# Financial instruments with credit risk

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# Lecture Summary

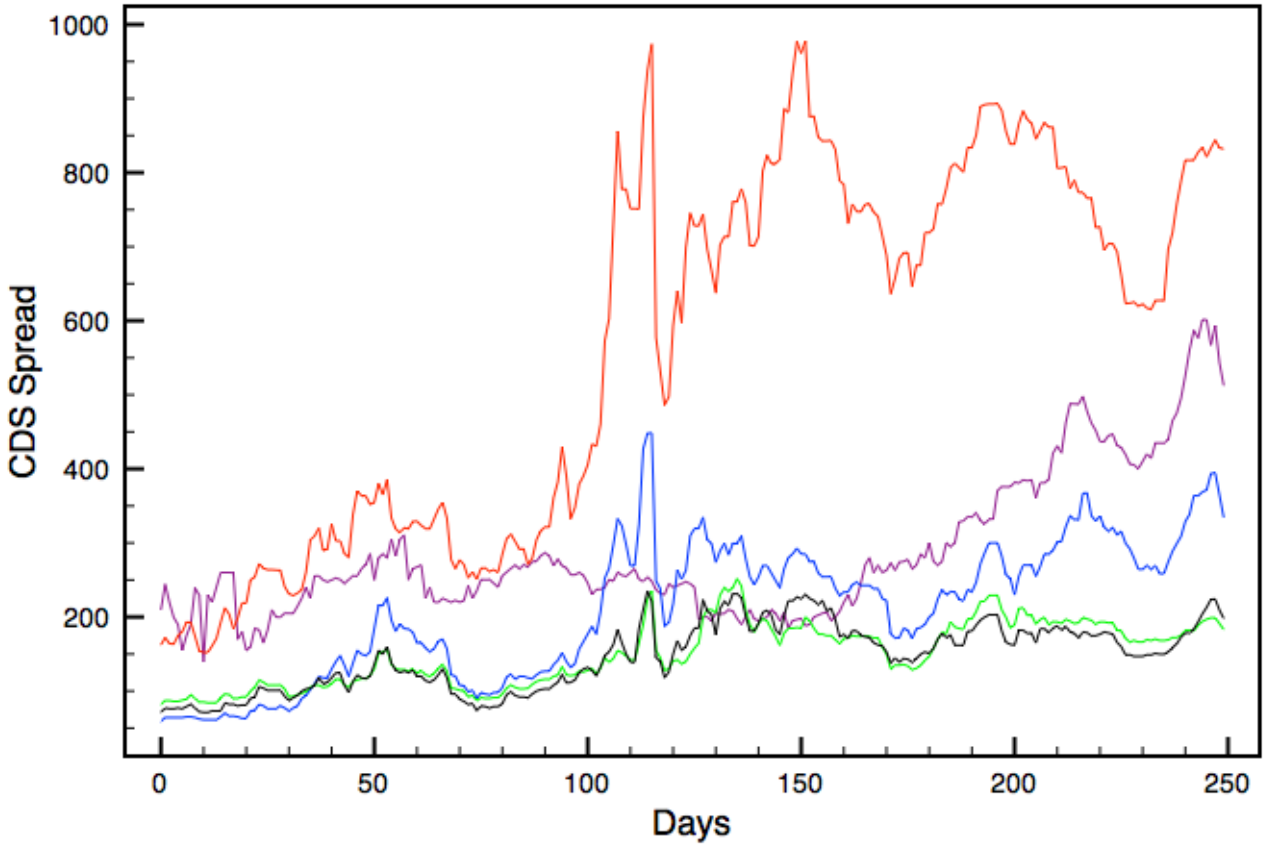
- Example of quoted CDS spreads
- Credit risk hedging using credit-default swaps
- Some historically important recovery ratios
- Corporate bonds and asset swaps
- Exotic single-name credit derivatives
- Portfolio credit derivatives
- Credit-default-swap index
- Major traded indexes

