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STOCK MARKET VOLATILITY: AN EVALUATION

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Abstract-The paper evaluated the multidimensional framework of stock market volatility.High indices of stock market in every aspect of measurement implied less variability of volatility.A country's depression or recession turned into severe volatile stock market which cannot be cured in the short run.Political turmoil or instability or chaos made negative impact on stock market which spurs volatility.The stock market volatility has the negative nexus with the growth rate of a nation i.e. high volatility reduces growth rate. There is causality between them. Since stock market volatility brings forth economic crisis which has ultimately spill over on growth inversely to other countries as well. The international trade and stock market volatility is negatively related in the sense that volatility reduces the volume of trade and increases current account and capital account deficits.

Index Terms – Stock market volatility, impact of volatility, factors of volatility, growth and volatility, trade and volatility

I. Introduction

Behaviour of stock market is uncertain, volatile and probabilistic although it is related with the major macroeconomic indicators of the economy. The stability of the stock market needs the strong capital market with high macro fundamentals. In the globalization era, the international trade plays a key role in changing stock market efficiency in the areas of banking and finance. The extreme volatility in the stock market produces instability in the capital market, destabilize the value of currency, as well as hampers international trade and finance. Even, the growth and the stock market volatility are inversely related where causality was found.A developed stock market should be fundamentally more competitive with any other international stock markets in which floating exchange rate mechanism is determined. The monetary and trade policy of a country crucially help in finding factors of stock market volatility to work properly although the patterns of behavior of investors and savers of the stakeholders are unknown where the political super structure and process of the economy are given. But the political factors may change parametrically. This paper evaluated the studies of the major works on stock market volatility on such multidimensional issues.

II. Volatility and its measurement

"Volatility is basically a function of uncertainty."-say's John Bollinger. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index. Commonly, the higher the volatility, the riskier is the security. One measure of the relative volatility of a particular stock to the market is its beta. A beta approximates the overall volatility of a security's returns against the returns of a relevant benchmark (usually the S&P 500 is used). For example, a stock with a beta value of 1.1 has historically moved 110% for every 100% move in the benchmark, based on price level. Conversely, a stock with a beta of .9 has historically moved 90% for every 100% move in the underlying index. Volatility is measured by the Chicago Board of Options Exchange (CBOE), primarily through the CBOE Volatility Index (VIX) and, to a lesser extent, the CBOE Nasdaq Volatility Index (VXN) for technology stocks. Seasoned traders who monitor the markets closely usually buy stocks and index options when the VIX is high. When the VIX is low, it usually indicates that investors believe the market will head higher. The standard deviation tells us how tightly the price of a stock is grouped around the mean or moving average (MA). When the prices are tightly bunched together,

the standard deviation is small. When the price is spread apart, you have a relatively large standard deviation. For securities, the higher the standard deviation, the greater the dispersion of returns and the higher the risk associated with the investment. As described by modern portfolio theory (MPT), volatility creates risk that is associated with the degree of dispersion of returns around the average. In other words, the greater the chance of a lower-than-expected return, the riskier is the investment. Volatility tends to decline as the stock market rises and increase as the stock market falls. When volatility increases, risk increases and returns decrease. Risk is represented by the dispersion of returns around the mean. The greater the dispersion of returns around the mean, the larger is the drop in the compound return.
Crestmont Research used the average range for each day to measure the volatility of the Standard & Poor's 500 Index (S&P 500) index. Their research tells us that higher volatility corresponds to a higher probability of a declining market. Lower volatility corresponds to a higher probability of a rising market. The VIX is used as a tool to measure investor risk. A high reading on the VIX marks periods of higher stock market volatility. This high volatility also aligns with stock market bottoms. Low readings on the VIX mark periods of lower volatility. As a general trend, when the VIX rises the S&P 500 drops. When the VIX is at a high, the S&P 500 is at a low, which may be a good time to buy. The higher level of volatility that comes with bear markets has a direct impact on portfolios. It also adds to the level of concern and worry on the part of investors as they watch the value of their portfolios move more violently and decrease in value.

