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Sovereign Credit Default Swaps and the Macroeconomy

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Abstract

The aim of this study is to determine whether the domestic economy as represented by the interest rate, the international economic status as represented by the exchange rate, or both determine sovereign credit default swap (CDS) spreads. 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 spreads, with domestic interest rates having only a limited effect. There is also some evidence of causality running from the CDS spread to the exchange rate.

Key Words: CDS Spread, Exchange rate, Granger non-causality

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I Introduction

This study will focus on analysing the domestic and external influences on sovereign credit default swap (CDS) spreads by investigating the relationship between the sovereign CDS spreads, interest rates and exchange rates against the background of the recent financial crises. In recent years, the 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, and in particular the relationship between sovereign CDS spreads and exchange rates, primarily.

A CDS is defined as a bilateral financial contract that isolates particular aspects of credit risk from an underlying instrument so transferring risk between two parties. In other words, the buyer pays the CDS premium to the seller, in return the 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 difference between a sovereign CDS and a corporate CDS is that, with a sovereign CDS, the country's credit risk will be transferred between CDS buyers and sellers. During the financial crisis in 2008 and the Greek 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 increasingly 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 Fabozzi *et al*. (2007) analyzed the relationship between CDS pricing and various fundamental factors such as interest rates to represent the domestic macroeconomy and liquidity measures, finding that they have significant effects.

Skinner and Townend (2002) viewed a CDS as a put option, and investigated the determinants of valuing a CDS using 29 sovereign US dollar CDS, they found that the risk-free rate, the interest rate volatility, the yield on the 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. Ismailescu and Kazemi, (2010) have assessed the

importance of credit ratings to sovereign CDS spreads in emerging markets, finding evidence that positive events have the most significant effect on the spreads.

Based on the previous studies, in this paper, we consider the exchange rate as another determinant of sovereign CDS spreads. The rest of the paper includes a brief description of the methodology, data and results, followed by a discussion and conclusion.

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, where the lag length of the VAR was determined using the Schwarz-Bayesian criteria, in the event of autocorrelation, further lags were added until it was removed. The non-causality test is then the standard test of joint significance of the lags on an explanatory variable. The VAR model is as follows:

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

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

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

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

Where cds_t is the CDS spread, Δer_t is the exchange rate change (return) and i_t is the risk free interest rate and d1 is an exogenous dummy variable, taking 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.

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 flexible managed exchange rate regime, France is a member of the Eurozone, thus adopting the euro as their legal tender. Therefore France can capture some of the features of Eurozone countries. It also raises the special issue of when the currency is a joint version and not 'owned' by the country to which the CDS relates.

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 level of the risk-free interest rate is a good proxy for the macroeconomic conditions (Fabozzi *et al*. (2007). 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, reflecting the international status of the country. 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 nine year contracts. According to the data in Figures 1 and 2, 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 Lehman Brothers, suggesting the financial crisis had a substantial impact on these CDS markets. Then the French sovereign CDS spreads experienced a second widening starting from the end of 2009, which reflects the Greek debt crisis.

IV Discussion

We applied the Granger non-causality tests to both individual explanatory variables and as a joint test. Table 1 includes the results from the causality tests for France and suggests there is evidence of bi-causality between the exchange rate and the CDS spreads, as well as evidence of the interest rate affecting the exchange rate for the two year CDS spread. However, neither variable has any effect on the interest rate. This appears to suggest that the movements in the exchange rate (representing international economic status) at least as much as the interest rate (representing the domestic economy) drive the sovereign CDS spreads and therefore the perceptions of risk of the economy as a whole.

