

Introduction

At present, India does not have organized options and futures markets for financial securities. Until recently, however, there existed a facility for a form of highly leveraged margin trading called the *Badla* system. For stocks categorized as Group A, investors could carry forward taking (making) delivery by using an intermediary - the *badla* financier, who lends the necessary cash (stock). Since the required margin was only 15%, this facility was akin to a form of forward trading where the investors could settle up the realized profits/losses before they took (made) delivery or made an offsetting trade. Most of the trades involving *badla* are reportedly settled with an offsetting trade without an actual deliveries taking place.

In March of 1994, the Securities and Exchange Board of India (SEBI), the principal regulatory agency for the Indian stock markets, severely restricted¹ the *badla* system blaming it for "excessive speculation" in the Indian stock markets. SEBI's decision to effectively ban the carry forward practice has been hotly debated in the Indian financial press. On one side are the regulators and certain market participants who blame the *badla* system for causing "excessive speculation" in Indian stock markets. On the other side are brokers and stock exchange officials who are unwilling to give up a system which has served them well. They argue that its ban will drive down liquidity and the trading volume thereby

¹ All the restrictions that were put into place by the SEBI are summarized in an Appendix.

increasing the cost of trading for small investors. They point to the dramatic fall in the trading volume since SEBI's unilateral decision to ban the *badla* system. In Table 1 we extract from a report by the Economic Times, which shows that the trading volume for Group A stocks by the end of 1994 is less than 10% of that at the beginning of the year. Yet the regulators seem to feel that this decline in trading volume is not a bad thing, as it only proves that they have succeeded in driving out the "short-term speculators" and helped the "genuine investors".

As academicians we are unable to define "excessive" speculation since no formal definition of "optimal" speculation exists. However, we would like to address the issue empirically and determine whether "excessive trading" by noise traders has rendered group A stocks more volatile than a comparable sample of group B stocks for which the *badla* system was unavailable. If it is found that, after controlling for other factors, the stocks in group A were more volatile, then it would strengthen the case for those who believe that noise traders destabilize the market. On the other hand, lower volatility for group A stocks may suggest that there is enhanced liquidity on account of the additional trades from the "speculators".

Stock price volatility has received much public attention in recent years in other countries as well. Episodes that increase stock price volatility such as the stock market crash of October 1987 have unnerved

investors, regulators, central banks as well as the general public. Speculative trades in derivative securities have often been blamed for destabilizing the cash markets and causing excessive volatility. Also, there are certain economists, such as James Tobin, Joseph Stiglitz and Lawrence Summers, who have recommended imposing a tax on short-term securities trades as they believe such trades induce excessive volatility.² In a similar vein, Hardouvelis (1990) claims that changes in the margin requirements have an effect on the market volatility. However, David Hsieh and Merton Miller (1990) dispute his results saying that they are an outcome of a "flawed test design". Overall, extant theory is unable to resolve the issue of whether speculative traders destabilize the stock markets.³ Therefore, it is imperative to turn to empirical evidence to settle this question.

Stoll and Whaley (1987) find an increase in the S&P 500 index volatility on expiration days of the derivative securities. On the other hand, Conrad (1989), Damodaran and Lim (1988), Detemple and Jorion (1990), and Nabar and Park (1988) find that stock return volatilities of individual stocks decrease after equity options were

² There are many authors who oppose the view that noise traders destabilize the market. For instance, Ross(1989) believes that taxing short-term trades will only discourage the activities of traders who provide liquidity to the market. If anything, he says, they should thank us for taxing them out of existence since they really don't know what is good for them! In fact, Umlauf (1993) finds that an imposition of a transaction tax in Sweden did not lower the volatility but resulted in lower trading volumes.

