

A tale of two overhangs: the nexus of financial sector and sovereign credit risks

VIRAL V. ACHARYA

Professor of Finance

New York University Stern School of Business

ITAMAR DRECHSLER

Assistant Professor of Finance

New York University Stern School of Business

PHILIPP SCHNABL

Assistant Professor of Finance

New York University Stern School of Business

There has emerged in the Western economies a strong nexus between the credit risks of financial sectors and their sovereigns. We argue that this phenomenon can be understood in the context of two debt overhang problems: one affecting the financial sector due to its under-capitalisation following the crisis of 2007-08; the second, affecting the non-financial sector, whose incentives are crowded out by high sovereign debt and anticipated future taxes. While the desire to resolve the financial sector overhang may make bailouts tempting, they raise the risk of exacerbating the overhang related to sovereign debt. Conversely, reduction of growth prospects due to sovereign debt overhang can make the financial sector riskier as it is highly exposed to sovereign debt both through direct holdings and indirectly through implicit government guarantees. We provide evidence on this important nexus, based on our ongoing research that exploits data on European bank and sovereign credit risks.

From 2007 to 2010, the public debt to gross domestic product (GDP) ratio of the Irish government increased roughly at 20% per annum, from one of the most prudent in 2007, at 25%, to among the highest in 2010, at 96%. Irish banks had looked increasingly vulnerable in the Fall of 2008 with their credit default swap (CDS) spreads – the cost of buying protection against default on their unsecured bonds – having reached a peak (on average across the four largest banks) of over 400 basis points (bps) in September 2008. While Irish bank CDS stabilised to 150 bps following the Irish government’s announcement of a blanket guarantee of all creditors of Irish banks on 30th September 2008, the post-bailout period saw Irish sovereign and bank CDS co-move strongly, with both increasing to over 600 bps by the start of 2011.

At the other end of Europe, the Italian government had maintained a debt to GDP ratio of close to 100% even before 2007. While the Italian banks were stable at CDS spreads of close to 100 bps in 2007, the Italian sovereign CDS widened steadily from 2007 to 2010, reaching nearly 600 bps in 2011. By this time, the Italian banks were also assessed in credit markets at a significantly higher risk of over 600 bps. The situation in Greece was similar, indeed worse, with Spain and Portugal sitting somewhere in between the case of

Ireland and the cases of Greece and Italy. All of these countries experienced severe growth contractions during 2007-2011.

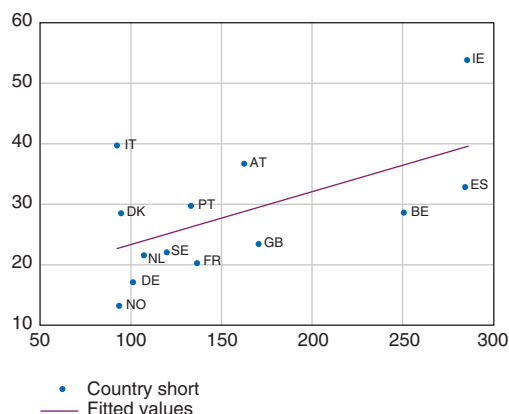
The pan-European patterns were similar: the average pre-bailout quality of the banking sector and the size of government debt predict future sovereign risk. We illustrate these relationships by examining empirical proxies for the quality of the banking sector and the size of the government debt *before* the bank bailouts and their association with the change in sovereign credit risk *after* the bailouts.

Chart 1 pertains to the quality of the banking sector. We measure the quality of the banking sector as the average bank CDS as of September 26th, 2008. We choose this date because it is immediately prior to the first announcement of bank bailouts in Europe and the United States. We thus interpret our measure as a proxy for the quality of the bank sector if investors do not necessarily expect bank bailouts. Consistent with this interpretation, we generally observe a large decline in average bank CDS after the announcement of a bailout. We use sovereign CDS to measure sovereign risk and we analyse the change in sovereign CDS over a short and a long horizon. The short horizon is September 26th until October 21st, 2008, the period when a large group of

