The Trust Preferred Market: From Start to (Expected) Finish

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These views expressed are our own and do not reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System

Agenda

Objectives

Describe the historical development of TruPS from inception to today

Describe the symbiotic relationship between investment banks and rating agencies and show model development over time

Describe our benchmark valuation model

Estimate expected losses on all TruPS CDO securities

Provide some lessons learned

Main Conclusions

Based on our benchmark model, we estimate:

- Even with no additional net defaults, 42% of bonds will be written off, 24% by balance
- With our base Model forecast, losses will total 36% of original balance, 43% of current balance, and will exceed $20B out of the $59B of securities issued

Economic reasons for TruPS issuance

- Effective form of raising capital for small unrated banks
- Favorable capital treatment
- Record low bank failures and low CRE defaults

Poor performance was a result of

- Nature of the real estate and financial crises
- Investment in TruPS CDOs constituted an indirect investment in the CRE market
- Models missed the highly correlated dimensions of the risks

Capital Structure of a Trust Preferred Security and Trust Preferred CDO

What are TruPS CDOs comprised of?

- The TruPS CDO market originated approximately $59B of securities issued from 2000 to 2007
- TruPS assets primarily consist of Banks, Thrifts, Insurance, REITs and blends of these categories as shown in the table below
- Other TruPS CDOs tranches
- A typical TruPS CDO consists of between 30 and 130 underlying assets

TruPS CDOs Issuance by Year & by Collateral Type ($ Million)

Year	Bank	Bank & Thrift	Bank, Thrift & Insurance	Insurance	REIT	Total
2000	553		200			753
2001	3,376					3,376
2002	337	4,256		359		4,953
2003	1,413	2,802	1,528	2,049		7,793
2004	1,848	2,537	2,312	1,054		7,751
2005	1,055	872	4,651		3,224	9,803
2006	362		9,220		5,008	14,590
2007	611	539	5,943		2,802	9,895
Total	9,556	11,007	23,853	3,463	11,035	58,913

TruPS CDOs - Structure

- Senior/subordinated structure
- Characterized by very high relative subordination and discount margins of senior AAA-rated bonds
  - For Sr. AAA bonds, 85% rated by all three rating agencies
  - For BBB bonds, 47% rated only by Fitch

What factors caused the development of TruPS?

- Begins with 1995 decision by Federal Reserve to approve for BHCs the use of up to 25 percent of TruPS for Tier 1 capital
  - Opposed by the FDIC, so it ended up in BHC
- By 10Q1, BHCs issued $150B in TruPS
- TruPS enabled banks to raise capital at the BHC level on a tax-advantaged basis without diluting shareholder value
- Key characteristics
  - Subdebt, but senior to equity
  - Non-amortizing 30-year note
  - Dividends deferrable up to 5 years, but are cumulative
- Problem: smaller, unrated banks could not issue TruPS…so In 2000, analysts at Solomon Smith Barney issued the first TruPS CDO with Fitch.
- The issuance of TruPS CDOs “helped the market explode.”

