How Do Political Factors Shape the Bank Risk-Sovereign Risk Nexus in Emerging Markets?

by

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Abstract:

This paper studies the role of conditioning political factors for determining the impact of banking crises on sovereign bond yield spreads for a sample of 33 emerging economies in the period 1995-2010. Accounting for the endogenous nature of banking crisis outbreaks, I find that sovereign bond yield spreads increase, on average, by 13 to 17 percentage points during banking crisis episodes. I find that the adverse impact of banking crises on sovereign solvency is less pronounced (or even insignificant) for countries run by powerful and effective governments, low levels of public debt, and a high degree of political stability.

Keywords: Banking crisis; Sovereign bond yield spread; Interaction models; Instrumental variable model; Emerging markets; Political variables

JEL classification: G01; G21; G12

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1. Introduction

Banking crises have frequently contributed to the outbreak of sovereign debt crises in emerging economies (Reinhart and Rogoff 2011a, 2013). Banking crises typically increase public debt levels (after government financed bank bailouts), reduce sovereign solvency (due to credit crunches and lower economic growth), and deteriorate the liquidity of the government (as banks reduce their sovereign bond holdings). Bad political management of a banking crisis may therefore lead to a significant deterioration of sovereign solvency, which may even lead to sovereign default. Identifying political variables that determine the conditional impact of banking crises on sovereign yield spreads may therefore help the government to reduce the risk of sovereign debt crisis.

The present paper considers the role of political factors for determining the impact of banking crises on sovereign bond yield spreads. Using annual panel data on 33 emerging economies in the period 1995-2010, I find that sovereign bond yield spreads increase, on average, by 13 to 17 percentage points during banking crisis episodes. This banking crisis related effect is however heterogeneous across countries with different political environments. By employing interaction models, I identify several political conditions which make this sovereign solvency deteriorating effect of banking crises less pronounced or even insignificant. In order to account for the possibly endogenous nature of banking crisis outbreaks, I estimate the interaction models using instrumental variable regressions. The results suggest that the government should reduce public debt levels (in non-crisis times) in order to guarantee that bailouts of banks during crises do not lead to sovereign over-indebtedness. In countries where the government has sufficient political power (i.e. where the government consists of few parties and has a large majority in the parliament) the outbreak of a banking crisis has a less disastrous impact on the solvency of government finances, as unpopular but potentially necessary decisions such as nationalization of

banks or the implementation of austerity budgets can be implemented more easily. High government effectiveness is found as a precondition to enable effective crisis management. Political instability may reduce the government's credibility and may therefore lead to more pronounced banking crisis induced increases in sovereign bond yield spreads.

A large body of literature has examined the determinants of sovereign risk, focusing either on actual sovereign default episodes (Cuadra and Sapriza, 2008; Hatchondo, Martinez, and Sapriza, 2009; Manasse and Roubini, 2009; Saiegh, 2009; Van Rijckeghem and Weder, 2009; Kohlscheen, 2010; Reinhart and Rogoff, 2011a,b; Jorra, 2012) or on sovereign bond yield spreads (Edwards, 1986; Cantor and Packer, 1996; Mauro, Sussman, and Yafeh, 2002; Block and Vaaler, 2004; Vaaler, Schrage, and Block, 2005; Baldacci, Gupta, and Mati, 2008; Dailami, Masson, and Padou, 2008; Hilscher and Nosbusch, 2010; Faria, Mauro, and Zaklan, 2011; Eichlerr and Hofmann, 2013; Gómez-Puig and Sosvilla-Rivero, 2013, 2014; Eichler, 2014; Gómez-Puig, Ramos-Herrera, and Sosvilla-Rivero, 2014). The list of variables which these studies identify as important drivers of sovereign default risk includes, for example, high levels of public debt, poor macroeconomic fundamentals, shortages of foreign exchange reserves, and global risk factors.

Some of these papers have focused on the impact of politics on sovereign default risk. Van Rijckeghem and Weder (2009) find that, in democracies, the presence of sufficient checks and balances and a parliamentary system reduce the risk of external debt defaults if the economic fundamentals are sufficiently strong. In non-democratic systems, the risk of defaults on domestic debt is low if the political regime is characterized by a high degree of stability, low polarization, or long tenure. Kohlscheen (2010) finds that in parliamentary democracies, where the government needs the support of the legislature to stay in office, the government is less likely to default on external debt than in presidential democracies. What is more, he finds that sovereign

debt defaults are less probable for multi-party governments, lower turnover of the executive, effective checks and balances, and at the end of presidential office terms. Saiegh (2009) obtains the result that multi-party governments are less likely to default on their debt than single-party governments. Cuadra and Sapriza (2008) consider the role of political stability for sovereign default risk. They show that a higher degree of political stability (i.e. a lower risk of political turnover) reduces the discount factor of the current government and therefore reduces the incentive to shift future resources to the present by increasing public debt. In result, Cuadra and Sapriza (2008) show that a higher degree of political stability reduces sovereign default risk.

Manasse and Roubini (2009) provide evidence of a political business cycle, finding that the risk of debt defaults rises prior to presidential elections, particularly if elections coincide with large amounts of short-term debt and relatively rigid exchange rate regimes. Block and Vaaler (2004) study the impact of the political business cycle on sovereign bond yield spreads and ratings. The political business cycle theory predicts that governments will implement expansionary fiscal policies prior to elections (in order to win elections) and to implement contractionary policies afterwards. According to this theory, Block and Vaaler (2004) find that sovereign credit ratings are downgraded in election years and that sovereign bond spreads are higher before elections than after elections. Hatchondo, Martinez, and Sapriza (2009) present a model which provides an alternative explanation for the observed rising sovereign default risk prior to elections. They show that if the incumbent government is perceived as creditor friendly, sovereign bond spreads may increase prior to elections since investors fear that it may be elected out of office and a subsequent debtor friendly government may trigger a political default. Vaaler, Schrage and Block (2005) investigate the role of ideological differences for determining sovereign bond spreads. They find that higher (lower) sovereign risk is perceived by investors if a right (left) wing government is more likely to be elected out of office.

A relatively new strand of this literature focuses on the impact of banking crises on sovereign default risk (Attinasi, Checherita, and Nickel, 2009; Acharya, Drechsler, and Schnabl, 2011; Dieckmann and Plank, 2012; Ejsing and Lemke, 2011; Barth, Prabhavivadhana, and Yun, 2012; Mody and Sandri, 2012). For the current crisis in the eurozone, these papers find that the bank bailouts in autumn 2008 led to a reduction in banks' credit default swap (CDS) premiums and an increase in sovereign CDS premiums, suggesting that credit risk was transferred from banks to sovereigns. Moreover, following the bailouts, sovereigns' CDS became more responsive to crisis risk in the overall economy, while banks' CDS became less responsive. Using two centuries of data, Reinhart and Rogoff (2011a) find that banking crises often precede sovereign debt crises. Acharya, Drechsler, and Schnabl (2011) theoretically show that bank bailouts may deteriorate the sovereign's creditworthiness as diluting existing government bondholders may be more beneficial for the government than financing bailout packages by raising taxes. Sovereign default risk may however also affect banking crisis risk as outlined by some papers. Some authors argue that higher sovereign credit risk leads to a lower value of government guarantees, which makes the bank bailouts less effective and, in turn, increases the default risk of banks (Demirgüç-Kunt and Huizinga, 2013; Acharya, Drechsler, and Schnabl, 2011). In line with this argument these papers find evidence for reverse causality, i.e. that higher sovereign default risk may increase bank default risk. Gennaioli, Martin, and Rossi (2013) model the two-way interaction of banking and sovereign debt crisis risk where the levels of private and public borrowing are complementary as banks hold public bonds as a store of liquidity. Using data for emerging markets, they find that private credit supply is reduced after sovereign defaults and that this effect is more pronounced for countries where public bond holdings of banks is large and the quality of financial institutions is high. In order to consider the possible issue of reverse causation as outlined by Demirgüç-Kunt and Huizinga (2013), Acharya, Drechsler, and Schnabl (2011),

and Gennaioli, Martin, and Rossi (2013) I apply fixed effects instrumental variables techniques to quantify the impact of banking crises on sovereign bond yield spreads.

