



September 20, 2004

## The ABCs of Bank Capital Valuation

### Introducing (A)dvanced (B)ank (C)apital (V)aluation (ABCV)

- ◆ Banc of America Securities is proud to launch a model to value the subordination premium within the debt capital structure of selected European and US banks.
- ◆ In the past, we believe investors have found it difficult to quantify the appropriate spread compensation when moving down in a bank's complex capital structure, including Upper Tier 2 (UT2) and Tier 1 (T1) debt securities.
- ◆ The Advanced Bank Capital Valuation (ABCV) model enables investors to analyze relative value opportunities within the debt capital structure of selected banks by estimating (in basis points) the incremental recovery premium, embedded option premium (most significant in T1 debt securities), incremental liquidity premium, and maturity mismatch between senior and sub debt. Moreover, the model is both forward looking and flexible. Indeed, it makes extensive use of signals from the equity derivatives markets to identify potential changes in credit risk as well as allows the user to stress-test the capital structure for changes in implied equity volatility, credit spreads, default rates, and recovery values.
- ◆ ABCV, when used in conjunction with Banc of America Securities' Credit Option Adjusted Spread (COAS) model, provides a powerful tool for identifying relative value within a bank's capital structure as well as across issuers. For example, LLOYDS 7.834 NC 2015 T1 appeared undervalued vs. ACAFP 7.047 NC 2012 T1 in early August 2004.
- ◆ Our extensive back-testing of selected banks in both Europe and the United States has provided encouraging results. For example, in the third quarter of 2002 our model signaled that T1 was expensive relative to LT2/senior for a subsector of banks. This reflected rising credit spread volatility (as derived from implied equity volatility) that resulted in the embedded call option in the T1 security to increase in value. Subsequently, the model signaled the tightening trend in T1 spreads relative to LT2/senior in 2003 and 2004.
- ◆ In the current improving credit environment characterized by low implied equity volatility and tight credit spreads, our model indicates that for most banks the value of the embedded option in T1 is negligible. However, this could quickly change following a spike in implied equity volatility resulting from potential geopolitical risks and negative company-specific credit shocks.
- ◆ Because of the extensive time involved in modeling and back-testing each bank, we are initially rolling out the model with 23 European and US banks. The banks include the most liquid samples of senior and subordinated debt securities with European banks represented by EUR benchmarks and US banks by US benchmarks. We plan to incorporate additional issuance including US Trust Preferred Securities (Trups) and Yankee issues of European banks over the coming months. In addition, we plan to launch a similar capital valuation model for insurance companies early next year.

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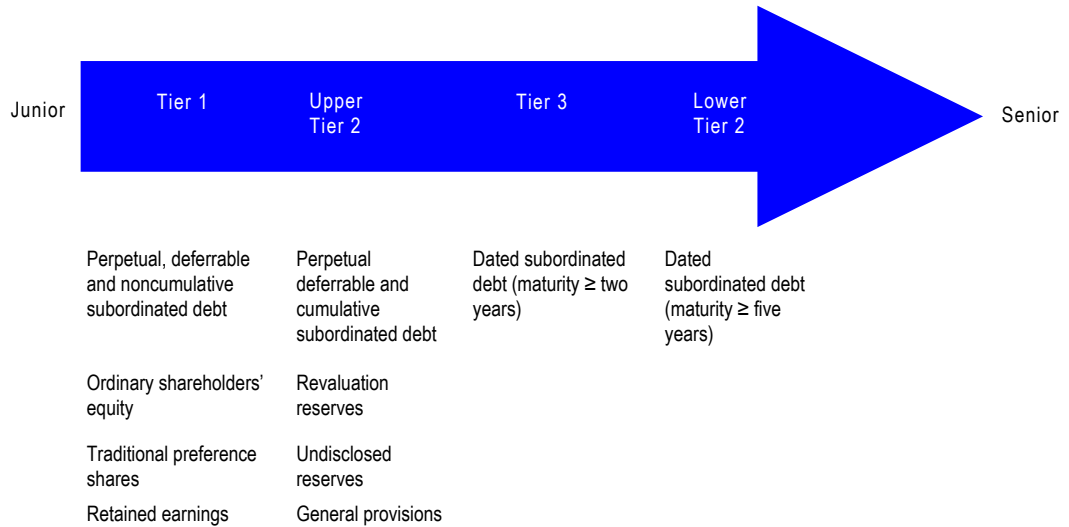
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## The Tiers of Bank Capital

The capital structure of a bank can be broadly classified into tiers with the debt portion consisting of Tier 1 (T1) debt (most junior), Upper Tier 2 (UT2) debt and Lower Tier 2 (LT2) debt. Senior debt is used mostly for funding purposes.

**Figure 1. Bank Capital Structure**



Sources: BIS, FSA and Banc of America Securities LLC estimates.

**Figure 2. Bank Debt Tiers Description**

	Subordination ranking	Maturity	Coupon	Step-ups
Senior	Sub to deposits and senior/general liabilities	Dated	Non-deferrable	None
LT2	Sub to senior	Dated	Non-deferrable	Few (exist mainly in institutional issues)
T3 (rare)	May be pari passu with LT2 depending on jurisdiction	Dated	Deferrable based on regulatory considerations	None
UT2	Sub to LT2 depending on jurisdiction	Perpetual	Cumulative and deferrable	Yes. Large step-ups above floating index if bond is not called
Hybrid T1	Sub to UT2, but higher than common equity	Perpetual	Non-cumulative and deferrable	Yes. Large step-ups above floating index if bond is not called

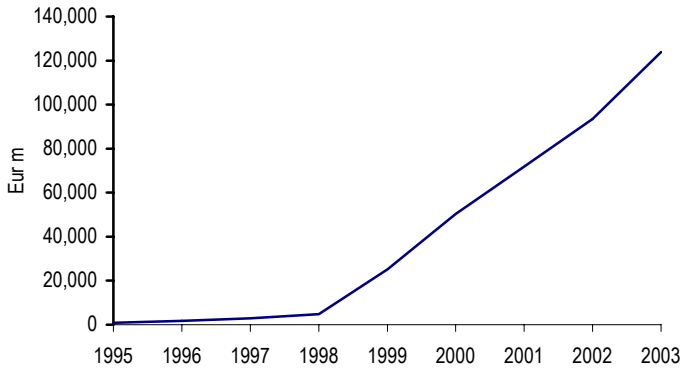
Source: Banc of America Securities LLC estimates.

Most rating agencies, including Moody's and S&P, have adopted standard notching practices to account for the increased risk of holding subordinated bank securities versus senior bank securities. For example, Moody's typically rates LT2 one notch lower than senior and UT2 and T1 around two notches below senior bond ratings.

Since the mid-1990s, there has been explosive growth in the issuance of hybrid capital securities by banks, mostly from European banks, but also from US banks through the issuance of Trust Preferred Securities (Trups). The top bank issuers of hybrid capital securities in Europe and the United States include RBS, HBOS, Barclays, J.P. Morgan Chase, and Citigroup. In many instances, the issuance was done to supplant capital following an acquisition and/or as an efficient means to boost ROE. Given current robust capital bases and prospects for significant organic capital generation in upcoming years, we would expect a more moderate pace of hybrid capital securities issuance in the near to medium term, thus presenting a favorable technical supply situation.

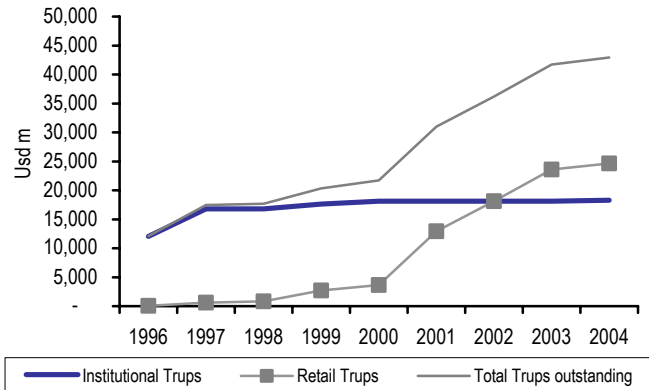
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Figure 3. European Banks' Hybrid Capital (UT2/T1) Growth



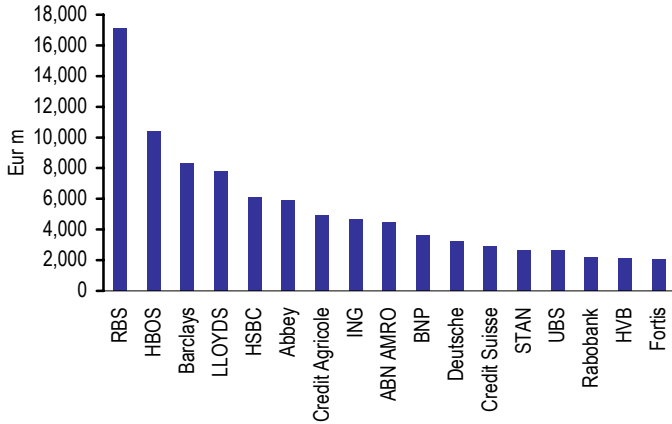
Source: Banc of America Securities estimates.

Figure 4. US Banks' Trups Growth



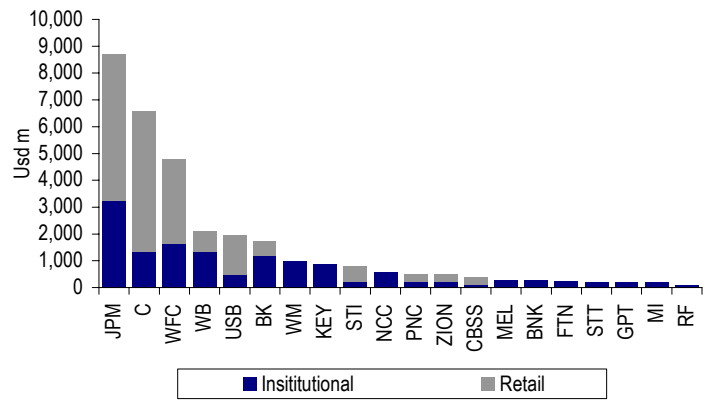
Source: Banc of America Securities estimates.

Figure 5. Largest Hybrid Capital (T1/UT2) European Bank Issuers



Source: Banc of America Securities estimates.

Figure 6. Largest Hybrid Capital (Trups) US Bank Issuers



Source: Banc of America Securities estimates.

In recent years, European and US bank credit quality has improved, and thus investors have been searching for higher yields provided by moving down in the capital structure (e.g., UT2 and T1 issues), but without being able to appropriately quantify the incremental risks and spread premium required, in our view. This search for higher yield has resulted in a dramatic compression in Tier 1 spreads versus Lower Tier 2 and Senior paper. Indeed, spreads have compressed from as wide as 90 bps in late 2002 to around 25 bps today. But what is the correct compensation at any given time?

## Valuing Subordination Premium

Our approach to valuing the subordinated premium of moving down in the debt capital structure of a bank is not dissimilar to that which is used for corporates, with some exceptions. Indeed, the first step is to determine the probability of default and recovery value for the different classes of bank debt securities. However, in contrast to corporates, banks have a notably lower probability of default and higher recovery value because they are closely regulated given their overall importance to the domestic (and in some cases global) financial system. For each bank, we select two or more bonds of similar maturity but differing levels of subordination. The primary bond can be a “senior” issue or “LT2” issue while the secondary bond can be “LT2” issue (if “senior” issue was used as primary) or “UT2/T1” issue. We classify the components of subordination premium as follows:

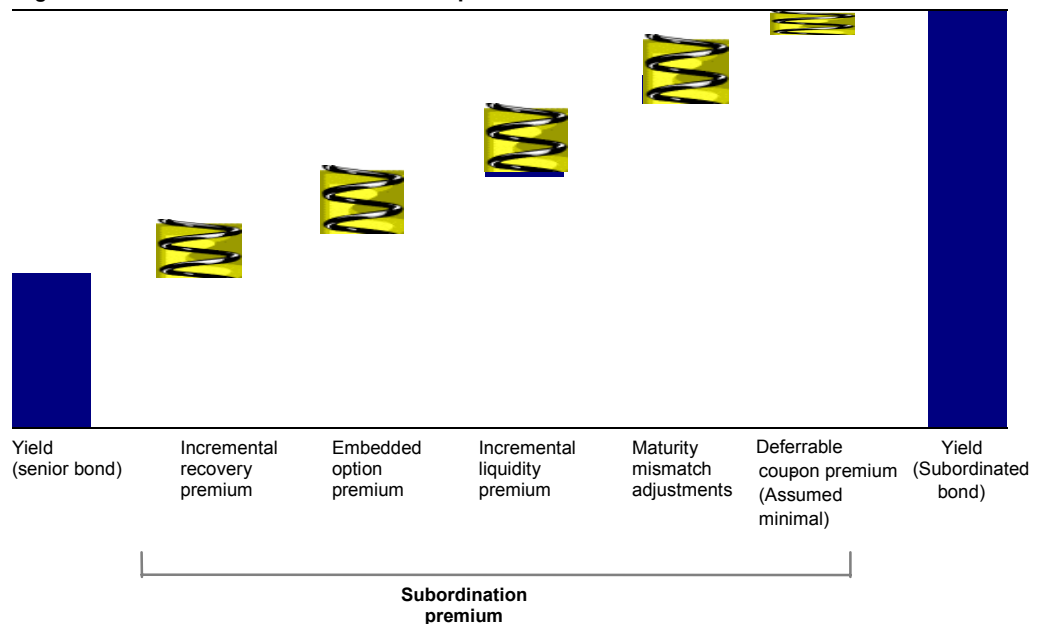
- ◆ Incremental Recovery Premium
- ◆ Embedded Option Premium
- ◆ Incremental Liquidity Premium
- ◆ Maturity Mismatch Adjustment
- ◆ Deferrable Coupon Premium

Thus, our analysis of subordination risk can be presented by the following equation:

$$\text{Yield (Subordinated Bond)} = \text{Yield (Senior Bond)} + \text{Subordination Premium}$$

$$\text{Subordination Premium} = \sum \text{Incremental Recovery Premium} + \text{Embedded Option Premium (most significant in T1 issues)} + \text{Incremental Liquidity Premium (if any)} + \text{Maturity mismatch adjustments} + \text{Deferrable Coupon Premium (assumed minimal)}$$

**Figure 7. Subordination Premium Components**



Source: Banc of America Securities LLC estimates.

Our definitions and assumptions for the various risk premiums are described in Figure 8.

**Figure 8. Different Kinds of Subordination Premium**

Types of Risk Premium	Description & Assumptions
Incremental Recovery Premium	Differential recovery values in event of default. Two parameters used: default probability (assumed to be the same for all classes of debt) and recovery rates.
Embedded Option Premium	Most significant in T1 issues due to high credit spread volatility. Embedded option premium increases/decreases in value with increased/decreased credit spread volatility (derived from implied equity volatility).
Incremental Liquidity Premium	Determined from the difference between historical spreads and model predicted components of subordination risk, which is regressed against implied equity volatility.
Maturity Mismatch Adjustments	Takes into account maturity differences between senior and subordinated bonds and the government curves.
Deferrable Coupon Premium	Exists in T1 issue(non-cumulative) and UT2 coupon (cumulative). We assume non-cumulative & cumulative deferrable coupon premium in T1 and UT2 respectively is relatively small compared with the other components of subordination risk.

Source: Banc of America Securities LLC estimates.

In the following section, we present a methodology (ABCV model) for valuing the components of subordination premium identified above. Currently, our model values the subordination premium of plain vanilla fixed-to-floating UT2 and Tier 1 bonds relative to Senior and LT2 debt. European banks appear to be the largest issuers of UT2 and T1 debt, while US banks are more active in the Trups markets. We plan to launch a Trups model later in the year.

As shown in Figure 9, our model includes 23 European and US banks and some of their most liquid senior and subordinated bonds.



Figure 9. Universe of Bonds in our ABCV Model

Issuer	BBG Ticker	Coupon	Maturity	First Call Date (if any)	Currency	Tier
ABN AMRO	AAB	4.625	5/12/2009		EUR	LT2
	AAB	4.75	6/24/2009		EUR	Senior
	AAB	5.375	9/8/2009		EUR	Senior
Banca Intesa	BAVB	6.25	3/1/2010		EUR	Senior
	BAVB	6.988	Perpetual	7/12/2011	EUR	T1
Bank of New York	BK	3.625	1/15/2009		USD	Senior
	BK	7.3	12/1/2009		USD	LT2
Bank of Scotland	HBOS	10.5	2/16/2018		GBP	LT2
	HBOS	3.75	1/23/2008		EUR	Senior
	HBOS	4.75	3/24/2009		EUR	LT2
	HBOS	6.461	Perpetual	11/30/2018	GBP	T1
Barclays	BACR	5.75	3/8/2011		EUR	LT2
	BACR	7.5	Perpetual	12/15/2011	EUR	T1
Bayerische Hypo-Und Verinsbank	HvB	6.625	10/12/2010		EUR	LT2
	HvB	7.055	Perpetual	3/28/2012	EUR	T1
BNP Paribas	BNP	5.25	12/17/2012		EUR	LT2
	BNP	6.342	Perpetual	1/24/2012	EUR	T1
Citigroup	C	4.875	5/17/2015		USD	LT2
	C	5.125	5/5/2014		USD	Senior
	C	5.625	8/27/2012		USD	LT2
	C	6.5	1/18/2011		USD	Senior
Commerzbank	CMZB	4.25	10/25/2009		EUR	Senior
	CMZB	4.75	4/21/2009		EUR	LT2
	CMZB	5.5	10/25/2011		EUR	Senior
	CMZB	6.125	10/25/2011		EUR	Senior
	CMZB	6.125	5/2/2011		EUR	LT2
	CMZB	6.5	7/12/2010		EUR	LT2
Credit Agricole	ACAFP	5.1	12/10/2013		EUR	LT2
	ACAFP	7.047	Perpetual	4/26/2012	EUR	T1
Deutsche Bank	DB	5.125	1/31/2013		EUR	LT2
	DB	5.33	Perpetual	9/19/2013	EUR	T1
HSBC	HSBC	5.375	12/20/2012		EUR	LT2
	HSBC	5.369	Perpetual	3/24/2014	EUR	T1
J.P. Morgan Chase	JPM	3.5	3/15/2009		USD	Senior
	JPM	4.5	11/15/2010		USD	Senior
	JPM	5.9	11/15/2011		USD	LT2
	JPM	6	2/15/2009		USD	LT2
	JPM	6.625	3/15/2012		USD	LT2
	JPM	7.875	8/1/2010		USD	LT2
LLOYDS	LLOYDS	4.75	3/18/2011		EUR	LT2
	LLOYDS	6.35	Perpetual	2/15/2013	EUR	T1
	LLOYDS	6.625	3/30/2015		GBP	LT2
	LLOYDS	7.834	Perpetual	2/17/2015	GBP	T1
Royal Bank of Scotland	RBS	5.125	6/30/2011		EUR	LT2
	RBS	6.467	Perpetual	6/30/2012	EUR	T1
San Paolo Imi	IBSANP	6.375	4/6/2010		EUR	LT2
	IBSANP	8.126	Perpetual	11/10/2010	EUR	T1
Societe Generale	SOCGEN	5.419	Perpetual	11/10/2013	EUR	T1
	SOCGEN	5.625	2/13/2012		EUR	LT2
Standard Chartered	STANLN	8.16	Perpetual	3/23/2010	EUR	T1
	STANLN	5.375	5/6/2009		EUR	LT2
SunTrust	STI	4.25	10/15/2009		USD	Senior
	STI	6.375	4/1/2011		USD	LT2
U.S. Bancorp	USB	3.4	3/2/2009		USD	Senior
	USB	6.375	8/1/2011		USD	LT2
Wachovia	WB	3.625	2/17/2009		USD	Senior
	WB	4.875	2/15/2014		USD	LT2
Washington Mutual	WM	4.625	4/1/2014		USD	LT2
	WM	4	1/15/2009		USD	Senior
Wells Fargo	WFC	4.625	4/15/2014		USD	LT2
	WFC	5.125	9/1/2012		USD	LT2
	WFC	5.5	8/1/2012		USD	Senior

Source: Banc of America Securities LLC estimates.

## Valuing Incremental Recovery Premium

### Step 1: Determining Probability of Default and Recovery Rates for Senior Debt

In order to determine the recovery premium in the unlikely event of a bank default, we need to identify the probability of default and recovery rates among the different tiers of bank capital. In terms of recovery rates, we assume that absolute priority rules apply in terms of the order of payments to creditors in the rare event that a bank defaults on its debt obligations and its assets are liquidated. In practice, lower tiers of the capital structure may actually recover modest damages despite more senior debt holders not being fully compensated for losses.

Assuming absolute priority rules, the following creditors would be paid in descending order as shown below:

- ◆ Secured claims;
- ◆ Administrative expenses of receiver;
- ◆ Deposit liability claims;
- ◆ Other general or senior liabilities of the institution;
- ◆ Subordinated obligations (Lower Tier 2, Tier 3, Upper Tier 2, Tier 1); and
- ◆ Shareholder claims.

We assume that administrative expenses for the receiver (to cover costs of litigation and other liquidation expenses) are the same for US and European banks and range from 2.75% of total assets (based on FDIC data<sup>1</sup>) to 6.40% of total assets, based on the findings of Christopher and James (1991)<sup>2</sup>. Administrative expenses as a percentage of assets should decline as the asset size of banks increases.

For illustrative purposes, Figure 10 shows that at year-end 2003 HBOS had £408 billion in total assets and, assuming that it loses 0%–1% of the book value of its assets in a distressed scenario (or £2.0 billion on average), all creditors are paid in full except for UT2 and Tier 1.

**Figure 10. Capital Structure of HBOS (Millions of GBP)**

	As of Dec 2003	Recovery in event of default 0%-1% loss in book value of assets
Total Assets	408,413	406,371 (-2,042)
a. Secured Claims		
b. Administrative Expenses of Receiver		16,337
c. Deposit Liability Claims	173,504	173,504
d. Other General or Senior Liabilities	195,534	195,534
e. Subordinated Obligations		
- Senior Unsecured Debt	8,869	8,869
- Tier 3 Debt		
- Tier 2 Lower Debt	7,238	7,238
- Tier 2 Upper Debt	5,374	4,889
- Tier 1 Debt	2,885	
f. Shareholder Claims	15,023	
Order of Liabilities & Equity (c to f)	408,427	390,034

Source: Banc of America Securities LLC estimates.

<sup>1</sup> Source: FDIC 2003 report: costs associated with bank failures.

<sup>2</sup> See Christopher, James (1991) article on loss realized in bank failures.

We determine the probability of default and recovery rates by creating a three-factor “risk neutral” pricing model taking into account default probability, recovery rates and liquidity premium as the three main factors. Risk neutral pricing assumes that investors do not require a premium to induce them to take risks and considerably simplifies our analysis. Most academic studies have traditionally used a two-factor model utilizing default probability and recovery/loss values. As a result of not considering liquidity premium, significant discrepancies have been found between market spreads and model spreads<sup>3</sup>. We aim to overcome this problem by utilizing a three-factor model to capture most risks faced by investors.

