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# Dissecting the ‘doom loop’: the bank-sovereign credit risk nexus during the US debt ceiling crisis

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## Abstract

Political events matter in economics. This paper uses the 2011 political standoff over increasing the US debt ceiling to define an instrument that is then used to estimate the impact on bank credit risk of changes in US credit risk. Results show that a 100 basis points increase in US sovereign default risk produces a 40 basis points increase in bank credit risk. Calculations also suggest that, as a consequence of the debt-ceiling crisis, US bank funding costs increased by approximately 18 basis points.

**JEL Codes:** G18; G21; G28;

**Keywords:** Banks, Sovereign default risk

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## 1. Introduction

The 2008 financial crisis was so disruptive for the global financial system that it forced many sovereigns to re-capitalise their banks. In some instances, the implementation of large state-funded bailout programmes put public finances under severe strain, ultimately increasing government default risk. If

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at the onset of the global financial crisis, credit risk spread primarily from banks to governments, the 2010 European sovereign debt crisis was a powerful reminder that credit risk can also proceed in the opposite direction; the exposure to sovereign bonds of troubled economies represented a significant source of credit distress for financial intermediaries. Even more recently, and despite improved financial conditions, the characterisation of the link between sovereign and bank credit risk has been an important ingredient for understanding financial and fiscal vulnerabilities, especially in Europe. The political turmoil following the Italian elections in March 2018 was accompanied by a repricing of sovereign risk and a sharp sell-off in Italian sovereign bond markets. Debt-market tensions then spilt over to financial intermediaries, evidence of a resurgent doom *doom loop*, the sovereign–bank credit-risk nexus.

The COVID-19 crisis has markedly increased the risk of doom loops emerging even in economies with traditionally sound fiscal positions. In spring 2020, the COVID-19 pandemic forced most advanced countries to shut down part of their economies, precipitating a recession of unprecedented nature and magnitude. The fiscal response that followed was large, and it produced a dramatic worsening of fiscal balances. Over the coming years, extraordinarily high levels of public debt will represent a key fiscal fragility for many advanced economies, especially in the wake of monetary policy normalisation.

Despite traditionally being shielded from fiscal tensions, the U.S. will be in a weaker fiscal position in the coming years. The 2020 federal deficit amounted to over 15 per cent of GDP, the greatest deficit as a share of the

economy since 1945. Some estimates suggest that the Federal debt, which recently surpassed 100 per cent of GDP, will approach 109 per cent of GDP in 2021, while general government debt could surpass 130 per cent by 2023, the highest in the nation's history. Should even mild tensions materialise in US public-debt markets, we can hardly expect the US banking sector to remain unaffected.

Higher sovereign default risks can transfer to banks via a number of channels. Mark-to-market valuations of sovereign bonds generate impairments on trading books, weakening bank profitability and balance sheets. Moreover, sovereign stress may transmit to banks by reducing the credit quality of bank assets indirectly affected by a sovereign default, such as private sector loans to creditors of the central government. Theoretical representations of bank–sovereign credit linkages are numerous. Empirical investigations are no less abundant, but in general only limitedly deal with the endogeneity issue embedded in this relationship; Altavilla et al. (2017) use monthly data for euro-area banks from 2007 to 2015 to find that, in vulnerable countries, publicly owned, recently bailed-out banks significantly amplified the transmission of risk from the sovereign via subdued lending. Alter and Schüller (2012) investigate the interdependence of default risk for several euro-area countries and their domestic banks. They find that in the period before bank bailouts, the contagion disperses from their credit spreads to sovereign credit default swaps (CDSs). Alter and Beyer (2014) try to quantify spillovers between sovereign credit markets and banks in the euro area. De Bruyckere et al. (2013) investigate contagion between bank and sovereign default risk in Europe over the period 2007 to 2012. Alber-

tazzi et al. (2014) examine the implications of sovereign debt tensions for the Italian credit market during the sovereign debt crisis. The authors find that sovereign spreads significantly affect the cost of credit for firms and households and exert a negative effect on loan growth. Similar results are found by Zoli (2013). De Marco (2017) and Popov and Van Horen (2013) use data from the European Banking Authority stress test to show that banks with large sovereign exposure raised lending rates more sharply and decreased their access to wholesale funding more extensively than did other banks. Acharya et al. (2018) use syndicated loan data to investigate the loan contraction caused by the sovereign crisis. Finally, Becker and Ivashina (2017) find crowding out effects due to the high exposure of banks to sovereigns in lending to corporates.

