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Quantitative Easing And Its Impact On The Financial Markets Of Emerging Economies

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Abstract: *The Quantitative easing programme by US Federal Reserve though seems to be a liquidity injecting stimulus programme, has been seen in the recent times to create panic among the investors throughout India and other emerging economies. The impact of US Federal Reserve proposing to withdraw its liquidity programme was observed on May 22nd, 2013. It is a clearly seen phenomenon that the impact of these meetings have been seen to have a profound impact and awaited very keenly by the investing community. Thus a need was felt to study the impact of Federal Reserve meeting in the year 2013 on the stock markets. For the study, fifteen 15 indices listed on Mumbai stock exchange were considered. 105 Event study methodology and parametric t-tests were conducted to analyse the impact of the Federal Reserve meeting on the indices and exchange rates. We observe that emerging economies mainly Indian markets are highly integrated with the global markets especially U.S markets in the recent times when compared to few years back. This study thus forecasts the real influence of complete withdrawal of the Federal Reserve quantitative easing on the emerging economies.*
Keywords: *Federal Reserve, Quantitative easing, Liquidity, Stock markets, Forex markets, Event Study*

I. INTRODUCTION

i. Quantitative Easing and its Importance

Quantitative easing is an unconventional monetary policy in which a central bank purchases government securities or other securities from the market in order to lower interest rates and increase the money supply. Quantitative easing increases the money supply with the financial institutions or cuts the interest rates in an effort to promote increased lending and liquidity. Lower interest rates encourage people to spend, not save. But when interest rates can go no lower, a central bank's only option is to pump money into the economy directly. The central bank does this is by buying assets - usually government bonds - using money it has simply created out of thin air. The institutions selling those bonds (either commercial banks or other financial businesses such as insurance companies) will then have "new" money in their accounts, which then boosts the money supply. This increases demand for the government bonds pushes up their value, thereby making them more expensive to buy, and so they become a less attractive investment. This means that the companies who sold the bonds may use the proceeds to invest in other companies or lend to individuals, rather than buying any more of the bonds.

The FOMC implemented its zero interest policy and quantitative easing program QE 1 in December 2008 with the onset of the global financial crisis brought on by the subprime mortgage crisis. It included the plans to purchase up to $ 300 billion in Treasury securities on top of the maximum $ 1.25 trillion of MBS and $200

billion in agency securities. QE 1 concluded in March 2010. QE 2 was implemented in November 2010 when the growth rate declined again in the third quarter 2010 and CPI rate dropped to 1.1%. The Federal Reserve decided to purchase $600 billion of long term Treasury securities by the second quarter of 2011. Then FRB announced its plan to purchase $70 billion of long term Treasury securities each month for the following 8 months. Unlike QE1 only treasury securities were purchased during QE2. QE 3 was implemented mainly due to the delayed recovery of the US employment and real estate markets QE, which encourages investors to move out from advanced economies into every other risky asset. QE has been blamed for "unfairly" appreciating emerging market currencies and sparking a "currency war" in the words of Brazilian Finance Minister guido Mantega, it has been blamed putting upward pressure on commodity prices and causing inflation around the globe (indirectly leading to uprising across the Arab world), and, most prominently, for fueling a massive rally in gold.

Gold prices has risen as an alternate monetary asset due to falling debt –to-GDP ratios in the U.S and the sovereign debt woes in Euro etc. Oil prices, as measured by WTI, the U.S. benchmark, gained 7.2% since QE2 started. While QE has the exclusive intention of lowing interest rates, it also looks to push investors out of Treasuries and other safe assets in order to spark a wealth effect (essentially a feedback loop in which higher equity prices spark capital investment and consumption).Treasury yields after QE2 increased to 3.725% on February 8 from 2.65% on August 2010. Since then it has progressively tumbled, as investors around the world have moved into Treasuries in order to mitigate risk. Interestingly, even a downgrade of U.S. sovereign debt, which should've impacted Treasuries directly, did nothing more than exacerbate capital flows to Treasuries. As of August 10, 2011, yield on 10-year Treasuries had fallen dramatically, down to 2.12%.

