Global Economy and Finance Journal
Volume 3. Number 2. September 2010. Pp. 61-75

Value-at-Risk Disclosure and Cost of Equity Capital

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Commercial banks disclose their exposure to market risks in the form of value-at-risk (VAR), potential maximum losses under a certain confidence level. Using a sample of 24 U.S. commercial banks, we examine the relation between VAR of banks' trading activities and their cost of equity capital. We show that the implied cost of equity capital and the bid-ask spread, both proxying for the cost of equity capital, are positively related to VAR, as well as a quality indicator based on bank technical sophistication. The results are consistent with the claims that VAR effectively captures bank trading risk, and that investors care about banks' risk-taking activities.

Keywords: Banking, Value-at-risk, Market risk disclosure, cost of equity capital,

1. Introduction

The unprecedented financial crisis of 2007-2008 reveals a disturbing fact of banks' reckless risk-taking and the catastrophic consequence of that. It also highlights an ongoing debate on whether the current market risk disclosure regime under SEC FRR 48 (1997) is adequate to inform investors of the real picture of banks' risk-taking. The main goal of this study is to empirically document the relationship between publicly disclosed VAR and banks' cost of equity capital. The value-at-risk (VAR) approach is one of the three disclosure methods endorsed by FRR 48 (1997), which reports the maximum potential loss, within a certain confidence level, that management expects to occur in normal market conditions. Market risk disclosure offers a gauge of risk exposure through which investors form their judgment regarding a company's risk taking. Ideally, risk measures should faithfully depict management's risk taking activities as well as their own assessment of future adverse conditions. Rational investors should demand high compensation in return for companies' risk taking upon learning it through risk measures.

We use a sample of 24 US commercial banks which report VAR for their trading activities over various time spans between 1998 and 2008. In testing the relationship between VAR and the cost of equity capital, we find that VAR is positively related to both measures: the implied cost of equity capital and the bid-ask spread. The results remain

We appreciate the helpful comments from Steve Kaplan, James Boatsman, Joe Comprix, workshop participants at Arizona State University, University of Vermont, Rowan University, conferees at the 2009 Mid-Atlantic American Accounting Association Meeting, the 2010 Annual American Business Research Conference, and an anonymous reviewer. All errors or omissions are the authors' responsibility.

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significant even after controlling for various firm characteristics. Specifically, the relationship between VAR and the implied cost of equity capital suggests the effectiveness of VAR as a risk measure as well as the apparent interest of investors in market risk exposure. We conduct supplementary analyses to examine whether the quality of VAR is incorporated into the cost of equity capital. We achieve this by including a measure for technical sophistication of banks (Basel Committee on Banking Supervision (2002), Liu et al. (2004)). Our premise is that banks with high technical sophistication are more likely to provide high quality VAR estimates and high quality VAR leads to a lower cost of equity capital. The results confirm our conjecture, although one needs to interpret them with caution due to the fact that technical sophistication is highly correlated with bank size.

Our study is relevant to regulators who are faced with the challenge of improving the risk disclosure by banks and other financial institutions, as part of the broader regulatory reformation effort that is intended to ensure the soundness of the global financial system. The findings that stock markets react to VAR disclosure in an economically sensible way adds further support to the current call for improved risk disclosure. They are also relevant to investors who are now probably more eager to understand banks' risk-taking activities: despite criticisms, VAR as a risk measure still conveys valuable information regarding banks' risk taking and should be fully exploited to improve investors' decision making. The rest of the paper proceeds as follows. Section II discusses the institutional background and prior literature. Section III develops the hypotheses. Section IV describes the research design and models. Sample selection and data description are presented in Section V. Section VI reports the empirical results. Section VII concludes.