Despite this evidence, the inherent identification problem that characterises the relationship between sovereign and bank credit risk has hampered accurate quantification of the causal relationship between the two. This paper tries to fill this gap by proposing a simple identification scheme based on instrumental variables. The idea is to use the political events relating to the 2011 US debt-ceiling crisis as a base for the characterisation of an instrument for US sovereign credit risk.. Recent events, including the 2016 UK referendum on EU membership, are potent reminders that political events may have a severe impact on financial markets and macroeconomics variables. This paper shows that the political struggle in the first quarters of 2011 between the White House and US House of Representatives for an increase in the debt ceiling had a non-negligible impact on US-government CDSs. Exogenous to innovations in bank credit risk, the events characterising the

crisis provide a source of variation in US sovereign default risk that can be used for the identification of the causal effect of sovereign credit risk on bank default risk.

Results show that a 100 basis points increase in US sovereign default risk causes a 41-basis-points increase in bank credit risk. Moreover, as a consequence of the debt-ceiling crisis, US bank funding costs increased by approximately 18 basis points.

The discussion that follows describes the empirical problem in the characterisation of the bank–sovereign credit-risk nexus (Section 2) and how to use the political timeline of the debt-ceiling crisis to construct an instrument for sovereign default risk (Section 3). Section 4 presents the estimated impact of government credit risk on bank CDSs. The final section contains conclusions and policy implications.

## **2. Empirics: anatomy of the bank-sovereign credit-risk relationship**

Consider the following model describing the relationship between bank and sovereign credit risk

$$s_t = \beta_s q_t + \gamma Z_{s,t} + v_{s,t} \tag{1}$$

$$q_t = \beta_q s_t + \delta Z_{q,t} + v_{q,t} \tag{2}$$

where  $s_t$  is a measure of default risk for banks at time  $t$ ,  $q_t$  is the corresponding measure for sovereigns;  $Z_{s,t}$  and  $Z_{q,t}$  are two vectors of exogenous

controls, possibly including a constant. This representation essentially suggests that the two endogenous variables,  $q_t$  and  $s_t$ , are jointly determined in a simultaneous equations model. If  $Z_{s,t} = Z_{q,t} = Z_t$  the system is unidentified and a simple OLS estimation of Equation (1) would produce biased and inconsistent estimates of  $\beta_s$  – the target coefficient measuring the impact of sovereign on bank credit risk. However if  $Z_{s,t} \neq Z_{q,t}$ , meaning if the set of exogenous variables is not the same for both equations and if there is at least one element  $z_t^i$  in  $Z_{q,t}$  not in  $Z_{s,t}$ , the identification of Equation (1), and thus of  $\beta_s$ , is possible. The conditions that must hold for each generic excluded instrument  $z_t^i$  in  $Z_{q,t}$  are  $E(z_t^i, u_t) = 0$ ,  $E(z_t^i, v_t) = 0$  and  $E(z_t^i, q_t) \neq 0$ , which implies  $\delta^i \neq 0$ .

In practice, it is not straightforward to think of an exogenous determinant of sovereign credit risk that is not also a determinant of the probability of bank default. Traditional identification assumptions based on covariance restrictions are unlikely to hold in this case, as they are inconsistent with the simultaneous nature of the relationship between the two endogenous variables. This paper proposes an instrumental variable approach to solve the identification problem entailed in Equations (1) and (2). The following sections describe how a political event, here the 2011 US political struggle (the *debt ceiling crisis*) can be exploited to construct an instrument of sovereign credit risk ( $z_t^j$ ) that is excluded from Equation (1), but that had an impact on sovereign default risk. The crucial intuition needed to justify the exclusion restriction  $E(z_t^j, v_t) = 0$  is that the disagreement between the House of Representatives and the White House over the possibility of an increase of the US debt ceiling was not affected by credit conditions in the

banking system.

### **3. Identification, the debt-ceiling political timeline**

On 2 November 2010, the Republicans won control of the US House of Representatives on a promise to scale back government spending and tackle the high fiscal deficit. This set the stage for a political battle between Democrats and Republicans six months later that brought the US government a few steps away from default. The fulcrum of this political struggle was the rise of the US debt ceiling, a legislative limit on the amount of national debt that can be issued by the US Treasury. In January 2011, the Treasury estimated that US borrowing needs could push the amount of debt incurred past the legal borrowing limit of 14.294 trillion USD sometime between 31 March 31 and 16 May. Failing to increase the debt ceiling before these dates would result in a technical default by the US government. The political crisis developed alongside a number of crucial votes, key meetings and political declarations that had an impact on the short-term default risk for US-government bonds (Table I). Within this paper's analytical framework, this political clash is used as an exogenous source of variation for US sovereign default risk, solving the identification problem described by Equations (1) and (2). The exclusion restriction required for a correct instrumental variable (IV)-identification strategy holds under the assumption that the political clash between Republicans and Democrats was not affected by other economic or financial factors, including fluctuations in bank credit risk.

