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   RESEARCH METHODOLOGY

   RESULTS & DISCUSSION

   FINDINGS

   RECOMMENDATIONS/SUGGESTIONS

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- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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DISAGGREGATED VOLATILITY - A CASE STUDY IN INDIAN STOCK MARKET

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ABSTRACT

This paper examines the benefits to forecasters of decomposing daily return volatility, applies a disaggregated approach to examine these characteristics in selected stocks of Indian Stock market. To decompose the return on a stock into three components. The market wide return, an industry- specific residual, and a firm - specific residual are based on this return decomposition. To construct time series of volatility measures of the three components for a typical firm and define volatility measures that sum to the total return volatility of a typical firm, without having to keep track of co-variances and without having to estimate betas for firms or industries. The analysis of volatility components relative to total volatility of an average form reveals that market – level volatility has the largest portion of total volatility on an average. The time series variation in total volatility is due to market and industry level.

KEYWORDS
disaggregated volatility, Indian stock market.

INTRODUCTION

Important objective of this paper is to focus attention on disaggregated volatility measures. It is known that the return to an individual stock has three components: aggregate market return, industry-level shocks and firm-level shocks. Thus, volatility of an individual stock depends on the volatility of industry-specific and firm-specific shocks as much as the volatility of aggregate market returns. There is little empirical research on volatility at the level of the industry or firm.

A few papers, Black (1976), Christie (1982) and Duffee (1995), use disaggregated data to study the "leverage" effect, the tendency for volatility to rise following negative returns. Black (1976) conducted the first empirical work on the relation between stock returns and volatility using a sample of stock return volatility over the period of 1962- 1975 by summing squared daily returns and taking the square root of the result. For each stock i standard deviation was estimated using the equation

$$\frac{\sigma_{it+1} - \sigma_{it}}{\sigma_{it}} = \alpha_0 + \lambda_0 rit + \varepsilon_{it+1} \qquad (1)$$

Where σ_{ts} is an estimate of the standard deviation of return. It was found that λ_0 coefficient of return was always negative and usually less than - 1.

A similar approach was used by Christie (1982). In this quarterly estimates of return volatility for 379 firms all of which existed throughout the period 1962-1978 were considered. In that equation (2) was used to estimate volatility

$$\log\left(\frac{\sigma_{t+1}}{\sigma_t}\right) = \alpha_0 + \lambda_0 r_1 + \varepsilon_{i+1.0} \qquad (2)$$

Over the period of 1962-1978 for each firm and finds a mean λ_0 of -0.23. It was studied whether this negative coefficient could be explained by the leverage effect and explained that leverage is a dominant but probably not the only determinant of λ_0.

Duffee (1995) followed the previous work in this area by using daily stock returns for the period of 1977-1991 but takes a different approach. The coefficient λ_0 in equation (3) equals the difference between λ_2 and λ_1 in the following equations:

$$\log \sigma_1 = \sigma_1 + \lambda_1 r_1 + \varepsilon_{t1} \qquad (3)$$

$$\log (\sigma_{t+1}) = \sigma_2 + \lambda_2 r_1 + \varepsilon_{t=12} \qquad (4)$$

It was found that for the typical firm traded on the American or New York Stock Exchange λ_1 was strongly positive, while the sign of λ_2 depends on the frequency over which these relations were estimated. It is positive at the daily frequency and negative at the monthly frequency. In both cases λ_1, exceeds λ_2, so λ_2 is negative in equation (2).

Some researchers, Bainard and Cutler (1993), Lowigani, Rush and Tave (1990), have used stock-market data to test macroeconomic models of reallocation across industries or firms. Bernard and Cutler (1993) develop a new measure of reallocation shocks based on the variance of industry stock market excess returns to assess the contribution of sectoral reallocation to unemployment in the postwar U.S. economy. They first construct a time series of the variance of sectoral stock market excess returns, termed cross-section volatility and unemployment. They construct the cross-section volatility series using industry data on stock market excess returns. Excess returns for each industry through time ε_{it} are formed as the residual from the market model:

$$R_{js} = \beta_{0j} + \beta_1 R_{mt} + \varepsilon_{it} \qquad (5)$$

where R_{js} is the return on the market portfolio at time *t* (the Standard & Poor Composite Index) and R_{js} is industry *j's* return at time *t*. They form the industry specific components of return variation:

$$\eta_{js} = \hat{\beta}_{0j} + \hat{\varepsilon}_{it} \qquad (6)$$

The excess returns include the time-variant component of the industry-specific response in order to capture trend movements within industries. They form the measure of cross-section volatility as the weighted variance of one-quarter excess returns. Then they examine the relation between cross-section volatility and unemployment and find a positive and statistically significant correlation between them.

They find that the volatility of the market, industry and firm level volatilities are important components of the total volatility at the return of a typical firm. All three volatility measures experience substantial variations over time and they are positively correlated as well as auto-correlated. They also find that over their sample petted, firm level volatility has a significant positive trend whereas market level and industry level volatility do not. They also study the lead-lag relations among their volatility measures and various Indicators of the state of the aggregate economy and find that all three volatility variables, particularly industry level volatility, help to forecast economic activity and reduce the significance of the other commonly used forecasting variable.

1.1 ESTIMATION OF VOLATILITY COMPONENTS

Volatility Decomposition

To decompose the return on a stock into three components. The market wide return, an industry- specific residual, and a firm - specific residual are based on this return decomposition. To construct time series of volatility measures of the three components for a typical firm and define volatility measures that sum to the total return volatility of a typical firm, without having to keep track of co-variances and without having to estimate betas for firms or industries. In this section, how to achieve such a representation of volatility is discussed.

Industries are denoted by an *i* subscript and individual firms are indexed by *j*, the simple excess return of firm *j* that belongs to industry *i* in period *t* is denoted as R_{jit}, This Excess return, is measured as an excess return over the Treasury bill rate. Let W_{jit} be the weight of firm *j* in industry *i* this methodology is valid for any arbitrary weighting scheme provided that it is used to compute the market return using the same weights; in this application market value weights are used. The excess return of industry *i* in period is given by$R_{it} = \Sigma_{j\epsilon i} W_{jit} R_{jit}$ Industries are aggregated correspondingly, the weight of industry *i* in the total market is denoted by *wit*, and the excess market return is $R_{it} = \Sigma_{j\epsilon i} W_{jit} R_{jit}$

The next step is the decomposition of firm and industry returns into the three components. A decomposition based on the CAPM is used, and then it is modified for empirical implementation. The CAPM implies that we can set intercept to zero in the following equations.

