly above "tranquil" levels in the aftermath of the BD banking crises. In contrast, while inflation is slightly higher than in "tranquil" times ahead of B, it gradually moderates throughout the crisis window, reaching levels that are similar to "tranquil" ones immediately after the crisis.

One widely documented source of instability for the emerging economies relates to the behavior of international portfolio capital flows, which could be disrupted by banking crises, with consequences for the sovereign. Figure 15 shows that there is a gradual and similar increase in portfolio capital inflows ahead of both events, which leads to levels that are above "tranquil" times ahead of both crises. While there is a soft landing in the aftermath of B, there is a sudden stop in BD – capital inflows drop sharply at T and remain depressed in the aftermath of the BD banking crises.

Figure 16 looks at the share of short-term debt in total foreign debt. While Reinhart and Rogoff (2008) point out that short-term debt tends to increase dramatically ahead of crises, we see that this is the case with BD crises only. While there is a significant shift towards short-term debt ahead of both events, the pace and magnitudes are markedly different. In B, the shift towards shorter maturities is small and gradual, and is followed by an equally gradual reversal to pre-crisis levels. In contrast, there is a large accumulation of short-term debt ahead of BD, reaching levels significantly above "tranquil" ones in the run-up to the banking crisis, reflecting foreign creditors' higher unwillingness to lend in BD relative to B. The behavior of both portfolio capital flows and short-term foreign debt seem to suggest that BD banking crises result in larger losses of credibility among foreign investors than B crises – and this loss in credibility affects the sovereign as well.

Overall, we find that that the macroeconomic environment ahead of B crises is characterized by low growth and high inflation, but that, nevertheless, the economy rebounds already by the second year after the banking crisis. In contrast, growth collapses and inflation shoots up following the BD banking crises. Growth rates then remain depressed, and inflation rates high, ahead of the sovereign default. This shows that BD banking crises are more damaging to the economy. These crises are also associated with a larger loss in foreign investors' confidence, as reflected in the portfolio inflows and short term foreign debt dynamics.

4.2. Sovereign debt crises versus twin debt-bank crises

Balance sheet relations

Figures 17 and 18 show that there is a sharp contrast between D and DB crises in terms of support provided by the central bank to the domestic banking system. While pre-crisis levels are of similar magnitude and both significantly above "tranquil" levels, what differentiates D and DB events are the dynamics of this indicator. Liquidity support is flat throughout D events, whereas it increases dramatically in DB, especially

accelerating during (t-1) to (t+1). In the aftermath of DB defaults, liquidity support remains persistently well above pre-crisis levels (and "tranquil" levels).

The fact that the amount of central bank support provided before and after the two defaults is significantly larger than in non-crisis times is an indication that banking sector tensions accompany both defaults, including single events. Presumably, difficulties to obtain financing in wholesale markets (due to increased uncertainty and a loss of investor confidence) and a deteriorating environment put strains on banking sectors around both events. Nevertheless, the significant differences in the dynamics and post-crisis levels suggests that defaults that are part of DB events cause more damage to banks' balance sheets - either directly, because of higher balance sheet interconnections, or via the impact on the economy and investor sentiment.

More insight into the potentially dangerous balance sheet interconnections between the banking sector and the sovereign could be obtained from examining the evolution of claims on government as a share of GDP and assets (figures 19 and 20). Unfortunately, while the estimated coefficients plotted in these figures show substantial differences between D and DB, few of these differences are statistically significant, as standard errors are very large. The most striking difference between the two events is that levels around DB episodes are much larger than either in D or "tranquil" times, suggesting that DB crises take place against banking sectors that are significantly more exposed to the government. The two figures show that, while banks significantly increase their exposure to the sovereign in the run-up to both defaults, the increase is more accelerated ahead of DB. Post-default, there is a gradual, but significant, decline in exposure in both events.

Our results thus suggest that there are large and systematic differences in the liquidity support provided by the central bank and the exposure to the sovereign around the two episodes. The fact that liquidity support is significantly larger than "tranquil" levels around both episodes points to the existence of banking sector tensions around the two defaults, whereas the fact that support increases sharply in DB suggests that this default is more damaging to the banking sector. Moreover, DB crises occur against significantly larger banking sector exposures to the sovereign. The sharper deterioration of the banking sector after BD defaults could be due to either the default being larger and messier or to the banking sector being more vulnerable than in D in the first place.

The banking sector

Unfortunately, the estimates of banking sector indicators are imprecise and plagued by high standard errors. Figure 21 shows that, while bank assets expand ahead of both events, the expansion is more accelerated ahead of DB. In the aftermath, assets decrease significantly in both events, but sharper in DB. The initial size of the banking sector is higher in D than in DB, but, due to the subsequent faster increase in DB, levels are similar entering the crisis and post-default.

Turning to the evolution of credit to the private sector (figure 22), the roughly flat dynamics ahead of D contrast with the significant credit boom ahead of DB. Post default, credit contracts in both episodes, although the crunch is larger and more sustained in DB than in D. On average, the credit-to-GDP ratio is significantly larger around D episodes than around DB ones.

In terms of deposits/GDP (figure 23), there is a significant increase ahead of DB, followed by a fast and substantial deposit run, indicating that banking sectors in these events are confronted with a larger loss in confidence. This contrasts with the flat dynamics around D crises - in particular, D is the only type of crisis that appears to not lead to a deposit run.

Thus, overall, the average banking sector around DB events appears to be smaller than the one ahead of D events, suggesting that the larger amounts of liquidity support provided by the central bank after defaults in DB may be due to the more damaging impact of the default on the banking sector in these crises, rather than to the size of the banking sector. The fact that DB defaults are also followed by large deposit runs confirms the more disruptive impact of the sovereign on the banking sector. In contrast, the impact of D defaults on the banking sector is muted.

Public finances

Figures 24-26 depict the behavior of budget balances, together with the corresponding revenues and expense. Budget deficits are larger ahead of D than ahead of DB (indeed, they are larger than in "tranquil" times). In both events, corrections of fiscal deficits start the year of the default, but the tightening is significantly more pronounced after the DB defaults than after D ones. Underlying these dynamics is the markedly different behavior of budget expense (while levels and dynamics are rather similar on the revenue side). Public spending is flat and significantly larger than in "tranquil" times ahead of both defaults. However dynamics start to diverge significantly starting with the default: in D, public spending decreases gradually, such that, after two years, expense is lower than pre-crisis levels and similar to "tranquil" ones. In contrast, the default in DB is accompanied by a drop in public spending, which is especially sharp during (t+1), and, post-crisis, public spending remains lower than in "tranquil" times for the subsequent years. Thus, in the aftermath of the default, public expense is cut more drastically in DB than in D – in fact, during the years following the default, public spending is significantly larger in D than in DB. This may be an indication of the lack of fiscal space in the aftermath of DB defaults, or of the adoption of a more austere stabilization package, both of which may negatively affect the banking sector in the short run.

Figure 27 shows that there is a significant and sustained increase in government debt ahead of both crises and up to (t+1), when levels in both events become larger than in "tranquil" times. Moreover, debt remains higher than pre-crisis levels (and than "tranquil" ones) in the aftermath of both defaults. While initial levels are similar, the ratio becomes larger in the immediate aftermath of DB default. Starting with (t+1) though, the reduction in debt is significantly faster in DB than in D, which could be

another potential signal of a tighter austerity package implemented in the aftermath of DB defaults.

Domestic economy and the external sector

Figures 28 and 29 trace the dynamics of real growth and inflation rates around the two episodes. Growth falls rapidly ahead of D crises and recovers equally rapidly in the aftermath, while inflation stays mostly flat throughout the crisis window. In contrast, DB defaults have a larger negative immediate impact on growth, while the recovery is slower. These growth dynamics are accompanied by inflation rates that are slowly moderating, going from levels that are significantly above "tranquil" times at (t-3) to levels that are significantly below at (t+3) – a further indication of a tight austerity package implemented in the aftermath of default in DB.