2. Background And Prior Literature

VAR and market risk disclosure by banks

Value-at-Risk (VAR) as a statistical concept and technique was initially developed as a risk management tool in the financial sector back to the early 1990s. It was then endorsed as one of the three disclosure approaches under Securities and Exchange Commission (SEC) Financial Reporting Release No. 48 (FRR 48, 1997). Nevertheless, due to its limitations in depicting risk and complexity in computation, its use is largely limited to reporting risk exposure of trading activities by banks and other financial institutions even today. VAR as a risk disclosure approach must be understood in the context of market risk disclosure. Mandated by FRR 48 (1997), all public companies are required to disclose in annual reports their exposures to market risk, which are broadly defined as changes in interest rates, exchange rates, commodity prices, equity prices, and other market prices. The regulation intends to address wide spread concern about the adequacy of then existing disclosures in business environments where companies are increasingly using market risk sensitive instruments.The VAR approach is one of the three disclosure approaches allowed by FRR 48. Under this approach, companies provide a dollar amount estimate of potential loss that management can expect not to exceed in normal market conditions over a certain holding period with a certain confidence level.

Banks and other financial institutions use the VAR approach to report market risk exposure for trading activities. We argue that banks' trading activities are of economic significance to shareholders in today's business environment. Due to escalated competition and narrowing margins offered by traditional business lines, banks are increasingly engaged in trading activities to boost their earnings and maintain stock performance.

Related literature

This study examines the relationship between publicly disclosed VAR and banks' cost of equity capital and whether investors incorporate the implication of VAR in the pricing process. In this respect, it adds to a growing body of research that uses firms' market risk disclosure as a setting to address issues related to economic consequences of disclosure. We discuss empirical research on market risk disclosure in the line of research of *ex post* volatility (thanks to a specific type of market risk). The logic underlying the research is straightforward: if companies faithfully communicate their *correct* assessment of market risk through *ex ante* risk measures, such as VAR, *ex ante* risk measures ought to relate to *ex post* realization of market movements.

VAR is commonly used in the banking industry. Most of prior studies choose to use a sample of commercial banks to test the predictability of VAR. Berkowitz and O'Brien (2001) compare nonpublic VAR with trading revenues by six large banks and conclude that VAR only partially measures banks' actual risk. Using trading VAR publicly disclosed by eight large banks, Jorion (2002) finds it predicts surprise in subsequent trading revenues. Using a larger sample of banks, Liu et al. (2004) find that the predictive power of trading VAR increases with technical sophistication and over time. Ahmed et al. (2004) shows that risk disclosure via the tabular format predicts subsequent volatility in net interest income. Hirtle (2007) finds that the risk information disclosed by banking holding companies would impact the equity market returns. Some other researches choose to use samples from other industry to examine the predicting power of VAR disclosure and the response from investors. Rajgopal (1999) finds stock returns become less sensitive to oil and gas price fluctuation after oil and gas companies disclose their commodity risk. Thornton and Welker (2002) find that oil and gas producers' market risk disclosures including VAR convey useful information to investors about commodity betas. Linsmeier et al. (2002) document that for a broad sample of non-financial firms, stock trading volume becomes less sensitive to a variety of market risk after the mandatory market risk disclosure under FRR 48 (1997). Building on these studies, our research reasons that rational investors ought to recognize the predictability, and proceeds to test whether investors fully recognize such attribute of VAR.

Our study is based on the accuracy of VAR. We believe that commercial banks tend to provide accurate and timely information for investors and investor could incorporate the information into their decision-making process. Prior studies provide evidence to examine the accuracy of VAR. Berkowitz et al. (2007) use an integrated, unifying framework to assess the accuracy of VAR forecasts by generating a daily profit and loss

measure. Perignon and Smith (2010) study both the level of VAR disclosure and the accuracy of the disclosed VAR figures for a sample of US and international commercial banks.

Evidence also exists that VAR is related to companies' systematic risk and/or total risk. For example, Liu et al. (2004) show that bank trading VAR predicts return volatility and betas, while Bali and Cakici (2004) find that VAR explains the cross-section of expected returns. Lim and Tan (2007) examine whether the quantitative VAR estimates are value-relevant using the earning-returns relation. They find that VAR is positively and significantly associated with future stock return volatility. Aware of the limitation of realized returns, our study examines the implied cost of equity capital which is inferred from analyst forecasts and concurrent prices. We also use the bid-ask spread to account for the information asymmetry component in the cost of equity capital. We reason that large risk exposure would allow divergence in investor opinions and thus increase the bid-ask spread.