The first step for the construction of an instrument from the timeline in



Table I is to interpret the expected effect on US sovereign default of each episode; the second column in Table I contains a description of each event along the timeline, and the last column sets out the reasonable expectation of the event’s impact on US-government credit risk. The expected impact on US sovereign default risk is postulated under the premise that persistent or widening disagreement between the parties hampered their achievement of the political agreement necessary to raise the debt ceiling, thus jeopardising the US government’s ability to stay solvent.

Figure 1 shows the evolution of one, two and five-year, USD denominated, US-government CDSs over the first half of 2011, against key dates identified in Table I; red (green) vertical lines mark episodes that are interpretable as increasing (decreasing) credit risk. From a graphic inspection, two facts stand out: first, US-government CDSs appear to spike on certain crucial dates identified on the crisis timeline. Second, the price of short-term CDSs appears to be more sensitive than that of the five-year contracts. In addition, the volatility in the CDSs markets increases significantly after May 2011, when the debt-ceiling debate reaches crisis proportions. From July to the beginning of August 2011, an inversion of the CDS curve can be observed, implying a higher cost for credit protection in the short term and indicating markets’ fear for an imminent default.<sup>1</sup>

The construction of a numeric variable from the timeline presented in Table I is not straightforward; the simplest choice is to create a dichotomous variable  $z_1$  ( $z_2$ ) assigning a value of one to each date associated with events

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<sup>1</sup>This was the first ever recorded inversion of the US sovereign CDS curve.

of disaccord (accord) among Democrats and Republicans about raising the debt ceiling and zero otherwise. An alternative is the construction of a unique variable (let us call it  $z_3$ ) and assigning two possible values (1 and -1) to events signalling accord and disaccord among the parties, respectively. Thus  $z_3$  is defined as  $z_2 - z_1$ . Both these solutions are tested using the empirical specifications that follow. In both cases, the resulting variables do not convey the *intensity* of the impact on US-government CDSs of the various events in the timeline. In the second case (a unique instrument), symmetry is also assumed between events increasing and reducing US-government CDSs. This condition does not affect the accurate assessment of the coefficient  $\beta$  in Equation (1) and the use of a unique instrument may bring the benefit of accrued estimation efficiency.

A key issue concerns the effect on the validity of the instrument of possible inaccuracies in the interpretation of the events comprising the timeline presented in Table I. Although common sense can be helpful in a compelling interpretation of the events reflected in Table I as potentially increasing (or decreasing) the risk of a default, such interpretation remains inherently subjective. In some cases, it is not possible to convincingly sort events linked to the political crisis into the two categories of analytical interest. In Table I only those events that appear more easily interpretable are used for the construction of the instruments; the others are omitted. However, mistakes in interpretation of the timeline in Table I are possible, and it is important to determine how they might affect the instrument. Errors in interpretation will affect the *relevance* of the instrument (the condition that  $E(z_t^i, q_t) \neq 0$ ) but not its exogeneity. This implies that misjudgement in the qualification

of the instrument will increase the probability of a Type II error in Equation (2) or the risk of rejection of the validity of the instrument. However, this possibility can be ruled out if the condition  $E(z_t^i, q_t) \neq 0$  (instrument relevance) is empirically verified.

#### 4. Estimation and results

The baseline specification is

$$s_t = \beta_s q_t + \phi_s q_{t-1} + \rho_s s_{t-1} + \gamma \Omega_{(t;t-1)} + \zeta_t \quad (3)$$

where  $s_t$  is a variable representing 5-year bank CDSs. This variable is computed as the median of 5-year USD CDSs for the largest six US banks by asset size.<sup>2</sup>  $q_t$  is the 5-year, USD US-government CDS.<sup>3</sup>  $\Omega$  is a vector of controls including the log of the VIX index and the Baa- to Aaa-rated corporate bond spread, two proxies for investor-risk appetite and known determinants of the price of insurance against default risk. Equation 3 is estimated using frequencies. The model also includes a set of time fixed effects defined at a quarterly frequency. The use of quarter fixed effects allows controlling for low-frequency macroeconomic variables that may affect both dependent and independent variables. One lag of two endogenous

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<sup>2</sup>Among these JP Morgan Chase & Co., Bank of America, Wells Fargo & Co., Citigroup Inc., Goldman Sachs and Morgan Stanley, representing over 60 percent of the overall US banking industry by assets in 2017.