$R_{it} = B_{im} R_{mt} + \in_{it}$ (1)

For industry returns and

$R_{it} = B_{ii} R_{it} + \eta_{ji}$

$= B_{ii} B_{im} R_{mt} + B_{ii} \in_{it} + \eta_{jit}$ (2)

For individual firm returns in equation (1) B_{im} denotes the beta for industry *i* with respect to the market return, and $€_{it}$ is the industry – specific residual similarly, in equation (2) B_{it} is the beta of firm *j* in industry *i* with respect to its industry, and n_{ji} is the firm-specific residual. n_{ji} is orthogonal by construction to the industry return R_{it} we assume that it is also orthogonal to the components R_{mt} and $€_{it}$. In other words, it is assumed that the beta of firm *j* with respect to the market. B_{jm}, satisfies $B_{jm} = B_{ji} B_{im}$. The weighted sums of the different betas equal unity.

$\sum_t w_{it} \beta_{im} = 1, \quad \sum_{j\epsilon i} \beta_{ji} = 1$, (3)

The CAPM decomposition (1) and (2) guarantees that the different components of a firm's return are orthogonal to one another. Hence it permits a simple variance decomposition in which all covariance terms are zero;

$Var(R_{it}) = \beta_{im}^2 Var(R_{mt}) + Var(\tilde{\epsilon}_{it}),$ (4)

$Var(R_{jit}) = \beta_{jm}^2 Var(R_{mt}) + \beta_{ji}^2 . Var(\tilde{\epsilon}_{it}) + Var(\tilde{\eta}_{jit}),$ (5)

The problem with this decomposition, however, is that it requires knowledge of firm-specific betas that are difficult to estimate and may well be unstable over time. Therefore we work with a simplified model that does not require any information about betas. We show that this model permits a variance decomposition similar to equations (4) and (5) on an appropriate aggregate level.

First, consider the following simplified industry return decomposition that drops the industry beta coefficient $\beta_{im,}$ from equation (1) :

$R_{it} = R_{mt} + \epsilon_{it}$ (6)

Equation (6) defines ϵ_{it} as the difference between the industry return --- and the market return R_{mt}.Campbell et al. (1997, 4, p.156) refer to equation (6) as a "market –adjusted-return model" in contrast to the market model of equation (1).

Comparing equations (1) and (6), we have.

$\epsilon_{it} = \tilde{\epsilon}_{it} + (\beta_{im} - 1) R_{mt}$ (7)

The market –adjusted –return residual equals the CAPM residual of equation (4) only if the industry beta $\beta_{im} = 1$ or the market returns$R_{mt} = 0$.

The apparent drawback of the decomposition (6) is that and are not orthogonal, and so one cannot ignore the covariance between them. Computing the variance of the industry return yields.

$Var(R_{it}) = Var(R_{mt}) Var(\tilde{\epsilon}_{it}) + 2 Cov(R_{mt}, \epsilon_{it})$

$= Var(R_{mt}) + Var(\epsilon_{it}) + 2(\beta_{im} - 1) Var(R_{mt}),$ (8)

Where taking account of the covariance term once again introduces the industry beta into the variance decomposition.

Note, however, that although the variance of an individual industry return contains covariance terms, the weighted average of variances across industrial is free of the individual covariances:

$\sum_i w_{it} Var(R_{it}) = Var(R_{mt}) + \sum_i \omega_{it} Var(\varepsilon_{it})$

$= \sigma_{mt}^2 + \sigma_{et}^2,$ (9)

Where $\sigma_{mt}^2 \equiv Var(R_{mt})$ and $\sigma_{mt}^2 \equiv \sum_i \omega_{it} Var(\varepsilon_{it})$. The terms involving betas aggregate out because from equation (3) $\sum_i \omega_{it} \beta_{im} = 1$. Therefore we can use the residual in equation (6) to construct a measure of average industry level volatility that does not require any estimation of betas. The weighted average $\sum_i \omega_{it} Var(R_{it})$ can be interpreted as the expected volatility of a randomly drawn industry (with the probability of drawing industry i equal to its weight ω_{it}).

We can proceed in the same fashion for individual firm returns; consider a firm returns decomposition that drops β_{ji} from equation (2):

$R_{jit} = R_{it} + \eta_{jit},$ (10)

Where η_{jit} is defined as

$\eta_{jit} = \tilde{\eta}_{jit} + (\beta_{ji} - 1) R_{it},$ (11)

The variance of the firm return is

$Var(R_{jit}) = Var(R_{it}) + Var(\eta_{jit}) + Cov(R_{it}, \eta_{jit})$

$= Var(R_{it}) + Var(\eta_{jit}) + 2(\beta_{ji} - 1) Var(R_{it}).$ (12)

The weighted average of firm variances in industry I is therefore

$\sum_{j\epsilon i} \omega_{jit} Var(R_{jit}) = Var(R_{it}) + \sigma_{\eta it}^2,$ (13)

Where $\sigma_{\eta it}^2 \equiv \sum_{j\epsilon i} \omega_{jit} Var(\eta_{jit})$ is the weighted average of firm –level volatility in industry *i*. Computing the weighted average across industries, using equation (9), yields again a beta-free variance decomposition :

$\sum_i \omega_{it} \sum_{j\epsilon i} \omega_{jit} Var(R_{jit}) = \sum_i \omega_{it} Var(R_{it}) + \sum_i \omega_{it} \sum_{j\epsilon i} \omega_{jit} Var(\eta_{jit})$

$= Var(R_{mt}) + \sum_i \omega_{it} Var(\epsilon_{it}) + \sum_i \omega_{it} \sigma_{\eta it}^2,$

$\sigma_{mt}^2 + \sigma_{et}^2 + \sigma_{\eta t}^2,$ (14)

Where $\tilde{\sigma}_{\eta t}^2 \equiv \sum_i \omega_{it} \sigma_{\eta it}^2 = \sum_i \omega_{it} \sum_{j\epsilon i} \omega_{jit} Var(\eta_{jit})$ is the weighted average of firm-level volatility across all firms. As in the case of industry returns, the simplified decomposition of firm returns (10) yields a measure of average firm –level volatility that does not require estimation of betas.