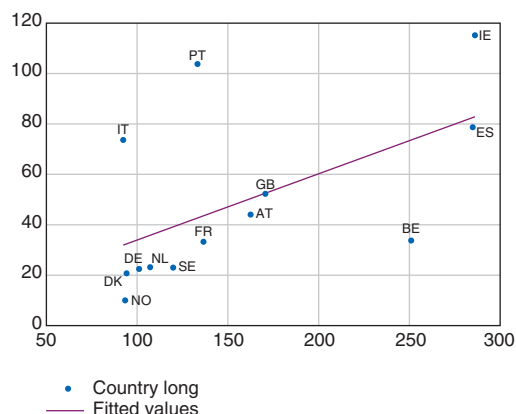
Chart 1
Average bank CDS before bailouts predicts sovereign CDS after bailouts

(in basis points, x axis: average bank CDS before bailouts, y axis: change in sovereign CDS during bailouts)

a) Short-run



b) Long-run



Note: This Chart shows the relation between average bank CDS by country before the bank bailouts (as of September 26th, 2008) and the increase in sovereign CDS after the bank bailouts (from September 26th, 2008 to October 21st, 2008). We include all European countries with available data on sovereign CDS and bank CDS.

Sources: Datastream (bank and sovereign CDS data) and Acharya, Drechsler, Schnabl (calculations).

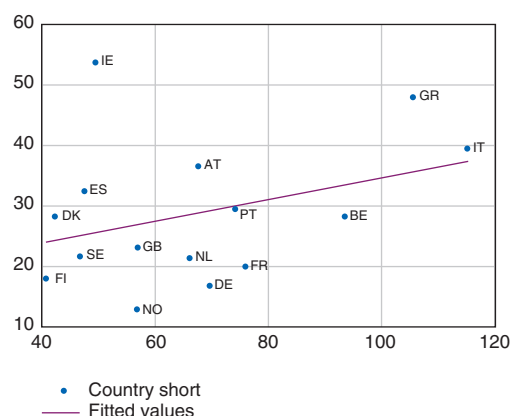
Note: This Chart shows the relation between average bank CDS by country before the bank bailouts (as of September 26th, 2008) and the increase in sovereign CDS after the bank bailouts (from September 26th, 2008 to the European bank stress tests on March 31st, 2010). We include all European countries with available data on sovereign CDS and bank CDS.

Sources: Datastream (bank and sovereign CDS data) and Acharya, Drechsler, Schnabl (calculations).

Chart 2
Debt-to-GDP ratio before bailouts predicts sovereign CDS after bailouts

(x axis: debt-to-GDP ratio before bailouts, y axis: change in sovereign CDS after bailouts, in basis points)

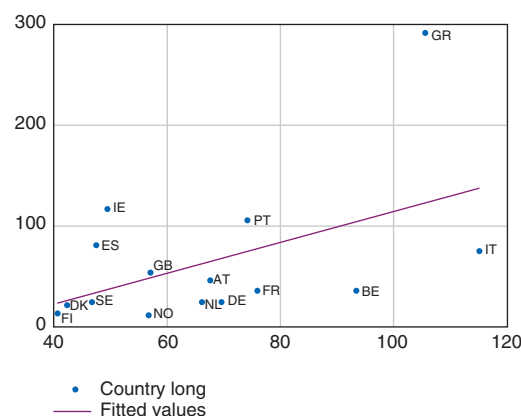
a) Short-run



Note: This Chart shows the relation between the debt-to-GDP ratio before the bank bailouts (as of July 1st, 2008) and the increase in sovereign CDS after the bank bailouts (from September 26th, 2008 to October 21st, 2008). We include all European countries with available data on sovereign CDS and debt-to-GDP ratio.

Sources: OECD (debt-to-GDP ratio), Datastream (sovereign CDS data) and Acharya, Drechsler, Schnabl (calculations).

b) Long-run



Note: This Chart shows the relation between the debt-to-GDP ratio before the bank bailouts (as of July 1st, 2008) and the increase in sovereign CDS after the bank bailouts (from September 26th, 2008 to the European bank stress tests on March 31st, 2010). We include all European countries with available data on sovereign CDS and debt-to-GDP ratio.

Sources: OECD (debt-to-GDP ratio), Datastream (sovereign CDS data) and Acharya, Drechsler, Schnabl (calculations).