As shown in Figure 30, there is a gradual but constant decrease in portfolio capital inflows around D crises, from levels significantly above "tranquil" times down to levels similar to non-crisis ones, suggesting that investors start retrenching already several years before the default. In contrast, in DB capital keeps flowing in up until (t-1), and the default is accompanied by a sharp drop in portfolio flows (followed by a later rebound to pre-crisis levels). What is more striking in DB is that the levels of capital flows are significantly below "tranquil" times both before and after the default. Thus, there is limited foreign capital flowing into the economy around these events, and capital flows are more volatile than around D. Turning to short-term external debt dynamics, Figure 31 shows that flat and similar levels ahead of the two defaults are followed by completely diverging dynamics in the aftermath. In particular, the composition of foreign borrowing dramatically changes towards short-term maturities in the wake of DB defaults and ahead of the ensuing banking crisis. The opposite takes place in the aftermath of D, where the share of short-term external debt decreases significantly after the default, to levels well below "tranquil" values. Together with the dynamics of portfolio flows, these dynamics point to a larger loss in credibility suffered by the sovereign in DB, which negatively impact the banking sector and the economy.

5. Conclusions

In light of the current turmoil in a number of advanced countries, understanding the channels through which financial distress transmits from public balances to financial institutions and vice versa is of utmost importance. In this paper we have analyzed past episodes of banking and sovereign distress in emerging economies, with a focus on the systematic differences between single episodes and those in which banking and sovereign debt crises combine. Although our results so far are preliminary, a few stylized fact show up with remarkable strength. We find that there are systematic differences between single crises and twin events, across several dimensions.

Banking systems are significantly larger and deeper around banking crises that bring down the sovereign, than around "single" banking crises. This suggests that the former

events are more likely to require larger government support and cause more damage to the economy (and thus to the sovereign), as well as that the government has more incentives to intervene and prop up the banking sector. It is interesting that banks in single episodes start sizing down already a year ahead of the crisis and continue to do so as the crisis unfolds. In contrast, in twin episodes, not only does asset downsizing start in the third year the banking crisis, but also the process is more gradual. This could indicate that the policy response to the unfolding crisis is to try to keep the banking sector afloat, postponing deleveraging until the crisis has already engulfed the public sector as well.

Ahead of "single" banking crises, low amounts of government claims in banks' balance sheets combine with high liquidity support supplied by the central bank, while in the aftermath, liquidity support falls quickly and claims on government start rising. In twin bank-debt crises, the fast and substantial accumulation of claims on government ahead of the banking crisis combines with no liquidity support from the central bank, while in the aftermath, the accumulation of claims on government moderates and central bank support shoots up.

While the two events occur against similar initial debt and budget positions, diverging patterns of public finances emerge once banking crises are underway. Indeed, banking crises that are part of twin bank-debt events are associated with a sharper increase in budget deficit, on the account of shoot-up in public spending. In terms of public debt, the flat dynamics ahead and after single banking crises contrast with the large accumulation in twin bank-debt crises, which starts during the year of the banking crisis and continues unabated up to the sovereign default – another indication that these banking crises put more strains on government finances.

Finally, while the macroeconomic environment ahead of "single" banking events is characterized by low growth and high inflation, the economy rebounds already by the second year of the crisis. In contrast, growth collapses and inflation shoots up following those banking crises that are part of twin events. Growth rates then remain depressed, and inflation rates remain high, as the sovereign heads into default. Banking crises that end up in defaults are also associated with a larger loss in foreign investors' confidence, reflected in a sudden stop in portfolio inflows and a sharp change in the composition of foreign debt toward short-term liabilities. Such loss of credibility most likely transfers to the sovereign.

Regarding the differences between "single" debt and twin debt-bank crises, we find that the average banking sector ahead of twin episodes is more exposed to the government, and that the pace of increase in claims on government in the run-up to the default is faster. The amount of liquidity support provided by the central bank around the two defaults is significantly larger than in non-crisis times, suggesting that banking sector tensions accompany both defaults, including "single" events. Nevertheless, the liquidity support provided by the central bank is flat throughout "single" events, whereas it increases dramatically during twin ones, suggesting that defaults that are part of twin events cause more damage to banks' balance sheets.

Banking sector in twin events are, on average, smaller than those in “single” default events.

While the state of public finances is roughly similar ahead of the two events, expenditure is cut more drastically and public debt drops faster in the aftermath of twin defaults, which may indicate a lack of fiscal space, or the adoption of a more austere stabilization package, both of which may negatively affect the banking sector and the economy in the short run.

The defaults associated with twin events have a larger immediate negative impact on growth, while the recovery in the aftermath is slower. These growth dynamics are accompanied by inflation rates that fall more markedly during twin events than during single ones – a further indication of a tight austerity package implemented in the aftermath of twin defaults. Finally, twin defaults are accompanied by a sharp drop in portfolio capital flows and a shift in the composition of foreign borrowing towards shorter maturities, reflecting a large loss of credibility suffered by the sovereign.

We believe this event study is useful in terms of uncovering important stylized facts, particularly in revealing nonlinear relationships. Moreover, by distinguishing between single and twin events, we find that a number of empirical facts usually associated with either “bank” or “debt” crises in general are to be found in twin events only, and not in single crisis episodes. Still, the results should not be interpreted as having any causal implications. To take up the issue of causality more seriously, a structural model is needed, which is the next step on our research agenda.

REFERENCES

Acharya, V., Dreschlet, I. and Schnabl, P. (2013), "A Pyrrhic Victory: Bank Bailouts and Sovereign Credit Risk", *mimeo*.

Alessandri, P. and Haldane, A. (2009), "Banking on the State", Bank of England, *mimeo*.

Alter, Adrian and Beyer, A. (2013), "The Dynamics of Spillover Effects during the European Sovereign Debt Turmoil", *mimeo*.

Arellano, C. and Kocherlakota, N.R. (2008), "Internal Debt Crises and Sovereign Defaults", *NBER Working Papers 13794*.

Baldacci, E. and Gupta, S. (2009), "Fiscal Expansions: What Works", *Finance & Development, IMF, December 2009, Volume 46, Number 4*.

Baldacci, E., Mulas-Granados, C. and Gupta, S. (2009), "How Effective is Fiscal Policy Response in Systemic Banking Crises?", *IMF Working Papers 09/160.*

Baldacci, E. and Mulas-Granadas, C. (2010), "Regaining debt sustainability after banking crises", *mimeo.*

Broner, F., Didier, T., Erce A. and Schmukler, S. (2013), "Gross Capital Flows: Dynamics and Crises", *Journal of Monetary Economics, Volume 60, Issue 1.*

Broner, F., Erce, A., Martin, A., and Ventura, J. (2014), "Sovereign Debt Markets in Turbulent Times: Creditor Discrimination and Crowding Out", *Journal of Monetary Economics, Volume 61.*

Broto, C. and Perez Quiros, G. (2013), "Disentangling contagion among Sovereign CDS spreads during the European debt crisis", *Bank of Spain, Working Paper Series No. 1314.*

Brutti, F. (2008), "Legal enforcement, public supply of liquidity and sovereign risk", *MPRA Paper no. 13949.*

Candelon, B. and Palm, F.C. (2010), "Banking and Debt Crises in Europe. The Dangerous Liaisons?", *CESifo Working Paper No. 3001.*

Caprio, G. Jr. and Honohan, P. (2008), "Banking Crises", *Institute for International Integration Studies Discussion Paper Series no. 242.*

Cavallo, E. and Izquierdo, A. (2009), "Dealing with an International Credit Crunch: Policy Responses to Sudden Stops in Latin America", Inter-American Development Bank, *mimeo.*

Carey, D. (2009), "Iceland: The Financial and Economic Crisis", *OECD Economics Department Working Papers, No. 725, OECD Publishing.*

Das, U., Papaioannou, M., and Trebesch, C. (2009), "Sovereign Default Risk and Private Sector Access to Capital in Emerging Markets", In: Primo Braga, Carlos A.

/Dömeland, Dörte (Eds): *"Debt Relief and Beyond: Lessons Learned and Challenges Ahead"*. World Bank Publishers, 2009

De Paoli, B., Hoggarth, G. and Saporta, V. (2009), "Output costs of sovereign crises: some empirical estimates", *Bank of England, Working Papers no. 362*.

Diaz-Cassou, J., Erce, A. and Vazquez, J. (2008a), "Recent episode of sovereign debt restructuring: A case-study approach", *Bank of Spain, Occasional Document 0804*.