A number of empirical studies have concluded that the Federal Reserve's unconventional monetary policies were helpful in lowering long term interest rate. D'Amico and King (2010), Gagnon et al. (2010), Wright (2012), and Hamilton and Wu (2011), concluded that the US unconventional monetary policies lowered interest rates during the global financial crisis. Hancock and Passmore (2011) concluded that the Federal Reserve's MBS purchases removed substantial risk premiums embedded in mortgage rates.

The implications of near zero nominal interest rates for monetary policy effectiveness, the dangers of deflation and the resulting rationale for quantitative easing were laid out and analyzed in Orphanides and Wieland (1998, 2000) and Coenen and Wieland (2003, 2004). Stroebel and Taylor (2009) use time series methods to argue the Federal Reserve's MBS purchases produced small or statistically insignificant effects on mortgage-Treasury spreads—not yields— that are adjusted for pre-payment and default risks.

But the effect of quantitative easing on the real economy is still a debatable question as it is argued that inspite of the QE programs the speed of recovery of the US employment and housing markets remains slow, and there have been disputes among the FOMC members regarding the implementation of QE2 and that the volume of money put into the market also may lead to global liquidity expansion, weakening of the dollar and raising oil and commodity prices.

As on December 19th, 2013 as shown in Figure 1, we can observe that impact of US tapering on the Emerging markets indices. It can be seen that there is a constant worry that overseas fund flows may decelerate with the US Federal Reserve announcing gradually winding up of its fiscal stimulus in every FOMC meetings.

INDEX	6-MONTH	1-YEAR	YTD
DAX	16	25.5	26.8
KOSPI	12.4	0.4	-0.6
CAC 40	10.9	17.6	18.8
FTSE100	8	10.9	12
TAIWAN TAIEX	5	6.5	6.3
SENSEX	2.8	-6.5	-6.1
SHANGHAI COMP	0.2	1.1	-3.7
IBOVESPA	-1.4	-26.4	-27
JAKARTA COMP	-26.1	-20.9	-21.7

FIGURE 1: US Tapering Fears Weighed On Emerging Markets In Last Six Months (%Returns In $)

Source: Bloomberg and The Financial Express, 20th December, 2013

According to some analysts, the tapering has been assimilated into the asset prices and therefore many investors are optimistic as to sell-off these assets would not happen. Still, empirical work documenting these effects—that is, the extent to which changes in the relative supply of and demand for Treasury debt affect it's pricing—is limited. The evidence that does exist typically relies on time-series or event-study methods examining aggregate measures of yields and outstanding debt (as in Bernanke et al., 2004; Engen and Hubbard, 2005; Han et al., 2007; Krishnamurthy and Vissing-Jorgensen, 2007; and Hamilton and Wu, 2010).

The Federal Reserve's upcoming decision outcome of (FOMC meetings) on whether to slow its third quantitative-easing campaign's debt monetizations is the most anticipated event. The focus on this imminent FOMC meeting is so hyper-intense that its impact should be considerable no matter what the Fed decides. The QE3 taper (or lack thereof), its size, and what the FOMC implies for future tapering will almost certainly spark sharp price reactions in the bond markets, currency markets, stock markets, and precious metals.

ii. Quantitative Easing Impact On Emerging Economies

Emerging markets have traced a similar path to oil and equities. As Bernanke's QE pushed investors out of Treasuries and into risky assets, capital flowed out of the U.S. and other advanced nations in search of yield and entered the emerging markets of China, Brazil and India. During the crisis phase of 2008-09, QE played an important role in crisis management, helping advanced and emerging economies alike. QE's implementation has led to higher exports from emerging economies but has also led to inflationary conditions in Asia Pacific economies, including China.