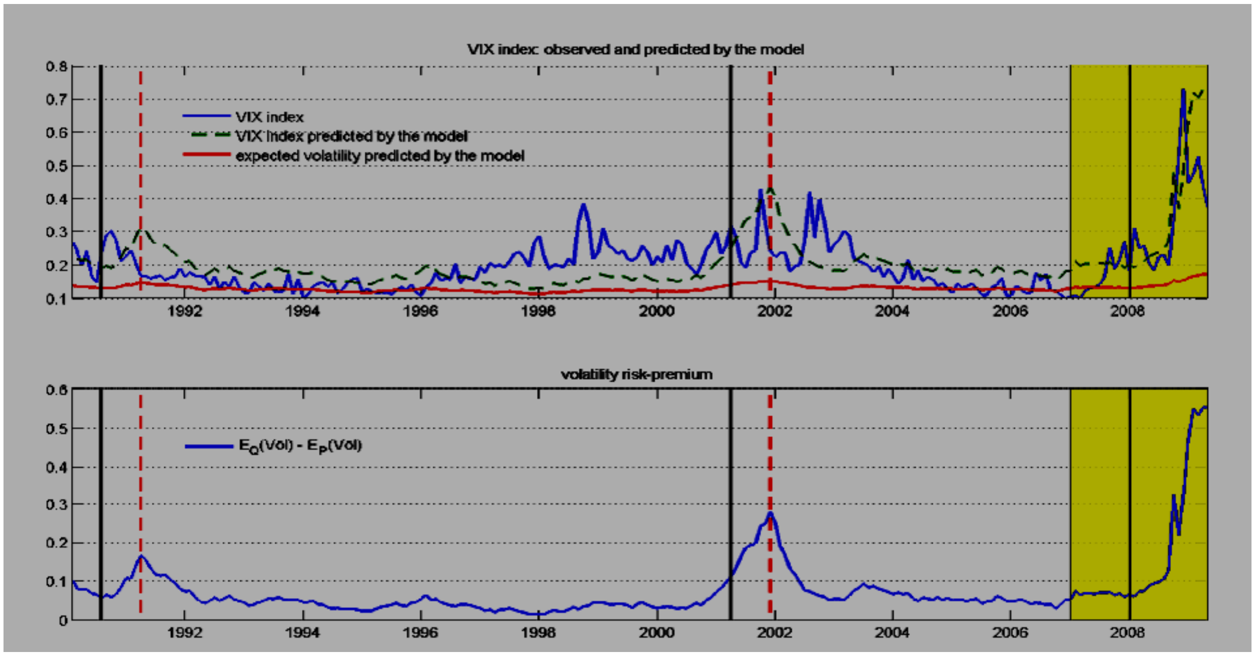
We've gone through some periods where that VIX Index got to almost record levels, especially after the financial crisis. But it mean-reverts. We didn't have a VIX Index in the 1920s and 1930s and early 1940s, but the volatility in that period was more extreme, sustained, and longer-lived than we get nowadays. The volatility of stocks has generally gone down over time. In the current situation, it's been particularly frustrating for politicians and those who run economies to see that the stock markets did recover but the labor markets, with a much stickier structure, have not. As investors get interested in a stock, trading volume, volatility, and prices rise, but stocks that are already volatile and very liquid actually have the worst returns. Using trading data from 1990 to 2011,the visuals are designed from S&P 500 index option data replicating the implied volatility wave (or variance swap curve) extending to an expiration of one year. The front of the volatility wave contains the same data used to calculate the CBOE VIX index. The movement of this wave demonstrates changing trader expectations of the future stock market volatility. As the wave moves through time the expected (or implied) volatility surface transforms into a realized volatility surface derived from historical S&P 500 index movement. The worry is that if interest rates now increase too much, this circle will become a vicious one-----higher interest rates will lead to money flowing back to the US from emerging markets, consumption in the US will decline, world growth will slow, and stock markets across the world will decline, with emerging markets being particularly hard hit.

III. Factors Affecting Stock Market Volatility

The risk-premiums arising from fluctuations in this volatility are strongly countercyclical, certainly more so than stock volatility alone. In fact, the risk-compensation for the fluctuation in the macroeconomic factors is large and countercyclical, and explains the large swings in the VIX index during recessions. When the VIX reached a record high of more than 70%, the model successfully reproduced through a counter cyclical variation in the volatility risk-premiums. It is evident that the same volatility risk-premiums might help predict developments in the business cycle in bad times and the end of a recession.
Which macroeconomic factor matters? It was found that industrial production growth is largely
responsible for the random fluctuations of stock volatility around its level, and that inflation plays, instead, a quite limited role in this context. At the same time, inflation plays an important role as a determinant of the VIX index, through two channels: (i) one, direct, channel, related to the inflation risk-premium, and (ii) an indirect

channel, arising from the business cycle propagation mechanism, through which inflation and industrial production growth are correlated. The second channel is subtle, as it gives rise to a correlation risk that it is significantly priced by the market.(Corredi,Distaso &Male,2010).

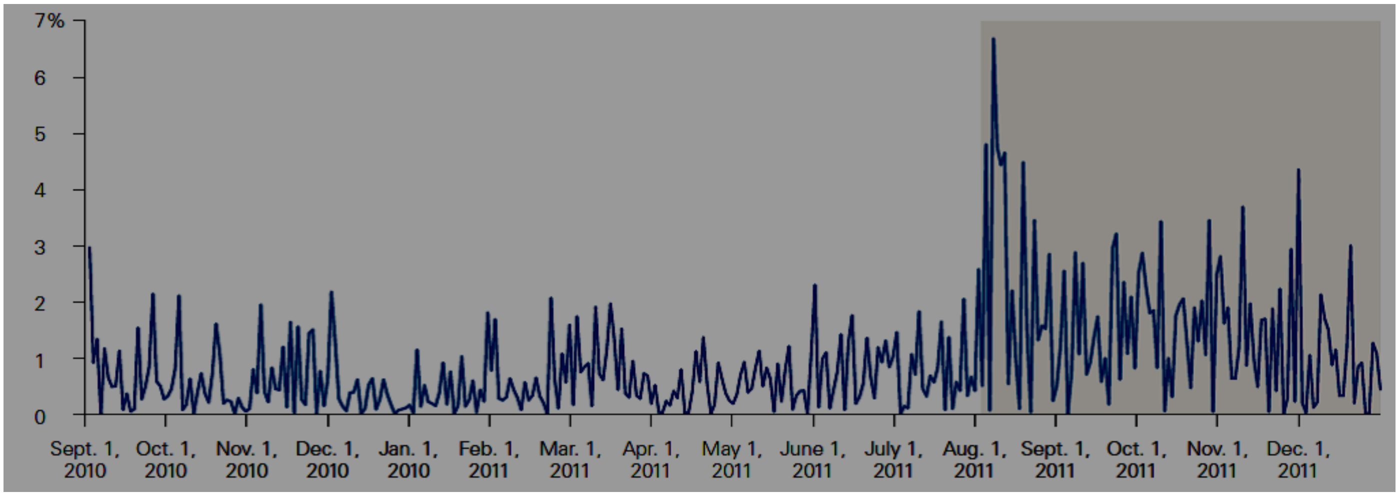
Fig.-1:VIX index and volatility risk premium



Source- Corredi,Valentina,Walter Distaso and Antonio Male,2010

In fact, stock volatility and volatility risk-premiums are driven by business cycle factors. An even more challenging and fundamental question is to explore the extent to which business cycle, stock volatility and volatility risk-premiums do endogenously develop. The volatility in global equity markets since late summer 2011 continues to attract widespread media and investor attention. Much of the commentary has focused on perceived causes for the volatility—such as the growth of hedge funds, high-frequency trading, quantitative investment programs, and vehicles such as exchange-traded funds (ETFs), specifically, leveraged and inverse ETFs. Little focus, meanwhile, has been placed on the global macro environment, which faces the continuing Euro zone debt crisis; the prospect of a slowing global economy; political brinkmanship in Washington, D.C., including the failure of the super committee created by the U.S. Congress to help reduce the national debt; and the rating downgrade of U.S. Treasury bonds from their AAA status by Standard & Poor's in early August 2011.