The present work aims to contribute to the literature in two ways. First, instrumental variable estimations are used to analyze the impact of banking crises on sovereign bond yield spreads thereby addressing the potentially endogenous nature of banking crisis outbreak. Second, this paper provides evidence that banking crises must not necessarily increase sovereign bond yield spreads significantly and identifies political variables that determine the size and significance of the impact of banking crises on sovereign bond yield spreads.

The rest of the paper is organized as follows. Section 2 provides descriptive evidence that banking crisis episodes are associated with above average sovereign bond yield spreads. Section 3 presents the results of the baseline regressions, which test the impact of banking crises on sovereign bond yield spreads using instrumental variables techniques. Section 4 presents the results of the interaction models testing for conditioning political factors, which determine the size and significance of the impact of banking crises on sovereign bond yield spreads. Section 5 concludes.

2. Descriptive evidence

I use annual panel data on 33 emerging economies in the period 1995-2010: Argentina, Belize, Brazil, Bulgaria, Chile, China, Colombia, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Georgia, Ghana, Indonesia, Jamaica, Kazakhstan, Lebanon, Malaysia, Mexico, Nigeria, Pakistan, Panama, Peru, Philippines, Russian Federation, South Africa, Sri Lanka, Turkey, Ukraine, Uruguay, Venezuela, and Vietnam. The choice of the considered countries and periods is largely determined by the availability of data on sovereign bond yield spreads (the dependent variable) explained below.

Table A1 in the Appendix describes the definitions and sources of the variables used. Table A2 in the Appendix provides some summary statistics. Sovereign risk is measured based on the yield spread between domestic and United States (U.S.) sovereign bonds taken from JP Morgan's Emerging Markets Bond Index (EMBI). Assuming that U.S. sovereign bonds are risk-less, this sovereign bond yield spread equals the bondholder's expected loss associated with a possible default of the considered emerging market government. A higher EMBI bond yield spread therefore indicates a higher level of sovereign risk. The EMBI considers only sovereign bonds denominated in U.S. dollars, which rules out exchange rate risk. The EMBI includes loans, Brady bonds, and Eurobonds issued by federal governments with an average maturity of 12 years. The EMBI index averages yield data from the most liquid bonds.[2]

Banking crisis episodes are taken from Laeven and Valencia (2008, 2012), who define systemic banking crises as an event when "a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face great difficulties repaying contracts on time. As a result, non-performing loans increase sharply and all or most of the aggregate banking system capital is exhausted" (Laeven and Valencia, 2008, p. 5).

<Insert Table 1 here>

Table 1 provides descriptive evidence of the impact of banking crises on sovereign bond yield spreads. During the 42 banking crisis episodes considered, EMBI spreads equal 1298.4 basis points on average, while the average of EMBI spreads during the full observation period (including crisis and non-crisis years) is 632.5 basis points. That is, during banking crises,

[2] The minimum size of a debt instrument to be included in the EMBI is $500 million, which guarantees that relatively liquid instruments with reasonable prices are considered. The EMBI measures so-called stripped spreads, which are derived by subtracting collaterals from the observed market prices.

sovereign bond yield spreads are around 6.5 percentage points above average, which lends some descriptive evidence for the hypothesis that banking crises increase sovereign default risk.

These descriptive findings may be explained by several reasons. First, banking crises may increase the risk of sovereign default by increasing public debt levels associated with bailout costs. History has shown that governments typically bail out troubled banks in times of banking crisis, since the overall economic costs associated with the outright defaults of banks are considered to be higher for the government than the bailout costs are. Another explanation as to why a banking crisis may lead to higher sovereign debt crisis risk may be the deterioration of the government's solvency. As a country's banking system becomes more fragile, banks reduce their lending to the real sector of the economy. This may happen because banks, which are attached higher default risk premiums by financial markets, may want to reduce their overall exposure or because they expect too high credit risk. Such a credit crunch may lead to lower levels of investment and therefore to lower economic growth. Several studies provide empirical evidence that banking crises may reduce the pace of economic growth. Depending on the sample and applied estimation methods, the cumulative output loss after the outbreak of a banking crisis is estimated to be between 3-4.5% (Furceri and Zdzienicka, 2012), 8-10% (Hutchison and Noy, 2005) and 15-20% (Hoggarth, Reis, and Saporta, 2002). Estimations of the reduction in economic growth after the outbreak of a banking crisis range between around 2% (Serwa, 2010) and around 3.5% (Demirgüç-Kunt, Detragiache, and Gupta, 2006) four and two years following the crisis outbreak, respectively. The banking crisis induced reduction in economic growth may reduce (expected) fiscal revenues, which, in turn, deteriorates sovereign solvency. Banking crises may also lead to a deterioration of the government's liquidity. Banks are among the most important buyers of sovereign bonds. More fragile banks may want to reduce their sovereign bond holdings since they want to decrease their leverage or their exposure to market risk. Governments may

therefore have more problems issuing sovereign bonds when banks become more fragile, which may lead to higher risk of sovereign illiquidity.

Such descriptive evidence is, of course, not sufficient to conclude that banking crises lead to higher sovereign bond yield spreads since the impact of control variables, the panel structure, as well as possible endogeneity is not modeled. The regression analyses in Sections 3 and 4 consider these issues using fixed effects instrumental variables models.

3. Baseline regressions

In order to analyze the impact of banking crises on sovereign bond yield spreads in more depth, I use fixed effects panel instrumental variable regression models. Several papers have highlighted the possible endogenous nature of banking crisis outbreaks (as outlined, for example, by Demirgüç-Kunt and Huizinga, 2013; Acharya, Drechsler, and Schnabl, 2011; and Gennaioli, Martin, and Rossi, 2013). For example, higher sovereign default risk may increase the probability of banking crises as government guarantees for banks lose credibility which may induce bank runs. Moreover, omitted variables may drive both the probability of sovereign default and banking crisis. In order to address the issue of endogeneity, I use instrumental variable regressions. I consider four instruments for banking crises: overhead costs of domestic banks, cost-to-income ratio of domestic banks, concentration of domestic banking sector, and a financial freedom index.