3. Hypothesis Development

The main goal of this study is to empirically document the relationship between publicly disclosed VAR and banks' cost of equity capital. Our research question would be does VAR disclosures impact banks' cost of equity capital? We expect a positive relationship between the magnitude of VAR and the cost of equity capital. As a risk measure, trading VAR purports to capture downside risk (potential loss) a bank may suffer from trading financial instruments on its own accounts. Recent research suggests that such information may be closer to the concept of uncertainty that investors use when pricing equity. In today's financial sector, with continually thinning profit margins for traditional business lines and low entry barriers, banks often find it attractive to take more risk because, if strategically managed, high risk will bring enhanced payoffs to banks.

We want to point out that in considering the relationship between risk and the cost of equity capital, it is more important to examine "relative risk appetite," that is, the amount of risk a bank assumes relative to its capital base, rather than absolute amount of risk. After years of active consolidation in the financial sector, it is likely that even though some banks decide to take higher levels of risk, the scale of excessively risky trading remains limited when the size of overall trading activities or the whole company is taken into account. In contrast, trading risk disproportionate to a bank's capital and risk management capability certainly presents a major negative factor for investors. They should thus demand high compensation for bearing high potential of loss.

Based on above analysis, we develop the following hypotheses:

H1: Commercial banks' value-at-risk disclosure is significantly associated with their cost of equity capital measures.

H2: Commercial banks' value-at-risk disclosure is significantly associated with their bid-ask spread measures.

4. Research Design And Model

To test the relationship between VAR and cost of equity capital, we use the following model

$$Costof\,Capital_t = \alpha_0 + \alpha_1 \times VaR_t + controls + \varepsilon_t \quad [1]$$

where:

Cost of equity capital = (i) the implied cost of equity capital (*COE*); (ii) the bid-ask spread (*BAS*) (Refer to the next section for details);

VAR = the trading VAR reported by banks in financial reports for quarter *t*.

A variety of proxies have been proposed for the cost of equity capital in the literature. In this study, we choose as proxies (1) the implied cost of equity capital based on market price or analyst forecast and (2) the bid-ask spread.

Model for the implied cost of equity capital

The model with the implied cost of equity capital as the dependent variable is

$$COE_t = b_0 + b_1 \times VAR_t + b_2 \times NOT_t + b_3 \times GAP_t + \varepsilon_t \quad [2]$$

The specification largely follows Liu et al. (2004), which is based on the division between two distinct activities of banks -- trading and non-trading activities. Since the measured cost of equity capital for banks is aggregated over the two activities, it is necessary to account for risk from banks' non-trading activities. The specification in [2] however, ignores the correlation between trading and non-trading activities, which currently can not be satisfactorily addressed. The notional amount of banks' derivatives (*NOT*) is included because it is another control for market risk exposure. But with the same hedging tools, the greater amount of derivatives will still bring higher risk to banks. Following Liu et al. (2004), we include the short-term repricing gap (GAP) as a control for this purpose because interest risk is the primary exposure of non-trading activities.

Model for the bid-ask spread

The bid-ask spread reflects for real transaction costs for investors and should determine a bank's cost of equity capital. Liquidity or lack of it certainly should influence a bank's cost of equity capital because illiquid assets are less desirable and must offer higher returns.