Fig-2:Volatility in the S&P index



Source- Corredi,Valentina,WalterDistaso and Antonio Male,2010

"Volatility in economic conditions" is defined here as the annualized rolling standard deviation over 36 months through December 31, 2011, in the Federal Reserve Bank of Philadelphia's Aruoba-Diebold-Scotti Business Conditions Index, which is designed to track real business conditions at high frequency. The index's underlying (seasonally adjusted) economic indicators (weekly initial jobless claims, monthly payroll employment, industrial production, personal income less transfer payments, manufacturing and trade sales, and quarterly real gross domestic product) blend high- and low-frequency information and stock and flow data. Volatility in the S&P 500 Index is defined here as the annualized rolling standard deviation over the 36 months through December 31, 2011, in the price returns of the index.
To be sure, the 2000s have so far witnessed two severe bear markets and an extreme level of volatility and risk during the global financial crisis, yet it's important to note that between 2003 and 2007, stock market volatility and risk aversion were at all-time lows historically. And when we compared the first decade of the 2000s and 2011 with long-term history, do not support the theory. In fact, Table-1 shows that volatility since 2000 has been on a par with the long-term averages (i.e., 1929–1999).

Table-1: Standard deviation of S&P Index returns for selected periods:

Periods	Annual	Quarterly	Monthly	Daily
1929–December 31, 1999	19.36%	11.65%	5.67%	1.13%
2000–December 31, 2011	19.05	9.02	4.71	1.38

Source-Federal Reserve Bank of Philadelphia

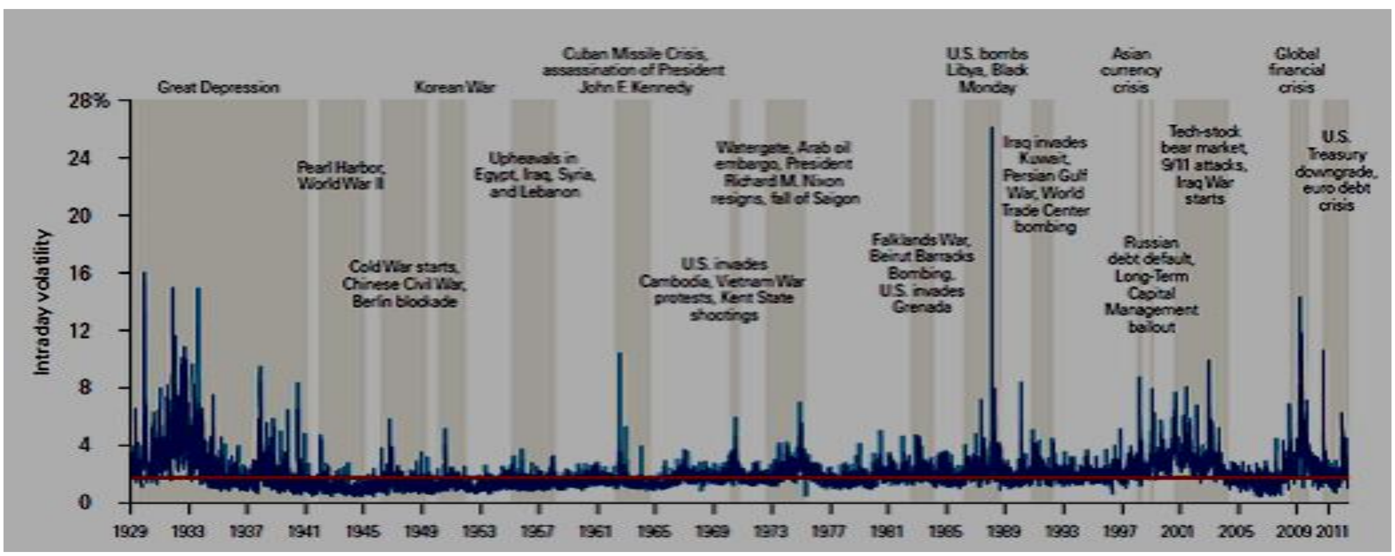
The political history showed that during the Great Depression, aggregate stock market volatility in a large number of advanced economies reached so high levels not seen before or since. Schwert (1989b) estimates that in the US, there was a two- to threefold increase in variability. According to his measure, the monthly variation of stock returns peaked at over 20 percent in 1932. Other developed countries experienced similar increases in volatility. This is all the more puzzling since macroeconomic series such as money growth and interest rates showed markedly smaller increases in variability . As a general rule, neither wars nor periods of financial panic appear to lead to significantly higher variability of equity returns over an extended period — despite the highly unstable behavior of other macroeconomic series. Recessions, however, are clearly associated with higher volatility . The argument that political risk during the Great Depression is partly to blame is supported by the recent finding that unusually high levels of synchronicity of individual stock returns contributed substantially to aggregate volatility .