# PIIGS quoted CDS spreads (November 2010)

Quoted 5Y CDS spread for PIIGS countries

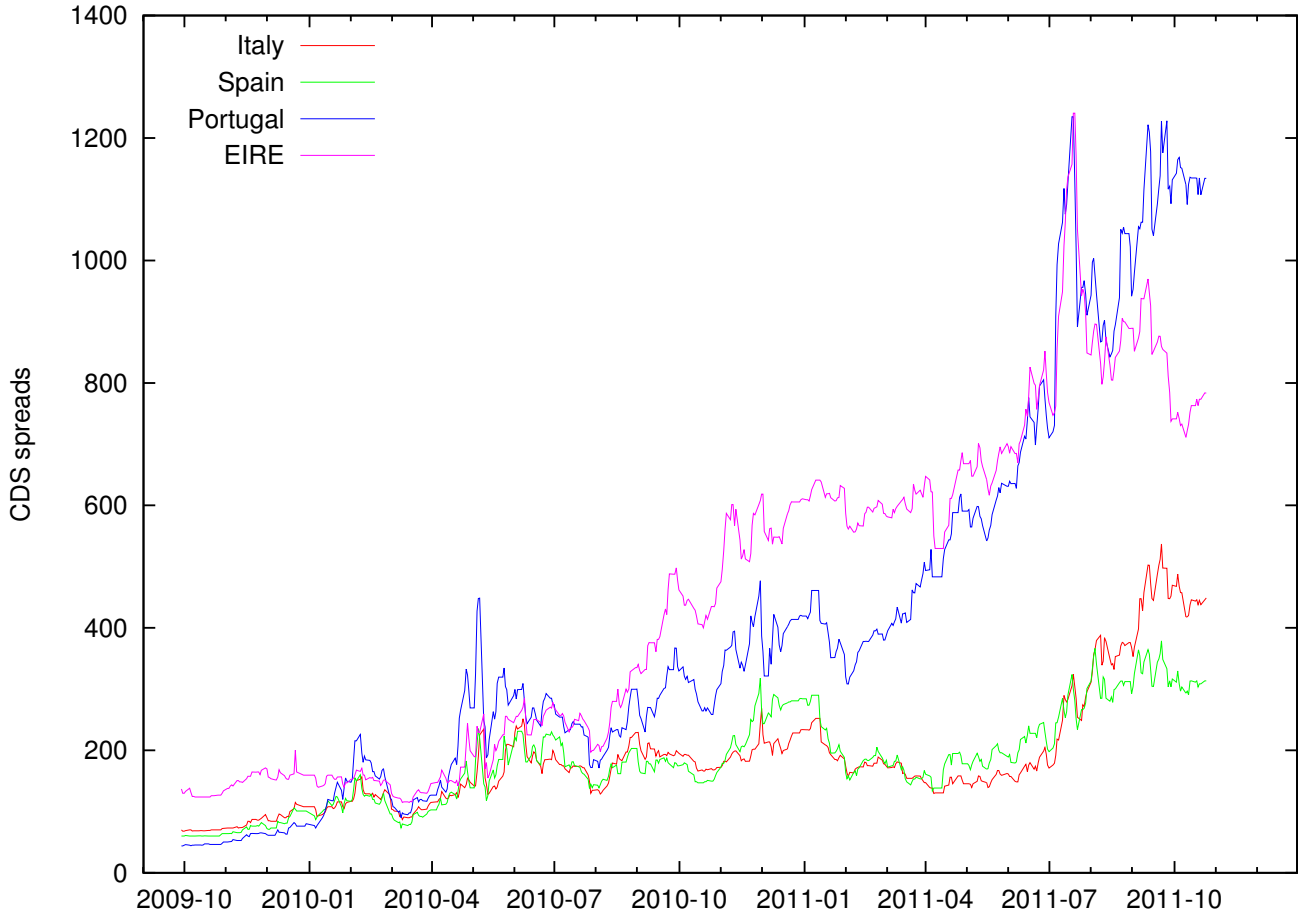
| Date | Portugal | Ireland | Italy | Greece | Spain |
|---|---|---|---|---|---|
| 15-Nov-10 | 334.25 | 512.41 | 183.05 | 832.09 | 197.97 |
| 15-Oct-10 | 279.23 | 405.14 | 168.16 | 625.01 | 146.90 |
| 15-Sep-10 | 285.21 | 381.12 | 199.48 | 867.71 | 184.07 |
| 16-Aug-10 | 233.94 | 294.98 | 193.39 | 806.67 | 175.88 |
| 15-Jul-10 | 246.87 | 225.00 | 173.80 | 747.69 | 181.36 |
| 15-Jun-10 | 269.14 | 197.50 | 197.74 | 802.04 | 206.08 |
| 17-May-10 | 263.15 | 242.50 | 141.90 | 640.23 | 168.00 |
| 15-Apr-10 | 166.79 | 256.09 | 125.85 | 390.54 | 129.76 |
| 15-Mar-10 | 94.94 | 250.36 | 90.05 | 261.57 | 77.04 |
| 15-Feb-10 | 183.58 | 250.30 | 126.93 | 318.87 | 124.96 |
| 15-Jan-10 | 119.79 | 255.40 | 107.91 | 319.81 | 117.76 |
| 15-Dec-09 | 63.15 | 179.81 | 92.06 | 218.86 | 81.04 |

