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Single Stock Futures Trading and Stock Price Volatility: Empirical Analysis

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1. INTRODUCTION

A large number of studies examine the relationship between futures trading volume and the price volatility in the underlying asset or market. Conflicting results, however, has been obtained to the effect that futures trading may increase or decrease volatility in the underlying market. Among the previous studies on the issue of the futures market-volume and spot market price volatility, Schwert (1990) finds that, at the time of high volatility for the S&P500 index, stock market and futures volume are also found to be high. Smith (1989), on the other hand, observes no effect by S&P500 futures volume on the changes in the volatility of S&P500 index returns. Similar results were also reported by Darat and Rehman (1995) for S&P500 stock index returns. Board, *et al.* (2001) applied the Stochastic Volatility (SV) model to the daily stock price data of London Stock Exchange and the FTSE 100 contracts traded on LIFE. The authors report evidence contrary to the hypothesis that futures trading volume destabilises the spot market, or that an increase in trading volume in one market relative to the other market destabilises the spot market. Overall, their results indicate that contemporaneous futures trading, after adjusting for the effects of information arrival and time trends, does not destabilise the spot market.

Some studies even find a negative relationship between S&P500 futures volume and the spot price volatility [see e.g., Santoni (1987); Brown-Hruska and Kuserk (1995)]. Bessimender and Seguin (1992) adopted an estimation procedure proposed by Schwert (1990) by iterating between a pair of regression equations which describe the evolution of the mean and volatility of the process in terms of the exogenous and lagged endogenous variables. The authors include three trading activity variables (spot trading volume, futures trading volume and open interest in the augmented conditional return standard deviation (volatility) equation. The authors observe that the expected (i.e. informationless) S&P500 futures trading activity is negatively related to equity volatility, when the spot-trading activity variables were included in the model. These findings led the authors to conclude that futures trading improve liquidity provision and depth in the equity markets, and reject the theories supporting the hypothesis of the destabilising effect of the futures trading.

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In contrast to these studies, Yang, Balyeat, and Leatham (2005) find that unexpected futures trading volume is positively related to price volatility in the underlying market for most of commodity futures markets selected. Using a GARCH model, Kyriacou and Sarno (1999) finds that contemporaneous and lagged futures volume for the FTSE 100 has increased spot market volatility. Ellueca and Lafuente (2003) examine the contemporaneous relations between trading volume and return in the Spanish stock index futures market, using a non-parametric approach for hourly return and futures trading activity variables. The total futures volume were decomposed in to expected (informationless trading activity) and unexpected (shocks in trading activity) components. The study documents a positive relation between price volatility and unexpected component of trading volume. The authors attribute this relationship to the arrival of new information (unexpected trading activity). This paper tests whether trading in SSFs contracts has an impact on price volatility of the underlying stocks following the introduction of the SSFs trading in the Pakistan's stock market. This study presents fresh evidence on the futures trading-volatility relationship in Pakistan's equity market using the most recent data of the single stock futures contracts introduced on the Karachi Stock Exchange. Specifically, the study examines the impact of futures trading on the level of price volatility of the underlying stocks. Specifically, single stock futures trading activity variables namely SSFs volume and open interest were included in the analysis to examine whether these futures trading activity variables have any role on the return volatility of the underlying stocks. The study documents a significant decrease in return volatility for the SSFs-underlying stocks following the introduction of single stock futures contracts on the Karachi Stock Exchange. The multivariate analysis in which the spot trading volume, the futures trading volume and open interest were partitioned into news and informationless components, the estimated coefficient of expected futures volume component is statistically significant and negatively related to volatility, suggesting that equity volatility is mitigated when the expected level of futures activity is high. The findings of the decreased spot price volatility of the SSFs-underlyned stocks associated with large expected futures activity is important to the debate of regarding the role of equity derivatives trading in stock market volatility. These empirical results for the Pakistan's equity market support theories implying that equity derivates trading improves liquidity provision and depth in the equity markets, and appear to be in contrast to the theories implying that equity derivates markets provide a medium for destabilising speculation.