Emerging markets (EM) have been hit by a slower China and the threat of Quantitative Easing (QE) tapering. Federal Reserve (Fed) Chairman Bernanke's announcement on 22nd May that the Fed was considering tapering saw large outflows from most EM assets, generating concerns over the extent of depreciation and the cost of financing deficits. However, the May 22 announcement from the Fed, signaling some confidence in the U.S. recovery, and an immediate uptick on 10-year Treasury bond rates, triggered a massive unwinding of long positions on EMs. This was particularly sharp in emerging markets with current-account deficits, prone to undergo exchange-rate devaluations. Since May, when the Fed first hinted at a gradual winding down of QE starting later this year, markets have been hit by sharp capital outflow from emerging economies, rising interest rates, and uncertainty about the impact of QE tapering on US economic growth. Of the BRICs, India and Brazil have been particularly badly hit, seeing large currency depreciation, but they are not alone amongst emerging markets. The correlation between the two variables turns out to be quite strong. A focus on the current account deficits is warranted because such a deficit leaves a country exposed to the risk of a 'sudden stop', which could be engendered by QE tapering. Under a 'sudden stop', capital flows to a country halt or even reverse following some trigger event, leading to difficulty in funding external liabilities. This in turn hurts domestic activity financed by those liabilities. The initial general exit from EM appears to be evolving into a more refined process of identifying those most vulnerable in the event of QE tapering. QE retreats signal the US economy going strong, so investors tend to sell out Asian assets and put them back to US markets. Emerging economies' monetary policy is trapped. These economies have announced the raise the benchmark interest rates which was

identified in Indonesia as well as in Brazil. Additionally, caused by the scaling down of QE, the Indian rupee's rapid depreciation was a key reason India's central bank "reluctantly" kept interest rates unchanged and suppressed the urge to cut interest rates again. Indian stock markets are also strongly hit by the global factors. It is out of concerns surrounding the end of QE that the International Monetary Fund, World Bank, European Union and South Korea recently asked the US to deal with the problem carefully to prevent economic and financial risks.

Tapering has meant outflow of funds from India to US, just reverse of what happened when quantitative easing was announced. Additionally a rising US economy provides a golden opportunity of investments which is indicated by the US market Index DOW Jones which has touched all time high.More withdrawal of money is expected from equity and bond markets in India.

BRICS (Brazil, Russia, India, China and South Africa) nations have agreed to set up a $100-billion foreign currency reserve pool to counter the impact of a pull-out by foreign investors when the US Federal Reserve started tapering its quantitative easing programme. BRICS nations also decided to have a New Development Bank, with an initial subscribed capital of $50 billion. The bank would meet infrastructure needs of emerging markets.
At their meeting, the BRICS leaders pointed to the continued slow recovery, high unemployment in some countries and ongoing challenges and vulnerabilities in the global economy, particularly in advanced economies. They emphasized major economies could do more to boost global demand and market confidence. BRICS leaders stressed the urgent need to implement the 2010 IMF quota and governance reform, as well as to complete the next general quota review by January 2014, as agreed at the G20 Seoul Summit, to ensure the fund's credibility, legitimacy and effectiveness. On Thursday, IMF said India might have to adopt a tight monetary stance. It favored allowing exchange rates to adjust according to economic fundamentals.
Central bank communication has become increasingly transparent over the past decade. This is important not only for reasons of democratic legitimacy and accountability but also for monetary policy to be most effective (Woodford 2005). FOMC statements explain the rationale for the policy action and convey the outlook for the future monetary policy stance. FOMC minutes provide more detailed information on the range of Committee members' views on the appropriate policy stance, on the U.S. economic outlook, and on the near-term monetary policy inclination. The Federal statement is released at the moment of the target rate decision, whereas the minutes come out three weeks after the FOMC meets. The extent to which market participants may scrutinize the FOMC minutes to gain information beyond what is contained in the statement is a question to be answered empirically. Currency traders and analysts monitor FOMC meetings for information of imminent changes in the federal funds rate target, because interest rates are fundamental determinants of exchange rates.
Fed's decision in September not to start tapering, anticipating the timing of a future move by the Fed will increase volatility and uncertainty. Furthermore, with valuations in less risky equity markets of Europe looking attractive, fund flows into emerging economies' equities may remain adversely affected in the short term. However, long-term prospects for emerging economies remain attractive, as growth rates are expected to exceed those of the United States and other major developed economies. As a result, funds are expected to flow back to emerging economies in the medium term. Moreover, with the Fed making it clear that its actions will be governed by US interests only, it may be just the trigger for some emerging economies to wake up from their policy slumber and move ahead with critical reforms to restore economic confidence.

