

Simulated Fair Valuation of Credit Default Swap (CDS)

by

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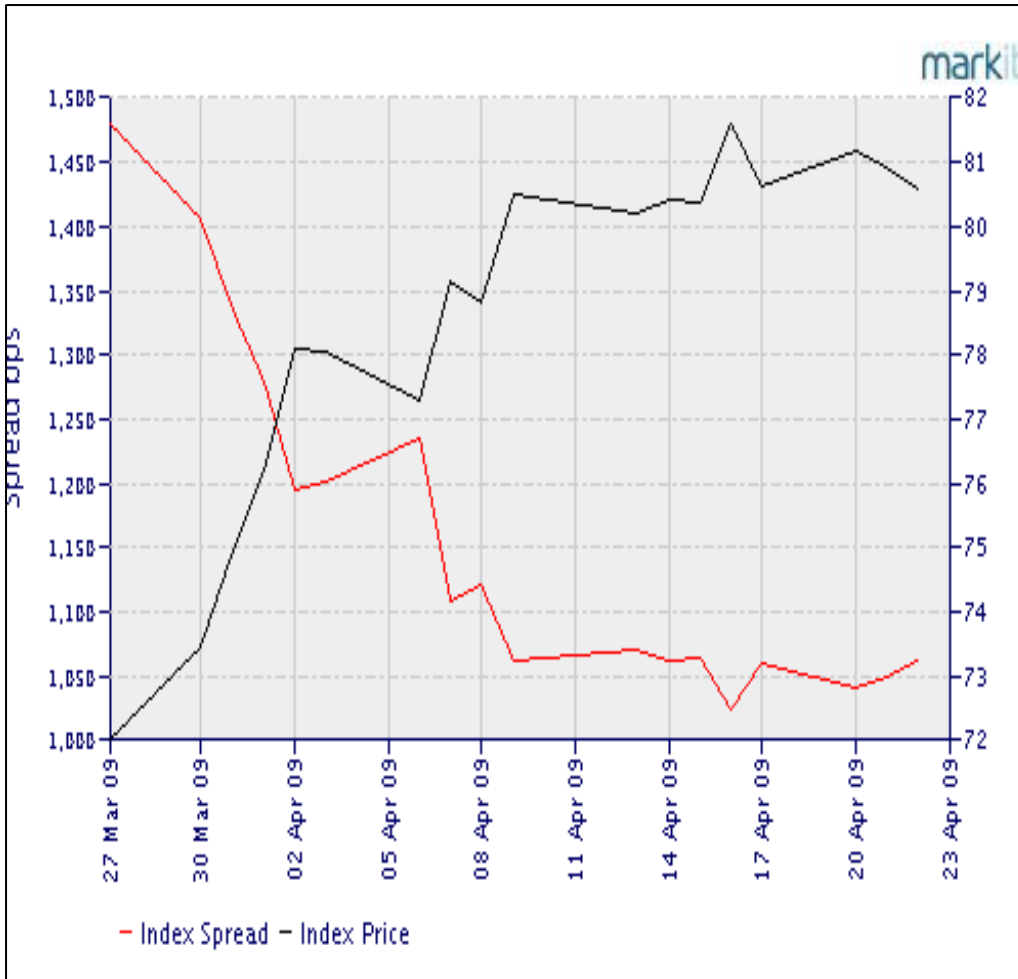
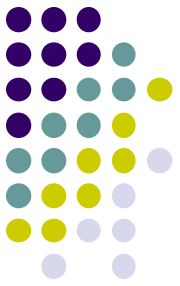
Claudia Lee

MGT239 Final Project Presentation

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**A. Gary Anderson Graduate School of Management
University of California, Riverside**

SAMPLE DATA : BASED ON CDX.NA.HY.B INDEX



Time Period (n)	Observation (X)
0	1460.0
1	1410.0
2	1195.0
3	1225.0
4	1120.0
5	1070.0
6	1065.0
7	1065.0
8	1040.0
9	1065.0
Mean =	1171.5
Std Dev =	152.0

where 'n' is time interval of 3-calender-day period

Probability of Non-Default (p) :

$$p = e^{[(-s*t)/(1-R)]}$$

where:

S = credit spread of one-year CDX:NA:NY:B over one month period

=	-288.5
=	-0.198

Δt = time period from 0, 1, ..., 9

=	0.100
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R = recovery rate of HY Bond investment in event of default

	0.30
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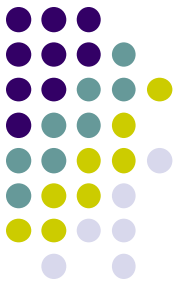
Probability of Non-Default (using "CDS:NA:NY:B" as proxy)




Time Period (n)	Periodic Probability (p _i)
0	0.866878
1	0.871129
2	0.889650
3	0.887042
4	0.896202
5	0.900598
6	0.901038
7	0.901038
8	0.903245
9	0.901038
Mean Prob. (p) =	0.895

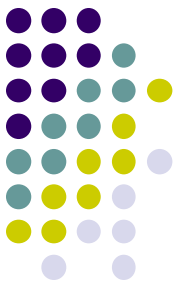
Average 3-day periodic probability of Non-Default

Cash Flow of CDS



- Cash Outflow 
 - Due to CDS premium Cost
 - Assume : pay the premium at the beginning of each month
- Cash Inflow
 - Due to default event occurrence
 - PV of [CDS Nominal Value (N)*(1- Recovery Rate)]
Ex. Default @ 1st month :
$$95,000,000 * (1-30%) * (1+0.44\%)^{-1}$$

Cash Outflow

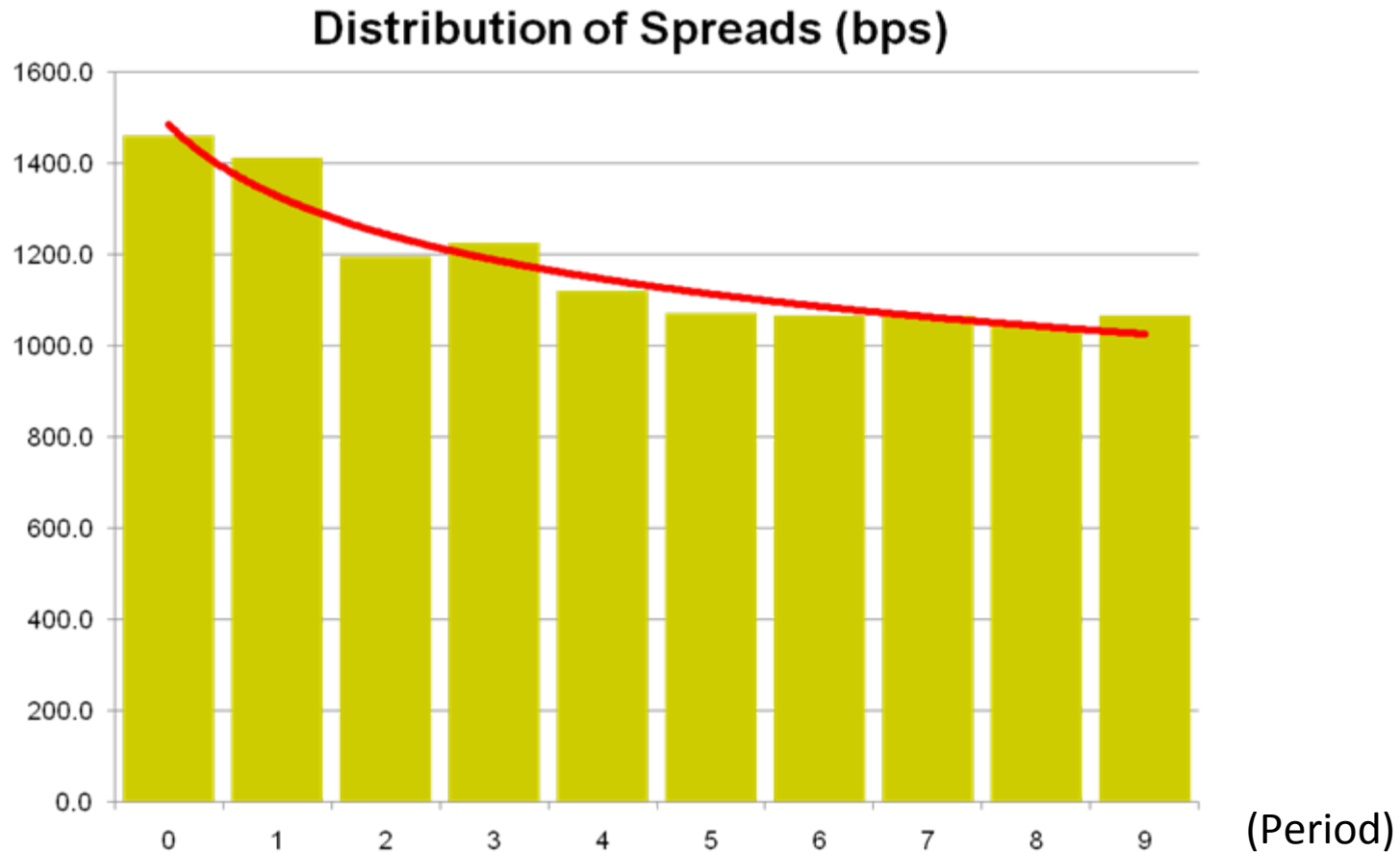
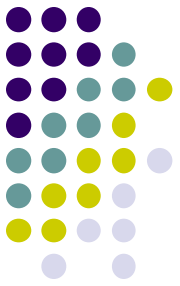