Western governments announced their bank bailouts. For the long horizon, we extend this period until the 2010 European bank stress tests (September 26th to March 31st, 2010). The 2010 European bank stress test is a natural cutoff for the long-term measure, but our results are robust to other cutoff dates.

As shown in Chart 1a, there is a positive relationship between the quality of the banking sector and the short-term change in the sovereign CDS. Countries with risky banking sectors, such as Spain and Ireland, had an increase in sovereign CDS of up to 50 bps, whereas countries with safe banking sectors, such as Norway or Sweden, experienced an increase of less than 20 bps. As shown in Chart 1b, the positive relationship survives if we examine the long-term change in sovereign CDS. The fit is quite remarkable given that the 2010 bank stress test were conducted more than 2 years after the Lehman bankruptcy.

Chart 2 pertains to the size of government debt. We measure government debt as the debt-to-GDP ratio before the Lehman bankruptcy (as of June 2008). As shown in Chart 2a, there is a positive relationship between the pre-bailouts size of debt-to-GDP and the short-term change in the sovereign CDS. Countries

with a high debt-to-GDP ratio, such as Italy and Greece, experienced an increase in bank CDS of up to 50 bps, whereas countries with a low debt-to-GDP ratio, such as Finland and Germany, experienced an increase of less than 20 bps. As shown in Chart 2b, the positive relationship survives if we examine the long-term change in sovereign CDS.

Charts 1 and 2 suggest that it is important to examine both the quality of the banking sector and the size of government debt. For example, Ireland is prominent in the banking sector chart (Chart 1) but an outlier with regard to the debt-to-GDP ratio (Chart 2). In contrast, Italy is prominent in the debt-to-GDP (Chart 2) but an outlier with regard to the banking sector (Chart 1). Taken together, our analysis shows that some countries, such as Ireland, entered distress due to significant debt overhang in the financial sector, whereas others, such as Italy, entered distress due to sovereign debt overhang.

We therefore argue in Acharya, Drechsler and Schnabl¹ that these relationships between financial and sovereign credit risks, and economic growth, are not accidents, but in fact represent a tale of two debt overhang problems. When financial sectors

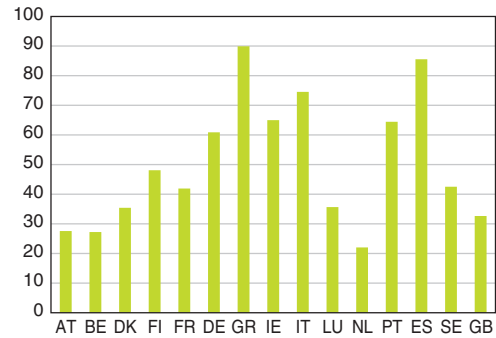
¹ See Acharya (V. V.), Drechsler (I.) and Schnabl (P.) (2010), "A Pyrrhic Victory? Bank bailouts and sovereign credit risk", Working paper, NYU-Stern.

are under-capitalised, as after the losses suffered during the 2007-08 financial crisis, economic growth can collapse as financial intermediaries engage in de-leveraging and a credit crunch ensues. In other words, the resulting debt overhang in the financial sector reduces banks' incentives to provide credit to the real economy. To avoid such a credit crunch and loss of real sector output, governments engage in large-scale, often blanket, financial sector bailouts.

Such bailouts, however, are costly and run the risk of amounting to a "Pyrrhic victory" for the sovereigns. First, bailouts require immediate issuance of additional debt by the sovereign in order to backstop the creditors of distressed or insolvent financial firms. This leads to an immediate increase in the sovereign's credit risk through the liability side of its balance-sheet. Second, and perhaps even more importantly, the sovereign runs the risk of becoming indebted to the point where another debt overhang can take hold in its economy. The private sector – households and corporations – anticipate that the sovereign's additional debt will require higher taxes in the future. This dilutes long-run returns on real-sector and human-capital investments. The resulting under-investment in the economy can cause growth and productivity in the sovereign to slow down, affecting the sovereign's credit risk through the asset-side of its balance-sheet. There is

Chart 3
 Home bias in Government debt

(y axis: home share; x axis: country)