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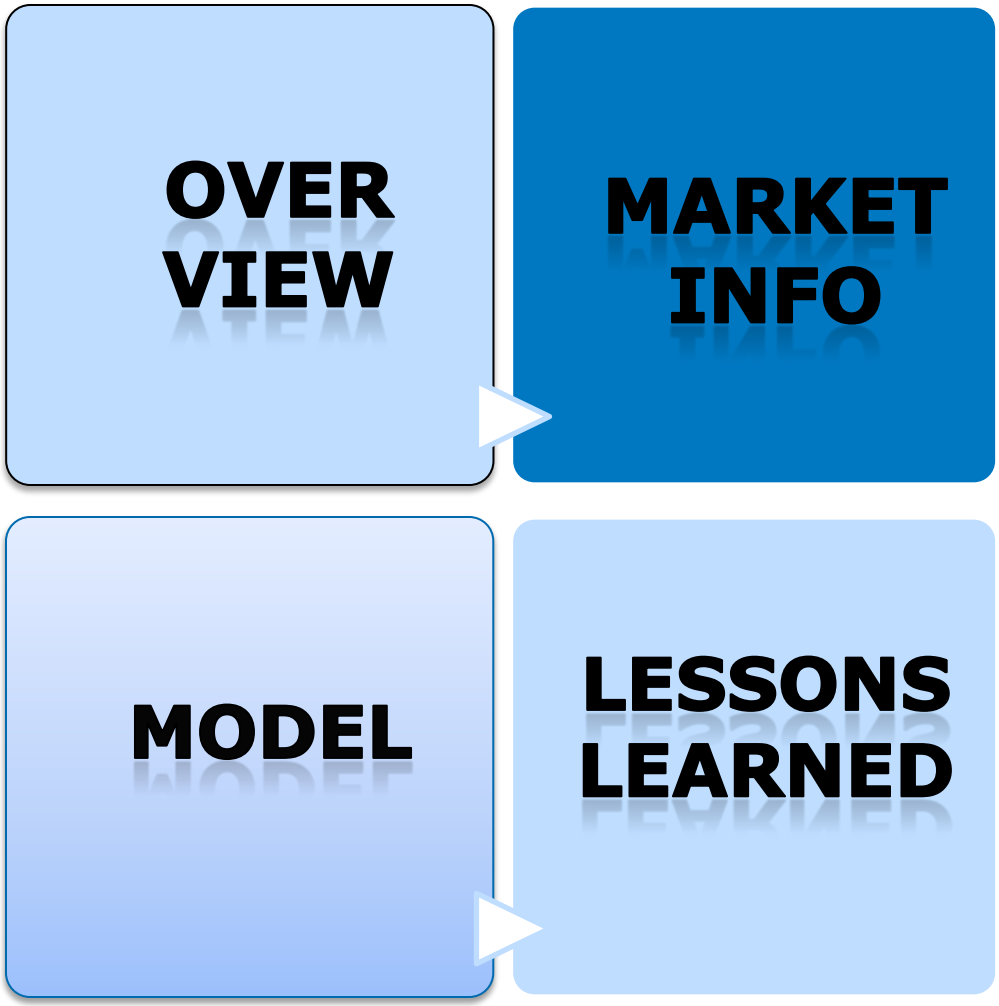


Issues in Market

Investment in TruPS CDOs is an indirect investment in unrated and deeply subordinated CRE bonds. From Merrill (2004):

"One can view investing in TruPS as an indirect investment in CRE."

"Most TruPS issuers… are small and unrated."

Declining risk management standards generate problems not picked up in ratings

"Early TruPS transactions were 'blind pools', where investors did not have access to collateral specifics."

"…other banks and insurers were…the first investors across the capital structure of TruPS [CDOs]."

in one case of a bank, IndyMac, being placed in 24 of the108 deals

Who was investing in TruPS CDOs?

- Not biggest banks: largest BHCs hold less than $1 billion
- Insurers: $2.8 billion (NAIC)
- Small to medium sized banks estimated at $10-$12 billion, mostly in the BBB-AA tranches.