Our model assumes the following:

- ◆ Default probability is the same for all types of debt issued by a bank (i.e., a default on a senior bond would coincide with a default on a subordinated issue).
- ◆ Recovery rates of different tiers of bank capital are expected to stay constant over time.
- ◆ Liquidity premium accounts for other “technical and market” factors that may affect the pricing of the bonds (e.g., customer preference for on-the-run, new issues of corporate bonds rather than seasoned issues of a bank).

The “modified” risk neutral pricing formula that is used to solve for the three factors, *marginal probability of default, recovery rate and liquidity premium* is:

$$\text{Price} = \sum_{t=1}^N \frac{S_t C + S_{t-1} d_t \mu (1 + C)}{(1 + i)^t} + \frac{S_N}{(1 + i)^N}$$

where

Price = Market Price of Senior/LT2 debt

$S_t$  = Cumulative Prob(No default) at time t

$d_t$  = Marginal Prob (default) at time t

$\mu$  = Recovery rate %

$i$  = Risk free rate + liquidity premium, expressed in %

$C$  = Coupon payment

$N$  = Total number of coupon paying periods

Our risk-neutral pricing formula is “modified” since it adds a liquidity premium to the risk free rate.

Since there are three unknowns that we need to solve for (marginal probability of default, recovery rate and liquidity premium), we require three liquid Senior/LT2 bonds per issuer. The three unknowns are identified by minimizing key differences between market prices and our theoretical risk-neutral prices. In the event that we have only one or two liquid Senior/LT2 issues for optimization, we understand that there are higher uncertainties and multiple solutions to the value of the three factors. We favor a solution with a higher default probability, so the incremental recovery premium between a Senior/LT2 bond and a more subordinated T1/UT2 bond is conservatively estimated. Our optimization exercise can be described as:

<sup>3</sup> See Jerome Fons’ 1994 article on using risk-neutral pricing to model term structure of credit risk.

Minimize  $\sum | \text{Market Price}_{\text{bond } i} - \text{Risk-Neutral Price}_{\text{bond } i} |$  for  $i = \text{Bond } 1, 2, 3, \dots$

by adjusting three key variables:

- ◆ E[Recovery]
- ◆ Prob<sub>Default</sub>
- ◆ Liquidity premium

Subject to the following two key constraints:

- ◆  $40\% \leq E[\text{Recovery}_{\text{senior/LT2}}] \leq 100\%$ . Recovery rates for senior bank debt are expected to be higher than general industrials. Historically, recovery values are hard to estimate, as there have been limited bank failures in the last two decades. For example, ten US banks with assets of more than \$5 billion failed from 1980 to 1990, but none from 1990 to 2000. Of the ten bank failures in 1980–1990, seven suffered less than a 10% loss in book value of assets<sup>4</sup>.
- ◆  $0.01\% \leq \text{Prob}_{\text{Default}} \leq \text{Min} [\text{Hist Prob}_{\text{Default } 10 \text{ yrs Industrial}}, \text{Hist Prob}_{\text{Default } 21 \text{ yrs-Industrial}}]$ . Hist Prob<sub>Default</sub> is derived from Moody’s historical default probability data for industrials. The key rationale is that for a given rating, bank default probability is equal or at least lower than that of general industrials due to significant regulatory control. Highly rated banks (e.g., Citigroup (Aa1) and HBOS (Aa2)) have Prob<sub>Default</sub> capped at 0.0745% and 0.163% respectively while lower-rated banks (e.g., Commerzbank (A2) and HvB (A3)) have Prob<sub>Default</sub> capped at 0.28% and 0.41%, respectively.

Although we have used a modified risk-neutral pricing approach to determine recovery rates and default probabilities, we have assumed some “real world” constraints to ensure that our optimization exercise is logical. For example, we assume that most of the spread of bank bonds is due to the liquidity risk premium rather than the default risk premium, as explained by the low default probability and high recovery rates relative to industrials. Some academics<sup>5</sup> have analyzed credit risk and found it to be worth <15% of total credit spread observed in Aa-AAA rated bonds and we have obtained similar findings in our modified risk-neutral approach.

Our optimization exercise for HBOS revealed a probability of default of 0.15% annualized, a recovery rate of 50% for Lower Tier 2 debt and a liquidity premium of 0.77% after minimizing differences between market prices and our risk neutral valuations.

Figure 11. HBOS example: Modified 3-factor Pricing Model

Rating (Senior)	Aa2			Input Bonds			Total Diff
	Shared Outputs	Minimum Values	Maximum Values	HBOS 9.375 2021 LT2	HBOS 11 2014 LT2	HBOS 6.375 2019 LT2	
E[Recovery]	50.00%	40%	100%				
Prob Default	0.15000%	0.100%	0.1632%				
Liquidity Premium	0.77%						
Market Price				140.35	142.19	106.01	
Theoretical Risk Neutral Valuations				140.37	142.03	106.10	
Absolute Price Diff				0.02	0.16	0.09	0.28

Source: Banc of America Securities LLC estimates.

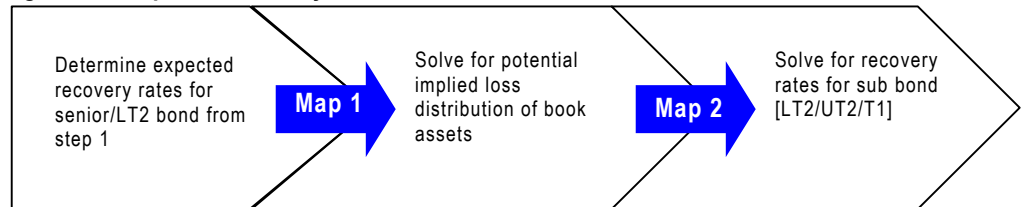
<sup>4</sup> See Kaufman (2004) article on FDIC losses in bank failures.

<sup>5</sup> See Huang & Huang (2003) article on how much of the corporate treasury yield curve is due to credit risk.

**Step 2: Solving for the Recovery Rate Differentials Between Senior and Subordinated Debt**

Owing to the lack of information regarding historical recovery rates for senior and subordinated bank bonds, we need to first map our “risk-neutral” recovery rates for Senior/LT2 bonds from step 1 to a “risk-neutral” implied loss distribution of book assets. Subsequently, we performed a second mapping from our implied loss distribution to determine the implied recovery rates for the subordinated bonds.

**Figure 12. Implied Recovery Rates for Subordinated Bonds**



Source: Banc of America Securities LLC estimates.

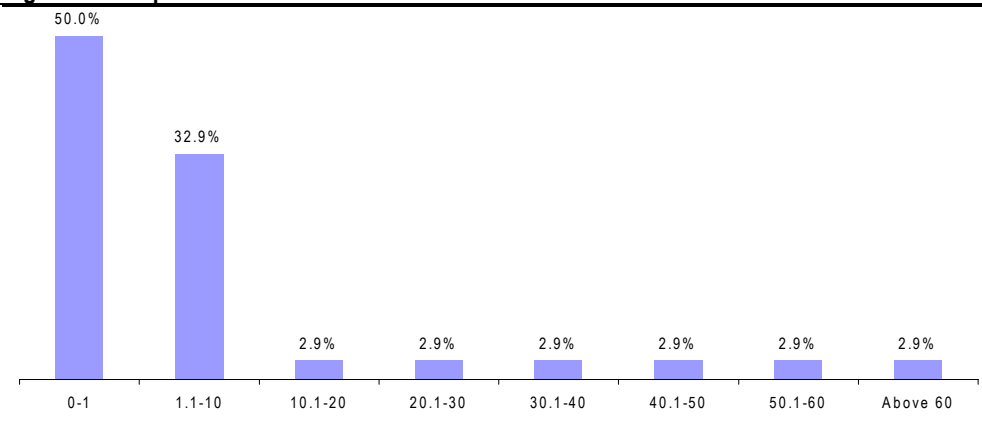
**Mapping 1**

We determined eight potential loss scenarios: 0%–1%, 1.1%–10.0%, 10.1%–20.0%, 20.1%–30.0%, 30.1%–40.0%, 40.1%–50.0%, 50.1%–60.0% and above 60%. A 1.1%–10% loss for HBOS would suggest that HBOS loses 1.1%–10.0% of £408 billion (book value of assets) or £20.4 billion (average) in the event of a default. Each loss scenario assumes absolute priority rules apply, i.e., a senior bondholder always gets paid before any subordinated holders. Subsequently, we used an optimization technique to determine the probability of each loss scenario, subject to two constraints:

- ◆  $E[\text{Recovery rates for senior/LT2 bond}] = \text{Stipulated recovery rate from step 1.}$
- ◆  $\sum \text{Probability of all loss categories} = 100\%$

Using our estimated recovery rate for HBOS’ LT2 debt of 50% (found in previous step), we derived an implied loss distribution for HBOS indicating a 50% probability that HBOS loses 0.1%–1.0% of assets, a 32.9% probability that HBOS loses 1.1%–10.0% of assets and a 17.1% probability that HBOS loses more than 10% of assets, in the event of a default. It is important to note that this distribution is based on an optimization technique and thus other outcomes are possible, but we believe this appears reasonable.

**Figure 13. Implied Loss Distribution for HBOS**



Source: Banc of America Securities LLC estimates.

Mapping 2

With the implied loss distribution, we performed a second mapping to determine the recovery rates for the subordinated debt.

Figure 14. Waterfall Scenarios for HBOS (millions of GBP)

Total Assets	Expected Value	% Loss							
		0-1	1.1-10	10.1-20	20.1-30	30.1-40	40.1-50	50.1-60	Above 60
a. Secured Claims	NA	-	-	-	-	-	-	-	-
b. Administrative Expenses of Receiver	100.0%	16,337	16,337	16,337	16,337	16,337	16,337	16,337	16,337
c. Deposit Liability Claims	98.1%	173,504	173,504	173,504	173,504	173,504	173,504	167,449	65,346
d. Other General or Senior Liabilities	88.5%	195,534	195,534	157,311	116,469	75,628	34,787	-	-
e. Subordinated Obligations	0.0%	-	-	-	-	-	-	-	-
- Senior Unsecured debt	59.7%	8,869	2,618	-	-	-	-	-	-
- Tier 3 Debt	0.0%	-	-	-	-	-	-	-	-
- Tier 2 Lower Debt	50.0%	7,238	-	-	-	-	-	-	-
- Tier 2 Upper Debt	45.5%	4,889	-	-	-	-	-	-	-
- Tier 1 Debt	0.0%	-	-	-	-	-	-	-	-
f. Shareholder Claims	0.0%	-	-	-	-	-	-	-	-
Assets remaining		406,371	387,992	347,151	306,310	265,468	224,627	183,786	81,683
Assets loss		-2,042	-20,421	-61,262	-102,103	-142,945	-183,786	-22,4627	-326,730

Source: Banc of America Securities LLC estimates.

We determined the expected recovery value for the subordinated debt by taking into account recovery rates under each loss scenario and the probability of each loss scenario occurring from step 1.

Expected recovery rates for key debtholders of HBOS are:

Figure 15. Expected Recovery Rates for Key Debtholders

	Expected Recovery Value	Book Value	Expected Recovery %
Senior Holder	$50\% * 8,869 + 32.9\% * 2,618 = 5,295$	8,869	59.7%
LT2 Holder	$50\% * 7,238 = 3,619$	7,238	50.0%
UT2 Holder	$50\% * 4,889 = 2,445$	5,374	45.5%
T1 Holder	0	2,885	0%

Source: Banc of America Securities LLC estimates.

Our analysis shows that the risk-neutral recovery values of Senior, LT2, UT2, and T1 are 59.7%, 50.0%, 45.5%, and 0.0%, respectively, for HBOS. Hence, recovery premium between LT2 and T1 issues of HBOS is equivalent to  $0.15\% * (50\% - 0\%) = 7.5$  bps.

$$\text{Incremental recovery premium} = \text{Prob}_{\text{default}} * (\text{Recovery}_{\text{senior}} - \text{Recovery}_{\text{sub}})$$

For a lower rated bank, (e.g., HVB), the recovery premium is significantly higher at 20.6 bps owing to high default probability of 0.41% and the recovery differential of 50% between LT2 and T1 holders of HVB.

Valuing the Embedded Call Option in Tier 1 Debt

Tier 1 (T1) hybrid debt securities issued by banks are the most subordinated security, senior only to equity. There are five main types of institutional T1 debt: non-innovative, innovative, direct issues, equity settlement, and dated T1. For our ensuing discussion, we focus on the innovative T1 issues that are characterized by perpetual maturity, non-cumulative deferrable coupon payments and step-up features, and that are generally callable ten years after issuance, subject to regulatory constraints.

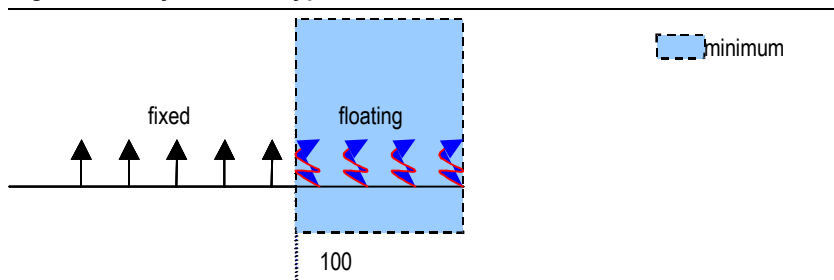
A call option is a common feature in many bank securities. There are currently two main types of callable bonds issued by banks:

- ◆ **Traditional Callable LT2** bonds pay fixed-rate coupons until the first call date. Issuers own the right, but do not have the obligation, to call the bond at par at any dates in the call schedule. Most banks issue 10-year LT2 debt with a call and step-up above a fixed or floating index at year five to enable them to call the issue that year so they can avoid the amortization after the fifth year set by most regulators<sup>6</sup>. Most banks also call the LT2 issue for reputation reasons, in our view. For our analysis, we assume callable LT2 to be equivalent to an option-free LT2 due to reputation, amortization considerations and low credit spread volatility.
- ◆ **Innovative Callable T1** bonds pay fixed-rate coupons until the first call date. Similar to traditional callable LT2 bonds, innovative callable T1 bonds step-up above a floating index (e.g., LIBOR) if they are not called. The value of the T1 embedded option depends mainly on future credit spread volatility and not on interest rate movements as shown below.

**Step 1: Payoff Structure of T1 Debt**

To determine the value of “innovative” callable T1 bonds, we need to first analyze the payoffs of a typical callable T1 issue from an issuer perspective. At the first call date, we assume that most issuers will prefer to pay the minimum of the present value of floating coupon payments or par whichever is less.

**Figure 16. Payoffs of a Typical Callable T1**



Source: Banc of America Securities LLC estimates.

Therefore, a callable T1 can be represented as an option-free bond with the same maturity less a call option on credit spread. Hence, in spread terms:

$$\boxed{\text{Callable T1 Spread}} = \boxed{\text{Option-Free T1 Spread}} + \boxed{\text{Call Option on Credit Spread}}$$

The underlying asset of the call option is the current credit spread of a perpetual “option less” T1 bond issue, and the strike is the fixed step-up stipulated in the bond prospectus. Under stable macroeconomic conditions, banks will call the T1 issue since the step-up coupon is higher than the current credit spread. However, if a bank’s credit ratings decrease significantly, step-up coupons may be less than the rising credit spread, causing the call spread option to increase in value. Hence, if credit spreads widen significantly, it becomes more likely that a bank may not call its T1 issue despite reputation risk of not doing so.

Detailed implementation steps to value the T1 embedded option are as follows:

<sup>6</sup> Regulators usually require banks to discount the amount of debt included as part of regulatory capital once they are within their call schedules.

**Step 2: Determine Key Black Scholes (BS) Pricing Formula to Value the Call Option on Credit Spread**

$$c = SN(d_1) - Ke^{-rt} N(d_2)$$

$$d_1 = \frac{\ln(S/K) + (r + 0.5\sigma^2)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

with the following five key parameters:

c: Call option on credit spread

S: Current credit spread of an “option less” T1 issue

K: Fixed step-up spread stipulated in prospectus

r: Risk free rate of time horizon, t

t: First call date–settlement date (yrs)

$\sigma$ : Credit spread volatility (%)

N(x): Cumulative probability distribution function for a variable that is normally distributed with mean 0 and standard deviation of 1

The initial estimate of the call option involves an iterative process. Our first step is to determine the credit spread of an “option less” T1 and is initially estimated by subtracting the call option from the current credit spread of a T1 issue. Subsequently, we refined our analysis by estimating the “theoretical” credit spread of an “option less” T1 issue as equivalent to a Senior/LT2 bond spread plus the incremental recovery premium and incremental liquidity premium.

Using HBOS 6.461 NC 2018 as an example with S=110 (current credit spread) -c, K=285, t=14.42 yrs, r=4.4%,  $\sigma_{\text{current}}=8.4\%$  (determined in step 4), c has negligible worth currently. However, in late 2002, credit spread volatility was much higher at ~17%, causing the T1 embedded option premium to be worth ~40 bps.

Some reviewers suggest that we interpret S as the price of a 10-year sub CDS. We believe this approach using CDS pricing is flawed for the following reasons:

- ◆ CDS deliverable is a LT2 asset and not a T1 bond. Hence, the spread volatility of a CDS price will understate our estimates. Furthermore, a regression analysis of CDS volatility with T1 benchmark spreads shows that CDS volatility is not a good predictor for T1 spreads. Our interviews with bank traders have confirmed that cash bonds may have little influence on CDS prices in the banking sector, further reinforcing our belief that CDS prices may not be suitable for our valuation.
- ◆ Ten-year sub CDS are hardly traded and their prices reflect a significant liquidity premium. Five-year sub CDS, which are more frequently traded, are of too short a duration to be used as an asset for our valuation.

**Step 3: Determine Validity of Black Scholes Assumption in Bond Option Valuation**

The Black Scholes formula is seldom used in evaluating traditional options in bonds because of concerns about the underlying assumptions, which may not be realistic for bonds. Fortunately, the Black Scholes assumptions work well for our T1 valuation as the underlying asset is a perpetual floater.



**Figure 17. Key Assumptions of Black Scholes and Rationale**

Key Concerns of Black Scholes Assumptions in Bond Valuations	Rationale
BS assumes constant volatility. For most bonds, volatility is assumed to be direct function of duration.	Our asset is a perpetual bond and will have duration term close to a very long dated bond.
BS assumes evolution of stock prices as stationary process [constant mean, constant variance and constant autocorrelation]. For most bonds of fixed maturity, prices must converge at par so process must change.	Our asset is a perpetual bond. Hence, the stationary process assumption is probably valid.
BS measures an option on a future (i.e., asset is assumed to last on a going-concern basis).	Our deliverable asset is a perpetual bond and lasts on a going concern basis.

Source: Banc of America Securities LLC estimates.

#### Step 4: Determine Appropriate Volatility Term to Value Call Option on Credit Spread

The credit spread volatility term in Black Scholes can be estimated through various sources including:

- Historical credit spread volatility of T1; and
- Regressed credit spread volatility from implied equity volatility of actively traded stock options.

To determine the appropriate volatility term to use, we selected HSBC 5.13 NC 2016. HBOS 6.461 NC 2018 is not used as we lack accurate historic HBOS CDS prices to perform the regression. We conducted two simple regressions: T1 benchmark spreads with different volatility terms and changes in T1 benchmark spreads with changes in different volatility terms.

Our regression results strongly suggest that implied equity volatility is the key independent volatility term affecting benchmark spreads and changes in benchmark spreads. This should not be surprising since T1 securities are next in line to equity in the capital structure. Historical CDS volatility is not a good predictor, since the underlying asset is LT2 and volatility is derived historically. Regression analysis also showed that historical CDS volatility is not a significant independent variable affecting credit spreads, as shown by the high p-values. A historical 12-month rolling volatility of T1 securities is also not a good predictor of credit spreads because current T1 securities are affected by future volatility rather than by historical volatility—and this is shown by the high p-values.

**Figure 18. Benchmark Spreads vs. Different Volatility Measures**

R2 of 0.79	Coefficients	Standard Error	t Stat	P-value
Intercept	-25.9108	64.87468	-0.3994	0.693451
Implied Equity Opt Vol	5.586172	1.527573	3.656894	0.001387
Historical 12-month Rolling Vol	0.733271	3.378058	0.217069	0.830155
HSBC SUBLT2 USD CR 5Y Default	1.855261	0.543854	3.411322	0.002503
HSBC SUBLT2 USD CR 10Y Default	-1.13032	0.860608	-1.31339	0.202584
HSBC SUBLT2 EUR CR 5Y Default	-0.30144	1.077368	-0.27979	0.782251

Source: Banc of America Securities LLC estimates.

**Figure 19.Changes in Benchmark Spreads vs. Changes in Volatility Measures**

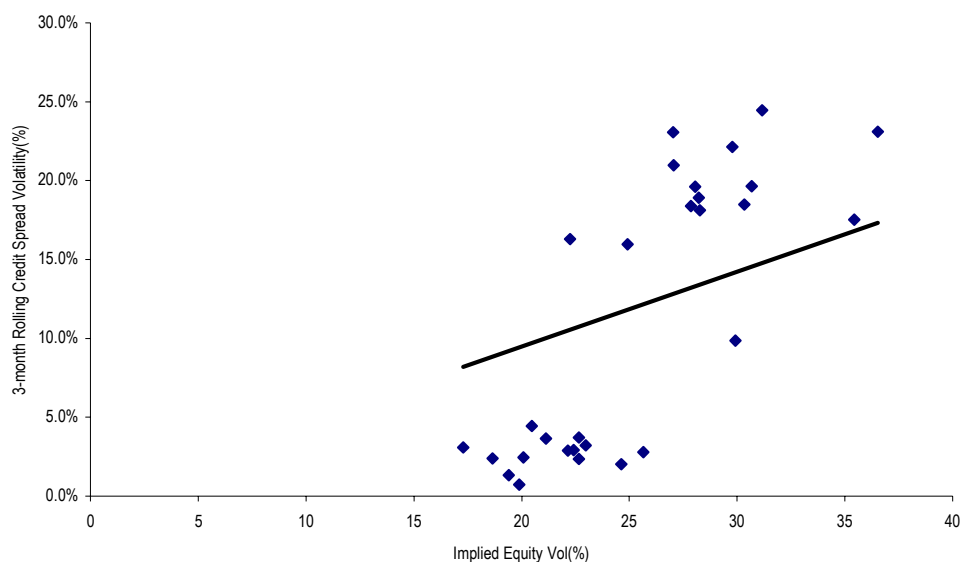
R2 of 0.17	Coefficients	Standard Error	t Stat	P-value
Intercept	1.427351	4.729032	0.301827	0.765753
Implied Equity Opt Vol	4.070581	1.345704	3.024872	0.006444
Historical 12-month Rolling Vol	3.634039	5.737516	0.633382	0.533322
HSBC SUBLT2 USD CR 5Y Default	0.585136	0.539347	1.084896	0.290266
HSBC SUBLT2 USD CR 10Y Default	-0.06897	0.872047	-0.07909	0.937706
HSBC SUBLT2 EUR CR 5Y Default	0.821477	1.727105	0.475638	0.639243

Source: Banc of America Securities LLC estimates.