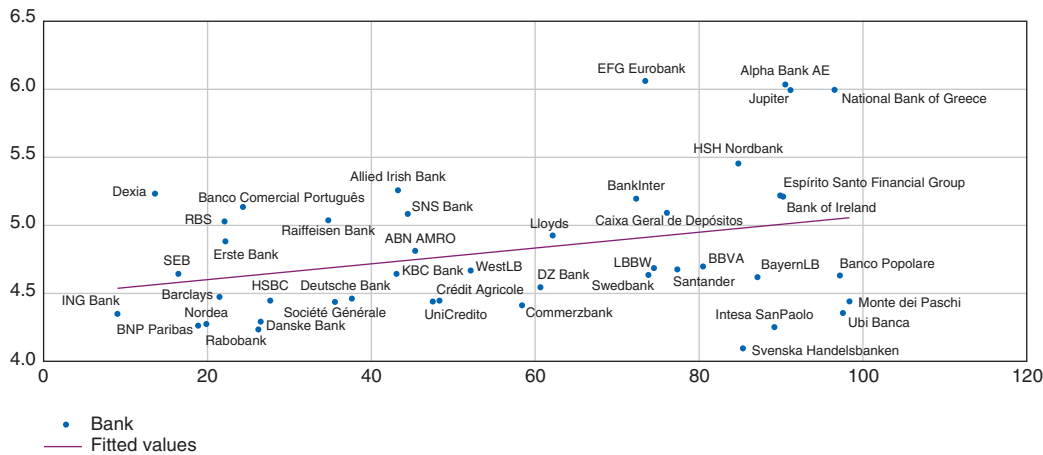
AT = Austria; BE = Belgium; DE = Germany; DK = Denmark; ES = Spain; FI = Finland; FR = France; GB = United Kingdom; GR = Greece; IE = Ireland; IT = Italy; LU = Luxembourg; NL = Netherlands; NO = Norway; PT = Portugal; SE = Sweden.

This Chart shows the average holdings of home sovereign debt as a share of total sovereign debt by country as of the European bank stress tests on March 31st, 2010. Sources: 2010 European bank stress tests (home share and Acharya, Drechsler, Schnabl (calculations)

therefore a tradeoff between the two overhangs, and the sovereign many need to "sacrifice" its own creditworthiness in order to alleviate the financial sector's overhang. The resulting rise in sovereign credit spreads induced by this "sacrifice" is consistent with the patterns in Chart 1 and 2, as are downwards revisions in expectations of growth in the Fall 2008.

Chart 4
 Home bias in Government debt and bank credit risk

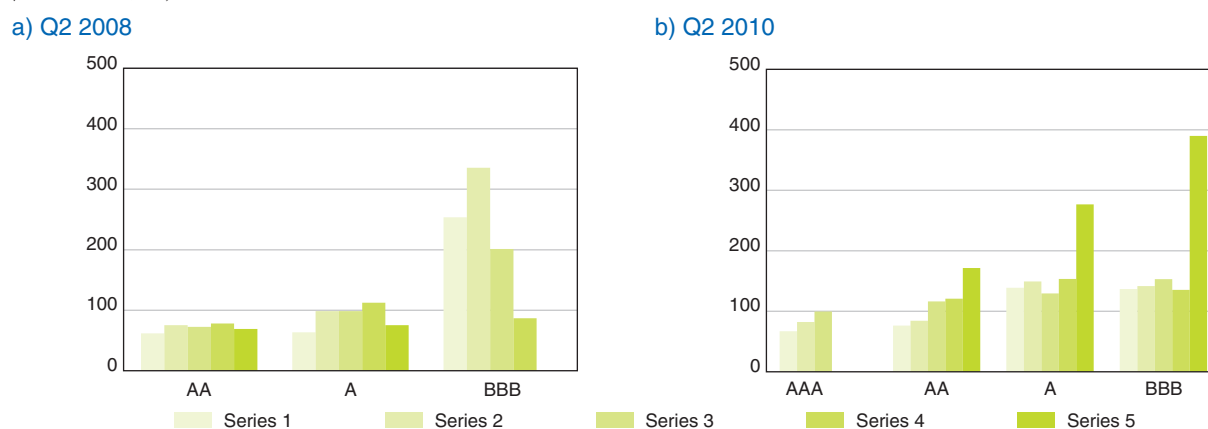
(y axis: log [Bank CDS]; x axis: home share, %)



