



December 2, 2015

*Weekly Post: Implementing a Credit Model*

Dear Clients-

The Comptroller's Handbook-Safety and Soundness on Liquidity 2012 discusses the Quantification Assessment of Contingency Funding Plan. The Projected Sources and Uses Statement report below is from Appendix B and uses a sample bank. This report looks at the Interest rate and Liquidity risk of the bank. However, Credit risk is also important to incorporate into these stress tests and understand the additional implications for ALM management.

**Projected Sources and Uses Statement**

Primary liquidity position	Actual	Moderate	Severe	Crisis
<b>Fed funds (purchased or sold)</b>	<b>10</b>	<b>1</b>	<b>14</b>	<b>10</b>
<b>Sources of funds</b>				
Loans reductions	1	0	0	0
Nonmaturity deposit growth	2	5	2	0
Time deposit growth	1	10	0	0
Borrowing growth	0	5	20	5
Investment maturities	2	2	2	2
Change in equity	0	-1	-2	-10
Other sources (including off bal. sheet)	0	0	0	0
<b>A. Total sources of funds</b>	<b>16</b>	<b>22</b>	<b>36</b>	<b>7</b>
<b>Uses of funds</b>				
Loan growth	2	2	1	0
Nonmaturity deposit reductions	1	1	2	2
Time deposit reduction	2	2	3	3
Brokered CDs maturing	1	1	1	1
Investment increases	2	0	0	0
Borrowing reduction	0	0	0	0
Other	0	0	0	0
<b>B. Total uses of funds</b>	<b>8</b>	<b>6</b>	<b>7</b>	<b>6</b>
<b>C. Fed funds (period end) (A – B)</b>	<b>8</b>	<b>16</b>	<b>29</b>	<b>1</b>

In addition, credit modeling needs to be consistent with the Credit Risk Stress Test Bulletin 2012-33.

Only a stress test analysis that includes the impact of credit risk, liquidity risk and interest rate risk on the enterprise can provide a holistic analysis for asset and liability management.

**Challenge**

For clarity of exposition, let us consider a fixed rate loan with specified principal payments. The risk of the fixed rate loan's yield is driven by the uncertain changes in the four components below:

1. the time value of money ( the funding cost)
2. option spread



3. credit spread
4. clean option-adjusted spread.

That is:

$$\text{loan yield} = \text{funding cost} + \text{option spread} + \text{credit spread} + \text{clean option adjusted spread}$$

The **funding cost** is derived from the base yield curve, which can be the treasury curve or the swap curve. The **option spread** is derived from the THC proprietary models based on market standards in valuing options. The **credit spread** is the premium and additional income required to compensate for the loan credit risk. The **clean option adjusted spread** is based on our THC research in determining the spread required to determine the market value of the loan.

- What information should I provide THC to incorporate and view the impact of credit risk of my balance sheet?
- How will the increase in credit risk affect my stress test results?
- How does the change in credit risk affect the loan's cash flows and your liquidity?

### Solution

The credit spread is often called the net loss rate, which is the gross loss rate \* (1 - recovery rate). The gross loss rate can be estimated based on historical experience and/or economic analysis. To the extent that if a bank's ALLL model is related or can be adjusted to the expected default rate of a loan over a 12 month horizon, then the model may give an estimate for a loan sector, for example the auto or fixed rate mortgage loans.

The credit spread of a loan can be specified by an internal rating relative to the loan sector credit spread. Loans with higher credit risk may have a lower credit rating that maps to a higher credit spread.

The THC model can take the internal rating, recovery rate and the gross loss rate (or default rate) for each loan to generate the credit risk related reports. These reports include the Contingency Funding Plan Quantitative Assessment, Bulletin 2012-33 stress test (transactional test with CECL measure, portfolio and enterprise tests), and cash flow reports.

### Numerical Example

A few stress test assumptions are illustrated below. They include the impact of a liquidity crisis [run on the bank] accessibility to external funding and the market effect, for instance, the widening of the option adjusted spreads.