High overhead costs of domestic banks may increase or decrease the probability of banking crisis. On the one hand, higher overhead costs may indicate inefficient management which may lead to low profitability and high fragility. On the other hand, high overhead costs may be an indicator of efficient internal risk management and market analysis which may only be operationalized with sufficient staffing. A high cost-to-income ratio of domestic banks should

increase the risk of banking crisis since the associated low profitability of banks leads to low capital buffers of banks. As depositors anticipate that inefficient management of banks (as indicated by a high cost-to-income ratio) increases the risk of bank insolvency, the risk of bank run-induced banking crises increases.

The concentration of the domestic banking sector may have an ambiguous impact on the stability of banks. Banks in concentrated banking systems should, on average, have a stronger market position and should therefore be more profitable than banks in fragmented banking sectors. Since higher profitability leads to higher capital buffers banks in concentrated banking systems should be more stable than banks in fragmented banking sectors (Boyd, De Nicolo, and Smith, 2004; Beck, Demirgüç-Kunt, and Levine, 2006). On the contrary, banks in concentrated banking sectors may have stronger incentives to take excessive risks since the on average large banks will expect to be bailed out in the case of insolvency (Schaeck, Cihak, and Wolfe, 2009).

As a fourth instrument for banking crisis risk, I use the financial freedom index of Heritage Foundation. More intense interference of the government in the banking sector (such as by direct or indirect ownership of banks) may lead to inefficient loan portfolios of banks since bank lending decision are (at least) partly driven by political considerations. Moreover, larger government stakes in the domestic banking sector should lead to bailout expectations of bank managers and thus moral hazard leading to risky business profiles of banks.

All instrumental variable regression are estimated using fixed country and year effects in order to account for all country specific (such as culture, creditor rights, and banking regulation) and time specific (global variables such as global business cycles, risk-appetite of international

investors, global liquidity conditions) variables that do not vary in time. [3,4] All t-values are based on robust standard errors.

I consider several control variables, which have frequently been found in the literature to determine sovereign default risk. A higher level of public debt to GDP is assumed to reduce the government's ability to repay its debt and to increase sovereign bond yield spreads. Higher GDP growth should reduce sovereign default risk as faster growing economies are better able to make debt service payments due to higher public revenues. I also consider openness defined as the sum of exports and imports to GDP. More open countries should suffer more from a loss of access to international capital markets and are thus less likely to default. A shortage of foreign exchange reserves (as indicated by lower foreign exchange reserves to imports and a lower current account balance) and a depreciation of the domestic currency against the U.S. dollar may increase sovereign default risk by reducing the government's ability to repay foreign debt. I also consider inflation which has an a priori unclear impact on the solvency of the government. On the one hand, higher inflation rates may increase sovereign bond yield spreads as new government bonds have to be issued at higher coupon rates, which increases nominal public debt levels in the long run. On the other hand, higher inflation rates may reduce sovereign bond yield spreads as fiscal revenues increase faster than prices, particularly in countries with progressive taxation schemes. Control variables are taken from the World Development Indicators.

<Insert Table 2 here>

[3] I have also estimated random effects models, however the Hausman (1978) test indicates that random effects would not be consistent and I consequently report the fixed effects results.
[4] Since I use fixed effects models, I do not consider time invariant instruments for banking crisis risk such as banking regulation.

The second stage estimation results of the fixed effects instrumental variable models are reported in Table 2 the results of the first stage regression are available upon request). In each specification the banking crisis coefficient is positive and significantly different from zero, confirming the hypothesis that the outbreak of a banking crisis leads to higher sovereign default risk as measures by higher sovereign bond yield spreads. The results of the first specification (which is considered as the baseline specification) suggest that the outbreak of a banking crisis yields an increase of sovereign bond yield spreads by around 17 percentage points. The remaining three specifications are variations of the baseline specification in order to test robustness of the results. The second specification uses total public debt to GDP (taken from Reinhart and Rogoff (2011b)) instead of external public debt to GDP. The third specification uses the banking crisis dummy taken from Reinhart and Rogoff (2011a), which yields slightly different crisis episodes than the Laeven and Valencia (2008, 2012) dummy. The fourth specification adds GDP p.c., arrears on external public debt to GDP, and public expenditures to GDP as control variables. The robustness checks largely confirm the results of the baseline specification suggesting that the outbreak of a banking crisis lead to a significant increase in sovereign bond yield spreads by 13 to 17 percentage points. The interaction models presented in Section 4 rely on the baseline model (the first specification), which has the best data coverage for the sample considered.

Assessing the tests for the relevance of instruments (the first stage F-statistic and the Kleibergen-Paap LM test for underidentification) reveals that the four instruments are sufficiently correlated with the banking crisis dummy and that the null of underidentification can be significantly rejected. The Hansen J overidentification test statistic is insignificant in each specification suggesting that the null hypothesis that all instruments are uncorrelated with the error term cannot be rejected, i.e. the instruments appear to be sufficiently exogenous. The results

for many control variables are in line with previous findings. Higher public debt to GDP, lower foreign exchange reserves to imports, larger depreciation of the domestic currency against the U.S. dollar, lower inflation, lower GDP p.c., and higher arrears on public debt lead to significantly higher sovereign bond yield spreads. I do not find evidence that GDP growth, openness, the current account balance, and public expenditures to GDP significantly affect sovereign bond yield spreads.

4. Interaction models

The size and significance of the impact of banking crises on sovereign bond yield spreads established in Section 3 may, however, depend on several conditioning political factors. For example, if the public debt to GDP ratio is low, the government may have enough fiscal resources to afford bank bailouts and may be able to weather out the solvency and liquidity deteriorating effects of a banking crisis, suggesting a low or even insignificant impact of the banking crisis dummy on sovereign bond yield spreads. On the contrary, if the government is already highly indebted a banking crisis may lead to a significant increase in sovereign debt crisis risk as a bank bailout plan, liquidity shortage, and solvency deterioration caused by higher banking sector fragility may more likely lead to actual or expected overindebtedness of the government.

In order to analyze such interaction effects, I re-estimate the baseline specification (first specification in Table 1), considering the interaction terms between the banking crisis dummy and the conditioning political variable Z (for example, the public debt to GDP ratio) as outlined in Eq. (1):

$$Sovereign\ spread_{it} = \alpha + \beta_1 Banking\ crisis_{it} + \beta_2 Z_{it} + \beta_3 Banking\ crisis_{it} * Z_{it} + \sum_j \beta_j Controls_{it} + \varepsilon_{it}\ , \quad (1)$$

In total, I consider seven conditioning political variables: the external public debt to GDP ratio, a political stability index, tenure of the government party, a government effectiveness index, government majority in the parliament, government fractionalization, and a legislative election year dummy. Each political variable is interacted with the Laeven and Valencia (2008, 2012) banking crisis dummy (as outlined in Eq., 1). Data for the conditioning variables are taken from the Database of Political Institutions and the World Bank's Worldwide Governance Indicators. Definitions and sources of the variables are explained in Table A1 in the Appendix. The results of the second stage estimation results of the interaction models are reported in Table 3. The interaction models are estimated using fixed effects instrumental variable estimations as explained in Section 3. For each specification, two first stage regression models are estimated, one for the banking crisis dummy (using the four instruments outlined in Section 3) and one for the interaction term of the banking crisis dummy and the respective conditioning political variable such as external public debt to GDP (using the four instruments outlined in Section 3 interacted with the conditioning political variable).