Finally, the SSFs-listed stocks are grouped with a sample non-SSFs stocks to conduct cross-sectional analysis for comparing return volatility behaviour in the post-futures period. After accounting for the effects of a number of determinants of volatility, sufficient evidence is found to support that, this multivariate test, like the previous analysis, provides no evidence that the volatility of the SSFs-underlying stocks is positively related to the introduction of the single stock futures trading in the Pakistan's stock market. Rather, the negative binary coefficient indicates that, overall, there is a decrease in return volatility for the SSFs-underlying stocks in the post-futures period.

The rest of the paper is organised as follows. Second section describes the data, followed by the description of the control group. The fourth section provides an in-depth analysis of the methodology used in the paper. The last section will provide an analysis of the data and conclude the paper.

2. DATA DESCRIPTION

Trading in SSFs on the KSE commenced in July 2001. The sample period of this study begins June 1, 1999 and ends June, 2008.[1] Presently, 44 stocks have SSFs contracts written on them and traded on the Karachi Stock Exchange. The final data sample consists of 28 stocks, which possesses a complete set of two years data of daily price observations and trading volume on either side of the futures listing dates. Daily closing share prices are obtained from the online database of Karachi Stock Exchange for each stock for a period of two years on either side of the SSFs listing date, yielding more than 500 daily observations per stock for each of the sub-periods.

3. CONTROL PORTFOLIO

There may be other factors, besides the SSFs listing, that have also affected the price performance characteristics of the stocks. Such factors may include, for instance, that firm-specific and/or industry-specific factors or changes in the macroeconomic factors that may have occurred at the time of SSFs initiation or during the sample period that have changed the dynamics of the market. Our tests, therefore, may mistakenly attribute such a change, if it occurred, to the introduction of SSFc contracts. It is therefore, necessary to study a sample of non-SSFs stocks to separate the effects of SSFS-initiation from other effects of other factors. Following the methodology of Mckenzie, Brailsford and Faff (2001), such a control mechanism is undertaken using control portfolio of similar stocks that did not have SSF introduced. In case the SSFs-introduced stocks behave differently to the control portfolio in the post SSFs period, this mechanism will strengthen the conclusions drawn in respect of the impact of introduction of SSFs contracts. The control group sample consisted of 28 stocks.

4. EMPIRICAL ANALYSIS

This section tests the hypothesis that trading activity in the single stock futures contracts has an impact on the spot market price volatility of the underlying stocks following the SSFs trading initiation in the Pakistan's stock market. To this end, we use a measure of daily stock return volatility by adopting a procedure introduced by Schwert (1989), and further followed by other studies [e.g., Bessimender and Seguin (1992, 1993); Wang (2002)]. The method entails iterating between the following two sets of equations. The conditional mean and conditional volatility equations are given by:

$$R_t = \alpha + \sum_{j=1}^{n} \gamma_j R_{t-j} + \sum_{i=1}^{4} \rho d_i + \sum_{j=1}^{n} \eta_i \hat{\sigma}_{t-j} + U_t \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (1)$$

$$\hat{\sigma}_t = \beta + \sum_{i=1}^{4} \theta_i d_i + \sum_{j=1}^{n} \eta_i \hat{\sigma}_{t-j} + \sum_{j=1}^{n} \varpi_j U_{t-j} + \varepsilon_t \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (2)$$

Where R_t is the daily stock return, d_i corresponds to the four dummies for days of the week to account for the extensively documented phenomenon of differing mean daily

[1]Selection of data from two years prior to the commencement of SSFs trading constitutes the pre-SSFs period for those stocks for which SSFs were introduced in July 2001. There ten such stocks. Moreover, other stocks that had SSFs introduced on different dates for which pre-SSFs and post-SSFs periods were selected at different time periods during the sample interval, stretching up to June 2008.

returns [French (1980); Gibson and Hess (1984); Keim and Stambausgh (1984)].[2] U_t is the residuals (unexpected returns) form Equation (1), σ is the estimated conditional volatility of returns at time t, and given by;

$$\sigma = |U_t|\sqrt{\pi/2} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

R_{t-i} (lagged returns) in Equation (2) as regressors allows for short term shifts in expected returns. Equation (2) estimates conditional standard deviation (volatility) by regressing it on daily dummies (for days of the week), lagged volatility estimates and lagged raw residuals from Equation (1). Lagged standard deviation estimates in the Equation (2) accounts for the persistence of volatility shocks [French, Schwert, and Stambaugh (1987); Bessimender and Seguin (1992); Wang (2002)].