<sup>3</sup>The choice of using USD denominated CDS with respect to the more liquid EUR denominated, responds to the necessity of eliminating possible exchange rate effects from the analysis. Similarly, the use of 5 year CDS, with respect to 1 or 2 year contracts, that, as shown, appeared to be more volatile during the period of analysis, is more appropriate to eliminate the possible impact of term spreads.

variables  $s_t$  and  $q_t$  and of the VIX index are introduced to eliminate serial correlation.

Regression results are reported in Table II. The first column shows results for a simple OLS estimation; the second and fourth columns show results for an IV-GMM estimation where key identifying conditions are obtained using the set of instruments discussed above. The third and fifth columns show corresponding first step estimations. In all IV specifications, the instrument performs well and the target coefficient  $\beta$  identifying the effect of government CDS on bank credit risk is positive and significant.<sup>4</sup> Quantitatively, a 100 basis points increase in the US sovereign default risk causes an increase of 41 basis points in bank credit risk.<sup>5</sup>

Table III sets out the results of various robustness tests. The first column in the table shows the benchmark specification. The second model uses a monthly (instead of quarterly) time fixed effect. The rationale for the introduction of a monthly fixed effect is to control for unobservable variables at higher than quarterly frequencies. In the third model, estimation is restricted to a shorter period around the first two quarters of 2011 (from November 2010 to August 2011).<sup>6</sup> The last column of Table III tests the robustness of results to the use of standard errors robust to arbitrary serial

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<sup>4</sup>the Kleibergen-Paap (K-P) rank LM underidentification statistics suggests the existence of significant correlation between the instrument and the endogenous variable; at the same time, a high value for the K-P Wald F-statistic allows to rule out the possibility that the estimated IV coefficient could be biased toward the corresponding OLS due to weak identification.

<sup>5</sup>Considering the model with a single instrument.

<sup>6</sup>The use of a longer time sample for the baseline estimation originates from the willingness of comparing the IV coefficient with a corresponding OLS estimate assessed over a sufficiently long period of time.

correlation. The key results survive this battery of tests. The use of month fixed effects reduces to 0.29 the point estimate of the target coefficient.

## 5. The cost of political uncertainty

The buyer of a credit swap receives a given contingent amount following a credit event, such as a default. The contingent amount usually corresponds to the difference between the face value of the underlying bond and its market value at the time of default.<sup>7</sup> As discussed in Duffie (1999) and Hull and White (2000) if both CDS and cash bonds price default risk equally and subject to possible arbitrage imperfections,<sup>8</sup> the spread on the risky ( $y$ ) bond over a risk-free ( $r$ ) should equal the CDS price. In this case, the following approximate arbitrage relation between CDS and credit risk spreads should hold:

$$s_t \approx y_t - r_t \quad (4)$$

Estimates of the impact of sovereign credit risk on bank CDSs obtained in the preceding sections can be used to quantify the additional financing

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<sup>7</sup>The principal amount minus the recovery rate times the sum of principal and accrued interest on the reference obligation

<sup>8</sup>The spread on a par fixed-coupon risky bond over the par fixed-coupon risk-free bond exactly equals the CDS price if the payment dates on the CDS and bond coincide, and recovery on default is a constant fraction of face value (Houweling and Vorst (2002)); this is rarely the case. Also physically settled CDS prices may contain CTD premia, and the arbitrage relation that should keep the two prices together may rely on short selling the cash bond, possibility that is not always costless and indeed is sometimes not even possible in illiquid bond markets. Nevertheless, Duffie (1999) and Hull and White (2000) show that the relationship between CDS prices and the difference between corresponding bond yields the risk free tend to be reasonably accurate for assets trading close to par when interest rates are not high and yield curves are relatively flat, as was the case of the sample period used in this analysis.

cost that may be suffered in the financial sector following an increase in government credit risk. In detail, the overall impact of the debt-ceiling debate on bank 5-year CDSs can be determined by looking at the projection of the instrument identifying disagreement among parties ( $z_1$ ) on US-government CDSs times the estimated impact of US sovereign credit risk on bank credit risk. Using estimates from Model (2) in Table II a rough calculation of the impact of the disagreement between the two political parties on US-government CDSs was 46 basis points. Multiplying this figure by the estimated impact on bank CDSs, we obtain an overall impact on bank CDSs of approximately 18 basis points. That is to say, US bank financing cost increased by approximately 18 basis points over the risk-free rate as a consequence of the US debt-ceiling crisis.