## PIIGS quoted CDS—spread graph November 2010

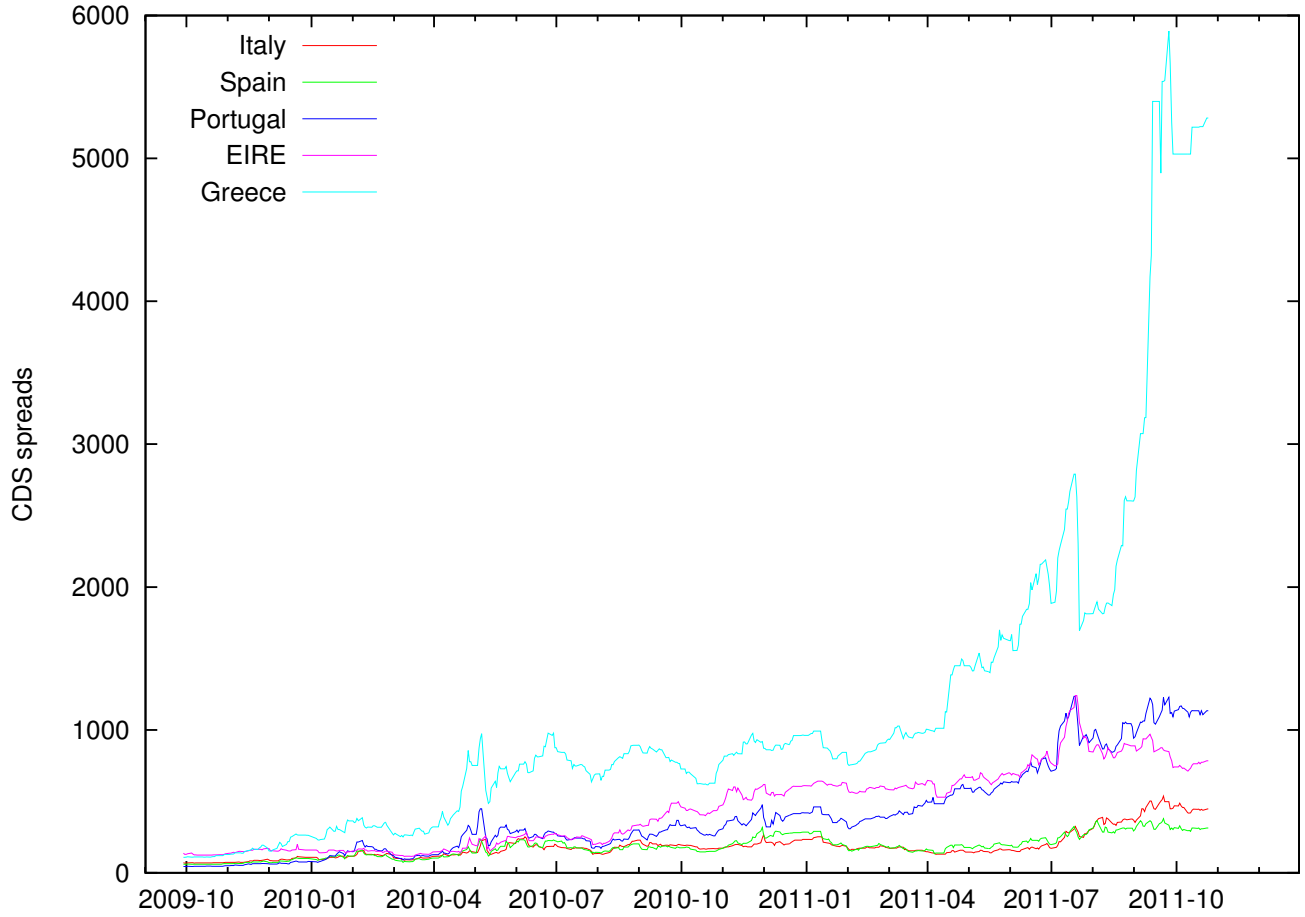


# Italy and Spain—quoted CDS spreads—latest 2 Years

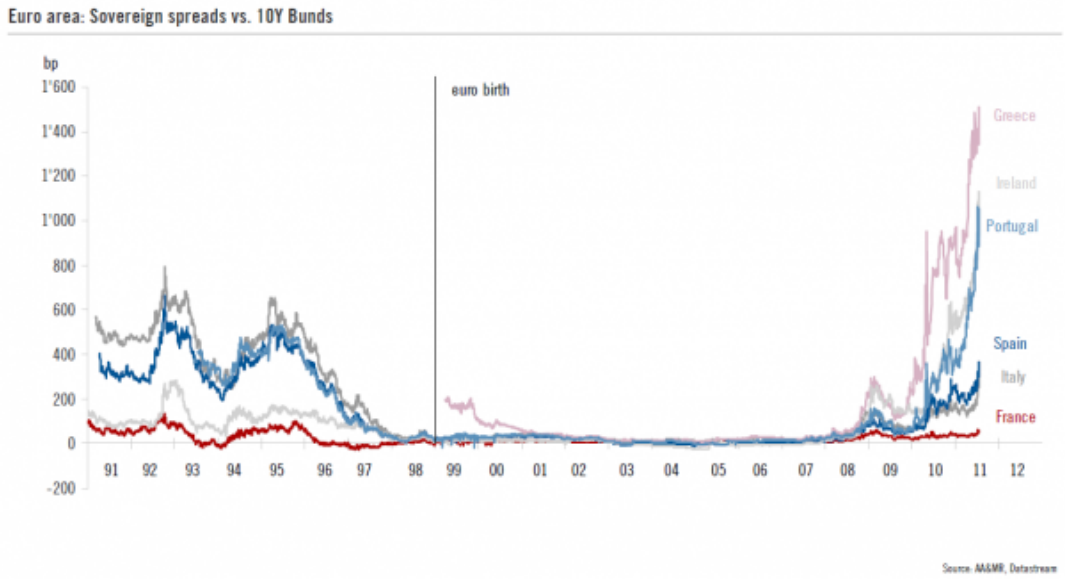
# PIIGS with no G—quoted CDS spreads—latest 2 Years



# PIIGS with G—quoted CDS spreads—latest 2 Years



# Before and after the Euro



# PIIGS default probabilities (November 2010)

Computed default probability for PIIGS countries from quoted 5Y CDS spreads on November, 15th, 2010

| **Country** | **Spread** | $\mathrm{P}_{def}(5\mathrm{Y})$ |
|---|---|---|
| Portugal | 334.25 | 24.5% |
| Ireland | 512.41 | 35.0% |
| Italy | 183.05 | 14.3% |
| Greece | 832.09 | 50.4% |
| Spain | 197.97 | 15.4% |

# PIIGS default probabilities (October 2011)

Computed default probability for PIIGS countries from quoted 5Y CDS spreads on October, 24th, 2011

| **Country** | **Spread** | $\mathrm{P}_{def}(1\mathrm{Y})$ | $\mathrm{P}_{def}(5\mathrm{Y})$ |
|---|---|---|---|
| Portugal | 1134.10 | 17.49% | 61.50% |
| Ireland | 783.52 | 12.43% | 48.27% |
| Italy | 448.84 | 7.33% | 31.48% |
| Greece | 5282.00 | 59.17% | 98.83% |
| Spain | 313.47 | 5.17% | 23.17% |

# Questions?

# Use of market default probabilities

Default probabilities from CDS quotes are useful to

- Understand the market perception of defaults at future dates
- Compute the fair value of credit-linked financial products
- *Perfectly* hedging a bond issue
- *Partially* hedging credit exposure

# Hedging credit risk with CDSs

Credit default swaps can be used to hedge against the loss incurred in lending money to a certain name

- The CDS hedge will exactly balance the losses (*perfect hedge*) when the losses of a purchased bond listed among the deliverable bonds
- All other losses are only *partially hedged* because, in general, the recovery ratio is not known beforehand

# Some historically important recovery ratios

| **Date** | **name** | **Recovery** |
|---|---|---|
| 2008-10-06 | Fannie Mae–Senior | 99.90 |
| 2008-10-06 | Fannie Mae–Subordinated | 91.51 |
| 2008-10-10 | Lehman Brothers | 8.625 |
| 2008-11-05 | Glitnir–Senior | 3.000 |
| 2008-11-05 | Glitnir–Subordinated | 0.125 |
| 2009-01-14 | Republic of Ecuador | 31.375 |
| 2009-06-12 | General Motors CDS | 12.50 |
| 2009-06-12 | General Motors Loans | 97.50 |
| 2009-11-10 | Metro-Goldwyn-Mayer Loans | 58.50 |

Meeting to decide default events: see file
`ISDA-Determinations-Committee-Requests.pdf`

Example of recovery auction: see file `RR-truvo-21092010.pdf`

# Questions?

# Bond price in presence of credit risk (1/3)

Problem: price a fixed-rate coupon bond issued by a risky entity: for example a corporate bond when the issuer credit is important

Input
- quotes for deposits, futures, and swaps
- one or more CDS quotes on the issuer
- the recovery ratio $R$

Intermediate
- risk-free term structure for the discount $D_r(t)$
- term structure for the probability of default $P(t)$

# Pricing a bond in presence of credit risk (2/3)

Each cash flow must be multiplied by the survival probability at that date and then discounted on on the risk-free term structure $D_r(t)$. In case of default the full recovery value is paid back.