³ Grundfest and Shoven (1991) suggest that models could be constructed to obtain virtually any type of prediction about volatility, by saying, "purely theoretical arguments ... on volatility... are as speculative as the speculation they seek to drive from the market." Similarly, Schwert (1990) says that the "search for antidotes for "excess" volatility is fruitless as the ailment does not, in fact, exist."

introduced. Harris (1989) compared the stock return volatilities of S&P 500 stocks with a matched group of non-S&P 500 stocks. He observed no significant difference between the two groups before trades in index futures and index options were introduced. However, following the introduction of derivative trading, S&P 500 stocks have been found to be more volatile. Jegadeesh and Subrahmanyam (1993) find that the bid-ask spreads are higher (though not economically significant) for the S&P 500 stocks as compared to a matched sample of non-S&P 500 stocks, after controlling for the determinants of spreads. They hypothesize that informed traders with firm-specific information prefer to trade in the cash market, while the uninformed operate in the index futures market. Thus with the introduction of the index futures, market makers of individual S&P 500 stocks may face higher adverse selection costs and reduced number of trades, resulting in higher spreads.

In this paper, we address this issue of whether "speculative traders" increase the stock price volatility by examining the cross sectional differences in volatility for two group of stocks on the Bombay Stock Exchange. Group A stocks, for which highly leveraged trades were allowed, were alleged to be prone to rampant speculation. By implication, trades involving the group B stocks are carried out by "genuine long-term investors." We organize the rest of the paper as follows. In section 2, we describe the trading system of the Bombay Stock Exchange with respect to transactions

in group A and group B securities. The data, methodology, and empirical results are reported in section 3. Finally, in section 4, we offer our conclusions.

2. An overview of trading on the Bombay Stock Exchange

The Bombay Stock Exchange (B.S.E) is the largest, most active stock market in India and accounts for 65-70% of all transactions in value terms and about 80% of market capitalization. As of 1991, 6700 companies were listed on the exchange. The total number of shareholders in India is estimated to be about 15 million.

Classification: Listed securities are classified into Group A and Group B categories. Group A securities, also known as specified securities, can be traded with or without effecting deliveries. Firms are included in this category based on the volume of the transactions, market capitalization, public shareholding pattern, payment of dividends etc. There are about 92 stocks in this category at any point in time. Transactions in Group B, alternatively called the cash shares, are settled on the settlement day.

Liquidity : Joseph (1990) studied the trading frequency of B.S.E. stocks and found that only 20% of the shares were traded almost every day . Trading in another 20% of the shares was reported 2 to 3 times a week . Another 10% of the shares were traded less than twice a week but at least once in ten days. The remaining 50% of the shares

were traded less than once in ten days. About 25% of the shares do not trade even once a year. Due to the manner in which the firms are selected to be part of Group A, they constitute about 80% of all the trading volume on the Bombay Stock Exchange.

Role of members: Even though the stock exchanges do not prescribe any functional distinction between members, the B.S.E. has a fairly well established specialization covering the following types: (i) the commission brokers (ii) the floor brokers (iii) odd lot dealers (iv) *taravaniwalas* (jobbers or specialists) and (v) the *budliwalas* or financiers. Commission brokers are members who buy and sell orders on the floor of exchange on behalf of their clients. The brokerage is currently 2.5% of the value of the contract. Floor brokers are actually authorized assistants or sub brokers and execute orders for any members of the exchange. They receive a share in the brokerage fees paid by the client to the commission brokers. *Taravaniwalas* specialize in one or more of the listed securities and operate mainly on their own account. They help to maintain a continuous market by standing ready to transact on both sides and charge a spread to compensate them for their services. However, they are under no obligation to give two-way quotes or act as a dealer continuously for any particular stock. Currently, market-making arrangements are not available for all stocks. Reliable time series data on spreads are unavailable. A survey of spreads conducted in May-June 1991 and reported in Gupta (1992) shows that spreads

ranged from 0.2% to 4.5% for Group A shares and from 0.3% to 30% for Group B shares. *Budliwalas* are the financiers who lend securities to those who have sold short, or lend money to those who need funds to take delivery of securities that they have purchased.