We can gain further insight into the relation between our volatility decomposition and that based on the CAPM if we aggregate the latter (equations (4) and (5) across industries and firms. When we do this we find that

$\sigma_{\epsilon t}^2 = \tilde{\sigma}_{\epsilon t}^2 + CSV_t(\beta_{im})\sigma_{mt}^2$, (15)

Where $\tilde{\sigma}_{\epsilon t}^2 \equiv \sum_i \omega_{it}\, \sigma_{\eta it}^2 = \sum_i \omega_{it} \sum_{j\epsilon i} \omega_{jit}\, Var(\eta_{jit})$ is the average variance of the CAPM industry shock and is the cross –sectional variance of industry betas across industries. Similarly,

$\sigma_{\eta t}^2 = \tilde{\sigma}_{\eta t}^2 + CSV_t(\beta_{jm})\sigma_{mt}^2 + CSV_t(\beta_{ji})\tilde{\sigma}_{\epsilon t}^2$,(16)

Where $\tilde{\sigma}_{\eta t}^2 \equiv \sum_i \omega_{it}\, Var(\tilde{\eta}_{it}), CSV_t\,(\beta_{jm}) \equiv \sum_i \omega_{it} \sum_j \omega_{jit}(\beta_{jm}-1)^2$ the cross-sectional variance of firm betas on the market is across all firms in all industries and $CSV_t\,(\beta_{im}) \equiv \sum_i \omega_{it}(\beta_{im}-1)^2$ is the cross-sectional variance of firm betas on industry shocks across all firms in all industries.

Equations (15) and (16) show that cross-sectional variation in betas can produce common movements in our variance components $\sigma_{mt}^2, \sigma_{\epsilon t}^2$ and $\sigma_{\eta t}^2$, even if the CAPM variance components $\tilde{\sigma}_{\epsilon t}^2$ and $\tilde{\sigma}_{\eta t}^2$ do not move at all with the market variance σ_{mt}^2.

Estimation

Firm – level return data is calculated for the firms traded on the BSE and the NSE. Estimation of the volatility components in equation (14) is based on the return decomposition (6) and (10), individual firms are aggregate into industries according to SIC classification. Sample period runs from January 2000 to December 2009. Obviously, the composition of firms in individual industrial has changed dramatically over the sample period. The industry with the most firms on average over the sample is financial services, information technology. Based on average market capitalization, the six largest industries on average over the sample are FMCG (24.5 %), Oil / Gas (22.4%), Metal (18.7%), IT (18.3%), followed by Finance and transport sector .Table 4 includes a list of the 10 largest industries. To get daily excess return, we subtract the 30 day T-bill return divided by the number of trading days in a month.

Following procedure is used to estimate the three volatility components in equation (14). Let *s* denote the interval at which returns are measured. Daily returns are used for most of the estimates. Using returns of intervals, volatility estimates at intervals t is constructed. Unless otherwise *t* refers to months. To estimate the variance components in equation (14) time-series variation of the individual return components within each period t is used, the sample volatility of the market return in period *t*, which is denote from now on as MKT, is computer as

$MKT_t = \tilde{\sigma}_{mt}^2 = \sum_{8\epsilon t}(R_{ms} - \mu_m)^2$, (17)

where μ_m is defined as the mean of the market return R_{ms} over the sample to be consistent with the methodology presented above, to construct, the market returns as the weighted average using all firms in the sample in a given period is used. The weights are based on market capitalization, for weights average market capitalization of a firm during period of study is used and the weights are assumed to constant within sample period.

For volatility in industry *i*, sum the squares of the industry – specific residual in equation (6) within a period t is used:

$\tilde{\sigma}_{\epsilon it}^2 = \sum_{8\epsilon t} \epsilon_{is}^2$, (18)

As shown above, average over industries are used to ensure that the co-variances of individual industries cancel out this yield the following measure for average industry volatility IND_t:

$IND_t = \sum_t \omega_{it}\tilde{\sigma}_{\epsilon it}^2$, (19)

Estimating firm-specific volatility is done in a similar way. First sum of the squares of the firm-specific residual in equation (10) for each firm in the sample is used:

$\tilde{\sigma}_{\eta it}^2 = \sum_{8\epsilon t} \eta_{jis}^2$, (20)

Next, to computer the weighted average of the firm-specific volatilities within an industry:

$\tilde{\sigma}_{\eta it}^2 = \sum_{j\epsilon i} \omega_{jit}\, \tilde{\sigma}_{\eta jit}^2$, (21)

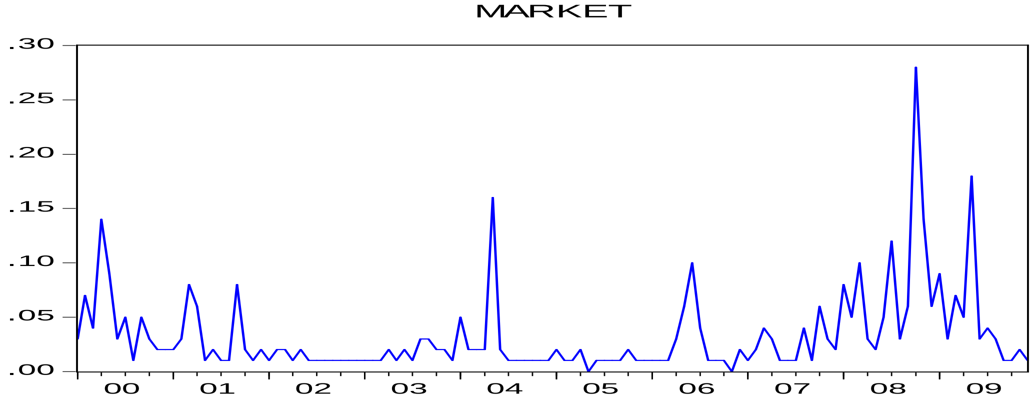
And lastly average over industries is to obtain as a measure of average firm-level volatility $FIRM_t$ as:

$FIRM_t = \sum_i \omega_{it}\; \tilde{\sigma}_{\eta it}^2$, (22)

As with industry volatility, this procedure ensures that the firm-specific co-variances cancel out.