For a bond paying coupons $C_i$'s the present value is given by

$$\begin{aligned}\mathsf{PV}_{\mathsf{bond}} = \sum_{i=1}^{n} [1 - P(t_i)]\, D_r(t_i)\, N\, C_i + [1 - P(t_n)]\, D_r(t_n)\, N + \\ + N\, R \int_0^{t_n} D_r(s)\, P(s + ds|s) \qquad (1)\end{aligned}$$

The first line is the expected cash flows in case of survival
The second line the cash flows in case of default, i.e. $R\,N$, to be paid at a random time of default

# Pricing a bond in presence of credit risk (3/3)

The last term in (1) can be approximated using the mid-point approximation.
Since $P(t + \mathrm{d}\, t|t)$ is the default probability between time $t$ and $t + \mathrm{d}\, t$

$$\int_0^{t_n} D_r(s)\, P(s + \mathrm{d}\, s|s) = \tag{2}$$
$$[P(t_1) - P(t_0)]\, D(t_{1/2}) + [P(t_2) - P(t_1)]\, D(t_{1+1/2}) + \dots$$

with $t_1, t_2, \dots$ are future dates on a regular lattice

The dirty price of the bond can be computed from its PV

$$P_{\text{bond}}^{\text{dirty}} = \frac{100}{N} \frac{\text{PV}_{\text{bond}}}{D_r(t_b)}, \tag{3}$$

where $t_b$ is the bond settlement date

# The asset swap (1/3)

A asset swap allows the holder of a fixed-coupon bond to swap the fixed cash flows from the bond to a stream of cash flows based on the Libor rate plus a spread*

In swapping the cash flows the investor retains the original credit worthiness of the issuer

Unlike a standard interest-rate swap, the premium is based on the credit exposure to the bond issuer and not on that of the asset-swap issuer.

*For some reason asset-swap spread is usually denoted by ASW

# The asset swap (2/3)

The asset swap is composed of a fixed leg that pays exactly the same coupons as the original bond, but not the redemption, and a floating leg that pays the Libor rate plus the asset-swap spread $A$

The floating payment is usually made at a different frequency and accrual basis than the fixed payment. The net present value of the asset swap at the bond settlement date, can be computed as

$$\mathsf{NPV}_{\mathsf{asw}} = N\left(L_{\mathsf{libor}} + A\, L_{\mathsf{spread}} - L_{\mathsf{fixed}}\right) \tag{4}$$

# The asset swap (3/3)

with

$$L_{\text{libor}} = \sum_{i=1}^{n_{\text{float}}} D_r(\tau_i)\, L_{i-1}\,(\tau_i - \tau_{i-1}) - L_0\,(t_b - \tau_0)\;, \tag{5}$$

$$L_{\text{spread}} = \sum_{i=1}^{n_{\text{float}}} D_r(\tau_i)\;(\tau_i - \tau_{i-1}) - (t_b - \tau_0)\;, \tag{6}$$

$$L_{\text{fixed}} = \sum_{i=1}^{n_{\text{fixed}}} D_r(t_i)\, C_i\,, \tag{7}$$

where

- $\tau_i$ are the payment dates for future floating payments
- $\tau_0$ is the accrual date for the current floating coupon
- $t - s$ is the year fraction between $s$ and $t$

## Next coupon for an asset swap

The asset swap can be bought at any time during the life of the bond

When it is bought in between coupon dates the next fixed coupon of the asset swap will completely match that of the bond and no accrual is therefore paid.

# The par asset swap (1/2)

Given the bond price $P_{\text{bond}}^{\text{dirty}}$, the asset swap is said to be at par when the portfolio composed by the bond and the asset swap are equivalent to a bond at par, i.e.,

$$P_{\text{bond}}^{\text{dirty}} + 100\,\frac{\text{NPV}_{\text{asw}}(t_b)}{N} = 100\,. \tag{8}$$

The asset swap spread $A$ can be computed from equations (4–8)

$$A = \frac{1 - P_{\text{bond}}^{\text{dirty}}/100 + L_{\text{fixed}} - L_{\text{libor}}}{L_{\text{spread}}}\,. \tag{9}$$

# The par asset swap (2/2)

Similarly, given the asset-swap spread for a certain bond, it is possible to compute the implied bond price:

$$\frac{P_{\text{bond}}^{\text{dirty}}}{100} = 1 + L_{\text{fixed}} - L_{\text{libor}} - A\, L_{\text{spread}}\,. \tag{10}$$

Therefore, the asset-swap spread and the bond price are equivalent and the knowledge of one is necessary and sufficient to determine the other.

