Badla Financing, Stock Returns and Volatility: The Case Study of Karachi Stock Exchange

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Abstract: Using badla financing as a measure of leverage we examine both temporal and contemporaneous links among badla financing, stock returns and market volatility. We find that the market volatility is significantly and positively related to the change in badla financing and to past market returns. We also observe a significantly positive temporal causation between prior market returns and both badla financing as well as stock price volatility.

1. Introduction

An understanding of the behavior of financial markets has never been more important than it is today. Following the improvement in technology, many new risk management tools have been introduced that have increased the efficiency of the market. Financial reforms and openness have brought an unbelievable change in the behavior of financial markets and overall stimulated the activities in these markets. Now these markets are more efficient and dynamic/volatile than before.

Since forecasting of stock price volatility has many practical applications, there is an increasing interest in modelling the volatilities of stock returns. Investment decisions, as characterized by asset pricing models, strongly depend on the assessment of future returns and risk of various assets. Analogously, the expected volatility of a security return plays an important role in the option pricing theory. Apart from corporate sector's investment decisions, the level of volatility can also influence the banks' willingness and ability to extend credit facilities.

In recent years Karachi Stock Exchange has gained a lot of attraction. It has been among the best performing markets of Asia. It has achieved new heights as the KSE 100 index crossed the barrier of 10,000 in March 2005 and then the barrier of 12,000 in April 2006. Similarly, the Market Capitalization and Trading Volume increased by more than 800% and 1000% respectively during 2001-2005 in terms of dollars, (source: Global Stock Markets Factbook, 2006).

However, during this period, the market has also experienced few crises that cast doubts on the fairness of the market operations. In particular, the crises started in March 2005[1] triggered the widely held opinion of speculations and manipulations prevailed in the market and thus forcing Securities and Exchange Commission of Pakistan (SECP), the regulatory body, to set up a task force to identify the causes of market crash. In this context, badla[2] financing is often blamed for causing instability in the market. For instance, in its annual review of financial markets-2006, the State Bank of Pakistan (SBP) said the presence of badla financing is one of the major factors of instability in equity markets.

Marginal borrowings have long been associated with instability in security market. In 1954, Galbraith claimed that the margin loans were the center of the 1929 Crash, arguing that heavy borrowing from brokers exacerbated the rise in stock prices in the late 1920s and the stock price declines during the Crash. Another analysis by the U.S. Security and Exchange Commission (1988) gave low margin requirements and high margin borrowings a prominent place in the pantheon of reasons for the 1987 stock market crash.

After the 1987 Crash, the link between margin borrowing and stock price volatility is of great concern to academician, researchers and policymakers. This concentration has got further mount after a controversial study of Hardouvelis (1990). This study concludes that historical evidence supports the premise that stock price volatility can be controlled by controlling margin financing[3]. The study also claims that the excess volatility arises from speculative bubbles rather that any fundamental cause. Seguin and Jarell (1993) addressed the role of margin calls in the October 1987 Crash by comparing returns and trading volumes on margin-eligible and margin-ineligible stocks traded on the NASDAQ. They performed an event analysis for the period October 16 to October 28, 1987. Their findings are consistent with the view that forced sales from margin calls were operating to raise trading volume on margin stock during the examined period.

More recently, a study by Kupiec (1997) reported that the volume of margin credit is positively and significantly related to stock market returns volatility and margin requirements had predictable effect on stock price volatility. Similarly, Zhang et al. (2005) used margin credit balance as a measure of leverage to examine the time series relation

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[1] In 2005, the market was highly volatile. The high low of 2005 was 10300 and 6400. The gap of 4100 points was the highest in the history of KSE for any particular year till that time.

[2] Badla is an informal source of financing, widely used in Pakistan's stock exchanges. This transaction is made when an investor, who lacks funds, commits to buy certain shares. A badla financer provides financing against such shares at market determined premium. This short term collateralized lending is very similar to a repurchase agreement (REPO) used in the inter bank market (for details, see Rashid (2007)).

[3] See Hsieh and Miller (1990) for counter conclusion. They suggest that there is little evidence to support the proposition that margin policy is an effective tool in controlling stock market volatility.

among margin borrowing, stock returns and market volatility. They found a statistically significant evidence of a strong market momentum effect and significant causal relation between stock returns and both leverage and volatility.

This paper therefore aims to examine whether market volatility is significantly and positively related to badla financing or not, after controlling the market momentum effects. The theoretical justification of the relationship between badla financing and stock market volatility is explained as follows. An upward change in stock prices encourages optimistic traders to borrow additional funds for stock purchases. These leveraged purchases create additional upward pressure on stock prices, which in turn encourages traders to borrow further. When the inevitable market corrections occur, leveraged traders – perhaps to avoid the borrowing cost – rush to dump a large chunk of stock in the market at once in order to liquidate their positions. Indeed, this excess supply would cause the tremendous decline in stock prices. Thus, there must be, in general, a positive relation between badla financing and stock price volatility[4].