With the bid-ask spread being as a proxy for the cost of equity capital, the model is

$$BAS_{t+1} = c_0 + c_1 \times VAR_t + c_2 \times SIZE_{t+1} + c_3 \times VOLUME_{t+1} + c_4 \times VOLATILITY_{t+1} + \varepsilon_{t+1} \quad [3]$$

Following the prior literature, we choose size (*SIZE*), trading volume (*VOLUME*) and return volatility (*VOLATILITY*) as control variables (e.g., Stoll (1978), Chiang and Venkatesh (1988), and Glosten and Harris (1988)). When estimating Model [2] and [3], we include a technical sophistication measure as do Liu et al. (2004). The dummy variable TS is equal to one if a bank is classified as high in technical sophistication

according to the survey by Basel Committee on Banking Supervision (2002). With high technical sophistication, banks are able to provide sophisticated models to calculate VAR and capture many risk factors. Thus, those banks with high technical sophistication are supposed to provide high-quality VAR which has high predictability of the volatility of future trading revenue.

Sample

We check all the public commercial banks in the US and choose 24 banks who are providing quantitative VAR disclosures in their financial statements. The banks in our sample choose Value at Risk (VAR) as the means to disclose their market risk exposure related to trading activities, as required by FRR No. 48 (1997). Thus, we select these 24 commercial banks over the period between 1998 and 2008 in our sample. We collect their trading VARs from the Management Discussion and Analysis section of their 10-K or 10-Q forms. Trading revenues, trading assets, the notional amounts of derivatives, and repricing gaps are obtained from Y9C, which banks filed with the Federal Reserve as a part of banking regulation requirement.

Descriptive statistics from Table 2 show that our sample contains the large-size banks. Those banks have a substantial amount of trading assets. The notional amounts of derivatives are much greater than their equity, which means managing the risk derived from trading activities is important for those banks.

Value-at-Risk (VAR) and implied volatility

We use either the quarter-end trading VAR or the average trading VAR for the quarter in this paper. We also calculate forecasted volatility of quarterly trading revenue σ_t by using the method in Jorion (2002).

Implied cost of equity capital

We calculate two measures of implied cost of equity capital (*COE*): Easton (2004) and Claus and Thomas (2001). Easton (2004) proposes a ratio type estimate for the cost of equity capital, using only short-term analysts' earnings forecasts and concurrent price. Claus and Thomas (2001) reverse-engineer the cost of equity capital from the residual income value model.

Bid-ask spread

The bid-ask spread has been long regarded as a proxy for information asymmetry between investors and management. In our paper, we calculated the daily bid-ask spread by using data from the CRSP database. Following Leuz and Verrecchia (2000), the bid-ask spread is the logarithmic average daily relative bid-ask spread scaled by the bid-ask midpoint over the quarter.

5. Empirical Results

Implied cost of equity capital

We analyze the impact of disclosure of VAR on cost of capital by testing model [2]. Table 4 presents the regression results in which the dependent variable, implied cost of equity capital, is calculated by using both Claus and Thomas (2001) and Easton (2004)'s formula. We begin by examining the simple regression of the implied cost of equity capital on the magnitude of VAR alone. We find that there exists a significantly positive relationship between the implied cost of capital and VAR, the risk measure. We also find that the relationship is much stronger in the pre-crisis period than in the crisis period. Our findings of a significant relationship between the implied cost of equity capital and the magnitude of VAR corroborate the findings in Rajgopal (1999) and Liu et al. (2004).

Specification 2 includes the quality of VAR as defined in the previous section. As predicted, high quality in VAR leads to a lower cost of equity capital. Table 4 also reports the impact of the quality of VAR on the cost of equity capital. As predicted, the coefficient of the dummy variable TS is significantly negative. It is consistent with the argument that investors likely regard high quality in VAR as a positive attribute and thus demand less risk compensation. Both the magnitude and quality remain significant, indicating that the information content of both variables is not completely overlapping.

In summary, we find that both magnitude and quality of VAR influence banks' cost of equity capital. Moreover, the relationship between the cost of equity capital and the magnitude of VAR implies that investors are able to correctly discern the quality of disclosed VAR and take its quality into account when interpreting VAR as a risk measure.