To obtain volatility estimates, Equation (1) is first estimated without the lagged standard deviation estimates to obtain residuals from the regression. The residuals obtained are the unexpected returns. These residuals are transformed by Equation (3) to obtain estimates of conditional volatility, and then we estimate Equation (2). The process is then iterated with volatility estimates (lagged) as regressors in Equation (1).

To examine relation between volatility and trading activity, we include spot trading volume, futures trading volume and open interest as activity variables. Open interest provides an additional measure of trading activity. Iteration is, therefore, between Equation (1) and an augmented Equation (4):[3]

$$\hat{\sigma}_t = \beta + \sum_{i=1}^{4}\theta_i d_i + \sum_{j=1}^{n}\eta_i\hat{\sigma}_{t-j}\sum_{j=1}^{n}\varpi_j U_{t-j} + \sum_{j=1}^{m}\mu_k A_k + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Where A_k is the m trading activity variables, i.e., spot trading volume, SSFs volume and open interest.

Many studies [e.g. Chen, Firth and Rui (2001) and Gallent, Rossi, and Tauchman (1992)] document evidence of time trends in trading volumes series. To mitigate any effects, therefore, of secular growth in volume, we first generate a "detrended" activity series by deducting 100-day moving average from the original series.[4] Each "detrended" activity series is then decomposed into expected (fitted values from ARIMA model) and unexpected (Actual minus expected values) components using an appropriate ARIMA (p, I, q) specification. The number of lags for ARIMA model were selected for each activity series on the basis of Akaike information criterion and Schwarz information criterion. The decomposition of each activity series into expected and unexpected components helps us to evaluate the effect of each component separately on the price volatility. The unexpected component of the deterended series represents daily activity shock, whereas, the expected component represents activity which can be forecasted, though highly variable across days. Slower adjustment changes are captured by the 100-day moving average series. Partitioning the spot trading volume, futures trading volume and open

[2]The day-of-the week effect refers to returns not being homogenously distributed over the trading days of the week. The main findings have been lowest and on average negative returns on Mondays and large returns on Fridays as compared to other days of the week [French (1980)].

[3]Besseminder and Seguin (1992) also included these three activity variables.

[4]The same procedure was also followed by Bessimender and Seguin (1992).

interest into expected, unexpected and moving average series result in nine variables, which were included in the augmented Equation (4).

4.1. Spot Trading Volume and Stock Return Volatility

Initially, we estimate Equations (1) and (4) with the spot trading volumes as the only activity variable. These empirical results are reported in the first column of the Table 1. As the table reports that all of the estimated coefficients for daily dummies are significant, indicating that the model has adequately captured the seasonal effects. Estimated coefficient on the unexpected component of the trading volume is positive and highly significant. Moreover, this coefficient is also larger than the estimated coefficients on the expected trading volume and the moving average volume. This implies that surprises (unexpected component) in the spot trading volume convey more information, and thus are more important in explaining equity volatility than either the variations in the anticipated (expected trading volume and moving average) level of trading activity. These results are in line with the findings of many empirical studies conducted in other markets. For instance, Patti (2008) finds positive relation of price volatility to expected an unexpected components of trading volume for the Indian stock market. The author also documents that an unexpected component of trading volume has greater impact on trading volume than the expected volume.

Table 1

Regression of Daily Return Standard Deviation Estimates on Spot Trading Volume and Futures Trading Dummy

FUTDUMY denotes a dummy variable which is equal to one for post- SSFs period and zero otherwise, for each stock. The table reports results for two regressions. Column (1) contains results for the regression model without dummy variable and the column (2) reports results for the dummy variable regression model.