Diebold, F., and Yilmaz, K. (2009), "Measuring financial asset return and volatility spill overs, with an application to global equity markets", *Economic Journal, Issue 119.*

Dreschler, I., Drechsel, T., Marques-Ibanez, D., and Schnabl, P. (2013), "Who Borrows from the Lender of Last Resort?", *Mimeo.*

Erce, A. (2013), "Sovereign Debt Restructurings and the IMF: Implications for Future Official Interventions", *Globalization and Monetary Policy Institute, Working Paper No. 143.*

Erce A. (2012), "Selective Sovereign Defaults", *Globalization and Monetary Policy Institute, Working Paper No. 127.*

European Commission (2009), "Public Finance Report in EMU-2009", *European Economy No. 5/2009.*

Feenstra, R.C and Taylor, A.M. (2008), "International Economics", *Worth Publishers*.

Gennaioli, N., Martin, A. and Rossi, S. (2010), "Institutions, Public Debt and Foreign Finance", AFA 2010 Atlanta Meetings paper, *mimeo.*

Goldstein, M. (2003), "Debt Sustainability, Brazil and the IMF", *Peterson Institute Working Paper Series WP03-1*.

Gray, D., Gross, M., Paredes, J., and Sydow, M. (2013), "Modelling Banking, Sovereign and Macro Risk in a CCA Global VAR", *IMF Working Paper 13/218.*

Heinz, F. and Sun, Y. (2014), "Sovereign CDS Spreads in Europe: The Role of Global Risk Aversion, Economic Fundamentals, Liquidity, and Spillovers", *IMF Working Paper 14/17.*

Honohan, P. (2008), "Risk Management and the Costs of the Banking Crisis", *The Institute for International Integration Studies Discussion Paper Series no. 262.*

IMF (2002), "Sovereign Debt Restructurings and the Domestic Economy Experience in Four Recent Cases", *Policy Development and Review Department*.

Kollmann, R., Roeger, W., and Veld, J. in't (2012), "Fiscal Policy in a Financial Crisis: Standard Policy vs. Bank Rescue Measures", *ECARES Working Paper 2012-006*.

Laeven, L., and Valencia, F. (2008a), "Systemic Banking Crises: A New Database", IMF.

Laeven, L. and Valencia, F. (2008b), "The Use of Blanket Guarantees in Banking Crises", *IMF Working Papers 08/250*.

Laeven, L. and Valencia, F. (2011), "The Real Effects of Financial Sector Interventions During Crises", *IMF Working Paper 11/45.*

Livshits, I. and Schoors, K. (2009), "Sovereign Default and Banking", *mimeo*.

Meissner, C.M. and Bordo, M.D. (2006), "Financial Crises, 1880-1913: The Role of Foreign Currency Debt", *WEF Working Paper no. 0002*.

Mitchell and Brian R., (2007), "*International Historical Statistics: 1750 – 2005*", series (London: Palgrave MacMillan,).

Mody, A., and Sandri, D. (2011), "The Eurozone Crisis: How Banks Came to be Joined at the Hip", *IMF Working Paper 11/269*.

Moody's (2014), "European Sovereign Debt and Banking Crises: Contagion, Spillovers and Causality", *Moody's Investors Service, Credit policy*.

Noyer, C. (2010), "Sovereign crisis, risk contagion and the response of the central bank", *mimeo.*

Obstfeld, M. and Gourinchas, P.O. (2011), "Stories of the Twentieth Century for the Twenty-First", *American Economic Journal: Macroeconomics*, forthcoming.

Panizza, U and Borensztein, E. (2008), "The Costs of Sovereign Default", *IMF Working Paper 08/238.*

Popov, A., and Van Horen, N. (2013), "The impact of sovereign debt exposure on bank lending: Evidence from the European debt crisis", *DNB Working Paper No. 382*.

Reinhart, C.M. and Rogoff, K.S. (2008a), "Banking Crises: An Equal Opportunity Menace", *NBER Working Papers 14587*.

Reinhart, C.M and Rogoff, K.S. (2008b), "The Forgotten History of Domestic Debt", *NBER Working Papers 13946*.

Reinhart, C.M and Rogoff, K.S. (2008c), "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises", *NBER Working Papers 13882*.

Reinhart, C.M. (2009), "The economic and fiscal consequences of financial crises", *MPRA Paper 13025.*

Reinhart, C.M. and Reinhart, V. (2009), "Fiscal stimulus for debt intolerant countries?", *MPRA Paper 16937.*

Reinhart, C.M. and Rogoff, K. S. (2009), "The Aftermath of Financial Crises", *NBER Working Paper 14656.*

Reinhart, C.M. and Rogoff, K.S. (2011), "From Financial Crash to Debt Crisis", American Economic Review, *forthcoming*.

Rosas, G. (2006), “Bagehot or Bailout? An Analysis of Government Responses to Banking Crises”, *American Journal of Political Science* Vol. 50 No.1, pages 175-191.

Van Rixtel, A., and Gasperini, G. (2013), “Financial Crises and bank funding: recent experience in the euro area”, *BIS Working Papers No. 406.*

APPENDIX 1: DATA DESCRIPTION

Table 2. Twin crises: Bank to Debt			
Country	**Bank crisis**	**Debt crisis**	**Source**
Algeria	1990	1991	S&P and L&V
Argentina	1980	1982	S&P and L&V
Chile	1981	1983	S&P and L&V
Dominican Republic	2003	2005	S&P and L&V
Ecuador	1982	1982	S&P and L&V
Ecuador	1998	1999	S&P and L&V
Guinea	1985	1986	S&P and L&V
Indonesia	1997	1998	S&P and L&V
Kenya*	1992	1994	S&P and L&V
Mexico	1981	1982	S&P and L&V
Morocco	1980	1983	S&P and L&V
Philippines	1983	1983	S&P and L&V
Nigeria	1991	1992	S&P and L&V
Senegal	1988	1990	S&P and L&V
Uruguay	1981	1983	S&P and L&V
Uruguay	2002	2003	S&P and L&V
Venezuela, R.B.	1994	1995	S&P and L&V

Source: Laeven and Valencia (2008), S&P (2009)

*Low income country (according to World Bank)

Table 3. Twin crises: Debt to Bank			
Country	**Debt crisis**	**Bank crisis**	**Source**
Albania	1991	1994	S&P and L&V
Argentina	1989	1989	S&P and L&V
Argentina	2001	2001	S&P and L&V
Bolivia	1986	1986	S&P and L&V
Brazil	1990	1990	S&P and L&V
Costa Rica	1981	1987	S&P and L&V
Cameroon	1985	1987	S&P and L&V
Ghana	1979	1982	S&P and L&V
Guinea*	1991	1993	S&P and L&V
Jordan	1989	1989	S&P and L&V
Macedonia	1992	1993	S&P and L&V
Niger*	1983	1983	S&P and L&V
Panama	1987	1988	S&P and L&V
Peru	1976	1983	S&P and L&V
Tanzania*	1984	1987	S&P and L&V
Turkey	1982	1982	S&P and L&V
Togo*	1988	1993	S&P and L&V
Russian Federation	1998	1998	S&P and L&V
Ukraine	1998	1998	S&P and L&V

Source: Laeven and Valencia (2008), S&P(2009)

* Low income country (according to World Bank)

Table 4. Summary Statistics: Crisis Indicators					
	1970s	**1980s**	**1990s**	**2000s**	**Total**
Single banking crises	3	17	55	2	77
Single debt crises	11	43	17	14	85
Twin crises	2	19	12	3	36
Twin bank-debt	0	9	6	2	17
Twin debt-bank	2	10	6	1	19
TOTAL	**16**	**79**	**84**	**19**	**198**
Total: banking crises	5	36	67	5	113
Total: debt crises	13	62	29	17	121

Figure 1. Crises 1975-2007, by type (number)