## 6. Conclusions

This paper proposed an empirical characterisation of the relationship between sovereign and bank credit risk. The core of the empirical strategy is represented by an instrument for US sovereign default risk, constructed using the timeline of events comprising the US 2011 debt-ceiling crisis. The use of a source of variation for sovereign CDS that is exogenous to bank credit risk allows the identification of the causal impact of an increase in sovereign credit risk on the probability of bank default. From a quantitative standpoint, an increase of 100 basis points in US sovereign credit risk increases bank CDS by about 41 basis points. Finally, as a consequence of the US debt-ceiling crisis, during the first quarters of 2011, US bank funding costs increased of about 18 basis point.

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TABLE I. Debt ceiling timeline: How U.S. debt talks spiraled into crisis

Date	Description	Interpretation	Expected effect on US Gov. CDS
November 2, 2010	Republicans win control of the House of Representatives on a promise to scale back government spending and tackle budget deficits that have hovered at their highest levels relative to the economy since World War Two.	Framework	(N/A)
January 6, April 4, and May 2, 2011	Treasury Secretary Timothy Geithner sends a letter to Congress urging lawmakers to act soon to increase the debt ceiling, warning that failure to do so would be disastrous for the economy. In January the Treasury estimates that U.S. borrowing needs could push the amount of debt past the legal borrowing limit of 14.294 trillion sometime between March 31 and May 16.	Framework: the debt ceiling crisis starts	(N/A)
January 28, 2011	Moody's Investors Service states that it may place a "negative" outlook on the AAA rating of US debt, as the country's budget deficit widened.	Not strictly political thus excluded from the analysis	(N/A)
February 15, 2011	President Obama presented his budget proposal for fiscal year 2012 on February 14. The following day the the U.S. House Committee on the Budget, strongly criticises the budget proposal with a written letter for not doing enough to rein in the rapidly expanding US deficit. The Senate will reject the budget proposal on May 25.	Initial evidence of disagreement between the parties	<i>Positive</i>
April 3, 2011	Republican Sen. John Cornyn, member of the Senate Budget Committee, says he will not vote to raise the debt ceiling unless it's accompanied by systematic reforms to address long-term spending and the national debt, voicing support for a balanced-budget amendment to the Constitution as a way to ensure the federal government lives within its means "instead of spending money we don't have."	Initial evidence of disagreement between the parties	<i>Positive*</i>
April 8, 2011	Democrats and Republicans narrowly avert a partial shutdown of the federal government, agreeing on a budget deal and a short-term funding extension a little more than an hour before the clock strikes midnight and time runs out. The new funding extension, which cuts spending by 2 billion USD, will last through the next week.	Difficult interoperation: the attainment of an agreement partially diffuse the risk of a default, however the effect is only shot lived and the timing in which the agreement was reached underscores the political distance between the two parties	<i>Ambiguous</i>

TABLE I. Debt ceiling timeline (Cont.)

Date	Description	Interpretation	Expected effect on US Gov. CDS
April 15, 2011	On a party-line vote 235-193, the House of Representatives passed the Republican 2012 budget proposal aimed to reduce total spending by 5.8 trillion USD and reduce total deficits by 4.4 trillion USD over 10 years compared to the current-policy baseline. The measure, which Obama opposes, includes a radical overhaul of Medicare and Medicaid and it has virtually no chance of clearing the Democratic-controlled Senate.	Difficult interpretation: while showing commitment toward finding a solution, the vote in the House of Representatives, also displays the unwillingness of Republicans to compromise and find a shared solution with Democrats. But a shared solution is necessary given the Democratic-controlled Senate.	<i>Ambiguous</i>
April 18, 2011	Standard & Poor's Ratings Services revises its outlook on the US to negative due to recent and expected further deterioration in the US fiscal profile, and of the ability and willingness of the US to soon reverse this trend. With the negative outlook, S&P believed there is a likelihood of at least one-in-three of a downward rating adjustment within two years.	Not strictly political thus excluded from the analysis.	(N/A)
May 16, 2011	The debt ceiling is reached. Treasury Secretary Timothy Geithner issued a "debt issuance suspension period, directing the Treasury to utilize "extraordinary measures" to fund federal obligations.	Not clear interpretation: having reached the debt ceiling stresses the urgency of action, however the extraordinary measures adopted by the Treasury buy more time for reaching an agreement.	<i>Ambiguous</i>
May 18, 2011	Bipartisan deficit-reduction talks among the "Gang of Six" high-profile Senators are suspended when Republican Tom Coburn drops out.	Evidence of disagreement between the parties; a bipartisan solution is the only viable option given the split in the Congress.	<i>Positive</i>
May 24, 2011	House Republicans says that they would allow a vote next week on an increase in the federal debt ceiling with no strings attached, in order to see it defeated and show Democrats that no increase in federal borrowing authority can be enacted without significant spending cuts. Calling the vote a stunt, leading Democrats said that having a debt-ceiling vote that was intended to fail was irresponsible and could rattle an already anxious financial community.	Evidence of persistent disagreement between the parties.	<i>Positive</i>
May 25, 2011	The Senate rejected both the Republican House budget proposal, by a vote of 57-40, and the Obama budget proposal, by a vote of 97-0.	Evidence of persistent disagreement between the parties.	<i>Positive</i>