This figure shows a positive association between home bias in government debt and bank credit risk (proxied for by the natural logarithm of a bank's credit default swap) as of the European bank stress tests on March 31st, 2010. Home bias in government debt is total home sovereign debt as a share of total sovereign debt. We include all banks that are included in the 2010 bank stress tests and that have bank CDS data. Sources: Datastream (bank CDS data), 2010 European bank stress tests (home share) and Acharya, Drechsler, Schnabl (calculations)

Chart 5
Quarterly bank CDS by credit rating and country CDS for 2Q 2008 and 2Q 2010

(y axis: mean of cds)



This Chart plots average banks CDS by credit rating and CDS country quintile for 2Q 2008 and 2Q 2010. We construct the country quintiles (1 to 5) based on sovereign CDS for each quarter. Next, we average bank CDS for each country quintile and each investment grade credit rating. The left hand panel shows that there was only a weak relationship between sovereign CDS and bank CDS for a given bank credit rating in the second quarter of 2008. The right hand side panel shows that there was a strong and positive relationship between sovereign CDS and bank CDS in the second quarter of 2010.
 Sources: Datastream (CDS data) and S&P RatingsXpress (credit ratings data).

Perversely, the deterioration in the sovereign's creditworthiness introduces the risk that its credit problems will feed back adversely onto its financial sector. One channel through which this occurs is the significant direct holdings of government debt by the financial sector. The stress test data revealed by the European regulators in June 2010 (on positions as of 31st March 2010) show that for every six euros of risk-weighted assets, the 91 stress-tested European banks held on average one euro of sovereign bonds. Further, Chart 3 shows the extent of "home bias", the proportion of the sovereign debt that was held by banks in a given country in the form of the country's own bonds. The home bias in government bond holdings is on average close to 60%, and is particularly strong for banks of troubled sovereigns (Greece, Ireland, Portugal, Spain and Italy). This home bias creates one form of reverse feedback from sovereign to the financial sector. As Chart 4 shows, the credit quality of European banks as of the stress tests in March 2010 – by when sovereign problems had begun to fester – was indeed related to the extent of their (respective) home bias.

The second form of reverse feedback arises due to the fact that the financial sector – with or without bailouts – is perceived to have creditor guarantees provided by the sovereign. As the sovereign's creditworthiness

declines, the value of these explicit and implicit government guarantees also declines, and this adversely impacts the financial sector's credit quality.

The case of the Spanish Bank Santander provides an example of the increased borrowing costs paid by a bank as the value of its sovereign's implicit guarantees deteriorates. Despite being the most profitable bank in the Euro region since 2007, Santander was in October 2010 paying more to borrow than some of its weaker counterparts in Germany. In particular, on June 1st 2010, Santander had a long-term bond rating of "AA" and was trading at a CDS fee of 207 bps. Its sovereign, Spain, had a sovereign CDS fee of 247 bps. On the same day, the German Bank WestLB had a long-term rating of "BBB+" and traded at a CDS fee of 158 bps. Its sovereign, Germany, had a sovereign CDS fee of 43 bps. Hence, even though credit ratings suggested that the profitability of Santander was significantly higher than the profitability of WestLB, the credit risk of Santander was higher than that of WestLB.²

Chart 5 shows that this pattern holds across Europe. We assign each bank the sovereign CDS of the country where the bank is headquartered and groups countries in five quintiles using sovereign CDS.

² In another example, Santander sold in September 2010 1 billion euros (USD 1.4 billion) of 4.125 percent, seven-year senior bonds with a AA rating that yielded 156 basis points more than average market rates. In contrast, Germany's Commerzbank AG, which required a government rescue in 2008, issued 1 billion euros of 4 percent, 10-year senior debt with an A rating that yielded 126 basis points more than the benchmark.

Next, we compute average banks CDS by credit ratings and by country quintile. The chart shows that keeping credit ratings constant, bank CDS monotonically increase in country quintiles, weakly so in the left panel which is before the bank bailouts (second quarter of 2008), and strongly so after the 2010 European bank stress (second quarter of 2010). In particular, banks with credit ratings of “AA” and “A” in the highest country quintile (e.g., Spain in June 2010) had on average higher CDS prices than banks with credit ratings of “BBB” in the lowest four country quintiles.