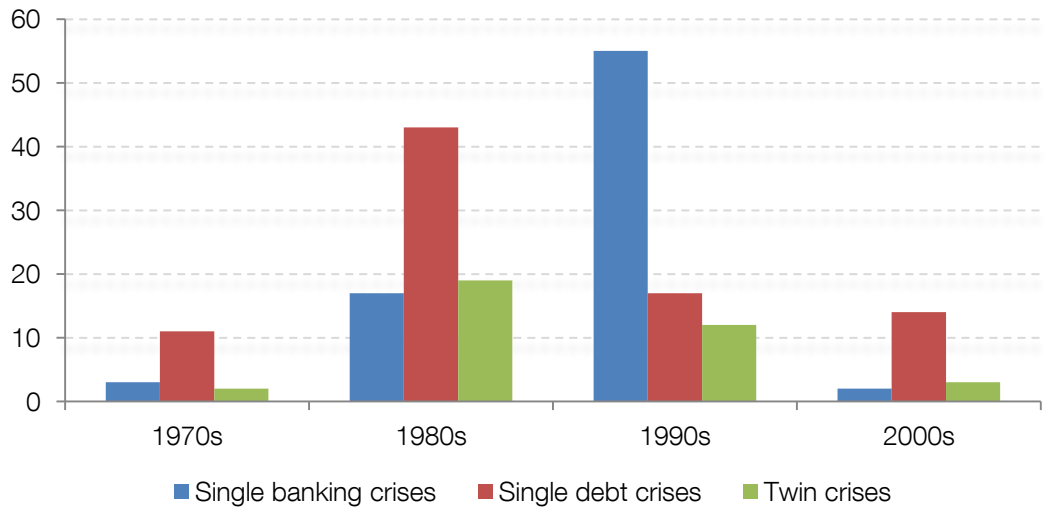

Table 5. Unconditional and Conditional Probabilities	
P(bank)	2.93
P(debt)	3.13
P(bank/debt in t-3 - t)	15.70
P(debt/bank in t-3 to t)	15.04

Table 6. The aggregate balance sheet of the banking sector	
DEPOSIT MONEY BANKS (as in former IFS monetary statistics classification)	
ASSETS	**LIABILITIES**
Reserves (line 20) Claims on Monetary Authorities Securities (line 20c) Other claims on Monetary Authorities (line 20n) Foreign assets (line 21) Claims on other resident sectors (line 22) Central Government (line 22a) Deposit Money Banks (line22e) State and Local Government (line 22b) Nonfinancial Public Enterprises (line 22c) Private Sector (line 22d) Other Banking Institutions (line 22f) Nonbank Financial Institutions (line 22g)	Demand Deposits (line 24) Time, Saving and For. Cur. Deposits (line 25) Money Market Instruments (line 26aa) Bonds (line 26ab) Restricted Deposits (line 26b) Foreign Liabilities (line 26c) Central Government Deposits (line 26d) Credit from Monetary Authorities (line 26g) Liabilities to Other Banking Institutions (line 26i) Liabilities to Nonbank Fin. Instit. (line 26j) Capital Accounts (line 27a)

Table 7. Variables: definitions and sources		
Variable	**Definition**	**Source**
"Exposure" variables		
Banking sector's claims on the central bank	Reserves (line 20) + securities (line 20c) + other claims on monetary authorities (20n)	International Financial Statistics
Banking sector's claims on government	Claims on central government (line 22a) + Claims on local government (line 22b) + Claims on non-financial public enterprises (line 22c)	International Financial Statistics
Banking sector's liabilities to the central bank	Credit from Monetary Authorities (line 26g)	International Financial Statistics
Banking sector's liabilities to government	Central Government Deposits (line 26d)	International Financial Statistics
Financial sector variables		
Credit to the private sector	Claims to the private sector (line 22d)	International Financial Statistics
Banking sector's total assets	Sum of all items on the asset side (line 20+line 20c +line 20n+line 21+line 22)	International Financial Statistics
Banking sector's deposits	Demand Deposits (line 24) + Time, Savings and For. Cur. Deposits (line 25) + Restricted Deposits (line 26b)	International Financial Statistics
Banking sector's foreign liabilities	Foreign liabilities (line 26c)	
Fiscal variables		
Government balance	Government revenues – government expense	EIU; IFS; WEO; Mitchell (2007); Art.IV reports.
Government revenues	General government total revenues	EIU; IFS; WEO; Mitchell (2007); Art.IV reports.
Government expense	General government total expense	EIU; IFS; WEO; Mitchell (2007); Art.IV reports.
Government debt	General government debt	World Development Indicators
Short-term debt/Total external debt	Ratio of short-term external debt over total external debt	World Development Indicators
Macroeconomic variables		
Real GDP growth	Annual change of real GDP	World Development Indicators
Inflation	Annual change of the Consumer Price Index	World Development Indicators
Portfolio capital flows	Sum of "portfolio investment liabilities" and "other investment liabilities"	International Financial Statistics
Lending interest rate	Interest rate charged by banks on loans to prime customers.	International Financial Statistics

APPENDIX 2: BANK vs BANK TO DEBT

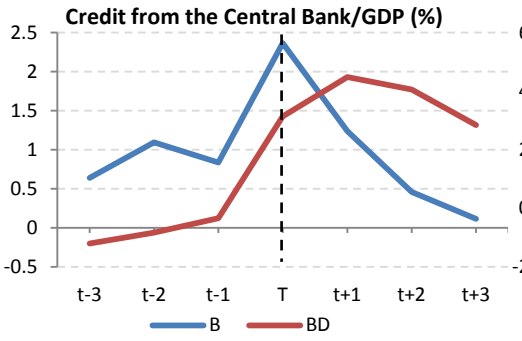

Figure 2. Liquidity support (% of GDP)

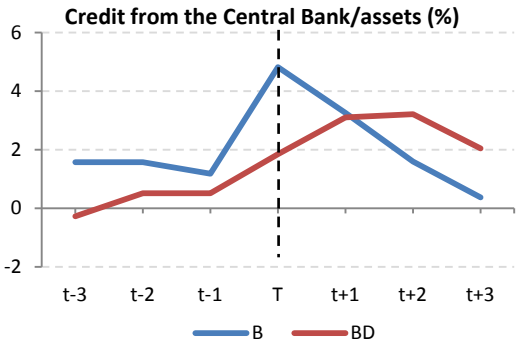

Figure 3. Liquidity support (% of assets)

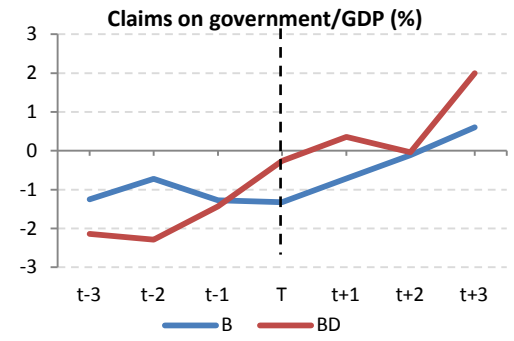

Figure 4. Claims on government (% of GDP)

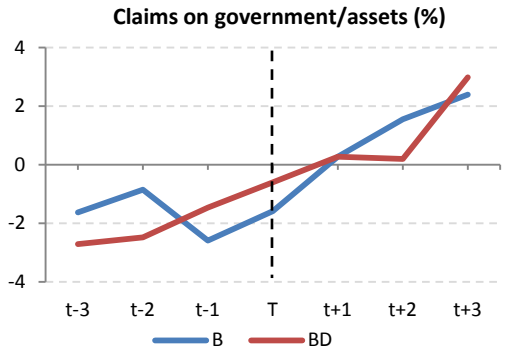

Figure 5. Claims on government (% total assets)

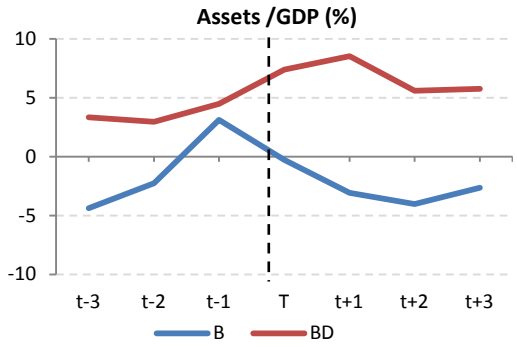

Figure 6. Banking sector assets (%GDP)

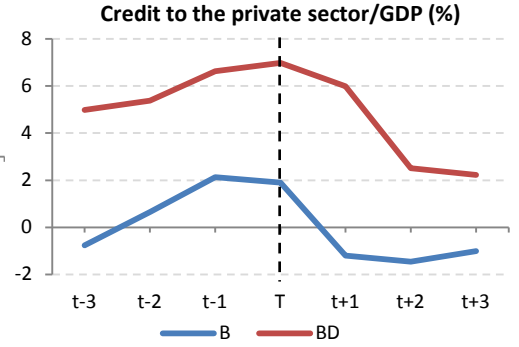

Figure 7. Credit to private sector (% GDP)