The cross national data set of New York University contains information on the nature of the political system and social instability for a set of 166 over the period 1815-1973. Overall, the interwar data set for a number of countries that are developed today shows a relatively high level of political instability and violence. For most indicators of political uncertainty, the levels are twice the average observed in the larger data set. This is true of the number of assassinations, of general strikes, government crises, riots, and anti-government demonstrations. In three categories, the subsample actually appears more stable - there were fewer revolutions, purges and acts of guerrilla warfare than in the 166 country sample. The variability of the measures of political instability is considerable, ranging from a coefficient of variation of 3.9 in the case of revolutions to 1.98 for government crises. While Germany scores very high on almost all measures of political fragility, recording a total of 188 events of unrest, Switzerland marks the opposite extreme. Only three acts indicating instability are recorded - two assassinations (in 1919 and 1923) and one riot (in 1932). There is also plenty of change over time. While 1919 saw, for example, four times the average number of assassinations in the subsample of 10 countries, there were none in 1936-38. The number of anti-government demonstrations reached more than twice is average level in 1932, and the number of riots peaked in 1934 at almost twice its normal frequency. Unsurprisingly, the tendency of governments to resort to violent acts of repression also peaked during the tumultuous years of the Great Depression, with the frequency of purges reaching a high of 2.6 times its average level in 1934. Europe and the US experienced two waves of turmoil and increasing uncertainty. Following the end of World War I and the Russian Revolution in 1917, chaos and civic unrest broke out in numerous countries. In the years 1919-23, there were 13 government crises, the same number of riots, and three general strikes. In France, there were waves of strikes in 1919 and 1920, considered by some observers as "a concerted attack upon the structure of bourgeois society". Nonetheless, these attacks ultimately failed -the trade union activist.

In the US and Britain, demobilizations and the end of war did not lead to the same degree of extreme instability as in continental Europe. However, the very sharp contractions in output and employment in 1920/21, engineered in part as an attempt to reduce prices and return to the gold standard at prewar parities, led to a considerable rise in worker militancy. This occurred against the background of a considerable strengthening of organized labor. As in the other belligerent countries, the position of labor had strengthened as a result of the war effort - governments recognized unions and encouraged cooperation between them and employers. Trade union membership in the TUC (Trades Union Congress) soared from 2.2 million in 1913 to 6.5 million in 1920. In the data set, Britain records 39 riots between 1919 and 1922, 12 assassinations, 6 general or politically motivated strikes, and 5 major government crises over the period. The average number of days lost in industrial disputes soared from 4.2 million in 1915-18 to 35.6 million in 1919- 23, the highest recorded value. Dissatisfaction with the established order could take a number of forms. In the US, there were 5 assassinations and four general or politically motivated strikes in 1919-23. Only one riot broke out, but 17 anti-government demonstrations were recorded. The total number of strikes increased sharply, to 3,630 in 1919, involving 4.2 million workers . Fear of a Communist takeover took the form of the so-called "Red Scare". Following the founding of the Third International in March, two Communist parties were formed in 1919, and quickly became active in propaganda . The second half of the 1920s saw a considerable decline in worker militancy and political violence. The 'roaring twenties' brought prosperity to many countries, with some exceptions. The US economy expanded rapidly, France reaped the benefits of currency stabilization under Poincare, and Germany, with the help of foreign loans, experienced an upsurge in activity after the end of the hyper inflation . At the same time, Britain's economy - tied to gold at an overvalued exchange rate - continued to languish . But even in those countries that didn't experience booms, labor militancy was on the wane. The second wave of unrest and politically motivated violence began in 1930, with the start of the Great Depression. Over the course of the crisis, industrial output in the US and Germany fell by 40-50 percent from peak to trough, and between a quarter and a fifth of all industrial workers were unemployed over the period 1930-38. In the face of massive capital outflows and pressure on reserves as a result of banking panics in Germany, Austria and the US, central banks first tried to defend the gold standard by a policy of deflation . Eventually, more and more countries abandoned the peg, either by devaluing or via a system of capital controls. Countries that remained on gold for a long time experienced the most severe contractions. France, which had initially avoided problems, eventually experienced major difficulties. Faced with a slump that extended into the second half of the 1930s, it was eventually forced to devalue in June 1937. Britain, which was amongst the first to abandon the gold standard, escaped relatively lightly." Recovery came faster and in a more robust way to the countries that abandoned gold first .

Economic difficulties were quickly reflected in the politics of the street and the factory floor. The total number of anti-government demonstrations soared from 22 in 1925-29 to 72 in 1930-34; riots rose from 62 to 108. The number of politically motivated general strikes increased from 7 to 10. In Germany, there is clear evidence that high rates of unemployment did much to boost the fortunes of the Communist party, already one of the strongest in the world . In the US, the Communist party expanded rapidly during the Great Depression, and union membership soared. Arthur Schlesinger noted about the year 1931 that "a malaise was seizing many Americans, a sense at once depressing and exhilarating, that capitalism itself was finished" . Perhaps even more importantly, the crisis rapidly increased the chances of Franklin D. Roosevelt gaining office. While even the most conservative businessmen did not equate this with a communist take-over, worries about the continued existence of "capitalism as we know it" were rampant. As Schlesinger noted, the "New York governor was the only presidential candidate in either major party who consistently criticized business leadership, who demanded drastic (if unspecified) changes in the economic system, who called for bold experimentation and comprehensive planning." Worries about future economic policy were compounded by the increasing realization that a return to the so-called "New Era" of prosperity and growth was impossible. Faced with growing labor militancy and an increasing willingness to contemplate central planning among the mainstream parties, right-wing radicalism also began to gain a following. Some observers and politicians, including prominent US senators, began to call for a Mussolini-style government, and magazines such as Vanity Fair and Liberty argued the case for a dictatorship .(Voth,2002)

