

The Relevance of Value-at-Risk Disclosures: Evidence from the LTCM Crisis

By:

N. Chipalkatti, Associate Professor, Seattle University

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V. Datar, Associate Professor, Seattle University

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Abstract

Previous studies have established that the failure of the hedge fund, Long Term Capital Management (LTCM), was associated with significant negative abnormal returns for a many U.S. banks especially around September 2, 1998 when LTCM announced its failure. This study attempts to examine whether bank value-at-risk (VaR) disclosures were used by investors to assess the potential trading loss that a bank could suffer at that time. This study examines whether there was any association between disclosed VaR and the magnitude of abnormal returns and trading volume surrounding the announcement date. The results indicate that there was no such association which suggests that investors did not use the VaR information to assess the potential trading losses of exposed banks. Banks that formed part of the LTCM bailout consortium and those with larger amounts of notional derivatives faced the largest negative reaction at the time of the failure announcement.

1. Objective of Study

Previous studies have established that the failure of the hedge fund, Long Term Capital Management (LTCM), was associated with significant negative abnormal returns for a many U.S. banks (Kabir and Hassan, 2005; Kho, et. al. 2000) especially around the critical event date of September 2, 1998 when LTCM announced its precarious situation. This study attempts to examine whether the bank value-at-risk (VaR) disclosures were used by investors to assess the potential trading loss that a bank could suffer in the third quarter of 1998. Specifically, the study examines whether there was any association between disclosed VaR and the magnitude of abnormal returns and abnormal trading volume surrounding the key LTCM event date for a sample of US bank holding companies. VaR disclosures are costly to prepare and complex to interpret. To the extent that the results indicate that there was such an association between the magnitude of VaR and the abnormal reaction around LTCM events, the study will validate the benefits of VaR disclosures to investors and reinforce the Security Exchange Commission's (SEC's) policy of mandating market risk disclosures.

2. Long Term Capital Management (LTCM) Failure

The hedge fund, LTCM, collapsed in September 1998 primarily due to the combined adverse impact of the Asian crisis, the Russian debt moratorium and the ruble devaluation. LTCM bet on the spread between low quality bonds and high quality bonds to decrease but because of the combined impact of the various events mentioned previously, the spread between low quality and high quality bonds widened. The poor liquidity in the low quality bonds, the panic buying of high quality Treasuries, (Putnam,

1998) and the sheer amount of leverage involved in LTCM's transactions made its failure inevitable. LTCM held most of its positions through derivative contracts and by beginning of September, the notional value of its derivative contracts (Edwards, 1999) through risk arbitrage positions (Spiro and Laderman, 1998) were in excess of \$ 1 trillion mostly by way of interest rate swaps and exchange traded futures contract. LTCM had \$ 80 billion of US Treasuries plus had large positions in the equity market. By early September, LTCM had lost 50% of its equity capital and it had lost 90% of the same by end-September. The enforced unwinding of LTCM positions put creditors, counterparties and other banks who had made the same set of trades as LTCM at significant risk of facing large losses. Kabir and Hassan (2005) find evidence of a significant contagion effect with big commercial and investment banks suffering market losses. Kho, et. al. (2000) estimate that exposed banks lost 11% of market value on key event date of September 2nd, 1998. By September 23rd, a consortium of banks led by Federal Reserve Bank of New York had put together a bailout package of \$ 3.625 billion. The consortium consisted of the following banks: Citicorp, J. P. Morgan, Banker's Trust, Chase Manhattan, Barclays, ING, and some investment banks (Cavaletti, 1998)

3. Market Risk and Value at Risk (VaR) disclosures

In January, 1997, the SEC required, in addition to disclosures about derivatives as per SFAS No. 119, the following additional disclosures relating to market risk:

(i). Enhanced descriptions in the footnotes of financial statements of accounting policies for derivative financial and commodity instruments.

(ii). Quantitative information about derivative financial and commodity instruments and other financial instruments which would enable investors to make assessments about current and future market risks.