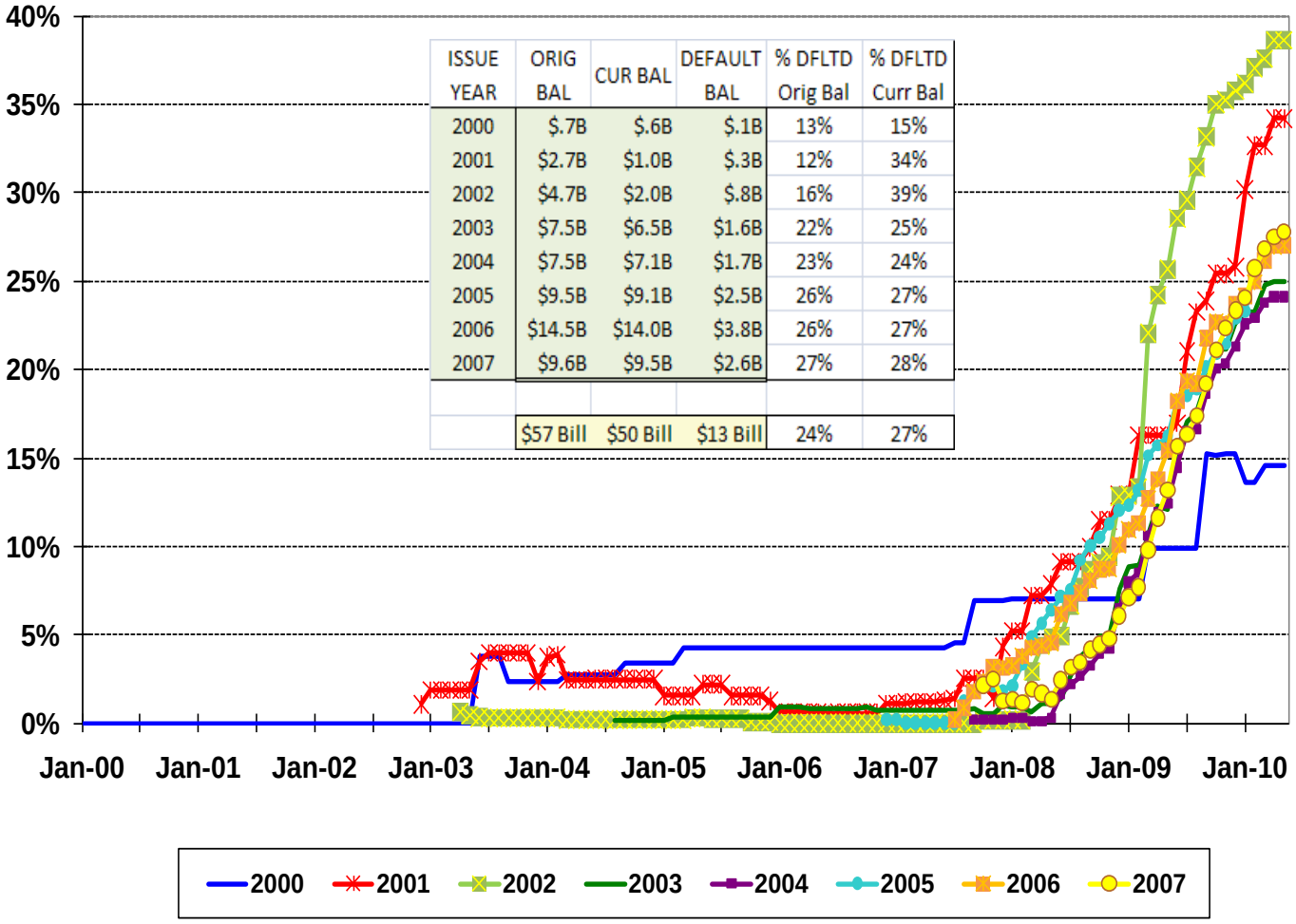
Rating agencies Modeling and background

- Modeling developed initially at SSB and rating agencies
- Three key elements to models:
  1. Internally generated failure models of industries (mostly banking, insurance and REITs)—most banks unrated
  2. Correlation coefficients—most CDOs in the same industry
  3. Recoveries—no knowledge of, assume small to none
- Moody's: "CDOs of [bank] Trust Securities have broken new ground by being the first single-industry transactions." "The assumptions regarding pool diversity are particularly important because TruPS CDOs are effectively single industry transactions."
- SSB divided the U.S. into five geographic "regions" which they wanted treated as separate "industries."
- Moody's accepted this formulation and their regions exactly match SSB's except for one state (Arkansas).

Performance updates and agency downgrades

- Up to March 2008, 12 REIT CDOs downgraded, but no bank TruPS CDO downgraded
- November 2008 Moody's bank TruPS CDO model revamped
  - Augmented models with two accounting-based risk ratios; if they failed, either placed them in default or assigned them a 6.5% 10-yr. default probability (Caa2 rating)
  - All default rates scaled up further by 25%
  - Banks *maximum* rating now capped at Baa2
  - Correlation assumptions increased to 10% inter-region, 45% intra-region
- Moody's downgraded bonds in over 40% of the market in 11/08 after their methodology change.