Fig-3: Political Factors of Volatility



Source- Mei,Jianping and LiminGuo,2002

IV. THE IMPACTS OF VOLATILITY

The conventional finance theory suggests that the stock market (excess) return, being a forward-looking variable that incorporates expectation about future cash flows and discount factors, contains useful information about investment and future output growth. Empirical literature provides substantial evidence in favour of this proposition .It is also seen from a number of recent studies that increased stock market volatility depresses economic activity and output .As per the existing literature, stock market volatility may affects output growth through several possible channels, such as, (i) its link with market uncertainty and hence economic activity, (ii) association between market volatility and structural change (which consumes resources) in the economy, (iii)

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link of volatility with cost-of-capital to corporate sector through expected return. It is, however, not clear to justify why volatility drives out return in predicting output growth . Guo (2002) has discussed major arguments put forward by the proponents of volatility effects on output and has reconciled the evidence provided by Campbell et al. (2001) with earlier empirical evidence on predictive power of the stock market returns and finance theory. Based on a small model he argues that volatility may influence output growth (or may drives out returns in predicting output) in some specifications possibly because of its influence on cost of capital through its link with expected return.

But if cost of capital is the main channel through which volatility affects output then returns should play more important role in forecasting output growth than volatility does. He also provides empirical results to support this hypothesis. He derives relevant results for three different time periods; one longer than (but covering), one identical with, and another adding more recent years but shorter in length than the Campbell et al. (2001) sample period. Interestingly, using Campbell et al. (2001) sample, he finds that the volatility drives out returns in predicting output growth because of the positive relation between excess returns and past volatility; if this relation is controlled for, excess returns show up significantly in the forecasting equation. In the liberalisation era, volatility in Indian financial markets is believed to have increased/changed and thus there is a need to assess the impact of financial market volatility on output growth. Some recent studies have shown that elevated stock market volatility depresses output. As per the conventional finance theory, however, it is the stock market (excess) returns that should have impact on future output growth. Currently, the issue is important in India, as there has been a perception that the volatility in Indian financial markets has increased/changed during the liberalisation era. Empirical results show that stock market volatility is strongly influenced by its own past values – pointing to the presence of significant volatility-feedback effects in the stock market.

The empirical observation that stock market volatility tends to be higher during recessions points toward a negative relationship between stock market volatility and output. Fig-4 shows a scatter plot of U.S. quarterly percentage growth of real GDP against implied U.S. stock market volatility together with a fitted regression line. The negative relationship between volatility and output growth is clearly visible. Scatter plots using historical volatility or GJR-based volatility instead of implied volatility show a similar negative relationship. Although the empirical evidence indicates a close relationship between stock market volatility and economic fluctuations, the evidence is only suggestive. However, several papers document similar linkages using more detailed empirical approaches. The empirical study of Romer (1990) deals primarily with the onset of the Great Depression. However, Romer also presents estimates of the relationship between stock market volatility and consumption in the U.S.A. Using annual U.S. data ranging from 1949 to 1986, she concludes that a doubling of stock market volatility reduces durable consumer goods output by about 6%, whereas the effect on nondurables is essentially 0. This ordering of the magnitudes of the effects is consistent with the idea that stock market volatility is closely related to uncertainty about future real economic activity.

Table-2: U.S. Ouarterly Stock Market Volatility in Periods of Expansion and Recession

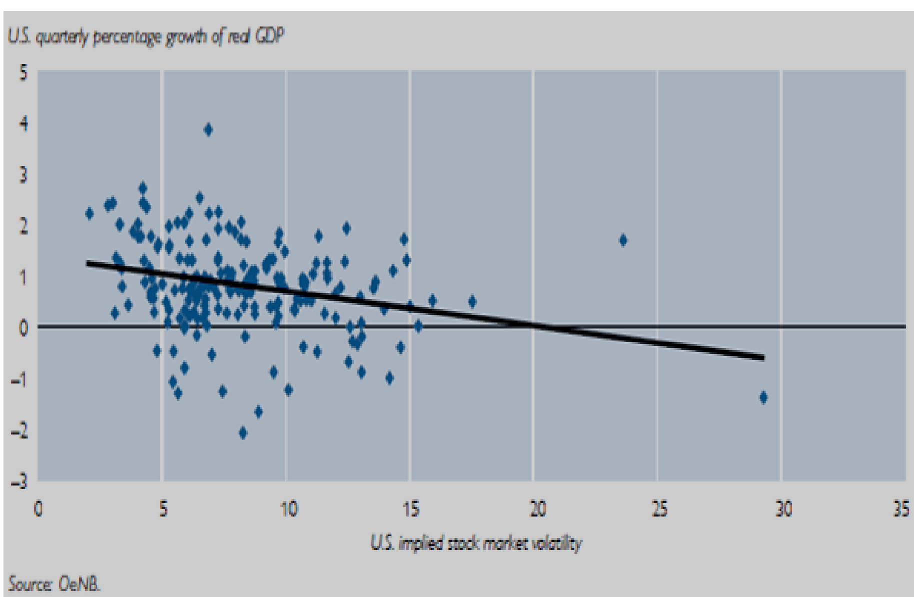
U.S. Quarterly Stock Market Volatility in Periods of Expansion and Recession

No recession	HV	GJRV	IV
Mean	7.6	7.0	7.7
Median	6.8	6.6	7.0
Maximum	36.9	16.9	23.6
Minimum	2.2	5.8	2.1
Number of observations	160	160	160
Recession	HV	GJRV	IV
Mean	11.3	8.3	10.4
Median	10.4	8.0	10.3
Maximum	40.5	15.5	29.3
Minimum	4.9	5.2	4.5
Number of observations	36	36	36

Source: OeNB.