Bid-ask spread

Table 5 presents the regression results for model [3] in which the bid-ask spread is a proxy for the information asymmetry component of the cost of equity capital. It reports the results of regression of the bid-ask spread on VAR, controlling for size, trading volume, and return volatility. Similar to the results for model [2], the coefficient of VAR is significant and has the predicted sign. The relationship is consistent with the scenario in which banks' appetite for risk results in anxiety among investors and causes divergence in investors' opinions. The effect of reducing information asymmetry is therefore muted. Similar to the test for the implied cost of equity capital, we examine the impact of both VAR and its quality on the bid-ask spread. And the dummy variable TS also has the predicted positive sign. Other control variables generally have the expected signs and are significant at various levels.

6. Conclusions

This paper examines how VAR disclosure influences the cost of equity capital for a sample of 24 commercial banks over 1998-2008. We examine both the magnitude and the quality of VAR. We use two measures to proxy for the cost of equity capital: the

implied cost of equity capital based on Easton (2004) and the bid-ask spread. In our test of the implied cost of equity capital, we find that both magnitude and quality of VAR influence banks' cost of equity capital. In the test of the bid-ask spread, the coefficient of magnitude is significant and has the predicted signs. We also get the expected sign from the dummy variable TS. Our study contributes to the literature by providing new evidence to the impact of magnitude and quality of disclosure on stock markets. The findings that stock markets react to VAR disclosure in an economically sensible way adds further support to the current call for improved risk disclosure. Our study has several limitations. The VAR disclosure is limited to a subgroup of commercial banks, which limits the generalizability of our results. However, we argue that one can still draw boarder implications from this study. For example, our results suggest that investors not only respond to the face value of disclosure, but also respond to the quality of disclosure.

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TABLE 1. DEFINITION OF VARIABLES

VAR_t	Quarterly value at risk, end of quarter value if available, average over quarter t otherwise (scaled by trading revenue)
COE_t	Implied Cost of Equity Capital
BAS_t	the logarithmic average daily relative bid-ask spread over quarter t(i.e., scaled by the bid-ask midpoint)
TS_t	Dummy variable. 1 if bank is of high technical sophistication, 0 otherwise.
NOT_t	Notional amounts of outstanding derivatives at the end of quarter t (scaled by trading assets)
GAP_t	0-1 year repricing gap (scaled by trading assets)
$SIZE_t$	the logarithmic market capitalization at the end of quarter t
$VOLUME_t$	the logarithmic average daily turnover (i.e., the number of shares traded scalded by the total number of shares outstanding) over quarter t
$VOLATILITY_t$	the logarithmic standard deviation of daily stock returns over quarter t

TABLE 2. DESCRIPTIVE STATISTICS

Name	*Number*	*Min.*	*25%*	*Median*	*75%*	*Max.*	*Mean*	*Std.dev.*
VAR	690	0.000	0.042	0.112	0.247	2.194	0.081	0.352
COE1	691	0.051	0.081	0.091	0.102	0.317	0.094	0.031
COE2	691	0.027	0.061	0.077	0.091	0.317	0.081	0.038
BAS	650	-8.020	-7.391	-6.510	-5.130	-3.295	-6.215	1.293
REVVOL	642	0.000	0.002	0.011	0.028	0.798	0.043	0.230
GAP	688	-0.000	0.002	0.011	0.028	0.798	0.044	0.116
NOT	685	0.000	0.032	0.059	0.103	0.356	0.075	0.061
SIZE	691	6.966	9.333	9.934	10.95	12.43	10.02	1.283
Beta	691	0.153	0.784	1.017	1.292	2.297	1.045	0.395
VOLUME	685	-7.704	-5.955	-5.654	-5.351	-3.824	-5.670	0.648
VOLATILITY	685	-5.031	-4.525	-4.062	-3.704	-2.714	-4.090	0.505

Note 1: COE1 is the cost of equity capital developed by Claus and Thomas (2001) method.

Note 2: COE2 is the cost of equity capital developed by Easton (2004) method.