<Insert Table 3 here>

Interpretation of the separate coefficients of the banking crisis dummy, β_1, and the interaction term of the crisis dummy with a political variable, β_3, as well as the associated significance levels can result in misleading statistical inference (Greene, 2003; Brambor, Clark, and Golder, 2006). Therefore, I follow Greene (2003, p. 123-124) and use the regression results of the interaction

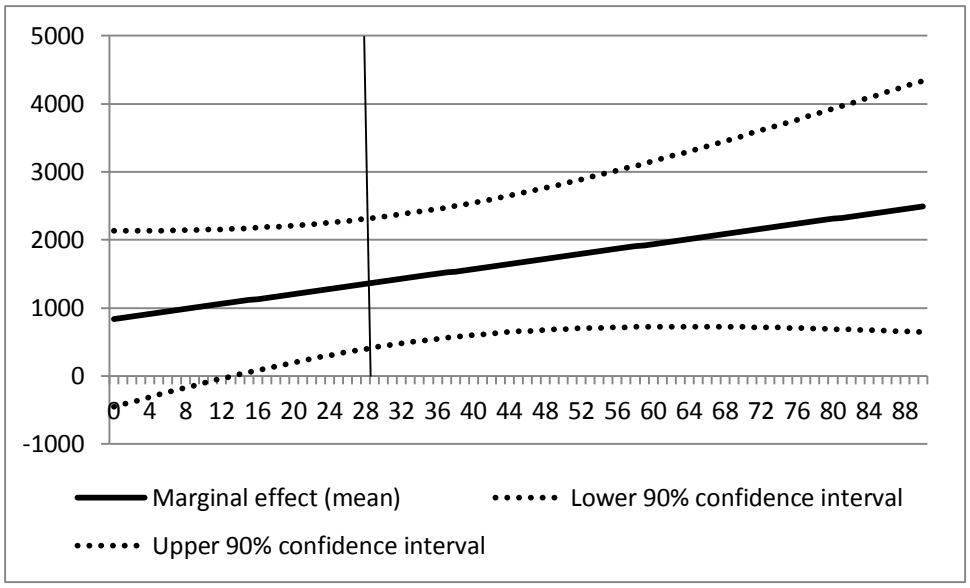
models (reported in Table 3) in order to calculate the marginal effect of the banking crisis dummy on sovereign bond yield spreads (conditional on the Z variable) and its standard deviation as follows:

$$\frac{\partial E(Sovereign\ spread)}{\partial Banking\ crisis} = \hat{\beta}_1 + \hat{\beta}_3 Z \quad , \tag{2}$$

$$\hat{\sigma}_{\frac{\partial E(Sovereign\ spread)}{\partial Banking\ crisis}} = \sqrt{var(\hat{\beta}_1) + Z^2 * var(\hat{\beta}_3) + 2 * Z * cov(\hat{\beta}_1 \hat{\beta}_3)}. \tag{3}$$

Figure 1 depicts the results for the marginal effect of a banking crisis on sovereign bond yield spreads conditional on ***external public debt to GDP***. The x-axis of Figure 1 shows the external public debt to GDP level which reaches values up to 90% in the dataset. The vertical line displays the sample mean of the conditioning variable (which equals 28% for external debt to GDP). The y-axis depicts the estimated marginal effect of a banking crisis on sovereign bond yield spreads for different values of external public debt to GDP. The marginal effect (the solid line) is upward-sloping, indicating that higher external public debt to GDP levels lead to a more pronounced effect of banking crises on sovereign bond yield spreads.

Figure 1: Marginal effect of banking crisis on sovereign bond yield spreads conditional on external public debt to GDP



Note: The solid line displays the marginal effect of the banking crisis dummy on the sovereign bond yield spread for different values of external public debt to GDP (the conditioning variable displayed on the x-axis). The dotted lines display the lower and upper 90% confidence intervals of the marginal effect. The marginal effect and the confidence intervals are calculated according to Eqs. (2) and (3) using the fixed effects instrumental variable estimation results of the interaction models reported in Table 3. The vertical line displays the sample mean of the conditioning variable.

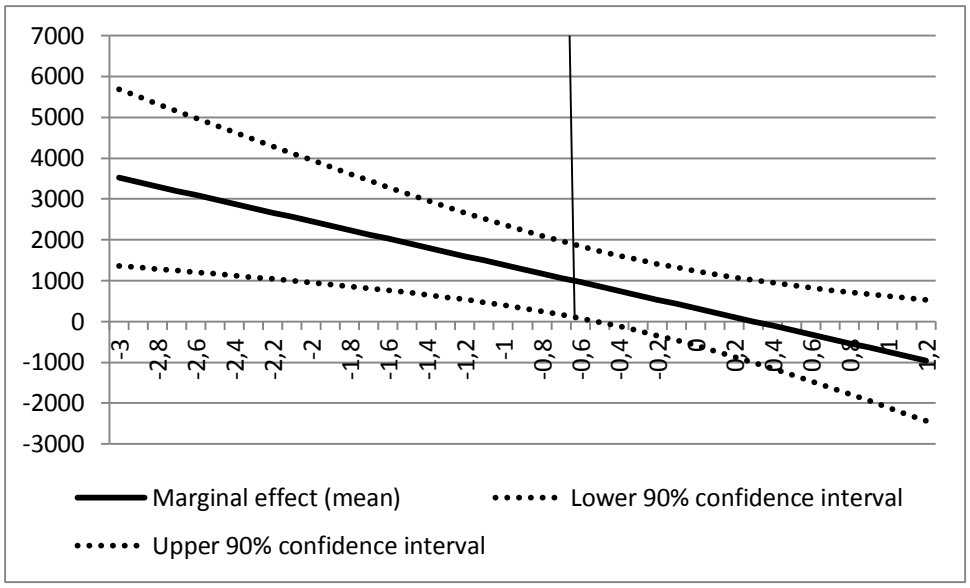
Taking the 90% confidence intervals (the dotted lines) into account, one can see that a banking crisis significantly increases sovereign bond yield spreads *only* if external public debt to GDP exceeds the critical level of 14%. This suggests that a banking crisis increases sovereign bond yield spreads only if public finances are weak (which is true for the average of countries, as the sample mean of external debt to GDP equals around 28%). Governments with sound public finances may not be significantly impacted by banking sector problems as they have enough free fiscal resources to finance bank bailouts and to weather out solvency and liquidity deterioration produced by a banking crisis. A possible implication from this finding would be to implement sustainable public debt levels in non-crisis periods in order to survive a banking crisis without serious damage to the sustainability of public finances.

Political stability may influence the marginal impact of banking crises on sovereign bond yield spreads in various ways. Governments in relatively stable political regimes can optimize over a longer period, which enables them to implement unpopular economic reforms and bank

bailout plans and may therefore be better able to contain the banking crisis related costs in the long run. Moreover, less frequent regime change reduces the adverse effects of political business cycles and the uncertainty towards the goals of the government and its expertise in safeguarding the sustainability of public finances. I use two indicators to measure the degree of political stability in a country: an overall political stability index taken from the Worldwide Governance Indicators and the tenure of the government party (i.e. the number of years the government party has been in office). Each indicator presents different aspect of political stability. While the overall political stability index measures to some degree political stability that is determined outside the political arena (i.e. the risk that the government is destabilized or overthrown by violent or unconstitutional means), the tenure of the government party measured political stability that is determined from inside the political system. Higher values of the overall political stability index and longer tenure of the government party indicate more political stability.