The paper tests the hypothesis that leverage from badla generates price volatility by examining the tripartite relationship between badla financing, stock returns and stock price volatility. To achieve this, the vector autoregressive (VAR) analysis is performed. We find that both the past market returns and the change in badla financing have a statistically significant impact on market volatility. However, our results suggest that there is no significant relationship between the change in call money rate and stock market volatility. We also observe a strong market momentum effect, as the lagged values of stock returns appeared statistically significant.

The remainder paper is organized as follows. The next section of the paper presents the empirical methodology. Section 3 describes the data. The empirical findings are presented and discussed in Section 3, and finally Section 4 concludes the paper.

2. Methodology

In financial economic literature, there are many competing parametric models to represent conditional heteroscedasticity of return volatility. Some have related this volatility to macroeconomic volatility, recessions and banking crises[5]. In this paper, we consider that stock market volatility can be influenced by trading activities, trading costs, and market liquidity (badla financing). The general form of the change in volatility model is defined as:

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[4] See Bogen and Krooss (1960), for more theoretical discussion on the relationship between security credit and stock price volatility. They conclude that cheaper loans stimulate the demand for stocks, inducing price increases that provide the additional equity that is the foundation of further borrowing to finance additional stock purchases.

[5] For further details, see Engle (1982) and Officer (1973).

$$\Delta SD(R)_t = \sum_{k=1}^{M} \beta_k f_{kt} + \varepsilon_t \tag{1}$$

where $\Delta SD(R)_t$ is the change in weekly volatility proxy of the aggregate stock market volatility at time t, and f_{kt} is the change in the kth factor at time t. With inclusion of N past volatility and an intercept, model (1) is thus expanded as follows:

$$\Delta SD(R)_t = \alpha + \sum_{k=1}^{M} \beta_k f_{kt} + \sum_{i=1}^{N} \theta_i \Delta SD(R)_{t-i} + \varepsilon_t \tag{2}$$

Following Officer (1973) and Hsieh and Miller (1990), we calculate the standard deviation of KSE-100 daily return in each week to construct the proxy for market volatility.

To further examine the inter-temporal relation between stock returns and badla financing, we perform vector autoregressive (VAR) analysis. We also include the unexpected returns of the previous two weeks to check the possible momentum effects. The VAR model is defined as follows:

$$Y_t = C + AZ_t + \sum_{i=1}^{2} \Gamma_i Y_{t-i} + \xi_t \tag{3}$$

where Y_t is a 2×1 column vector of two endogenous variables and the Z_t is a column vector of exogenous variables in the system. The term C is a 2×1 column vector of constant terms. The term A and Γ are the matrix of coefficient and ξ_t is a 2×1 column vector of innovations.

3. Data

The data on exchange rate and call money rate is obtained from State Bank of Pakistan. The closing value of KSE-100 index is obtained from First National Equity[6] database and the badla investment volume as well as badla rates are taken from Aarif Habib Investment database. These time series data range from January 1, 2003 to August 31, 2007. The first order log difference is used to find the change in variables.

4. Empirical Finding

To assess the relationship between stock returns and the change in badla financing, we estimate the VAR model described by equation (1). We also include the unexpected returns of the previous two week to check for possible momentum effects. The estimates of the model are presented in Table 1.

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[6] www.fnetrade.com

Table 1: Results from Vector Autoregressive Analysis for Stock Returns and the Change in Badla Financing

Independent Variables	Stock Returns (SR_t)	Change in Badla Financing (ΔBF_t)
Intercept	0.006*	-0.258
SR_{t-1}	0.002	9.794*
SR_{t-2}	0.130*	8.275*
ΔBF_{t-1}	0.003*	-0.179*
ΔBF_{t-2}	-0.001	-0.209*
ΔCR_t	0.003*	0.241*
ΔEX_t	-0.676	96.211

Note: * denotes significant at the 5% level.

The results are interesting. Both market returns and the change in badla financing are significantly and positively influenced by prior market returns. The past change in badla financing, in contrast, has statistically significant negative impact on stock returns as well as on the change in badla financing. The coefficient for the change in call money rate is positive and statistically significant. This implies that an increase in call money rate will cause an increase in badla financing. However, our results suggest that neither stock returns nor badla financing significantly related to the change in exchange rate and call money rate validating our VAR model when these two traded as exogenous.

The change in badla financing tends to follow previous market return, implying that the gains in stock market encourage optimistic traders to do badla financing to rollover their positions to the next settlement. This piece of evidence suggests that the market has become used to badla investment which is not an encouraging sign.

To examine the relationship between stock returns and the change in call money rate, we estimate the VAR model described by equation (3) for stock returns and the change in call money rate. Table 2 presents the regression results.