**Step 5: Transform Implied Equity Volatility Into Predicted Credit Spread Volatility**

We regressed historical implied equity volatility with three-month rolling spread volatility annualized to determine the relationship between both volatility terms. Predicted HSBC credit spread volatility (%) = 0 (intercept) + 0.4744 Implied equity volatility of HSBC (%) with R<sup>2</sup> of 31%. Hence, we expect that a 1% absolute increase in implied equity volatility will cause HSBC credit spread volatility to increase by 0.47%. Regression analysis for HBOS unfortunately does not yield a significant relationship between credit spread volatility and implied equity volatility. Instead, we estimated credit spread volatility for HBOS by comparing it with similarly rated banks, as most highly rated bank risks are systemic rather than firm specific. Hence, we can estimate HBOS credit spread volatility (%) = 0 (intercept) + 0.35 Implied equity volatility.

**Figure 20. Regression Analysis of Credit Spread Volatility With Implied Equity Volatility of HSBC**

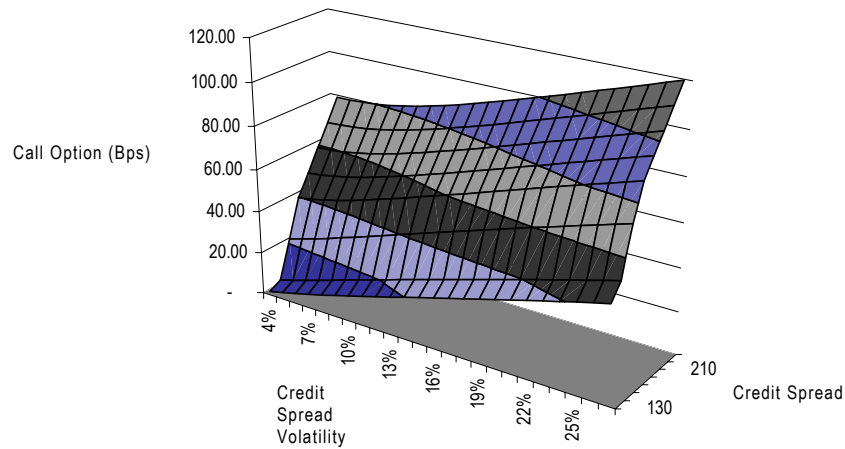


Source: Banc of America Securities LLC estimates.

**Step 6. Sensitivity Analysis of Call Option**

As shown in Figure 21, the value of the call option on credit spread is highly sensitive to credit spread volatility and current credit spreads. Intuitively, as credit spreads and credit spread volatility increase, so too does the likelihood that banks could extend the T1 issue (despite potential market reputation concerns<sup>7</sup>) rather than call the bond since it is cheaper to pay the step-ups than raise new capital. Therefore, the call option on the credit spread is deep in-the-money when credit spreads and volatility increase. For example, the HBOS 6.461 NC 2018 call option was worth ~40bps in late 2002 due to rising volatility and deteriorating credit spreads. In the current benign credit environment, we believe embedded T1 options have negligible worth due to low volatility and low credit spreads.

**Figure 21. Sensitivity Analysis of Call Option on Credit Spreads to Credit Spreads and Credit Spread Volatility**

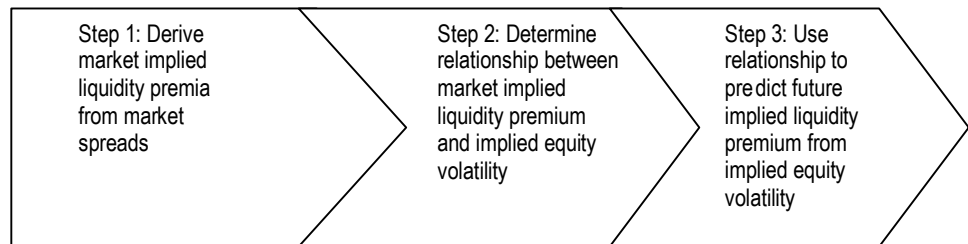


Source: Banc of America Securities LLC estimates.

**Valuing the Incremental Liquidity Premium of Subordinated Bond**

Liquidity is a difficult variable to model because of its randomness during periods of greed and fear in the market place. Our model addresses this difficulty of estimating the liquidity premium by using a three-step approach:

**Figure 22. Three Steps of Estimating the Liquidity Premium**



Source: Banc of America Securities LLC estimates.

<sup>7</sup> Market participants frequently state that a bank will always call and never extend a callable T1 issue for reputation reasons. We believe this logic is flawed, as a bank treasurer should do what makes the most financial sense from an asset/liability perspective and in the interest of shareholders.

**Step 1: Determine Market Implied Incremental Liquidity Premium**

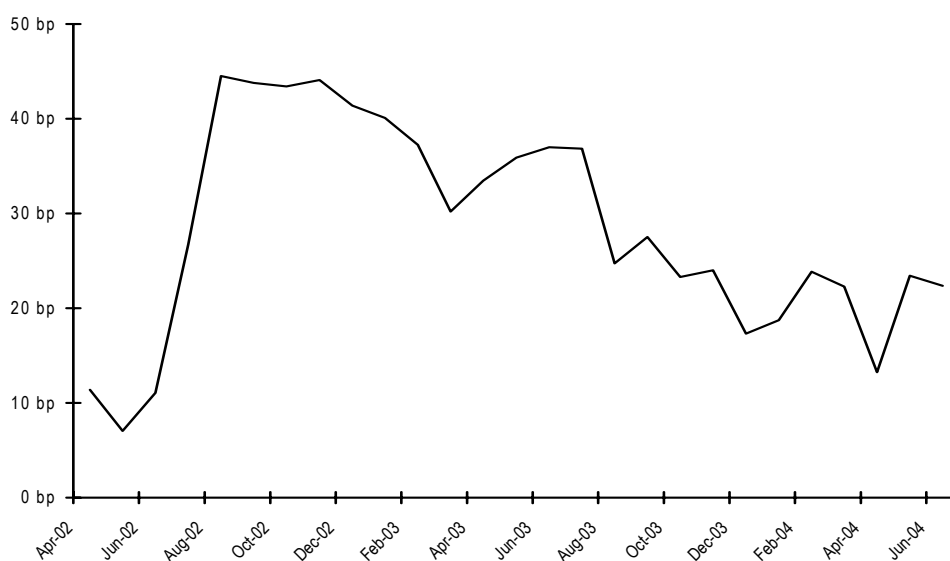
We derive the market implied incremental liquidity premium between a senior bond and more subordinated bond from observable market spreads, less other previously calculated components of the subordination premium (e.g., the recovery premium, embedded option premium, maturity mismatch premium, etc.).

Market implied incremental liquidity premium (sub vs. senior bond)

$$= \text{Market incremental spread (sub vs. senior)} - (\Sigma \text{Recovery premium} + \text{Embedded option} + \text{Maturity mismatch adjustments})$$

The incremental liquidity premium of T1 over LT2 for HBOS has fluctuated around 10–20 bps during stable credit environments, but rose to 40 bps during the credit crunch in late 2002.

**Figure 23. Historical Incremental Liquidity Premium of HBOS (T1 –LT2)**

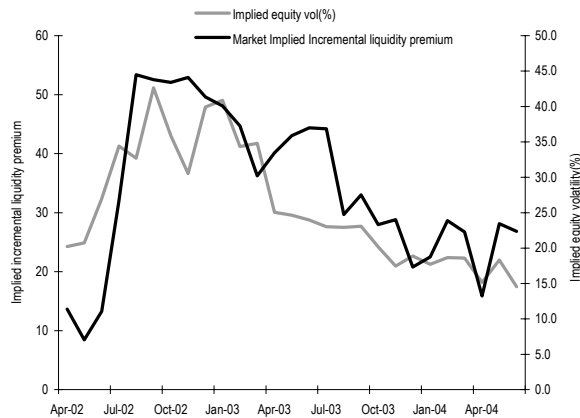


Source: Banc of America Securities

**Step 2: Establish Relationship Between Historical Market Implied Incremental Liquidity Premium and Historical Implied Equity Volatility**

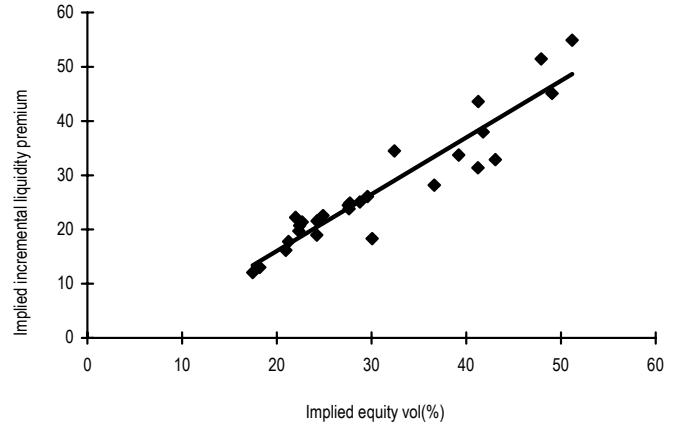
Through a multi-regression exercise, we found a significant relationship between historical market implied incremental liquidity premium and prior period implied equity volatility and the change in implied volatility. Using HBOS as an example, incremental liquidity premium  $_t$  (between LT2 and T1) =  $-0.63 + 0.9150 \text{ Implied vol}_{t-1} + 1.644 \Delta \text{ Implied vol}_{t-1 \rightarrow t}$  with  $R^2$  of 0.60. With May and June 2004 implied equity volatility hovering around 22.2% and 18.0% respectively, the incremental liquidity premium of moving from LT2 to T1 in June 2004 is around 12.8 bps.

**Figure 24. Implied Incremental Liquidity Premium and Implied Equity Volatility**



Source: Banc of America Securities LLC estimates.

**Figure 25. Implied Incremental Liquidity Premium With Implied Equity Volatility of HBOS**

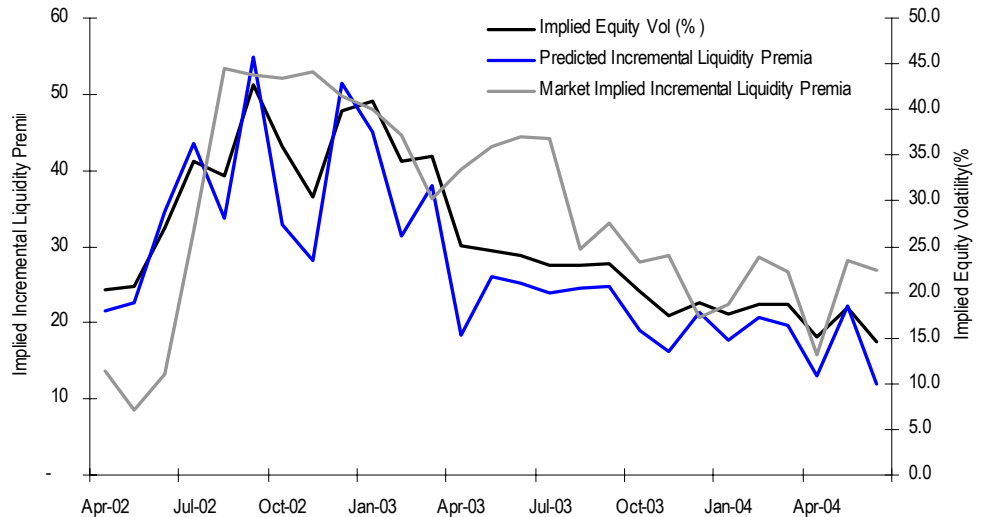


Source: Banc of America Securities LLC estimates.

**Step 3: Predict Historical and Future Incremental Liquidity Premium**

Lastly, we use our regression equation to predict historical and future incremental liquidity premium (between senior and sub) based on our implied equity volatility and change in volatility.

**Figure 26. Market Implied Incremental Liquidity Premium vs. Predicted Incremental Liquidity Premium for HBOS T1 vs. LT2**



Source: Banc of America Securities LLC estimates.

### Determining the Maturity Mismatch Adjustments

Owing to different maturities between the two bonds selected, we adjusted for investors' general demand for higher yield in instruments with longer maturities than shorter maturities, assuming an upward sloping yield curve. We interpolated the risk-free rates relative to on-the-run government Treasuries for each bond based on its maturity and determined the difference in risk-free rates between the senior and more subordinated bonds due to difference in maturities.

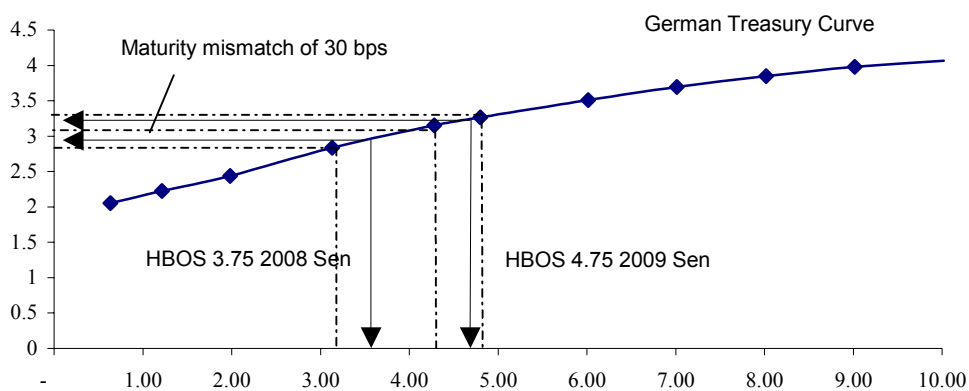
An astute investor may argue that one should use duration-based weights for interpolation rather than maturity-based weights or boot-strap zero coupon discount factors from a list of bank bonds with the same tier but different maturities. We have used maturity-based weights since these are significantly easier to use on a day-to-day basis. Furthermore, duration-based weights may provide misleading results during distressed situations. For example, if HBOS T1 widens with respect to LT2 during a credit crunch, duration of T1 decreases due to higher discount rates, and maturity mismatch adjustments between T1 and LT2 will decline correspondingly. This is intuitively incorrect since we expect maturity mismatch adjustments between T1 and LT2 to stay flat or increase during a turbulent credit environment. We understand that the size of coupons may have a modest effect on maturity mismatch and we try to match bonds with similar payments and maturities.

For example, HBOS 3.75 1/23/2008 senior and HBOS 4.75 3/24/2009 LT2 are approximately 3.4 and 4.6 years from maturity, respectively, as of August 30, 2004. The risk free benchmark for HBOS 3.75 1/23/2008 senior is between OBL 4.5 08/17/07 Govt (3.13 yrs, 2.836% YTM) and OBL 3.5 10/10/2008 (4.28 yrs, 3.154% YTM). Interpolation using maturity-based weights indicates that HBOS 3.75 1/23/2008 Senior's risk free rate is worth 2.95% versus HBOS 4.75 3/24/2009 LT2's risk free rate of 3.25%. Hence, the maturity mismatch is worth ~ 30 bps.

Maturity mismatch adjustments for HBOS:

- ◆ -1 bp between HBOS 10.5 2/16/2018 LT2 and HBOS 6.461 NC 11/30/2018 T1.
- ◆ 30 bps between HBOS 3.75 1/23/2008 Senior and HBOS 4.75 3/24/2009 LT2.

Figure 27. HBOS Maturity Mismatch Adjustments Using Risk-Free Rates

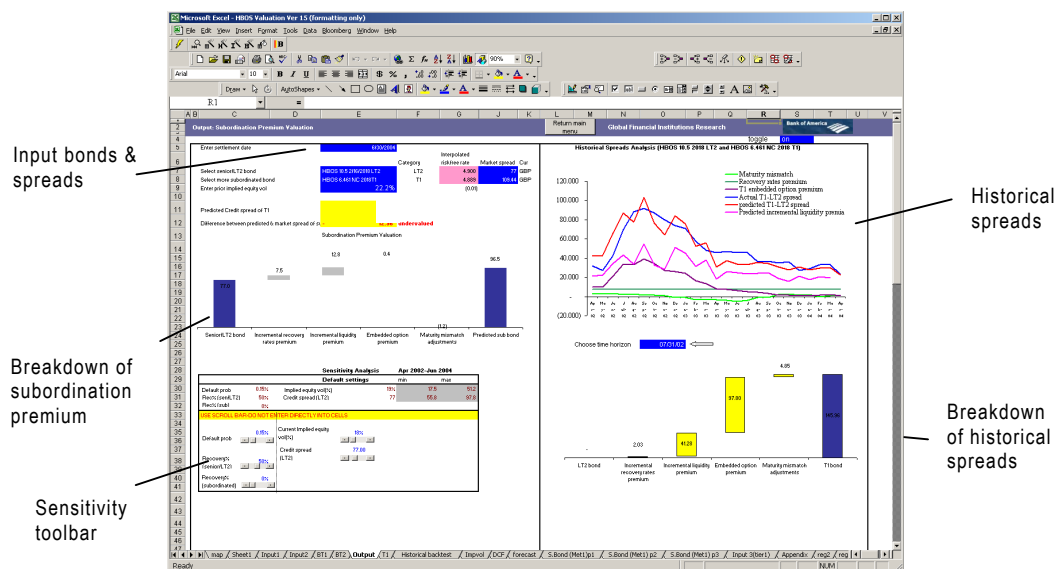


Source: Banc of America Securities LLC estimates.

One key caveat in determining the maturity mismatch adjustments is to ensure that the benchmarks used in both senior and subordinated bonds are identical. This is particularly tricky for euro-denominated issues where each issue may be benchmarked against a different German government security and adjustments need to be made. For example, in determining relative value between LLOYDS 4.75 3/18/2011 LT2 and LLOYDS 6.35 NC 2013 T1, we need to adjust the benchmark from DBR 5 07/04/2011 Govt to DBR 3.75 07/04/2013 Govt so that the LT2 benchmark is consistent with the T1 benchmark.

The Model in Practice

Figure 28. Bank of America ABCV Model Interface



Source: Banc of America Securities estimates.

For each bank capital structure that investors want to model, they will need to select two bonds of different subordination from the list of liquid bonds within that bank’s capital structure, and then enter the market spreads of the bonds above their relevant benchmarks. For illustration, we have selected HBOS 10.5 2018 LT2 (77.0 bps) and HBOS 6.461 NC 2018 T1 (109.4 bps) as the two bonds that we want to compare on June 30, 2004. After selecting the two bonds, we enter the market spreads observable and the implied equity volatility that we observed during the last period (i.e., last month or last week).

Figure 29. Key Inputs of ABCV Model

Enter Settlement Date	6/30/2004			
		Category	Interpolated Risk Free Rate	Market Spread
Select Senior/LT2 Bond	HBOS 10.5 2/16/2018 LT2	LT2	4.900	77.0
Select More Subordinated Bond	HBOS 6.461 NC 2018T1	T1	4.889	109.4
Enter Prior Implied Equity Vol	22.2%		(0.01)	

Source: Banc of America Securities Limited estimates.

Our model subsequently breaks down the relative subordination premium between the LT2 and T1 of HBOS into an incremental recovery rate premium (7.5 bps), an incremental liquidity premium (12.8 bps), an embedded option premium (0.4 bps), and maturity mismatch adjustments (-1.2 bps). Hence, we calculated that the credit spread of the HBOS T1 bond was worth 96.5 bps versus the current market credit spread of 109.4 bps. Thus, our model indicates that HBOS T1 at a market price of 109.4 bps is undervalued versus our model estimate of 96.5 bps on June 30, 2004.

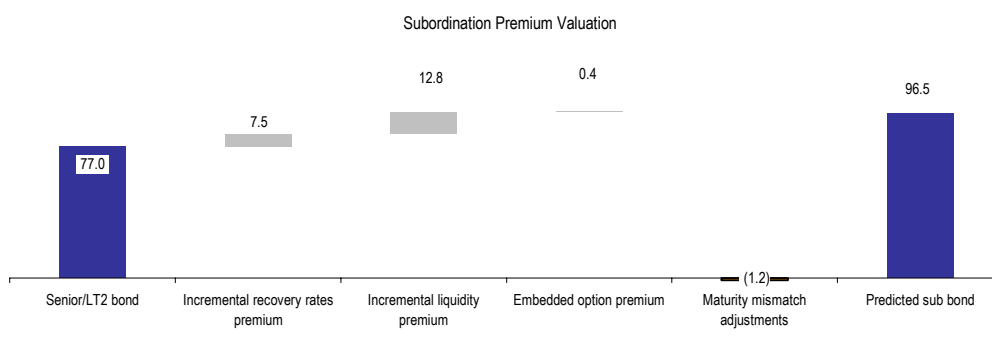
**Figure 30. Key Outputs of ABCV Model**

	Spread (bps)	
Market Spread (LT2)	77	
Recovery Rates Premium	7.5	
Incremental Liquidity Premium	12.8	
Embedded Option Premium	0.4	
Maturity Mismatch Adjustments	-1.2	
Predicted Spread (T1)	96.5	
Market Spread (T1)	109.4	
Difference	12.9	Undervalued

Source: Banc of America Securities LLC estimates.

Investors can also perform a sensitivity analysis of the subordination premium by adjusting key variables, including default probability, recovery rates for Senior/LT2 bonds, recovery rates for subordinated bonds, implied equity volatility (%) and the credit spread of the Senior/LT2 bond. For example, if the implied equity volatility of HBOS spikes from its current 18% to 50% (last experienced in late 2002), we expect the embedded option premium to increase in value from 0.4 bps to 38.6 bps and the incremental liquidity premium to increase from 12.8 bps to 65.4 bps, causing the total subordination premium to widen by an additional 90.8 bps because of the increase in implied equity volatility. Under this scenario, the bond is overvalued relative to the market or in other words, we expect T1 to widen relative to LT2.

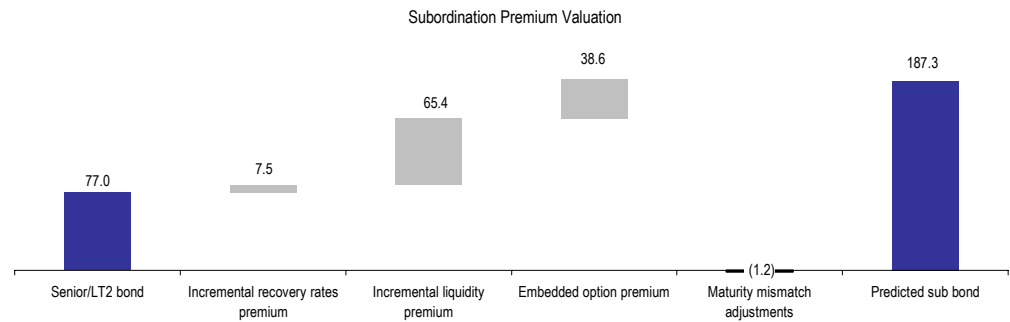
**Figure 31. Subordination Premium Breakdown (implied equity vol of 18%)**



Source: Banc of America Securities LLC estimates.



