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"Shooting the Messenger"

A discussion of the CDS market and Greece's default

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Outline

- The Background
- The Eurozone Sovereign CDS market
- Not all spreads are the same
- Looking at the price data
- Looking for causality
- The Greek credit event
- The EU ban on naked CDS
- Conclusions

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The Background

"I think that derivative products… the CDS on sovereign debt have to be at least very, very regulated, rigorously regulated, limited or banned, this is a personal position on financial instruments"

Christine Lagarde interviewed on Europe 1, February 28, 2010

"I do not have evidence of a leading role played by CDS speculation or movement. But I am convinced that 1) we need to investigate and 2) any narrow and shallow market with very few players, a fact admitted by the players themselves, should be under close watch and should be regulated."

Christine Lagarde interviewed by the FT, March 25, 2010

"Short selling did not cause the crisis, but can aggravate price declines in distressed markets"

Commissioner Michel Barnier, Europa, 19 October 2011

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The Eurozone Sovereign CDS market

The Eurozone CDS Market

- This market has grown over the past 5 years but is still much smaller than its cash equivalent
- It fulfills the primary purpose of CDS which was to allow banks to hedge their books
- Buying CDS protection is private, bilateral, liquid and fairly simple
- So every CDS contract has a buyer and a seller – it is a zero sum game
- They do not add risk to the credit markets (apart from counterparty risk) - they are simply transferring the risk from one party to another
- The natural bias of CDS is from the short side
- Bonds on the other hand are biased to the long side as insurance companies and banks are required to hold high quality assets

Speculating about Speculation

- There is no doubt that some hedge funds have been buying naked CDS protection to speculate on a sovereign default
- But can this, by itself, lead to a downward spiral in bond prices ?
- To drive the CDS spread wider, speculators will need to trade a significant fraction of the CDS market – we should be able to see this in the data
- In the absence of new information, investors will sell protection and receive the higher spreads thereby stopping any widening in CDS spreads
- If the spread difference becomes significant, arbitrageurs will sell protection and short the bonds - this will reduce the CDS spread and push the bond spreads wider – this is not risk free and nor is it an easy trade to do in any significant size so its effect should be limited
- So how can the bond market be affected ? Would bond holders who see the CDS market become spooked and decide to sell their bonds
- Is it an timing/inertia effect - if bad news hits the market – is it quicker to sell bonds or to buy CDS protection – which market moves easiest
- To start our analysis it is worth comparing the size of the CDS market to the bond market – we will then start to look at some price data

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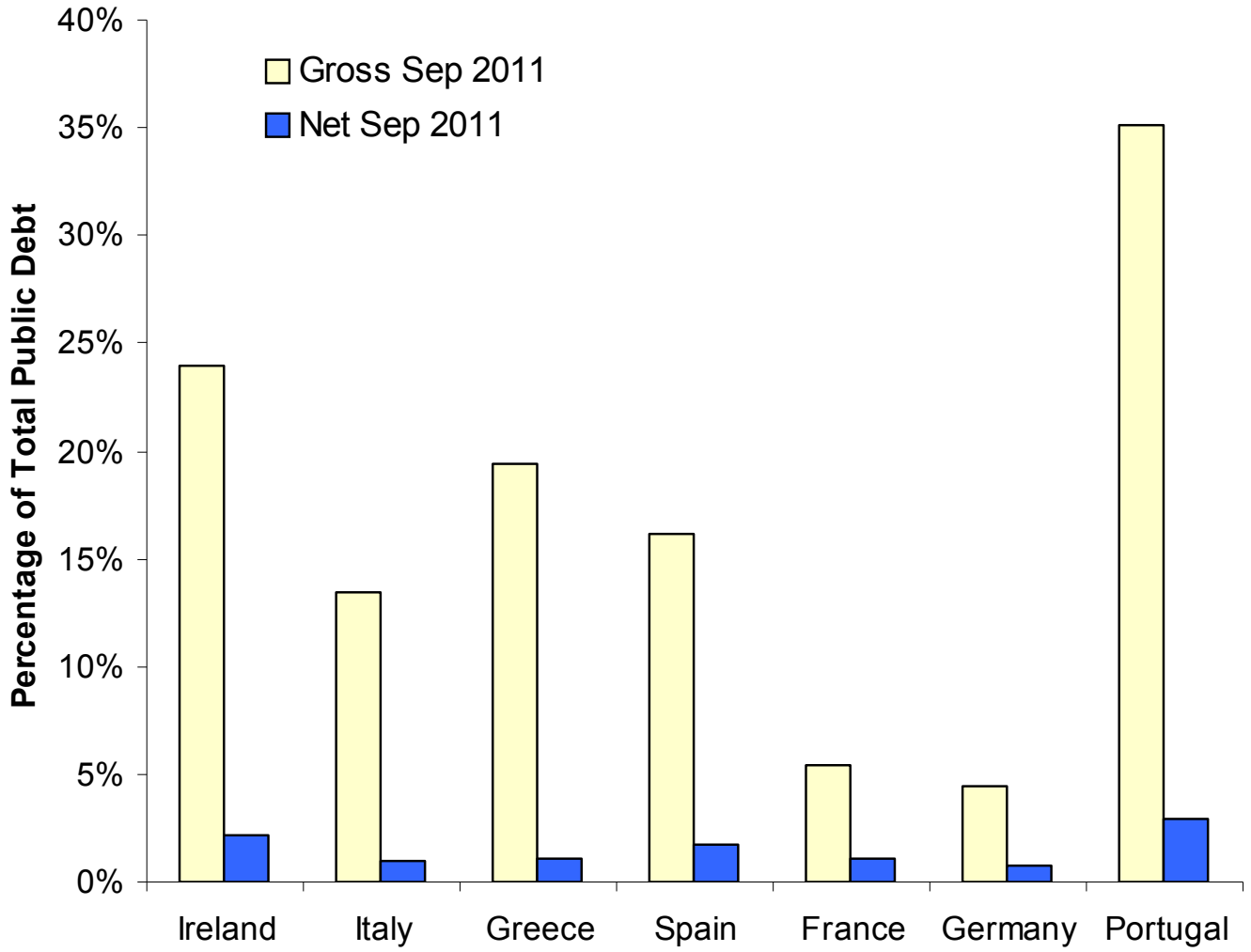
CDS Market Size