(iii). Additional qualitative information about same.

(iv). Additional disclosures about derivative financial and commodity instruments when omissions would cause information filed with the SEC to be misleading.

The SEC required the quantitative information to be provided by all banks and thrifts and all non-bank and non-thrift registrants with the SEC that have a market capitalization greater than \$ 2.5 billion as of June 15, 1997. For others, the quantitative information was required to be provided for all fiscal year endings after June 15, 1998. In these disclosures, the company should distinguish between instruments entered for trading purposes and those entered for other than trading purposes (e.g., hedging).

For quantitative disclosures, the SEC provided three options:

(a) Tabular presentation of fair value information and contract terms sufficient to determine the instruments future cash flows by expected maturity date.

(b) Sensitivity Analysis approach which provides information about the impact on earnings, cash flows or fair value based on selected hypothetical changes in market prices or rates.

(c) Value at Risk (VaR) disclosures that express the potential loss in earnings, cash flows or fair values from market movements with selected likelihood of occurrence.

This study focuses specifically on VaR disclosures made by banks (see Table 1 for an example of a VaR disclosure) and whether these disclosures provided incremental

information to investors about potential trading losses at the time of the collapse of LTCM.

4. Previous Literature Relating to VaR Disclosures and Hypothesis Development

Jorion (2002) demonstrated that that quarterly VaR data predicts unexpected trading revenues and remains a significant predictor over and above the impact of the notional amount of derivatives held by a bank. In his study, Jorion used 8 banks, with 6 years of annual and quarterly data from December 1994 to December 1999. Liu, Ryan and Tan (2004) demonstrate that (a) trading VaR is positively associated with the variability of trading income of the next quarter and this relationship is stronger for the technically sophisticated banks and also increases with time, (b) that banks' VaR is positively associated with returns variability, and, (c) that banks' VaR has predictive power for next period's beta and realized return. This study, based on Jorion's earlier study, involved a sample of 17 banks from 1997 to the first quarter of 2002.

This paper examines the usefulness of VaR disclosures using an event study – the LTCM announcement of the crisis. Kabir and Hassan (2005) demonstrated that banks reacted negatively to the LTCM announcement on September 2, 1998 with the largest negative reaction faced by banks in the bailout consortium and the large investment banks. However, they also found evidence of a contagion effect – the LTCM crisis had a negative impact on all banks. The LTCM event provides an opportunity to examine the usefulness of the VaR disclosures by examining whether there is any association between VaR magnitude and the magnitude of the negative reaction on the date of the LTCM announcement. The results of the previous VaR studies suggest that the higher the trading VaR , the greater is impact of an unexpected change in interest rates, foreign

exchange rates etc on a bank's earnings. This suggests that the higher the trading VaR, the greater will be the negative impact of an unexpected crisis like the failure of the LTCM hedge fund and the larger will be the unexpected trading losses faced by a bank.

This paper examines whether investors used the VaR information to determine the loss potential of banks (directly and indirectly) exposed to LTCM at the time of the first release of the information by the hedge fund, namely, September 2nd, 1998. It is expected that firms with higher VaR numbers will face a larger negative reaction at the time of this announcement. The study uses the period from September 2, 1998 to September 4, 1998 as the event window to examine the market's reaction to the LTCM announcement. Using an approach similar to Kabir and Hassan (2005), the study obtains the unexpected returns and volume reaction for each bank. The absolute value of the t—statistic associated with this event window is then utilized to examine whether the size of the unexpected reaction is positively associated with the magnitude of the VaR as disclosed in the bank's annual report. The hypothesis that is examined in this study follows.

The t-statistic measuring the magnitude of a bank's unexpected returns and volume reaction in the event window will be positively associated with the magnitude of a bank's trading VaR.

A significant positive association between the size of the unexpected returns and volume reaction will indicate that investors found the VaR information useful to assess the potential trading losses of a bank exposed to the LTCM crisis.