**Figure 32. Subordination Premium Breakdown (implied equity vol of 50%)**

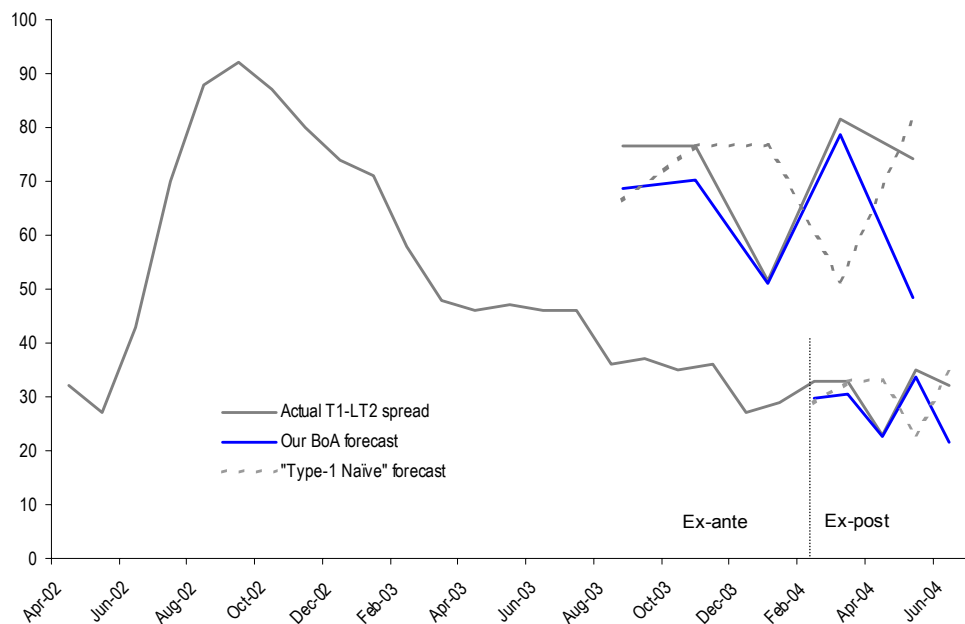


Source: Banc of America Securities LLC estimates.

**Back-testing of ABCV Model**

We have so far used data from April 2002 to February 2004 (ex-ante) to “train” our model. The key question facing all investors is “How did our model perform during back-testing?” Using HBOS as an example, we compared our model results with actual market data from February 2004 to June 2004 (ex-post). Our predicted spread (dark blue line in Figure 33) moves in conjunction with the actual spread (grey line). We compared our model’s forecast with the simplest forecasting technique known as “Naïve 1” method. “Naïve 1” method forecasts that a value for this period equals the previous period’s actual value. A Theil U statistic is used to evaluate our model’s forecast accuracy. A Theil U statistic ranges from 0 to 1 with 0 representing a perfect model with 100% accuracy and 1 representing a naïve model predicting no change. Our three-to-five months forecast yielded Theil U statistic of ~0.14–0.5, suggesting that our model provides “informational precedence”.

**Figure 33. Ex-ante and Ex-post Forecasts of HBOS T1-LT2 Spreads**

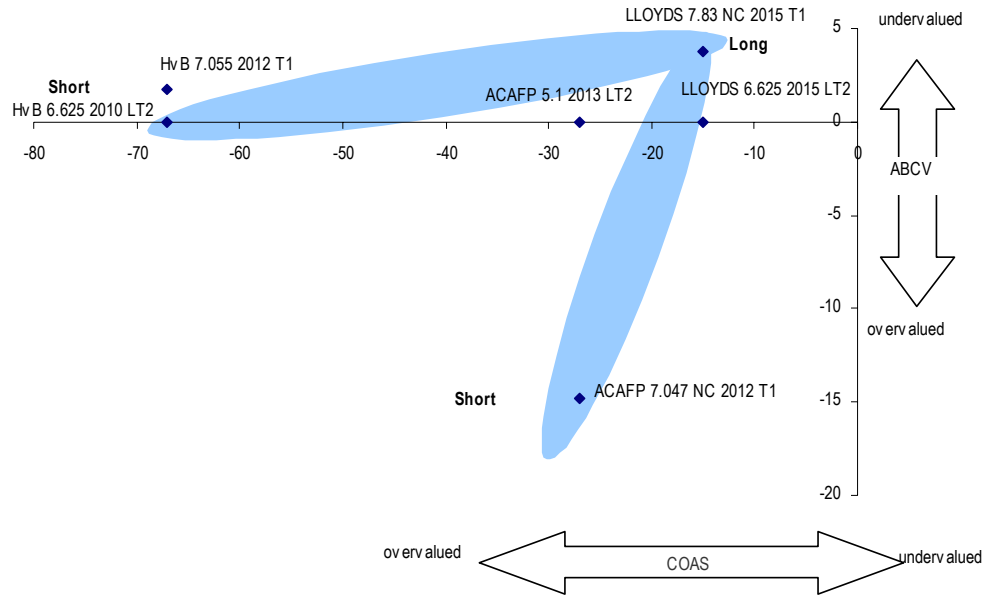


Source: Banc of America Securities LLC estimates.

**ABCV vs. COAS Model<sup>8</sup>**

Our ABCV model when integrated with our Banc of America Securities’ Credit Option Adjusted Spread (COAS) model provides a powerful tool for identifying relative value within a bank’s capital structure as well as across issuers.

**Figure 34. ABCV vs. COAS Model**



Source: Banc of America Securities Limited estimates.

For illustration purposes, we plot the LT2 and T1 issues for three European banks: Credit Agricole, LLOYDS and HVB on a scatterplot based on July 30, 2004 figures. The X-axis represents our COAS value and the Y-axis represents our ABCV value. Rather than traditional cross-issuer trades (e.g. LLOYDS vs. HVB) or intra-issuer relative trades (e.g., LT2 vs. T1) of LLOYDS, we can conduct “diagonal” relative value trades across different issuers and capital structures (e.g., HVB LT2 issue versus LLOYDS T1 issue). The ability to analyze debt instruments across a wide range of issuers and subordination levels is extremely useful for pair wise relative valuation. In Figure 34, LLOYDS T1 looks undervalued relative to HVB LT2 and ACAFP T1 on July 30, 2004 as LLOYDS has a tighter COAS statistic and higher ABCV value.

<sup>8</sup> Note, these names are not intended to represent a recommendation or investment advice with respect to any particular issuer and are merely the results generated by our Credit OAS proprietary credit evaluation model. For a more detailed description of this model, including the data input into the model, please see “Introducing Credit Option Adjusted Spread and Lighthouse”, *Credit Market Strategist*, December 16, 2002, and “A Hundred Years of Flight, One of Lighthouse and Credit OAS”, *Credit Market Strategist*, December 23, 2003.”

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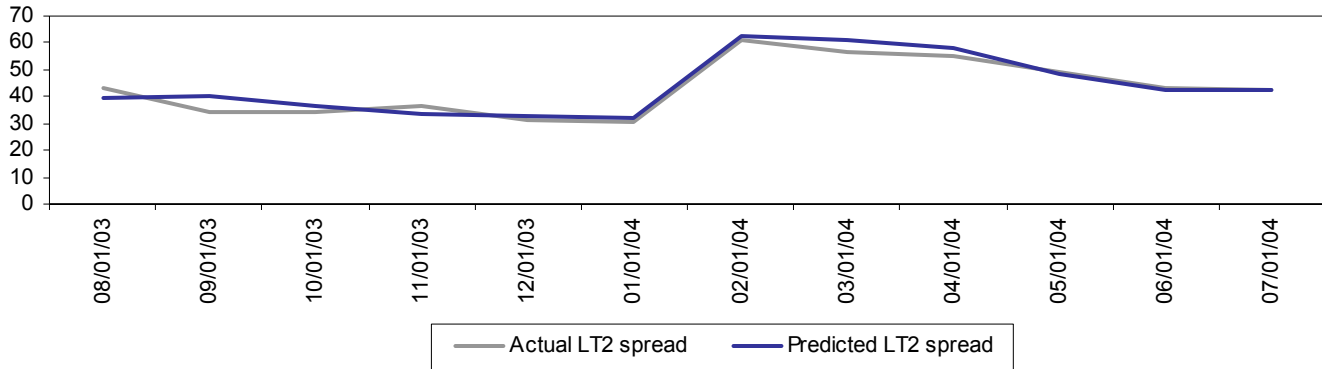
\* Note, the results of the ABCV model on the following pages are not intended as a recommendation or investment advice with respect to any particular issuer and merely represent the results generated by the model.

ABN Amro

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
ABN AMRO BANK NV	AAB	4.625	5/12/2009	A1/A+		LT2	EUR
ABN AMRO BANK NV	AAB	4.75	6/24/2009	Aa3/AA-		Senior	EUR
ABN AMRO BANK NV	AAB	5.375	9/8/2009	Aa3/AA-		Senior	EUR

Sample Back-testing



Sensitivity Analysis

Remarks

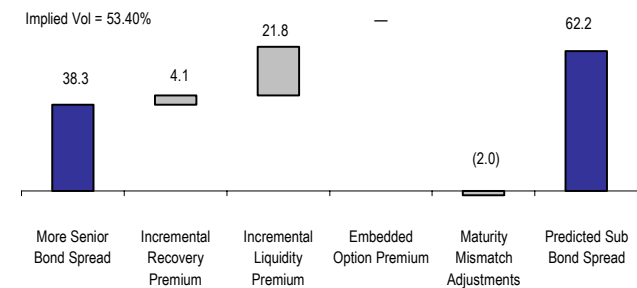
Before (3/10/2004)

Key Inputs

AAB 4.75 2009 Senior	38.3
AAB 4.625 2009 LT2	63.3
Implied Volatility (%)	53.4%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>62.2</b>
<b>Difference (Market vs. Predicted)</b>	<b>1.1</b>
<b>Undervalued</b>	
Recovery Rate Premium*	4.1
◆ Prob Default	0.154%
◆ Recovery Senior	45.0%
◆ Recovery LT2	18.0%
Incremental Liquidity Premium	21.8
Embedded Option	0.0
Maturity Mismatch	(2.0)

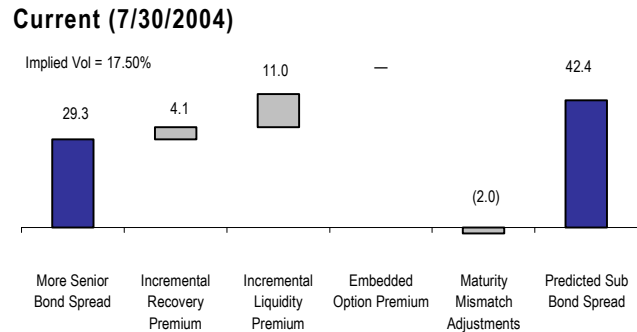


Key Inputs

AAB 4.75 2009 Senior	29.3
AAB 4.625 2009 LT2	42.3
Implied Volatility (%)	17.5%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>42.4</b>
<b>Difference (Market vs. Predicted)</b>	<b>-0.1</b>
<b>Overvalued</b>	
Recovery Rate Premium*	4.1
◆ Prob Default	0.154%
◆ Recovery Senior	45.0%
◆ Recovery LT2	18.0%
Incremental Liquidity Premium	11.0
Embedded Option	0.0
Maturity Mismatch	(2.0)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

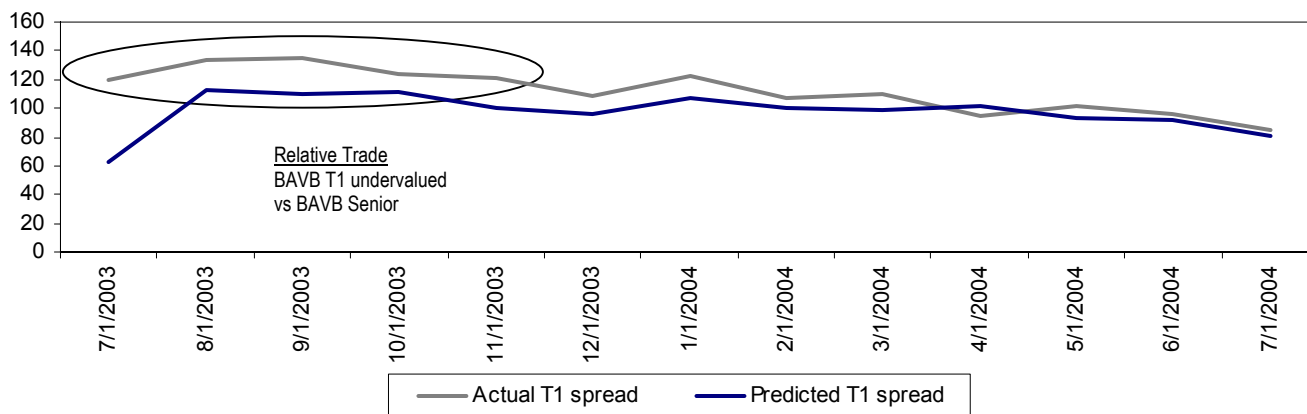
\* Modest recovery rate for senior and low recovery rate for LT2 reflects low equity cushion and high level of senior liabilities as shown in Appendix B.

## Banca Intesa

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
BANCA INTESA SPA	BAVB*	6.25	3/1/2010	A1/A		Senior	EUR
INTESABCI CAPITAL TRUST	BAVB	6.988	Perpetual	NR/BBB+	7/12/2011	T1	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

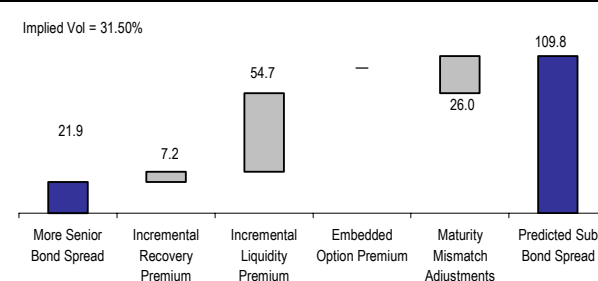
#### Key Inputs

BAVB 6.25 2010 Senior	21.9
BAVB 6.98 NC 2011 T1	119.2
Implied Volatility (%)	31.5%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>109.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>9.4</b>
<b>Undervalued</b>	
Recovery Rate Premium†	7.2
◆ Prob Default	0.154%
◆ Recovery Senior	70.0%
◆ Recovery T1	22.1%
Incremental Liquidity Premium	54.7
Embedded Option	0.0
Maturity Mismatch	26.0

#### Before (7/30/2003)



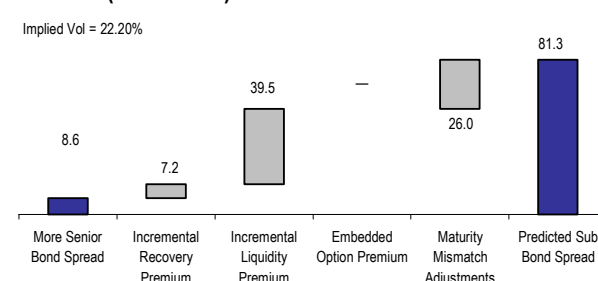
#### Key Inputs

BAVB 6.25 2010 Senior	8.6
BAVB 6.98 NC 2011 T1	84.6
Implied Volatility (%)	22.2%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>81.3</b>
<b>Difference (Market vs. Predicted)</b>	<b>3.3</b>
<b>Undervalued</b>	
Recovery Rate Premium†	10.5
◆ Prob Default	0.154%
◆ Recovery Senior	70.0%
◆ Recovery T1	22.1%
Incremental Liquidity Premium	39.5
Embedded Option	0.0
Maturity Mismatch	26.0

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

\* Credit spread of BAVB 6.25 2010 Senior is determined from 2011 benchmark used in BAVB 6.988 NC 2011 T1.

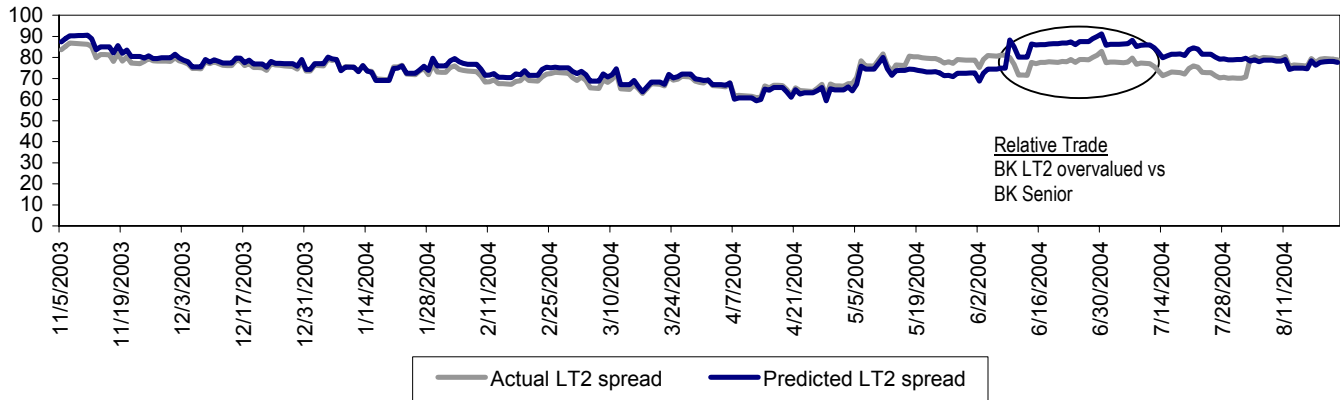
† High senior recovery rate reflects modest equity cushion but relatively low deposits and senior liabilities. However, low T1 recovery reflects high level of senior debt obligations (Appendix B).

Bank of New York

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
Bank of New York Co. Inc.	BK	3.625	1/15/2009	Aa3/A+		Senior	USD
Bank of New York Co. Inc.	BK	7.3	12/1/2009	A1/A		LT2	USD

Sample Back-testing



Sensitivity Analysis

Remarks

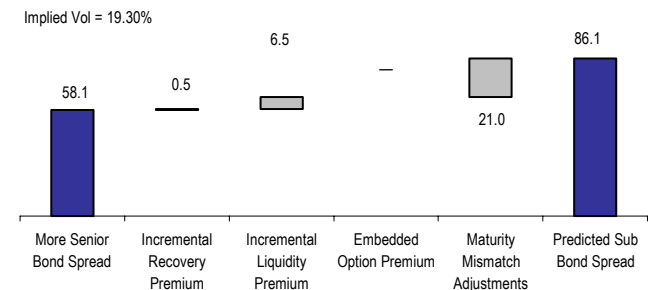
Before (11/5/2003)

Key Inputs

BK 3.625 2009 Senior	58.1
BK 7.3 2009 LT2	83.6
Implied Volatility (%)	19.3%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>86.1</b>
<b>Difference (Market vs. Predicted)</b>	<b>-2.5</b>
	<b>Overvalued</b>
Recovery Rate Premium*	0.5
◆ Prob Default	0.15%
◆ Recovery Senior	80.0%
◆ Recovery LT2	77%
Incremental Liquidity Premium	6.5
Embedded Option	0.0
Maturity Mismatch	21.0



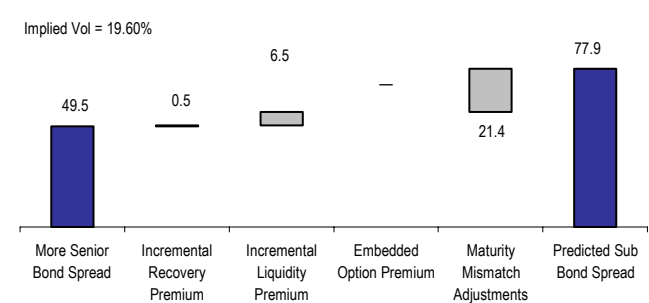
Key Inputs

BK 3.625 2009 Senior	49.5
BK 7.3 2009 LT2	70.2
Implied Volatility (%)	19.6%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>77.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>-7.7</b>
	<b>Overvalued</b>
Recovery Rate Premium*	0.5
◆ Prob Default	0.15%
◆ Recovery Senior	80.0%
◆ Recovery LT2	77%
Incremental Liquidity Premium	6.5
Embedded Option	0.0
Maturity Mismatch	21.4

Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

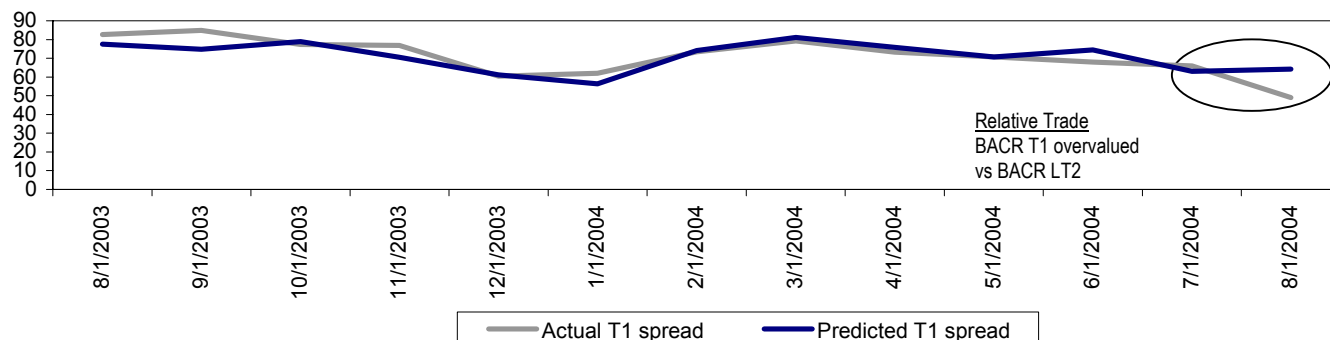
\* High senior and LT2 recovery reflects very strong equity cushion and relatively low senior liabilities, despite a high deposit base (Appendix B).

## Barclays

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
BARCLAYS BANK PLC	BACR*	5.75	3/8/2011	Aa2/AA-		LT2	EUR
BARCLAYS BANK PLC	BACR	7.5	Perpetual	Aa3/NR	12/15/2010	T1	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

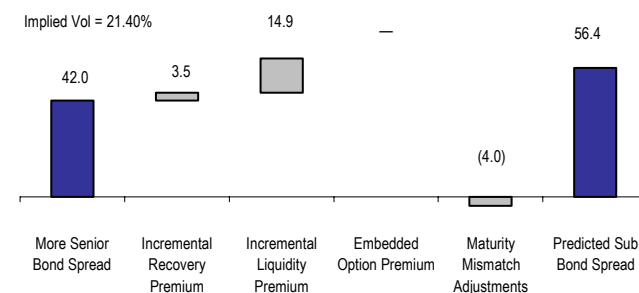
#### Key Inputs

BACR 5.75 2011 <sub>LT2</sub>	42.0
BACR 7.5 NC 2010 <sub>T1</sub>	62.0
Implied Volatility (%)	21.4%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>56.4</b>
<b>Difference (Market vs. Predicted)</b>	<b>5.6</b>
<b>Undervalued</b>	
Recovery Rate Premium <sup>†</sup>	3.5
◆ Prob Default	0.07%
◆ Recovery <sub>LT2</sub>	50.0%
◆ Recovery <sub>T1</sub>	0%
Incremental Liquidity Premium	14.9
Embedded Option	0.0
Maturity Mismatch	(4.0)

#### Before (1/30/2004)



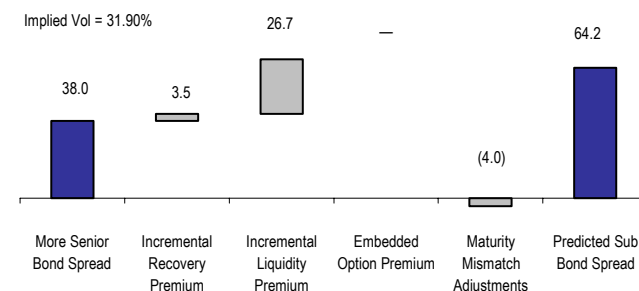
#### Key Inputs

BACR 5.75 2011 <sub>LT2</sub>	38.0
BACR 7.5 NC 2010 <sub>T1</sub>	49.0
Implied Volatility (%)	31.9%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>64.2</b>
<b>Difference (Market vs. Predicted)</b>	<b>-15.2</b>
<b>Overvalued</b>	
Recovery Rate Premium <sup>†</sup>	3.5
◆ Prob Default	0.07%
◆ Recovery <sub>LT2</sub>	50.0%
◆ Recovery <sub>T1</sub>	0%
Incremental Liquidity Premium	26.7
Embedded Option	0.0
Maturity Mismatch	(4.0)

#### Current (8/31/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

\* Credit spread of BACR 5.75 2011 LT2 is determined from using 2010 benchmark used in BACR 7.5 NC 2010.