Table 2 contains results for the USA, which are similar to those of France. The difference is that the causality between the exchange rate and the CDS spreads is unidirectional: from the exchange rate to the CDS spreads. This difference with the French result may be due to the response of the US currency market to the financial

crisis of 2008. After the financial crisis began, investors across the globe lost confidence and in this context, the US dollar was regarded as a reserve currency and therefore appreciated. Thus the significant widening in the sovereign CDS spreads coinciding with the economy deteriorating did not lead to the expected devaluation of their exchange rate. In this situation, the joint effect of an appreciating dollar but weaker economy have cancelled out producing no significant effect for the CDS spreads on the exchange rate. Overall the results are much the same regardless of whether the two or nine year CDS contracts are used. For both countries the Lehman's dummy in the VAR is significant except in the US CDS spread equations, suggesting the risk of the collapse had already been priced into the spreads before it occurred.

v Conclusion

When considering sovereign CDS spreads, it is not so much interest rates and the domestic macroeconomy that is important, as other studies have found using corporate CDS spreads, but with sovereign CDS markets the risks from movements in the exchange rate need also to be considered. Although the impact of exchange rates varies between countries, these results provide evidence that the exchange rate is an important determinant of sovereign CDS spreads. However there is only limited evidence that the interest rate has any effect on these CDS spreads. Thus our findings suggest that the international status is at least as important as domestic factors. So for countries concerned with the cost of insuring their debt, one policy implication is that managing the exchange rate is at least as important as managing the domestic economy..

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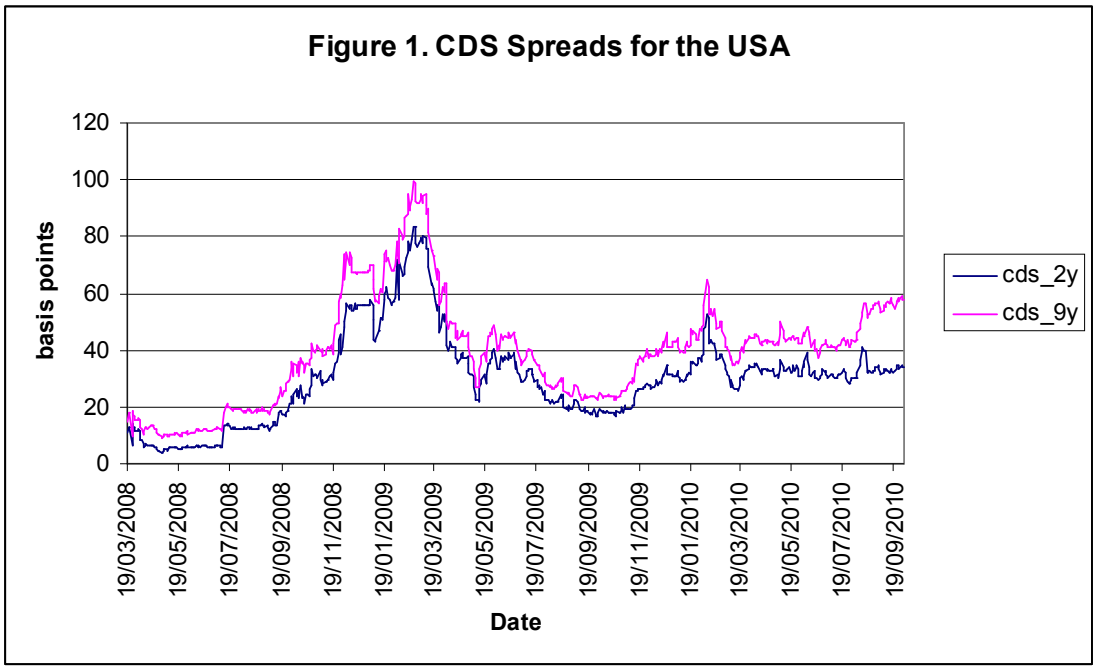
Figure 1. CDS Spreads for the USA
basis points
120
100
80
60
40
20
0
19/03/2008
19/05/2008
19/07/2008
19/09/2008
19/11/2008
19/01/2009
19/03/2009
19/05/2009
19/07/2009
19/09/2009
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19/05/2010
19/07/2010
19/09/2010
Date
cds_2y
cds_9y