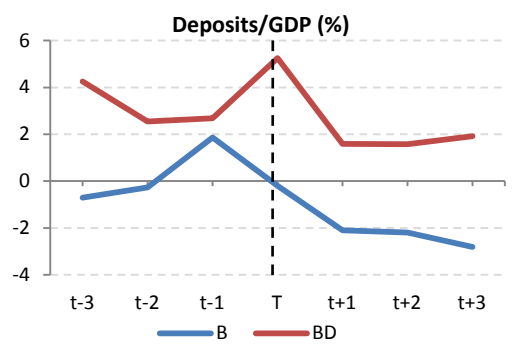

Figure 8. Banking sector deposits (% of GDP)

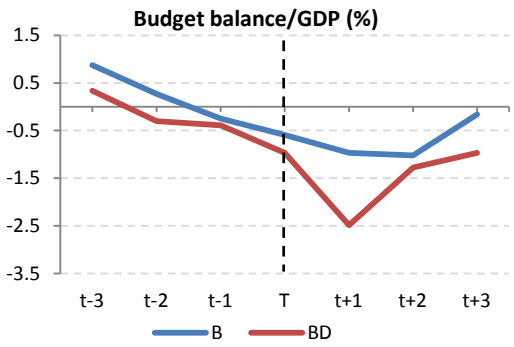

Figure 9. Budget balance (% GDP)

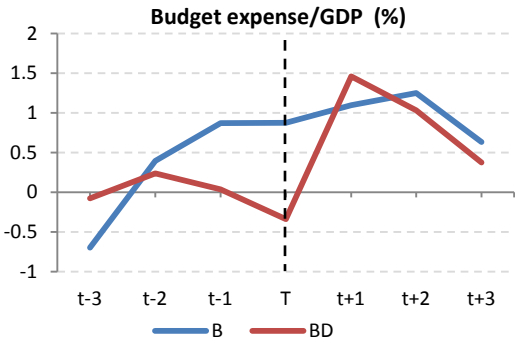

Figure 10. Budget expenditures (% GDP)

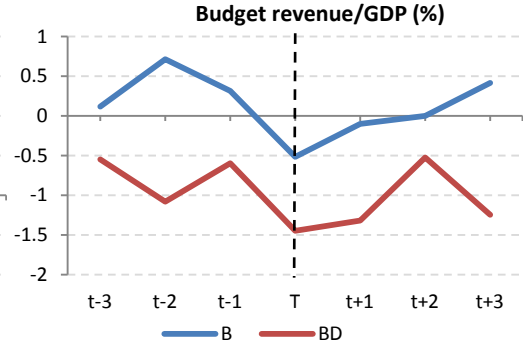

Figure 11. Budget revenues (% GDP)

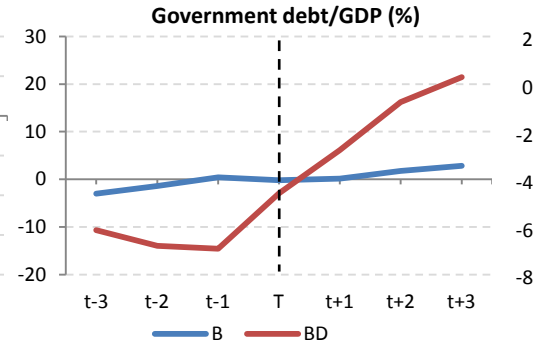

Figure 12. Public debt (% GDP)

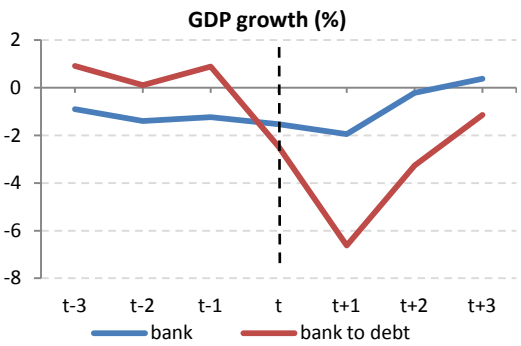

Figure 13. Real growth

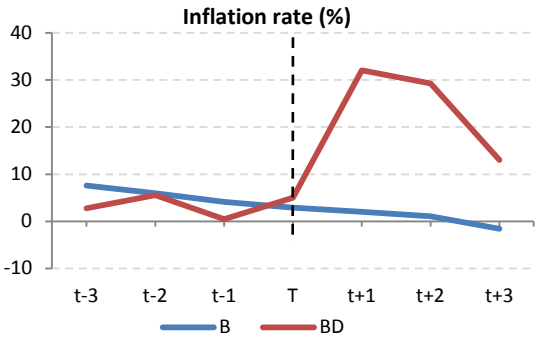

Figure 14. Inflation dynamics

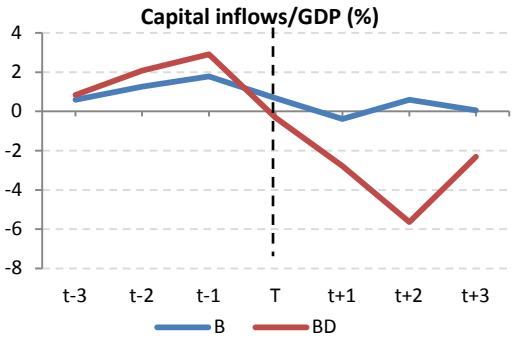

Figure 15. Portfolio capital inflows (% GDP)

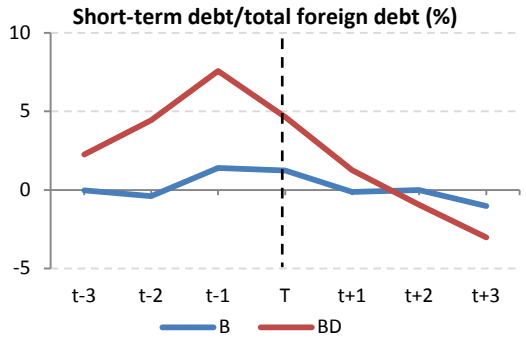

Figure 16. Short-term debt in total foreign debt

DEBT vs DEBT TO BANK

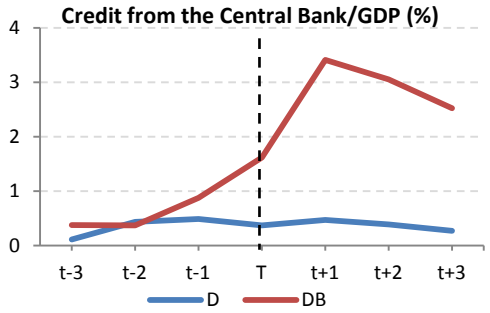

Figure 17. Liquidity support (% of GDP)

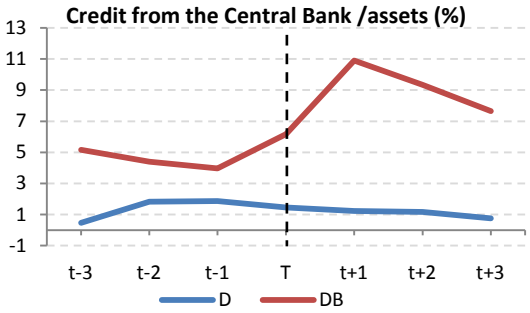

Figure 18. Liquidity support (% of assets)

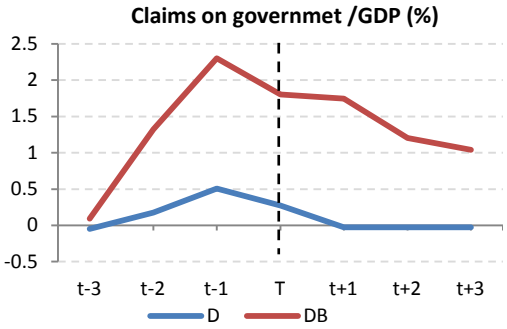

Figure 19. Claims on government (% of GDP)