TABLE I. Debt ceiling timeline (Cont)

<b>Date</b>	<b>Description</b>	<b>Interpretation</b>	<b>Expected effect on US Gov. CDS</b>
May 31, 2011	The House voted on a bill to raise the debt ceiling without any spending cuts tied to the increase. The bill, which would have raised the debt ceiling by 2.4Étrillion USD, failed by a vote of 97-318. Democrats accused Republicans of playing politics by holding a vote they knew would fail.	Evidence of persistent disagreement between the parties.	<i>Positive</i>
June 23, 2011	Biden’s negotiations on the debt ceiling were halted when both Eric Cantor and Jon Kyl walk out over disagreements on taxes.	Evidence of persistent disagreement between the parties.	<i>Positive</i>
June 30, 2011	The Senate plans to forgo its scheduled recess for the week of July 4th to work on legislation to raise the debt ceiling and cut the deficit. Senate Majority Leader Harry Reid announces the Senate will take the Independence Day holiday off but will return to work on July 5. Democratic legislators discuss a scaled-back deal that would avert default but force Congress to tackle the debt ceiling issue again before the 2012 elections.	The episode shows the commitment of the Senate to reach an agreement.	<i>Negative</i>
July 7, 2011	After hosting lawmakers at White House, Obama says Republicans and Democrats are still far apart on many issues but that all agree on the need to raise the debt ceiling.	Evidence of persistent disagreement between the parties.	<i>Positive</i>
July 9, 2011	Boehner says a "grand bargain" is out of reach because Republicans will not accept the tax increases Democrats are demanding, and he calls for a more modest 2 trillion USD package that would rely mostly on spending cuts.	Evidence of persistent disagreement between the parties about the "grand bargain", involving savings up to 4 trillion USD; however Boehner declaration shows commitment to find a more limited deal.	<i>Ambiguous</i>
July 10, 2011	President Obama meets with congressional leaders at the White House. At one point, the talks get heated between House Majority Leader Eric Cantor and the President. Multiple sources, speaking on condition of anonymity, say President Obama tells the gathering that "this could bring my presidency down," referring to his pledge to veto any short-term extension of the debt ceiling. Sources say he vows, "I will not yield on this." Cantor tells reporters after the meeting that he proposed a short-term agreement to raise the federal debt ceiling, a position President Obama has previously rejected.	Evidence of persistent disagreement between the parties	<i>Positive*</i>

TABLE I. Debt ceiling timeline (Cont.)

Date	Description	Interpretation	Expected effect on US Gov. CDS
July 19, 2011	The ‘Gang of Six’ resurfaces with a deficit reduction plan that proposes 3.75 trillion USD in savings over 10 years and contains 1.2 trillion USD in new revenues. The Republican Majority in the House brought the ‘Cut, Cap and Balance Act (H.R.2560)’, their proposed solution to the crisis, to a vote. They passed the bill by a vote of 234-190, split closely along party lines: 229 Republicans and 5 Democrats ‘for’, 181 Democrats and 9 Republicans ‘against’; it was sent to the Senate for consideration. The Bill authorised that the debt ceiling be raised by 2.4 trillion USD after a ‘Balanced Budget Amendment’ was passed by Congress. <sup>2</sup>	Evidence of progress toward the rising the debt ceiling	<i>Negative</i>
July 21, 2011	Obama and Boehner are reported to be discussing a 3 trillion USD deficit-cutting deal. Obama stresses some revenues will need to be included in any accord. Obama meets with congressional Democratic leaders at the White House, but there are no reports of a breakthrough.	Despite the efforts between the two parties, no agreement is reached	<i>Positive</i>
July 31, 2011	Obama announces a deal between his administration and congressional leaders has been reached. The agreement, which still requires congressional approval, proposes a two-stage process. In the first stage, it includes 917 billion USD in spending cuts and other deficit reduction now, as well as a 900 billion USD increase in the debt ceiling. In the second stage, a special joint committee of Congress will recommend further deficit reduction steps totalling 1.5 trillion USD or more by the end of November, with Congress obligated to vote on the proposals by the end of the year.	Solution to debt ceiling crisis approaches.	<i>Negative*</i>
August 1, 2011	The U.S. House passes the debt ceiling deal that the White House and congressional leaders reached the previous day. The Senate will approve the measures the following day.	The debt ceiling crisis is over.	<i>Negative</i>