1.2 MEASURING TRENDS IN VOLATILITY

FIGURE 1: STANDARD DEVIATION OF VALUE – WEIGHTED STOCK INDEX. THE STANDARD DEVIATION OF MONTHLY RETURNS WITHIN EACH YEAR FOR THE PERIOD FROM 2000 TO 2009



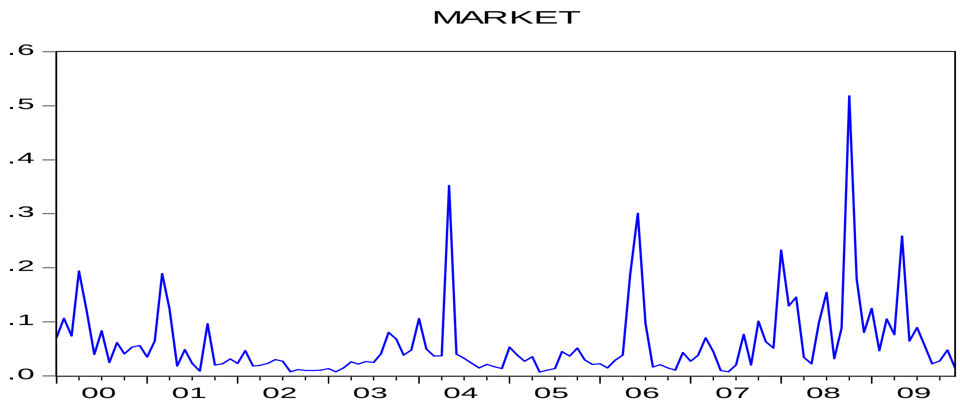
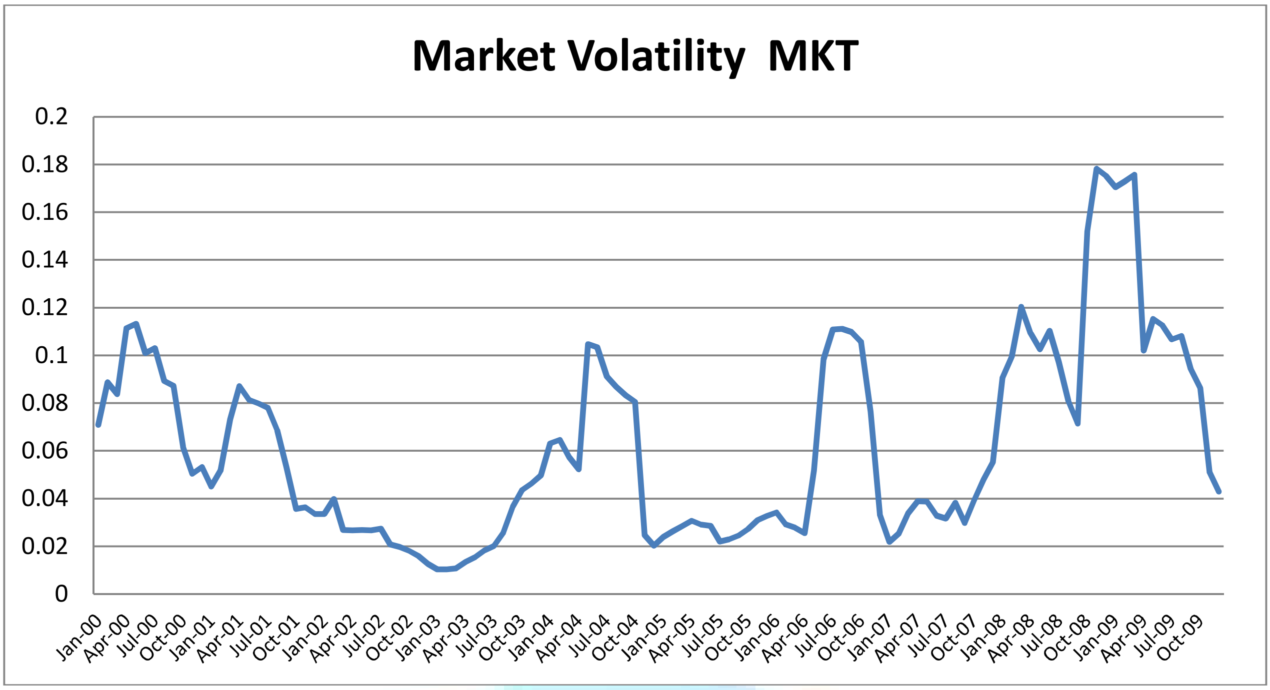
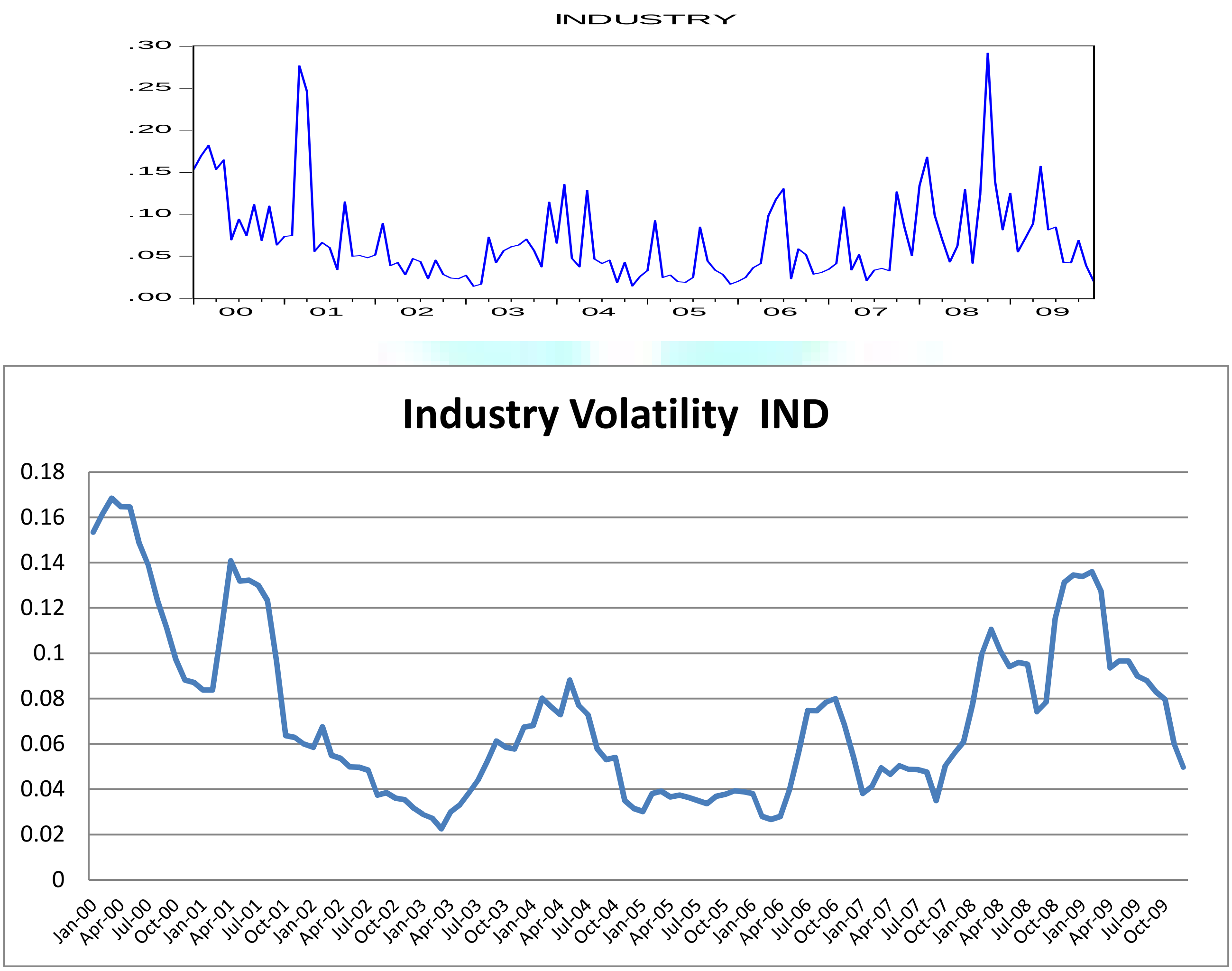