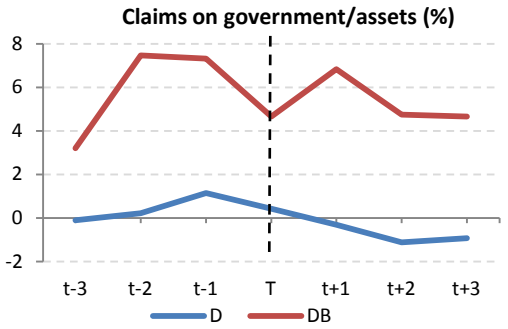

Figure 20. Claims on government (% total assets)

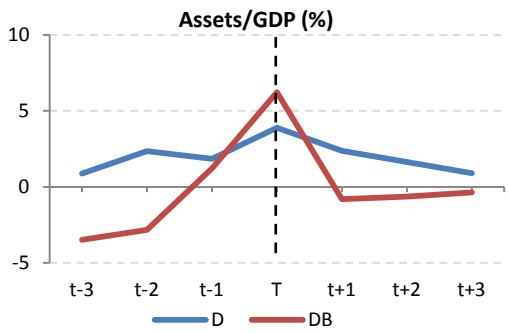

Figure 21. Banking sector assets (%GDP)

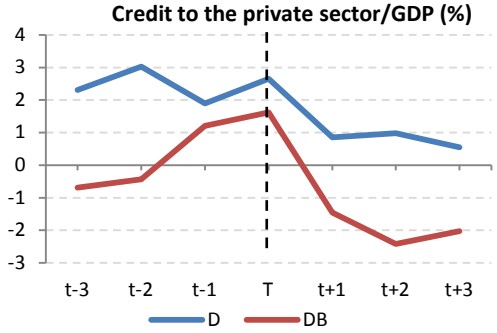

Figure 22. Credit to private sector (% GDP)

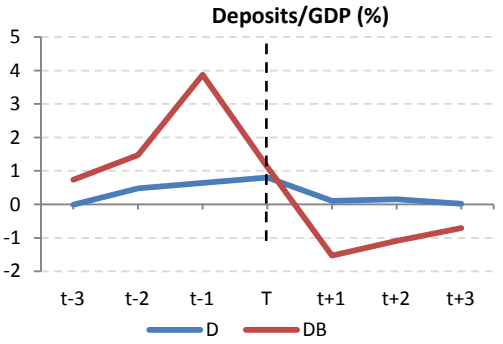

Figure 23. Banking sector deposits (% of GDP)

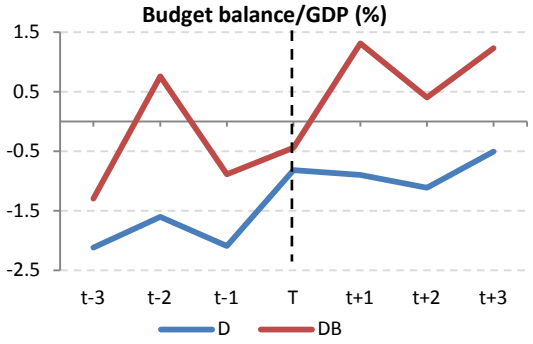

Figure 24. Budget balance (% GDP)

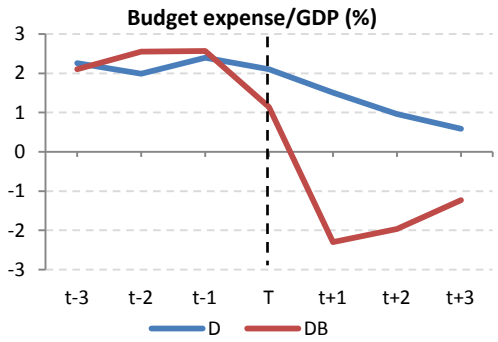

Figure 25. Budget expenditures (% GDP)

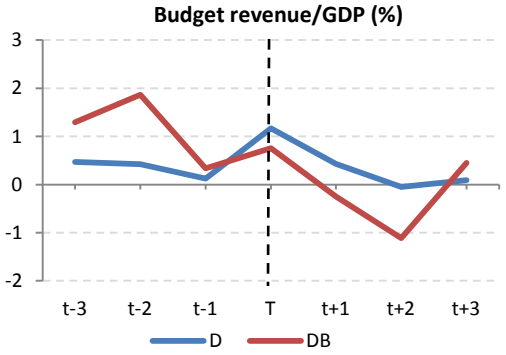

Figure 26. Budget revenues (% GDP)

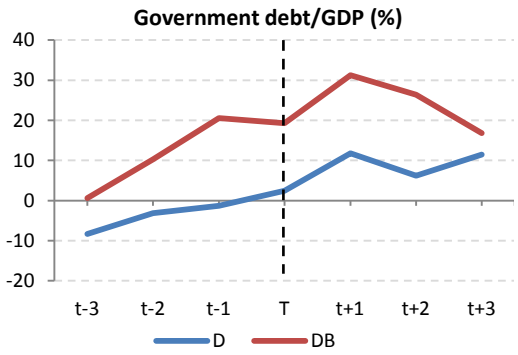

Figure 27. Public debt (% GDP)

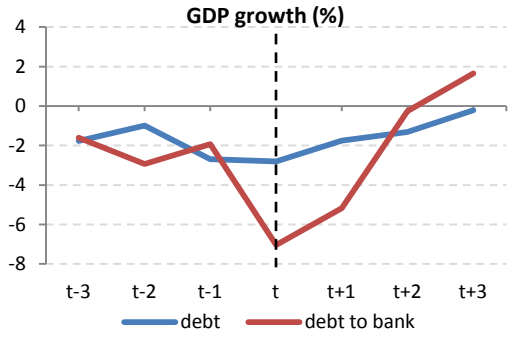

Figure 28. Real economic growth

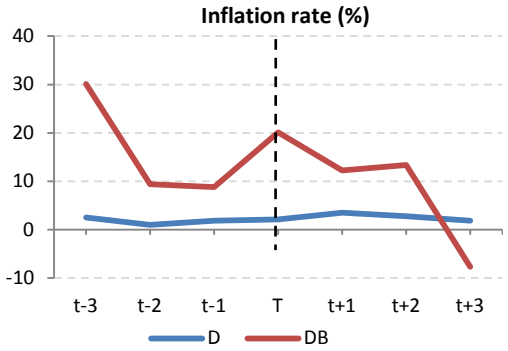

Figure 29. Inflation dynamics

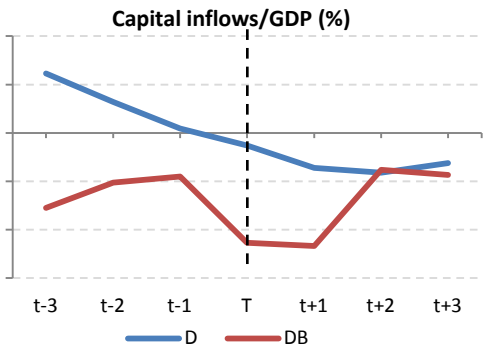

Figure 30. Portfolio capital inflows (% GDP)

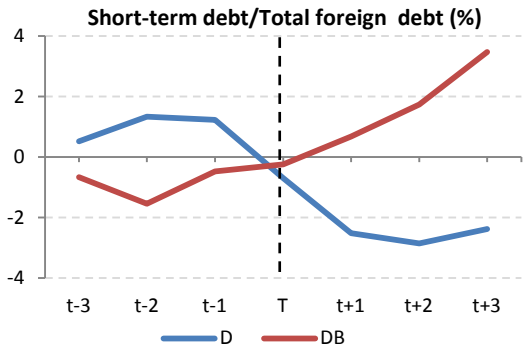

Figure 31. Short-term debt in total foreign debt

APPENDIX 3: ECONOMETRIC RESULTS

Table 8. Credit from the Central Bank (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	0.102	0.113	0.263*	-0.077
	[0.148]	[0.389]	[0.133]	[0.270]
Year t-2	0.381*	0.111	0.451**	-0.023
	[0.226]	[0.297]	[0.177]	[0.268]
Year t-1	0.426**	0.263	0.345*	0.048
	[0.195]	[0.310]	[0.176]	[0.208]
Year Event	0.324	0.484*	0.974***	0.547*
	[0.207]	[0.258]	[0.219]	[0.283]
Year t+1	0.409*	1.018***	0.510***	0.740***
	[0.212]	[0.376]	[0.184]	[0.240]
Year t+2	0.338*	0.912***	0.189	0.678*
	[0.199]	[0.302]	[0.153]	[0.342]
Year t+3	0.235	0.753***	0.047	0.504
	[0.196]	[0.245]	[0.153]	[0.395]
Observations	1592	1592	1592	1592
R-squared	0.06	0.06	0.06	0.06
No. of Countries	75	75	75	75
No. of Events	41	10	46	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 9. Credit from the Central Bank (% total assets)

