

May 29, 2008

Tri-party Repo Discussion - Lehman

Goals

- Examine and discuss risks associated with tri-party repos:
 - Concentration risk (reliance on single service provider and intraday liquidity provider);
 - Operating risk (process of daily unwind);
 - Pricing risk (use of vendors vs. dealers; how to price more thinly traded assets);
 - Liquidation risk (potential price decline in the event of liquidation);
 - Overnight refinancing risk (risk that tri-party investors do not roll over overnight repos);
 - ALM tenor risk.
- Review stress analysis and liquidity needs of Lehman's tri-party repo book based on several scenarios:
 - 100% tri-party margin intraday;
 - Margin covering one-day liquidation risk;
 - Margin covering one-day liquidation risk plus pricing risk;
 - Financing via PDCF (Lehman);
 - Financing via Discount Window (JPMorgan).
- Consider impact of additional regulatory oversight and potential risk mitigants.

Margin Analysis – Where We Stand

- We accept any security used as collateral in overnight tri-party repos using 20% of their margin for our intraday financing (except for equities, which use 125% margin).
- This includes securities that are unrated and/or are priced by Lehman.

Security Type	Count	Collateral Market Value	Overnight Margin	Ratings	Intraday Financing	Current Collateral Coverage (20% of Overnight Mg)
Fed-Eligible - Total	10,280	101,278,201,139	101.56%	AAA	100,962,862,658	100.31%
USTs	604	31,999,094,145	101.55%	AAA	31,900,502,714	100.31%
Agency Securities	1,103	31,799,954,551	101.55%	AAA	31,701,572,761	100.31%
Agency MBSs	7,502	31,898,993,660	101.52%	AAA	31,802,574,461	100.30%
Agency CMOs	1,071	5,580,158,784	101.97%	AAA	5,558,212,721	100.39%
DTC-Eligible - Total	8,866	49,350,504,527	105.40%	Mixed - many non-IG	47,229,965,040	104.49%
ABSs	1,083	6,593,671,009	107.46%	AAA-CCC	6,496,715,425	101.49%
Corporates	2,353	12,394,772,108	104.45%	Mainly A and below	12,285,479,032	100.89%
CPs	205	9,564,571,597	104.73%	A1-P1	9,474,900,456	100.95%
Equities	2,152	8,533,996,472	106.82%	NA	6,827,197,178	125.00%
DTC Other - Mainly Munis	744	4,566,962,335	103.62%	IG - some Unrated	4,534,145,142	100.72%
CMOs	2,329	7,696,531,006	105.58%	AAA-CCC	7,611,527,807	101.12%
Cash	1	392,000,000	100.00%	NA	392,000,000	100.00%
TOTAL	19,146	151,020,705,667	102.78%		148,584,827,698	101.64%
UST Excess		486,955,775			98,591,431	
Impact Net of UST Excess						

Taking equities with higher margin has reduced overall intraday risk.

Margin Analysis – Impact of Using Overnight TPI Margin - Lehman

- The impact of implementing 100% of the tri-party investor overnight margin for Lehman (currently at 20%) is US\$2.8 billion in increased margin (modeled as reduced financing below).

Security Type	Count	Collateral Market Value	Overnight Margin	Ratings	100% of Overnight Mg			
					Intraday Financing	Coll. Cov.	Impact vs. Current State	
Fed-Eligible - Total	10,280	101,278,201,139	101.56%	AAA	99,720,981,781	101.56%	(1,241,880,877)	-1.2%
USTs	604	31,999,094,145	101.55%	AAA	31,512,138,370	101.55%	(388,364,344)	
Agency Securities	1,103	31,799,954,551	101.55%	AAA	31,314,058,604	101.55%	(387,514,157)	
Agency MBSs	7,502	31,898,993,660	101.52%	AAA	31,422,656,848	101.52%	(379,917,613)	
Agency CMOs	1,071	5,580,158,784	101.97%	AAA	5,472,127,959	101.97%	(86,084,763)	
DTC-Eligible - Total	8,866	49,350,504,527	105.40%	Mixed - many non-IG	45,659,323,759	108.08%	(1,570,641,281)	-3.3%
ABSs	1,083	6,593,671,009	107.46%	AAA-CCC	6,135,822,530	107.46%	(360,892,896)	
Corporates	2,353	12,394,772,108	104.45%	Mainly A and below	11,866,924,290	104.45%	(418,554,742)	
CPs	205	9,564,571,597	104.73%	A1-P1	9,132,422,089	104.73%	(342,478,367)	
Equities	2,152	8,533,996,472	106.82%	NA	6,827,197,178	125.00%	0	
DTC Other - Mainly Munis	744	4,566,962,335	103.62%	IG - some Unrated	4,407,460,940	103.62%	(126,684,202)	
CMOs	2,329	7,696,531,006	105.58%	AAA-CCC	7,289,496,733	105.58%	(322,031,075)	
Cash	1	392,000,000	100.00%	NA	392,000,000	100.00%		
TOTAL	19,146	151,020,705,667	102.78%		145,772,305,539	103.60%	(2,812,522,158)	-2.1%
UST Excess		486,955,775			486,955,775			
Impact Net of UST Excess					(2,325,566,384)			

