

Sovereign-Bank Nexus: Ten Years after the Debt Crisis

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Abstract

Economic policy, along with banking policy, has undergone fundamental changes in the decade after the Eurozone Debt Crisis, with one of its main objectives to break the vicious loop between bank and sovereign risks. A decade after the peak of the crisis, it is worth taking a look at what extent (if at all), after many reforms undertaken, the intensity of the nexus has been weakened. This paper analyzes the evolution of the nexus intensity since the Debt crisis, both at aggregate European and national levels, and derives relevant recommendations. The results suggest that when considering the nexus development at national level, no significant weakening of the nexus can be observed. The efficiency of the reforms so far undertaken is thus questionable. The findings point to the need to continue with the reform agenda and initiatives aimed at breaking the nexus, such as completing the banking union and updating the regulation of the banks' sovereign exposures.

Key words: Euro-crisis, Sovereign-Bank, Default-Risk, Debt-crisis, Nexus

JEL Code: G15, G21, H63

Introduction

Against the backdrop of the general economic growth in Europe in recent years, albeit somewhat slower in some countries, many reforms of economic governance in both the European Union and the euro area have been introduced. Economic policy, along with banking policy, has undergone fundamental changes, with one of its main objectives to break the vicious loop between bank and sovereign risks¹, the troublesome element and the catalyst of the last crisis. A decade after its peak, it is worth taking a look at what extent (if at all) the intensity of the nexus has been weakened. Such findings help assess the efficiency of the reforms undertaken and have implications for further possible policy responses.

The aim of this paper is to carry out an analysis of the evolution of the nexus intensity since the Debt crisis and to derive relevant conclusions and recommendations. Thomson Reuters daily market data on credit default swap (CDS) spreads² were used as an indicator of

¹ Credit risk associated with the sovereign is referred to as the "sovereign risk". Similar risk associated with the bank is sometimes called the "bank risk".

² The CDS spread (or premium) is the annual fee paid by the buyer to the seller of the CDS expressed in basis points (bps).

the counterparty default risk as perceived by the market participants,³ and the parallel movement of the bank CDS spreads and the sovereign CDS spreads as a proxy for the nexus intensity. Correlation and regression analyses were performed on a sample of euro area countries and major euro area banks representing over half of total banking assets in the euro area. The sovereign-bank nexus was assessed both at aggregate “European sovereign” level and at the national level, with an account of the most interesting country-cases.

There are other measuring options, yet this paper argues in accordance with e.g. Simkovic and Kaminetzky (2011) for the use of CDS spreads as the most appropriate proxy for the given purpose. While several authors illustrate the nexus for specific countries or for certain periods of time (typically during stress in markets with Italian government bonds), there has been little attempt to analyze the nexus more comprehensively – i.e. to look at the intensity development in the whole euro area, both at aggregate and local levels, for the whole decade after the crisis, and see whether there have been improvements (i.e. decoupling of risks). This paper therefore adds to the existing literature and complements it with a more comprehensive view on the evolution of the sovereign-bank nexus in the euro area post-Debt crisis.

1 Measuring options: case for the CDS spreads

The relation between the sovereign (the public sector) and banks is a complex one. However, one of the most relevant dimensions of these two entities’ interconnectedness, particularly in the context of the euro area Debt crisis after 2010, is the ability of one to drag down in crisis the other, i.e. the mutual credit risk transmission. This specific relationship of a credit risk spillover, as first spotted and described by the authors from the IMF, specifically Mody (2009), came to be known as the infamous sovereign-bank nexus. The nexus can manifest itself thanks to the multiple risk transmission channels that exist between sovereigns and banks.⁴

There are numerous ways to illustrate the sovereign-bank nexus. The co-movements of stock prices and sovereign bond yields are the typical examples, among others. This paper uses the correlation of the sovereign and bank CDS spreads as the most appropriate measure to document the nexus, as do various other authors, including Simkovic and Kaminetzky (2011); Nashikkar et al. (2011), Goyal et al. (2013), Acharya et al. (2014), Demary and Bauer (2014), Navaretti et al. (2016) or the ECB. If the bank and sovereign risks, as measured by the bank

³ The development of the CDS spread represents a market assessment (or perception) of credit risk and is used as a reference value of the receivable price or a trigger for collateral calls.