<sup>1</sup>The CBO analysis, released in April 2011, estimated that the budget would increase total deficits over 10 years by 2.7 trillion USD: from 6.7 trillion USD of the March 2011 baseline to 9.4 trillion USD with the proposed budget. <sup>2</sup>Since Constitutional amendments require a two-thirds majority vote in both chambers of Congress to pass, a vote for a Balanced Budget Amendment would require more support than the Cut, Cap and Balance Act bill achieved in the House vote. \*Event happened outside trading hours; effect imputed on the following Monday. This timeline constructed using the online news archives of AFP, CNN, the New York Times, the Los Angeles Times and Reuters.

Figure 1. US government CDSs during the debt ceiling crisis.

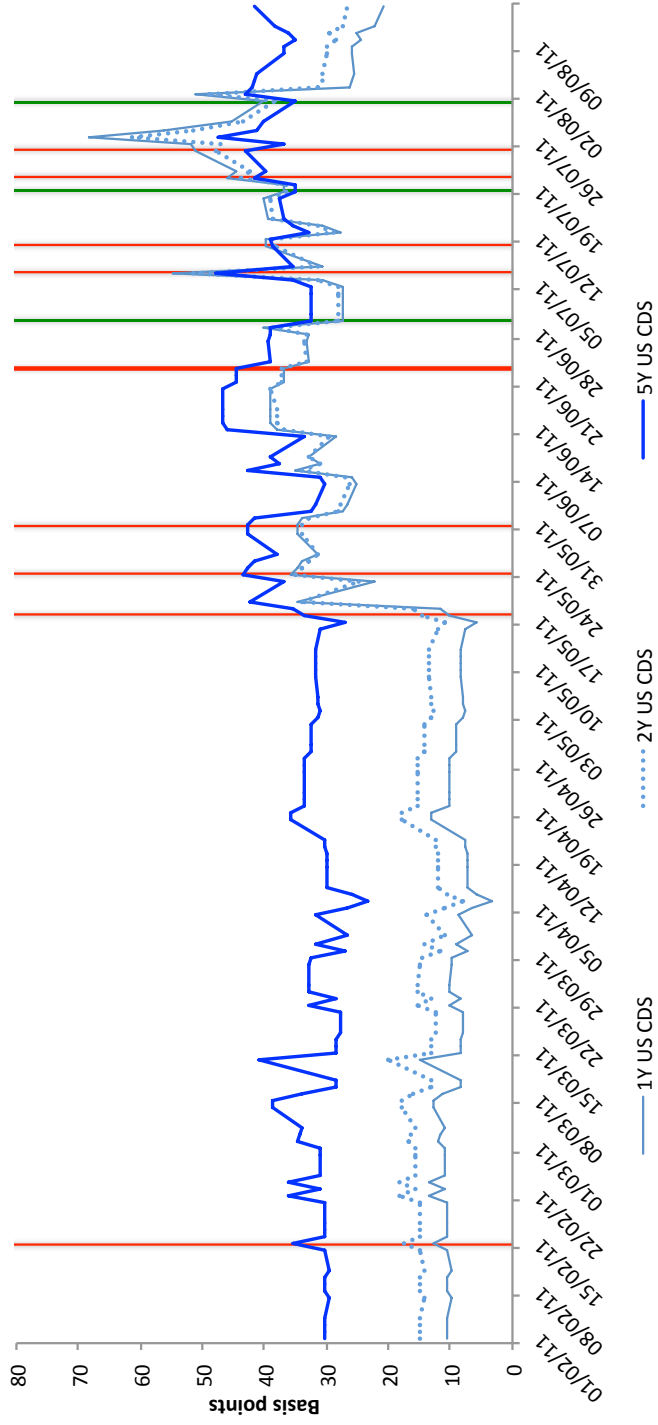


TABLE II. Bank CDS and government credit risk

	OLS		IV		
	(1)	(2)	(3)	(4)	(5)
	Bank CDS	Bank CDS	Gov.CDS	Bank CDS	Gov.CDS
Gov. CDS	0.519** (0.185)	0.385* (0.235)		0.410* (0.237)	
L.Bank CDS	0.904** (0.029)	0.913** (0.029)	-0.002 (0.004)	0.904** (0.029)	-0.002 (0.004)
L.Gov. CDS	-0.478** (0.163)	-0.365** (0.224)	0.917** (0.023)	-0.378** (0.225)	0.917** (0.022)
VIX	0.593** (0.063)	0.595** (0.063)	0.016 (0.013)	0.594** (0.063)	0.016 (0.013)
L.VIX	-0.449** (0.062)	-0.449** (0.062)	-0.009 (0.012)	-0.450** (0.062)	-0.009 (0.012)
Baa-Aaa Corporate Bond Spread	0.029 (0.056)	0.031 (0.056)	0.004 (0.012)	0.029 (0.056)	0.003 (0.012)
$z_1$ ( <i>disagreement</i> ) <sup>1</sup>			0.051** (0.012)		
$z_2$ ( <i>agreement</i> ) <sup>2</sup>			-0.044** (0.011)		
$z_3$ ( $z_1 - z_2$ )					0.049** (0.009)
Underidentification test <sup>3</sup>			0.0105		0.0025
Weak identification test <sup>4</sup>			19.030		30.640
Month FE	Yes	Yes	Yes	Yes	Yes
Observations	1043	1043	1043	1043	1043

The table presents the regression results for the relationship between bank and sovereign 5 year CDSs. The first equation shows results for a standard OLS regression, models 2-4 and 3-5 are respectively the second and first step regressions of IV-GMM models where US sovereign CDS are instrumented with a variable constructed from the calendar dates of the 2010 US debt ceiling crisis. Daily frequencies from 01-01-2008 to 30-12-2011. Robust standard errors in parenthesis. <sup>1</sup> the first instrument is a dummy