Margin Analysis – Impact of Covering Liquidation Risk (One-Day)

- The impact of implementing margin to cover the one-day liquidation risk of collateral for Lehman (assuming no price risk) is US\$4.3 billion in increased margin (modeled as reduced financing below) vs. current state and US\$1.5 billion vs. TPI margin.

Security Type	Count	Collateral Market Value	Overnight Margin	Ratings	One-Day Liquidation Risk-Based Mg			Liquidation Risk Factor
					Intraday Financing	Coll. Cov.	Impact vs. Current State	
Fed-Eligible - Total	10,280	101,278,201,139	101.56%	AAA	99,184,267,777	102.11%	(1,778,594,881)	-1.8%
USTs	604	31,999,094,145	101.55%	AAA	31,528,707,461	101.49%	(371,795,253)	0.75%
Agency Securities	1,103	31,799,954,551	101.55%	AAA	31,176,675,442	102.00%	(524,897,319)	1.00%
Agency MBSs	7,502	31,898,993,660	101.52%	AAA	31,117,468,315	102.51%	(685,106,146)	1.25%
Agency CMOs	1,071	5,580,158,784	101.97%	AAA	5,361,416,559	104.08%	(196,796,162)	2.00%
DTC-Eligible - Total	8,866	49,350,504,527	105.40%	Mixed - many non-IG	44,735,654,248	110.32%	(2,494,310,792)	-5.3%
ABSs	1,083	6,593,671,009	107.46%	AAA-CCC	5,947,491,250	110.86%	(549,224,175)	5.00%
Corporates	2,353	12,394,772,108	104.45%	Mainly A and below	11,787,428,275	105.15%	(498,050,757)	2.50%
CPs	205	9,564,571,597	104.73%	A1-P1	9,377,105,994	102.00%	(97,794,462)	1.00%
Equities	2,152	8,533,996,472	106.82%	NA	6,827,197,178	125.00%	0	4.50%
DTC Other - Mainly Munis	744	4,566,962,335	103.62%	IG - some Unrated	4,231,290,603	107.93%	(302,854,539)	3.75%
CMOs	2,329	7,696,531,006	105.58%	AAA-CCC	6,565,140,948	117.23%	(1,046,386,859)	7.50%
Cash	1	392,000,000	100.00%	NA	392,000,000	100.00%		
TOTAL	19,146	151,020,705,667	102.78%		144,311,922,025	104.65%	(4,272,905,673)	-2.9%
UST Excess		486,955,775			470,386,684			
Impact Net of UST Excess					(3,802,518,989)			

Margin Analysis – Impact of Covering 1-Day Liquidation + Price Risk

- The impact of implementing margin to cover both the liquidation and price risk of collateral for Lehman is US\$6.1 billion in increased margin (modeled as reduced financing below) vs. current state, US\$3.2 billion over TPI margin, and US\$1.8 billion over liquidation risk margin.