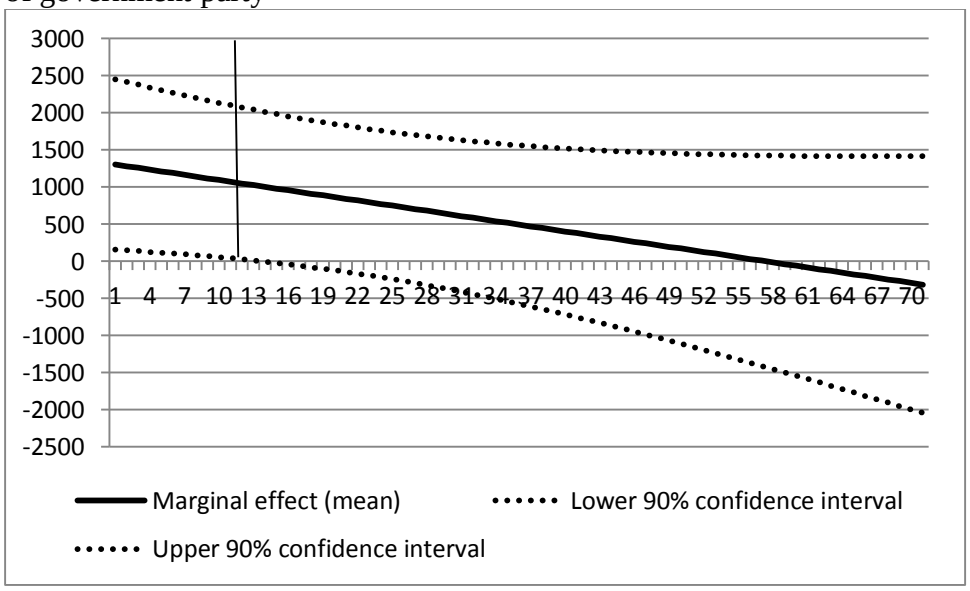
The results depicted in Figures 2 and 3 confirm the hypothesis that higher degrees of political stability are associated with significantly lower banking crisis induced increases in sovereign bond yield spreads. Beyond some critical values of political stability (i.e. for overall political stability index values above -0.5 and government parties which have been in office for more than 13 years) the impact of banking crisis outbreaks on sovereign bond yield spreads is found to be insignificant. These findings suggest that by increasing political stability the solvency deteriorating effects of banking crises may be reduced as unpopular fiscal or banking sector reforms are more likely be implemented, the adverse effects of political business cycles are mitigated, and the uncertainty about government policies to manage the banking crisis are reduced.

Figure 2: Marginal effect of banking crisis on sovereign bond yield spreads conditional on political stability



Note: The solid line displays the marginal effect of the banking crisis dummy on the sovereign bond yield spread for different values of the political stability index (the conditioning variable displayed on the x-axis, higher values of the political stability index indicate more stable regimes). The dotted lines display the lower and upper 90% confidence intervals of the marginal effect. The marginal effect and the confidence intervals are calculated according to Eqs. (2) and (3) using the fixed effects instrumental variable estimation results of the interaction models reported in Table 3. The vertical line displays the sample mean of the conditioning variable.

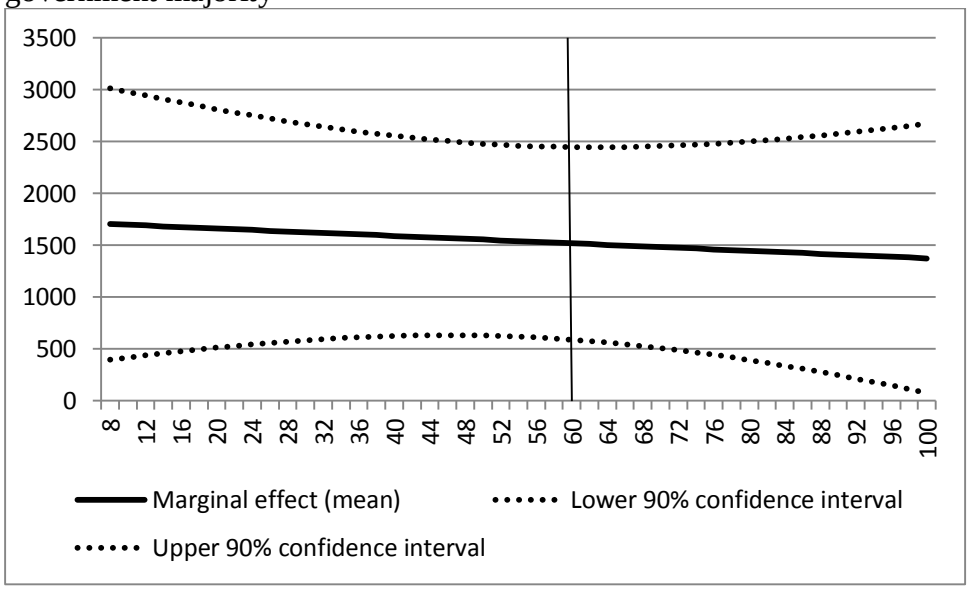
Figure 3: Marginal effect of banking crisis on sovereign bond yield spreads conditional on tenure of government party



Note: The solid line displays the marginal effect of the banking crisis dummy on the sovereign bond yield spread for different values of tenure of government party (the conditioning variable displayed on the x-axis). The dotted lines display the lower and upper 90% confidence intervals of the marginal effect. The marginal effect and the confidence intervals are calculated according to Eqs. (2) and (3) using the fixed effects instrumental variable estimation results of the interaction models reported in Table 3. The vertical line displays the sample mean of the conditioning variable.

In order to mitigate the adverse effects of banking crises on the solvency of the government, the government needs sufficient ***political power*** to manage a banking crisis. Several government actions necessary to manage a banking crisis, such as deciding on bank mergers, nationalization of banks, or the implementation of austerity budgets, may need the support of the parliament. Governments which have a large government majority in the parliament may therefore be more successful in managing a banking crisis with lower or even insignificant increases of sovereign bond yield spreads during banking crisis episodes. Moreover, the government will be better able to contain the sovereign solvency deteriorating effects of banking crises if it consists of few parties since it is easier to find a consensus on crisis management policies than in countries where the government is highly fractionalized.