FIGURE 2: MONTHLY MARKET VOLATILITY MKT



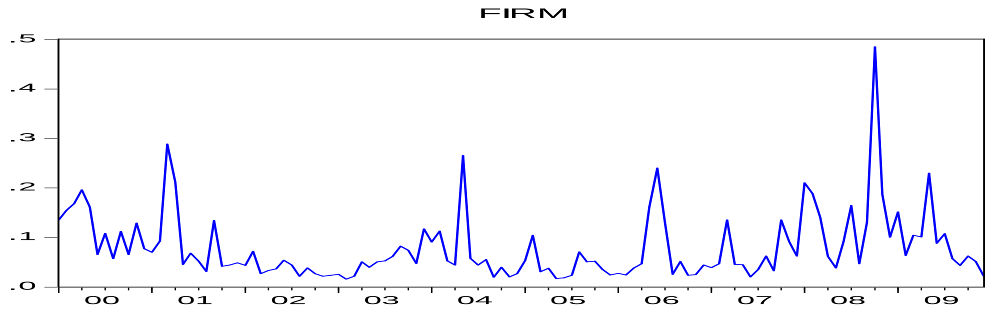
The top panel shows the variance within each month of daily market returns, calculated using equation (17), for the period January2000 to December 2009. The bottom panel shows a backwards 6 month moving average of MKT.

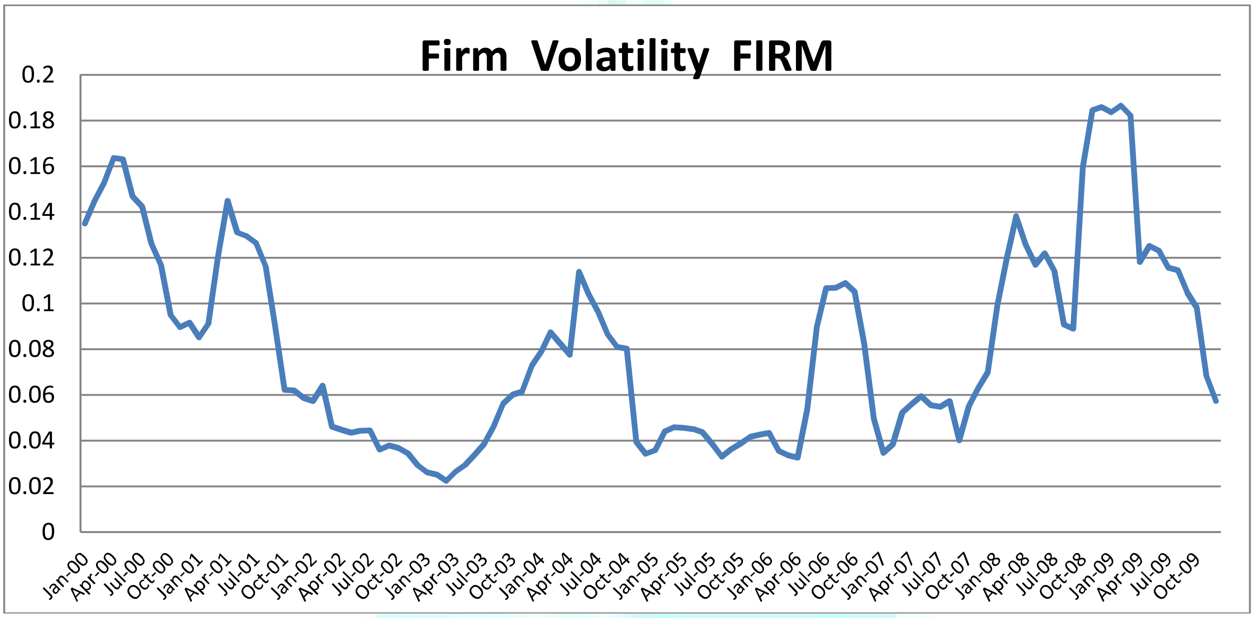
FIGURE 3: MONTHLY INDUSTRY-LEVEL VOLATILITY IND



The top panel shows the variance within each month of daily industry returns relative to the market, calculated using equations (18) and (19), for the period from january2000 to December 2009. The bottom panel shows a backwards 6-month moving average of IND.

FIGURE 4: MONTHLY FIRM –LEVEL VOLATILITY FIRM





The top panel shows the monthly variance within each month of daily firm returns relative to the firms industry, calculated using equations (20)-(22), for the period from January 2000 to December 2009. The bottom panel shows a backwards 6- month moving average of FIRM.

1.3 GRAPHICAL ANALYSIS

Discussions on the stock market have often suggested that the volatility of the market has increased over time. At the aggregate level, however, this is not true; the percentage volatility of market index returns shows no systematic tendency to increase over time. To be sure, there have been episodes of increased volatility, but they have not persisted, Schwert (1989) presented a particularly clear and forceful demonstration of this fact, and we begin by updating his analysis.