	(1)		(2)	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Intercept	0.014	22.65*	0.014	20.98*
FUTDUMY			–0.001	–1.77**
Daily Dummies				
Tuesday	0.011	18.90*	0.012	17.65*
Wednesday	0.009	15.69*	0.010	14.66*
Thursday	0.010	15.88*	0.010	14.81*
Friday	0.009	14.85*	0.009	14.00*
Trading Volumes				
Expected	0.024	7.98*	0.027	5.48*
Expected*FUTDUMY			–0.065	–1.03
Unexpected	0.043	17.32*	0.059	15.21*
Unexpected*FUTDUMY			–0.027	–5.53*
Moving Average	–0.021	–1.20	–0.039	–1.44
Moving Average*FUTDUMY			0.028	0.78
10 Lagged Volatility Estimates	0.377	23.08*	0.176	22.92*
Lagged Unexpected Returns	0.041	5.57*	0.021	2.95*
Durbin Watson	2.00		2.00	
Adjusted R^2	0.11		0.11	
Diagnostic Checks	Estimate	P-value		
LB-Q(36)	34.379	0.546		
LB-Q^2 (36)	25.226	0.91		

Note: * (**) represents statistical significance at 0.01 (0.05) level, LB-Q(k) and LB-Q^2 (k) are the portmanteau Ljung-Box Q test statistics for testing the joint significance of autocorrelation of standardised residuals and squared residuals for lags 1 to k respectively.

4.2. SSFs Trading and Stock Price Volatility

As an initial econometric examination of the single stock futures trading on the equity volatility of the underlying stocks in the spot market, we include a dummy variable in Equation (4) that takes on a value equal to one for post-SSFs period (two years time period, with almost 500 observations for each stock), and equal to zero for the pre-SSFs period, containing almost same number of observations compared to post-SSFs period. We also allow the regression intercept and the slope coefficients on volume variables to shift subsequent to the introduction of the SSFs trading.

Empirical results of Equation (4) are reported in the second column of Table 1. Notable result of this analysis is that the observed change in the slope coefficient associated with the unanticipated spot trading volume is negative and highly significant (at 1 percent significance level). This implies that the spot volume shocks are associated with smaller price movements subsequent to the introduction of the SSFs trading. Similarly, the estimated coefficient for the slope dummy on the moving average volume is negative though it is not statistically significant. Again, this also implies a reduction in the magnitude of the relation subsequent to the introduction of the SSFs. In contrast, the estimated coefficient for the shift in the regression intercept subsequent to the introduction of SSFs trading is negative and statistically significant.

These findings are consistent with the view that stock return volatility (equity volatility) has been reduced, and market depth (as measured by the volume of shares required to move prices) has been increased by the introduction of SSFs trading. There may have been other changes in the overall financial and capital markets in Pakistan, or even some of the sectors/stock specific factors, during the period examined in the study, and these reductions in equity volatility need not be solely attributable to the introduction of SSFs trading in Pakistan's stock market.

4.3. SSFs Trading Activity Variables and Stock Price Volatility

Evidence on the relation between Single Stock Futures trading and stock price volatility reported in the prior section is not entirely conclusive, at least in part, because the introduction of single stock futures trading constitutes but a single event. To further augment the specificity of the evidence, this study further examines the relation between stock price volatility and levels of futures trading activity by including SSFs trading volume and open interest.[5] Following the methodology adopted by Besseminder and Seguin (1992), for each trading date, futures volume and open interest are summed across contracts to obtain aggregate futures activity.

We again decompose each trading activity (spot trading volume, SSFs trading volume and open interest) in to three additive components namely moving average, expected and unexpected components using the same methodology as discussed in the previous section. Empirical results of estimating (4) with these activity series are reported in the Table 2. Inclusion of SSFs-trading variables does not change the sign of coefficient estimates on the expected and unexpected components of the spot-trading variables. The coefficient estimate for unexpected SSFs-trading volume, like that for unexpected spot-

[5]Open interest is the sum total of all outstanding long and short positions of futures contracts that have not been closed out, at the end of the trading day.

Table 2

Regression of Daily Return Standard Deviation Estimates on Spot Trading Volume and Futures Trading Volume

Both spot and futures trading volumes for each stock are de-trended by subtracting 100 day moving average volume from each series before partitioning into expected and unexpected components. Test statistics are in parenthesis.