# Cash-flow computation for asset swap

Vodafone Group Plc 6.25% 15Jan2016 EX EUR A- (FIT) — Help

XS0408285913=R | Default | MM MID Price 114.9885 | 22 Nov10 10:16 TRFIT 114.86 | 22-Nov-2010

| Bond | BUY |
|---|---|
| Maturity | 15-Jan-2016 |
| Currency | EUR |
| Bond Type | Fixed |
| Coupon | 6.250 |
| Frequency | Annual |
| Basis | Actual/Actual |
| Notional | 100M |
| Market Price | 120,365,212 @25Nov10 |
| Accrued | 5,376,712.33 |

☑ Fair Value in Bond Currency

☑ Adjust Dates and CashFlows to WD

| Swap | Paid | Received |
|---|---|---|
| Start Date | 25-Nov-2010 | |
| Currency | EUR | EUR |
| Fixed/Floating | Fixed | Float |
| Coupon/Spread | 6.250 | 0.0 bp |
| Frequency | Annual | Semi-annual |
| Basis | Actual/Actual | MM Act/360 |
| Notional | 100,000,000 | 100,000,000 |
| Current Rate | | 1.2660 EURIBOR |
| Fair Value EUR | -30,172,442 | 11,580,314 ☑ with accrued |
| Accrued | 0.00 | 10,550.00 |
| Irregular Coupon | None | |
| Swap NPV | -18,592,127 | |
| Total NPV | 101,773,085 | |

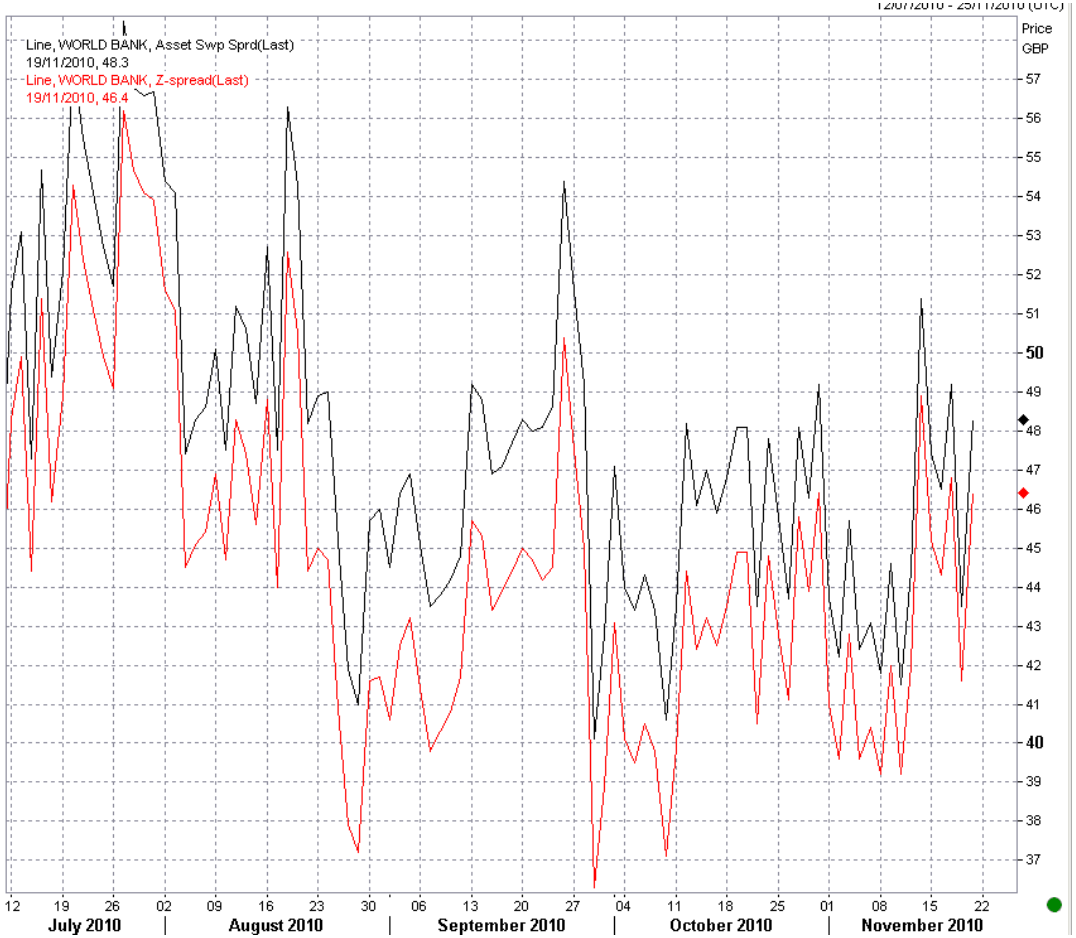
for user defined bond ->

| Asset Swap Calculation | |
|---|---|
| Price | 114.989 |
| Yield | 3.052 |
| Vanilla Swap | 2.401 |

| Spread | | |
|---|---|---|
| Asset Swap ☑ use clean price | | 73.1 bp |
| Upfront Payment | | -14,988,500 |
| Funding Spread | | 0.0 bp |
| **Spread Details** | **Spread** | **Money** |
| Upfront | -304.2 bp | -14,988,500.00 |
| Swap | 377.34 bp | 18,592,127.25 |
| Funding Spread | 0 bp | 0.00 |
| Total | 73.14 bp | 3,603,627.25 |

