SPILLOVERS OF THE CREDIT DEFAULT SWAP MARKET

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Introduction

- A CDS provides protection against a ‘credit event’
- In theory buying a Corporate Bond and a CDS (insurance) on that bond should be equivalent to buying a risk free asset
- Using arbitrage arguments, the yield on the corporate bond should be equal to the risk free rate plus the CDS spread. Or, equivalently the credit spread should be equal to the CDS spread
- But ..

Arbitrage in Practice

- Counterparty risk
- Liquidity issues
- Regulatory issues
- Sovereign debt: not clear which is the risk free asset. This is the topic of this paper
- A lot of the literature deals with how the arbitrage works in practice: in corporate bonds mostly well except in times of turmoil
- Also, whether new information is impounded first in the bond or in the CDS market

This paper

- Looks at sovereign bond **yields** and CDS spreads for 7 countries, especially around the potential sovereign default from some European countries.
- CDS spreads have increased not only for countries receiving bail-outs, but also those providing them.
- Studies how bond yields (not credit spreads) respond to changes in CDS spreads

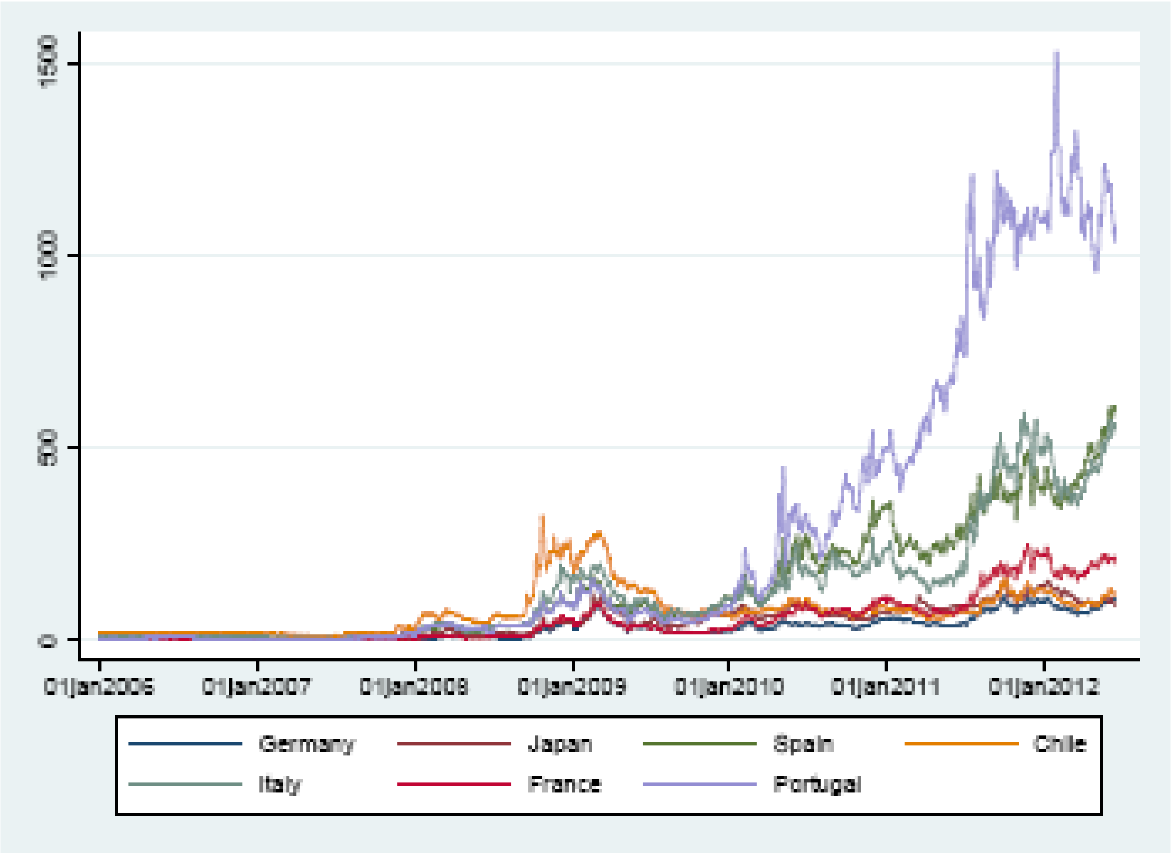


Figure 1: CDS by country (daily data) in basis points

Impulse Response Functions (Q1)

- Using a VAR for CDS and bond yields, the paper estimates impulse response functions of bond yields to innovations in CDS spreads. This is done country by country.
- Somewhat surprisingly, the paper finds that for some countries the effect is zero or even negative (‘safe havens’).
- For the others, the troubled countries, the effect is positive and sometimes close to one.