Variable	Coefficient	t-Statistic	Prob.
Intercept	0.012559	(5.84)*	0.000
Daily Dummies			
Tuesday	0.008801	(4.16) *	0.000
Wednesday	0.00912	(4.40) *	0.000
Thursday	0.007306	(3.43) *	0.001
Friday	0.004645	(2.08) **	0.038
Trading Activity			
Spot Volumes			
Expected	0.0223	(5.95)*	0.000
Unexpected	0.0317	(12.07)*	0.000
Moving Average	0.0381	(0.98)	0.327
SSFs Futures Volume			
Expected	–0.0190	(3.27) *	0.001
Unexpected	0.0456	(3.12) *	0.002
Moving Average	–0.0194	(0.02)	0.983
SSFs Open Interest			
Expected	–0.0264	(–0.54)	0.587
Unexpected	–0.0370	–0.32	0.748
Moving Average	0.0654	0.84	0.401
Lagged Volatility Estimates	0.254868	(5.42) *	0.000
Lagged Unexpected Return	0.141833	(3.48) *	0.001
Durbin-Watson	2.03	Adj. R^2	0.25

trading volume, is positive and significant, and is larger in magnitude that the spot-trading volume coefficient. As Besseminder and Seguin (1992) points out that, this positive coefficient implies that information shocks move prices and generate trading in both markets.

Unlike the results for the expected (i.e., informationless) component of the spot volume, the coefficient estimate for the expected SSFs-volume is negative and significant, indicating decreased stock price volatility when expected SSFs-volume is high. On the other hand, coefficient estimates on the expected and unexpected components of the open interest are negative, but neither is statistically different from zero. These empirical results are in line with the study of Besseminder and Seguin (1992) for S&P500 Index. Contrary to the findings of their study in case of moving average, estimated coefficient on all three moving average series (spot-trading volume, SSFs-volume and open interest) are statistically insignificant, indicating that long-term variations may not be relevant for explaining volatility in Pakistan's equity market.

To summarise, empirical evidence indicates that equity volatility is positively related to spot-trading activity, whether expected (informationless trading) or unexpected, and to the contemporaneous futures trading shocks. Whereas, the partial effects on equity volatility of expected and moving average (though insignificant in case of moving average) are negative, suggesting that equity volatility is mitigated when the expected level of futures activity is high. The findings of the decreased spot price volatility associated with large expected futures activity is important to the debate of regarding the role of equity derivatives trading in stock market volatility. These empirical results for the Pakistan's equity market support theories implying that equity derivates trading improves liquidity provision and depth in the equity markets, and appear to be in contrast to the theories implying that equity derivates markets provide a medium for destabilising speculation.

4.4. Cross-sectional Analysis

Finally, following the methodology of Galloway and Miller (1997), SSFs-listed stocks are grouped with non-SSFs stocks and the behaviour of the return volatility is examined surrounding the introduction of single stock futures trading. The regression model takes the following form:

$$\hat{\sigma}_t = \beta_1 + \sum_{i=1}^{4} \theta_i d_i + \sum_{j=1}^{n} \eta_i \hat{\sigma}_{t-j} + \beta_2 LNVOL_t + \beta_3 LN(Firm)_t + \beta_4 FUTDUMY_t + \varepsilon_t \quad \ldots \quad (5)$$

where $\hat{\sigma}_t$ is the post-futures period daily volatility estimate; $LN(Firm)$ is the natural logarithm of equity value of the firm; $LNVOL$ is the natural logarithm of spot trading volume, coefficients for days of the week, lagged volatility estimates and a binary variable (FUTDUMY) that is equal to one for the SSFs-listed stocks and 0 for the non-SSFs stocks.

We are mainly interested in estimating β_4 regression coefficient in Equation (5) which would indicate whether the stock price volatility of the SSFs-underlying stocks behaves in a different way than that of non-SSFs stocks in the post-SSFs trading period, while accounting for other factors known to influence stock price volatility. When this coefficient is negative (positive), this implies that the average stock price volatility of the SSFs-listed stock is lower (higher) than that of the matching non-SSFs listed stocks in the post-futures period.