TruPS CDO Vintage Def/Def As Percent of Current Balance



ISSUE YEAR	ORIG BAL	CUR BAL	DEFAULT BAL	% DFLTD Orig Bal	% DFLTD Curr Bal
2000	$.7B	$.6B	$.1B	13%	15%
2001	$2.7B	$1.0B	$.3B	12%	34%
2002	$4.7B	$2.0B	$.8B	16%	39%
2003	$7.5B	$6.5B	$1.6B	22%	25%
2004	$7.5B	$7.1B	$1.7B	23%	24%
2005	$9.5B	$9.1B	$2.5B	26%	27%
2006	$14.5B	$14.0B	$3.8B	26%	27%
2007	$9.6B	$9.5B	$2.6B	27%	28%
	$57 Bill	$50 Bill	$13 Bill	24%	27%

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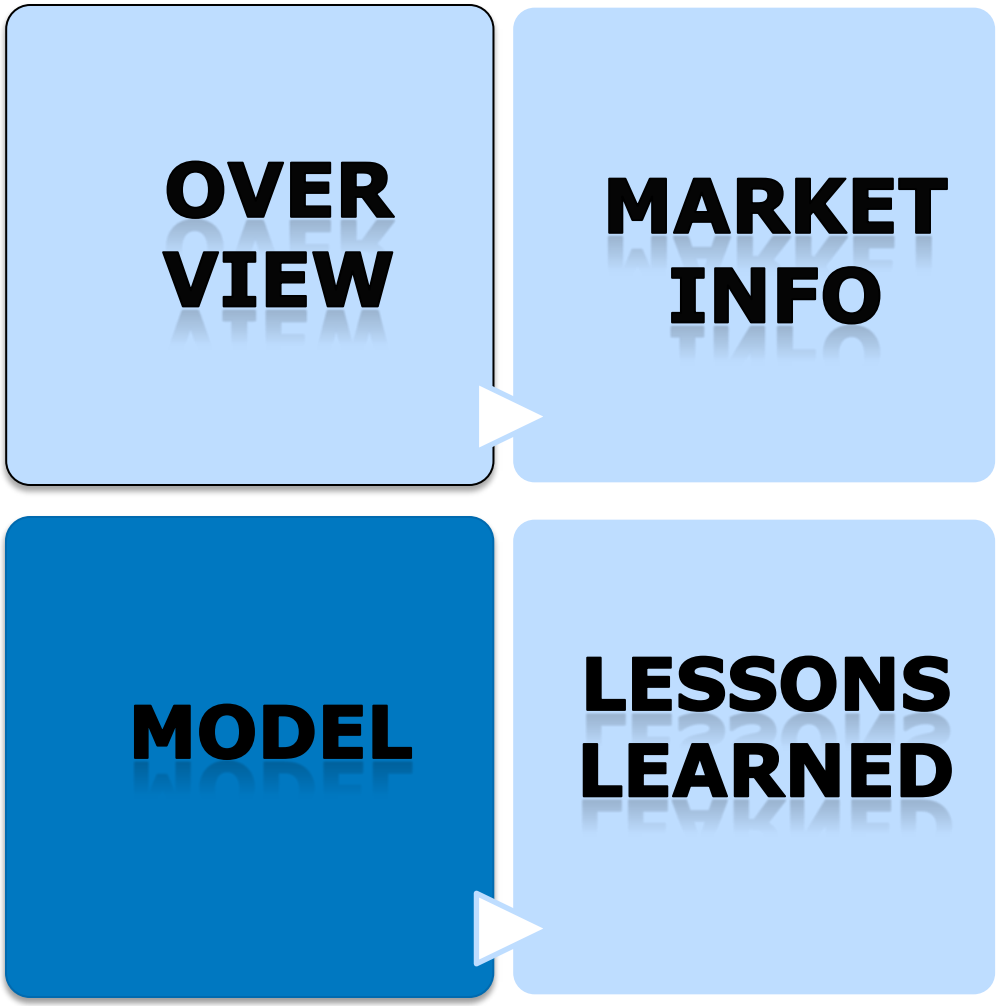


TruPS Modeling Assumptions

RADAR developed an internal model for valuing TruPS CDOs

Additional detail provided in RADAR's paper, expected to be released shortly, The Trust Preferred CDO Market: From Start to (Expected) Finish

Utilizes empirical data to develop modeling assumptions

- Retrieved default, deferral, and cure level data at the deal level from FTN, the largest issuer of TruPS
  - This asset level default data represented about 1/3 of the entire market and we built our default/deferral (DD) curve off of this data
- Pattern of time series was such that we chose a Merton (1974) unit root model to justify near-term unit-root forecast of modeling with the latest DDs

TruPS Modeling Assumptions (cont.)

Main assumptions:

Next 2 yrs. (7/10—6/12) net deferrals follow a unit root where the 24 month forecast is the latest DD rate on each deal.