5. Sample Description and Methodology

According to the testimony of Julie William, Acting Comptroller of Currency, before the Committee on Banking and Financial Services of the U.S. House of

Representatives, October 1, 1998, the top 25 banks account for 99% of the notional derivatives traded in the U.S. A list of the top 50 banks was obtained from Federal Reserve study on subordinated debt (Staff Study No. 172, 1998) from which the names of only the top 28 banks were extracted. The daily returns and daily trading volume were obtained from CRSP. Three of these banks were eliminated because of merger related activity in the same time period, and an additional three were eliminated as no CRSP data was found for them. The remaining 22 banks were utilized to conduct the initial event study in order to obtain the return and volume reaction for each bank to the LTCM announcement on September 2nd, 1998. The next step was to examine the association between the unexpected reaction and VaR . Unfortunately, 4 banks utilized the sensitivity approach to disclosing market risk and were eliminated. An additional 5 banks had to be eliminated as no usable VaR data was found in their annual reports. The final sample size (Table 2) that was utilized to examine the association between the unexpected returns and volume and VaR was thirteen banks. This compares favorably with the sample by used Jorion (2002) and Liu, Ryan and Tan (2004) in their studies. The data for Trading VaR (TVAR), Notional Derivatives (ND), Total Assets (TA), Trading Revenue as a Proportion of Total Revenue (TRADREVPROP), and Trading Assets as a Proportion of Total Assets (TRDATPROP) were obtained directly from annual reports. If VaR is disclosed to be immaterial, it is coded as zero for the purposes for this analysis. Data on whether bank was in LTCM rescue consortium obtained from Kabir and Hassan (2005). Three of sample banks were in the rescue consortium. A sample description of the final 13 banks is on Table 3.

6. How did the banks react? Overall significance – model and test

The approach used to test the overall reaction of the sample banks in the event window is similar to that used by Kabir and Hassan (2005). To examine the overall reaction, daily returns and daily trading volume data was obtained from July 1, 1998 to September 18, 1998. The Federal Reserve Bank of New York became officially involved with the bailout on September 19, 1998. The event window is centered on September 3, 1998 and begins on September 2, 1998 when LTCM sent a letter to its investors informing them of the crisis. All days after September 4th, are post-event days. The following pooled seemingly unrelated regressions (SURs) were estimated to control for heteroskedasticity and cross-correlation. Correction for auto-correlation was also incorporated.

Model 1:

$$RET_{i,t} = C(1) + C(2)*D1_t + C(3)*D3_t + C(4)*TENYRTRSRET_{i,t} + C(5)*FOREXRET_{i,t} + C(6)*EQLWTINDX_{i,t} + [error]_{i,t}$$

The coefficients C(2) and C(3) were constrained to be equal for all sample banks so as to obtain the overall significance of the abnormal returns for the entire sample around the event window and the post-event window.

Model 2:

$$VOL_{i,t} = B(1) + B(2)*D1_t + B(3)*D3_t + B(4)*TENYRTRSRET_{i,t} + B(5)*FOREXRET_{i,t} + B(6)*EQLWTINDX_{i,t} + [error]_{i,t}$$

Similarly, in the daily trading volume model the coefficients B(2) and B(3) were constrained to be equal for all sample firms to determine overall significance of the trading volume reaction.

In the regression models, the variables used are as follows:

D1= event window dummy;

D3 = post-event window dummy;

TENYRTRSRET = Daily returns on 10year Treasuries;

FOREXRET= Daily return on Trade Weighted Exchange Index from the U.S Treasury;

EQLWTINDX= Equal Weighted Index from CRSP.

The results (Table 4) indicate a significant negative returns reaction to LTCM events in event window followed by a significant positive returns reaction in the post-event window. This is consistent with the results obtained by Kabir and Humayun (2005). For volume, no significant reaction in the event window was observed. However, the results indicate a significant increase in volume in the post-event window. The lack of a significant volume reaction, given the significant return reaction, is puzzling. The purpose of this paper is to examine the association between the magnitude of the abnormal reaction and the size of the trading VaR disclosed by bank. These tests are described next.

