Sovereign Credit Default Swaps and the Macroeconomy

Yang Liu and Bruce Morley

No. 03/11

BATH ECONOMICS RESEARCH PAPERS

Department of Economics

Sovereign Credit Default Swaps and the Macroeconomy

Yang Liu

Department of Economics

University of Bath

And

Bruce Morley*

Department of Economics

University of Bath

Abstract

The aim of this study is to determine whether the domestic interest rate or the exchange rate affect the sovereign credit default swaps. To date most studies on corporate CDS markets have emphasised the importance of domestic factors such as the interest rate. But with the sovereign CDS market, the international environment also needs to be incorporated into any analysis. Using a VAR and Granger non-causality tests, the results suggest that it is the exchange rate that has the most important effect on sovereign CDS markets, with domestic interest rates having only a marginal effect.

* Address for correspondence: Department of Economics, University of Bath, Bath, UK, BA2 7AY, e-mail, bm232@bath.ac.uk, Tel. +44 1225 386497, Fax: +44 1226 383423.

I Introduction

This study will focus on investigating the relationship between sovereign CDS spreads, interest rates and exchange rates against the background of the recent financial crisis. In recent years, the credit default swap (CDS) market has expanded significantly, with the outstanding notional value of debt insured by credit default swaps soaring from $631.5 billion in early 2001 to a peak of around $62 trillion at the end of 2007. During the financial crisis in 2008 the CDS market played a significant role, coinciding with a substantial widening in CDS spreads as the scale of the crisis emerged. However, as yet there is little research on the sovereign CDS Market due to a lack of data so far and in particular the relationship between CDS spreads and other macroeconomic factors.

A CDS is defined as "a bilateral financial contract that isolates specific aspects of credit risk from an underlying instrument and transfers risk between two parties" (JP Morgan, 2002). In other words, the CDS buyer pays the CDS premium to the seller and in return, the CDS buyer gets the right to deliver the defaulted debt obligation to the seller. The premium on a CDS contract (also called the CDS spread) is quoted in basis points of the notional value in the contract. Generally, according to the types of reference entity, the CDS contracts can be categorized into two groups: the corporate CDS and the sovereign CDS. This paper focuses on the sovereign CDS market, where sovereign obligations are the reference assets. A big difference between a sovereign CDS and a corporate CDS is that, in the case of a sovereign CDS, the country's credit risk will be transferred between CDS buyers and CDS sellers. During the financial crisis in 2008 and the Greece debt crisis in 2009, many countries have been under pressure to raise funds to finance fast growing fiscal deficits, in this context, the

investors attempt to insure against losses on holding sovereign debt. The sovereign CDS markets have thus become more and more important in financial markets.

To date, there are a number of empirical studies on CDS spreads and macroeconomic fundamentals, but most of them focus on corporate CDS spreads rather than sovereign CDS spreads. Among these previous studies, the most common explanatory variables include the risk-free interest rate, the yield of the reference obligation, and credit ratings. For instance Greatrex (2008) has analysed the variation in monthly CDS spread changes using structural variables and found that 30% of the variation in CDS spreads changes can be explained by these variables. Also Ericsson, Jacobs and Oviedo (2005) analyzed the relationship between theoretical determinants of default risk and CDS premia, finding that the volatility, the leverage and the risk-free rate have significant effects on credit default swap premia. Likewise Bhar, Colwell and Wang (2008) decomposed CDS spreads into a transitory component and a persistent component, finding that credit ratings, the short-term interest rate, the slope of the yield curve, equity volatility and measure of liquidity have significant but different impacts on both components. Skinner and Townend (2002) viewed CDS as a put option, and investigated the determinants of valuing a CDS using 29 sovereign US dollar CDS as samples, they found that the risk-free rate, the interest rate volatility, the yield on reference asset, and the time to maturity are all statistically significant factors for pricing credit default swaps. Furthermore, Skinner and Diaz (2003) analysed the relationship between sovereign CDS spreads and macro-level variables, finding CDS spreads are significantly linked to the risk-free short-term rate, the yield of the reference obligation, interest rate volatility and the time to maturity.