Months 25-36	3.00% CDR
Months 37-48	1.50% CDR
thereafter	.25%CDR

Recoveries: 10% based on very recent experience

CPR: 1%, based on historically observed 1.38%

Central modeling limitations :

- No collateral specific information on TruPS issuers, only information on counts only (Asset #1,…,Asset n)
- Most defaulted institutions still reporting balances since HCs have not yet been liquidated
- Only aggregated balances are observed for deferred & defaulted assets

Model assumptions are conjectures

How do our expected compare to Moody's models, which had asset level detail?

Model Validation - comparison against Moody's

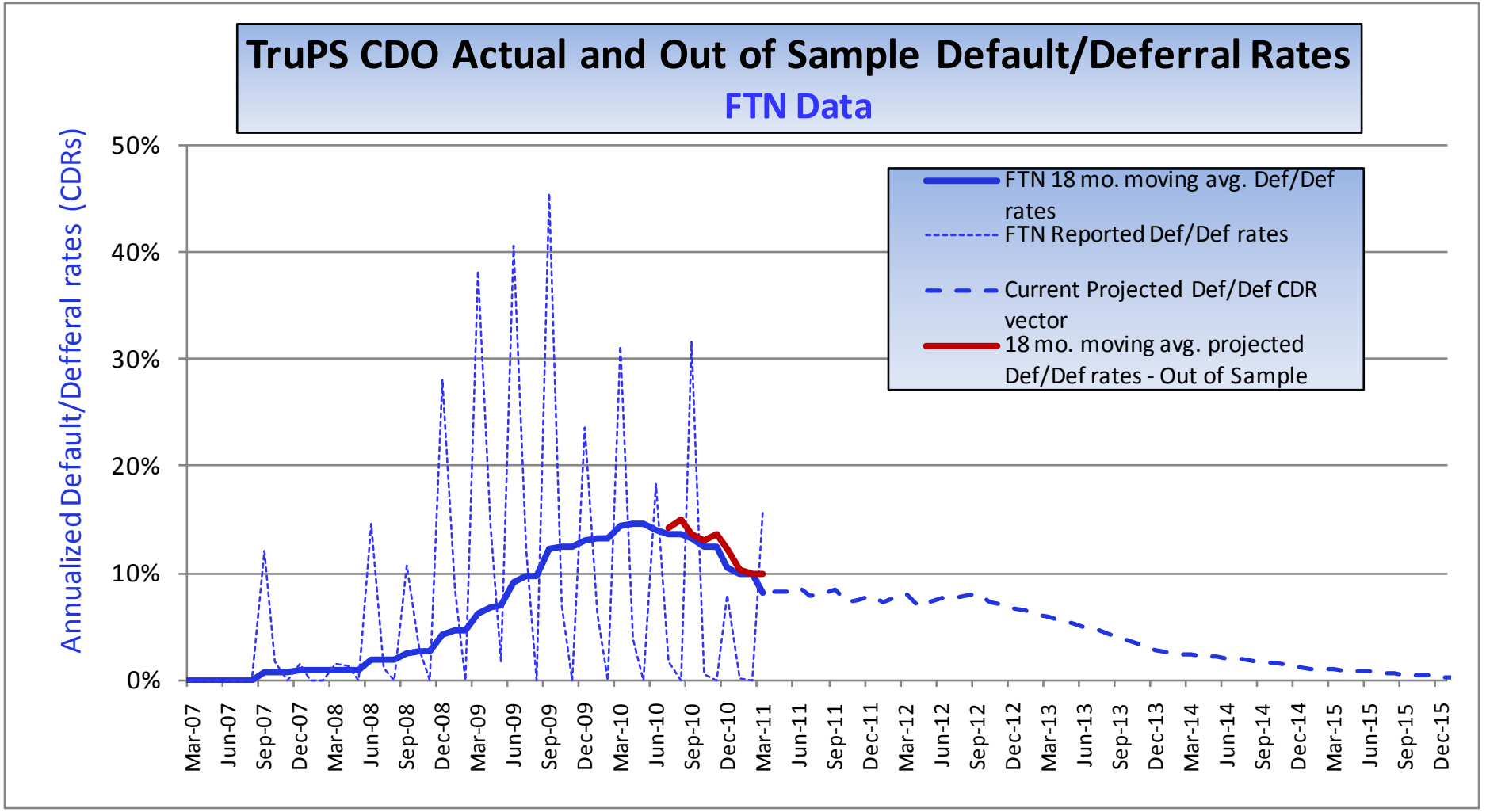
- Moody's rated approximately 80% of the TruPS issued
- We benchmarked our original model results against Moody's and found that in aggregate we forecast collateral losses which are about 4.4% lower than Moody's forecast [1]