	D crises	DB crises	B crises	BD crises
Year t-3	0.120	0.663*	0.328**	-0.059
	[0.155]	[0.353]	[0.148]	[0.291]
Year t-2	0.456*	0.566*	0.327**	0.096
	[0.231]	[0.309]	[0.164]	[0.302]
Year t-1	0.467**	0.509*	0.245	0.097
	[0.191]	[0.269]	[0.172]	[0.257]
Year Event	0.362*	0.793***	1.001***	0.346
	[0.211]	[0.261]	[0.213]	[0.249]
Year t+1	0.310*	1.402***	0.675***	0.580**
	[0.175]	[0.318]	[0.197]	[0.249]
Year t+2	0.290	1.199***	0.332*	0.601*
	[0.194]	[0.247]	[0.168]	[0.318]
Year t+3	0.187	0.983***	0.077	0.383
	[0.190]	[0.295]	[0.157]	[0.346]
Observations	1523	1523	1523	1523
R-squared	0.08	0.08	0.08	0.08
No. of Countries	73	73	73	73
No. of Events	38	9	42	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 10. Claims on Government (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	-0.058	-0.345	-0.443***	-0.701***
	[0.164]	[0.279]	[0.159]	[0.156]
Year t-2	0.051	-0.036	-0.203	-0.744***
	[0.194]	[0.278]	[0.193]	[0.223]
Year t-1	0.199	0.274	-0.370*	-0.464*
	[0.212]	[0.281]	[0.192]	[0.257]
Year Event	0.064	0.175	-0.381**	-0.085
	[0.171]	[0.361]	[0.167]	[0.352]
Year t+1	0.023	0.106	-0.197	0.117
	[0.182]	[0.334]	[0.137]	[0.341]
Year t+2	0.011	-0.002	-0.015	-0.012
	[0.209]	[0.273]	[0.135]	[0.353]
Year t+3	-0.005	0.018	0.205	0.650
	[0.200]	[0.224]	[0.150]	[0.453]
Observations	1716	1716	1716	1716
R-squared	0.03	0.03	0.03	0.03
No. of Countries	78	78	78	78
No. of Events	44	12	45	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 11. Claims on Government (% total assets)

	D crises	DB crises	B crises	BD crises
Year t-3	-0.075	-0.139	-0.252	-0.578***
	[0.167]	[0.336]	[0.174]	[0.176]
Year t-2	-0.043	0.205	-0.134	-0.529**
	[0.191]	[0.411]	[0.199]	[0.236]
Year t-1	0.151	0.360	-0.403**	-0.315
	[0.199]	[0.381]	[0.181]	[0.228]
Year Event	0.008	0.142	-0.248	-0.134
	[0.158]	[0.333]	[0.186]	[0.321]
Year t+1	0.012	0.314	0.040	0.055
	[0.184]	[0.384]	[0.160]	[0.359]
Year t+2	-0.122	0.154	0.238	0.039
	[0.190]	[0.328]	[0.143]	[0.306]
Year t+3	-0.096	0.216	0.368**	0.636
	[0.187]	[0.304]	[0.149]	[0.410]
Observations	1737	1737	1737	1737
R-squared	0.03	0.03	0.03	0.03
No. of Countries	78	78	78	78
No. of Events	44	12	45	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 12. Assets (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	0.091	-0.303	-0.323**	0.322
	[0.153]	[0.247]	[0.139]	[0.237]
Year t-2	0.244	-0.246	-0.166	0.284
	[0.176]	[0.245]	[0.159]	[0.278]
Year t-1	0.191	0.105	0.231	0.432
	[0.194]	[0.320]	[0.191]	[0.271]
Year Event	0.404*	0.541	-0.023	0.710**
	[0.242]	[0.388]	[0.175]	[0.278]
Year t+1	0.247	-0.071	-0.227	0.821***
	[0.222]	[0.220]	[0.169]	[0.239]
Year t+2	0.170	-0.055	-0.297**	0.538*
	[0.166]	[0.208]	[0.136]	[0.278]
Year t+3	0.094	-0.032	-0.195	0.553**
	[0.141]	[0.256]	[0.141]	[0.234]
Observations	1720	1720	1720	1720
R-squared	0.47	0.47	0.47	0.47
No. of Countries	78	78	78	78
No. of Events	43	12	45	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	Yes	Yes	Yes	Yes

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 13. Credit to the private sector (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	0.273**	-0.084	-0.084	0.590**
	[0.130]	[0.150]	[0.146]	[0.224]
Year t-2	0.358**	-0.053	0.071	0.638**
	[0.153]	[0.212]	[0.180]	[0.265]
Year t-1	0.224	0.141	0.235	0.785***
	[0.171]	[0.214]	[0.188]	[0.282]
Year Event	0.314	0.189	0.209	0.827***
	[0.218]	[0.299]	[0.204]	[0.309]
Year t+1	0.101	-0.178	-0.132	0.710**
	[0.178]	[0.183]	[0.182]	[0.292]
Year t+2	0.116	-0.282	-0.161	0.298
	[0.138]	[0.208]	[0.148]	[0.347]
Year t+3	0.065	-0.236	-0.111	0.264
	[0.129]	[0.249]	[0.133]	[0.288]
Observations	1786	1786	1786	1786
R-squared	0.49	0.49	0.49	0.49
No. of Countries	78	78	78	78
No. of Events	48	13	47	15
Country dummies	Yes	Yes	Yes	Yes
Country trends	Yes	Yes	Yes	Yes

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 14. Deposits (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	-0.001	0.094	-0.084	0.582**
	[0.157]	[0.227]	[0.144]	[0.258]
Year t-2	0.080	0.189	-0.031	0.348
	[0.178]	[0.294]	[0.179]	[0.270]
Year t-1	0.106	0.496	0.221	0.367*
	[0.204]	[0.367]	[0.169]	[0.196]
Year Event	0.134	0.143	-0.023	0.718***
	[0.242]	[0.319]	[0.183]	[0.230]
Year t+1	0.018	-0.196	-0.249	0.217
	[0.227]	[0.277]	[0.168]	[0.271]
Year t+2	0.025	-0.147	-0.260*	0.216
	[0.169]	[0.292]	[0.137]	[0.178]
Year t+3	0.004	-0.092	-0.333**	0.263
	[0.139]	[0.259]	[0.139]	[0.159]
Observations	1801	1801	1801	1801
R-squared	0.45	0.45	0.45	0.45
No. of Countries	78	78	78	78
No. of Events	48	13	49	15
Country dummies	Yes	Yes	Yes	Yes
Country trends	Yes	Yes	Yes	Yes