TABLE 3. VARIABLE CORRELATIONS

VARIABLE	COE1	COE2	SPREAD	VAR	NOT	GAP	SIZE	BETA	VOLUME	VOLATILITY
COE1		0.774***	0.125***	0.068*	-0.010	-0.000	0.014	0.220***	0.261***	0.295***
COE2	0.482***		0.031	0.074*	-0.001	-0.015	0.130***	0.157***	0.159***	0.164***
SPREAD	0.172***	-0.022		0.008	-0.033	0.082**	-0.155***	0.113***	-0.176***	0.645***
VAR	0.119***	0.301***	0.024		-0.063	-0.109***	0.134***	0.069*	0.097**	0.051
NOT	-0.029	0.010	-0.074*	-0.033		0.206***	0.361***	0.255***	0.224***	0.037
GAP	-0.096**	-0.176***	0.062	-0.196***	-0.433***		-0.366***	-0.231***	-0.331***	-0.032
SIZE	0.074*	0.358***	-0.141***	0.361***	0.459***	-0.633***		0.286***	0.335***	-0.073*
BETA	0.090**	0.003	0.151***	0.036	0.320***	-0.338***	0.223***		0.620***	0.543***
VOLUME	0.078**	-0.061	-0.148***	0.019	0.334***	-0.282***	0.113***	0.492***		0.371***
VOLATILITY	0.206***	0.055	0.685***	-0.030	0.042	-0.075*	-0.064	0.497***	0.312***	

The upper right (lower left) is Pearson (Spearman) correlation coefficients. ***, **, and * stand for being significant at 1%, 5%, and 10%, respective.

TABLE 4. RELATION BETWEEN COST OF EQUITY AND VAR

PANEL A: Dependent Variable=COE1

	Pre-Crisis: 1998-2006			Crisis: 2007-2008			Full Period: 1998-2008		
Parameter	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
INTERCEPT	0.088***	0.046***	0.064***	0.133***	0.086	0.211*	0.093***	0.045**	0.070***
	(25.687)	(2.421)	(3.124)	(5.249)	(0.915)	(1.625)	(19.082)	(1.823)	(2.523)
VAR	0.010**	0.007**	0.005*	-0.016	-0.017*	-0.017*	0.006*	0.004	0.002
	(2.026)	(1.758)	(1.341)	(-1.207)	(-1.379)	(-1.610)	(1.308)	(0.874)	(0.459)
GAP	0.008	0.029***	0.032***	-0.093	-0.006	0.227***	-0.003	0.030**	0.033**
	(0.657)	(2.469)	(2.394)	(-0.989)	(-0.063)	(4.593)	(-0.185)	(1.792)	(1.895)
NOT	0.002	-0.038**	-0.054***	-0.118*	-0.148**	-0.180***	0.003	-0.063**	-0.080***
	(0.077)	(-1.692)	(-2.551)	(-1.404)	(-1.770)	(-5.760)	(0.092)	(-2.288)	(-3.547)
SIZE		0.005***	0.003		0.001	-0.013		0.004*	0.001
		(2.553)	(1.272)		(0.095)	(-1.231)		(1.582)	(0.333)
BETA		-0.002	-0.003		0.031***	0.026**		0.014**	0.014**
		(-0.481)	(-0.662)		(2.610)	(1.769)		(1.730)	(1.704)
TS			0.010*			0.066***			0.013*
			(1.488)			(2.627)			(1.611)
Adj. R^2	0.028	0.099	0.134	0.000	0.027	0.138	0.001	0.044	0.065

t-statistics use two-way clustered standard errors (by time and firm). The coefficient estimates for GAP and NOT are multiplied by 1,000 for the display purpose. ***, **, and * stand for being significant at 1%, 5%, and 10% levels, respectively.

TABLE 4. RELATION BETWEEN COST OF EQUITY AND VAR (CONT.)