Validation Moody's Vs. Model Forecasts

Descriptive Diff Statistics		*% Diff range*	*Freq*	*%*
Mean	-4.4%	-28% to -25%	1	1%
Median	-3.10%	-25% to -22%	0	0%
Standard Deviation	6.69%	-22% to -19%	1	1%
Range	40.57%	-19% to -16%	0	0%
Minimum	-27.76%	-16% to -13%	2	2%
Maximum	12.81%	-13% to -10%	6	7%
Count	87	-10% to -7%	6	7%
		-7% to -4%	8	9%
		-4% to -1%	17	20%
		-1% to 2%	25	29%
		2% to 5%	11	13%
		5% to 8%	7	8%
		8% to 11%	2	2%
		11% to 14%	0	0%
		14% and Higher	1	1%
		Total	**87**	**100%**

Sources: Moody's (2010a), FTN (2010), Intex.

[1] Since then we have incorporated a 10% recovery assumption into our Model


TruPS CDO Actual and Out of Sample Default/Deferral Rates
FTN Data
Annualized Default/Defferal rates (CDRs)
50%
40%
30%
20%
10%
0%
FTN 18 mo. moving avg. Def/Def rates
FTN Reported Def/Def rates
Current Projected Def/Def CDR vector
18 mo. moving avg. projected Def/Def rates - Out of Sample
Mar-07
Jun-07
Sep-07
Dec-07
Mar-08
Jun-08
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Dec-08
Mar-09
Jun-09
Sep-09
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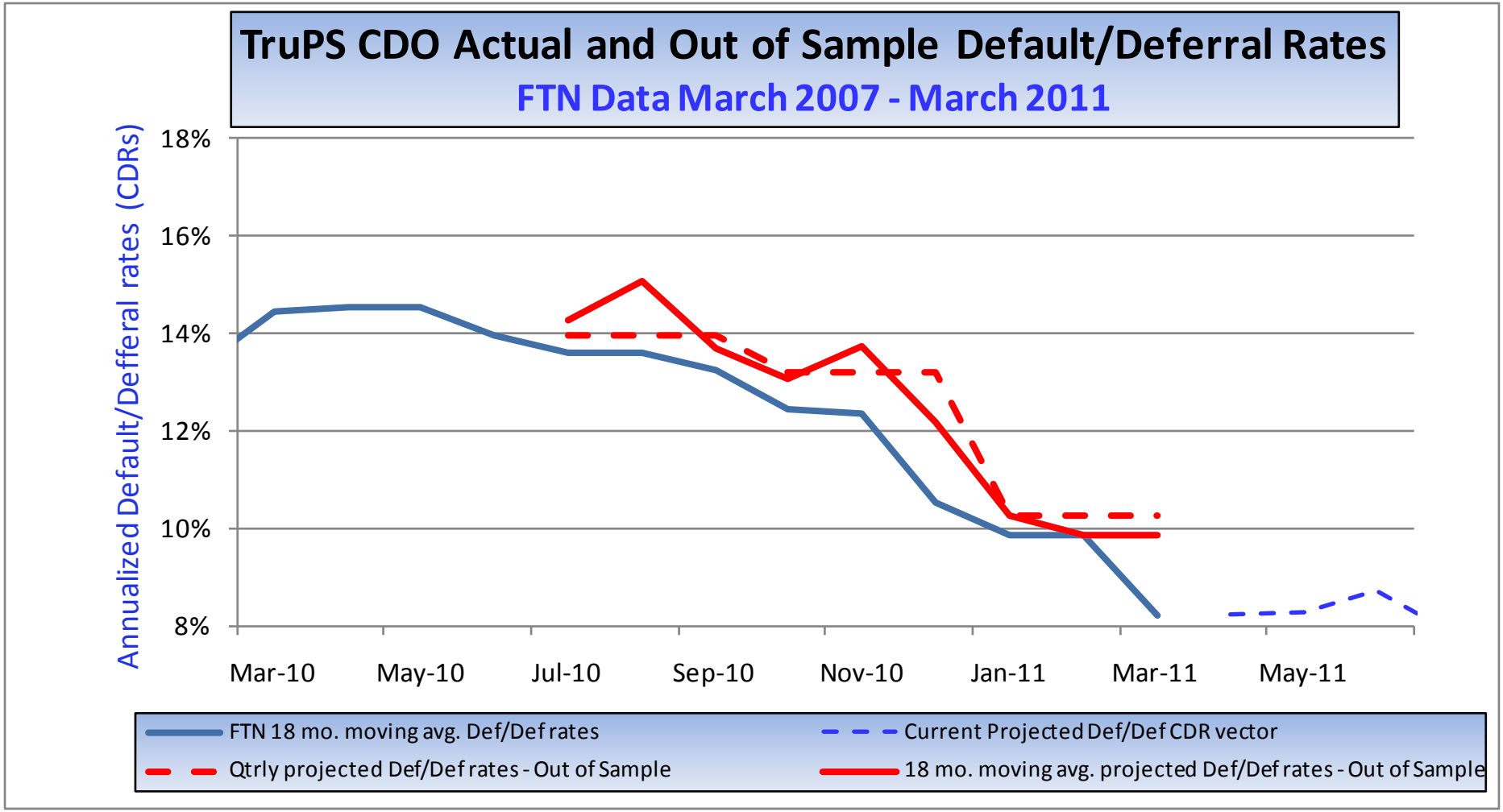
Out of Sample Results