In addition to the binary variable, three control variables were also incorporated in the Equation (5). First, as argued by Galloway and Miller (1997), if the introduction of futures trading improves the liquidity of the underlying stocks with a resulting decline in stock price volatility, this effect is more evident in case of smaller firms with less liquid stocks. In this case, the estimated coefficient, β_3, is expected to be negative (i.e., $\beta_3 < 0$). Consequently, the firm's market value of equity is included in the model to account for this "size effect". Second, a voluminous body of literature exists that documents a positive contemporaneous relationship between trading volume and stock return volatility. We therefore, expect the coefficients on expected (informationless) and unexpected trading volumes to be positive (i.e., $\beta_2 > 0$). Thus the expected and unexpected components of spot trading volume of the underlying stocks and that of control group stocks is employed to control for this positive return volatility-volume effect. Table 3 presents results for the regression Equation (5). The estimated coefficients for the control variables have the expected signs and are statistically significant. However, our primary interest lies in the coefficient estimate, β_4, of the binary variable. The coefficient estimate (β_4) is negative and highly statistically significant. This multivariate test, like the previous analysis, provides no evidence that the volatility of the SSFs-underlying stocks is positively related to the introduction of the single stock futures trading in the Pakistan's stock market. Rather, the negative binary coefficient indicates that, overall, there is a decrease in return volatility for the SSFs-underlying stocks in the post- futures period. Thus the evidence tends to support the notion that the single stock futures trading had a negative impact on the level of price volatility for the underlying stocks.

Table 3

Cross-sectional Analysis: OLS Regression Results

Dependent variable is the post-futures stock price volatility. Explanatory variables are: the natural logarithm of the firm's market value equity value, the natural logarithm of the spot trading volume for both SSFs-listed and sample of control group stocks, coefficients for daily dummies, lagged volatility estimates, and a binary variable equal to one if the firm is SSFs-listed, and zero if the firm belongs to a control group.

Variable	Coefficient	t-Stat	p-value
Intercept	0.027	10.401*	0.000
Daily Dummies			
D2	0.024	9.274*	0.000
D3	0.023	9.042*	0.000
D4	0.023	8.965*	0.000
D5	0.022	8.447*	0.000
FUTDUMY	–0.006	–9.603*	0.000
LOGVOL	0.001	11.267*	0.000
LNFV	–0.001	–9.085*	0.000
Lagged Volatility			
σ (–1)	0.184	21.729*	0.000
σ (–2)	0.088	10.191*	0.000
σ (–3)	0.094	10.890*	0.000
σ (–4)	0.048	5.537*	0.000
σ (–5)	0.030	3.492*	0.001
σ (–6)	0.018	2.073*	0.038
σ (–7)	0.036	4.155*	0.000
σ (–8)	0.028	3.277*	0.001
σ (–9)	0.029	3.418*	0.001
σ (–10)	0.034	4.061*	0.000
Lagged Unexpected (–1)	**0.026**	**3.54***	
Adj. R	0.14	D-Watson	2.006

5. CONCLUSION

This study tests the hypothesis that increases in futures market trading activity has an impact on the equity volatility of the underlying stocks by using a measure of daily stock return volatility by following a procedure suggested by Schwert (1989). Spot trading volume, SSFs trading volume and open interest analyse the relation between stock price volatility and trading activity variables. The data consists of daily closing prices of the underlying stocks, spot trading volume, SSFs volume and open interest for the period July, 2001 to February, 2008. The study examines whether the effect of spot volume, futures volume and open interest on the spot price volatility of the underlined is homogeneous by partitioning the three trading activity variables into expected and unexpected components by an appropriate ARMA specification and allowing each component (expected, unexpected and moving average series) to have a separable effect on observed spot price volatility of the underling stocks.

We adopt Schwert's (1989) procedure for volatility estimation and including the trading activity variables of the two markets in the volatility regression equation. The results show that stock price volatility of the underlying stocks is positively related to both the expected and unexpected components of the spot trading volume. However, the unexpected component of the volume has a greater impact on the equity volatility than the expected (informationless) volume. This analysis confirms the findings of many other studies showing a positive relationship between spot trading volume and spot price volatility. Equity volatility is also positively related to the contemporaneous futures shocks (unexpected component of futures volume). Expected futures volume is statistically significant and negatively related to volatility, suggesting that equity volatility is mitigated when the expected level of futures activity is high. The findings of the decreased spot price volatility associated with large expected futures activity is important to the debate of regarding the role of equity derivatives trading in stock market volatility. These empirical results for the Pakistan's equity market support theories implying that equity derivates trading improves liquidity provision and depth in the equity markets, and appear to be in contrast to the theories implying that equity derivates markets provide a medium for destabilising speculation.

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