Contagion (Q2)

- Looks at the issue of whether there is contagion in CDS spreads from troubled countries to safe-haven countries. Uses Diebold-Yilmaz methodology to compute a 'contagion index' which is based on the forecast error variance decomposition generated by a VAR for CDS for the 7 countries.
- Finds no contagion for CDS spreads.
- But significant spillover for CDS spread volatility.

Comment 1: Include more countries

- Why not include other countries in the analysis?
  - US, UK, Switzerland
  - Other euro countries (Holland, Austria, Greece, …)
  - Other Latin American countries (Brazil, Venezuela,..)
- This would make the paper even stronger.

Comment 2: Unit Root problem

- IRF to shocks to CDS (for individual countries)

$$\begin{bmatrix} CDS_t \\ Y_t \\ x_t \end{bmatrix} = \Phi(L) \begin{bmatrix} CDS_t \\ Y_t \\ x_t \end{bmatrix} + \begin{bmatrix} \varepsilon_t^{CDS} \\ \varepsilon_t^{Y} \\ \varepsilon_t^{x} \end{bmatrix}$$

  - Unit root problems: the time series of yields may be non-stationary (for daily and weekly data)?
  - Shouldn’t you use changes in yields and CDS spreads instead of levels?
  - Once the system is estimated on changes, it can be transformed into levels to calculate the IRF.
  - The results are available?

Table 7: VAR(3) for Germany. No exogenous variable included

	Sample (1)		Sample (2)		Sample (3)	
	CDS	Yield	CDS	Yield	CDS	Yield
Constant	0.071*	0.039	0.245*	0.086	0.023	0.037
	[0.07]	[0.49]	[0.00]	[0.62]	[0.53]	[0.57]
CDS $(t-1)$	0.872*	0.203	0.731*	0.408*	0.986*	0.416
	[0.01]	[0.28]	[0.00]	[0.09]	[0.01]	[0.14]
CDS $(t-2)$	0.076	-0.215	0.097	-0.269	0.265	-0.971*
	[0.54]	[0.39]	[0.52]	[0.38]	[0.13]	[0.03]
CDS $(t-3)$	-0.007	-0.031	-0.032	-0.069	-0.223	0.538
	[0.94]	[0.87]	[0.78]	[0.77]	[0.1]	[0.11]
Yield $(t-1)$	-0.045	0.957*	-0.098*	0.944*	0.024	1.033*
	[0.31]	[0.01]	[0.08]	[0.00]	[0.6]	[0.01]
Yield $(t-2)$	0.017	0.105	0.021	0.216	0.032	-0.085
	[0.78]	[0.4]	[0.78]	[0.17]	[0.62]	[0.61]
Yield $(t-3)$	0.01	-0.09	0.016	-0.148	-0.069	0.022
	[0.82]	[0.33]	[0.79]	[0.23]	[0.13]	[0.85]
RMSE	0.062	0.126	0.069	0.141	0.069	0.141
R^2	0.941	0.963	0.922	0.968	0.922	0.968
Num. Of Obs	128	128	76	76	91	91

Note: $p-$ values in brackets. * stands for 1% significance level

Comment 3: Sample periods

- The periods chosen for the estimation are a little confusing: they all overlap.
- The IRF are almost the same for the a and b periods. Period c is slightly different, but less significant

Comment 4: Multi–country VAR

- To complement the IRF done country by country, why not use the multi-country VAR to estimate impulse respond functions of bond yields of one country to innovations in CDS spreads of the other countries.
- Could it be possible that innovations in the CDS spreads of the troubled countries are the ones affecting the bond yields in the safe-havens?