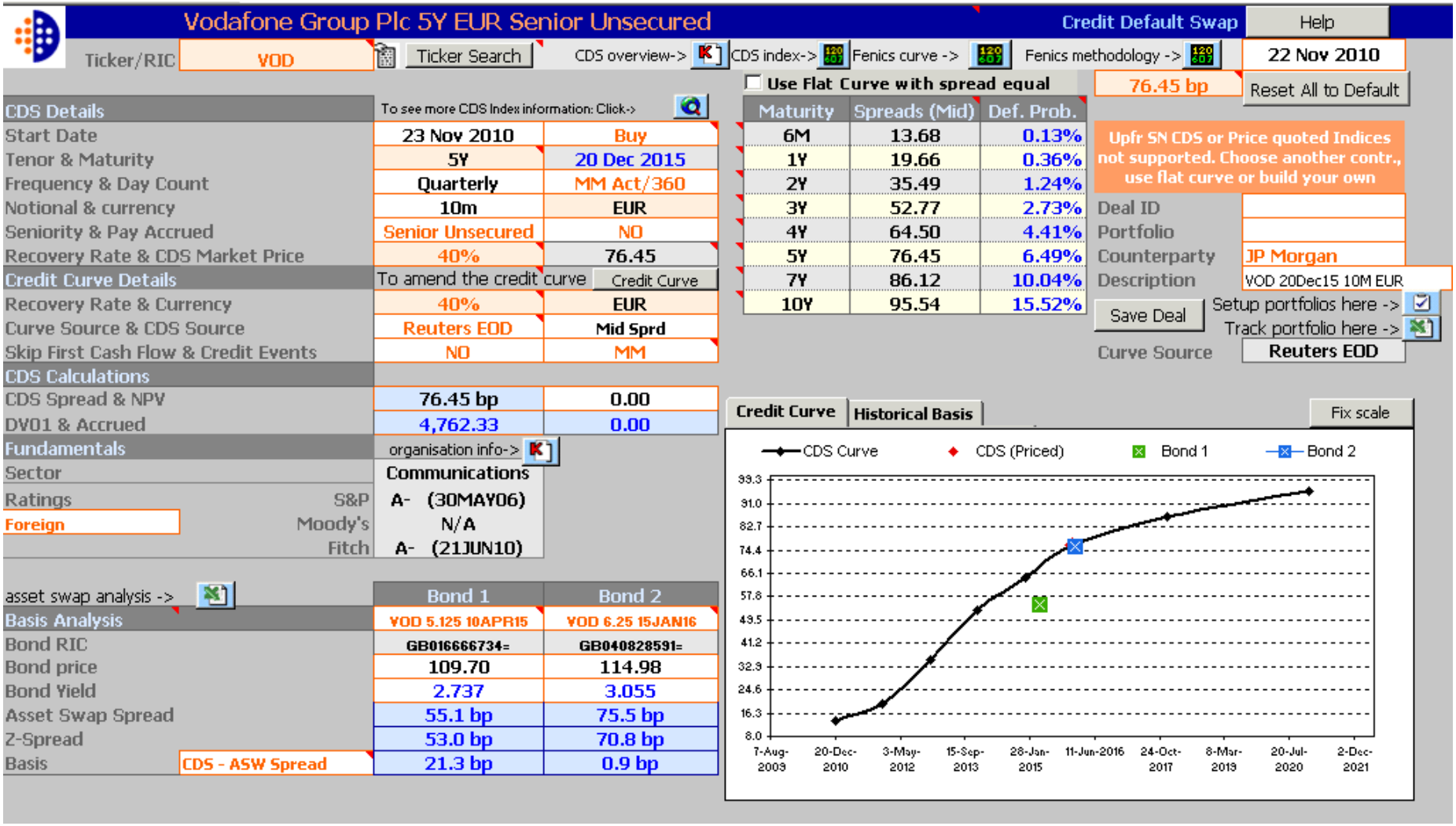
| Dates | Bond Cash Flows | | | Swap Cash Flows | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Received EUR Fixed 6.25% | | 124,029,430 | Paid EUR Fixed 6.25% | | -30,172,442 | Received EUR Float 0 bp | | 11,580,314 |
| Date | Rate | cashflow | NPV | Rate | cashflow | NPV | Rate | Cashflow | NPV |
| 17 Jan2011 | 6.2500 | 6,250,000 | 6,242,552 | 6.2500 | -873,288 | -872,247 | 1.2660 | 186,383 | 186,161 |
| 15 Jul2011 | | | | | | | 1.3751 | 683,724 | 678,272 |
| 16 Jan2012 | 6.2500 | 6,250,000 | 6,152,112 | 6.2500 | -6,250,000 | -6,152,112 | 1.5198 | 781,010 | 768,778 |
| 16 Jul2012 | | | | | | | 1.9874 | 1,004,766 | 979,191 |
| 15 Jan2013 | 6.2500 | 6,250,000 | 6,024,576 | 6.2500 | -6,250,000 | -6,024,576 | 2.1661 | 1,101,093 | 1,061,379 |
| 15 Jul2013 | | | | | | | 2.2960 | 1,154,380 | 1,100,045 |
| 15 Jan2014 | 6.2500 | 6,250,000 | 5,880,207 | 6.2500 | -6,250,000 | -5,880,207 | 2.5160 | 1,285,941 | 1,209,856 |
| 15 Jul2014 | | | | | | | 2.7710 | 1,393,219 | 1,292,775 |
| 15 Jan2015 | 6.2500 | 6,250,000 | 5,712,882 | 6.2500 | -6,250,000 | -5,712,882 | 2.9633 | 1,514,593 | 1,384,430 |
| 15 Jul2015 | | | | | | | 3.1581 | 1,587,825 | 1,428,684 |
| 15 Jan2016 | 6.2500 | 106,250,000 | 94,017,101 | 6.2500 | -6,250,000 | -5,530,418 | 3.2962 | 1,684,708 | 1,490,743 |

# Asset-swap spread vs z-spread



# Credit rating analysis for single names

- Find the quoted credit spreads: bootstrap the probability curve
- Find/Compute the asset-swap spread and the z-spread
- Find/Compute the bond prices and yields
- Compute the basis = CDS - ASW
- Compare risky and riskless yield curves