TruP CDO Rating Transitions

Original Rating Through June 2010

Original Rating	Current Rating (Lowest of Moody's, S&P & Fitch Ratings)												Ratings Changes		
	AAA	AA	A	BBB	BB	B	CCC	CC	C	D	NR	Total	% Upgraded/ Unchanged	% Downgraded	% Downgraded Below Inv. Grade
AAA [1]	12	19	8	44	65	50	15	11	3	21		248	5%	95%	67%
AA				2	3	9	21	34	12	6		87	0%	100%	98%
A					3	16	5	12	184	7		227	0%	100%	100%
BBB [2]			1		1	3	7	1	85			98	1%	99%	99%
BB							1		20			21	0%	100%	NA
NR											109	109	NA	NA	NA
Total	12	19	9	46	72	78	49	58	304	34	109	790	2%	98%	87%

Sources: Intex for Moody's and Fitch ratings, S&P for S&P ratings.

Note:

(1) 9 bonds had their ratings withdrawn due to payoff, but were AAA rated before payoff. One bond was BBB before payoff so its current rating is BBB; one had a D rating and a '0' pool factor.

(2) One bond had its rating withdrawn but was was upgraded to A- before payoff.

Summary Performance Measures for TruPS CDOs By Collateral Type				
			Default/Deferral Rate as % of Balance	
Collateral Type	N	Pool Factor	% Current	% Original
Bank	21	0.81	32.3%	26.0%
Bank and Thrift	25	0.76	34.3%	23.7%
Bank, Thrift and Insurance	36	0.97	27.0%	26.5%
Insurance	9	0.80	4.2%	3.1%
REIT	16	0.94	27.1%	25.6%
Totals	107	0.87	27.6%	23.5%
Sources: Intex, Merrill (2004), PF2.				

Insurance TruPS are performing relatively well

Comparison of Bank/Thrift Failures TruPS CDOs Versus Overall Bank/Thrift Failures 2007--June 2010		
Category	Banks/Thrifts in TruPS CDOs	Total FDIC-Insured Banks/Thrifts
Total Banks/Thrifts	1,813	8,171
Total Failed Banks/Thrifts 2007-2010	123	284
Failure Rate	6.8%	3.5%
Notes:		
TruPS CDO data from Fitch (2010)		
FDIC-insured bank/thrift data is from FDIC (2010).		
Bank/thrift totals is an average of annual totals from 2007-2010.		