Comment 5: VIX

- In the VAR used to estimate the contagion index (and in the Appendix), VIX is included as an exogenous variable as a measure of ‘global risk’.
- It is not clear whether you should use the contemporaneous value of VIX or the lag values?
- Why not report also the coefficients on the VIX variable for the different countries? How important is global risk in different countries?
- Is endogeneity a concern if contemporaneous VIX is used?

Comment 6: Contagion in levels

- While the spillover of levels (CDS spreads) for the safe-havens did not increase during the euro crisis they were pretty significant over the period considered

Figure 10: Diebold-Yilmaz Contagion Index for Germany

Comment 6 : Contagion in levels

- “I conclude that sovereign debt from Germany, Chile and Japan are both, unaffected by contagion from other economies and have served as store-of-value assets during the current turbulence.” (From the abstract of the paper)

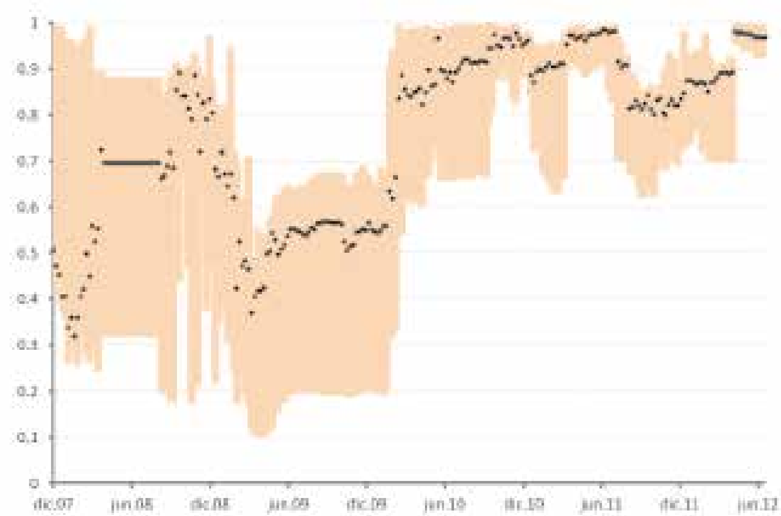
Comment 6 : Contagion in levels

- It is not clear why contagion can only be measured by the changes in the index and not on the level of the index.
- Around 70% of the forecast error variance decomposition for Germany can be attributed to the other countries!
- "..the larger the part of the error in predicting variable x that can be accounted by *other* errors, the larger the contagion."
- There might have been a decrease of contagion during 2012, but it was still pretty high.

Comment 7 : Contagion in volatility

- The spillover for variances (of CDS spreads) was clearly stronger over the period.

Figure 13: Diebold-Yilmaz Contagion Index for Germany (volatility)



Why not include a spillover table, as in Diebold-Yilmaz? (this is the data used to calculate the contagion index)