Trading system: By and large, floor trading on the organized exchanges is the principal trading arrangement in the Indian stock markets. Trading is confined to members or their representatives. The brokers execute trades on behalf of their clients during the official trading session which lasts from 11:30 a.m. to 2:30 p.m. on weekdays. The trading floor contains several trading posts for the different securities. Potential buyers and sellers gather at the trading post where a particular security is traded and bargain using an open out-cry system. Trades are consummated at mutually agreed upon prices and where jobbing (marketmaking) is done the *taravaniwala* plays a facilitational role. The traders record the details of the deals entered into them in "sauda" books. The "sauda" books are exchange-provided notepads and the entries in them are used as evidence in settling disputes.

Settlement Procedures: For group B shares, payment of money and physical delivery of shares takes place once in two weeks on the settlement date. For group A shares, settlement is done by either: (a) delivering shares against payment, or (b) offsetting a purchase by a sale or vice versa within the account period (two weeks), or (c) carrying over the transaction to the next period. The

carryover procedure is explained with the following example.

Suppose an investor buys 1,000 shares of XYZ Corporation at Rs.55 per share. On the settlement date, XYZ sells for Rs.50 and the investor wants to carry forward the transaction to the next settlement. However, stock exchange rules stipulate that all transactions conducted in an account period must be settled on the settlement date. So the investor must find a financier to help her. Typically her broker will help her to find a *budliwala*. The *budliwala* finances an amount equal to the number of shares times the make-up price (less the margin which is typically 15%). The make-up price is determined by the stock exchange authorities and is fairly close to the price on settlement day. Assuming a make-up price of Rs.50, the investor takes delivery of 1000 shares by paying Rs.55,000. She provides Rs.5,000 and the *budliwala* puts up the other Rs.50,000. Now the investor sells the shares to the badla financier at the make-up price of Rs.50 and executes a resale contract for the subsequent settlement at a rate of Rs.50 plus the *badla* financing charge.

Typically, the *badla* rates have ranged between 2 and 3% for the two-week period or more than 50% on an annualized basis! Clearly, these rates are much higher than other nominal interest rates in India. For instance, interest rates on bank loans have ranged between 18 and 20%. This may imply that the badla charge

includes an "option-premium" with the possible default by the individual.

3. Data, sample selection and empirical results

3.1 Data and sample selection procedure

Data for this study were obtained from the database of Dataline and Research Technologies Limited (DART). The DART database covers nearly 2,000 companies listed on the Bombay Stock Exchange. Daily stock price data for 1992 was used for the analysis in this study. Data on closing prices and number of shares outstanding were obtained in computer-readable form from this database.

Our sample includes 74 firms from group A and 86 firms from group B. We chose all firms in group A for which we were able to obtain price and number of shares outstanding data from the database. We computed the trading frequency of each firm in group A in 1992. We find that the firms in group A were traded on average on 94.27% of the days on which the stock exchange remained open. On the Bombay Stock Exchange, group A firms constitute the relatively more liquid stocks. Therefore, to obtain a comparable sample of Group B firms, we computed the trading frequency of Group B firms and chose the most liquid ones. We imposed the additional constraint that the number of shares outstanding and closing price data be available on the database. 86 firms satisfied the criteria and their average trading frequency came out to be 0.9294.

The rationale for matching the two samples based on trading frequency is due to the fact that the trading frequency of the firms on the B.S.E. is shown to depend on the market capitalization and the number of shares held by the public (Eleswarapu and Krishnamurti (1994)). Thus the trading frequency represents other key firm characteristics that might impact the firm's stock volatility. Of course, we control for all the possible factors using a regression framework. Also, choosing Group B firms that relatively trade more frequently aids in computing price volatility without encountering the problems associated with thin trading.

The reason for choosing 1992 for our analysis is as follows. The Indian Stock market witnessed a major scam in 1992, where large sums of money from the banks' treasury portfolios was illegally diverted into the stock market. There was a huge surge in the stock prices before a crash on the discovery of the scam. So the stock market experienced extreme volatility with large price movements. The popular opinion was that there was a speculative bubble with prices being disconnected from "true" values. If this is true the impact of these speculative trades should have a greater effect on Group A stocks where there is the facility of leveraged trading (the *badla* system). Therefore we should expect greater volatility and price reversals in group A stocks.