PANELB: Dependent Variable=COE2

	Pre-Crisis: 1998-2006			Crisis: 2007-2008			Full Period: 1998-2008		
Parameter	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
INTERCEPT	0.073***	0.064***	0.095***	0.136***	0.094	0.280**	0.079***	0.059**	0.097***
	(19.574)	(4.076)	(5.457)	(4.842)	(0.767)	(2.194)	(14.257)	(1.826)	(3.141)
VAR	0.007**	0.006**	0.003	-0.012	-0.014	-0.014	0.007*	0.006	0.003
	(1.876)	(1.822)	(0.880)	(-0.727)	(-1.009)	(-1.264)	(1.621)	(1.148)	(0.576)
GAP	0.019**	0.023***	0.028***	-0.235**	-0.105	0.240***	0.003	0.026	0.032**
	(1.749)	(2.395)	(4.258)	(-1.840)	(-0.900)	(3.332)	(0.172)	(1.256)	(1.707)
NOT	-0.007	-0.016	-0.041**	-0.157**	-0.172	-0.219**	-0.004	-0.053	-0.080**
	(-0.255)	(-0.624)	(-2.124)	(-1.695)	(-0.986)	(-1.903)	(-0.160)	(-1.112)	(-1.961)
SIZE		0.001	-0.002*		-0.003	-0.023**		-0.000	-0.005*
		(0.540)	(-1.331)		(-0.257)	(-2.240)		(-0.101)	(-1.366)
BETA		0.001	-0.001		0.051***	0.043**		0.025**	0.025**
		(0.093)	(-0.105)		(2.794)	(2.152)		(2.191)	(2.185)
TS			0.016***			0.097***			0.020**
			(2.650)			(3.671)			(2.144)
Adj. R^2	0.015	0.013	0.075	0.011	0.080	0.264	0.000	0.056	0.090

TABLE 5. RELATION BETWEEN BID-ASK SPREAD AND VAR

	Pre-Crisis: 1998-2006			Crisis: 2007-2008			Full Period: 1998-2008		
Parameter	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
INTERCEPT	-1.972**	-1.423	-0.973	-2.470***	-3.264*	-3.175	-3.732***	-2.758**	-1.973*
	(-2.263)	(-1.040)	(-0.705)	(-2.807)	(-1.308)	(-1.113)	(-4.071)	(-2.113)	(-1.581)
VAR	0.111**	0.108**	0.100**	-0.001	0.006	0.005	0.086**	0.081*	0.071*
	(1.974)	(1.825)	(1.722)	(-0.031)	(0.157)	(0.127)	(1.829)	(1.597)	(1.377)
SIZE	-0.844***	-0.799***	-0.766***	-0.087	-0.122	-0.117	-0.986***	-0.907***	-0.844***
	(-9.079)	(-7.233)	(-6.505)	(-0.742)	(-0.740)	(-0.620)	(-6.971)	(-6.103)	(-5.817)
VOLUME	2.270***	2.324***	2.274***	0.613**	0.491	0.490	2.065***	2.161***	2.092***
	(12.720)	(9.964)	(9.694)	(1.976)	(1.125)	(1.117)	(12.440)	(9.931)	(9.777)
VOLATILITY	0.055	0.066*	0.013	-0.223***	-0.236***	-0.242***	0.054	0.070	-0.010
	(1.251)	(1.391)	(0.219)	(-7.935)	(-9.665)	(-4.509)	(1.020)	(1.251)	(-0.170)
BETA		-0.189	-0.204		0.220	0.212		-0.294	-0.317
		(-0.685)	(-0.740)		(0.494)	(0.437)		(-1.135)	(-1.225)
TS			0.178*			0.024			0.262**
			(1.339)			(0.210)			(1.738)
Adj. R^2	0.686	0.687	0.689	0.477	0.476	0.470	0.637	0.641	0.645

t-statistics use two-way clustered standard errors (by time and firm). The coefficient estimates for GAP and NOT are multiplied by 1,000 for the display purpose. ***, **, and * stand for being significant at 1%, 5%, and 10% levels, respectively