- What matters is the net notional – this is a measure of how much outright exposure institutions and dealers have to each other

* CDS gross and net notional market size as a percentage of total public debt. The CDS figures are from the DTCC as of September 2011 while the debt figures are from the Economist, 2012

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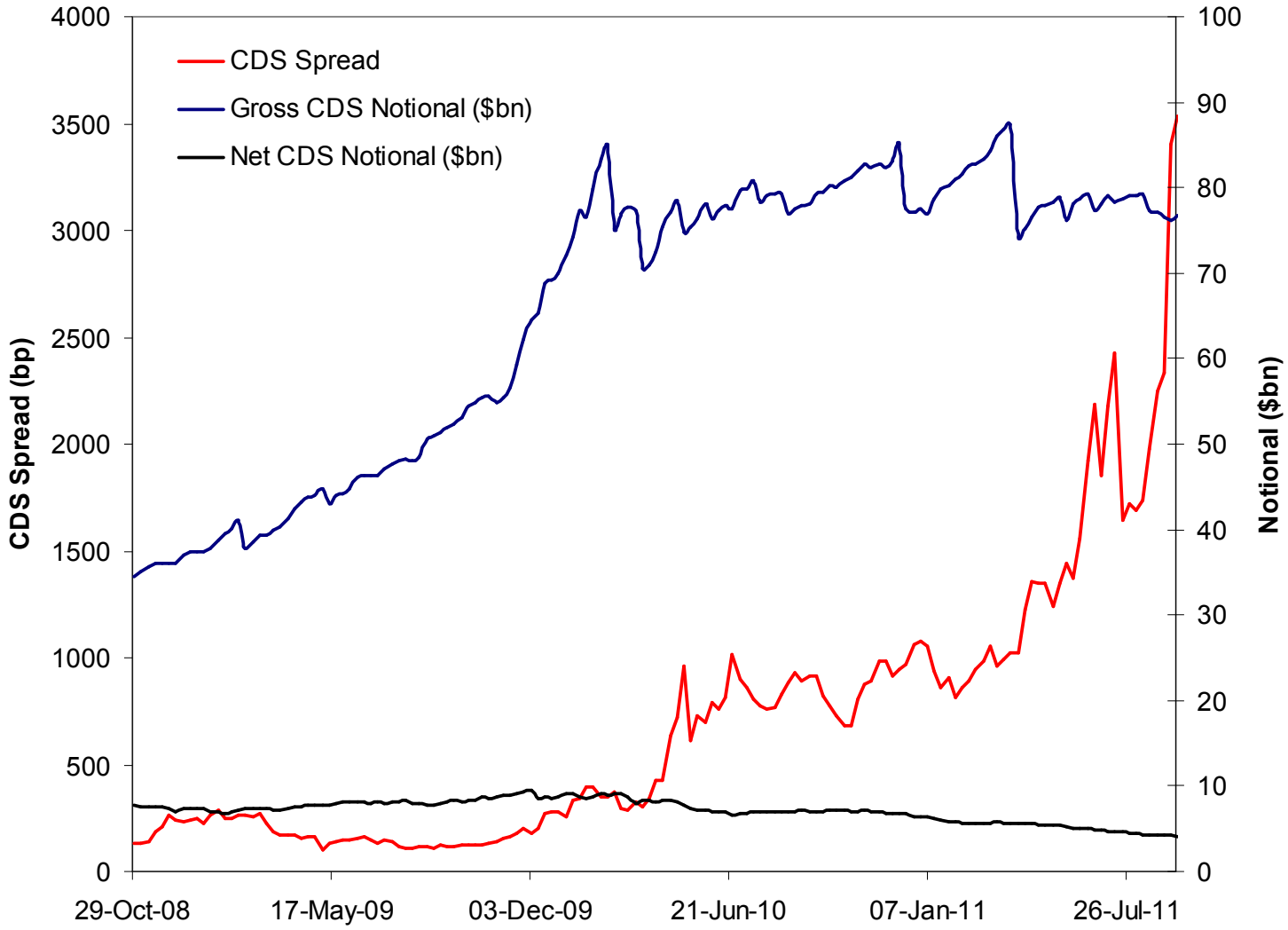
CDS Spreads and CDS Market Size



- As Greek spreads deteriorate, trading activity picks up but net notional is unaffected and actually falls – little sign of any speculative attacks

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Not all Spreads are the Same

The Different Credit Spreads

- Before we can empirically analyse the relationship between bonds and CDS, we need to understand the data we will use
- We can observe par CDS spreads and for bonds, the yield spread and the asset swap spread
- Each behaves differently and we need to be aware of this before we start to compare them

The CDS spread: This is the amortised repayment of the expected present value of the protection leg and is paid until maturity or the time of the credit event, whichever occurs first.

The yield spread: This is the difference between the yield to maturity of the risky bond and the yield to maturity of the same maturity German benchmark bond.

The asset swap spread: This is the amortised repayment of the difference in price between the risky bond and an identical (same coupon and maturity) Libor credit quality bond to a fixed maturity