Vodafone Group Plc 5Y EUR Senior Unsecured
Credit Default Swap
Help
Ticker/RIC
VOD
Ticker Search
CDS overview->
CDS index->
Fenics curve ->
Fenics methodology ->
22 Nov 2010
Use Flat Curve with spread equal
76.45 bp
Reset All to Default
CDS Details
To see more CDS Index information: Click->
Start Date 23 Nov 2010 Buy
Tenor & Maturity 5Y 20 Dec 2015
Frequency & Day Count Quarterly MM Act/360
Notional & currency 10m EUR
Seniority & Pay Accrued Senior Unsecured NO
Recovery Rate & CDS Market Price 40% 76.45
Credit Curve Details
To amend the credit curve
Credit Curve
Recovery Rate & Currency 40% EUR
Curve Source & CDS Source Reuters EOD Mid Sprd
Skip First Cash Flow & Credit Events NO MM
CDS Calculations
CDS Spread & NPV 76.45 bp 0.00
DV01 & Accrued 4,762.33 0.00
Fundamentals
organisation info->
Sector Communications
Ratings S&P A- (30MAY06)
Foreign Moody's N/A
Fitch A- (21JUN10)
Maturity Spreads (Mid) Def. Prob.
6M 13.68 0.13%
1Y 19.66 0.36%
2Y 35.49 1.24%
3Y 52.77 2.73%
4Y 64.50 4.41%
5Y 76.45 6.49%
7Y 86.12 10.04%
10Y 95.54 15.52%
Upfr SN CDS or Price quoted Indices not supported. Choose another contr., use flat curve or build your own
Deal ID
Portfolio
Counterparty JP Morgan
Description VOD 20Dec15 10M EUR
Save Deal
Setup portfolios here ->
Track portfolio here ->
Curve Source Reuters EOD
asset swap analysis ->
Bond 1 Bond 2
Basis Analysis VOD 5.125 10APR15 VOD 6.25 15JAN16
Bond RIC GB0016666734= GB0040828591=
Bond price 109.70 114.98
Bond Yield 2.737 3.055
Asset Swap Spread 55.1 bp 75.5 bp
Z-Spread 53.0 bp 70.8 bp
Basis CDS - ASW Spread 21.3 bp 0.9 bp
Credit Curve
Historical Basis
Fix scale
CDS Curve
CDS (Priced)
Bond 1
Bond 2
99.3
91.0
82.7
74.4
66.1
57.8
49.5
41.2
32.9
24.6
16.3
8.0
7-Aug-2009
20-Dec-2010
3-May-2012
15-Sep-2013
28-Jan-2015
11-Jun-2016
24-Oct-2017
8-Mar-2019
20-Jul-2020
2-Dec-2021

# Exotic credit-linked notes

See, for example, `Credit.Linked.Note.pdf`

# Questions?

# Portfolio credit derivatives

Portfolio credit derivatives are products that give exposure/protection to the collective credit of a group of names

- Biggest problem of single name CD: low volumes
- Credit risk is usually on a number of names
- Standardized contracts traded on a market (not an OTC)
- Market based means high volumes, smaller bid/ask

# Credit default swap index

A CDS index is a contract that gives exposure/protection to a standard portfolio of names

Buying a CDS index is like buying a CDS on each index underlying name with a single index spread

+ More liquid than the corresponding CDS portfolio

– Gives a partial hedge to our portfolio

# Most traded baskets

Historically two big markets developed: Europe and North America

- (Markit) CDX baskets in North America
- (Markit) iTraxx in Europe
- (Markit) iTraxx in Asia
- (Markit) iTraxx SovX for sovereign

Composition of investment-grade iTraxx Europe

see file `itraxx-europe-series-13.pdf`

Composition of investment-grade CDX North America

see file `CDX-IG-14-v1.pdf`

# NPV of CDS index

Neglecting the accrual leg and with no upfront payments we have

$$\mathsf{NPV}_i = N_i \left[ s_i \, A_i - C_i \right] \tag{11}$$

for each single name

In the CDS index we assume $N_i = N/n$ and the same spread $s$ for all names

$$\mathsf{NPV}_{\mathsf{index}} = \frac{N}{n} \sum_{i=1}^{n} \left[ s \, A_i - C_i \right] \tag{12}$$

# Fair spread of CDS index (1/2)

Is the CDS-index fair spread the average of all single-name spreads?

For each name $s_i$ is the fair spread, so that

$$s\,A_i - C_i = (s - s_i)\,A_i + s_i\,A_i - C_i = (s - s_i)\,A_i \tag{13}$$

The CDS-index NPV becomes

$$\mathsf{NPV}_{\mathsf{index}} = \frac{N}{n}\sum_{i=1}^{n}(s - s_i)\,A_i = \frac{N}{n}\left[s\sum_{i=1}^{n}A_i - \sum_{i=1}^{n}s_i\,A_i\right] \tag{14}$$

# Fair spread of CDS index (2/2)

The index fair spread $\tilde{s}$ is such that $\text{NPV}_{\text{index}}=0$,

$$\tilde{s} = \left[\sum_{i=1}^{n} s_i \, A_i\right] / \left[\sum_{i=1}^{n} A_i\right] \tag{15}$$

- Not just the arithmetic average of CDS spreads
- The default legs do not enter this expression

# Quotes of major European (corporate) indices as Nov. 19th, 2010

**CDS Market Summary**

N.America Europe Asia Sovereigns Volatility

**Credit Indices**

| Name | Spread/Price | Unit | Change(%) |
|---|---|---|---|
| Markit iTraxx Europe | 101 | Spread | 0.76% |
| Markit iTraxx Europe Crossover | 457 | Spread | 0.55% |
| Markit iTraxx Europe HiVol | 151 | Spread | -0.87% |
| Markit iTraxx Europe Senior Financials | 135 | Spread | 2.27% |
| Markit iTraxx Europe Sub Financials | 226 | Spread | 5.66% |

# Quotes of major North American (corporate) indices as Nov. 19th, 2010

**CDS Market Summary**

N.America Europe Asia Sovereigns Volatility

**Credit Indices**

| Name | Spread/Price | Unit | Change(%) |
|---|---|---|---|
| Markit CDX.NA.IG | 90 | Spread | -0.83% |
| Markit CDX.NA.IG.HVOL | 140 | Spread | -0.80% |
| Markit CDX.NA.HY | 100.79 | Price | 0.21% |
| Markit CDX.NA.HY.B | 101.21 | Price | 0.16% |
| Markit CDX.NA.HY.BB | 107.11 | Price | 1.29% |
| Markit CDX.NA.XO | 208 | Spread | 3.20% |
| Markit CDX.EM | 113.06 | Price | -0.02% |