Figure 4: Marginal effect of banking crisis on sovereign bond yield spreads conditional on government majority

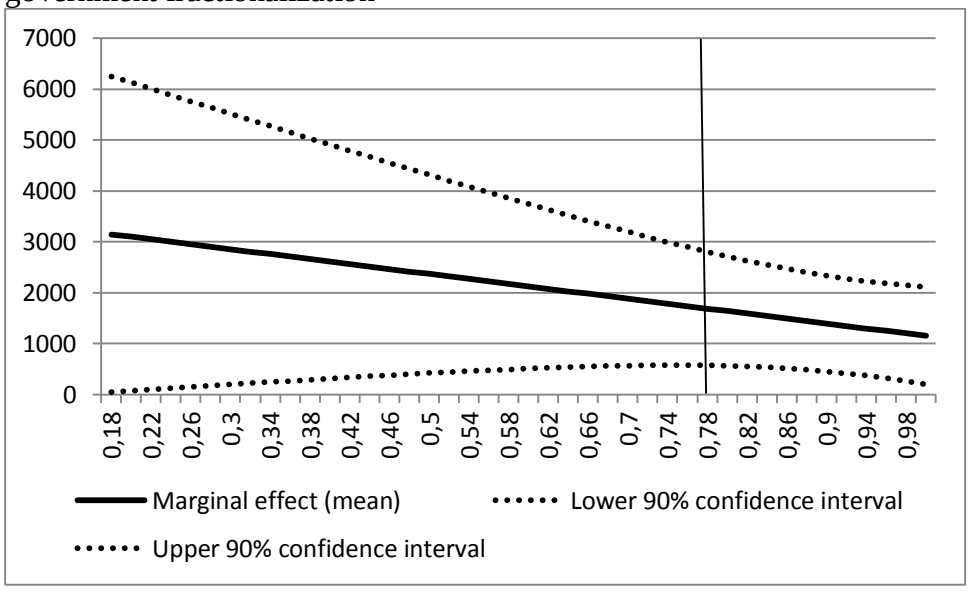


Note: The solid line displays the marginal effect of the banking crisis dummy on the sovereign bond yield spread for different values of government majority in parliament (the conditioning variable displayed on the x-axis). The dotted lines display the lower and upper 90% confidence intervals of the marginal effect. The marginal effect and the confidence intervals are calculated according to Eqs. (2) and (3) using the fixed effects instrumental variable estimation results of the interaction models reported in Table 3. The vertical line displays the sample mean of the conditioning variable.

In order to test the importance of the political power of the government I use the government majority in the parliament (the fraction of seats in the parliament held by government parties) and a herfindahl index measuring the degree of government fractionalization (calculated as the sum of squared seat shares of all parties in the government).

The results depicted in Figure 4 suggest a less pronounced banking crisis-related increase in sovereign bond yield spreads when the government has a large majority in the parliament. Thus, a large government majority needed to get bills on banking crisis management (such as bank restructuring bills or austerity budgets) passed quickly through the parliament may reduce effective bailout costs and contain solvency and liquidity deteriorating effects of banking crises.

Figure 5: Marginal effect of banking crisis on sovereign bond yield spreads conditional on government fractionalization

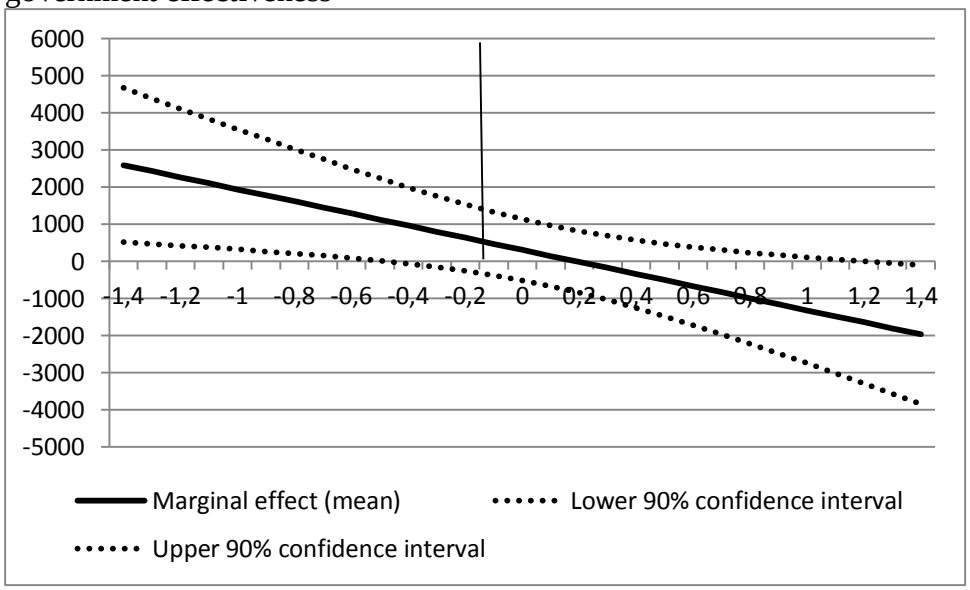


Note: The solid line displays the marginal effect of the banking crisis dummy on the sovereign bond yield spread for different values of government fractionalization (the conditioning variable displayed on the x-axis, higher values of government fractionalization herfindahl index indicates lower degree of government fractionalization). The dotted lines display the lower and upper 90% confidence intervals of the marginal effect. The marginal effect and the confidence intervals are calculated according to Eqs. (2) and (3) using the fixed effects instrumental variable estimation results of the interaction models reported in Table 3. The vertical line displays the sample mean of the conditioning variable.

The results for government fractionalization depicted in Figure 5 suggest that governments with a lower degree of fractionalization can better contain the negative effects of banking crises on sovereign bond yield spreads. Thus, single party governments or government coalitions dominated by a large party are better suited to find fast consensus on political decisions meant to contain the sovereign solvency deteriorating effects of banking crises leading to lower (or even insignificant) banking crisis induced increases of sovereign bond yield spreads.

In order to contain the negative effects of banking crises on sovereign bond yield spreads, the government should also have the competence to manage a banking crisis successfully. Since it is difficult to judge the ***effectiveness of the government*** in banking crisis management, I use the World Bank's governance indicator for overall government effectiveness as a proxy. Higher government effectiveness scores may be associated with a better and faster ability of the government to manage bank bailouts, implement new measures of banking supervision, or to consolidate the budget in order to avoid a deterioration of sovereign solvency.

Figure 6: Marginal effect of banking crisis on sovereign bond yield spreads conditional on government effectiveness



Note: The solid line displays the marginal effect of the banking crisis dummy on the sovereign bond yield spread for different values of the government effectiveness index (the conditioning variable displayed on the x-axis, higher

values of the government effectiveness index indicates more effective government). The dotted lines display the lower and upper 90% confidence intervals of the marginal effect. The marginal effect and the confidence intervals are calculated according to Eqs. (2) and (3) using the fixed effects instrumental variable estimation results of the interaction models reported in Table 3. The vertical line displays the sample mean of the conditioning variable.

The estimation results of the impact of banking crisis breakouts on sovereign bond yield spreads for different levels of government effectiveness are displayed in Figure 6. Higher values of the government effectiveness score indicate better governance. The results suggest that in countries with a higher quality of governance, banking crises have less severe or even insignificant effects on sovereign bond yield spreads. By improving the quality of governance the deteriorating impact of banking crises on sovereign bond yield spreads may therefore be contained.

Table 4 presents the results for the marginal effects for the legislative ***election year*** dummy. Political business cycle theories have been used to explain the cyclical behavior of public expenditures and revenues around elections. A possible hypothesis may be that the incumbent government increases public expenditures and reduces tax rates in order to increase the probability of re-election, while after elections fiscal deficits are reversed to restore sustainability of public finances. The results suggest that banking crises have a more pronounced impact on sovereign bond yield spreads during election years (with a significant marginal effect of around 1680) than during non-election years (with a significant marginal effect of around 1634). Although the difference in marginal effects is not large the result lends some support for a political business cycle where financial markets are uncertain about the goals and expertise of the new government concerning the resolution of a banking crisis during election years which leads to higher sovereign bond yield spreads than during non-election years.