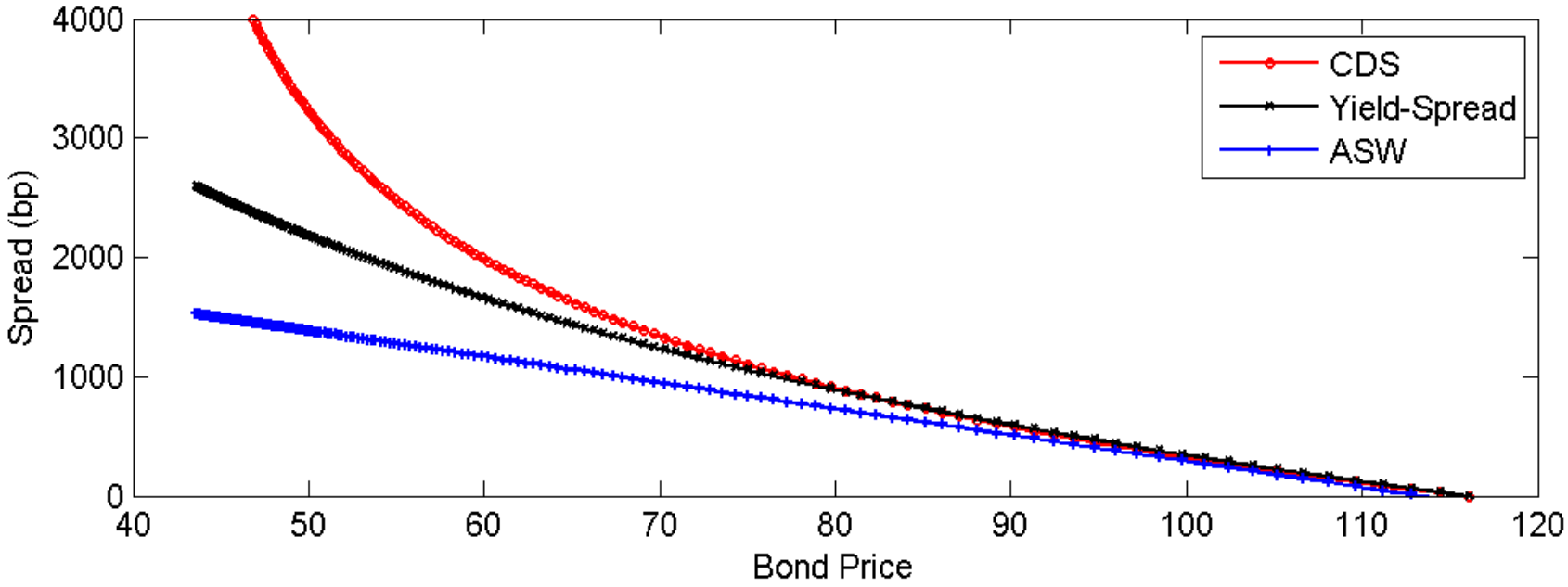
Spreads In Distress

We especially need to understand how they behave in times of distress

- CDS Spread: If the market expects immediate default
  - the expected PV of (100%-R) has to be paid over the remaining life
  - The CDS spread therefore tends to infinity as long as R < 100%
  - As CDS trade upfront, this high spread is only a quotation convention and is never seen in cash flow terms.
- Bond Yield Spread: If the market expects an immediate default,
  - the bond price tends to R and the yield-spread tends to a finite number.
  - The yield spread only tends to infinity if R = 0%.
- Asset Swap Spread: If the market expects an immediate default,
  - the bond price tends to R and
  - the price difference with the Libor bond tends to a finite limit.
  - As this is repaid over a finite period, the ASW remains finite.

Modelling the Relationship

- We can test this using a simple credit model which prices the bond and CDS in a common framework
- We choose a 5-year contract and bond and set R=40%



- We can conclude that a CDS spread which exceeds the yield-spread or the asset swap spread is not automatically a signal of speculative trading
- It depends on the size of the difference – and note that in this case the allowed difference can be very large as default approaches

The Currency Effect

- But there is another effect which cannot be ignored - **the standard CDS contracts on Eurozone sovereign debt are denominated in US dollars**
- This means that following a credit event, the face value of euro-denominated debt that has to be delivered must have the same dollar value as the CDS notional
- If the FX rate and the default event are independent, then we should see no difference between the CDS spread quoted on the (non-standard) euro-denominated contract and the CDS spread quoted on the dollar contract
- This assumption seems reasonable when the reference credits are corporates
- But when the reference entity is a Eurozone sovereign, then this assumption of independence is no longer appropriate
- Care then needs to be taken when comparing dollar CDS spreads with bond spreads based on euro bond prices

Quantifying the FX Effect

- Ehlers et al [2006] have shown that if the market expects a jump in the FX rate on default the ratio of the spreads is

$$CDS_{\$} = k \cdot CDS_{€}$$

where k is the ratio of the immediate post-default eurodollar FX rate to the immediate pre-default FX rate quoted in EUR per unit of USD

- This means that
  - if the market expects a weakening of the euro on a credit event then the value of k will be greater than 1
  - if the market expects a strengthening of the euro on a credit event then the value of k will be less than 1
- If the market expects a weakening of the euro versus the dollar then the USD CDS should have a higher par spread than the EUR CDS

Summary of Fundamental Reasons for a positive basis

- Several years ago I wrote a paper [O'Kane 2001] setting out the many drivers of the CDS basis which we defined as

$$\text{CDS basis} = \text{CDS spread} - \text{Bond yield spread}$$

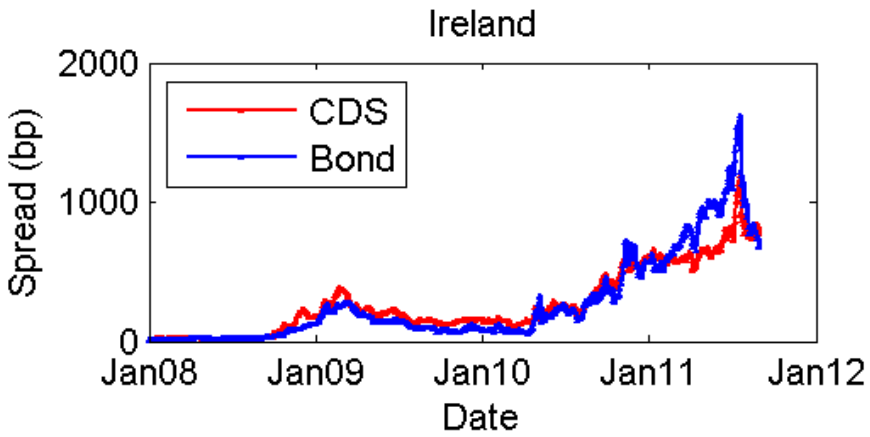
- Reasons for a positive basis included
  - In times of distress, the CDS spread widens by more than the yield spread due to the different types of spread calculations
  - If the market expects a weakening of the euro versus the dollar then the dollar-denominated CDS should trade with a higher CDS spread than the euro-denominated CDS
  - The protection buyer is long a cheapest to deliver option whose value is proportional to the probability of a restructuring event i.e. it is roughly proportional to the spread and could be worth as much as 5-10% of the CDS spread [O'Kane 2001]
- There are also non-technical reasons which relate to supply and demand