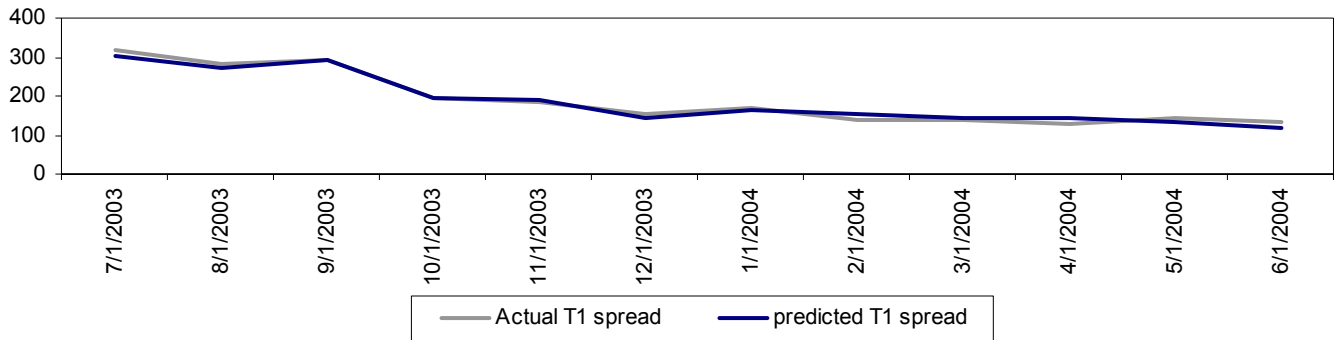
† Relatively low senior recovery rate and 0 T1 recovery rate reflects low equity cushion and relatively high deposit base and senior liabilities (Appendix B).

## Bayerische Hypo-Und Verinsbank

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
BAYER HYPO- VEREINSBANK	HVB	6.625	10/12/2010	Baa1/BBB+		LT2	EUR
HVB FUNDING TRUST VIII	HVB	7.055	Perpetual	Baa2/NR	3/28/2012	T1	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

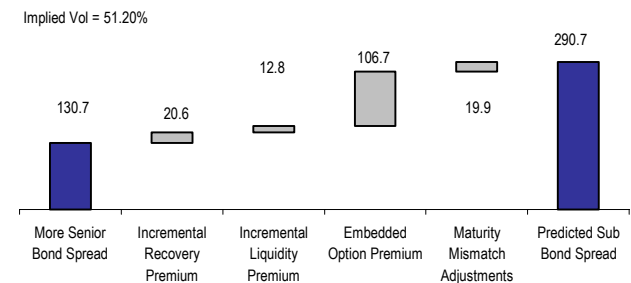
#### Key Inputs

HVB 6.625 2010 <sub>LT2</sub>	130.7
HVB 7.055 NC 2012 <sub>T1</sub>	291.3
Implied Volatility (%)	51.2%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>290.7</b>
<b>Difference (Market vs. Predicted)</b>	<b>0.6</b>
	<b>Undervalued</b>
Recovery Rate Premium*	20.6
◆ Prob <sub>Default</sub>	0.409%
◆ Recovery <sub>LT2</sub>	50.0%
◆ Recovery <sub>T1</sub>	0%
Incremental Liquidity Premium	12.8
Embedded Option	106.7
Maturity Mismatch	19.9

#### Before (9/30/2003)



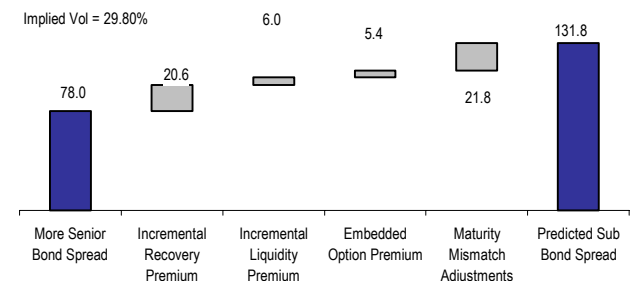
#### Key Inputs

HVB 6.625 2010 <sub>LT2</sub>	78.0
HVB 7.055 NC 2012 <sub>T1</sub>	133.5
Implied Volatility (%)	29.8%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>131.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>1.7</b>
	<b>Undervalued</b>
Recovery Rate Premium*	20.6
◆ Prob <sub>Default</sub>	0.409%
◆ Recovery <sub>LT2</sub>	50.0%
◆ Recovery <sub>T1</sub>	0%
Incremental Liquidity Premium	6.0
Embedded Option	5.4
Maturity Mismatch	21.8

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

\* Relatively low LT2 recovery and 0 T1 recovery reflects low equity cushion and high senior liabilities, despite very low deposit base (Appendix B).

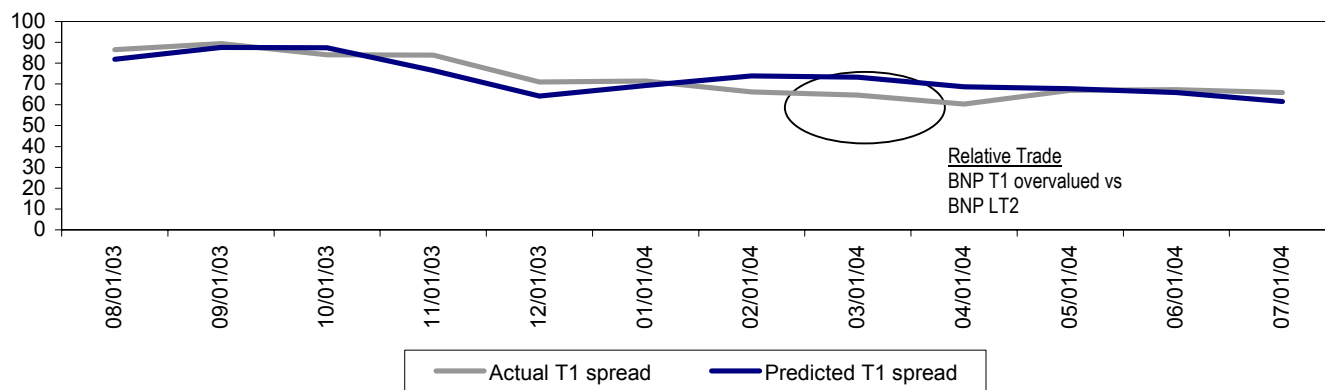


## BNP Paribas

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
BNP PARIBAS	BNP	5.25	12/17/2012	Aa3/AA-		LT2	EUR
BNP PARIBAS CAP TRST IV	BNP	6.342	Perpetual	A1/A+	1/24/2012	T1	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

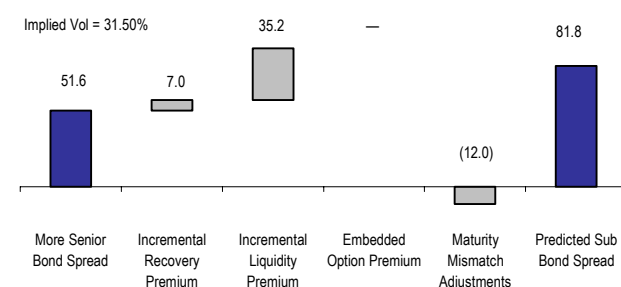
#### Key Inputs

BNP 5.25 2012 LT2	51.6
BNP 6.342 NC 2012 T1	86.5
Implied Volatility (%)	31.5%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>81.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>4.7</b>
<b>Undervalued</b>	
Recovery Rate Premium*	7.0
◆ Prob Default	0.154%
◆ Recovery LT2	45.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	35.2
Embedded Option	0.0
Maturity Mismatch	(12.0)

#### Before (8/31/2003)



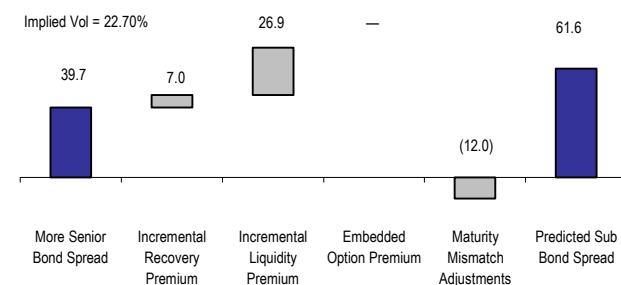
#### Key Inputs

BNP 5.25 2012 LT2	39.7
BNP 6.342 NC 2012 T1	65.9
Implied Volatility (%)	22.7%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>61.6</b>
<b>Difference (Market vs. Predicted)</b>	<b>4.3</b>
<b>Undervalued</b>	
Recovery Rate Premium*	7.0
◆ Prob Default	0.154%
◆ Recovery LT2	45.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	26.9
Embedded Option	0.0
Maturity Mismatch	(12.0)

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

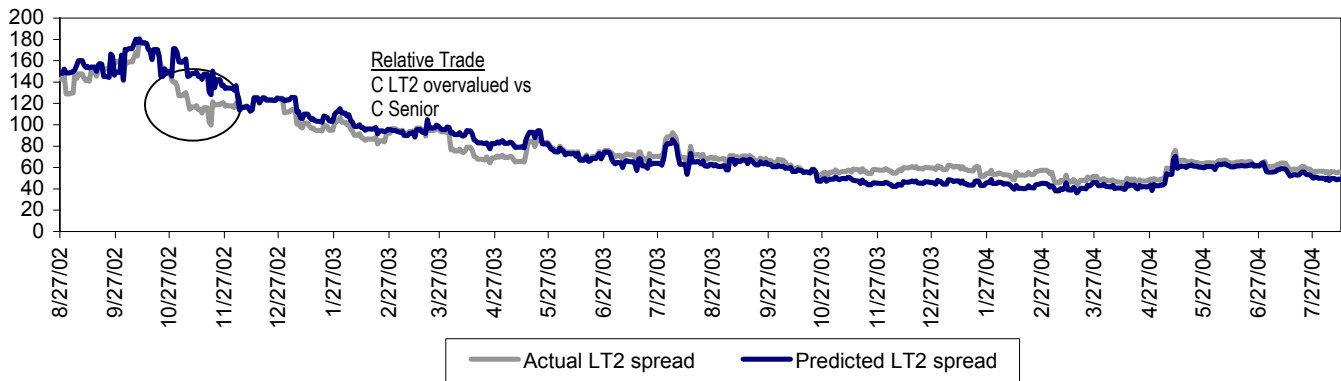
\* Relatively low LT2 recovery and 0 T1 recovery reflects low equity cushion and high senior liabilities, despite a low deposit base (Appendix B).

Citigroup

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
Citigroup Inc.	C	4.875	5/17/2015	Aa2/A+		LT2	USD
Citigroup Inc.	C	5.125	5/5/2014	Aa1/AA-		Senior	USD
Citigroup Inc.	C	5.625	8/27/2012	Aa2/A+		LT2	USD
Citigroup Inc.	C	6.5	1/18/2011	Aa1/AA-		Senior	USD

Sample Back-testing



Sensitivity Analysis

Remarks

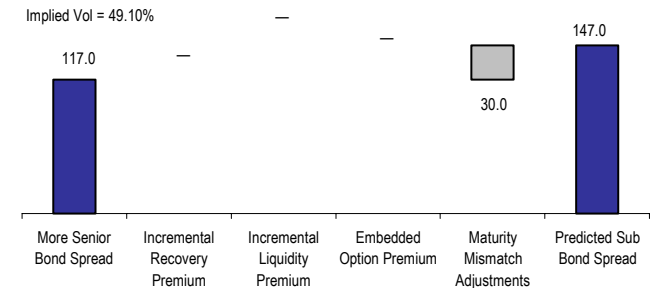
Key Inputs

C 6.5 2011 Senior	117.0
C 5.625 2012 LT2	142.8
Implied Volatility	49.1%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>147.0</b>
<b>Difference (Market vs. Predicted)</b>	<b>-4.2</b>
<b>Overvalued</b>	
Recovery Rate Premium*	0.0
◆ Prob Default	0.0746%
◆ Recovery Senior	80.0%
◆ Recovery LT2	79.6%
Incremental Liquidity Premium	0.0
Embedded Option	0.0
Maturity Mismatch	30.0

Before (8/28/2002)



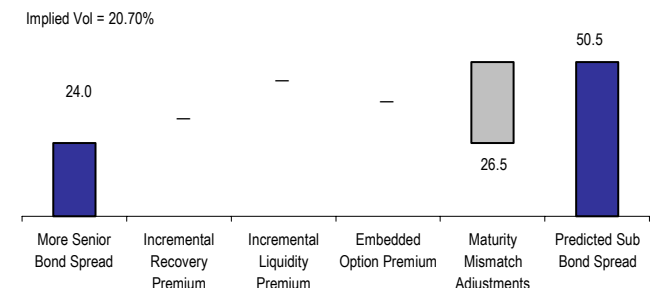
Key Inputs

C 6.5 2011 Senior	24.0
C 5.625 2012 LT2	56.4
Implied Volatility	20.7%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>50.5</b>
<b>Difference (Market vs. Predicted)</b>	<b>5.9</b>
<b>Undervalued</b>	
Recovery Rate Premium*	0.0
◆ Prob Default	0.0746%
◆ Recovery Senior	80.0%
◆ Recovery LT2	79.6%
Incremental Liquidity Premium	0.0
Embedded Option	0.0
Maturity Mismatch	26.5

Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

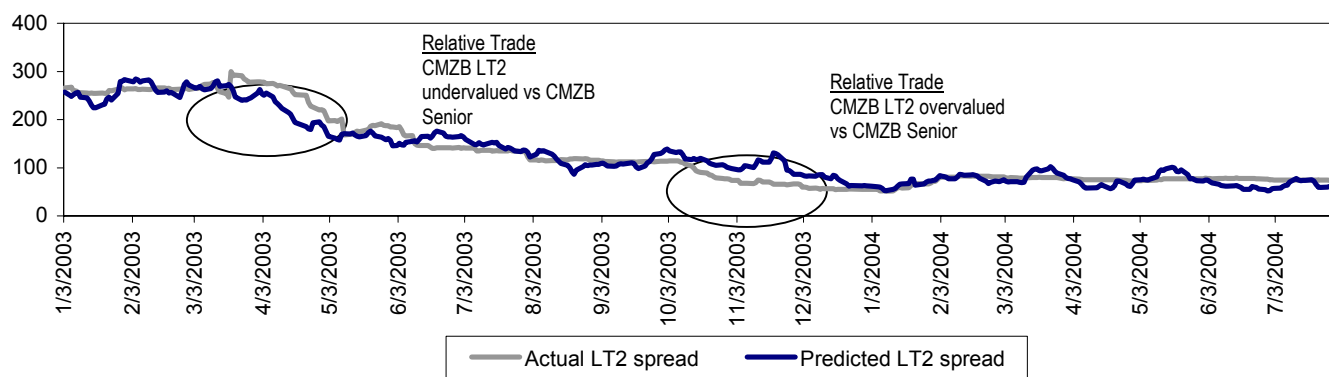
\* High senior and LT2 recovery rates reflect strong equity cushion and a relatively modest senior liabilities and deposit base (Appendix B).

## Commerzbank

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
COMMERZBANK AG	CMZB	4.25	10/25/2009	A2/A-		Senior	EUR
COMMERZBANK AG	CMZB	4.75	4/21/2009	A3/BBB+		LT2	EUR
COMMERZBANK AG	CMZB	5.5	10/25/2011	A2/A-		Senior	EUR
COMMERZBANK AG	CMZB	6.125	10/25/2011	A2/A-		Senior	EUR
COMMERZBANK AG	CMZB	6.125	5/2/2010	A3/BBB+		LT2	EUR
COMMERZBANK AG	CMZB	6.5	7/12/2010	A3/BBB+		LT2	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

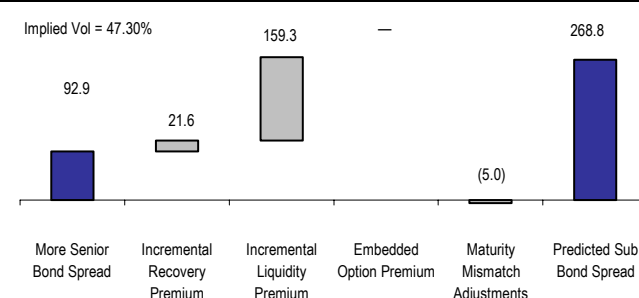
#### Key Inputs

CMZB 6.125 2010 Senior	92.9
CMZB 6.5 2010 LT2	265.7
Implied Volatility (%)	47.3%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>268.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>-3.1</b>
<b>Overvalued</b>	
Recovery Rate Premium*	21.6
◆ Prob Default	0.27%
◆ Recovery Senior	40.0%
◆ Recovery LT2	8.9%
Incremental Liquidity Premium	159.3
Embedded Option	0.0
Maturity Mismatch	(5.0)

#### Before (1/3/2003)



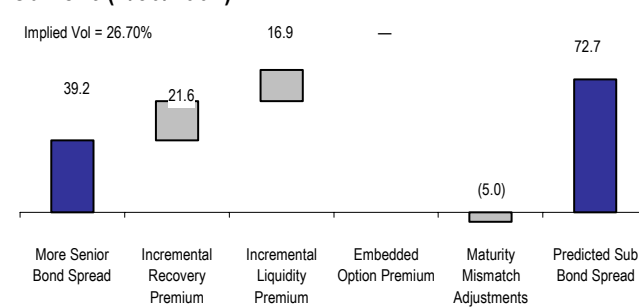
#### Key Inputs

CMZB 6.125 2010 Senior	39.2
CMZB 6.5 2010 LT2	74.0
Implied Volatility (%)	26.7%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>72.7</b>
<b>Difference (Market vs. Predicted)</b>	<b>1.3</b>
<b>Undervalued</b>	
Recovery Rate Premium	21.6
◆ Prob Default	0.27%
◆ Recovery Senior	40.0%
◆ Recovery LT2	7.9%
Incremental Liquidity Premium*	16.9
Embedded Option	0.0
Maturity Mismatch	(5.0)

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

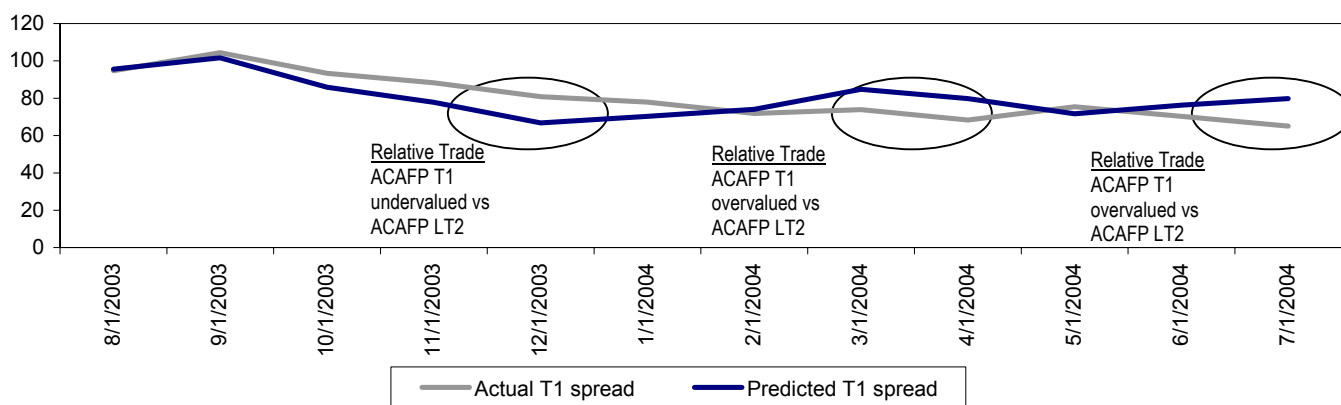
\* Low senior and LT2 recovery rates reflect low equity cushion and sizeable senior debt and liabilities, despite relatively low deposit base (Appendix B).

## Credit Agricole

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
CSSE NATL DE CREDIT	ACAFP	5.1	12/10/2013	NR/NR		LT2	EUR
CL CAPITAL TRUST 1	ACAFP*	7.047	Perpetual	A1/A	4/26/2012	T1	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

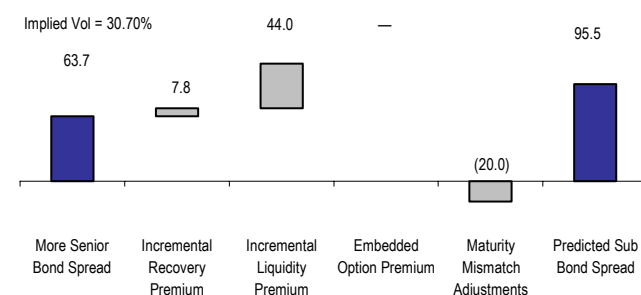
#### Key Inputs

ACAFP 5.1 2013 <sub>LT2</sub>	63.7
ACAFP 7.047 NC 2012 <sub>T1</sub>	94.7
Implied Volatility (%)	30.7%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>95.5</b>
<b>Difference (Market vs. Predicted)</b>	<b>-0.8</b>
<b>Overvalued</b>	
Recovery Rate Premium†	7.8
◆ Prob <sub>Default</sub>	0.154%
◆ Recovery <sub>LT2</sub>	50.0%
◆ Recovery <sub>T1</sub>	0%
Incremental Liquidity Premium	44.0
Embedded Option	0.0
Maturity Mismatch	(20.0)

#### Before (8/31/2003)



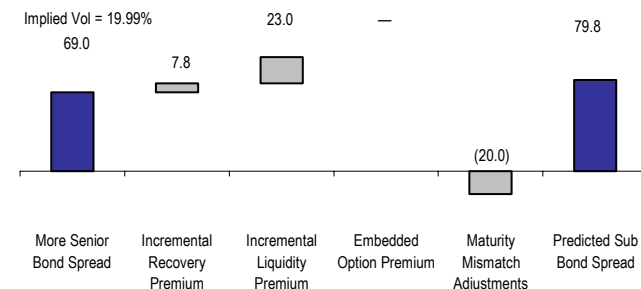
#### Key Inputs

ACAFP 5.1 2013 <sub>LT2</sub>	69.0
ACAFP 7.047 NC 2012 <sub>T1</sub>	65.0
Implied Volatility (%)	19.9%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>79.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>-14.8</b>
<b>Overvalued</b>	
Recovery Rate Premium†	7.8
◆ Prob <sub>Default</sub>	0.154%
◆ Recovery <sub>LT2</sub>	50.0%
◆ Recovery <sub>T1</sub>	0%
Incremental Liquidity Premium	23.0
Embedded Option	0.0
Maturity Mismatch	(20.0)

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

\* Credit spread of ACAFP 7.047 NC 2012 T1 is determined from 2013 benchmark used in ACAFP 5.1 2013 LT2.