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 15. Budget Balance (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	-0.566***	-0.385	0.323*	0.139
	[0.198]	[0.336]	[0.184]	[0.293]
Year t-2	-0.428**	0.225	0.099	-0.126
	[0.206]	[0.329]	[0.215]	[0.345]
Year t-1	-0.558***	-0.264	-0.093	-0.163
	[0.197]	[0.517]	[0.202]	[0.348]
Year Event	-0.218	-0.132	-0.219	-0.401
	[0.193]	[0.286]	[0.161]	[0.354]
Year t+1	-0.240	0.389**	-0.358**	-1.036***
	[0.249]	[0.186]	[0.153]	[0.347]
Year t+2	-0.298	0.119	-0.377**	-0.533
	[0.232]	[0.226]	[0.158]	[0.337]
Year t+3	-0.135	0.365	-0.059	-0.400
	[0.237]	[0.324]	[0.153]	[0.313]
Observations	1548	1548	1548	1548
R-squared	0.05	0.05	0.05	0.05
No. of Countries	76	76	76	76
No. of Events	41	11	41	13
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 16. Budget Expense (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	0.480**	0.513	-0.158	-0.028
	[0.206]	[0.328]	[0.190]	[0.324]
Year t-2	0.423**	0.622*	0.084	0.063
	[0.197]	[0.337]	[0.199]	[0.334]
Year t-1	0.509**	0.627*	0.186	0.009
	[0.223]	[0.355]	[0.194]	[0.368]
Year Event	0.448**	0.279	0.187	-0.096
	[0.211]	[0.345]	[0.210]	[0.350]
Year t+1	0.321	-0.560*	0.235	0.385
	[0.216]	[0.333]	[0.190]	[0.444]
Year t+2	0.205	-0.478*	0.267	0.272
	[0.162]	[0.266]	[0.173]	[0.441]
Year t+3	0.125	-0.300	0.135	0.099
	[0.183]	[0.349]	[0.156]	[0.362]
Observations	1548	1548	1548	1548
R-squared	0.04	0.04	0.04	0.04
No. of Countries	76	76	76	76
No. of Events	41	11	42	13
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 17. Budget Revenue (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	0.128	0.404	0.037	-0.156
	[0.174]	[0.433]	[0.228]	[0.279]
Year t-2	0.115	0.582	0.226	-0.307
	[0.203]	[0.488]	[0.183]	[0.313]
Year t-1	0.034	0.106	0.100	-0.169
	[0.187]	[0.477]	[0.166]	[0.352]
Year Event	0.317	0.236	-0.164	-0.411
	[0.214]	[0.433]	[0.193]	[0.316]
Year t+1	0.117	-0.078	-0.033	-0.374
	[0.194]	[0.415]	[0.181]	[0.306]
Year t+2	-0.014	-0.347	0.000	-0.149
	[0.197]	[0.378]	[0.161]	[0.309]
Year t+3	0.024	0.141	0.132	-0.354
	[0.200]	[0.391]	[0.161]	[0.384]
Observations	1564	1564	1564	1564
R-squared	0.02	0.02	0.02	0.02
No. of Countries	76	76	76	76
No. of Events	41	11	42	13
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 18. Government Debt (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	-0.324	0.021	-0.207	-0.433*
	[0.209]	[0.368]	[0.182]	[0.259]
Year t-2	-0.128	0.331	-0.094	-0.567**
	[0.230]	[0.400]	[0.175]	[0.243]
Year t-1	-0.058	0.665	0.026	-0.592**
	[0.249]	[0.523]	[0.213]	[0.238]
Year Event	0.095	0.624	-0.015	-0.120
	[0.214]	[0.429]	[0.203]	[0.285]
Year t+1	0.453**	1.010**	0.010	0.248
	[0.195]	[0.493]	[0.168]	[0.230]
Year t+2	0.239	0.852*	0.120	0.658**
	[0.161]	[0.444]	[0.171]	[0.305]
Year t+3	0.441**	0.544	0.191	0.870***
	[0.168]	[0.392]	[0.160]	[0.325]
Observations	1639	1639	1639	1639
R-squared	0.05	0.05	0.05	0.05
No. of Countries	73	73	73	73
No. of Events	44	9	43	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 19. Real GDP growth (%)

	D crises	DB crises	B crises	BD crises
Year t-3	-0.353*	-0.289	-0.222	0.238
	[0.189]	[0.266]	[0.184]	[0.274]
Year t-2	-0.198	-0.527***	-0.341**	0.030
	[0.171]	[0.163]	[0.157]	[0.230]
Year t-1	-0.535***	-0.347	-0.303	0.230
	[0.196]	[0.217]	[0.200]	[0.181]
Year Event	-0.558***	-1.262***	-0.374**	-0.641**
	[0.172]	[0.290]	[0.183]	[0.253]
Year t+1	-0.350**	-0.928**	-0.478**	-1.722***
	[0.145]	[0.432]	[0.222]	[0.407]
Year t+2	-0.262	-0.046	-0.051	-0.848***
	[0.165]	[0.338]	[0.125]	[0.316]
Year t+3	-0.043	0.298	0.091	-0.298
	[0.186]	[0.383]	[0.105]	[0.222]
Observations	1855	1855	1855	1855
R-squared	0.07	0.07	0.07	0.07
No. of Countries	76	76	76	76
No. of Events	47	12	46	14
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 20. Inflation rate (%)

	D crises	DB crises	B crises	BD crises
Year t-3	0.257	1.038**	0.907***	0.131
	[0.198]	[0.479]	[0.253]	[0.263]
Year t-2	0.194	0.331	0.714***	0.255
	[0.163]	[0.324]	[0.198]	[0.232]
Year t-1	0.169	0.304	0.491***	0.023
	[0.119]	[0.341]	[0.179]	[0.184]
Year Event	0.215	0.693	0.347**	0.230
	[0.165]	[0.556]	[0.171]	[0.229]
Year t+1	0.358	0.424	0.243	1.444***
	[0.223]	[0.320]	[0.155]	[0.517]
Year t+2	0.256*	0.463	0.131	1.317***
	[0.130]	[0.315]	[0.170]	[0.389]
Year t+3	0.192	-0.259**	-0.178	0.581*
	[0.160]	[0.110]	[0.119]	[0.329]
Observations	1614	1614	1614	1614
R-squared	0.08	0.08	0.08	0.08
No. of Countries	72	72	72	72
No. of Events	46	10	37	15
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 21. Capital inflows (% GDP)

	D crises	DB crises	B crises	BD crises
Year t-3	0.457**	-0.628**	0.127	0.152
	[0.180]	[0.292]	[0.149]	[0.348]
Year t-2	0.238	-0.415	0.267	0.378
	[0.175]	[0.253]	[0.186]	[0.273]
Year t-1	0.033	-0.364	0.376**	0.529**
	[0.166]	[0.291]	[0.187]	[0.224]
Year Event	-0.096	-0.919***	0.143	-0.057
	[0.223]	[0.301]	[0.142]	[0.450]
Year t+1	-0.268	-0.948***	-0.081	-0.504
	[0.203]	[0.329]	[0.186]	[0.367]
Year t+2	-0.306	-0.310	0.127	-1.024***
	[0.213]	[0.507]	[0.190]	[0.325]
Year t+3	-0.232	-0.352*	0.012	-0.418***
	[0.144]	[0.207]	[0.154]	[0.156]
Observations	1603	1603	1603	1603
R-squared	0.27	0.27	0.27	0.27
No. of Countries	71	71	71	71
No. of Events	46	11	40	15
Country dummies	Yes	Yes	Yes	Yes
Country trends	Yes	Yes	Yes	Yes

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively

Table 22. Short-term debt (% External Debt)

	D crises	DB crises	B crises	BD crises
Year t-3	0.067	-0.084	-0.003	0.283
	[0.165]	[0.214]	[0.172]	[0.243]
Year t-2	0.173	-0.195	-0.051	0.555**
	[0.198]	[0.266]	[0.173]	[0.236]
Year t-1	0.159	-0.069	0.182	0.950***
	[0.195]	[0.365]	[0.206]	[0.314]
Year Event	-0.093	-0.035	0.161	0.582
	[0.185]	[0.333]	[0.204]	[0.352]
Year t+1	-0.326**	0.086	-0.016	0.157
	[0.140]	[0.355]	[0.164]	[0.331]
Year t+2	-0.370***	0.220	-0.002	-0.119
	[0.132]	[0.277]	[0.211]	[0.354]
Year t+3	-0.309**	0.438*	-0.133	-0.380*
	[0.154]	[0.252]	[0.146]	[0.214]
Observations	1602	1602	1602	1602
R-squared	0.03	0.03	0.03	0.03
No. of Countries	65	65	65	65
No. of Events	48	12	40	15
Country dummies	Yes	Yes	Yes	Yes
Country trends	No	No	No	No

The table reports the coefficients obtained from a fixed-effects panel regression of the variable in the title on a seven-year window around crisis events, controlling for country fixed effects. Crisis events are spilt into independent debt crises; independent bank crises; twin debt-bank crises; and twin bank-debt crises. The variable is first normalized by dividing by the standard deviation at the country level. The sample period is 1975 to 2007. Standard errors, clustered at the country-level, are reported in brackets. *, **, and *** mean significant at 10%, 5%, and 1% respectively