After the introduction, there is a brief description of the methodology, data and results, followed by a discussion of the policy implications.

II Methodology

Due to the dynamic nature of financial markets, the relationship between CDS spreads, exchange rates and interest rates has been modelled using a Vector Autoregressive (VAR) model [1]. The standard Granger non-causality / block exogeneity tests have then been applied to the VAR, using the approach in Granger *et al.* (2000). The lag length of the VAR was determined using the Schwarz-Bayesian criteria, in the event of autocorrelation, further lags were added until removed. The VAR model is as follows:

$$cds_t = \alpha_0 + \sum_{i=1}^{K} \alpha_i cds_{t-i} + \sum_{i=1}^{K} \beta_i \Delta er_{t-i} + \sum_{i=1}^{K} \chi_i i_{t-i} + d1 + u_{1t} \quad (1)$$

$$er_t = \delta_0 + \sum_{i=1}^{K} \delta_i cds_{t-i} + \sum_{i=1}^{K} \phi_i \Delta er_{t-i} + \sum_{i=1}^{K} \varphi_i i_{t-i} + d1 + u_{2i} \quad (2)$$

$$i_t = \gamma_0 + \sum_{i=1}^{K} \gamma_i cds_{t-i} + \sum_{i=1}^{K} \eta_i \Delta er_{t-i} + \sum_{i=1}^{K} \iota_i i_{t-i} + d1 + u_{3t} \quad (3)$$

Where cds_t is the CDS spread, Δer_t is the exchange rate return and i_t is the risk free interest rate and d1 is an exogenous dummy variable which takes the value of 0 until September 15th 2008 and 1 thereafter, this coincides with the collapse of Lehman brothers and signals the start of the most serious phase of the crisis.

[1] Although other factors such as credit ratings could also be included, for the two countries tested their rating remained the same throughout so was not included.

III Data and Results.

The data used in this study is all daily and is from 19th March 2008 to the 30th September 2010 for the USA and from the 16th August 2005 to the 30th September 2010 for France. Both are the earliest dates for which the data is available and all the data is taken from *Datastream*. These two countries have been selected due to their importance in the international financial system and also because they represent different approaches to exchange rates. Whereas the USA has adopted a managed exchange rate regime, France is a member of the European single currency (Euro) and shares a currency with other European member states. So although the cds premia relate to French government debt, the exchange rate is based on the Euro, but differs slightly to other European countries as it is trade weighted.

The data used in this study consists of the risk-free interest rate, which is the 3-month London interbank offered rates (3-month Libor). The Exchange rate employed is the nominal effective exchange rate (NEER). NEER is a type of trade-weighted index (TWI), which is the best known measure of international competitiveness (Forsyth and Dwyer, 2006) According to the data, the first quarter of October 2008 is a watershed for the Libor in both countries. Before the first quarter of October 2008, the movements of Libor differ in the two countries. The main reason is related to the subprime mortgage crisis, then after the first quarter of October 2008, the Libor in both countries significantly declined, which was related to the policy initiatives launched by the central banks after the financial crisis began. The sovereign CDS spreads are expressed in basis points of the notional value in the contract per annum, with the spreads relating to two and five year bonds. According to the data, the

movements of the CDS spreads generally follow the same trend in both countries. The most striking change is the significant growth from September 2008 to March 2009, followed by a period of decline, which coincides with the collapse of Lehmans and shows that the financial crisis has had a substantial impact on these CDS markets.

The Granger non-causality tests have been conducted on individual variables as well as joint tests. Table 1. includes results from the causality tests for the USA and suggests there is evidence of causality from the exchange rate to the CDS spreads but not vice versa, also there is only causality in the direction of the interest rate to the exchange rate, whilst neither variable has any effect on the interest rate. This appears to suggest it is the effect of movements in the exchange rate representing international factors rather than the domestic economy which is driving the CDS spread and perceptions of risk in terms of government debt and the economy as a whole. This may well reflect the importance of the CDS market to international investment in government bonds and therefore the importance of exchange rate movements to its value in the investors currency. The results are much the same regardless of whether the two or nine year CDS spreads are used.