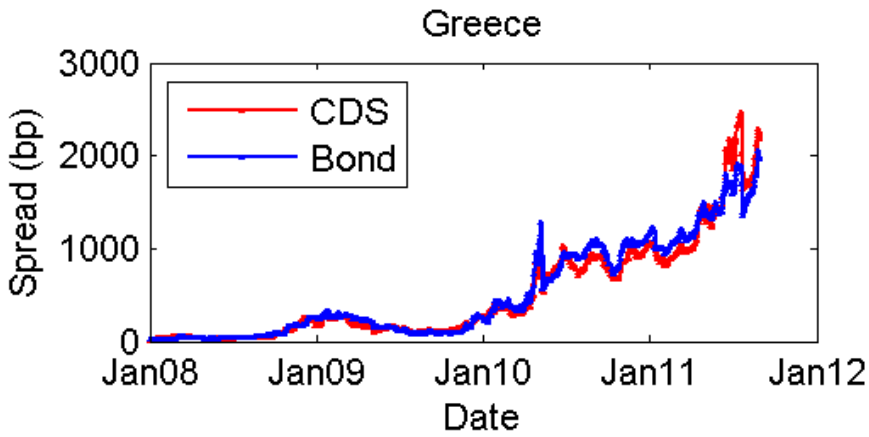
Looking at the price data

The Data

- We looked at Portugal, Ireland, Italy, Greece, Spain
- We also included France as a reference
- The data period was from January 2008 to September 2011
- We used Bloomberg 5Y dollar-denominated CDS spreads
- For our bond yield measure we used the yield spread defined as the difference between the yield-to-maturity of the risky bond and the same maturity German government bond
- All data was mid-market
- It is first of interest to look at the evolution of the spreads for each country
- Each one presents slightly different characteristics

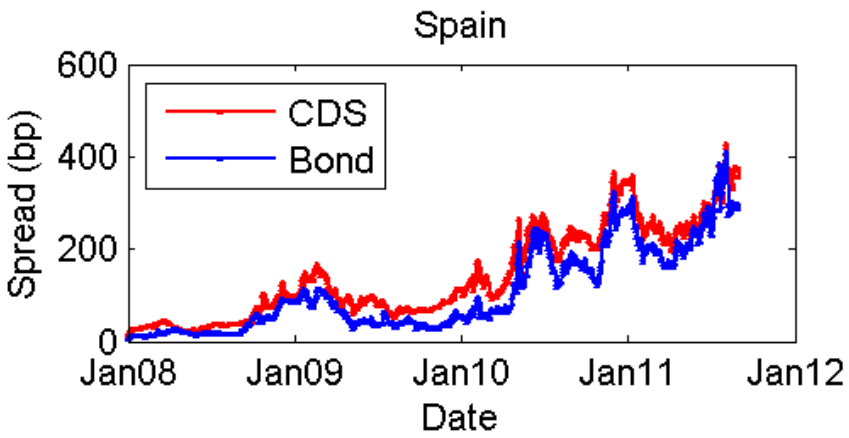
Ireland and Greece

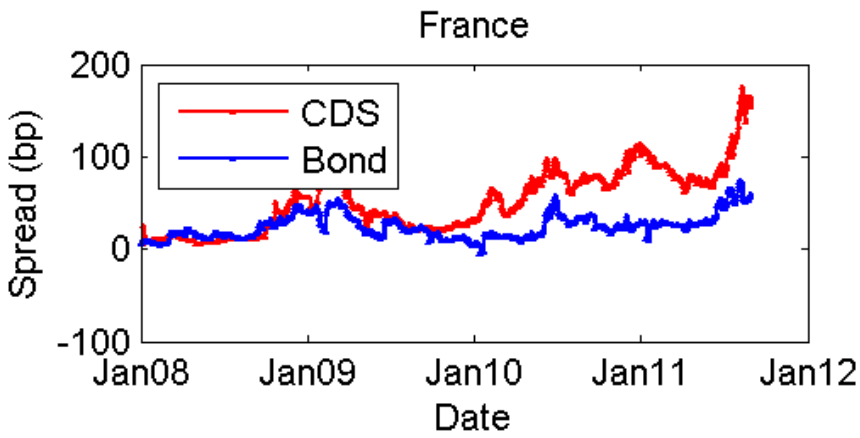




- Ireland
  - CDS spreads and bond spreads started to widen at the same time
  - CDS spreads remained wider than bond spreads until January 2011 after which bond prices fell significantly.
  - The rescue package caused these spreads to fall together
- Greece
  - Both markets started to rise together
  - And since then they have shadowed each other closely
  - In the limit of impending default the CDS spreads exceeded the bond spreads as suggested by our simple model