7. Association between Trading VaR and the Magnitude of the Abnormal Returns and Volume Reaction

Due to non-availability of annual report data relating to trading VaR, the sample size had to be reduced to thirteen banks. A description of this final sample is on Table 3. To test the association between firm-specific reactions in the event window extending from September 2 to September 4, 1998, a two step estimation process was undertaken. In the first step, a seemingly unrelated system of thirteen regression equations was estimated to obtain the abnormal reaction during the event window.

Model 3:

$$RET_{i,t} = C(1) + C(2)*D1_{i,t} + C(3)*D3_{i,t} + C(4)*TENYRTRSRET_{i,t} + C(5)*FOREXRET_{i,t} + C(6)*EQLWTINDX_{i,t} + [error]_{i,t}$$

Unlike the equation estimated for Model 1, the coefficient for C(2) and C(3) are not constrained to be equal for each firm. Hence, for each firm, these coefficients measure the abnormal reaction in the event and the post-event window. The same was repeated for the volume equation.

Model 4:

$$VOL_{i,t} = B(1) + B(2)*D1_{i,t} + B(3)*D3_{i,t} + B(4)*TENYRTRSRET_{i,t} + B(5)*FOREXRET_{i,t} + B(6)*EQLWTINDX_{i,t} + [error]_{i,t}$$

The results for this system of seemingly unrelated regressions are presented on Table 5. The results indicate that only 4 of the banks in the sample had significant negative reactions at the time of the LTCM announcement. Of these four all but J. P. Morgan were in the bailout consortium. Interestingly, one of the banks had a positive reaction during the event window. These results remain qualitatively the same even when the event window is expanded to 5 trading days. On the other hand, 8 of the 13 banks had significant increases in volume during the event window indicating significant revisions in investor beliefs at this time.

The second step, involves testing the association between Trading VaR and size of the t-statistic for daily returns and trading volume in the event window. To check this, the following cross-sectional regression was estimated using RETSTAT, the returns t-statistic in the event window, and VOLSTAT, the volume t-statistic in the event window.

Model 5:

$$ABS(RETTSTAT) = C(1) + C(2)*CONSORT + C(3)*(TVAR) + C(4)*TRADREVPROP + C(5)*ND + C(6)*TA + error$$

Model 6:

$$\text{VOLTSTAT} = C(1) + C(2)*\text{CONSORT} + C(3)*(T\text{VAR}) + C(4)*\text{TRADREVPROP} + C(5)*\text{ND} + C(6)*\text{TA} + \text{error}$$

Here ABS(RETSTAT) is the absolute value of the t-statistic on the event period dummy coefficient, reflecting the abnormal returns reaction, obtained from the first step of the estimation process. Similarly, VOLSTAT is the t-statistic on the event period dummy coefficient and reflects the abnormal volume reaction. The variable CONSORT is a dummy variable that indicates whether the bank was part of the bailout consortium. Since the event took place prior to the bailout announcement, this coefficient is not expected to be significant. TVAR is the log of the trading VaR disclosed by the firm. As per hypothesis, the coefficient on this variable is expected to be significant and positive. The higher the trading VaR, the larger should be the expected trading loss from a unforeseen event like the LTCM failure. TRADREVPROP is the proportion of trading revenue to total revenue of a bank. The larger the trading revenue as a proportion of total revenue, the greater should be the expected trading loss due to the LTCM crisis. A variation of the above equation using TRDATPROP, the proportion of trading assets to total assets, was also run with qualitatively similar results that have not been reported. The variable ND is the log of the proportion of notional derivatives to total assets from a bank and the variable TA is the log of the total assets of the firm. Banks with a larger pool of notional derivatives are expected to get hurt more by the LTCM unwinding. The last variable controls for any size effects.