Source- Raunig and Scharler,2010

Fig-4:U.S. Stock Market Volatility and GDP Growth



Source-Raunig and Scharler,2010

Raunig and Scharler (2010) evaluate the uncertainty hypothesis by estimating the influence of stock market volatility on durable consumption growth, nondurable consumption growth and investment growth. Their analysis is based on quarterly time series data for the U.S.A. Based on a number of different estimates of time-varying stock market volatility, they find that stock market volatility exerts an economically and statistically significant effect on aggregate demand. Moreover, they find that the adverse effect of stock market volatility on aggregate demand depends on the extent to which decisions are reversible. Based on their richest specification (Table 3), they find that an increase in volatility by one standard deviation reduces the quarterly growth of durable consumption by around –0.70 percentage points, whereas the effect on the growth of nondurable consumption is only –0.14 percentage points. Investment growth responds with a lag of one quarter and declines by 1.12 percentage points.

Table-3:Effect of an Increase in Stock Market Volatility by one Standard Deviationon U.S. Consumption and Investment Growth

	Volatility	Lagged volatility
Growth of durable consumption	–0.70	×
Growth of nondurable consumption	–0.14	×
Investment growth	×	–1.12

Source: OeNB.

Source- Raunig and Scharler,2010

Choudhry (2003) analyzes the influence of stock market volatility on GDP and the components of GDP using an error-correction framework. Under the assumption that volatility follows a non -stationary stochastic process, he estimates the short-run and long-run dynamics of GDP components using an error-correction framework. His results confirm that stock market volatility has adverse effects on consumption and investment.
It was examined that the dynamic effects of monetary policy shocks, identified from Federal funds futures data, by employing a vector autoregressive (VAR) model. The use of market-based measures of monetary policy shocks allows us to avoid the need to resort to identifying assumptions and circumvents dimensionality (degrees of freedom) problems in the estimated VAR. Our goal from this analysis is threefold. First, they assess the dynamic response of stock market volatility and the variance risk premium to monetary policy shocks. Second, their analysis allows us to characterize asymmetries in the return-volatility relationship. Third, they study the channels through which monetary policy shocks affect stock market volatility by analyzing the joint response of several financial variables to market-based measures of monetary policy shocks. By inspecting the channels of monetary policy transmission to volatility, we also identify the importance of changes in the risk premium or leverage on stock market volatility and therefore investigate in further detail the importance of the volatility feedback and leverage effect hypotheses.
Their results show a contemporaneous decrease in excess returns of 1% and an increase in stock market volatility which peaks one month following the shock at 0.8%. The results illustrate an asymmetric return-volatility relationship and demonstrate that monetary policy exerts an effect on the variance risk premium. They further explore the effect of monetary policy by estimating a bivariate GARCH model relating federal funds futures to stock market volatility. The bivariate GARCH model uncovers a novel and significant bidirectional volatility effect. Theoretically, volatility is a key component of many derivative pricing models and an understanding of the dynamic response of volatility to monetary policy shocks would allow for better derivative pricing. Using a VAR model that incorporates a futures-based measure of monetary policy shocks, their findings uncover a significant response of stock market volatility to monetary policy shocks. The results show

an asymmetric return-volatility response to a monetary policy shock and reveal an important response of the variance risk premium, and by extension, of risk aversion, to monetary policy. They also study the channels through which monetary policy affects stock market volatility. Their findings suggest that while leverage and futures-trading volume display an increase following a monetary policy shock, the importance of these channels in affecting short term changes in volatility is limited. The longer-term dynamic response of volatility appears to be dominated by the persistent effect of monetary policy on stock market fundamentals (dividends). In light of the important dynamic response of stock market volatility to monetary policy, they investigate the volatility interaction among a futures contract written on the monetary policy rate set by the Fed, namely federal funds futures, and the stock market using a bivariate GARCH model. Their analysis points to a bidirectional volatility relationship between the federal funds futures and stock markets. This, in turn, suggests an important role for market participants' uncertainty about the future course of monetary policy in determining stock market volatility.
We find that the volatility of the stocks affected by the reform declines after the implementation of the reform, relative to other stocks, which means that the effect of retail trading on volatility is positive. We argue that this positive effect is consistent with the view that some retail investors behave as noise traders. In support of this claim, we show that the reform also triggers a drop in the size of price reversals and the price impact of trades for the stocks affected by the reform. All these observations are predicted by models of noise trading. One must be careful in interpreting these findings: they are consistent with the view that some retail investors play the role of noise traders but they do not imply that *all* retail investors are noise traders or that only retail investors are noise traders. Moreover, we do not identify the drivers of retail trades (misperception of future payoffs, risk aversion, or hedging needs). Thus, our findings should not be construed as evidence that retail investors are irrational traders. Our findings also raise new questions. The literature on retail investors pre dominantly finds that these investors follow contrarian strategies, on average. We use our data on retail investors to measure the contribution of contrarian and momentum trades to retail trading activity. The reform has a more negative impact on contrarian trades. This observation can be reconciled with our finding regarding volatility in one of two ways: either retail contrarian trades dampen volatility but their stabilizing effect is smaller than the destabilizing effect of retail momentum trades, or retail contrarian trades also have a positive effect on volatility. Both stories are plausible. The first story is consistent with Kaniel, Saar, and Titman (2008), who argue that retail investors act as liquidity providers. The second story is consistent with Bloomfield, O'Hara, and Saar (2009). They consider an experiment in which some participants have no specific reason to trade and have no information. Instead of staying put, these agents trade and realize losses. Interestingly, they use contrarian trading strategies and contribute to mispricing by slowing down price adjustments to true values. There might be several reasons why noise traders may appear to act as contrarian investors.
For instance, they may be prone to behavioral biases such as the disposition effect or they may not realize that their limit orders are more likely to execute in the case of adverse price movements. Therefore amplify volatility. Our quasi-experiment cannot tell which story is correct. To do so, in keeping with the spirit of our study, one would need to find a separate instrument for contrarian retail trades and momentum retail trades. We leave this question to future research.