⁴ A useful diagram of several types of risk transmission channels between sovereign and banks can be found in Véron (2017) or De Bruyckere et al. (2012).

and sovereign CDS spreads, are positively correlated, it is possible to talk about the existing nexus that reflects the interconnected risk of default. On the other hand, decreasing correlation of these two credit risks indicates the nexus' relaxation ("decoupling" of the default risks).

For the purposes of sovereign-bank nexus documentation, the advantage of the CDS spreads over bond yields lies in the yield structure and a better comparability. In terms of the yield structure, the composition of the factors determining the yield on the bond is much more diverse than on the CDS premia, with the non-default component (e.g. maturity, coupon, rating or liquidity) playing a significant role. In contrast, the CDS spread should explicitly capture the portion of the bond yields associated with default risk (Nashikkar et al., 2011). Also, the CDS spread is a suitable proxy for the risk of default of a reference asset (bond) because they are better comparable than spreads on bonds across countries and companies (Breckenfelder and Schwaab, 2015).

2 Analysis of cross-default risk using CDS spreads

What follows is an illustration and analysis of the trends and developments in the correlation of the intertwined default risk across the euro area countries and banks in the decade following the financial and the subsequent sovereign debt crisis (2009-2019).

2.1 The sample

Thomson Reuters daily data for the decade starting January 2009 to January 2019 were used for this analysis. The original dataset on the bank CDS spreads contained 82 major banks from European Economic Area countries and some other countries from the rest of the world selected on the basis of a filter: banks / senior debt / 5-year CDS / euro denomination. This dataset was then adjusted to include only the euro area countries, which resulted in a sample of 50 banks from 11 euro area countries and representing slightly over half (approx. 53 %) of the total banking assets in the euro area.

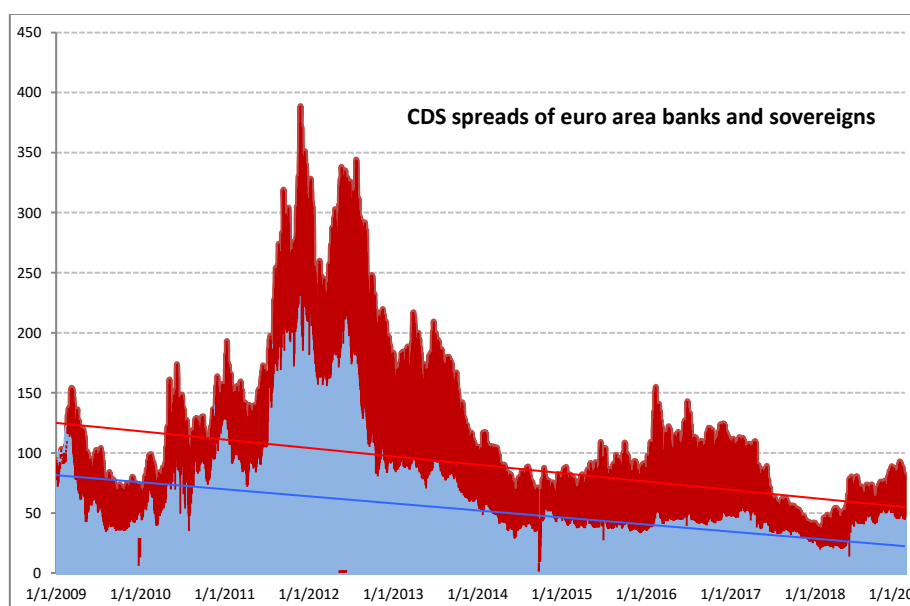
In order to document the average values of CDS spreads and the relationship between them, taking into account the importance of the respective states and banks involved in shaping the overall nexus between the "European sovereign" and the euro area banks, weighted averages were used. The weighted average mid-spread CDS of selected banks calculated at the close of trading was obtained by assigning weights to individual banks in the sample corresponding to the share of the total assets of the particular bank in the total assets of the euro area banking

sector. The weighted average of the daily mid-spread of the CDS of individual countries was calculated using the shares of these countries in the total euro area GDP.⁵

2.2 The sovereign-bank nexus at European level

Fig. 1 shows the evolution of the nexus. Both types of CDS spreads are interpolated with a linear regression curve to show the trend. Since 2009, a declining trend of the CDS spread levels can be observed, despite significant fluctuations in individual periods.