Table 3

Spillover Table, Global Stock Market Returns, 10/1/1992–23/11/2007

	From																			
To	US	UK	FRA	GER	HKG	JPN	AUS	IDN	KOR	MYS	PHL	SGP	TAI	THA	ARG	BRA	CHL	MEX	TUR	Contribution From Others
US	93.6	1.6	1.5	0.0	0.3	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.0	0.5	0.3	6
UK	40.3	55.7	0.7	0.4	0.1	0.5	0.1	0.2	0.2	0.3	0.2	0.0	0.1	0.1	0.1	0.1	0.0	0.4	0.5	44
FRA	38.3	21.7	37.2	0.1	0.0	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.3	63
GER	40.8	15.9	13.0	27.6	0.1	0.1	0.3	0.4	0.6	0.1	0.3	0.3	0.0	0.2	0.0	0.1	0.0	0.1	0.1	72
HKG	15.3	8.7	1.7	1.4	69.9	0.3	0.0	0.1	0.0	0.3	0.1	0.0	0.2	0.9	0.3	0.0	0.1	0.3	0.4	30
JPN	12.1	3.1	1.8	0.9	2.3	77.7	0.2	0.3	0.3	0.1	0.2	0.3	0.3	0.1	0.1	0.0	0.0	0.1	0.1	22
AUS	23.2	6.0	1.3	0.2	6.4	2.3	56.8	0.1	0.4	0.2	0.2	0.2	0.4	0.5	0.1	0.3	0.1	0.6	0.7	43
IDN	6.0	1.6	1.2	0.7	6.4	1.6	0.4	77.0	0.7	0.4	0.1	0.9	0.2	1.0	0.7	0.1	0.3	0.1	0.4	23
KOR	8.3	2.6	1.3	0.7	5.6	3.7	1.0	1.2	72.8	0.0	0.0	0.1	0.1	1.3	0.2	0.2	0.1	0.1	0.7	27
MYS	4.1	2.2	0.6	1.3	10.5	1.5	0.4	6.6	0.5	69.2	0.1	0.1	0.2	1.1	0.1	0.6	0.4	0.2	0.3	31
PHL	11.1	1.6	0.3	0.2	8.1	0.4	0.9	7.2	0.1	2.9	62.9	0.3	0.4	1.5	1.6	0.1	0.0	0.1	0.2	37
SGP	16.8	4.8	0.6	0.9	18.5	1.3	0.4	3.2	1.6	3.6	1.7	43.1	0.3	1.1	0.8	0.5	0.1	0.3	0.4	57
TAI	6.4	1.3	1.2	1.8	5.3	2.8	0.4	0.4	2.0	1.0	1.0	0.9	73.6	0.4	0.8	0.3	0.1	0.3	0.0	26
THA	6.3	2.4	1.0	0.7	7.8	0.2	0.8	7.6	4.6	4.0	2.3	2.2	0.3	58.2	0.5	0.2	0.1	0.4	0.3	42
ARG	11.9	2.1	1.6	0.1	1.3	0.8	1.3	0.4	0.4	0.6	0.4	0.6	1.1	0.2	75.3	0.1	0.1	1.4	0.3	25
BRA	14.1	1.3	1.0	0.7	1.3	1.4	1.6	0.5	0.5	0.7	1.0	0.8	0.1	0.7	7.1	65.8	0.1	0.6	0.7	34
CHL	11.8	1.1	1.0	0.0	3.2	0.6	1.4	2.3	0.3	0.3	0.1	0.9	0.3	0.8	2.9	4.0	65.8	2.7	0.4	34
MEX	22.2	3.5	1.2	0.4	3.0	0.3	1.2	0.2	0.3	0.9	1.0	0.1	0.3	0.5	5.4	1.6	0.3	56.9	0.6	43
TUR	3.0	2.5	0.2	0.7	0.6	0.9	0.6	0.1	0.6	0.3	0.6	0.1	0.9	0.8	0.5	1.1	0.6	0.2	85.8	14
Contribution to others	292	84	31	11	81	19	11	31	14	16	10	8	6	12	21	9	3	8	7	675.0
Contribution including own	386	140	68	39	151	97	68	108	86	85	73	51	79	70	97	75	68	65	92	Spillover index = 35.5%

Notes: The underlying variance decomposition is based upon a weekly VAR of order 2, identified using a Cholesky factorisation with the ordering as shown in the column heading. The (i, j)-th value is the estimated contribution to the variance of the 10-week-ahead real stock return forecast error of country i coming from innovations to real stock returns of country j. The mnemonics are defined as in Table 1.