The findings in the other paper highlight the importance of information regarding stock market volatility in the monetary policy-making process, and also warn that the stock market boom stimulated by an accommodative monetary policy may easily turn into a financial bubble. If the bubble bursts, both the financial system and the real economy will be devastated. Therefore, the side effect of an accommodative monetary policy on the stock market should draw more attention from monetary authorities. From this perspective, the conclusion of the present paper may be generalized to take into account more nations across the world.
Christiano et al. (2008) find that the implementation of accommodative monetary policy can signal that a rebound of the stock market is just around the corner, and the imperfect rationality of investors can make the stock market fluctuate more frequently than is usual. To date, the literature has come to a general consensus that stock market volatility has a negative effect on the recovery of the real economy. What remains controversial is whether monetary policy may increase stock market volatility, and therefore central banks should take this

possibility into account when setting monetary policies. For example, Bernanke and Gertler (1999) and Cecchetti et al. (2000) provide distinct conclusions. Bernanke and Gertler (1999) explore how the macro economy is affected by alternative monetary policy rules either with or without the stock market volatility being taken into account. Their results suggest that it is desirable for central banks to focus on inflationary pressures while stock market volatility becomes relevant only if it signals potential inflationary or deflationary forces. Therefore, monetary policy with additional focus on stock market volatility does not benefit the economy in any significant manner.

However, Cecchetti et al. (2000) raise several objections to Bernanke and Gertler's (1999) conclusion. Cecchetti et al. (2000) believe that one of the final goals of monetary policy is to maintain a stable financial system. Large fluctuations in the stock market can cause adverse shock to the real economy. Therefore, central banks should not only concentrate on inflation and real economic growth, but also set a goal to react to the stock market volatility. In addition, Gilchrist and Saito (2006) employs a general equilibrium model on the basis of the Real Business Cycle theory and shows that it is necessary for monetary policy to consider stock market volatility. However, leverage has no impact on asymmetric volatility at the daily frequency and, moreover, we observe asymmetric volatility for stocks with no leverage. Also, expected returns may vary with the business cycle, that is, at a lower than daily frequency. Trading activity of contrarian and herding investors has a robust effect on the relationship between daily volatility and lagged return. Consistent with the predictions of the rational expectation models, the non-informational liquidity-driven (herding) trades increase volatility following stock price declines, and the informed (contrarian) trades reduce volatility following stock price increases. The results are robust to different measures of volatility and trading activity.

Prasad and Terrones (2003) suggest that financial integration (due mainly to the removal of capital controls) is responsible for an increase in the relative volatility of consumption and asset returns, especially in countries that have liberalized their capital accounts only relatively recently and partially. When negative shocks hit these countries, these authors observe, they tend to lose access to international capital markets. The rapid reversal of capital flows in response to these events amplifies the volatility of their consumption and asset market outcomes. Dellas and Hess(2002), on the other hand, find that the removal of capital controls is associated with less output and stock market volatility. This runs counter to the thesis that financial integration increases stock market volatility.

We found a positive association of monetary volatility with stock market volatility; an interpretation is that the conduct of monetary policy and the nature of the monetary regime are important for stock market volatility. That monetary policy became increasingly volatile in a number of countries in the 1970s and 1980s thus may be part of the explanation for why stock markets have been more volatile in recent decades. Probing deeper, we found that fixed exchange rate regimes are associated with relatively low levels of stock market volatility, flexible exchange rate regimes with relatively high ones. This makes it tempting to conclude that the collapse of currency pegs and the transition to floating explain the recent rise in stock market volatility. But not only the official exchange rate regime but also the conduct of monetary policy under that regime appear to matter, in that we find a positive effect of monetary volatility on stock market volatility even after controlling for the exchange rate regime.

The study of Prashant Joshi, I-Shou University, Taiwan(2011) examines the return and volatility spillover among Asian stock markets in India, Hong Kong, Japan, China, Jakarta, and Korea using a six-variable asymmetric generalized autoregressive conditional heteroskedasticity. The magnitude of volatility linkages is low indicating weak integration of Asian stock markets. The study finds that own volatility spillover is higher than cross-market spillover. The overall persistence of stock market volatility is highest for Japan (0.931) and lowest for China (0.824).

V. TRADING VOLUME AND STOCK MARKET VOLATILITY

The fluctuations in stock market and trading volume are influenced by the flow of information. The higher the volume, the narrower are the spreads, as a result there is less slippage, and less volatility. Traders keep a close eye on trading volume because it reflects the dynamic interplay between informed traders and uninformed traders who interact with each other in the marketplace in light of their own trading strategies and, ultimately, set market clearing prices. Trading volume is termed as the critical piece of information in the stock market because it either activates or deactivates the price movements. Stock prices are usually influenced by positive trading volume through the available set of relevant information in the market. A revision in investors' expectations usually leads to an increase in trading volume which eventually reflects the sum of investors' reaction to news.

There are extensive empirical studies which support the positive relationship between price, trading volume and volatility of a tradable asset. Various theoretical models have been developed to explain the relationship between price and trading volume. These include sequential arrival of information models, a mixture of distributions model , asymmetric information models , and differences in opinion models. All these models advocate the positive relationship between price, trading volume and volatility. In a similar strand of literature, the asymmetric nature of volume response to return (volatility) i.e. the trading volume is higher in which price ticks up than volume on down tick, has been explained.