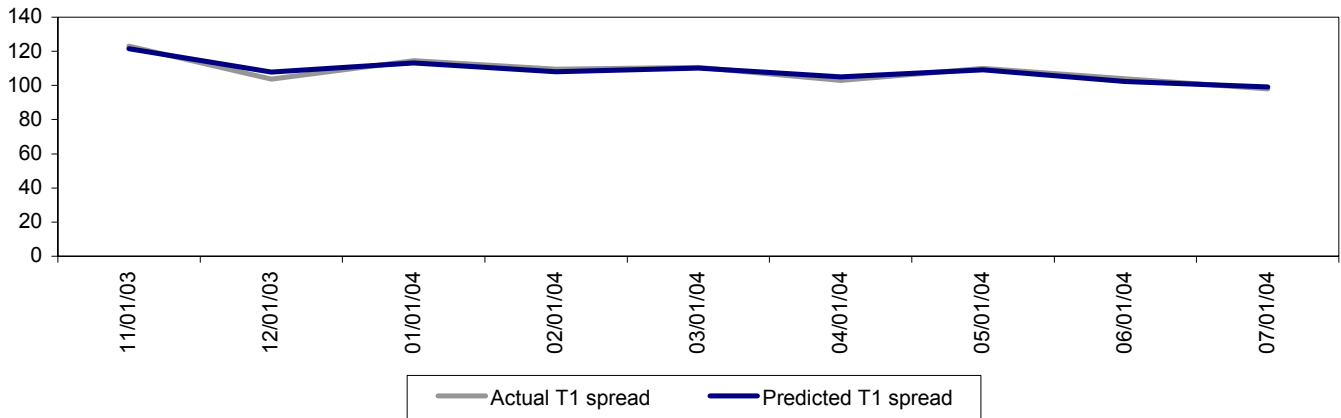
† Low LT2 recovery and 0 T1 recovery reflect low equity cushion and high senior debt obligations and senior liabilities, despite modest deposit base (Appendix B).

Deutsche Bank

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st call date (if applicable)	Tier	Currency
DEUTSCHE BANK AG	DB	5.125	1/31/2013	A1/A+		LT2	EUR
DEUTSCHE CAP TRUST IV	DB	5.33	Perpetual	A2/A	9/19/2013	T1	EUR

Sample Back-testing



Sensitivity Analysis

Remarks

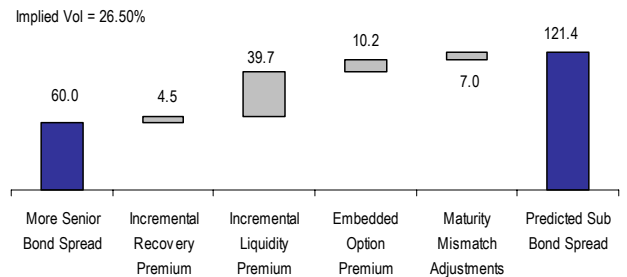
Before (11/30/2003)

Key Inputs

DB 5.125 2013 LT2	60
DB 5.33 NC 2013 T1	123.0
Implied Volatility (%)	26.5%

Key Outputs

Predicted Sub Bond Spread	121.4
Difference (Market vs. Predicted)	1.6
	<b>Undervalued</b>
Recovery Rate Premium*	4.5
◆ Prob Default	0.15%
◆ Recovery LT2	30.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	39.7
Embedded Option	10.2
Maturity Mismatch	7.0



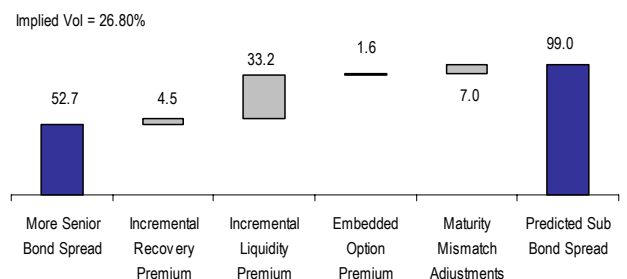
Key Inputs

DB 5.125 2013 LT2	52.7
DB 5.33 NC 2013 T1	98.1
Implied Volatility (%)	26.8%

Key Outputs

Predicted Sub Bond Spread	99.0
Difference (Market vs. Predicted)	-0.9
	<b>Overvalued</b>
Recovery Rate Premium	4.5
◆ Prob Default	0.15%
◆ Recovery LT2	30.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	33.2
Embedded Option	1.6
Maturity Mismatch	7.0

Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

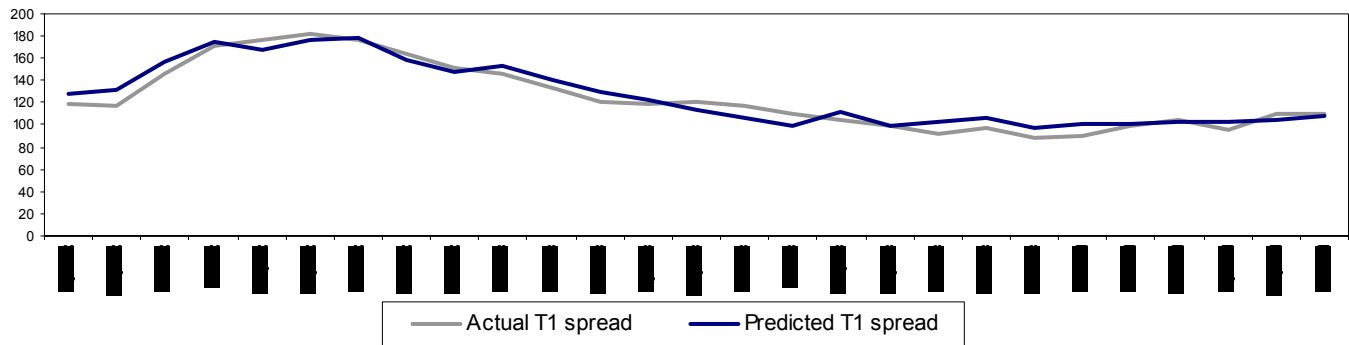
\* Very low LT2 recovery and 0 T1 recovery reflect low equity cushion and relatively high senior debt and liabilities and modest size deposit base (Appendix B).

HBOS

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
HALIFAX GROUP PLC	HBOS	10.5	2/16/2018	Aa3/AA-		LT2	GBP
HBOS TREASURY SRVCS PLC	HBOS	3.75	1/23/2008	Aa2/AA		Sen	EUR
HALIFAX PLC	HBOS	4.75	3/24/2009	Aa3/AA-		LT2	EUR
HBOS CAPITAL FUNDING LP	HBOS	6.461	Perpetual	NR/A	11/30/2018	T1	GBP

Sample Back-testing



Sensitivity Analysis

Remarks

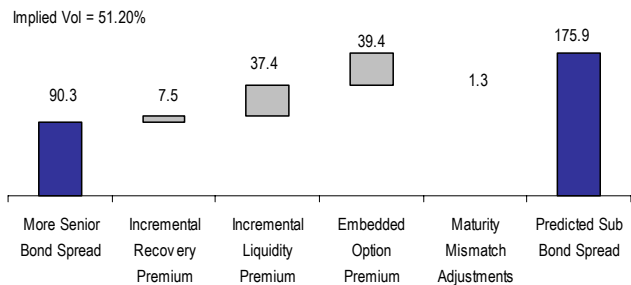
Before (9/30/2002)

Key Inputs

HBOS 10.5 2018 LT2	90.3
HBOS 6.461 NC 2018 T1	181.5
Implied Volatility (%)	51.2%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>175.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>5.6</b>
<b>Undervalued</b>	
Recovery Rate Premium*	7.5
◆ Prob Default	0.15%
◆ Recovery LT2	50.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	37.4
Embedded Option	39.4
Maturity Mismatch	1.3



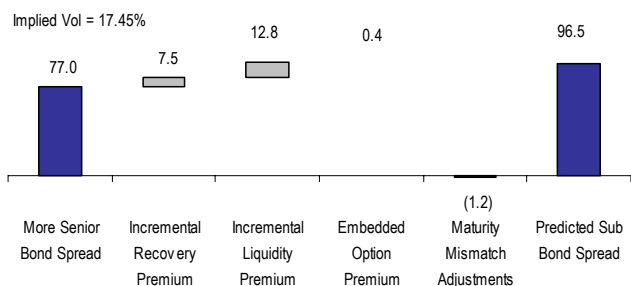
Key Inputs

HBOS 10.5 2018 LT2	77.4
HBOS 6.461 NC 2018 T1	109.4
Implied Volatility (%)	18.0%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>96.5</b>
<b>Difference (Market vs. Predicted)</b>	<b>12.9</b>
<b>Undervalued</b>	
Recovery Rate Premium	7.5
◆ Prob Default	0.15%
◆ Recovery LT2	50.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	12.8
Embedded Option	0.4
Maturity Mismatch	-1.2

Current (6/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

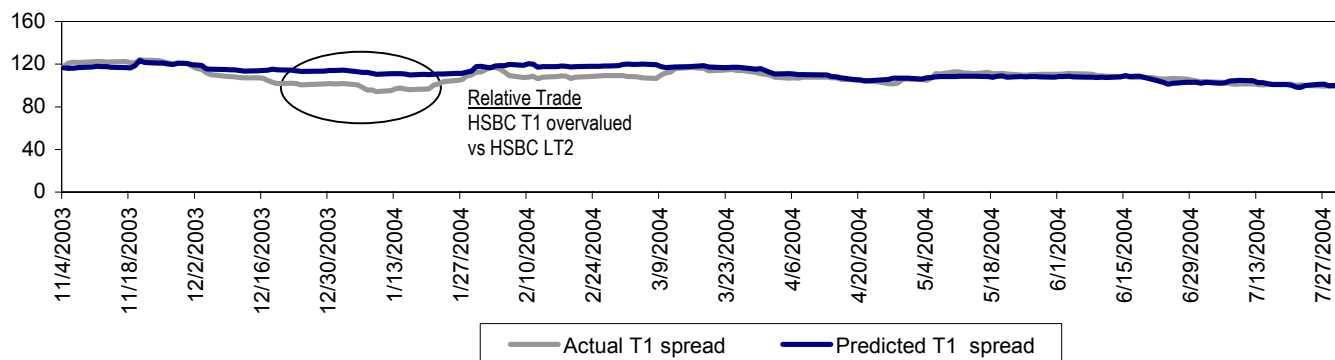
\* Low LT2 recovery and 0 T1 recovery reflects low equity cushion and high senior liabilities and deposit base(Appendix B).

# HSBC

## Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
HSBC HOLDINGS PLC	HSBC	5.375	12/20/2012	Aa3/A		LT2	EUR
HSBC CAPITAL FUNDING	HSBC	5.3687	Perpetual	A1/A-	3/24/2014	T1	EUR

## Sample Back-testing



## Sensitivity Analysis

### Remarks

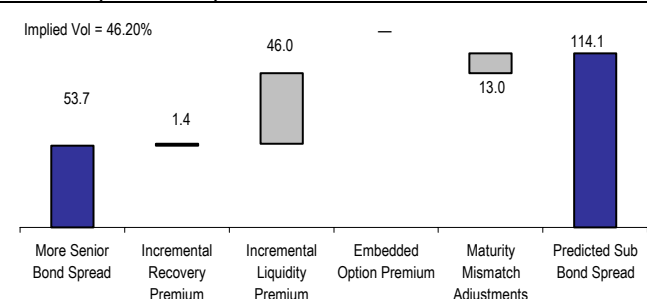
#### Key Inputs

HSBC 5.375 2012 <sub>LT2</sub>	53.7
HSBC 5.3687 NC 2014 <sub>T1</sub>	118.1
Implied Volatility (%)	46.2%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>114.1</b>
<b>Difference (Market vs. Predicted)</b>	<b>4.0</b>
	<b>Undervalued</b>
Recovery Rate Premium <sup>‡</sup>	1.4
◆ Prob Default	0.1%
◆ Recovery <sub>LT2</sub>	62.4%
◆ Recovery <sub>T1</sub>	48.6%
Incremental Liquidity Premium	46.0
Embedded Option	0.0
Maturity Mismatch	13.0

### Before (11/4/2003)



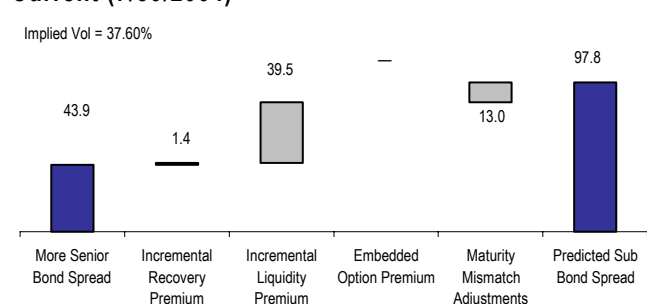
#### Key Inputs

HSBC 5.375 2012 <sub>LT2</sub>	43.9
HSBC 5.3687 NC 2014 <sub>T1</sub>	99.7
Implied Volatility (%)	37.6%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>97.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>1.9</b>
	<b>Undervalued</b>
Recovery Rate Premium <sup>‡</sup>	1.4
Prob Default	0.1%
Recovery <sub>LT2</sub>	62.4%
Recovery <sub>T1</sub>	48.6%
Incremental Liquidity Premium	39.5
Embedded Option	0.0
Maturity Mismatch	13.0

### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

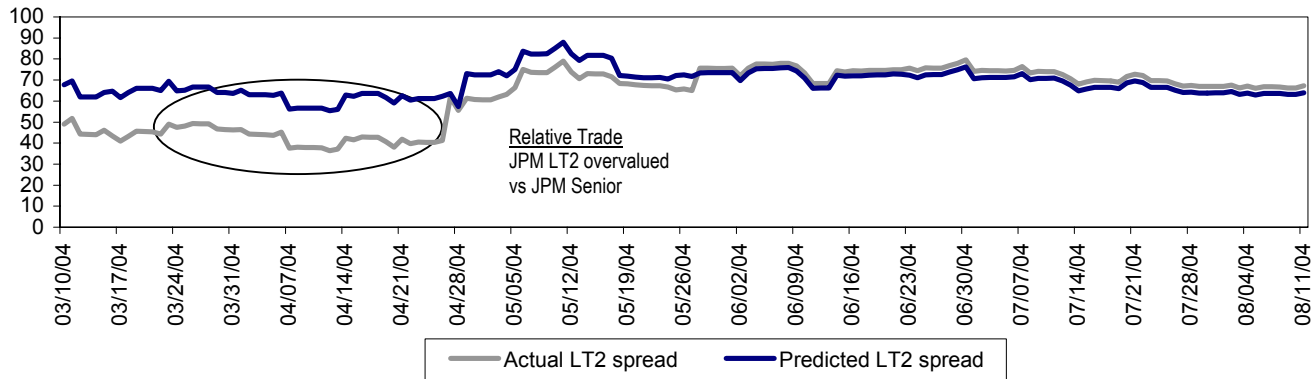
<sup>‡</sup> High LT2 and T1 recovery rates (48.6%) reflect high equity cushion and low senior liabilities, despite high deposit base (Appendix B).

J.P. Morgan Chase

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
JPMorgan Chase & Co.	JPM	3.5	3/15/2009	Aa3/A+		Senior	USD
JPMorgan Chase & Co.	JPM	4.5	11/15/2010	Aa3/A+		Senior	USD
Bank One Corp.	JPM	5.9	11/15/2011	A1/A		LT2	USD
JPMorgan Chase & Co.	JPM	6.0	2/15/2009	A1/A		LT2	USD
JPMorgan Chase & Co.	JPM	6.625	3/15/2012	A1/A		LT2	USD
Bank One Corp.	JPM	7.875	8/1/2010	A1/A		LT2	USD

Sample Back-testing



Sensitivity Analysis

Remarks

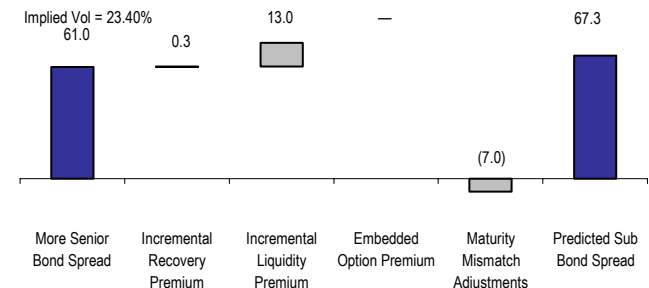
Key Inputs

JPM 3.5 2009 Senior	61.0
JPM 6.0 2009 LT2	49.0
Implied Volatility	23.4%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>67.3</b>
<b>Difference (Market vs. Predicted)</b>	<b>-18.3</b>
<b>Overvalued</b>	
Recovery Rate Premium†	0.3
◆ Prob Default	0.15%
◆ Recovery Senior	80.0%
◆ Recovery LT2	78.0%
Incremental Liquidity Premium	13.0
Embedded Option	0.0
Maturity Mismatch	(7.0)

Before (3/10/2004)



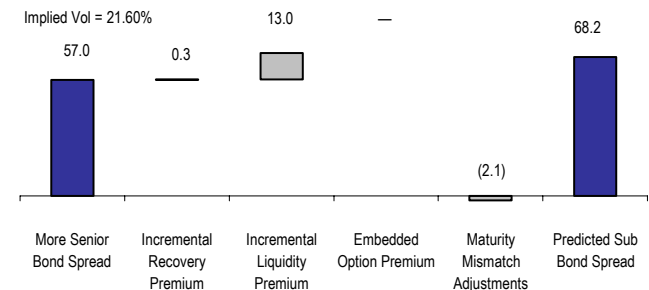
Key Inputs

JPM 3.5 2009 Senior	57.0
JPM 6.0 2009 LT2	67.0
Implied Volatility	21.6%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>68.2</b>
<b>Difference (Market vs. Predicted)</b>	<b>-1.2</b>
<b>Overvalued</b>	
Recovery Rate Premium†	0.3
◆ Prob Default	0.15%
◆ Recovery Senior	80.0%
◆ Recovery LT2	78.0%
Incremental Liquidity Premium	13.0
Embedded Option	0.0
Maturity Mismatch	(2.1)

Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

† High senior and LT2 recovery rates reflect solid equity cushion and low senior liabilities despite high level of senior debt and modest deposit base (Appendix B).

\* JPM's LT2 recovers 57.7% vs 65.3% for WB's LT2 as JPM has 9.2% of assets subordinated to LT2 (UT2, T1, equity) vs WB 9.8% subordinated to LT2.

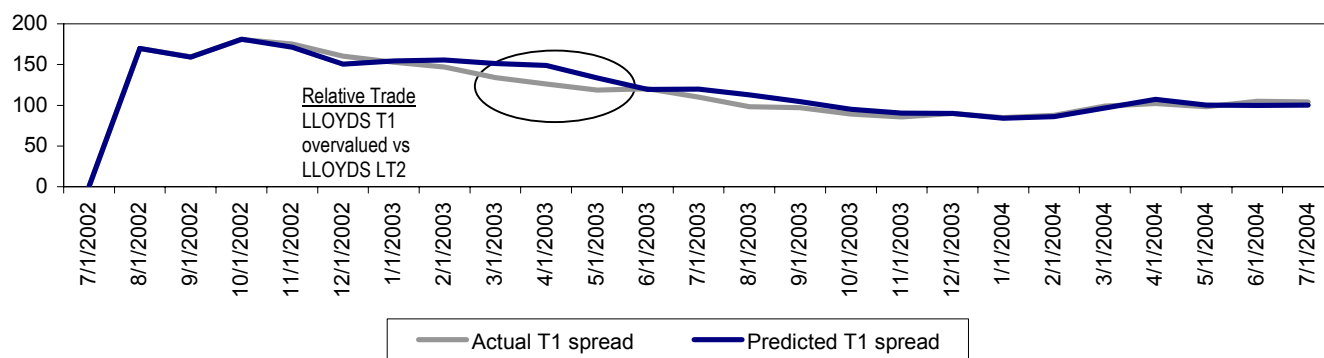


## Lloyds

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
LLOYDS TSB BANK PLC	LLOYDS	4.75	3/18/2011	Aa1/AA-		LT2	EUR
LLOYDS TSB BANK PLC	LLOYDS	6.35	Perpetual	Aa2/A+	2/15/2013	T1	EUR
LLOYDS TSB BANK PLC	LLOYDS	6.625	3/30/2015	Aa1/AA-		LT2	GBP
LLOYDS TSB CAPITAL 2	LLOYDS	7.834	Perpetual	Aa2/A	2/17/2015	T1	GBP

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

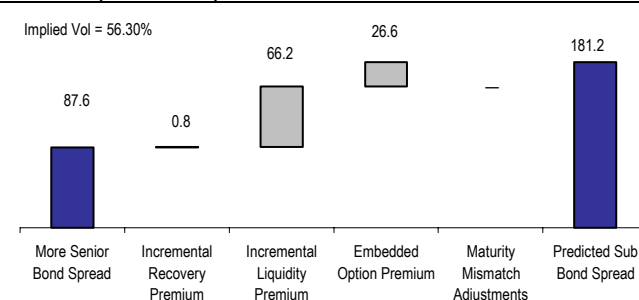
#### Key Inputs

LLOYDS 6.625 2015 LT2	87.6
LLOYDS 7.83 NC 2015 T1	180.6
Implied Volatility (%)	56.3%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>181.2</b>
<b>Difference (Market vs. Predicted)</b>	<b>-0.6</b>
<b>Overvalued</b>	
Recovery Rate Premium*	0.8
◆ Prob Default	0.014%
◆ Recovery LT2	50.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	66.2
Embedded Option	26.6
Maturity Mismatch	0.0

#### Before (9/30/2002)



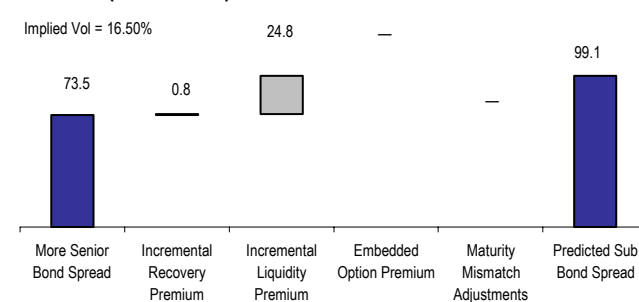
#### Key Inputs

LLOYDS 6.625 2015 LT2	73.5
LLOYDS 7.83 NC 2015 T1	102.9
Implied Volatility (%)	16.5%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>99.1</b>
<b>Difference (Market vs. Predicted)</b>	<b>3.8</b>
<b>Undervalued</b>	
Recovery Rate Premium*	0.8
◆ Prob Default	0.014%
◆ Recovery LT2	50.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	24.8
Embedded Option	0.0
Maturity Mismatch	0.0

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

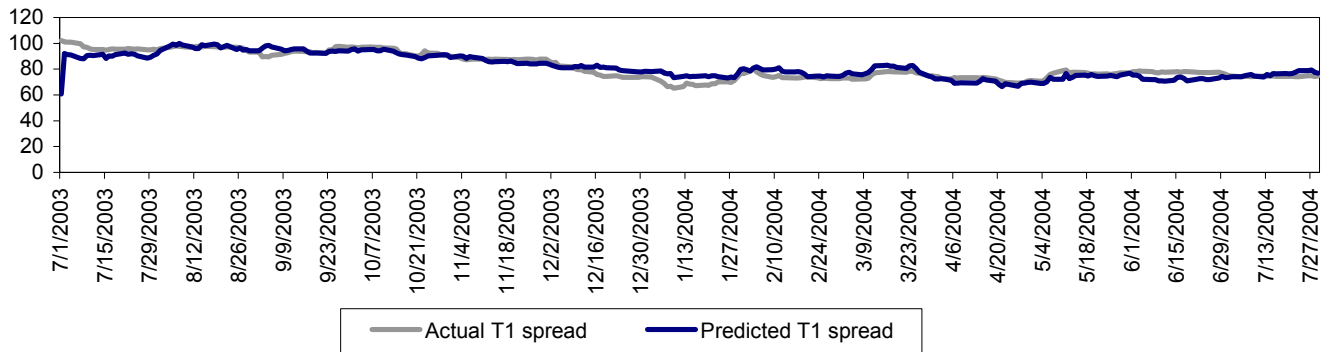
\* Low LT2 recovery rate and 0 T1 reflects low equity cushion and high senior liabilities and deposit base. The low recovery rates may seem strange to investors given the company's Aaa rating by Moody's. However, the high rating reflects the lowest default probability in our universe but this does not necessarily translate into a high recovery rate as shown in Appendix B.