Fig. 1: Evolution of the nexus in the euro area (2009-2019; in bps)



Source: Thomson Reuters, own calculations

Tab. 1 shows that the sovereign-bank nexus reached its highest intensity in 2010 and 2011. This corresponds to the culmination of the euro crisis (Greek bailout, rescue package for Ireland and Portugal etc.). The nexus then reached its lowest point in 2015 and in 2017, when both types of risks became statistically less dependent on each other. Meanwhile, in 2016 and in 2018, another increase can be observed. Albeit the picture is more complicated when correlation coefficients are displayed on quarterly basis, the long-term trend shows that, at European level, there is currently (the beginning of 2020) no such strong link between the two previously highly interconnected risks.

⁵ The original dataset for euro area CDS spreads does not include two Member States - Greece and Luxembourg (likely due to outlier values and/or data disruptions), so these countries are not part of the adjusted sample.

Tab. 1: Yearly correlation coefficients

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Correlation coefficient	0.63	0.73	0.75	0.68	0.61	0.58	0.35	0.57	0.28	0.49

Source: Thomson Reuters, own calculations

Tab. 2 and the following figures shows the results of the regression analysis carried out in Gretl and Excel for the data on the sovereign CDS spreads and the bank CDS spreads.

Tab. 2: Regression results^{6, 7}

		<i>Regression Statistics</i>						
Multiple R		0,960035455						
R Square		0,921668075						
Adjusted R Square		0,92164676						
Standard Error		23,49967879						
Observations		3677						
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	23879044,23	23879044,23	43240,73703	0			
Residual	3675	2029463,27	552,2349034					
Total	3676	25908507,5						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	11,98809472	0,543564471	22,05459582	2,4625E-101	10,92237694	13,0538125	10,92237694	13,0538125
0	1,526596448	0,00734138	207,9440719	0	1,512202867	1,540990028	1,512202867	1,540990028

Source: Own calculations

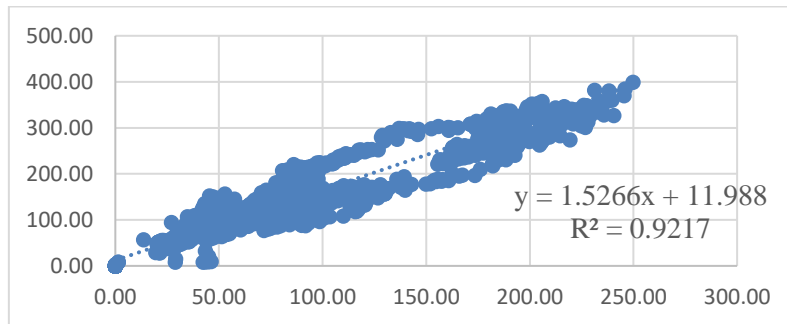
The regression model ($y = 1.5266x + 11.988$) estimated using the ordinary least squares method can be described as of a high quality ($R^2 = 0.9217$, or adjusted $R^2 = 0.9216$), as the empirical data match the regression model. The value of the calculated F-test, i.e. the statistical significance of the regression model, is 43240.74. The level of significance ("Significance F", or F-value), at which we can still reject the null hypothesis of the model's statistical insignificance, is zero, as well as the p-value (p-value = 2.5E - 101) that acquires a value very close to zero. The variables are therefore statistically significant at almost zero level of significance. The null hypothesis H_0 can thus be safely rejected at any low level of significance.

Graphically, the regression is shown below in Fig. 2.

⁶ Sovereign CDS spreads - weighted average for the euro area (independent, or explanatory variable) and bank CDS spreads - weighted average for the euro area (dependent, or explained variable). Despite the two-way relationship (the feedback loop) between the two sets of entities, the dependence direction of the variables was chosen on the basis of two factors. Firstly, various authors use it that way, such as BIS (2011), Dieckmann and Plank (2011), Fratzscher and Rieth (2018) or the ECB (2018). Secondly, the foregoing of the sovereign CDS spreads is partially (yet not always and perfectly) observable in the graphical representation of the data.