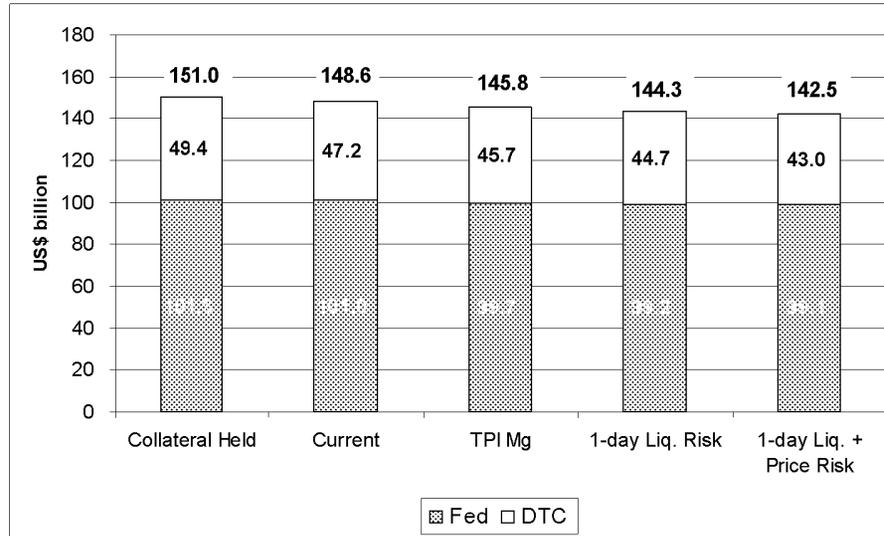
Security Type	Count	Collateral Market Value	Overnight Margin	Ratings	One-Day Liq. Risk Mg + Price Adjustm. Mg Intraday Financing	Coll. Cov.	Impact vs. Current State	Liquidation Risk Factor	Price Risk Factor
Fed-Eligible - Total	10,280	101,278,201,139	101.56%	AAA	99,100,565,395	102.20%	(1,862,297,262)	-1.8%	
USTs	604	31,999,094,145	101.55%	AAA	31,528,707,461	101.49%	(371,795,253)	0.75%	0.00%
Agency Securities	1,103	31,799,954,551	101.55%	AAA	31,176,675,442	102.00%	(524,897,319)	1.00%	0.00%
Agency MBSs	7,502	31,898,993,660	101.52%	AAA	31,117,468,315	102.51%	(685,106,146)	1.25%	0.00%
Agency CMOs	1,071	5,580,158,784	101.97%	AAA	5,277,714,178	105.73%	(280,498,544)	2.00%	1.50%
DTC-Eligible - Total	8,866	49,350,504,527	105.40%	Mixed - many non-IG	43,033,307,931	114.68%	(4,196,657,109)	-8.9%	
ABSs	1,083	6,593,671,009	107.46%	AAA-CCC	5,452,965,924	120.92%	(1,043,749,501)	5.00%	7.50%
Corporates	2,353	12,394,772,108	104.45%	Mainly A and below	11,787,428,275	105.15%	(498,050,757)	2.50%	0.00%
CPs	205	9,564,571,597	104.73%	A1-P1	9,281,460,278	103.05%	(193,440,178)	1.00%	1.00%
Equities	2,152	8,533,996,472	106.82%	NA	6,827,197,178	125.00%	0	4.50%	0.00%
DTC Other - Mainly Munis	744	4,566,962,335	103.62%	IG - some Unrated	3,888,768,428	117.44%	(645,376,714)	3.75%	7.50%
CMOs	2,329	7,696,531,006	105.58%	AAA-CCC	5,795,487,847	132.80%	(1,816,039,960)	7.50%	10.00%
Cash	1	392,000,000	100.00%	NA	392,000,000	100.00%			
TOTAL	19,146	151,020,705,667	102.78%		142,525,873,326	105.96%	(6,058,954,372)	-4.1%	
UST Excess		486,955,775			470,386,684				
Impact Net of UST Excess					(5,588,567,688)				

Impact of Using Fed Discount Window or PDCF Margin

- The impact of using the Fed Discount Window Margin for Lehman is approximately US\$19 billion in increased margin (modeled as reduced financing below) because margin is generally higher, equities are not accepted, and only AAA CMOs and BBB or better ABSs and Munis are accepted as collateral.
 - Assuming 50% of CMOs rated AAA and two thirds of ABSs and Munis rated BBB or better.
- The impact of using the Fed Primary Dealer Credit Facility Margin for Lehman is US\$36 billion in increased margin (modeled as reduced financing below) because margin is generally higher, CMOs and equities are not accepted, and only BBB or better Corporates, Munis and ABSs are accepted as collateral.
 - Assuming two thirds of Corporates, Munis, and ABSs rated BBB or better.