In Table 2, we describe the sample characteristics. The average closing price is Rs.610.03 and Rs.226.66 for group A and group B shares respectively. The average

trading frequency for the two groups are 0.9427 and 0.9294. Market capitalization for group A and group B shares are Rs.15,310 million and Rs.6389 million respectively. We ran market model regressions of individual security daily returns during 1992 on the Bombay Stock Exchange National Index. The average daily residual variance are 0.00238 and 0.00565 for the group A and group B stocks respectively. We also computed 2-day and 5-day returns and estimated the market model residuals. The 2-day average residuals are 0.00311 and 0.00880 for the two groups of shares. For 5-day residuals, we found the averages to be 0.00570 and 0.01620. The two groups have almost identical trading frequencies. But the group B shares included in our sample tend to have lower prices on average and their market capitalizations are also lower. The market model residual variances of group B shares are also two to three times more as compared to group A shares.

3.2 Empirical results

Our major objective is to compare the stock return volatilities of group A and group B stocks. Since the focus is on the volatility created by excessive speculation by the noise traders, we isolate the volatility on account of general market movements and focus our attention on the market market residuals. Obviously, factors besides inclusion in group A (or B) will affect the volatilities. Therefore, we control for the other possible factors in a regression framework similar to Harris (1989). We use the average closing

price, market capitalization and the trading frequency as our other control variables. As Harris (1989) points out the volatility is likely to be related inversely to the price level on account of price discreteness and/or bid-ask spreads, where a constant volatility in prices is likely to be induced irrespective of the price level. This would imply a relatively higher return volatility for low priced stocks. Next, the volatility is expected to be higher for smaller firms as they would have larger undiversified risk. Finally, the trading frequency is also likely to affect the price volatility. Firms that trade less frequently are illiquid and hence volatility will be larger on account of the bid-ask bounce.

$$\text{RESVAR}_{it} = \alpha_0 + \alpha_1 \text{InGrB}_{it} + \alpha_2 \text{ClPr}_{it} + \alpha_3 \text{MarCap}_{it} + \alpha_4 \text{TrFrq}_{it} + e_{it} \quad (1)$$

Where RESVAR_{it} is the market model residual variance of stock i and the independent variables are described below. Using market model parameters, residuals are computed on a daily basis. The variances of the residuals of each firm are then computed for each calendar month. InGrB_{it} is a dummy variable that takes the value of one if it is a group B stock and zero otherwise. ClPr_{it} is the average closing price of stock i during the month. MarCap_{it} is the market capitalization of stock i as of March 31, 1992. TrFrq_{it} is the trading frequency of stock i and is computed as the fraction of the number of days on which the given stock traded with respect to the total number of trading days in a given

month. Our primary interest lies in the estimate of the parameter α_1 which represents the average difference in residual variance between the control sample belonging to group B and those of group A securities after controlling for cross-sectional variation due to the other independent variables.

We estimate the model over the year 1992 utilizing residual variances measured over daily, 2-day and 5-day intervals. The multiday variances are computed from overlapping data. If badla trades are indeed destabilizing, then we would like to know whether the increase in volatility depends on the time interval used for computing returns.

In Table 3, we report the parameter estimates from regressing the residual variance computed on a monthly basis on the dummy variable for inclusion in group B, the average closing price of the stock, the market capitalization, and the trading frequency. For residuals computed using daily returns, the regression results indicate that α_1 , the coefficient of the dummy variable is positive but not statistically different from zero. That is, group B stocks are more volatile than group A stocks after controlling for other factors that affect volatility, but the difference is not statistically significant. The results also indicate that as expected stocks with higher trading frequency have significantly lower volatility. Market capitalization has a negative effect on residual variance, but the variable is not

significant statistically at conventional levels. The closing price variable is also not significant. When 2-day returns are used for computing the residual variances, regression results show that all the variables except the closing price variable are significant at conventional levels. The dummy variable InGrB is significant with a positive coefficient, indicating that group B stocks are in fact more volatile than group A stocks, even after controlling for other variables that are expected to affect stock return volatility. Similar results are found when 5-day returns are used for computing the residuals with the exception that the market capitalization variable is not significant. This clearly does not support the view that excessive speculation on account of the *badla* system has increased the volatility of the group A stocks.