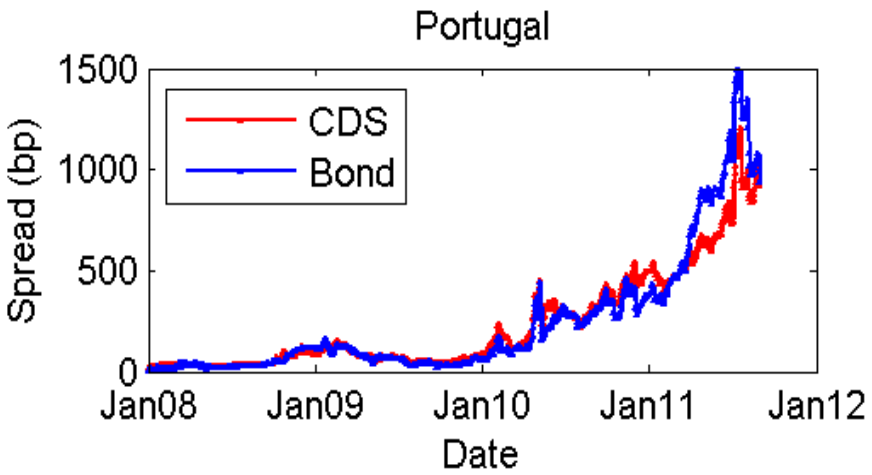
Spain and France

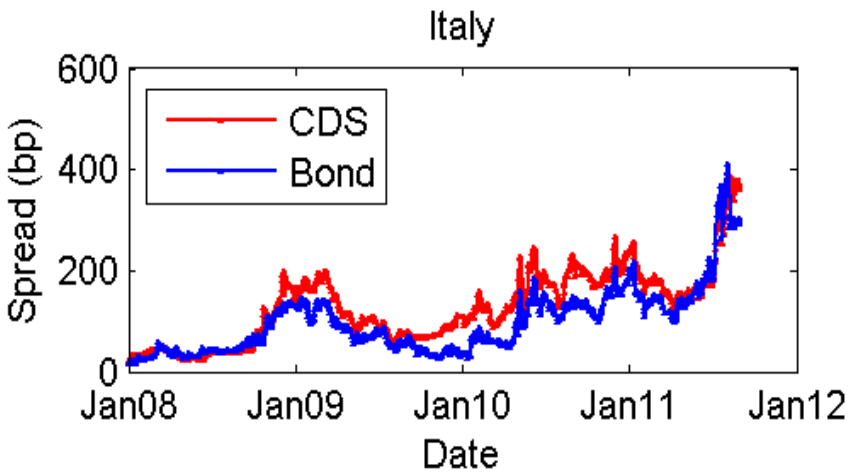




- Spain
  - The CDS market widened by more than the bond market
  - This could be due to the natural demand for Spanish bonds (some from the ECB) which has kept their prices high
  - This has changed in recent months as investors have become more nervous about Spain and the CDS basis has narrowed
- France
  - The French CDS and bond market are correlated but have diverged significantly - A safe haven effect ?

Portugal and Italy

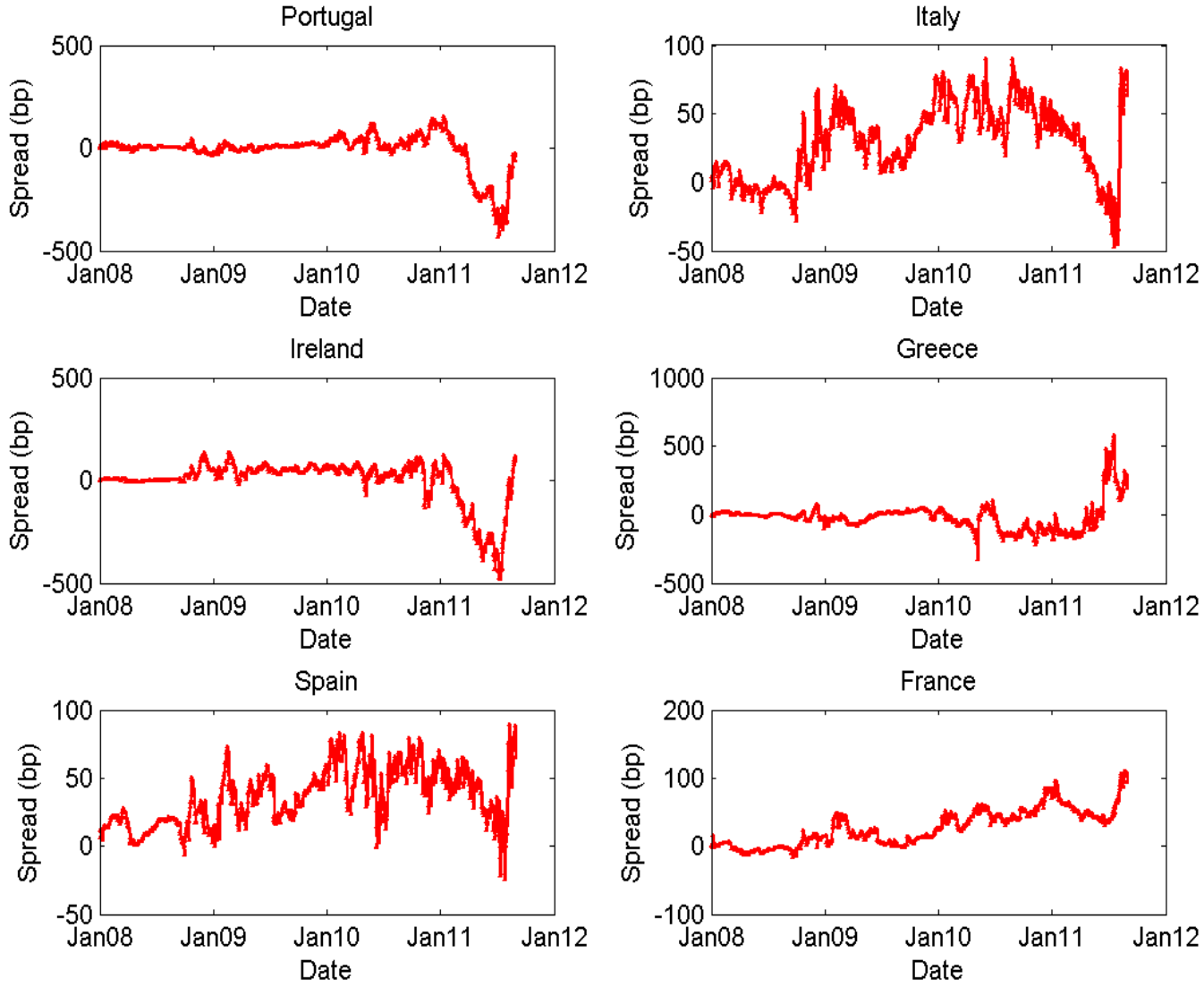




- Portugal
  - In Portugal both markets seem to widen together
  - We see the bond market widen by more than the CDS market
- Italy
  - The deterioration in Italy was not as monotonic as in Portugal
  - The CDS market rose by more than the bond market
  - Once again there was probably a “safe-haven” effect
  - The ECB also purchased significant amounts of Italian bonds

The CDS Basis

- Increases in the basis can be due to the nature of CDS/Bond spreads, a credit event EUR weakening, CTD, bond demand, and speculation