It can be seen from the table that there is no significant relationship between market returns and lagged change in call money rate. The current change in call money is significantly and negatively affected by the previous change in call money rate. In addition to this, we find that both market returns and the change in call money rate are significantly and positively related to the change in badla financing. This implies that badla financing is playing significant role in determination of call money rate in Pakistan.

Table 2: Results from Vector Autoregressive Analysis for Stock Returns and the Change in Call Money Rate

Independent Variables	Stock Returns (SR_t)	Change in Call Money Rate (ΔCR_t)
Intercept	0.007*	0.095
SR_{t-1}	0.012	-5.135
SR_{t-2}	0.125*	1.093
ΔCR_{t-1}	0.001	-0.616*
ΔCR_{t-2}	-0.001	-0.299*
ΔBF_t	0.005*	0.194*
ΔEX_t	-1.266	-74.862

Note: * denotes significant at the 5% level.

We next examine the contemporary influence of the change in badla financing, ΔBF_t, on the change in weekly standard deviation (a proxy for market volatility) of daily returns of KSE-100 index. We estimate the model described by equation (2) to explore the relation between badla financing and market volatility. The change in call money rate and the change in exchange rate are also included in the model to control the risk effect. In addition to this, the model contains the change in volatility of the previous three weeks to check the possible momentum effects as well as the aggregate returns of KSE-100 index as market returns. Specifically, the model is defined as follows:

$$\Delta SD(R)_t = \alpha + \beta_1 \Delta BF_t + \beta_2 \Delta CR_t + \beta_3 \Delta EX_t + \beta_4 SR_t + \sum_{i=1}^{3} \theta_i \Delta SD(R)_{t-i} + \zeta_t \quad (4)$$

where ζ_t has zero mean and constant variance. Estimates for contemporaneous relation between the change in badla financing and market volatility are summarized in Table 3.

Table 3: Results for Contemporaneous Linkages between Badla Financing and Volatility

Independent Variables	Change in Market Volatility ($\Delta SD(R)_t$)			
	A	**B**	**C**	**D**
Intercept	3.249	0.904	0.699	0.138
ΔBF_t	**4.358**	**4.427**	**3.913**	**3.559**
SR_t	**-303.428**	**-312.690**	**-325.367**	-175.724
SR_{t-1}		**346.539**	**376.770**	**278.785**
ΔCR_t			2.5509	1.315
$\Delta SD(R)_{t-1}$				**-0.559**
$\Delta SD(R)_{t-2}$				**-0.232**
$\Delta SD(R)_{t-3}$				-0.094

Note: The bold values are significant at the 5% level.

We find that the change in market volatility is positively and significantly affected by the change in badla financing. This finding supports the idea that the leveraged purchasers create additional upward pressure on stock prices and then with the arrival of any unfavorable public news or/and to avoid the consecutive cost of badla financing they rush to liquidate their positions. Thus, the leveraged purchases create wild price fluctuations. It may also imply that leverage resulting badla financing causes stock price volatility.

To further address the tripartite relation between market returns, badla financing, and market volatility, we perform vector autoregressive analysis described by equation (3) to examine the inter-temporal relation between market returns and market volatility. The estimates of the VAR are presented in Table 4.

The table reveals that market volatility is significantly related to previous stock returns as well as to past market volatility. It is interesting to note that both market returns and market volatility are significantly and positively related to the change in badla financing. The findings suggest that the post market returns Granger-cause both the current change in badla financing and market volatility (see Table 1). However, both the change in call money rate and the change in nominal exchange rate have no any direct significant impact on market volatility.

Table 4: Results from Vector Autoregressive Analysis for Stock Returns and Market Volatility

Independent Variables	Stock Returns (SR_t)	Change in Market Volatility ($\Delta SD(R)_t$)
Intercept	0.006*	-0.019
SR_{t-1}	0.089	305.207*
SR_{t-2}	0.064	-207.241
$\Delta SD(R)_{t-1}$	0.000	-0.533*
$\Delta SD(R)_{t-2}$	-0.005*	-0.162*
ΔBF_t	0.004*	2.305*
ΔCR_t	0.001	1.601
ΔEX_t	-1.048	1370.298

Note: * denotes significance at the 5% level.

5. Conclusions

This paper examines the tripartite causal relation between leverage, stock returns and stock price volatility. Badla financing is used as a proxy for leverage. We perform vector autoregressive (VAR) analysis to explore the inter-temporal linkages between the variables. In addition to the change in call money rate and the change in exchange rate; we

also include the prior market returns in the specification of VAR model to check for possible momentum effects.

The estimates provide evidence that the market volatility is significantly and positively influenced by both the change in badla financing as well as the previous market returns. Regarding causality, we find that the past market returns Granger-cause both the change in badla financing and volatility. A strong momentum effect is also observed. However, the results suggest that both the change in call money rate and the change in nominal exchange rate do not have any statistically significant effect on market volatility.

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