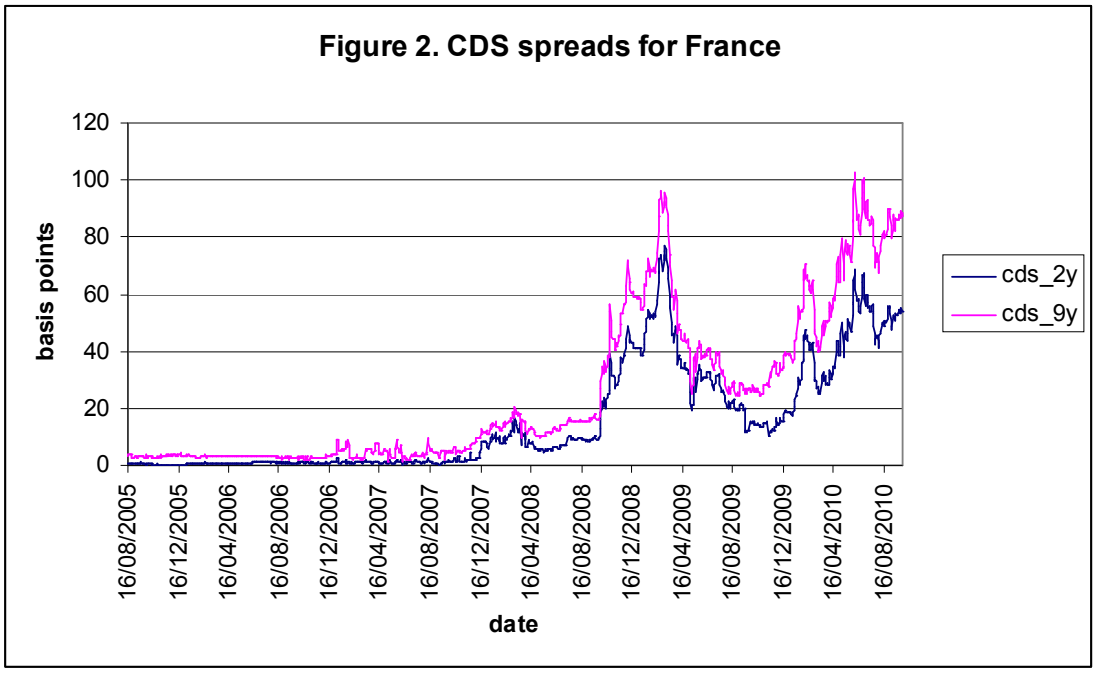
Figure 2. CDS spreads for France
basis points
120
100
80
60
40
20
0
16/08/2005
16/12/2005
16/04/2006
16/08/2006
16/12/2006
16/04/2007
16/08/2007
16/12/2007
16/04/2008
16/08/2008
16/12/2008
16/04/2009
16/08/2009
16/12/2009
16/04/2010
16/08/2010
date
cds_2y
cds_9y

Table 1. Granger non-causality results for France

Dependent Variable (Y)	**CDS→ Y**	**IR→Y**	**ER→Y**	**Joint→Y**	**Lehman's dummy variable**
CDS2		13.275**	18.680*	31.000*	0.469*
					(2.925)
IR	4.286		4.388	8.568	-0.005*
					(3.321)
ER	23.448*	11.039		35.769*	-0.001*
					(2.813)
CDS9		6.887	26.789*	33.101*	0.585**
					(2.684)
IR	1.974		4.119	6.057	-0.005*
					(3.591)
ER	15.096*	11.633		27.332*	-0.001**
					(2.663)

Notes:: The statistics follow chi-squared distributions with 12 (24 joint) degrees of freedom, with a *,** indicating significance at the 1%, 5%, level respectively, t-statistics in parentheses for dummy. CDSX is the X year CDS spread, IR is the interest rate and ER differenced exchange rate, Y is the dependent variable in each equation..

Table 2. Granger non-causality results for the USA

Dependent Variable (Y)	**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: See Table 1, except 6 (12 joint) degrees of freedom used.