Royal Bank of Scotland

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
NATL WESTMINSTER BANK	RBS*	5.125	6/30/2011	Aa2/AA-		LT2	EUR
RBS CAPITAL TRUST A	RBS	6.467	Perpetual	A1/A	6/30/2012	T1	EUR

Sample Back-testing



Sensitivity Analysis

Remarks

Key Inputs

RBS 5.125 2011 <sup>LT2</sup>	28.2
RBS 6.467 NC 2012 <sup>T1</sup>	101.2
Implied Volatility (%)	25.8%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>92.0</b>
<b>Difference (Market vs. Predicted)</b>	<b>9.2</b>
	<b>Undervalued</b>
Recovery Rate Premium	2.1
◆ Prob <sup>Default</sup>	0.1%
◆ Recovery <sup>LT2</sup>	78.0%
◆ Recovery <sup>T1†</sup>	56.6%
Incremental Liquidity Premium ‡	46.3
Embedded Option	0.0
Maturity Mismatch	15.4

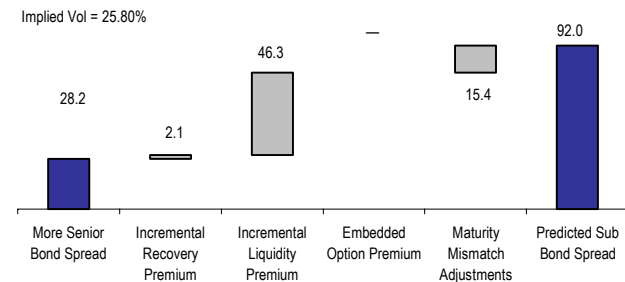
Key Inputs

RBS 5.125 2011 <sup>LT2</sup>	23.6
RBS 6.467 NC 2012 <sup>T1</sup>	74.6
Implied Volatility (%)	21.0%

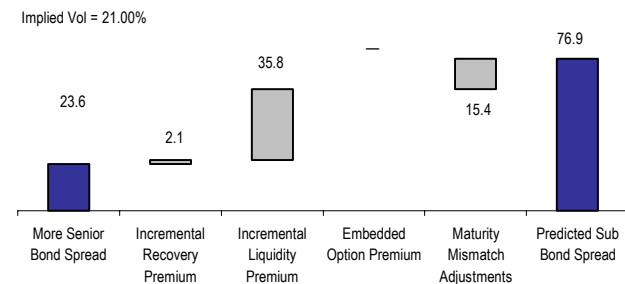
Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>76.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>-2.3</b>
	<b>Overvalued</b>
Recovery Rate Premium <sup>‡</sup>	2.1
Prob <sup>Default</sup>	0.1%
Recovery <sup>LT2</sup>	78.0%
Recovery <sup>T1†</sup>	56.6%
Incremental Liquidity Premium	35.8
Embedded Option	0.0
Maturity Mismatch	15.4

Before (7/2/2003)



Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

\* Credit spread of RBS 5.215 2011 LT2 is determined from 2012 benchmark used in RBS 6.467 NC 2012 T1.

† RBS T1 recovers 56.6% (2nd highest after HSBC) as equity constitutes 6.8% of assets.

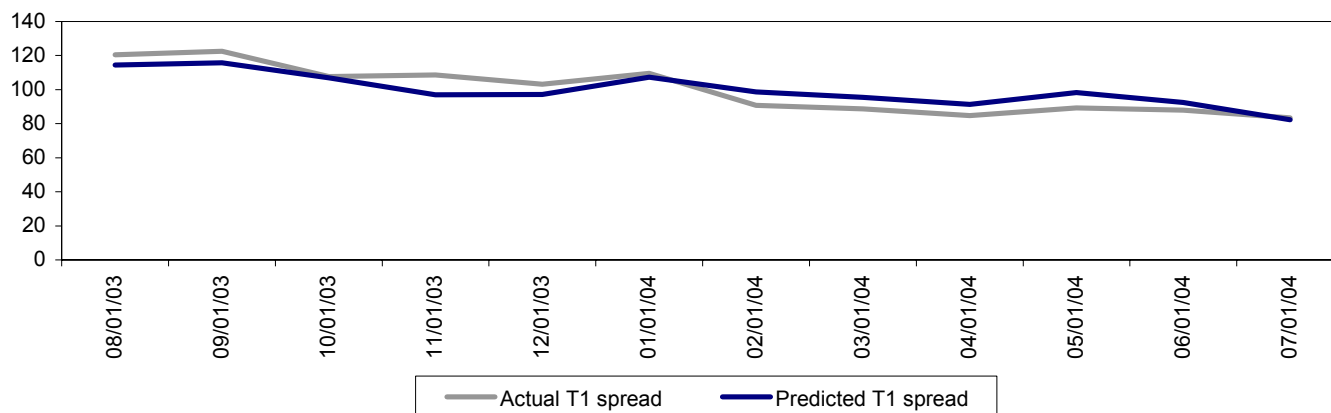
‡ High LT2 and T1 recovery reflects a high equity cushion and low senior liabilities, despite a modest deposit base (Appendix B).

## San Paolo IMI

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
SANPAOLO IMI	IBSANP	6.375	4/6/2010	A1/A		LT2	EUR
SANPAOLO IMI CAPITAL	IBSANP	8.126	Perpetual	A2/A-	11/10/2010	T1	EUR

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

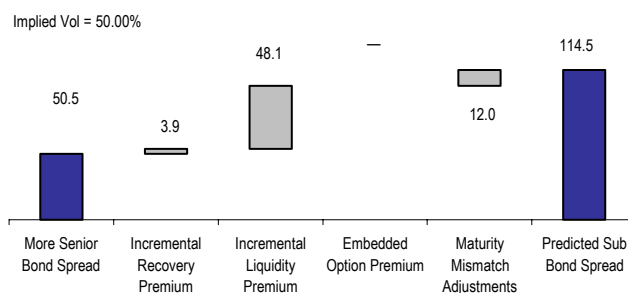
#### Key Inputs

IBSANP 6.375 2010 LT2	50.5
IBSANP 8.126 NC 2010 T1	112.5
Implied Volatility (%)	50.0%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>114.5</b>
<b>Difference (Market vs. Predicted)</b>	<b>-2.0</b>
<b>Overvalued</b>	
Recovery Rate Premium*	3.9
◆ Prob Default	0.154%
◆ Recovery LT2	50.0%
◆ Recovery T1	25%
Incremental Liquidity Premium	48.1
Embedded Option	0.0
Maturity Mismatch	12.0

#### Before (7/30/2003)



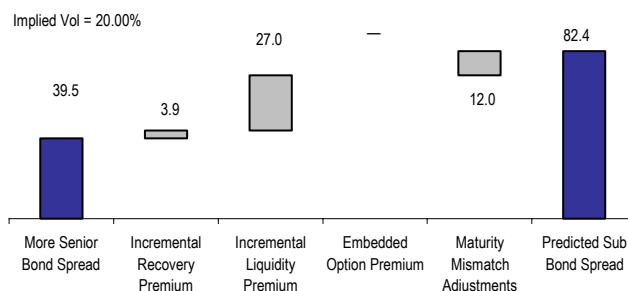
#### Key Inputs

IBSANP 6.375 2010 LT2	39.5
IBSANP 8.126 NC 2010 T1	83.5
Implied Volatility (%)	20.0%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>82.4</b>
<b>Difference (Market vs. Predicted)</b>	<b>1.1</b>
<b>Undervalued</b>	
Recovery Rate Premium*	3.9
Prob Default	0.154%
Recovery LT2	50.0%
Recovery T1	25%
Incremental Liquidity Premium	27.0
Embedded Option	0.0
Maturity Mismatch	12.0

#### Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

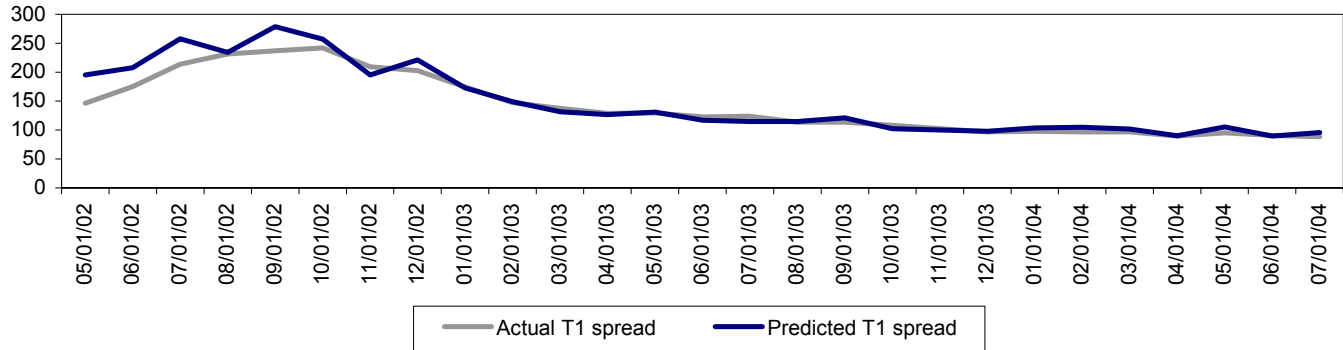
\* Low LT2 recovery and a low (but not 0) T1 recovery rate reflects a high equity cushion offset by high deposit base and senior debt obligations, despite a relatively low level of senior liabilities(Appendix B).

Societe Generale

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
SG CAPITAL TRUST III	SOCGEN	5.419	Perpetual	A2/A	11/10/2013	T1	EUR
SOCIETE GENERALE	SOCGEN	5.625	2/13/2012	A1/A+		LT2	EUR

Sample Back-testing



Sensitivity Analysis

Remarks

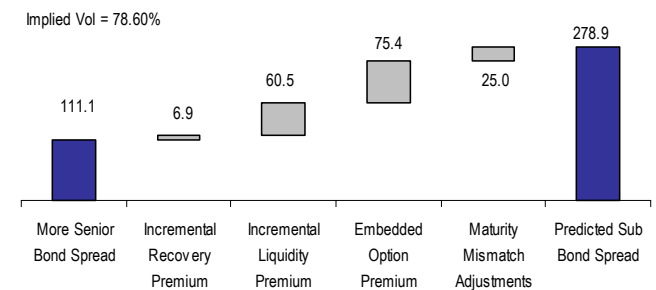
Key Inputs

SOCGEN 5.625 2012 LT2	111.1
SOCGEN 5.419 NC 2013 T1	236.7
Implied Volatility (%)	78.6%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>278.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>-42.2</b>
<b>Overvalued</b>	
Recovery Rate Premium*	6.9
◆ Prob Default	0.154%
◆ Recovery LT2	45.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	60.5
Embedded Option	75.4
Maturity Mismatch	25.0

Before (9/30/2002)



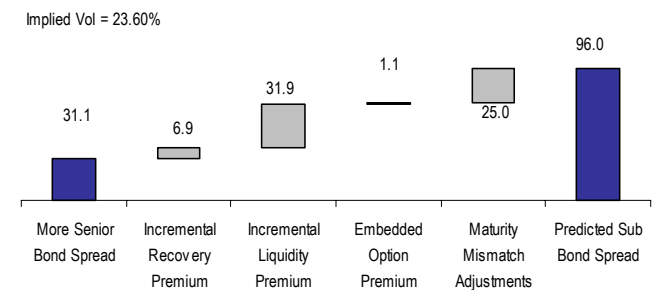
Key Inputs

SOCGEN 5.625 2012 LT2	31.1
SOCGEN 5.419 NC2013 T1	88.6
Implied Volatility (%)	23.6%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>96.0</b>
<b>Difference (Market vs. Predicted)</b>	<b>-7.4</b>
<b>Overvalued</b>	
Recovery Rate Premium*	6.9
◆ Prob Default	0.154%
◆ Recovery LT2	45.0%
◆ Recovery T1	0%
Incremental Liquidity Premium	31.9
Embedded Option	1.1
Maturity Mismatch	25.0

Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

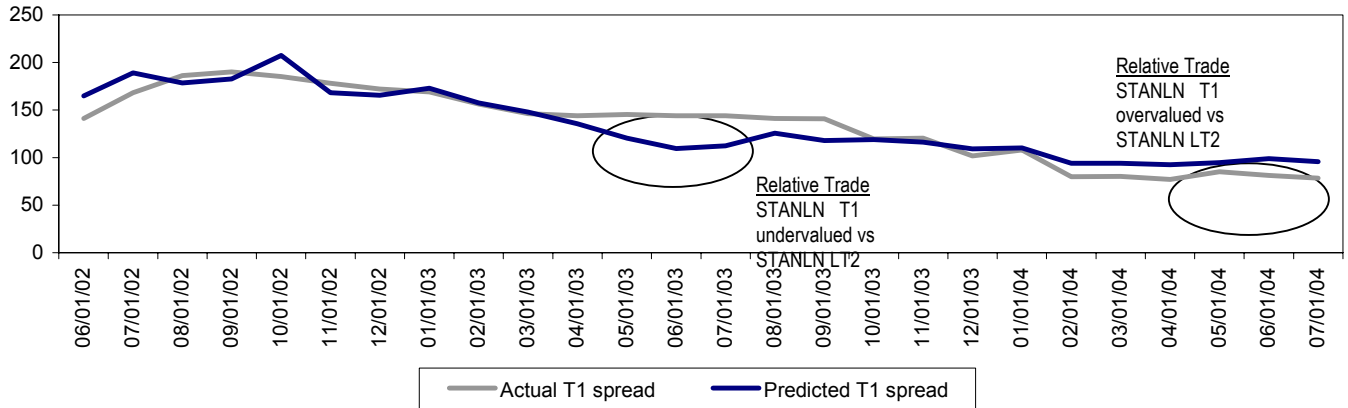
\* A modest LT2 recovery and 0 T1 recovery reflects a low equity cushion and relatively high senior debt obligations and modest size deposit base and senior liabilities (Appendix B).

Standard Chartered

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
STANDARD CHARTERED BANK	STANLN*	5.375	5/6/2009	A3/A-		LT2	EUR
STAND CHARTERED CAP TRST	STANLN	8.16	Perpetual	Baa2/BBB	3/23/2010	T1	EUR

Sample Back-testing



Sensitivity Analysis

Remarks

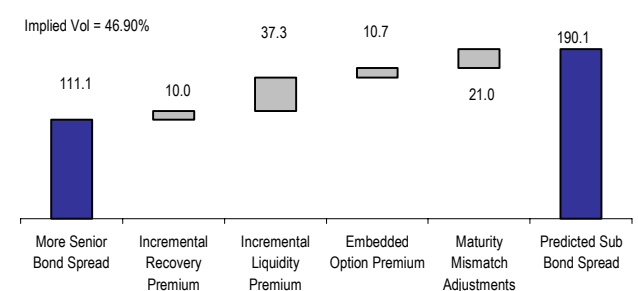
Key Inputs

STANLN 5.375 2009 LT2	111.1
STANLN 8.16 NC 2010 T1	190.2
Implied Volatility (%)	46.9%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>190.1</b>
<b>Difference (Market vs. Predicted)</b>	<b>0.1</b>
<b>Undervalued</b>	
Recovery Rate Premium†	10.0
◆ Prob Default	0.278%
◆ Recovery LT2	53.3%
◆ Recovery T1	17.3%
Incremental Liquidity Premium	37.3
Embedded Option	10.7
Maturity Mismatch	21.0

Before (9/30/2002)



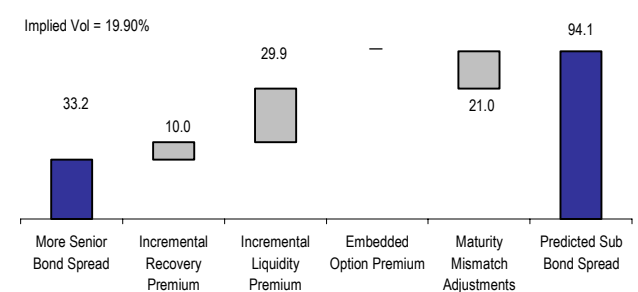
Key Inputs

STANLN 5.375 2009 LT2	33.2
STANLN 8.16 NC 2010 T1	78.2
Implied Volatility (%)	19.9%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>94.1</b>
<b>Difference (Market vs. Predicted)</b>	<b>-15.9</b>
<b>Overvalued</b>	
Recovery Rate Premium†	19.6
◆ Prob Default	0.278%
◆ Recovery LT2	53.0%
◆ Recovery T1	17.3%
Incremental Liquidity Premium	29.9
Embedded Option	0.0
Maturity Mismatch	21.0

Current (7/30/2004)



Sources: IBOXX; Bloomberg; Banc of America Securities LLC estimates.

\* Credit spread of STANLN 5.375 2009 LT2 is determined from 2010 benchmark used in STANLN 8.16 NC 2010 T1.

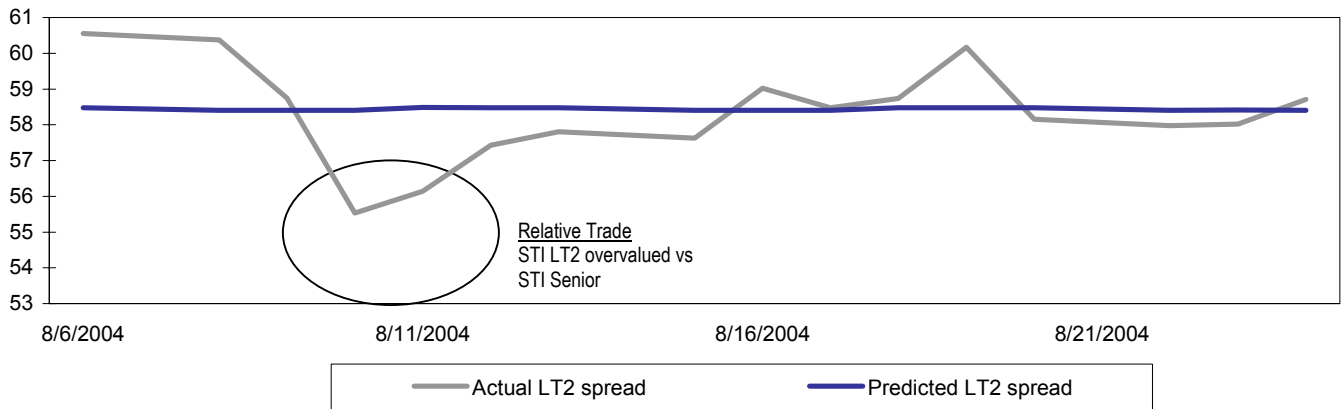
† A low LT2 and a low (but not 0) T1 recovery rate reflects a solid equity cushion and relatively low senior liabilities but a high deposit base (Appendix B).