<Insert Table 4 here>

5. Conclusions

This paper studied the conditional impact of banking crises on sovereign bond yield spreads for a sample of 33 emerging economies in the period 1995-2010. History and recent experience has shown that banking crises occur frequently and typically damage the sustainability of public finances. Since it seems almost impossible to prevent the outbreak of banking crises at all, particularly in emerging markets, it is important to contain the negative effects of banking crises for sovereign solvency. The results obtained from the interaction models of this study may help as a guidance to contain the detrimental impact of banking crises on sovereign bond yield spreads. I find that banking crises significantly increase sovereign bond yield spreads only in countries with large levels of sovereign indebtedness suggesting that public debt levels should be cut back in non-crisis periods in order to make sure that a banking crisis will not severely damage the solvency of the government. Moreover, the results suggest that a stable and competent government with a sufficient majority in the parliament may be better able to contain the public solvency deteriorating impact of banking crises suggesting that a government of technocrats may help in banking crisis situations.

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Table 1: Sovereign bond yield spreads on average and in banking crisis periods

Country	Banking crisis year	EMBI spread - banking crisis	EMBI spread - average
Argentina			1847.5
	1995	887.0	
	2001	5363.0	
	2002	6342.3	
	2003	5484.9	
Belize			1190.6
Brazil			559.2
	1997	520.0	
	1998	1239.0	
Bulgaria			371.7
	1997	622.0	
Chile			131.0
China			108.8
	1998	200.0	
Colombia			389.3
	1998	626.0	
	1999	416.0	
	2000	755.0	
Cote d'Ivoire			2530.7
Dominican Republic			609.7
	2003	1141.2	
	2004	823.9	
Ecuador			1482.0
	1998	1631.0	
	1999	3353.0	
	2000	1415.0	
	2001	1233.0	
	2002	1801.5	
Egypt			198.7
El Salvador			335.4
Georgia			957.2
Ghana			668.3
Indonesia			302.3
Jamaica			776.8
Kazakhstan			600.5
	2008	1303.3	
	2009	393.3	
	2010	324.4	
Lebanon			446.2
Malaysia			189.1

	1997	197.0	
	1998	616.0	
	1999	172.0	
Mexico			352.2
	1995	1017.0	
	1996	502.0	
Nigeria			916.5
Pakistan			624.8
Panama			330.4
Peru			374.9
Philippines			369.6
	1997	380.0	
	1998	498.0	
	1999	310.0	
	2000	644.0	
Russian Federation			981.4
	1998	4722.0	
	2008	804.8	
South Africa			248.5
Sri Lanka			768.4
Turkey			421.1
	2000	803.0	
	2001	702.0	
Ukraine			814.2
	2008	2771.4	
	2009	989.1	
	2010	460.6	
Uruguay			349.5
	2003	636.5	
	2004	388.0	
	2005	297.6	
Venezuela, RB			847.0
	1997	436.0	
	1998	1309.0	
Vietnam			312.0
Average		1298.4	632.5

Table 2: Estimation results of the baseline models

Dependent variable: Sovereign bond yield spread	Baseline specification		Total public debt		Reinhart and Rogoff banking crisis dummy		Additional controls	
Banking crisis	1754.233	***	1606.056	***			1510.574	***
	(2.67)		(2.79)				(2.75)	
Banking crisis					1257.359	**		
(Reinhart and Rogoff definition)					(2.04)			
External public debt to GDP	19.624	***			28.498	***	8.470	
	(2.71)				(3.72)		(1.18)	
Total public debt to GDP			12.012	**				
			(2.37)					
GDP growth	4.643		7.364		-25.417		14.791	
	(0.24)		(0.45)		(-1.41)		(0.98)	
Openness	-0.012		-4.627		-1.834		-3.388	
	(0.00)		(-0.97)		(-0.37)		(-0.92)	
Reserves to imports	-70.577	***	-70.584	***	-46.173	**	-58.577	***
	(-3.17)		(-3.22)		(-2.10)		(-2.66)	
Current account balance	3.897		5.622		14.753		-2.735	
	(0.51)		(0.54)		(1.32)		(-0.27)	
Exchange rate change	3.012		7.959	**	3.767	*	6.939	**
	(1.15)		(2.50)		(1.71)		(2.46)	
Inflation	-4.223	**	-7.920	***	-3.875		-7.070	***
	(-2.04)		(-3.38)		(-0.69)		(-3.28)	
GDP p.c.							-0.285	*
							(-1.75)	
Arrears to GDP							78.515	***
							(3.09)	
Public expenditures to GDP							22.997	
							(0.67)	
R2 second stage	0.220		0.261		0.391		0.392	
F-stat. second stage	5.450	***	6.760	***	5.860	***	8.290	***
F-stat. first stage	4.770	***	6.870	***	7.840	***	4.430	***
Kleinbergen Paap LM	14.920	***	19.590	***	16.520	***	14.720	***
Overidentification test (Hansen J)	2.112		3.014		7.511		1.393	
No. of observations	342		307		280		331	

Note: Displayed are the results of the second stage regressions of the fixed effects instrumental variables model (considering country and year fixed effects). Four instruments for the banking crisis dummy are used: Overhead costs of domestic banks, cost-to-income ratio of domestic banks, concentration of domestic banking sector, financial freedom index. The results of the first stage regressions are available upon request. t-values in parentheses are based on robust standard errors. *, **, and *** denotes significance at the 10%, 5%, and 1% level.

Table 3: Estimation results of the interaction models

Banking crisis	837.903		323.273		310.197		1633.751	**	1327.686	*	1733.617	**	3586.617						
	(1.07)		(0.59)		(0.62)		(1.99)		(1.89)		(2.02)		(1.58)						
Banking crisis*External public debt to GDP	18.371																		
	(1.11)																		
Political stability			-561.259	***															
			(-4.80)																
Banking crisis*Political stability index			-1066.01	**															
			(-2.34)																
Government effectiveness					-840.051	***													
					(-3.35)														
Banking crisis*Government effectiveness					-1629.09	**													
					(-2.11)														
Election year							-6.701												
							(-0.07)												
Banking crisis*Election year							46.206												
							(0.05)												
Tenure of government party									6.142										
									(0.90)										
Banking crisis*Tenure of government party									-23.115										
									(-1.33)										
Government majority											43.700								
											(0.12)								
Banking crisis*Government majority											-358.493								
											(-0.30)								
Government fractionalization													-141.585						
													(-0.40)						
Banking crisis*Government fractionalization													-2431.67						
													(-1.04)						
External public debt to GDP	15.132	*	27.553	***	21.583	***	20.238	***	23.294	**	22.041	***	26.732	***					
	(1.76)		(3.97)		(2.99)		(2.75)		(2.47)		(2.71)		(3.27)						
GDP growth	-4.039		-11.084		-13.816		1.936		-14.939		2.482		10.935						
	(-0.24)		(-0.67)		(-0.72)		(0.10)		(-0.83)		(0.13)		(0.45)						
Openness	0.182		0.632		4.271		0.282		0.926		0.134		-1.585						
	(0.05)		(0.19)		(1.24)		(0.07)		(0.22)		(0.03)		(-0.29)						
Reserves to imports	-70.855	***	-50.682	***	-47.902	**	-69.452	***	-55.577	***	-81.599	***	-66.791	***					