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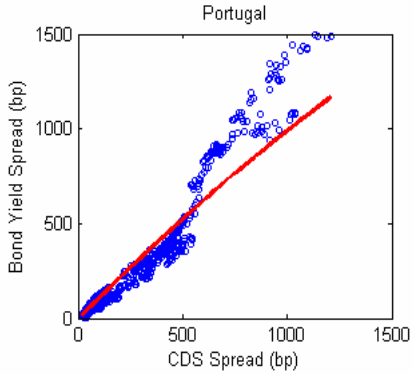
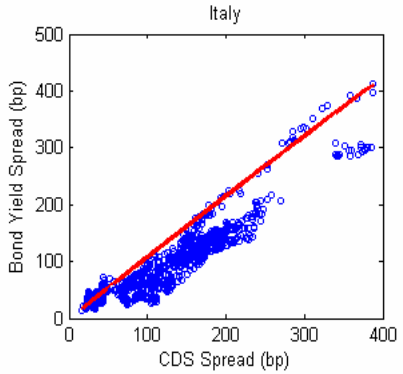
Removing the CDS / Bond Spread effect

- To remove the effect of the different spreads we plot the daily spreads for each country and the theoretical model discussed earlier

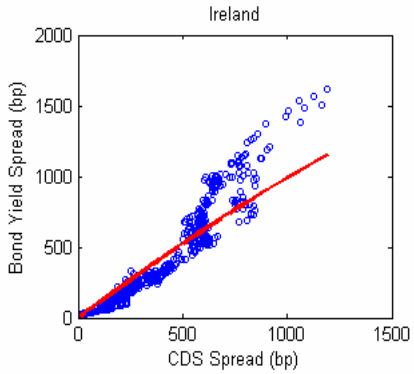
Capitulation effect in bond market

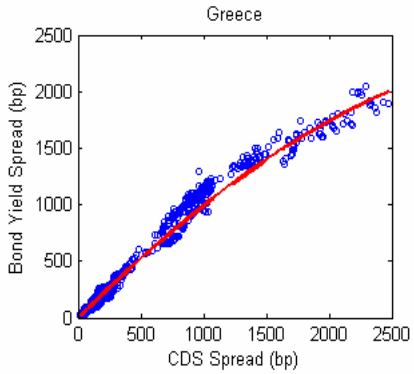




Devaluation, ECB, Bond demand

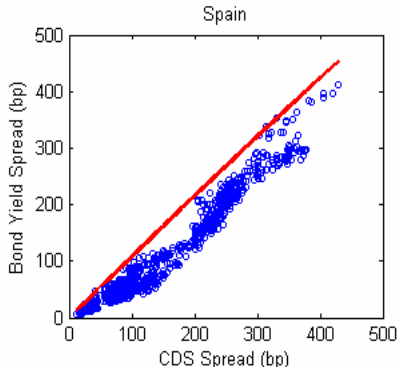
Capitulation effect in bond market

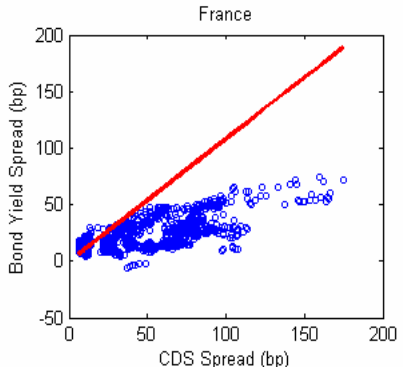




Best fit - Devaluation effect small, No-ECB, No Bond demand

Similar to Italy - Devaluation, Bond demand





France is a Safe haven – significant demand for bonds

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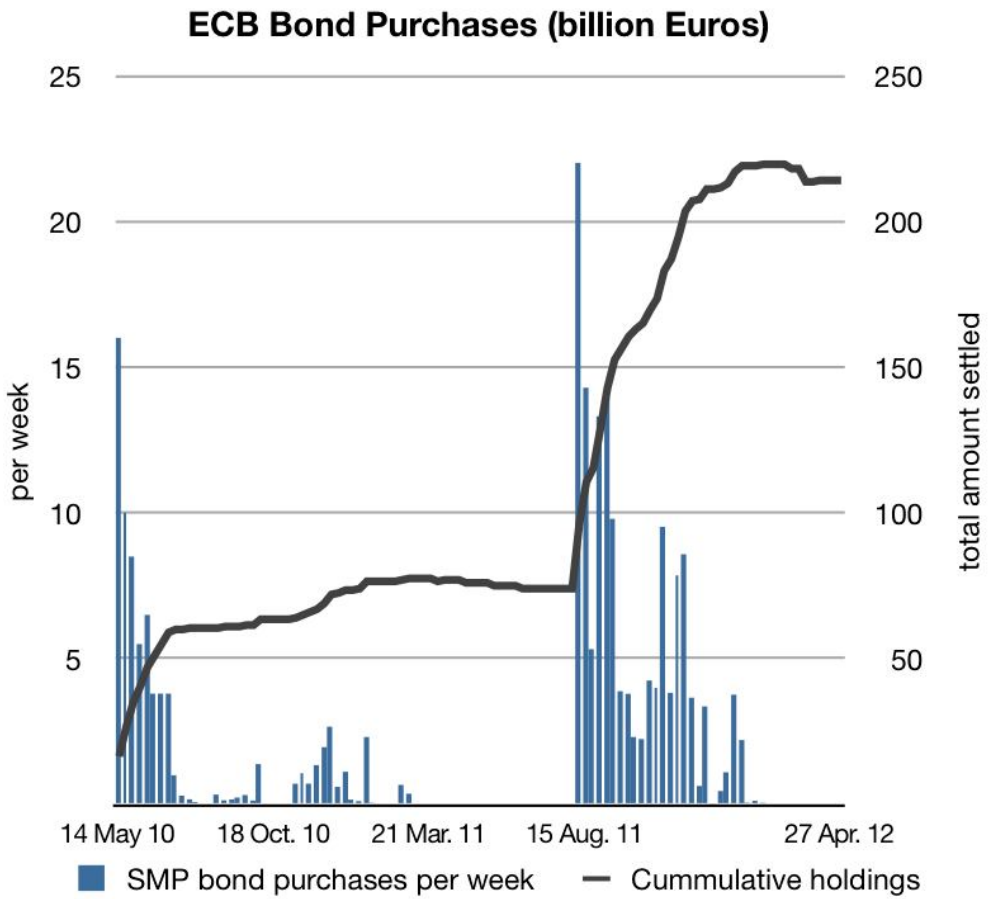
ECB Interventions