⁷ Correlation coefficient = 0.9600 | Coefficient of determination (R^2) = 0.9217 | Adjusted coefficient of determination = 0.9216 | Standard estimation error $Y = 23.4997$ | Number of observations = 3677

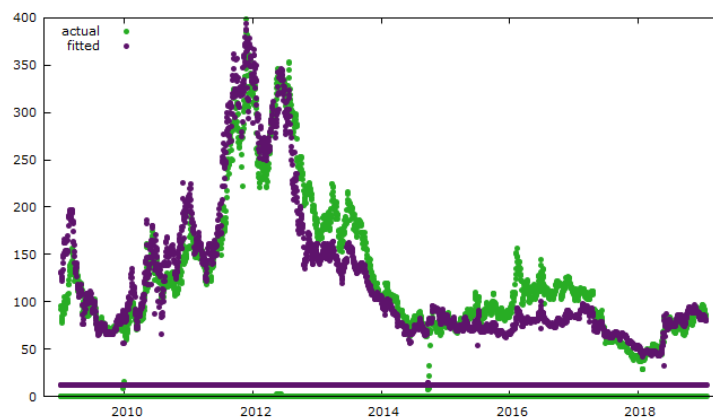
Fig. 2: Function of independent and dependent variables (in bps)⁸



Source: Thomson Reuters, own calculations

Fig. 3 below shows the actual (observed) and fitted (estimated) values derived from the equation of the estimated regression model for the dependent variable (CDS spreads of euro area banks - weighted average) depending on time. The standard estimation error between the actual and fitted values is 23.4997.

Fig. 3: Actual and fitted values for the dependent variable against the time axis (in bps)



Source: Thomson Reuters, own calculations

The results of the correlation and regression analyses performed at European level are not unambiguous. Three aspects can be highlighted in particular: 1) relatively strong correlation (above 0.5) for most of the observed period (total correlation coefficient = 0.96); 2) long-term declining trend; and 3) fluctuations recorded in otherwise quiescent years after the crisis.

If fluctuations were interpreted only as temporary and their significance were neglected at the expense of the role of the long-term trend, it can be argued that, at least in terms of the

⁸ The function of the independent variable (weighted average of euro area sovereign CDS spreads - x-axis) and the dependent variable (weighted average of euro area banks CDS spreads – y-axis) is interpolated by a regression line whose equation is given by $y = 1.5266x + 11.988$.

correlation of the mutual risk of default, the intensity of the link between the European sovereign (euro area or banking union conceived as one jurisdiction) and the banks in its territory decreases (in trend) and the decoupling of the interdependent risks therefore takes place on average in the decade after the crisis. From this - less conservative - conclusion it could be deduced that the relevant measures and reforms undertaken to break the vicious circle might have been successful in delivering one of their main goals. However, such an overly optimistic conclusion would be premature and it is necessary to raise several reservations against it:

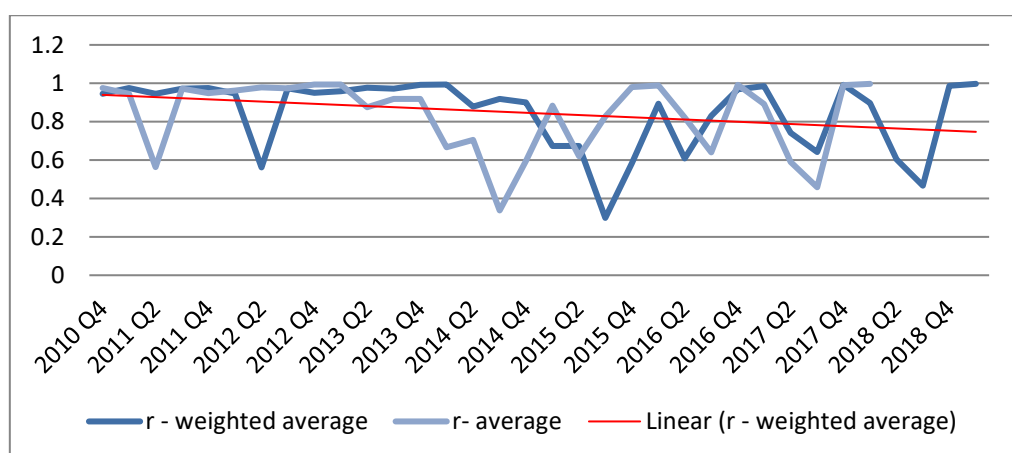
- 1) The overall positive economic development in recent years may partly explain the improvement in the nexus evolution. With generally positive market sentiment in good times, the market tends to underestimate all types of risks.
- 2) The overall decline in the market risk aversion to zero across financial assets due to loose monetary policy conditions may have obscured a change in the decoupling or, conversely, the strengthening of the bank-sovereign CDS spreads' dependence.
- 3) The notorious irrationality of financial markets could cause a specific external shock to affect the evolution of the CDS spreads and their correlation, without suggesting much about the real systemic interconnectedness.
- 4) Data irregularities (non-trading in certain periods or missing data on this trading), which lead to a reduction of correlation coefficients in given time periods.
- 5) The CDS spreads movements and their correlation do not capture all the complex links existing between the sovereign and banks. Thus, using other methods of measuring the same phenomenon can potentially lead to different results.
- 6) The decoupling of the statistical dependence of both types of risks may be due to market expectations that the political commitment to break the sovereign-bank nexus will be met. Two effects are at play here: a) the credibility of political signaling, and b) the self-fulfilling prophecy unrelated to the role of fundamentals (the phenomenon of multiple equilibria).
- 7) The sovereign-bank nexus can recover relatively quickly (in the span of one year) even after the indicator of its intensity drops to considerably low values. Its statistically observable decrease is therefore not necessarily a guarantee of the actual or permanent decoupling of risks.
- 8) Finally, and most importantly, the data aggregated for the whole monetary/banking union mask significant differences across Member States. Particularly at the national level, it is necessary to further address the link.