In figure 1 plots the volatility of the value weighted BSE composite index for the period 2000 through 2009 for consistency with Schwert, annual standard deviations based on monthly data is constructed. The figure shows the huge spikes in volatility during the late 2000 and 2001 as well as the higher levels of volatility during the global melt down of the 2008s and the stock market crash of 2000 and 2008. In general however, there is no discernible trend in market volatility the average annual standard deviation for the period from 2000 to 2009 is 2.2 percent.

These results raise the questions of why the investor has such a strong impression of increased volatility. One possibility is that increased index levels have increased the volatility of absolute changes, measured in index points, and that the investor does not understand the need to measure percentage returns. Another possibility is that investor's impressions are formed in part by the behavior of individual stocks rather than the market as a whole. Casual empiricism does suggest increasing volatility for individual stocks. On any specific day, the most volatile individual stocks move by extremely large percentage often 25 percent or more. The question remains whether such impressions from casual empiricism can be documented rigorously and, if so, whether these patterns of volatility for individual stocks are different from those existing in earlier periods with this motivation.

Figures 2 to 4 plot the three variance components, estimated monthly, using daily data over the period from 2000 to 2009: market volatility MKT, industry –level volatility IND, and firm-level volatility FIRM, all three series are annual The top panels show the raw monthly time series and the bottom panels plot a lagged moving average of order 12. Note that the vertical scales differ in each figure and cannot be compared with figure 1 (because variances are plotted rather than a standard deviation).

Market volatility shows the well-known patterns that have been studied in countless papers on the time variation of index return variances. Comparing the monthly series with the smoothed version in the bottom panel suggests that market volatility has a slow-moving component along with a Fair amount of high-frequency noise. Market volatility was particularly high around 2000s – 2001s, in the mid -2004s, around 2007 - 2008, and at the very end of the sample, the stock market crash in 2007-2008caused and enormous spike in market volatility which is cut off in the plot. The value of MKT in October 2008 is 0.5182. The cyclical behavior of MKT and the other volatility measures below.

Next, consider the behavior of industry volatility IND in figure 3. Compared with market volatility, industry volatility is slightly lower on average. As for MKT, there is a slow – moving component and some high –frequency Noise, IND was particularly high in the 2000s – 2001s and around 2007s mid of 2008. The effect of the crash in October 2008 is quite significant for IND, although not as much as for MKT. More generally, industry volatility seems to increase during macroeconomic downturns.

Figure 4 plots firm-level volatility FIRM. The first striking feature is that FIRM is on average much higher than MKT and IND. This implies that firm-specific volatility is the largest component of the total volatility of an average firm. The second important characteristic of FIRM is that it trends up over the sample. The plots of MKT and IND do not exhibit any visible upward slope whereas for FIRM it is clearly visible. This indicates that the Stock market has become more volatile over the sample but on a firm level instead of a market or industry level. Apart from the trend, the plot of FIRM looks similar to MKT and IND. Firm –level volatility seems to be higher in recessions and the crash also has a significant effect.

Looking at the three volatility plots together, it is clear that the different volatility measures tend to move together, particularly at lower frequencies, for example, all three volatility measures increase during the dot com bubble in the 2000s-2001s. However, there are also some periods in which the volatility measures move differently. It is evident from the plots that the stock market crash in 2007-2008 had a significant effect on all three volatility series. This raises the issue whether this one-time event might overshadow the rest of the sample and distort some of the results.

1.4 STOCHASTIC VERSUS DETERMINISTIC TREADS

Figure 2 to 4 suggest the strong possibility of an upward trend in idiosyncratic firm-level volatility. A first important question is whether such a trend is stochastic or deterministic in nature. The possibility of a stochastic trend is suggested by the persistent fluctuations in volatility shown in the figures.

Table 1 reports autocorrelation coefficients for the three volatility measures using raw data. The autocorrelation structure of monthly volatility measure constructed from daily data. All these series exhibit fairly high serial correlation, which raises the possibility that they contain unit roots in the series.

TABLE - 1: AUTO CORRELATION

SL.	Market	Industry	Firm
1	0.309	0.484	0.412
2	0.100	0.257	0.166
3	0.138	0.243	0.206
4	0.072	0.148	0.094
5	0.035	0.135	0.075
6	0.054	0.169	0.099
7	0.187	0.154	0.164
8	0.130	0.212	0.189
9	0.178	0.153	0.210
10	0.076	0.154	0.111
11	-0.002	0.138	0.057
12	-0.040	0.141	0.037
13	-0.099	0.032	-0.076
14	-0.021	0.001	-0.061
15	-0.029	0.029	-0.017
16	0.011	-0.013	0.005
17	-0.040	-0.042	-0.048
18	-0.051	-0.027	-0.055
19	0.046	0.032	0.047
20	-0.018	-0.033	-0.028
21	-0.044	-0.102	-0.093
22	-0.071	-0.136	-0.118
23	-0.118	-0.160	-0.166
24	0.015	-0.049	-0.061
25	0.103	-0.033	0.011
26	-0.028	-0.045	-0.049
27	0.001	0.031	0.008
28	0.165	0.040	0.119
29	0.133	0.054	0.083
30	-0.017	-0.044	-0.026
31	-0.032	-0.077	-0.071
32	-0.029	-0.052	-0.048
33	-0.041	-0.082	-0.073
34	-0.009	-0.016	-0.009
35	0.033	-0.007	0.003
36	-0.027	-0.060	-0.039

To check this, in table.2 and table 3 employs augmented dickey and fuller (1979) p-tests based on regressions of time series on their lagged values and lagged difference terms that account for serial correlation. The number of lagged differences to be included can be determined by the Automatic based on SIC, MAXLAG=12 lagged difference term, and is also reported in table 5.3 the hypothesis of a unit root is rejected for all three volatility series at the 5 percent level and 1 percent level, whether a deterministic time trends is allowed or not.