SunTrust

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
SunTrust Banks Inc.	STI	4.25	10/15/2009	Aa3/A+		Senior	USD
SunTrust Bank	STI	6.375	4/1/2011	Aa3/A+		LT2	USD

Sample Back-testing



Sensitivity Analysis

Remarks

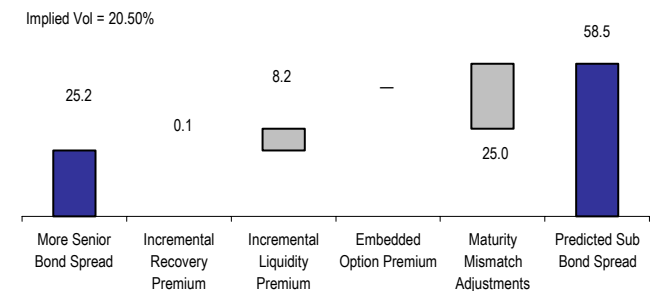
Key Inputs

STI 4.25 2009 Senior	25.2
STI 6.375 2011 LT2	60.6
Implied Volatility (%)	20.5%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>58.5</b>
<b>Difference (Market vs. Predicted)</b>	<b>2.1</b>
<b>Undervalued</b>	
Recovery Rate Premium*	0.1
◆ Prob Default	0.154%
◆ Recovery Senior	80.0%
◆ Recovery LT2	79.4%
Incremental Liquidity Premium	8.2
Embedded Option	0.0
Maturity Mismatch	25.0

Before (8/6/2004)



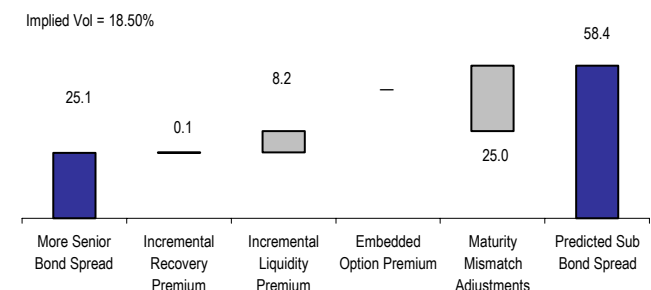
Key Inputs

STI 4.25 2009 Senior	25.1
STI 6.375 2011 LT2	58.7
Implied Volatility (%)	18.5%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>58.4</b>
<b>Difference (Market vs. Predicted)</b>	<b>0.3</b>
<b>Undervalued</b>	
Recovery Rate Premium*	1.8
◆ Prob Default	0.154%
◆ Recovery Senior	80.0%
◆ Recovery LT2	79.4%
Incremental Liquidity Premium	8.2
Embedded Option	0.0
Maturity Mismatch	25.0

Current (8/24/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

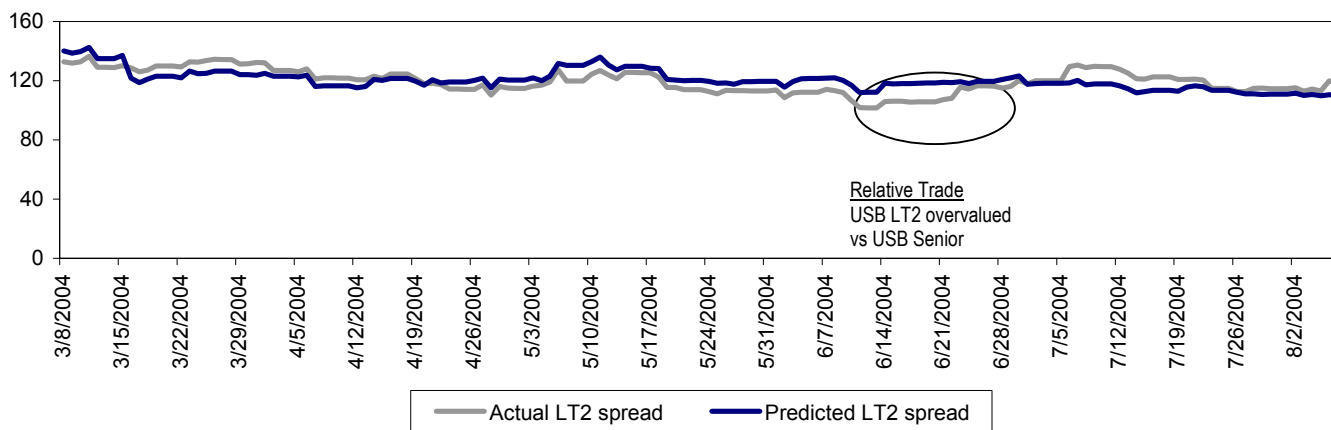
\* A high senior and LT2 recovery rate reflects a high equity cushion and low senior liabilities despite a high deposit base (Appendix B). STI 4.25 '09 is holding company unsecured bond while STI 6.375 '11 is a bank level subordinated bond. Structural subordination is assumed to be minimal due to low default probability.

## U.S. Bancorp

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
US Bank NA	USB	3.4	3/2/2009	Aa2/AA-		Senior	USD
US Bank NA Minnesota	USB	6.375	8/1/2011	Aa3/A+		LT2	USD

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

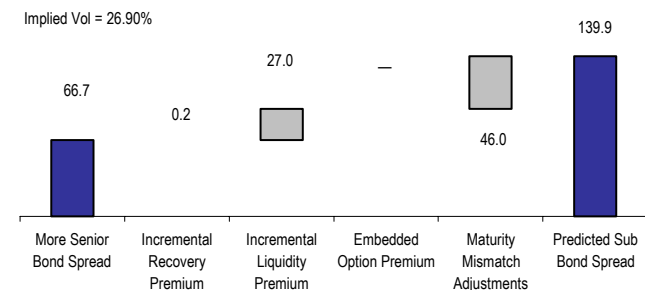
#### Key Inputs

USB 3.4 2009 Senior	66.7
USB 6.375 2011 LT2	132.8
Implied Volatility (%)	26.9%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>139.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>-7.1</b>
	<b>Overvalued</b>
Recovery Rate Premium*	0.2
◆ Prob Default	0.133%
◆ Recovery Senior	85.0%
◆ Recovery LT2	83.3%
Incremental Liquidity Premium	27.0
Embedded Option	0.0
Maturity Mismatch	46.0

#### Before (3/8/2004)



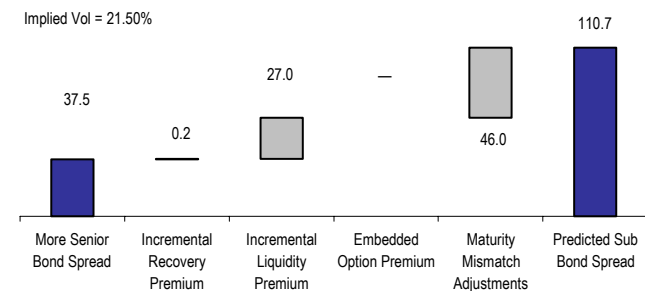
#### Key Inputs

USB 3.4 2009 Senior	37.5
USB 6.375 2011 LT2	114.7
Implied Volatility (%)	21.5%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>110.7</b>
<b>Difference (Market vs. Predicted)</b>	<b>4.0</b>
	<b>Undervalued</b>
Recovery Rate Premium	0.2
◆ Prob Default	0.133%
◆ Recovery Senior	85.0%
◆ Recovery LT2	83.3%
Incremental Liquidity Premium	27.0
Embedded Option	0.0
Maturity Mismatch	46.0

#### Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

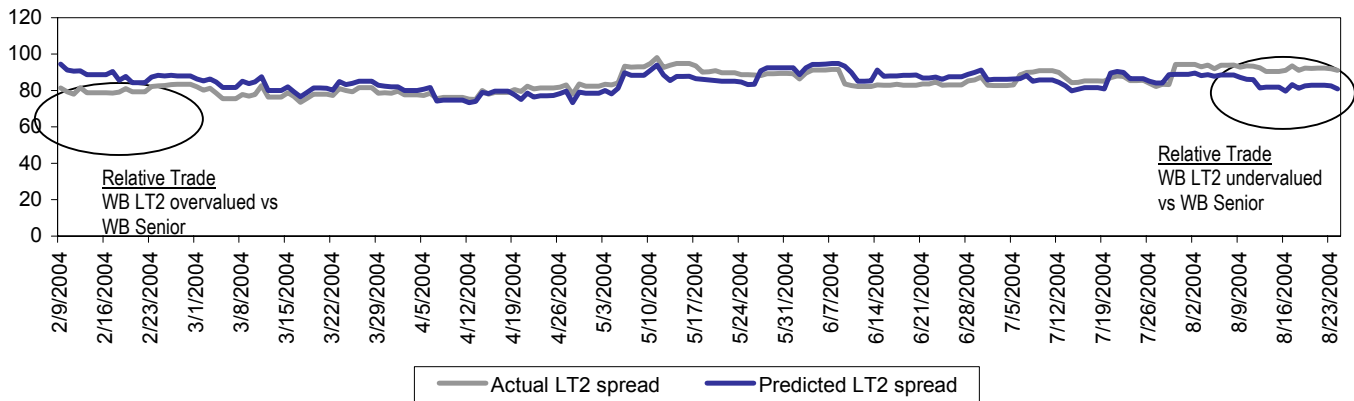
\* The highest equity cushion in our universe and low senior liabilities despite a high deposit base underpin a very high senior and LT2 recovery rate (Appendix B).

Wachovia

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
Wachovia Corporation	WB	3.625	2/17/2009	Aa3/A		Senior	USD
Wachovia Corporation	WB	4.875	2/15/2014	A1/A-		LT2	USD

Sample Back-testing



Sensitivity Analysis

Remarks

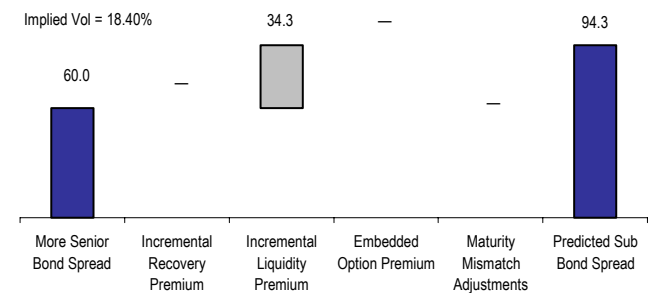
Key Inputs

WB 3.625 2009 Senior	60.0
WB 4.875 2014 LT2	79.2
Implied volatility (%)	18.4%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>94.3</b>
<b>Difference (Market vs. Predicted)</b>	<b>-15.1</b>
<b>Overvalued</b>	
Recovery Rate Premium <sup>‡</sup>	0.0
◆ Prob Default	0.15%
◆ Recovery Senior	80.0%
◆ Recovery LT2	80.0%
Incremental Liquidity Premium <sup>†</sup>	34.3
Embedded Option	0.0
Maturity Mismatch*	0.0

Before (2/9/2004)



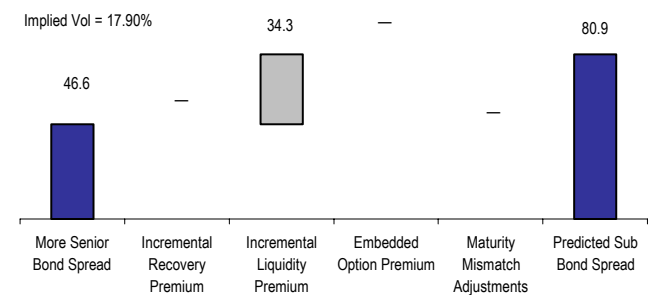
Key Inputs

WB 3.625 2009 Senior	46.6
WB 4.875 2014 LT2	94.3
Implied volatility (%)	17.9%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>80.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>13.4</b>
<b>Undervalued</b>	
Recovery Rate Premium <sup>‡</sup>	0.0
◆ Prob Default	0.15%
◆ Recovery Senior	80.0%
◆ Recovery LT2	80.0%
Incremental Liquidity Premium <sup>†</sup>	34.3
Embedded Option	0.0
Maturity Mismatch*	0.0

Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

<sup>‡</sup> A high senior and LT2 recovery rate reflect a strong equity cushion and low senior liabilities, despite a high deposit base (Appendix B).

<sup>†</sup> Incremental liquidity premium of 34.3 bps is implied from historic market spreads. It is relatively high due to technical/ market issues between 2009 Senior and 2014 LT2.

\* Maturity mismatch is assumed to be negligible as credit spread is calculated from different benchmarks (T5 for WB 2009 Senior and T10 for WB 2014 LT2).

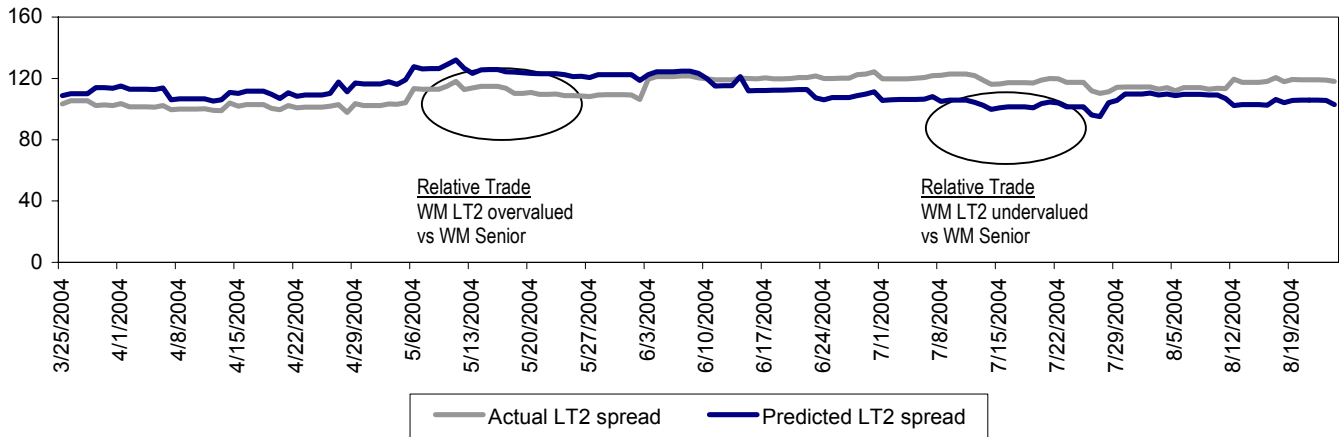


## Washington Mutual

### Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
Washington Mutual Inc.	WM	4.625	4/1/2014	Baa1/BBB+		LT2	USD
Washington Mutual Inc.	WM	4	1/15/2009	A3/A-		Senior	USD

### Sample Back-testing



### Sensitivity Analysis

#### Remarks

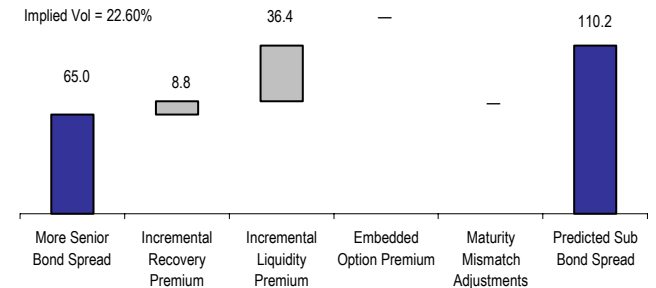
#### Key Inputs

WM 4.625 2009 Senior	65.0
WM 4. 2014 LT2	103.4
Implied Volatility (%)	22.6%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>110.2</b>
<b>Difference (Market vs. Predicted)</b>	<b>-6.8</b>
	<b>Overvalued</b>
Recovery Rate Premium†	8.8
◆ Prob Default	0.409%
◆ Recovery Senior	70.0%
◆ Recovery LT2	48.6%
Incremental Liquidity Premium	36.4
Embedded Option	0.0
Maturity Mismatch*	0.0

#### Before (3/25/2004)



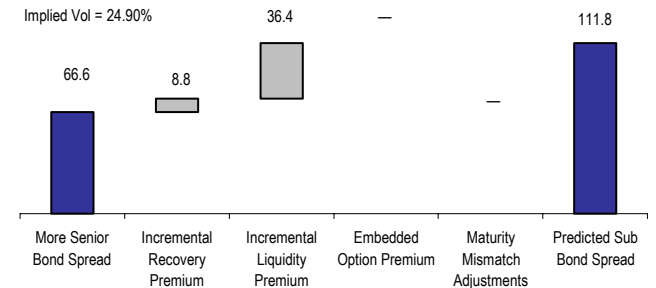
#### Key Inputs

WM 4.625 2009 Senior	66.6
WM 4. 2014 LT2	114.3
Implied Volatility (%)	24.9%

#### Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>111.8</b>
<b>Difference (Market vs. Predicted)</b>	<b>2.5</b>
	<b>Undervalued</b>
Recovery Rate Premium†	8.8
◆ Prob Default	0.409%
◆ Recovery Senior	70.0%
◆ Recovery LT2	48.6%
Incremental Liquidity Premium	36.4
Embedded Option	0.0
Maturity Mismatch*	0.0

#### Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

† A solid equity cushion results in a high T1 recovery rate, but a high level of deposits and senior liabilities result in a low senior/LT2 recovery (Appendix B).

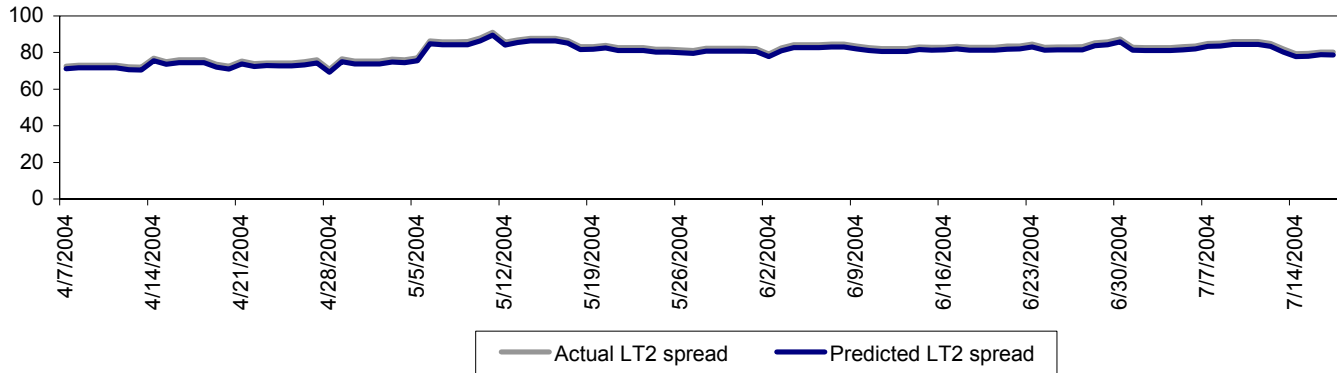
\* Maturity mismatch is assumed to be negligible as credit spread is calculated from different benchmarks (T5 for WM 2009 Senior and T10 for WM 2014 LT2).

Wells Fargo

Bonds in ABCV Portfolio

Issuer Name	Security Description	Coupon	Maturity	Moody's/S&P	1st Call Date (if applicable)	Tier	Currency
Wells Fargo & Co.	WFC	4.625	4/15/2014	Aa2/A+		LT2	USD
Wells Fargo & Co.	WFC	5.125	9/1/2012	Aa2/A+		LT2	USD
Wells Fargo Financial	WFC	5.5	8/1/2012	Aa1/AA-		Senior	USD

Sample Back-testing



Sensitivity Analysis

Remarks

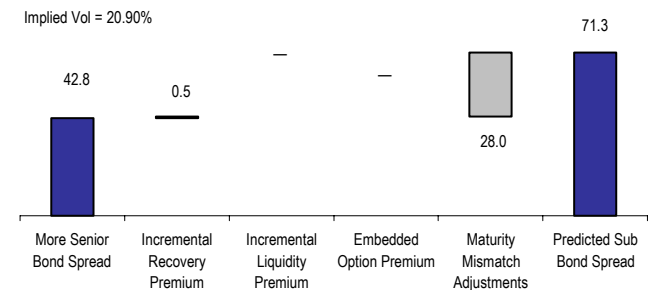
Before (4/7/2004)

Key Inputs

WFC 5.5 2012 Senior	42.8
WFC 4.625 2014 LT2	72.6
Implied Volatility (%)	20.9%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>71.3</b>
<b>Difference (Market vs. Predicted)</b>	<b>1.3</b>
<b>Undervalued</b>	
Recovery Rate Premium*	0.5
◆ Prob Default	0.07%
◆ Recovery Senior	80.0%
◆ Recovery LT2	72.5%
Incremental Liquidity Premium	0.0
Embedded Option	0.0
Maturity Mismatch	28.0



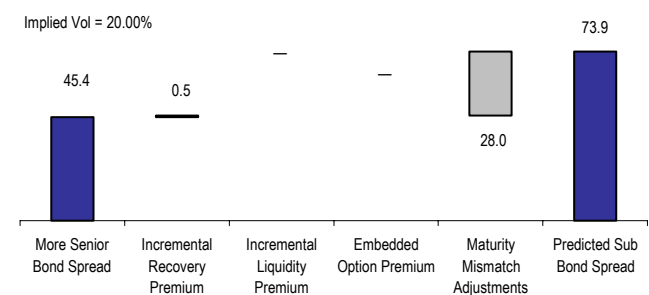
Key Inputs

WFC 5.5 2012 Senior	45.4
WFC 4.625 2014 LT2	78.3
Implied Volatility (%)	20.0%

Key Outputs

<b>Predicted Sub Bond Spread</b>	<b>73.9</b>
<b>Difference (Market vs. Predicted)</b>	<b>4.4</b>
<b>Undervalued</b>	
Recovery Rate Premium*	0.5
◆ Prob Default	0.07%
◆ Recovery Senior	80.0%
◆ Recovery LT2	72.5%
Incremental Liquidity Premium	0.0
Embedded Option	0.0
Maturity Mismatch	28.0

Current (7/30/2004)



Sources: EJV; Bloomberg; Banc of America Securities LLC estimates.

\* A high equity cushion and low senior liabilities results in a high senior and LT2 recovery rate, despite high deposit base (Appendix B). WFC 4.625 '14 and 5.125 '12 are hold Co sub bonds while WFC 5.5 '12 is issued out of WFFinancial (subsidiary of holding company). Structural subordination is assumed to be minimal due to low probability of default for WFC.

The ABCs of Bank Capital Valuation

Appendix B: Recovery Rates for Different Tiers of Bank Debt

	Deposits / Total Assets (%)	General or Senior Liabilities / Total Assets (%)	Senior Outstanding / Total Assets (%)	LT2 Outstanding / Total Assets (%)	UT2 T3 Outstanding / Total Assets (%)	Outstanding T1 / Total Assets (%)	Outstanding Equity / Total Assets (%)	Recovery LT2	Recovery Senior	Recovery LT2	Recovery UT2	Recovery T1
ABN AMRO	27%	54%	14%	2%	0%	0%	0%	18%	45%	18%	0%	0%
Banca Intesa	38%	32%	21%	3%	0%	0%	1%	50%	70%	50%	22%	22%
Bank of New York	63%	22%	2%	3%	1%	0%	1%	77%	80%	77%	77%	69%
Barclays	41%	42%	11%	1%	1%	0%	1%	50%	66%	50%	13%	0%
Bayerische Hypo-Und Vermsbank	7%	76%	9%	2%	2%	0%	1%	50%	56%	50%	17%	0%
BNP Paribas	26%	68%	1%	1%	0%	0%	0%	45%	50%	45%	0%	0%
Citigroup	38%	39%	12%	2%	1%	0%	0%	80%	80%	80%	71%	70%
Commerzbank	27%	49%	19%	2%	1%	0%	0%	9%	40%	9%	0%	0%
Credit Agricole	38%	45%	12%	1%	1%	0%	0%	50%	64%	50%	2%	0%
Deutsche Bank	39%	46%	10%	1%	0%	0%	0%	30%	47%	30%	0%	0%
HEOS	42%	48%	2%	2%	1%	0%	1%	50%	60%	50%	46%	0%
HSBC	55%	21%	14%	2%	0%	0%	1%	63%	74%	63%	49%	49%
J. P. Morgan Chase	42%	27%	20%	1%	2%	0%	1%	78%	80%	78%	50%	48%
LLOYDS	44%	45%	3%	2%	1%	0%	0%	50%	63%	50%	35%	0%
Royal Bank of Scotland	49%	31%	10%	1%	2%	0%	0%	78%	78%	78%	58%	57%
SanPaolo IMI	58%	18%	15%	2%	0%	0%	0%	50%	70%	50%	50%	25%
Societe Generale	34%	43%	17%	2%	0%	0%	0%	45%	60%	45%	0%	0%
Standard Chartered	61%	24%	5%	2%	1%	0%	1%	53%	80%	53%	17%	17%
Sun Trust	67%	12%	11%	1%	1%	0%	1%	79%	80%	79%	72%	67%
U.S. Bancorp	63%	9%	13%	2%	2%	0%	1%	83%	85%	83%	83%	70%
Wachovia	58%	28%	3%	1%	1%	0%	1%	80%	80%	80%	75%	65%
Washington Mutual	56%	33%	3%	1%	1%	0%	1%	49%	70%	49%	49%	49%
Wells Fargo	63%	11%	13%	1%	3%	0%	1%	73%	80%	73%	73%	70%

Sources: IBIOXX; Annual reports; Bloomberg; Banc of America Securities LLC estimates.







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