Alternatively, we can test the strength of the association between sovereign and bank CDS as a function of a bank’s credit rating. Specifically, we use daily bank-level data to estimate

$$\log(\text{Bank CDS}_{it}) = \sum_k \alpha_k \text{Rating}_{ikt} + \delta_t \sum_k \beta_k \text{Rating}_{ikt} * \log(\text{Sov CDS}_{it}) + \delta_t + \varepsilon_{it}$$

where $\log(\text{Bank CDS}_{it})$ is the natural logarithm of the CDS of bank i at time t , Rating_{ikt} is an indicator variable for the S&P Rating k of bank i at time t , $\log(\text{Sov CDS}_{it})$ is the natural logarithm of the CDS of the country in which bank i is based, and δ_t are time fixed effects. We focus our analysis on banks that are based in Europe and the United States with more than USD 50 billion in assets (according to Bankscope) and that have traded bank CDS and sovereign CDS (according to Datastream). We restrict our sample to the period after the bank bailouts and we focus on banks with S&P investment grade ratings (according to S&P RatingsXpress).

Table 1 presents the result. As shown in Column (1), bank CDS is larger for banks with lower ratings. This result is not surprising and suggests that credit ratings are informative about a bank’s financial distress. More importantly, Column (2) shows that the relationship between bank and sovereign CDS is positive for all banks and statistically significant for banks with lower ratings such as banks with A or BBB ratings. For banks with a credit rating of AA or higher, a 10% increase in sovereign CDS is associated with a 1.2% increase in bank CDS. For banks with a credit rating of A or BBB the effect increases to 3.1% and 2.6% respectively. Hence, the strength of the association is larger for banks with lower ratings. In short, these results suggest that an increase in sovereign CDS increases bank credit risk even after controlling for bank credit ratings and that the impact of sovereign CDS is larger for bank with lower credit ratings.

Table 1
Bank CDS and sovereign CDS by bank rating

Dependant variable	Log(Bank CDS)	
	(1)	(2)
Rating A	0.454** (0.098)	-0.317 (0.542)
Rating BBB	0.724** (0.148)	-0.007 (0.610)
Rating (AAA or AA) * Log(Sovereign CDS)		0.122 (0.111)
Rating A * Log(Sovereign CDS)		0.307** (0.100)
Rating BBB * Log(Sovereign CDS)		0.265* (0.108)
Constant	4.530** (0.072)	4.011** (0.429)
Time Fixed Effects	Y	Y
Observations	41,763	40,826
Banks	83	82
R-squared	0.180	0.241

The table shows regressions of bank CDS on bank credit ratings and sovereign CDS for the period from November 2008 to December 2010 using daily data. The sample includes all banks that have more than USD 50 billion in assets in Bankscope, have an investment grade rating from S&P in RatingsXpress, and have traded CDS in Datastream. The omitted category is Rating AAA and AA. The standard errors are clustered at the bank-level ** 1% significant and * 5% significant.

Source: Acharya, Drechsler, Schnabl.

Both of these reverse feedbacks – the first due to direct holdings of government bonds by financial firms, and the second due to implicit guarantees of the financial sector by governments – would further result in withdrawal of intermediation by banks, exacerbating sovereign credit risks, and giving rise to severe downward spirals of growth.

The nexus of debt overhangs and credit risks between the sovereign and the financial sectors that we have highlighted has an important policy implication. Sovereign bonds are accorded minimal, often zero, risk-weights in capital requirements for banks as long as sovereigns are well-rated. However, through the nexus of debt overhangs, even small deteriorations in the credit quality of sovereigns can precipitate financial and economic crises. It may therefore be prudent in good times, even when sovereigns are well-rated, to entertain the “stress test” possibility of future credit deterioration, e.g., through non-zero risk weights on sovereign bonds, and to require banks to fund sovereign bond holdings with reasonable quantities of capital. Not doing so can result in excessive funding of sovereigns by banks in good times, but with sharp reversals in bad times, as is being witnessed currently in the euro zone.