	(-3.41)		(-2.91)		(-2.37)		(-3.04)		(-2.58)		(-3.17)		(-3.03)	
Current account balance	3.814		-9.437		5.157		3.652		6.505		4.884		8.758	
	(0.58)		(-1.28)		(0.72)		(0.48)		(0.70)		(0.54)		(0.71)	
Exchange rate change	2.793		2.478		3.284		3.062		2.283		2.819		2.153	
	(1.19)		(1.11)		(1.04)		(1.12)		(0.89)		(1.01)		(0.81)	
Inflation	-4.494	**	-2.800		-4.282	*	-4.188	**	-3.619	*	-3.944	*	-3.104	
	(-2.47)		(-1.62)		(-1.71)		(-2.00)		(-1.76)		(-1.79)		(-1.43)	
R2 second stage	0.370		0.437		0.395		0.260		0.370		0.325		0.117	
F-stat. second stage	6.670	***	7.390	***	6.360	***	5.330	***	4.330	***	5.350	***	4.650	***
F-stat. first stage dummy regression	7.900	***	3.200	***	3.360	***	4.700	***	2.870	***	3.300	***	3.860	***
F-stat. first-stage interaction regression	14.150	***	3.270	***	1.920	*	8.210	***	1.120		2.860	***	4.640	***
Kleinbergen Paap LM	13.720	*	16.270	**	20.610	***	9.440		12.470	*	15.660	**	7.120	
Overidentification test (Hansen J)	14.195	**	8.022		7.344		5.554		5.099		6.039		4.804	
No. of observations	342		338		338		342		275		312		313	

Note: Displayed are the results of the second stage regressions of the fixed effects instrumental variables model (considering country and year fixed effects). Dependent variable is the sovereign bond yield spread Four instruments for the banking crisis dummy are used: Overhead costs of domestic banks, cost-to-income ratio of domestic banks, concentration of domestic banking sector, financial freedom index. The results of the first stage regressions are available upon request. t-values in parentheses are based on robust standard errors. *, **, and *** denotes significance at the 10%, 5%, and 1% level.

Table 4: Marginal effect of banking crisis on sovereign bond yield spreads conditional on the legislative election year dummy

No election year	1633.75	**
	(1.98)	
Election year	1679.96	**
	(2.33)	

Note: t-values in parentheses are based on robust standard errors. ** denotes significance at the 10% and 1% level.

Appendix

Table A1: Definitions and sources of the variables

Variable	Definition	Source
Dependent variable		
Sovereign bond yield spread	Redemption yield of domestic (U.S. dollar denominated) sovereign bonds and the redemption yield on U.S. treasuries	JP Morgan's Emerging Markets Bond Index, Datastream
Independent variables		
Banking crisis dummy	Dummy variable, which equals 1 in a year when a banking crisis takes place, and 0 otherwise; dummy is taken from Laeven and Valencia (2008, 2012), who define systemic banking crises as an event when "a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face great difficulties repaying contracts on time. As a result, non-performing loans increase sharply and all or most of the aggregate banking system capital is exhausted"	Laeven and Valencia (2008, 2012)
External public debt to GDP	Foreign public debt to gross domestic product (GDP)	World Development Indicators (WDI), World Bank
GDP growth	Year-over-year percentage change in GDP (in constant U.S. dollars)	WDI
Openness	Exports plus imports to GDP	WDI
Reserves to imports	Foreign exchange reserves to imports	WDI
Current account balance to GDP	Current account balance to total foreign exchange reserves (including gold)	WDI
Exchange rate change	Year-over-year percentage change in the local currency/U.S. dollar exchange rate; positive values indicate a depreciation of the local currency against the U.S. dollar	WDI
Inflation	Year-over-year percentage change in consumer price index	WDI

Total public debt to GDP	Domestic and foreign public debt to gross domestic product (GDP)	Reinhart and Rogoff (2011a)
GDP p.c.	GDP per capita (in constant U.S. dollars)	WDI
Arrears to GDP	Principal arrears (public and publicly guaranteed) to Gross Domestic Product (GDP)	WDI
Public expenditures to GDP	Total public expenditures to GDP	WDI
Instrumental variables		
Overhead costs to total assets of domestic banks	Accounting value of a bank's overhead costs as a share of its total assets	Financial Structure Database 2012, Beck and Demirgüç-Kunt (2009)
Concentration of domestic banking sector	Assets of three largest banks as a share of assets of all commercial banks	Financial Structure Database 2012, Beck and Demirgüç-Kunt (2009)
Cost to income ratio of domestic banks	Total costs as a share of total income of all commercial banks	Financial Structure Database 2012, Beck and Demirgüç-Kunt (2009)
Financial freedom index	Index measuring government interference in the financial sector, higher values indicate less government interference	Heritage Foundation
Interaction variables		
Government effectiveness	Index captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies; higher values indicate more effective government policies	Worldwide Governance Indicators, World Bank, Kaufmann et al. (2010)
Political stability index	Index captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including	Worldwide Governance Indicators, World

	politically-motivated violence and terrorism	Bank, Kaufmann et al. (2010)
Election year	Dummy variable equals one if legislative election takes place in current year; zero otherwise	Database of Political Institutions, World Bank, Beck et al. (2001)
Tenure of government party	Variable indicates how long the party of the chief executive has been in office	Database of Political Institutions, World Bank, Beck et al. (2001)
Government majority	Fraction of seats in the parliament held by the government. It is calculated by dividing the number of government seats by total (government plus opposition plus non-aligned) seats.	Database of Political Institutions, World Bank, Beck et al. (2001)
Government fractionalization	Sum of squared seat shares of all parties in the government; higher values indicate lower levels of government fractionalization	Database of Political Institutions, World Bank, Beck et al. (2001)

Table A2: Summary statistics

Variable	Mean	Std. dev.	Minimum	Maximum
Sovereign bond yield spread	632.529	851.314	50.846	6342.273
Banking crisis dummy (Laeven and Valencia)	0.123	0.328	0	1
Banking crisis dummy (Reinhart and Rogoff)	0.139	0.346	0	1
External public debt to GDP	27.762	19.812	1.435	89.615
GDP growth	4.287	4.124	-14.800	18.287
Openness	72.018	41.186	15.841	220.407
Reserves to imports	5.429	3.426	0.296	24.235
Current account balance to GDP	-0.590	7.280	-27.157	32.543
Exchange rate change	9.828	52.782	-27.802	845.467
Inflation	12.992	58.051	-1.408	1058.374
GDP p.c.	3150.071	2160.477	317.395	10749.319
Arrears to GDP	1.393	5.594	0	55.617
Public expenditures to GDP	13.025	3.908	3.723	25.878
Total public debt to GDP	48.553	29.311	4.317	162.023
Overhead costs to total assets of domestic banks	4.312	2.310	0.876	12.737
Concentration of domestic banking sector	53.124	16.977	20.464	100
Cost to income ratio of domestic banks	60.598	16.043	16.372	192.247
Financial freedom index	50.819	15.707	20	90
Government effectiveness index	-0.132	0.530	-1.337	1.274
Political stability index	-0.573	0.768	-2.705	0.968
Election year	0.237	0.425	0	1
Tenure of government party	11.967	16.411	1	71
Government majority	0.587	0.226	9.278	100
Government fractionalization	0.779	0.275	0	1