CDS Annual Premium (C) = 10,117,500

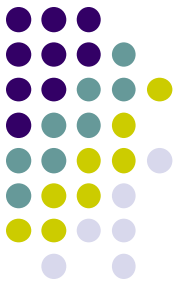
Monthly Time (t)	Monthly Premium Cost to CDS-holders	Monthly PV of Premium Cost to CDS-holders
1	843125.00	843125.00
2	843125.00	839421.05
3	843125.00	835733.38
4	843125.00	832061.91
5	843125.00	828406.56
6	843125.00	824767.28
7	843125.00	821143.98
8	843125.00	817536.60
9	843125.00	813945.07
10	843125.00	810369.31
11	843125.00	806809.27
12	843125.00	803264.86
Total PV of Premium Cost to CDs holders		9876584.28



Probability of Default @ T (Exponential Distribution)



Event-Based Valuation



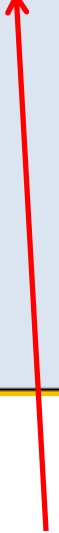
Monthly (t)	Non-default Probability (@ t)
1	1.000
2	1.000
3	1.000
4	0.449
5	0.630
6	0.301
7	0.498
8	1.000
9	0.139
10	0.119
11	0.016
12	1.000

Monthly Time (t)	Expected Month of Default, [(1-p) @ t]	Event-based CDS Price (to Default Time)
0		
1	0	-
2	0	-
3	0	-
4	1	55,462,524.99
5	0	-
6	0	-
7	0	-
8	0	-
9	0	-
10	0	-
11	0	-
12	0	-
No Default (by T)	0	-

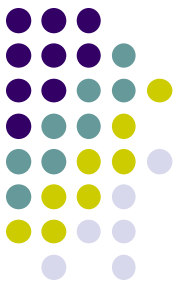
Default time (@Month)

PV of total Cash Flow

Assume: when non-default rate $\leq 0.5 \rightarrow$ Default happens



Risk-Weighted Average Valuation

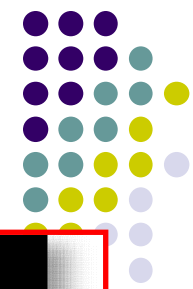


Monthly (t)	Non-default Probability (@ t)
1	0.738
2	1.000
3	0.870
4	0.105
5	0.929
6	1.000
7	0.589
8	0.493
9	1.000
10	0.033
11	1.000
12	1.000