- The ECB Securities Market Programme purchased significant amounts of mostly Spanish and Italian government debt
- The size of the intervention was an order of magnitude larger than any selling in the CDS market i.e. €250bn (i.e. $325bn)



Looking for Causality

Lagged Cross Correlations

- One question is which market responds first – any proof of speculation would need to show the CDS market moving first
- It is difficult to detect subtle lead or lag patterns by just looking at the data
- When I look at any time series I see mostly synchronous moves and some moves with lags and leads of a day or so
- We need to employ statistical techniques and the first test is to examine the cross correlations of lagged spread changes
- We define

$$\rho_{CDS,Bonds}(l) = corr(\Delta S_{CDS}(t), \Delta S_{Bond}(t+l))$$

- If l > 0 and $\rho > 0$ then we can infer that an increase in the CDS spread today will tend to cause an increase in the bond spread l days later, i.e. CDS lead bonds
- If l < 0 and $\rho > 0$ then we can infer that an increase in the bond yield spread today will tend to cause an increase in the CDS spread l days later, i.e. bonds lead CDS

Lagged Cross Correlations: Results

Lag (days)	Portugal	Italy	Ireland	Greece	Spain	France
-3	0.9	-4.9	5.5	-0.9	-11.5	0.1
-2	3.7	-10.6	5.6	4.3	-11.4	3.2
-1	28.0	19.3	31.1	18.4	15.0	10.1
0	72.5	70.4	62.4	71.3	72.3	28.3
1	36.7	20.0	23.2	17.8	28.9	8.8
2	7.1	-10.6	11.5	2.6	-6.4	-1.4
3	-11.8	-3.6	-4.3	-5.7	-13.7	3.9

Bonds lead CDS if $\rho>0$

Synchronous

CDS lead bonds if $\rho>0$

The French exception

Looking for Causality

- Can we prove or disprove the hypothesis that CDS spread changes cause bond yield spread changes?
- Maybe, but to prove this hypothesis we would need to show that CDS spreads move first and then propose some testable mechanism to describe how the information influences the bond market
- It would have to explain how the much smaller CDS market can influence the much larger bond market
- It would need to establish the corresponding time scale – does it takes seconds, minutes, hours, days or weeks
- Such a test would probably require more than daily spread data alone

Granger Causality

- There is a weaker form of causality known as “Granger causality” or GC
- This tests whether the inclusion of past CDS spread data helps us to better predict changes in bond spreads than just the past bond spread data alone
- It can be understood as a test which detects the flow of information from one data series to another
- The test is more powerful than just correlation (which is a symmetric measure) as it can determine the direction of flow of the information and can account for such effects as feedback
- We can also do the opposite test to see if bond data can improve our ability to predict CDS spread changes better than just past CDS data
- The GC test is based on a simple linear regression of spread changes

The Granger Causality Test

- The regression equation for bond yield spread changes $\Delta S_{Bond}(t)$ is
- We regress the daily change in the bond yield spread today against the m-days of lagged daily changes in the bond yield spread
- We then include the lagged daily changes in the CDS spread for the past n=5 days using the formula

$$\Delta S_{Bond}(t) = \sum_{i=1}^{m} \alpha_i \Delta S_{Bond}(t-i) + \sum_{j=1}^{n} \beta_j \Delta S_{CDS}(t-j) + \varepsilon$$

- The null hypothesis is that CDS spread changes do not have explanatory power, i.e. that the β's are statistically insignificant from zero
- If this hypothesis is rejected to some significance level then we have evidence of Granger causality
- We search for the number of lags which gives us the best predictability using the Bayesian Information Criterion (BIC)

Granger Test Results

Null Hypothesis	CDS do not lead bonds				Bonds do not lead CDS			
Country	F-statistic	P-statistic (%)	Optimal Lags m/n	Accept/ Reject	F-statistic	P-statistic (%)	Optimal Lags m/n	Accept/ Reject
Portugal	33.7	0.0	4/3	R	16.5	0.0	5/4	R
Italy	5.3	2.2	4/1	A	10.8	0.0	2/2	R
Ireland	16.3	0.0	5/3	R	19.2	0.0	1/1	R
Greece	32.6	0.0	1/1	R	2.92	8.8	1/1	A
Spain	27.1	0.0	2/1	R	5.49	1.9	5/1	A
France	4.76	3.1	1/1	A	47.9	0.0	5/1	R

- If the hypothesis is rejected with a sufficiently low p-value then we have detected some form of Granger causality

Granger Causality Results

	CDS spread changes Granger Cause changes in the bond yield	CDS spread changes do NOT Granger Cause changes in the bond yield
Bond spread changes cause changes in the CDS Spread	**Portugal and Ireland**	**Italy and France**
Bond spread changes do NOT cause changes in the CDS Spread	**Greece and Spain**	**None**

- Note that most of the Granger causing lags were at just one day suggesting that any information transfer effect is short-lived
- In Portugal and Ireland the information flow was in both directions, implying a feedback system
- Granger causality does not prove causality – it could just be two different markets reacting to the same news at different speeds
- This test does not separate widening from narrowing – we cannot tell if the lead or lag effect depends on the direction of the spread change

Other Work: EC Report

- In late 2010 the European Commission released a report (only made public through an FOI request) which stated that

  "*All in all, the analysis of the fundamental factors shows that the differences in bond and CDS spreads across countries are justified. Government deficits, debt levels and current account deficits give a consistent picture of vulnerabilities*."

  (p. 15)

  "*This implies that CDS spreads can hardly be considered [to be] causing the high bond yields for these countries*."

  (p. 22)

  "*In fact, the … CDS spreads, are well below the no-arbitrage bound for Greece and Portugal, and very close to the line for Ireland, Italy and Spain. This finding is consistent with sufficient supply of insurance being offered for troubled countries and that speculators act as insurance (liquidity) providers at a time of distress. This could be considered to be beneficial for the cost of funding sovereign deficits, because the insurance provided allow institutional investors to take on more debt, and thus keep the yields for troubled countries lower than otherwise would be possible*."

  (p. 22)

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The Greek Credit Event

The Greek Credit Event

- Fears of the effect of a Greek credit event were a common theme in the media - even the ex-head of the ECB became involved

  "[Governments should] avoid whatever would trigger a credit event".