Margin Requirements – 5/23 data

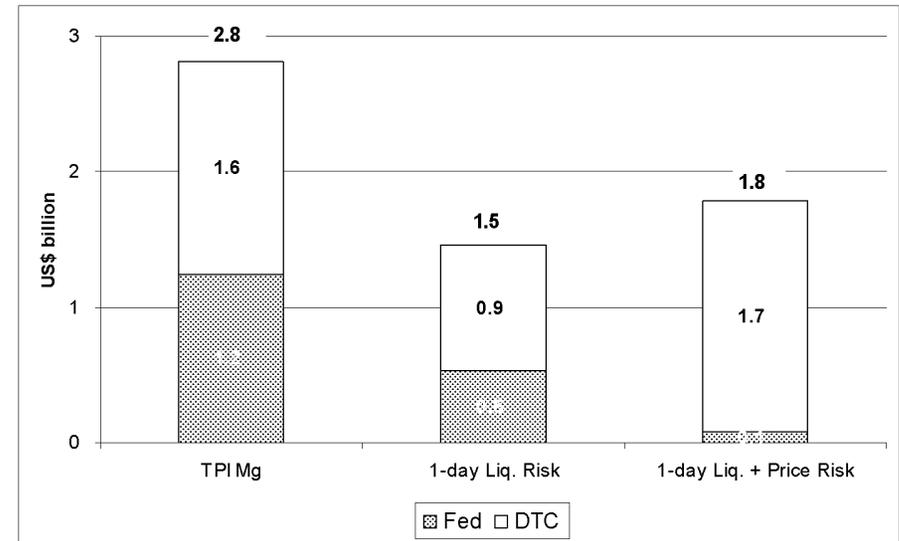
Intraday Financing



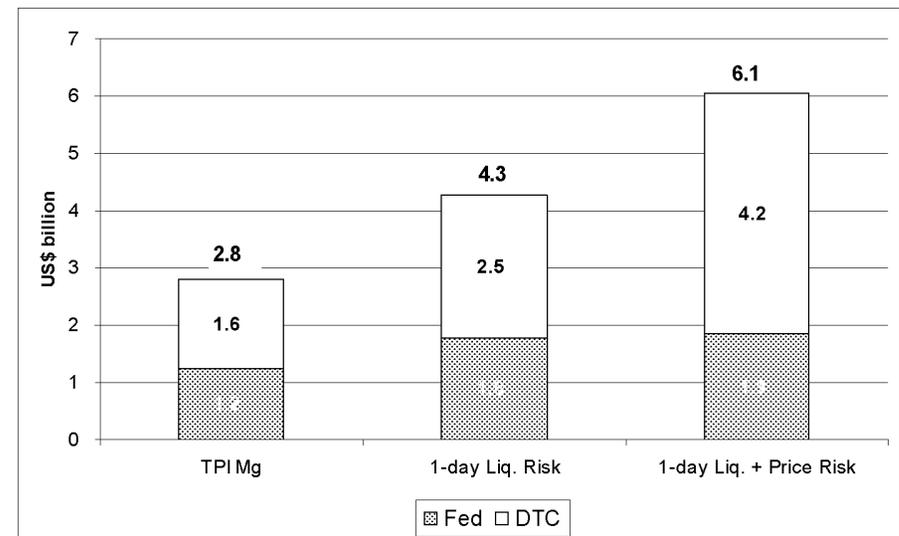
Definitions:

- **TPI Mg** – margin used by tri-party investors
- **One-day Liquidation Risk** – margin to cover the potential/estimated price move in one day (exposure to daily volatility with 97.5% confidence)
- **One-Day Liquidation + Price Risk** – margin to cover the potential price move in one day plus the estimated price overstatement for illiquid securities

Incremental Increase in Margin



Cumulative Increase in Margin



Areas for Discussion

- Operating procedures.
- Improved pricing.
- Margin changes.
- Collateral restrictions.
- Liquidity contingency plans.

**Tri-party Repo Margin Analysis - Lehman
APPENDIX – Margin Analysis Methodology Assumptions**

Methodology for Margin Analysis

- **May 27 morning unwind data** (reflecting end of day tri-party repos on May 23 end of day).
- **More granular but still high-level:** Very granular margin analysis at a security and rating level is virtually impossible due to large number of securities involved (over 19,000).
 - All Fed-eligible securities (67%) are rated AAA.
 - DTC-eligible securities are spread through the entire rating scale, with some unrated.
 - Assumed “average” maturity profile for each security type.
- **No correlation:** Analysis ignores correlation of securities held as collateral and the fact that:
 - If any of the large dealers faces a problem, it is very likely that US Treasuries will rally.
 - Prices for different types of securities are likely to move in different directions (ex. US Treasuries vs. equities and some fixed income securities).
- **Parameters:** Margin analysis quantified gradual margin increases to reflect (in this order):
 - Tri-Party Investor Margin (from 20% to 100%).
 - **One-Day Liquidation Risk (one-day price volatility).** We typically use a five-day liquidation period for securities financing exposure calculation, factoring in the volatility and correlation of the securities involved. We can not account for correlation for our manual margin analysis. Given the diversified securities held as collateral, we believe that using a one-day liquidation period without correlation is equivalent to using a five-day liquidation period with correlation. Using a five-day liquidation period without correlation would overstate the risk.
 - Price Risk (estimate of potential vendor price overstatement for illiquid securities).