Monthly Time (t)	Monthly PV of Premium Cost to CDS-holders	-CF	+CF	Probability of Default (1-p) at Time (t)	(C) * [(B)+(A)]
		(A)	(B)		
0	-843125.00	-843125.00	0.000000000		
1	-839421.05	-1682546.05	66207857.83	0.262127	14,765,956.12
2	-835733.38	-2518279.44	65916999.07	0.000000	-
3	-832061.91	-3350341.34	65627418.09	0.095828	5,342,492.63
4	-828406.56	-4178747.91	65339109.27	0.574549	31,865,936.92
5	-824767.28	-5003515.19	65052067.02	0.004801	264,874.59
6	-821143.98	-5824659.17	64766285.79	0.000000	-
7	-817536.60	-6642195.77	64481760.02	0.025749	1,406,019.01
8	-813945.07	-7456140.83	64198484.21	0.018717	1,016,732.17
9	-810369.31	-8266510.15	63916452.86	0.000000	-
10	-806809.27	-9073319.41	63635660.51	0.017624	947,435.82
11	-803264.86	-9876584.28	63356101.71	0.000000	-
12	-799736.03	-9876584.28	63077771.04	0.000000	-
No Default (by T)	-799736.03	-9876584.28	0.000000000	0.000606	5,984.21
Total (over 12-month):				1.000000	55,603,463

Risk-Weighted Average Price of CDS (over 12-month)

CDS Simulation Model – GUI



HEDGERS GROUP, INC

VALUATION SOFTWARE - 2009[®]

User Name: HEDGERS GROUP

VALUATION OF CREDIT DEFAULT SWAP ("CDS")

INPUTS :

● UNDERLYING ASSET

Asset Type : Bond

Nominal Value : \$ 100,000,000

Present Value : \$ 95,000,000

● MARKET CONDITIONS

Discount Rate : 0.44125 %

Proxy CDS Product/Index (if any) :

Period	Observations (N ≤ 10)
1 (oldest)	1460.0
2	1410.0
3	1195.0
4	1225.0
5	1120.0
6	1070.0
7	1065.0
8	1065.0
9	1040.0
10 (latest)	1065.0

● CDS CONTRACT ASSUMPTIONS

CDS Nominal Value : \$ 95,000,000 (if below par value)

Expected Recovery Rate : 0.30 %

Total Premium Frequency : 12 times per annum

Premium Spread (Actual/Proxy) : 10.65 % per annum

OUTPUTS :

◆ SIMULATED CDS FAIR VALUATION :

EVENT-BASED : \$ 55,871,742.92 RISK-BASED : \$ 53,861,504.52

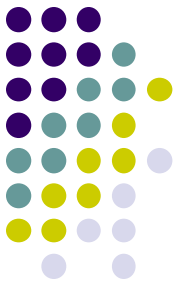
Period	Probability of Default (1 - p)
1	0.00
2	0.00
3	0.00
4	0.20
5	0.00
6	0.10
7	0.25
8	0.35
9	0.00
10	0.02
11	0.00
12	0.03
N-D	0.01

◆ CDS STATISTICS :

VOLATILITY	\$	VOLATILITY	\$
MAX	2,140,948.52	MAX	923,701.77
MIN	56,331,273.55	MIN	56,330,125.92
LCL	-9,876,584.28	LCL	43,699,122.25
UCL	55,738,887.04	UCL	55,691,272.45
UCL	56,004,598.80	UCL	55,805,912.49

◆ EXPECTED MONTHS TO DEFAULT :

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CDS Simulation Model – Potentials

❖ **CDS Model is OPTIMAL – due to following natures:**

- *Primary by Proxy CDS Index, or Secondary by Actual CDS Spread*
- *Two or more valuation approaches – defaults are event-based and risk-based*
- *Flexible capital structure – equity / debt / hybrids*
- *Scalability – maturity period / contractual value / serial tranches*
- *User-friendly + Endless skins for GUI*

❖ **A value-added proposition for any stakeholders within international credit markets.**

❖ **WAY FORWARD:**

Incubation / Prototypes / Beta / Global Launch / Organic Growth / Exit Strategy

That's It Folks!
Thank You.
Any Questions???