Table 2. contains results for France, where there is evidence of causality in both directions between the CDS spreads and the exchange rate, as well as evidence of the interest rate affecting the exchange rate. Again there is no evidence of either variable having an effect on the interest rate, which is less surprising for France, where due to the single currency interest rates are very similar across the Euro area. There is also evidence that jointly the interest rate and CDS spread affects the exchange rate, where

a combination of economic risk and interest rate jointly determine exchange rates, as suggested by standard risk augmented asset parity conditions. Interestingly despite the shared nature of the exchange rate, it still affects the risk of French debt. This suggests that when pricing debt risk, the markets take into account not just the risk to the French economy but also risks to the Euro zone as a whole. Similarly the Euro exchange rate is affected by the risk of French sovereign debt, again emphasising the importance of the French economy to the Eurozone. The Lehman's dummy is significant in all the French VAR equations, but in the USA, it is not significant in the CDS equation, suggesting the risk of a financial crisis had already been partially priced into the CDS markets, but not bond or foreign exchange markets.

Conclusion

When considering sovereign CDS spreads, it is not so much the interest rate and domestic macroeconomy that is important as studies have found with the corporate CDS spreads. But with sovereign CDS markets the risks from movements in the exchange rate need to be considered. Although this varies between countries depending on their exchange rate regime, there is evidence that the exchange rate has a determining effect on CDS spreads and some evidence of causality in the other direction. However there is little evidence that the interest rate has any effect on the CDS spread, suggesting the international environment is at least as important as domestic factors. So for countries concerned at the cost of insuring their debt, one policy implication is that managing the exchange rate is as important as the domestic economy.

References

Fabozzi, F., Cheng, X. and R-R Chen, (2007), Exploring the Credit Default Risk in Credit Default Swaps, *Finance Research Letters*, 4, 10-18.

Granger, C., Huang, B-N and C-W Yang, (2000), A bivariate causality between stock prices and exchange rates: Evidence from recent Asian flu, *Quarterly Review of Economics and Finance*, 40, 337- 354.

Greatrex, C. (2008) The credit default swap's market determinants, Fordham Discussion paper 2008-06.

Skinner, F. and A. Diaz, (2003), An Empirical study of Credit Default Swaps, *Journal of Fixed Income*, 13, 28-38.

Skinner, F. and T. Townend, (2002), An empirical analysis of Credit Default Swaps, *International Review of Financial Analysis*, 11, 297-309.

Table 1. Granger non-causality for the USA

Variable	**CDS→ Y**	**IR→Y**	**ER→Y**	**Joint→Y**	**Lehman's dummy variable**
CDS2		10.468	22.631*	34.211	-0.171
					(0.302)
IR	13.979		14.595	28.834	-0.021
					(2.473)
ER	18.157	23.291*		37.807*	-0.005
					(3.220)
CDS9		5.195	22.017	30.239	-0.578
					(0.936)
IR	18.531		13.052	33.494	-0.018
					(2.144)
ER	15.008	21.418**		34.560	-0.005
					(3.052)

Notes: The statistics all follow chi-squared distributions, with a *,**, *** indicates significance at the 1%, 5%, 10% level.

Table 2. Granger non-causality for France

Variable	**CDS→ Y**	**IR→Y**	**ER→Y**	**Joint→Y**	**Lehman's dummy variable**
CDS2		13.027*	18.566**	30.527**	0.456
					(2.893)
IR	14.250		6.297	10.357	-0.005
					(3.365)
ER	23.221**	10.583		34.596**	-0.001
					(2.830)
CDS9		7.349	26.795*	33.577*	0.585
					(2.676)
IR	2.091		6.194	8.188	-0.005
					(3.633)
ER	15.000*	11.124		26.652*	-0.001
					(2.678)

Notes: See Table 1.