Studies since 1970's have indicated a strong positive contemporal correlation between volume and volatility. However, two very recent papers challenged this stylized fact using the volatility decomposition technique. Giot et al. (2010) finds that only the continuous component shows a positive contemporal volume-volatility relation, while the jump component shows negatively correlation. Amatyakul (2010) also presents the evidence showing similar negative correlation. Campbell et al. (1993) showed, a positive correlation between current volatility and lagged trading volume is likely to be observed in liquidity trading. When informed traders trade their stocks due to private information, that information will spread over the market through price signal.

Using 50 Indian stocks, Kumar and Sing (2011) analyze the returns and volume relationship, focusing on the contemporaneous relation between absolute returns and trading volume, the asymmetric behavior of trading volume in response to price changes and dynamic (lead-lag) relationship between returns and trading volume. They model the dynamic relationship using VAR model. This study also investigates the contemporaneous relationship between volatility and trading volume. Lamoureax and Lastrapes (1990) supported the influence of trading volume on the persistence of GARCH effects on the returns of the financial assets. Their findings indicate evidence of positive contemporaneous correlation between absolute price changes and trading volume in Indian stock markets. However, they get mixed result on asymmetric relationship between trading volume and returns. Most of the stocks show asymmetric behavior which is in line with the findings of Assogbavi et al. (1995) and Brailsford (1996). Some of the stocks, where we do not find asymmetric behavior, are consistent with the findings of Assogbavi (2007) that clearly indicated the absence of asymmetric relationship in emerging markets. The results of dynamic relationship between returns and trading volume show very interesting results. They find strong evidence that in Indian market, past returns Granger cause trading volume, which can easily conceived in an emerging market (Assogbavi, 2007) where the state of development of the market possibly does not allow instantaneous information dissemination. Their results are further supported by the variance decomposition. However, in most of the cases the relationship lacks economic significance even when statistically significant. The results of impulse response analysis indicate that both returns and volume are mostly affected by their own lag and the volume is more autoregressive than returns i.e. any shock in either returns or volume does not affect the return series beyond one lag.

Brailsford (1994) paper presents an empirical analysis of the relationship between trading volume and stock return volatility in the Australian market. The initial analysis centres upon Karpoff's (1987) model of the volume-price change relationship. Evidence is found which supports the model. The relationship between price change and trading volume, irrespective of the direction of the price change, is significant across three alternative measures of daily trading volume for the aggregate market and individual stocks. Furthermore, evidence is found supporting the hypothesis that the volume-price change slope for negative returns is smaller than the slope for positive returns, thereby supporting an asymmetric relationship. Trading volume is then examined in the context of conditional volatility using a GARCH framework. Similar to the results of Lamoureux and Lastrapes (1990), the findings show a reduction in the significance and magnitude of the conditional variance equation coefficients, and a reduction in the persistence of variance when trading volume is

added as an exogenous variable. Hence, there is *prima facie* evidence that if trading volume proxies for the rate of information arrival, then ARCH effects and much of the persistence in variance can be explained.
Karanasos and Kyrtson(2011) investigate the Korean stock volatility-volume relation for the period 1995-2005 and hence contribute to the study of emerging markets' liberalization after the financial crisis in 1997.In this work they have studied the volume-volatility relationship and they have taken into account the highly complex endogenous structures of the Korean stock market by employing the MG-GARCH model of Kyrtsou and Terraza (2003). Therefore, heteroscedasticity is interpreted endogenously while heterogeneity of expectations about future prices and dividends is the main source of fluctuations in returns. Its performance over traditional stochastic alternatives such as the simple GARCH model sheds ore light on the link between the two variables. They have also provided strong empirical support for the argument made among others by Karanasos and Kartsaklas (2004) that instead of focusing only on the univariate dynamics of stock volatility one should study the joint dynamics of stock volatility and trading volume. Moreover, as Kim, Kartsaklas and Karanasos (2005) have pointed out, they have shown that in investigating the interdependence of the two variables it is important to distinguish between domestic and foreign investors' trading volume. Finally, by conducting sub-sample analyses it was found that there are structural shifts in causal relations. Specifically, before the financial crisis in 1997 there was no causal relation between domestic volume and stock volatility whereas during and after the crisis a positive relation began to exist. Additionally, the effect of either foreign or total volume on volatility was negative in the pre-crisis period but turned to positive during and after the crisis. For the foreign volume the effects become weaker when they include the Mackey-Glass term. Such findings confirm the high interest in using the MG-GARCH approach, since improper filtering of the stock returns by simple GARCH models can lead to erroneous conclusions about the volume-volatility link.

Asai and Unite (2007) reconsider the relationship between stock return volatility and trading volume. Based on the multi-factor stochastic volatility model for stock return, they suggest several specifications for the trading volume. This approach enables the unobservable information arrival to follow the ARMA process. They apply the model to the data of Philippine Stock Exchange Composite Index and find that two factors are adequate to describe the movements of stock return volatility and variance of trading volume. They also find that the weights for the factors of the return and volume models are different from each other. The empirical results show (i) a negative correlation between stock return volatility and variance of trading volume, and (ii) a lack of effect of information arrivals on the level of trading volume. These findings are contrary to the results for the equity markets of advanced countries.

VI. Conclusion

The paper studied various dimensions of stock market volatility including measurement and nature of impact of volatility with the help of important economic literatures.It emphasized also on the political factors of volatility and attempted to relate economic growth with stock market volatility in the long run process reviewing a few econometric models and concludes that political instability and depression catapulted the stock market volatility which dwindled the growth rate of a country including a strong negative spillover effects of volatility from other countries on growth rate .The nexus between international trade and volatility was explained through econometric models showing asymmetric in nature where volatility reduces both volume of trade and increases current account and capital account deficits.

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