II. LITERATURE REVIEW

Volker Wieland (2009) Here empirical evidence from the previous period of quantitative easing in Japan between 2001 and 2006 is presented. The arguments and evidence presented in this note suggest that quantitative easing can be a powerful tool for avoiding deflation. As soon as inflation appeared to stabilize near a rate of zero, the Bank of Japan rapidly reduced the monetary base as a share of nominal income as it had announced in 2001. The Bank was able to exit from extensive quantitative easing within less than a year. Some implications for the current situation in Europe and the United States are discussed.

Orphanides and Wieland (1998) evaluated the impact of the zero bound in an empirically estimated, dynamic and stochastic macroeconomic model. This model incorporates forward-looking behaviour by consumers and price setters but also allows for the existence of price rigidities and inflation stickiness and showed that the zero bound represents a quantitatively important constraint on monetary policy in an environment of near zero

steady-state inflation. Recessions and deflationary episodes would be significantly deeper than in the absence of such a floor on nominal interest rates.

Orphanides and Wieland (2000) study the optimal design of monetary policy in periods of near zero interest rates using a simple stylized macroeconomic model. Their paper outlines a decision framework for quantitative monetary policy. Prescriptions for interest rate policy are translated into prescriptions for base money. Of course, in normal times, when the interest rate prescriptions are positive, central banks prefer to use an interest rate rather than a monetary quantity as operating target. Interest rates are much easier to observe and control on a continuous basis than monetary quantities. However, in unusual times, when nominal rates are stuck at zero, the quantity of base money remains available as a tool for gauging the extent of monetary easing. Thus, they propose that monetary policy operations be shifted to the quantity of money provided whenever overnight policy rates register near zero. They also illustrate the usefulness of a measure such as the Marshallian k that puts the quantity of nominal money into perspective relative to nominal income. They also note that interest rates for longer durations or the exchange rate could replace the overnight rate as a gauge of monetary operations. Quantity measures, however, remain of interest as they serve to highlight channels of monetary policy transmission that remain available when the interest rate channel is rendered inactive at the Zero interest level.

Antulio N. Bomfim (2000) This paper tries to examine pre-announcement and news effects on the stock market in the context of public disclosure of monetary policy decisions. Stock returns are proxied by daily percentage changes in the Standard & Poor 500 index. The Federal Reserve data on policy meeting dates and on the target federal funds rate are used. The results suggest that the stock market tends to be relatively quiet--conditional volatility is abnormally low--on days preceding regularly scheduled policy announcements. Although this calming effect is routinely reported in anecdotal press accounts, it is statistically significant only over the past four to five years, a result that may be attributed to changes in the Federal Reserve's disclosure practices in early 1994. The paper also looks at how the actual interest rate decisions of policy makers affect stock market volatility. The element of surprise in such decisions tends to boost stock market volatility significantly in the short run, and positive surprises--higher-than-expected values of the target federal funds rate--tend to have a larger effect on volatility than negative surprises. The implications of the results for broader issues in the finance literature are also discussed

Pierluigi Balduzzi, Edwin J. Elton, and T. Clifton Green (2001) This paper uses intraday data from the interdealer government bond market to investigate the effects of scheduled macroeconomic announcements on prices, trading volume, and bid-ask spreads. The findings were that 17 public news releases, as measured by the surprise in the announced quantity, have a significant impact on the price of at least one of the following instruments: a three-month bill, a two-year note, a 10-year note, and a 30-year bond. These effects vary significant according to maturity. Public news can explain a substantial fraction of price volatility in the aftermath of announcements, and the adjustment to news generally occurs within one minute after the announcement. In addition to price data, our data set contains information on trading volume and bid-ask spreads, enabling us to investigate the effects of different announcements on trading activity and have relevant implications for models of the yield curve and of interest rate dynamics. The study and findings also have implications for the macrostructure of bond markets. Bid-ask spreads, on the other hand, widen at the time of the announcements, but then revert back to normal values after five to fifteen minutes. The effects that they have documented have relevant implications for yield curve modelling and for the microstructure of bond markets.