TABLE 2: AUGMENTED DICKEY-FULLER TEST (ADF) FOR LEVEL 0 (CONSTANT)

	MKT	IND	FIRM
Constant ADF t-value	-7.84	-6.96	-6.96
Critical Value of t (1%)	-3.43	-3.43	-3.43
Critical Value of t (5%)	-2.86	-2.86	-2.86
Lag Length	0	0	0
H_0	**Rejected**		

TABLE 3 (a): AUGMENTED DICKEY-FULLER TEST (ADF) FOR LEVEL 0 (CONSTANT & TREND)

	MKT	IND	FIRM
Constant & Trend ADF t-value	-8.00442	-6.38896	-6.95771
Critical Value of t (1%)	-4.03698	-4.03698	-4.03698
Critical Value of t (5%)	-3.44802	-3.44802	-3.44802
Lag Length	0	0	0
H_0	**Rejected**		

TABLE 4: AUGMENTED DICKEY-FULLER TEST (ADF) FOR FIRST DIFFERENCE (CONSTANT)

	MKT	IND	FIRM
Constant ADF t-value	-12.5292	-12.0148	-12.5756
Critical Value of t (1%)	-3.43	-3.43	-3.43
Critical Value of t (5%)	-2.86	-2.86	-2.86
Lag Length	1	1	1
H_0	**Rejected**		

TABLE 4 (a): AUGMENTED DICKEY-FULLER TEST (ADF) FOR FIRST DIFFERENCE (CONSTANT & TREND)

	MKT	IND	FIRM
Constant & Trend ADF t-value	-12.4742	-11.977	-12.5227
Critical Value of t (1%)	-4.03698	-4.03698	-4.03698
Critical Value of t (5%)	-3.44802	-3.44802	-3.44802
Lag Length	1	1	1
H_0	**Rejected**		

Given these results, next step is to analyze the volatility series in levels rather than first differences. Table 5 shows some descriptive statistics

TABLE - 5: DESCRIPTIVE STATISTICS

	FIRM	INDUSTRY	MARKET
Mean	0.0793	0.0698	0.0610
Median	0.0531	0.0517	0.0374
Maximum	0.4852	0.2920	0.5182
Minimum	0.0159	0.0145	0.0070
Std. Dev.	0.0688	0.0519	0.0733
Skewness	2.5270	1.8404	3.2886
Kurtosis	12.5431	7.1648	17.0477
Jarque-Bera	583.0648	154.4706	1202.9880

All three volatility measures exhibit substantial variation over time unconditional standard deviations of the variance series. Market and firm volatility are more variable over time than industry volatility, but a large portion of the time-series variation in market volatility is due to the crash in 2008.

Next issue is of trends. In table 4 we rejected the unit root hypothesis for all three volatility series. An alternative hypothesis is the existence of a deterministic linear time trend. Since all volatility series are fairly persistent, standard trend tests are not valid.

TABLE 6: CORRELATION STRUCTURE

	FIRM	IND	MKT
FIRM	1.000	0.923	0.940
IND		1.000	0.752
MKT			1.000

Table 6 shows the correlation between the three volatility series are around 0.9 this result confirms the visual evidence trends in the plots. It is clear from figure 2 to 4 that there are many short run movements around these trends and these trends tend to correlate across the three volatility measures. All the three volatility measures are highly positively correlated.

Table 7 measures how important the three volatility components are relative to the total volatility of an average firm. First, consider the mean over the whole sample, market volatility accounts for about 16 percent of the unconditional mean of total volatility whereas IND accounts for 12 percent,. However, the largest protion of total volatility is firm-level volatility, with about 72 percent. Consistent with the observation of trends in the three series, the share of firm-level volatility has increased from 71 percent in the first nine years of the sample to 77 percent in the last nine years.

A variance decomposition shows that most of the time-series variation in total volatility is due to variation in MKT and FIRM. Industry volatility is more stable over time. The two largest components are FIRM variance and the co-variation of MKT and FIRM; together they account for about 60 percent of the total time-series variation in volatility. The market component by itself is much less important, only 15 percent of the total variation in volatility. Relative to its mean, however MKT shows the greatest time-series variation.

TABLE 7: MEAN AND VARIANCE DECOMPOSITION

	MKT	IND	FIRM
Mean	0.160	0.116	0.724
	0.162	0.126	0.712
	0.134	0.097	0.769
Variance			
Raw series			
MKT	0.149	0.081	0.328
IND		0.027	0.133
FIRM			0.282
Conditional means			
MKT	0.099	0.067	0.334
IND		0.026	0.137
FIRM			0.337

Note: Entries are the shares of MKT, IND and FIRM in the total mean and variance of the volatility of a typical stock. MKT is market volatility constructed from equation (17), IND is industry –level volatility constructed from equation (18) and (19), and FIRM is firm –level volatility constructed from equations (20) –(22). The volatility of a typical stock = MKT +IND +FIRM Then for the mean of volatility.

At the top of table 7 a variance decomposition for the conditional expectations of the volatility series. This puts even more weight on the terms involving FIRM; about 80 percent of the total variation is due to variance and covariance terms of FIRM. The contribution of MKT is below 10 percent the industry – level terms for conditional expectations are more or less unchanged compared to the raw data.

TABLE 8: RESULT OF OLS REGRESSION

Dependent Variable: MARKET				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**R-squared**
IND	1.0618	0.0857	12.3960	0.5656
FIRM	1.0006	0.0336	29.8007	0.8827

TABLE 9: RESULT OF OLS REGRESSION

Dependent Variable: INDUSTRY				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**R-squared**
MKT	0.5327	0.0430	12.3960	0.5656
FIRM	0.6962	0.0267	26.0384	0.8518

TABLE 10: RESULT OF OLS REGRESSION

Dependent Variable: FIRM				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**R-squared**
MKT	0.8822	0.0296	29.8007	0.8827
IND	1.2235	0.0470	26.0384	0.8518

One issue that arises in interpreting these results is whether the common variation in MKT, IND, and FIRM might be explained by cross-sectional variation in betas. In equation (15), we showed that movements in MKT might produce variation in IND if betas differ across industries and the volatility of industries CAPM residuals is independent of MKT., Under this hypothesis, the coefficient in a regression of IND on MKT would equal the cross-sectional variance of betas across industries empirically, the regression coefficient is 0.27 in full sample whereas a direct estimate of cross sectional variance of industry betas is only 0.03; this calculation suggests that cross- sectional variation in betas cannot explain more than a small fraction of the common movement in MKT and IND. A similar calculation based on equation (16) gives the same result for co-variation between FIRM and the other two volatility measures. In sample, a regression of FIRM on MKT and IND given coefficients of 0.72 and 1.40 respectively, much too large to be explained by plausible cross-sectional variation firm's beta coefficients.