The **credit risk** is measured by the conditional default rate, which is the gross loss rate and the recovery rate. The gross loss rate would increase as the condition deteriorates from moderate to crisis. The increase is measured as a percentage of the gross loss rate in the base case. Likewise as the conditions worsen, the recovery rate would be lower.



**Stress Test Scenarios**

Stress Test Scenario		Base Case	Liquidity Moderate	Liquidity Severe	Liquidity Crisis
Liquidity Crisis / Plan	Crisis Horizon	N/A	12 months	12 months	12 months
	Runoff Basis	N/A	No	No	No
	Net Withdrawal of Demand Deposits	N/A	5.00%	15.00%	35.00%
	Net Withdrawal of CDs	N/A	10.00%	20.00%	25.00%
	Net paydown of Loans	N/A	5.00%	15.00%	20.00%
Funding Sources	Unpledged Investments	25,000	25,000	25,000	25,000
	Unsecured Federal Funds Lines	8,000	7,200	6,000	4,000
	Brokered CD Subject to Policy Limits	5,000	5,000	0	0
	FHLB and Other Borrowings Line	7,500	5,625	5,625	3,750
	Loans Available to Securitize/Sell	0	0	0	0
Risk Drivers	Interest Rate Shock		base case	base case	base case
	Prepayment Speeds	not set	not set	-25%	-50%
	Spread Widen (OAS)	not set	not set	not set	not set
	Conditional Default Rate	not set	not set	50%	100%
	Recover Ratio	not set	not set	not set	not set

You can evaluate the impact of credit risk on the enterprise level and view it disaggregated into any segment of the balance sheet down to the loan level. The cash flows presented are broken down by the four following items and provide transparency of the model to risk measures:

1. interest payments
2. principal cash flows
3. loss of principals
4. recovery amounts

**1-4 FAMILY FIRST MORTGAGES**

Date	Cash Flow	Amort. Prin	Prepay. Prin	Recov. Prin	Loss. Prin	Loss. Int	Interest	Servicng Cost	Perf. Bal
Oct-15	3,250.75	1,105.44	1,784.31	92.93	23.23	0.47	281.17	13.11	64,474.15
Nov-15	3,042.73	1,085.00	1,610.86	95.54	23.88	0.47	263.87	12.53	61,658.87
Dec-15	2,711.57	1,000.60	1,380.45	91.43	22.86	0.45	251.08	12.00	59,163.52
Jan-16	2,273.54	583.83	1,368.69	93.27	23.32	0.45	239.28	11.52	57,094.42
Feb-16	2,222.68	482.62	1,427.30	93.62	23.40	0.45	230.26	11.11	55,067.49
Mar-16	1,963.37	426.70	1,228.62	98.49	24.62	0.47	220.30	10.73	53,289.05
Apr-16	1,682.62	387.80	1,003.39	90.18	22.54	0.43	211.65	10.40	51,785.14
May-16	1,594.82	318.70	991.91	91.40	22.85	0.43	202.92	10.11	50,360.28
Jun-16	1,631.80	313.22	1,042.93	88.97	22.24	0.41	196.52	9.84	48,892.92
Jul-16	1,525.77	307.30	955.00	82.69	20.67	0.39	190.35	9.57	47,527.25
Aug-16	1,448.58	302.06	898.99	72.51	18.13	0.34	184.33	9.31	46,235.57
Sep-16	1,368.50	296.92	824.47	77.21	19.30	0.36	178.96	9.07	45,017.66
Oct-16	1,311.19	292.41	775.21	78.93	19.73	0.37	173.47	8.84	43,851.38
Nov-16	1,303.12	287.68	773.42	81.40	20.35	0.38	169.22	8.61	42,688.52
Dec-16	1,149.19	283.24	631.65	78.43	19.61	0.36	164.25	8.39	41,675.59

**Conclusion**



By providing THC your credit information, you will be able to analyze your strategies holistically. As a result, your risk management will be more comprehensive and your strategic planning more accurate.

*Please do not hesitate to contact THC to incorporate your credit information into your ALM process, reports and your use of Risk Officer.*

Regards,

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