If speculative trades cause pricing errors, then short-horizon returns would have large error components. On subsequent trading days, these errors would be rectified. Therefore, we expect a negative serial correlation in stock returns. We can study the serial correlation pattern by using variance ratios. Our results from Table 2 imply that the ratio of 2-day residual variance (divided by two) to daily residual variance is 0.6534 and 0.7788 for group A and group B stocks respectively. This implies group A stocks experience higher price reversals group B stocks. There are two possibilities. Either firm specific characteristics or

the effect of inclusion in Group A may influence the serial correlation in stock returns.

We run the following regression to control for firm specific attributes:

$$\text{VarRatio}_{it} = \beta_0 + \beta_1 \text{InGrB}_{it} + \beta_2 \text{ClPr}_{it} + \beta_3 \text{MarCap}_{it} + \beta_4 \text{TrFrq}_{it} + e_{it} \quad (2)$$

Where VarRatio_{it} is the ratio of long horizon residual variance of stock i to its corresponding short horizon value, and the independent variables are described below. InGrB_{it} is a dummy variable that takes the value of one if it is a group B stock and zero otherwise. ClPr_{it} is the average closing price of stock i during the month. MarCap_{it} is the market capitalization of stock i as of March 31, 1992. TrFrq_{it} is the trading frequency of stock i and is computed as the fraction of the number of days on which the given stock traded with respect to the total number of trading days in a given month. VarRatio_{it} is computed as the ratio of half the 2-day residual variance to its daily residual variance or the ratio of one-fifth of the 5-day residual variance to the daily residual variance.

The OLS parameter estimates are reported in Table 4. The 2-day to daily residual variance regression indicates that the inclusion in group B (InGrB) is not statistically significant. Trading frequency has a negative and statistically significant effect. Stocks with higher trading frequency, *ceteris paribus*, have lower residual variance ratios and therefore larger

negative serial correlations. Trading causes pricing errors for both group A and group B stocks. The 5-day to daily residual variance regression results do not indicate any statistically significant coefficients. The two groups are not significantly different from each other in terms of their serial correlation behavior. Thus, pricing errors are not any more common in group A than in group B stocks.

4.0 Conclusion

Our study examines a current and controversial issue that is being hotly debated in the Indian financial press. The regulatory agency (SEBI) has effectively banned *badla* trading in March 1994 with the objective of curbing "excessive speculation" in the Indian secondary markets. We study the effect of *badla* trading on stock return volatility by comparing a sample of group A and group B stocks. Group A stocks were alleged to have been adversely affected by excessive speculation on account of the *badla* system - a facility which allowed for highly leveraged trades. After controlling for other factors such as trading frequency, the price level and the market capitalization of the firms, we find that the residual variance is actually lower for the group A stocks. We do not find any evidence that supports the allegations made by regulators that *badla* trading destabilizes stock prices and causes excessive volatility. The banning of the *badla* system by the regulators, on the grounds that it causes "excessive" speculation, is clearly unwarranted and not justified on economic grounds.

Appendix

In March 1994, the Securities Exchange Board of India (SEBI) imposed several restrictions on *Badla* trading. A summary of the key changes are as follows:

1. The squaring off of positions is disallowed after after one settlement period. That is, traders can offset their long or short positions with an offsetting trade only within that settlement period (two weeks). Beyond that time period, all transactions have to result in a delivery.
2. The carryforward facility is subject to an initial margin of 30% and an additional margin of 15% for each subsequent settlement period. That is, the margin requirement will increase to 45%, 60% etc.
3. The carryforward of delivery is subject to an upper limit of 90 days.
4. The margin requirements are calculated on a gross basis for each trader.

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Table 1
Average daily trading volume (in millions of Rs.) on Bombay Stock Exchange in 1994

<i>Month</i>	<i>Group A</i>	<i>Group B</i>	<i>Total</i>
January	4060	1540	5600
February	1340	2590	3930
March	2410	1440	3850
April	790	1270	2060
May	600	1190	1790
June	1100	2560	3660
July	630	3150	3780
August	1060	2260	3320
September	770	3280	4050
October	610	3810	4420
November	790	2350	3140
December	360	1860	2220

Source: The Economic Times, December 20, 1994.