The results (Table 6) indicate that there is no association between the Trading VaR disclosed and the abnormal returns reaction at the time of the LTCM event. However, investors reacted significantly more negatively in the case of banks that were part of the bailout consortium. Also, banks with greater proportion of notional

derivatives to total assets were negatively impacted by a significantly greater amount. Similarly, in the case of trading volume, there is no association between the magnitude of the Trading VaR and the magnitude of the abnormal reaction for trading volume in the event window. Larger firms had significantly lower volume in the event window.

8. Conclusion:

This study examined whether the market risk disclosures made by banks provide useful information to investors about potential trading losses. The study did this by examining the association between bank value-at-risk (VaR) disclosures and the magnitude of abnormal returns and abnormal trading volume surrounding the key LTCM event dates for a sample of US bank holding companies. The results indicate that there was no association between the trading VaR disclosed by a bank and the magnitude of the abnormal returns and volume reaction. This suggests the following:

- (a) Investors did not use trading VaR to assess the loss potential of banks at the time of the LTCM crisis. This might have to do with the reliability and/or the relevance of the disclosure. It also might be the case that the average investor could not understand the implications of the VaR disclosure. It would be interesting to verify if the actual 3rd quarter trading losses were associated with the trading VaR disclosed.
- (b) The significantly negative reaction for only the consortium banks suggest that information regards the bailout had leaked and selectively penalized these banks.
- (c) Investors believed that LTCM was “too big to fail” and correctly assessed that the Fed would step in to prevent a widespread and severe contagion effect.

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Table 1

Sample VaR disclosure: Bank of New York, 10Q as of 6/30/1998

The Company manages trading risk through a system of position limits, a value at risk (VAR) methodology, stop loss advisory triggers, and other market sensitivity measures. Risk is monitored and reported to senior management by an independent unit on a daily basis. The VAR methodology captures, based on certain assumptions, the potential overnight pre-tax dollar loss from adverse changes in fair values of all trading positions. The calculation assumes a one day holding period for most instruments, utilizes a 99% confidence level, and incorporates the non-linear characteristics of options. This methodology does not, however, attempt to evaluate risk created from extraordinary financial, economic or other occurrences, and any risk evaluation system has judgment aspects.

The following table indicates the calculated VAR amounts for the trading portfolio for the periods indicated.

(In \$ millions)	2nd Qtr 1998	2nd Qtr 1998	2nd Qtr 1998	YTD	YTD	YTD	As of 6/30/98
Market Risk	Avg.	Min.	Max.	Avg.	Min.	Max.	
Interest Rate	4.5	2.1	7	4.8	2.1	7.0	3.9
Foreign Exchange	2.1	0.8	3.5	2.2	0.8	4.0	1.4
Overall Portfolio	6.6	4.0	9.0	7.0	4.0	9.7	5.3

Table 2

Sample Selection

- -
 - Banks in list: 28
 - Less: 3 Merger Activity
 - Less: 3 No CRSP data
 - 22 Banks in Event Analysis for Pooled SUR
 - Less: 4 Sensitivity Format used for Market Risk disclosures
 - Less: 5 No annual report or VaR data found
- Final Sample: 13 Used for VaR analysis**

Table 3

Sample Description (in \$ millions)

PERMNO	NAME	Trading VaR	Trading Revenue (% of Total Revenue)	Notional Derivatives (% of Total Assets)	Notional Derivatives (\$ mill.)	Total Assets (\$ mill.)
36469	FIRST UNION CORP	9	0.04	0.21	47910	228996
47079	CITICORP	16	0.16	11.25	3498100	310897
47159	FLEET FINANCIAL GROUP INC	8.1	0.07	0.48	47,972	100,713
47896	CHASE MANHATTAN CORP	28.9	0.19	23.16	8500000	366995
48071	MORGAN J P & CO INC	31	0.64	26.19	7353600	280777
48354	BANKERS TRUST CORP	156.8	0.38	0.47	81270	172311
49656	BANK NEW YORK INC	13.2	0.03	4.36	274882	63003
51772	BANKBOSTON CORP	30	0.04	1.83	129000	70499
53938	REPUBLIC NEW YORK CORP	12	0.08	4.14	248,567	59,919
58246	NORTHERN TRUST CORP	0	0.04	0.55	16305	29777
59379	MELLON BANK CORP	2	0.06	1.16	55255	47448
64995	KEYCORP	0.9	0.05	0.48	36573	75778
72726	STATE STREET CORP	0.9	0.14	2.58	120567	46711
	MEAN	23.75	0.15	5.91	1570000	142602
	MAX	156.80	0.64	26.19	8500000	366995
	MIN	0.00	0.03	0.21	16305	29777
	SD	41.51	0.18	8.86	2981929	116076