# Quotes of major Sovereign indices as Nov. 19th, 2010

**CDS Market Summary**

N.America Europe Asia Sovereigns Volatility

**Sovereign Indices**

| Name | Spread | Change(%) |
|---|---|---|
| Markit iTraxx SovX Western Europe | 166 | 1.14% |
| Markit iTraxx SovX CEEMEA | 203 | 0.98% |
| Markit iTraxx SovX Asia Pacific | 102 | 2.34% |
| Markit iTraxx SovX Global Liquid IG | 132* | 4.51% |
| Markit iTraxx SovX G7 | 73* | 7.48% |
| Markit iTraxx SovX BRIC | 103* | 13.80% |

# Quotes of major Sovereign indices as Nov. 19th, 2010

| Index | Series | Version | Term | RED Id | On Run | Coupon | Maturity | Date | Time | Comp Price | Theo Price | Comp Spread | Theo Spread | Mid Day Spread Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CDX.NA.HY | 17 | 1 | 5Y | 2I65BRHM5 | Y | 500 | 20Dec16 | 17Nov11 | N1830 | 89.960% | 90.829% | 760.02 | 735.60 | |
| CDX.NA.HY.B | 17 | 1 | 5Y | 2I65BSEN4 | Y | 500 | 20Dec16 | 17Nov11 | N1830 | 92.391% | 92.955% | 692.70 | 677.51 | |
| CDX.NA.HY.BB | 17 | 1 | 5Y | 2I65BVBY6 | Y | 500 | 20Dec16 | 17Nov11 | N1830 | 102.061% | 102.276% | 451.89 | 446.97 | |
| CDX.EM | 16 | 1 | 5Y | 2I65BZAP7 | Y | 500 | 20Dec16 | 17Nov11 | N1830 | 107.562% | 108.050% | 331.97 | 321.74 | |
| CDX.NA.IG | 17 | 1 | 5Y | 2I65BYCN3 | Y | 100 | 20Dec16 | 17Nov11 | N1830 | 98.269% | 98.257% | 136.46 | 136.72 | |
| CDX.NA.IG.HVOL | 17 | 1 | 5Y | 2I65B3AS2 | Y | 100 | 20Dec16 | 17Nov11 | N1830 | 93.504% | 92.670% | 243.00 | 262.68 | |
| | | | | | | | | | | | | | | |
| iTraxx Europe | 16 | 1 | 5Y | 2I666VAW5 | Y | 100 | 20Dec16 | 17Nov11 | L1600 | 95.994% | 95.751% | 187.69 | 193.22 | |
| iTraxx Europe HiVol | 16 | 1 | 5Y | 2I667LAT3 | Y | 100 | 20Dec16 | 17Nov11 | L1600 | 91.866% | 91.841% | 285.30 | 285.92 | |
| iTraxx Europe Crossover | 16 | 1 | 5Y | 2I667KBY3 | Y | 500 | 20Dec16 | 17Nov11 | L1600 | 90.520% | 91.088% | 760.00 | 742.84 | |
| | | | | | | | | | | | | | | |
| iTraxx Japan | 16 | 1 | 5Y | 2I668HBP8 | Y | 100 | 20Dec16 | 18Nov11 | T1600 | 95.507% | | 194.93 | | |
| iTraxx Australia | 16 | 1 | 5Y | 2I668IAP7 | Y | 100 | 20Dec16 | 18Nov11 | T1600 | 95.457% | | 198.30 | | |
| iTraxx Asia ex-Japan IG | 16 | 1 | 5Y | 4ABCAMAI7 | Y | 100 | 20Dec16 | 18Nov11 | T1600 | 94.784% | | 213.57 | | |
| | | | | | | | | | | | | | | |
| iTraxx SDI-75 | 4 | 3 | 10Y | 4ABCAIAK1 | Y | 35 | 20Jun17 | 17Nov11 | | | 87.873% | | 291.15 | |
| | | | | | | | | | | | | | | |
| iTraxx SovX Western Europe | 6 | 1 | 5Y | 5C769MAF8 | Y | 100 | 20Dec16 | 17Nov11 | L1600 | 88.826% | 88.858% | 357.75 | 356.93 | |
| iTraxx SovX CEEMEA | 6 | 1 | 5Y | 5C769NAF6 | Y | 100 | 20Dec16 | 17Nov11 | L1600 | 89.236% | 89.499% | 339.79 | 333.43 | |
| iTraxx SovX Global Liquid Investment Grade | 6 | 1 | 5Y | 5C769KAF2 | Y | 100 | 20Dec16 | 17Nov11 | | | 94.189% | | 227.10 | |
| iTraxx SovX G7 | 6 | 1 | 5Y | 5C769JAF5 | Y | 100 | 20Dec16 | 17Nov11 | | | 96.452% | | 175.99 | |
| iTraxx SovX BRIC | 6 | 1 | 5Y | 4ABCAPAD1 | Y | 100 | 20Dec16 | 17Nov11 | | | 95.701% | | 192.71 | |
| iTraxx SovX Asia Pacific | 6 | 1 | 5Y | 4ABCANAD6 | Y | 100 | 20Dec16 | 18Nov11 | T1600 | 96.398% | | 177.25 | | |
| | | | | | | | | | | | | | | |
| LCDX.NA | 17 | 1 | 5Y | 5F199GEP8 | Y | 250 | 20Dec16 | 17Nov11 | N1600 | 92.289% | | 491.13 | | |
| iTraxx LevX Senior | 6 | 9 | 5Y | 4ABCAJER0 | Y | 500 | 20Jun15 | 18Nov11 | L1100 | 103.000% | | | | |
| | | | | | | | | | | | | | | |
| MCDX.NA | 17 | 1 | 5Y | 5A79DPAH0 | Y | 100 | 20Dec16 | 17Nov11 | N1830 | 95.590% | | 213.75 | | |

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# References

1. Wikipedia: `http://en.wikipedia.org/wiki/Credit_default_swap_index`

2. Markit website: `http://www.markit.com/cds`

3. *Options, future, & other derivatives*, John C. Hull, Prentice Hall (from sixth edition)

 