  Jean-Claude Trichet, Summer, 2011

- As at least 97% of CDS contracts are registered at the DTCC, and their public website showed $3.2bn of Greek CDS outstanding, it was hard to understand the concerns since this is small in relative terms
- Regulators were also able to ask the DTCC for greater detail in order to determine if there were any significant positions or counterparty exposures
- The market had had at least a year to prepare for this event
- For the market, the only real concerns related to whether the CDS auction price, which was based partly on the prices of the newly exchanged bonds would be able to cover the losses of investors on the old bonds.

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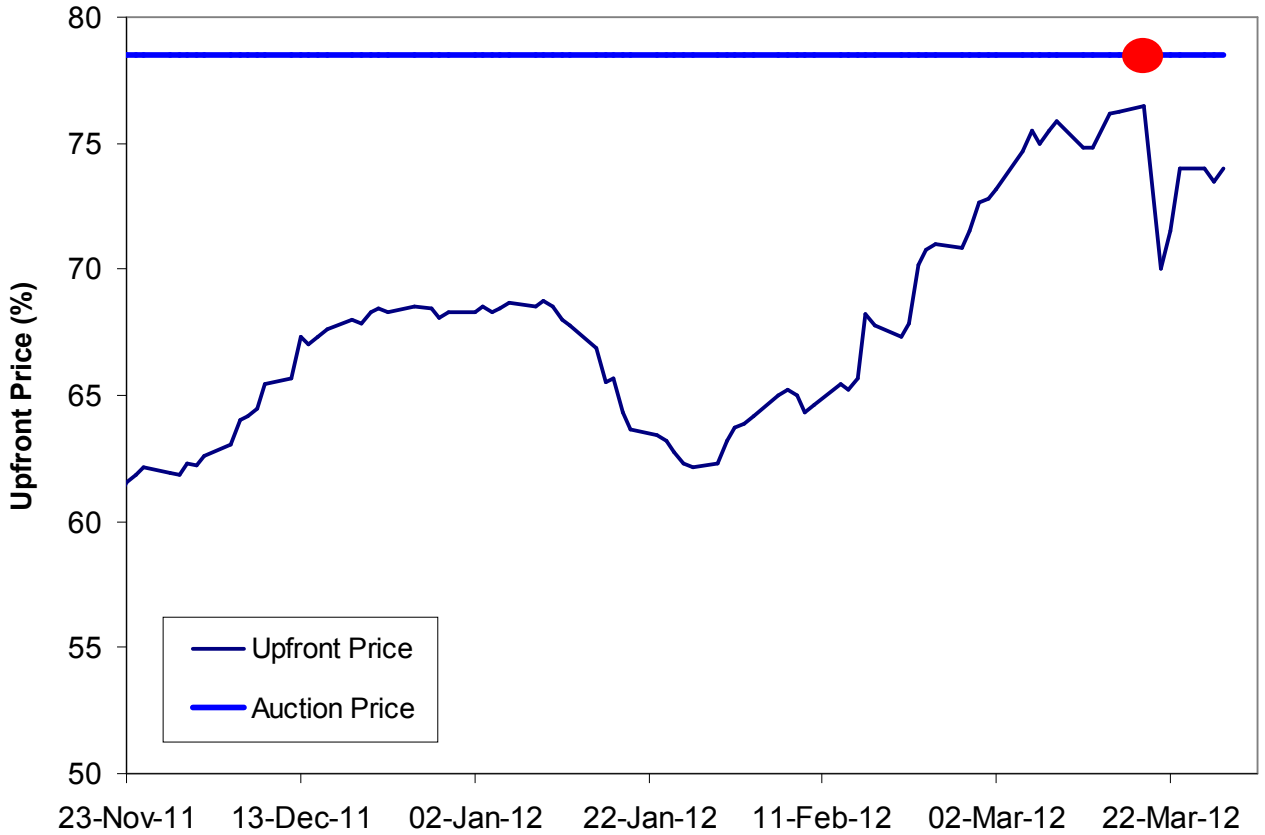
The Greek Credit Event

- The Greek restructuring credit event was finally declared on 9 March 2012
- At the time of the credit event the total outstanding in Greek CDS contracts was just $3.2bn USD plus some CDS from the iTraxx SovX index
- In the auction the new bonds traded close to the old bonds
- At the 19th March auction the recovery price was set at 21.5 cents/$
- The event was settled without any problems – it was a non-event !



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The EU Ban on Naked CDS

ESMA Naked CDS Rules

- A various number of proposals were discussed on how to handle the issue of CDS with a range of options including do nothing, limit naked CDS in times of distress, ban naked CDS and ban all CDS
- In the end, the EC has decided to move ahead on an outright ban on naked CDS which will come into effect in November 2012
- Regulations have recently been produced by the European Securities Markets Authority, an EU authority
- The rules state that you must have an exposure to hedge before you can buy protection
- If the exposure is not the reference entity of the CDS, the party buying protection must be able to justify a correlation of 70% between the hedge and the exposure
- Proxy hedging, if it fails the correlation test, is not allowed
- Restrictions can be suspended if the liquidity of the sovereign debt falls below some threshold

Conclusions

- Claims of the systemic influence of speculative CDS buyers on the bond markets are not backed up by the data as information appears to flow in both directions
- It is possible that the Granger causality relationship between CDS and bonds is due to the different markets reacting at different speeds to the same information
- There are many other possible hypotheses that we could suggest for this, some more testable than others
- Removal of speculators will remove liquidity from the market and possibly increase bid-offer costs to those who wish to hedge
- Without a global ban, such trading will move offshore where it will be harder to control and less transparent
- The CDS market makes it very easy for people to see how credit risk has increased … and CDS spreads are now quoted by the media
- Maybe the messenger is being blamed …

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Appendix

CDS Market Size

Country	Gross	Net	Public Debt*
Ireland	42.6	4.0	178.0
Italy	309.9	23.3	2312.0
Greece	76.7	4.1	394.0
Spain	164.5	17.8	1016.0
France	122.5	24.3	2261.0
Germany	106.7	18.4	2383.0
Portugal	66.8	5.7	190.0

Source: DTCC, Economist
* Estimate for 2012