variable identifying dates characterised by events denoting political *disagreement* over the increase of the debt ceiling. <sup>2</sup> the second instrument identifies all dates characterised by events denoting political *agreement* over the increase of the debt ceiling <sup>3</sup> Kleibergen-Paap rk LM statistic, Chi-sq(2) P-val. <sup>4</sup> Kleibergen-Paap rk Wald F statistic, Stock-Yogo critical values for % 10 maximal IV size is 19.93 for Model (3) and 16.38 for Model (5). \*  $p < 0.10$ , \*\*  $p < 0.05$ .

TABLE III. Bank CDS and government credit risk, robustness

	Robustness on baseline				Panel	
	(1) Bank CDS	(2) Bank CDS	(3) Bank CDS	(4) Bank CDS	(5) Bank CDS	(6) Gov.CDS
Gov. CDS	0.410* (0.237)	0.295* (0.169)	0.436** (0.211)	0.410* (0.237)	0.410** 0.096	
L.Bank CDS	0.904** (0.030)	0.830** (0.038)	0.933** (0.048)	0.904** (0.030)	0.904** (0.012)	-0.002 ( 0.002)
L.Gov. CDS	-0.378* (0.225)	-0.412** (0.181)	-0.319** (0.151)	-0.378* (0.225)	-0.378** (0.092)	0.917** (0.009)
VIX	0.594** (0.063)	0.613** (0.065)	0.386** (0.057)	0.594** (0.063)	0.594** (0.025)	0.016** ( 0.005)
L.VIX	-0.450** (0.062)	-0.343** (0.065)	-0.284** (0.057)	-0.450** (0.062)	-0.450** (0.025)	-(0.009)* (0.004)
BAA-AAA Corporate Bond Spread	0.029 (0.056)	-0.116 (0.093)	0.082 (0.054)	0.029 (0.056)	0.028** ( 0.022)	0.003 (0.004)
Underidentification test <sup>3</sup>	0.0025	8.418	0.0012	0.0025	0.0001	
Weak identification test <sup>4</sup>	30.640	24.056	37.739	30.640	187.14	
Country fixed-effects	N/A	N/A	N/A	N/A	Yes	Yes
Time fixed-effects	Quarter	Month	Quarter	Quarter	Quarter	Quarter
Time Sample	01/08-12/11	01/08-12/11	11/10-08/11	01/08-12/11	01/08-12/11	01/08-12/11
Serial Correlation Robust SE	No	No	No	Yes	No	No
Observations	1043	1039	159	1043	6258	6258
Adjusted $R^2$	0.886	0.756	0.935	0.886	0.8881	0.8664

The first model represents the baseline specification, the remaining equations test result robustness to different time fixed effects (Model 2), time sample (Model 3), and specification for the standard error (adjusted for serial correlation). Daily frequencies from 01-01-2008 to 31-10-2011. <sup>3</sup> Kleibergen-Paap rk LM statistic, Chi-sq(2) P-val. <sup>4</sup> Kleibergen-Paap rk Wald F statistic Robust standard errors in parenthesis.

\*  $p < 0.10$ , \*\*  $p < 0.05$