Table.8 to.10 explains the deterministic trend shown by the market, industry and firm level volatility using linear trend. When market volatility is treated as dependent variable firm has more predicting power than industry level volatility. When industry is treated as dependent then also firm volatility has forecasting ability rather than market volatility. When firm volatility is treated as depending variable then both market as well as industry has an explaining powersince the value of R square is high with both.

TABLE 11: GRANGER CAUSALITY (LAG 2)

	MKT	**IND**	**FIRM**
MKT		0.3408	0.6099
IND	0.337		0.0667
FIRM	0.2073	0.3877	

TABLE 12: GRANGER CAUSALITY (LAG3)

	MKT	**IND**	**FIRM**
MKT		0.5529	0.9355
IND	0.1921		0.815
FIRM	0.1921	0.5831	

Table 11 and 12 investigates whether the volatility measures help to forecast each other using Granger causality tests. The Table 11 reports p-values for bi-variate VARs and the Table 12 uses tri-variate VARs including all three series. The VAR lag length was chosen using the Akaike information criterion. In bivariate VARs MKT appears to granger cause both IND and FIRM at significance levels. IND does not help to predict MKT or FIRM, but FIRM helps significantly to forecast MKT and IND. Much of the causality survives in tri-variate systems. MKT granger causes IND and FIRM at high significance levels than in the bi-variate case. FIRM granger causes of IND are insignificant IND Fails to granger cause the MKT series as in the case of bivariate. Overall, market volatility appears to lead the other volatility measures, whereas industry volatility tends to lag. Firm-level volatility helps to predict market volatility as well as the other way round.

1.5 CONCLUSION

To conclude a significant positive deterministic trend has been found in market level volatility. Industry and firm level volatility, on the other hand do not show similar trend. High correlation between the series implies that they move together. The analysis of volatility components relative to total volatility of an average form reveals that market – level volatility has the largest portion of total volatility on an average. The time series variation in total volatility is due to market and industry level.

REFERENCES

1. Andrikopoulos, A. and Angelidis, T. (2010), Idiosyncratic Risk, Returns, and Liquidity in the London stock Exchange: a Spillover Approach, International Review of Financial Analysis, Vol. 19, No. 3, June 2010, pp. 214-221.
2. Anoruo, E. and Mustafa, M. (2007), an Empirical Investigation into the Relation of Oil to Stock Market Prices, North American Journal of Finance and Banking Research, 1, 1.
3. Bakry, W.K. (2006). "A Panel in GARCH Analysis of Stock Return Volatility in an Emerging Market: A Case Study of Egypt," School of Economics and Finance, College of Law and Business, University of Western Sydney.
4. Bollerslev, Tim, Ray Chou, and Kenneth kroner 1992, ARCH modeling in finance: A review of the theory and empirical evidence, journal of Econometrics 52, 5-59).
5. Brown, C.A. (1999), the volatility Structure Implied by Options on the SPI Futures Contract, Autralian Journal of Management, 24, 2 ©The Australian Graduate School of Management.
6. Campbell, John .Y. and Pierre Perron 1991, pitfalls and opportunities what macroeconomics should know about unit roots, NBER (macroeconomics annual 6, 141-201.
7. Campbell, John y. and Martain Lettau, 1990 dispersion and volatility in stock returns; an empirical investigation NBER working paper 7144.
8. Cheong, C.W., Nor, A.H.S.M., and Isa, Z. (2007), Long Persistence Volatility and Links between National Stock Market Indices, International Research Journal of Finance and Economics, 7.
9. Cohen, Randolph .B. Brian J. Hall, and Luis, Viceira, 2000, executive stock options encourage risk-taking? Working paper, Harvard business school.
10. Engle, R.F. (1982), Autoregressive Conditional Heteroskedasticity with Estimates of the
11. Fleming, J.M. (1962). "Domestic Financial Policies under Fixed and Floating Exchange Rates," IMF Staff Papers, 9(3), 369-79.
12. Hafner, C.M., and Preminger, A. (2006), Asymptotic theory for a Factor GARCH Model, core discussion paper.
13. Hahm, (2003), Transmission of Stock Returns and Volatility: the Case of Korea.

14. Johansen, s. (1991). "Estimation and Hypothesis Testing of Co-integration Vectors in Gaussian Vector Autoregressive models," Econometrica 59, 1551-1580.
15. Jyostsna Tadikonda and Veerendra P. Emani, Indian IT Industry- will it be a victim of "Dutch disease"? Treasury Management, Icfai University Press, February 2008.
16. Kaur, H. (2004), Time Varying Volatility in the Indian Stock Market, Vikalpa, 29, 4, pp. 25-42.
17. Kenen, P.B. (1976). Capital Mobility and Integration: A Survey, Princeton Studies in International Finance No. 39, Princeton University.
18. Khedhiri, S., and Mohammad, N. (2008), Empirical Analysis of the UAE Stock Market Volatility, International Research Journal of Finance and Economics, 15.
19. Kim, S., In, F., and Viney, C. (2001), Modeling Linkages between Australian Financial Future Markets, Australian Journal of Management, 26, 1.
20. Kroner, K.V., and Ng, V.K. (1998). Modeling Asymmetric Comovements of Asset Returns. The Review of Financial Studies, 11, 817-844.
21. LeRoy, S.F. and Parke, W.R. "Stock Price Volatility: Tests Based on the Geometric
22. Neslon, Daniel, 1992 filtering and forecasting with specified ARCH models I ; getting the right variance with the wrong model, journal of econometrical 52, 61-90
23. Niclas Hagelin and Bengt Pramborg, Hedging Foreign Exchange Exposure: Risk Reduction from Transaction and Translation Hedging, May 28, 2002
24. Poterba, James M., Lawrence H. Summers. "The Persistence of Volatility and Stock Market Fluctuations." American Economic Review. 76, 11742-1151.
25. Sault, S.J. (2007), A Disagreegated Analysis of Movements in East Asian Regional Stock Volatility, Australian Journal of Management, 32, 2.
26. Schwert. G. William and Paul. J.Seguin, 1990 heteroskedasticity in stock returns, journal of Finance 45, 1129-1155.
27. Schwert. G. William, 1989, why does stock market volatility change over time? Journal of finance 44, 1115-1153.
28. Shiller, Robert.J. 1981. Do stock prices move to be justified by subsequent changes in dividends? American economic Review 71, 421-436.
29. Stock Market Volatility and the Information Content of Stock Index Options," Journal of Econometrics 52, 267-87.
30. Wang, J., and Yang, M. (2006), Asymmetric Volatility in the Foreign Exchange Markets.

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