Table 4

Spillover Table, Global Stock Market Volatility, 10/1/1992–23/11/2007

To	From																			
	US	UK	FRA	GER	HKG	JPN	AUS	IDN	KOR	MYS	PHL	SGP	TAI	THA	ARG	BRA	CHL	MEX	TUR	Contribution From Others
US	63.9	14.9	3.9	1.9	4.9	0.2	1.8	0.3	1.6	0.9	0.4	2.6	0.3	0.1	0.1	0.0	0.1	0.2	2.0	36
UK	22.9	54.5	5.0	1.3	7.4	0.5	2.1	0.3	1.0	0.8	0.1	2.4	0.2	0.2	0.4	0.2	0.1	0.1	0.7	46
FRA	24.0	32.8	27.3	0.2	5.4	0.2	2.8	0.4	0.3	1.2	0.4	2.4	0.2	0.3	0.6	0.3	0.1	0.1	0.9	73
GER	26.9	29.5	13.6	13.7	4.8	0.2	3.9	0.2	0.2	1.3	0.8	2.0	0.2	0.4	0.6	0.3	0.1	0.2	1.0	86
HKG	2.0	0.5	0.7	0.0	87.7	0.1	0.1	0.4	1.4	0.5	1.5	3.4	0.6	0.4	0.0	0.1	0.0	0.1	0.3	12
JPN	2.7	3.3	0.4	0.7	1.6	82.9	0.1	0.1	0.9	1.1	0.1	1.6	0.3	0.0	0.6	0.3	0.3	0.2	2.8	17
AUS	8.9	2.2	0.3	0.6	43.9	0.2	34.7	1.2	1.7	1.3	0.1	2.8	0.1	1.0	0.1	0.2	0.2	0.3	0.1	65
IDN	2.8	0.9	0.3	1.0	6.1	0.3	0.6	71.4	6.9	2.3	2.5	2.8	0.7	0.0	0.0	0.3	0.2	0.2	0.9	29
KOR	2.5	0.6	0.4	0.4	9.1	1.0	1.0	10.3	67.5	1.3	0.9	2.5	0.8	0.2	0.1	0.1	0.2	0.3	0.8	32
MYS	1.3	0.6	0.3	0.6	7.2	1.0	0.9	0.8	1.7	70.7	3.1	6.1	0.3	0.5	0.9	0.6	0.1	1.5	1.9	29
PHL	2.1	0.3	0.3	0.4	8.9	0.3	0.4	8.8	3.0	6.1	66.7	1.5	0.2	0.2	0.2	0.2	0.1	0.2	0.3	33
SGP	12.5	4.1	0.6	0.1	12.2	0.8	0.8	7.6	7.2	2.8	1.5	45.8	0.5	0.1	0.7	0.7	0.0	0.7	1.2	54
TAI	8.5	0.4	0.4	0.2	2.8	0.7	1.3	0.5	9.5	0.7	1.7	0.6	69.0	0.2	0.4	0.8	0.2	0.7	1.3	31
THA	0.5	0.7	0.4	0.3	9.0	0.2	0.3	3.6	2.9	0.4	0.8	5.3	0.2	73.9	0.1	0.5	0.1	0.7	0.2	26
ARG	3.5	1.5	1.6	0.4	2.7	0.5	1.2	0.3	0.1	2.1	0.2	0.8	0.4	0.3	81.0	0.9	0.8	0.6	1.0	19
BRA	4.5	2.3	1.4	0.3	12.6	0.4	3.3	1.0	0.3	10.0	0.7	3.4	0.5	0.3	11.7	45.2	0.3	0.9	0.8	55
CHL	3.5	0.7	0.7	0.3	2.7	0.1	3.6	1.1	0.2	1.8	0.3	1.8	0.3	0.4	3.6	5.0	73.7	0.2	0.1	26
MEX	6.5	1.3	0.7	0.3	25.0	0.2	4.8	0.3	0.5	2.4	0.3	2.1	0.2	0.5	6.3	3.0	0.3	44.1	1.1	56
TUR	2.8	1.7	0.8	0.7	3.9	0.3	1.2	0.3	1.1	2.7	0.5	0.9	4.0	0.1	0.7	0.3	0.2	1.1	76.8	23
Contribution to others	138	98	32	10	170	7	30	38	41	40	16	45	10	5	27	14	3	8	17	749.6
Contribution including own	202	153	59	23	258	90	65	109	108	111	83	91	79	79	108	59	77	52	94	Spillover Index = 39.5%

Notes: The underlying variance decomposition is based upon a weekly VAR of order 2, identified using a Cholesky factorisation with the ordering as shown in the column heading. The (i, j)-th value is the estimated contribution to the variance of the 10-week-ahead stock return volatility forecast error of country i coming from innovations to the stock return volatility of country j. We calculate Chile's volatility using the Santiago Stock Exchange IGPA Index for January 1992–May 2004, and using the Santiago Stock Exchange IPSA index for June 2004 onward. The mnemonics are defined as in Table 1.

Conclusions

- Very interesting paper.
- It uses sophisticated econometric techniques.
- It makes important points.
- Hopefully my comments will be helpful in improving the paper.

Technical Points

- Why not use Pesaran and Shin (1998) generalized IRF analysis for unrestricted VAR, which does not require orthogonalization of the shocks and is invariant to the ordering of the variables in the VAR?
- In Diebold and Yilmaz (2009) example they have 19 countries, and they do not seem to have problems?