Table 2
Descriptive statistics of the sample

<i>Characteristic</i>	<i>Mean for Group A</i>	<i>Mean for Group B</i>
Closing price	Rs.610.03	Rs.226.66
Trading frequency	0.9427	0.9294
Market Capitalization	Rs.15310 million	Rs.6389 million
Daily residual variance	0.00238	0.00565
2-day residual variance	0.00311	0.00880
5-day residual variance	0.00570	0.01620
Variance ratio: 2-day/(1-day*2)	0.6534	0.7788
Variance ratio: 5-day/(1-day*5)	0.4790	0.5735

Table 3
OLS parameter estimates (t-statistics) of the regressions on the
monthly variance of market model residual

The parameter estimates are obtained from the following model:

$$RESVAR_{it} = \alpha_0 + \alpha_1 InGrB_{it} + \alpha_2 ClPr_{it} + \alpha_3 MarCap_{it} + \alpha_4 TrFrq_{it} + e_{it}$$

Where $RESVAR_{it}$ is the market model residual variance of stock i in month t and the independent variables are described below. $InGrB_{it}$ is a dummy variable that takes the value of one if it is a Group B stock and zero otherwise. $ClPr_{it}$ is the average closing price of stock i in month t . $MarCap_{it}$ is the market capitalization of stock i in month t as of March 31, 1992. $TrFrq_{it}$ is the trading frequency of stock i and is computed as the fraction of the number of days on which the given stock traded with respect to the total number of trading days in a given month. $RESVAR_{it}$ is computed by using the daily market model residuals. The variances of the residuals are then computed for each calendar month.

Independent Variable	Return Differencing Interval		
	Daily	2-Day	5-day
Intercept	0.0244 (2.968)	0.0331 (3.359)	0.0591 (3.601)
InGrB	0.0018 (1.662)	0.0037 (2.858)	0.0074 (3.418)
ClPr	0.0192 (0.747)	0.0174 (0.565)	0.0292 (0.571)
MarCap	-5.28×10^{-4} (-1.622)	-7.94×10^{-4} (-2.306)	0.0011 (-1.734)
TrFrq	-0.0108 (-2.354)	-0.0127 (-2.328)	-0.0296 (-3.251)

Table 4
OLS parameter estimates (t-statistics) of the regressions on the
monthly variance ratios of market model residuals

The parameter estimates are obtained from the following model:

$$\text{VarRatio}_{it} = \beta_0 + \beta_1 \text{InGrB}_{it} + \beta_2 \text{ClPr}_{it} + \beta_3 \text{MarCap}_{it} + \beta_4 \text{TrFrq}_{it} + e_{it}$$

Where VarRatio_{it} is the ratio of long horizon residual variance of stock i in month t to its corresponding short horizon value, and the independent variables are described below. InGrB_{it} is a dummy variable that takes the value of one if it is a Group B stock and zero otherwise. ClPr_{it} is the average closing price of stock i in the month t . MarCap_{it} is the market capitalization of stock i in month t as of March 31, 1992. TrFrq_{it} is the trading frequency of stock i in month t and is computed as the fraction of the number of days on which the given stock traded with respect to the total number of trading days in a given month. In the second column, ResVarRatio_{it} is computed as the ratio of half the 2-day residual variance to its daily residual variance. Similarly the third column reports the ratio of one-fifth of the 5-day residual variance to the daily residual variance.

Independent Variable	Return Intervals for Computing Variance Ratio	
	2-day to Daily	5-day to Daily
Intercept	1.560 (2.462)	0.749 (0.253)
InGrB	0.074 (0.880)	0.652 (1.660)
ClPr	-1.539 (-0.780)	-7.90 (-0.844)
MarCap	0.034 (1.351)	0.080 (0.682)
TrFrq	-1.489 (-4.236)	-1.870 (-1.138)