2.3 The sovereign-bank nexus at national level

The sovereign-bank nexus is a significant problem especially at the national level. There has been some heterogeneous development throughout the euro area Member States in this regard. In the case of Italy and Spain, the risk of sovereign default correlates almost perfectly with the risk of default of the domestic banks throughout the whole reference period. There has thus been no weakening of the sovereign-bank nexus in those countries.

Elsewhere in the euro area, some promising progress has taken place. In the Netherlands (see Fig. 4 below), Germany or Ireland, a gradual decoupling of the interconnected risk of default can be observed. The opposite trend, however, can be seen in other euro area countries. In the case of France and Portugal, the correlation has even been increasing since the crisis. A slight increase is also observable in the case of Italy. The intensity of the nexus remained relatively constant in trend (although still high), in the case of Spain, Belgium or Austria (average correlation coefficient at 0.98; 0.93 and 0.84, respectively).

Fig. 4: Netherlands – evolution of the correlation coefficient - quarterly averages



Source: Thomson Reuters, own calculations

Conclusion

Regarding the intensity of the sovereign-bank nexus measured by the bank-sovereign CDS spreads co-movements, the result is twofold. First, if the euro area (or the banking union) is considered to be a single jurisdiction, the relationship between the aggregate of all euro area (banking union) banks, and the aggregate of all euro area Member States is statistically less and less significant, the sovereign-bank nexus has thus gradually weakened since the euro area Debt crisis. On the other hand, in the case of individual euro area Member States vis-a-vis the banks

in their territory, the evolution of the nexus intensity has been heterogeneous. The sovereign-bank nexus is still very strong in most of the cases and only in a few countries, a decoupling of the interconnected risk is to be observed, yet still remaining at high levels.

These conclusions have implications i.a. for assessing the success of the past, current and ongoing reform efforts aimed at strengthening the European Monetary Union and the stability of the euro area financial system in general, as well as, in particular, weakening the sovereign-bank crisis feedback loop. Given that sovereign-bank nexus is primarily a challenge at the national level, it can be stated that the problem of the interconnected risk spillovers has not yet been resolved.

As regards the reasons for such unsatisfactory development, it can be assumed that the nexus continues to be maintained by failing to address the main direct channels of risk transmission at the domestic level, both from the sovereign to the banks through the banks' sovereign exposures, and from banks to the sovereign through the national deposit guarantees. It is also possible, or rather likely, that the reforms by which the risk transfer channels have already been addressed lack the necessary credibility from the market perspective.⁹

A logical recommendation stemming from this conclusion is to continue the reform agenda and address the remaining channels of the sovereign-bank risk transmission, mainly by completing the Banking Union and by introducing relating initiatives such as the regulation of the banks' sovereign exposures, while also ensuring a credible enforcement of the relevant existing rules and mechanisms.

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⁹ For more discussion on this subject, see Famfollet and Sankotová (2018).

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