This table demonstrates that the bank failure rate was nearly double for banks which issued TruPS

If we used our existing default deferral balances with zero net additional defaults and deferrals we would have a 42% write down by count and 24% write down by balance

TruPS CDO Bonds Summary Loss Estimates
April 2011

Forecasts	N	Current Balance	% Bonds	% Balance	Loss Forecast
Full Write Down with Existing D/D	327	$11.8 B	42%	24%	$11.8 B
Partial Write Down with Existing D/D, Full W/D with Forecast	110	6.4 B	14%	13%	6.4 B
No Write Down with Existing D/D, Full WD with Forecast	15	.6 B	2%	1%	.6 B
Write Downs >50%-99% with Forecast	27	2.8 B	3%	5%	1.9 B
Write Downs >0%-50% with Forecast	27	3.5 B	3%	7%	.6 B
No Write Down with Forecast	279	25.1 B	36%	50%	.0 B
Totals	**785**	**$50.2 B**	**100%**	**100%**	**$21.4 B**

Notes:
D/D = defaults and deferrals on current assets
For two bonds we did not have information to compute losses
Source: Intex, FTN (2011)

36% of the bonds by count and 50% by balance have zero losses even with the application of the future default curve

TruPS CDO Tranche Loss Estimates

TruPS CDO Tranche Loss Estimates by Seniority/Original Rating					
Current Subordination vs. Default Analysis	Intex Base Deal Adjusted Default Curve Analytics				
	No WD	< 50% WD	< 100% WD	Full WD	Total
Sr. AAA					
No Write Down	108	11	5		124
Partial Write Down	1	3	1		5
Total Sr. AAA	109	14	6	0	129
% Total	84%	11%	5%	0%	129
Jr. AAA					
No Write Down	87	4	2	9	102
Partial Write Down	3	1	1	9	14
Full Write Down				2	2
Total Jr. AAA	90	5	3	20	118
% Total	76%	4%	3%	17%	
AA					
No Write Down	24	1		4	29
Partial Write Down	13	2	5	24	44
Full Write Down				14	14
Total AA	37	3	5	42	87
% Total	43%	3%	6%	48%	
A					
No Write Down	25	1	3	1	30
Partial Write Down	6	2	5	69	82
Full Write Down				115	115
Total A	31	3	8	185	227
% Total	14%	1%	4%	81%	

AA's and single A's had full write downs of 48% and 81%

The BBB's and BB's respectively had Full Write-downs of 90% and 95%

Our base range for forecasting is between 75%-125% of the dflt curve

This table demonstrates that at our base range, AAA's are priced between 98.3% and 90.5%

The AA's are priced between 65.5% and 46.4%

The single A to BBB range is priced between 35% and 11.2%

TruPS CDO Weighted Average OTTI Value by Percentage of Deal Default Curve

Orig Rating	Cur Face in $mm	# of Bonds	Percentage of Base Deal Default Curve								
			0%	25%	50%	75%	100%	125%	150%	175%	200%
Sr. AAA	21,777	129	100.0	99.6	99.1	98.3	97.2	96.1	94.5	92.6	90.3
Jr. AAA	6,479	118	98.3	97.8	96.7	95.0	93.4	90.5	87.4	82.9	78.4
AA	3,902	87	88.9	82.5	74.3	65.5	56.2	46.4	37.3	30.7	25.9
A	10,198	227	57.8	49.4	41.7	35.0	29.6	25.5	22.5	20.2	18.4
BBB	2,909	97	27.2	21.1	17.8	15.3	13.0	11.2	9.7	9.0	8.4
BB	543	21	6.0	2.7	1.2	1.2	1.2	1.2	1.2	1.1	0.5
Equity	4,375	106	6.8	6.0	5.4	4.9	4.5	4.0	3.6	3.2	2.9

Notes:

Some Equity classes (mostly insurance) have OTTI values but the deals do not have BB bonds

Source: Intex

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Conclusions/Lessons Learned

TruPS CDOs will suffer heavy losses

- With no further defaults/deferrals, losses > $11.8 billion, 42% of securities fully written off.
- We estimate security losses will total $21.4 billion, 43% of outstanding April 2011 balances, 36% of original issuance balance.

20/20 hindsight: TruPS CDOs are indirect investment in CRE bonds

- Subprime CDOs at least *initially* rated BBB
- Done during a period of record low CRE losses and bank failures

Large gaps in risk management

- Banks relying on ratings

Investors were ill served by symbiotic relationship between investment banks and rating agencies

- Correlation assumptions developed for unrelated securities
- Banks were the primary investors in their own debt
- Many banks put into multiple deals