Where,

TVAR = Trading VaR ; TRADREVPROP = Trading Revenue as a Proportion of Tottal

Revenue; ND = Notional Derivatives as a Proportion of TA; NDValue = Notional

Derivatives; TA = Total Assets.

Table 4

Results of the Overall Test

Sample Size: 22 Banks

Panel A: Returns

Coefficient	Value	T-stat	p value
C (2)	-0.007554	-2.033728	0.0422
C (3)	0.011586	4.602595	0.0000
R-squared	60.11%		
F-statistics	6.92	Significant at p < 0.01	

Panel B: Trading Volume

B (2)	-0.004816	-0.044945	0.9642
B (3)	0.227996	2.335792	0.0197
R-squared	81.8%		
F-statistics	3979.63	Significant at p < 0.01	

Note: The other bank specific coefficients have not been tabulated

Table 5

Abnormal Returns and Volume Reaction From Sept. 2 to Sept. 4, 1998

NAME	Returns Coefficient (retcoef)	Returns T-stats. (rettstat)	Volume Coefficient (volcoef)	Volume T-stats. (voltstat)
FIRST UNION CORP	-0.01389	-1.2376	0.33986	1.728321
CITICORP	-0.04039	-3.17375	1.131576	4.321568
FLEET FINANCIAL GROUP INC	-0.00093	-0.10453	0.567791	2.755442
CHASE MANHATTAN CORP	-0.05434	-4.19256	1.025884	4.968169
MORGAN J P & CO INC	-0.04566	-3.86654	0.896165	3.023138
BANKERS TRUST CORP	-0.02585	-2.48799	1.535133	4.682632
BANK NEW YORK INC	-0.00127	-0.133	0.635867	2.135007
BANKBOSTON CORP	-0.02364	-1.88292	0.457751	1.924995
REPUBLIC NEW YORK CORP	-0.02106	-1.86072	0.368244	1.355985
NORTHERN TRUST CORP	0.013219	1.028135	0.850292	3.214891
MELLON BANK CORP	-0.01296	-1.45948	0.226417	1.220265
KEYCORP	-0.01272	-1.21602	-0.11541	-0.627
STATE STREET CORP	-0.00177	-0.21518	1.001424	3.056318

Note: The cells in bold are significant at $p < 0.05$ levels.

Table 6

The Association Between Trading VaR and the Magnitude of the Abnormal

Returns and Abnormal Volume Reaction

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.579858	0.456413	1.270468	0.2445
CONSORT	0.891542	0.393679	2.264638	0.0579
TVAR	0.085013	0.265817	0.319817	0.7584
TRADREVPROP	0.745245	1.749735	0.425919	0.6830
ND	0.075716	0.037220	2.034301	0.0814
TA	1.52E-06	3.10E-06	0.490081	0.6391
R-squared	0.806772			
Adjusted R-squared	0.668753			
F-statistic	5.845			
Prob(F-statistic)	0.019			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.770805	1.147028	1.543820	0.1665
CONSORT	2.273546	0.417795	5.441780	0.0010
TVAR	0.016127	0.409868	0.039346	0.9697
TRADREVPROP	1.374024	1.352526	1.015894	0.3435
ND	0.018771	0.021951	0.855133	0.4208
TA	-9.41E-09	5.05E-09	-1.864092	0.1046
R-squared	0.639374			
Adjusted R-squared	0.381784			
F-statistic	2.482137			
Prob(F-statistic)	0.133791			