Bernanke et al. (2004) studied the responses of the yield curve during several more-recent cases of government intervention in Treasury market and concluded that such interventions could have significant effects on yields, and they cited this evidence as providing possibilities for monetary policy when short-term interest rates are constrained by the zero lower bound. Bernanke et al. argued that the buyback program of long term debt during 2004 had significant effects (although they did not provide precise estimates of the magnitudes). They also examine two other episodes that may pertain to the effects of changing Treasury supply on yields—the initiation of large purchases of Treasuries by Asian central banks in 2002 and the market perception that the Fed might undertake an LSAP-type program in 2003.

Ben S. Bernanke Kenneth N. Kuttner (2005) This paper analyzes the impact of changes in monetary policy on equity prices, with the objectives of both measuring the average reaction of the stock market and understanding the economic sources of that reaction. The study uses heteroskedasticity-based estimator to correct for possible simultaneity bias. The analysis takes a more conventional event-study approach while controlling directly for certain kinds of information jointly affecting monetary policy and stock prices. To explain equity prices'

response, they have adapted VAR model and find that policy's impact on equity prices comes predominantly through its effect on expected future excess equity returns. They find that, on average, a hypothetical unanticipated 25-basis-point cut in the Federal funds rate target is associated with about a 1% increase in broad stock indexes. Adapting a methodology due to Campbell and Ammer, we find that the effects of unanticipated monetary policy actions on expected excess returns account for the largest part of the response of stock prices

Christopher J. Neely (2010) The study is on explaining the changes in the internal long term bond yields and the spot value of the dollar because of the Federal Reserve's unconventional monetary policy announcements in 2008-2009. A simple portfolio choice model is used to explain the changes in expected U.S. and foreign excess bond yields very well. The primary contribution of this paper is to evaluate the unconventional policies' joint effect on nominal international long bond yields in local currencies and exchange rates with event study methods (Fama (1970)). Secondarily, this paper demonstrates that the observed asset price behavior is basically consistent with the expected effects of an asset purchase in a simple PB model under the assumption of long-run purchasing power parity. Because asset prices react relatively rapidly to news, an event study of the unconventional policy events is most appropriate for determining their effects. The jump depreciations of the USD are fairly consistent with estimates of the impacts of previous equivalent monetary policy shocks. The policy announcements do not appear to have reduced yields by reducing expectations of real growth. Unconventional policy can reduce international long-term yields and the value of the dollar even at the zero bound.

Stefania D'Amico and Thomas B. King (2010) The study is focused on the effects of the Federal Reserve's program to purchase $300 billion of US Treasury coupon securities announced and implemented during 2009 using a panel of daily CUSIP-level data on LSAP purchases and returns . The dependent variables are percentage price changes in each of these securities (measured at end-of-day) and the independent variables are constructed from the security-level amounts purchased and total outstanding amounts. They derive that each purchase operation, on average, caused a decline in yields in the sector purchased of 3.5 basis points on the days when these purchases occurred (the "flow effect" of the program). In addition, the program as a whole resulted in a persistent downward shift in the yield curve of as much as 50 basis points (the "stock effect"), with the largest impact in the 10- to 15-year sector. The coefficient patterns generally support a view of segmentation or imperfect substitution within the Treasury market. They find that both types of effect were statistically and economically significant. Specifically, that the average purchase operation temporarily reduced yields by about 3.5 basis points and that the program as a whole shifted the yield curve down by up to 50 basis points. It thus seems likely that the Treasury LSAP program met the Federal Reserve's objectives of improving Treasury market liquidity and contributing to a reduction in the cost of credit. The scope for further study is to understand whether similar effects hold in other markets and in other periods and, if so, exactly what mechanisms are behind them.

Hamilton and Wu (2010) use a variant of the Vayanos-Vila model to explicitly relate estimates of an affine term-structure model to measures of outstanding Treasury supply. One of their results (based on pre-LSAP data) is that substituting $400 billion in long-term Treasury debt with an equal amount of short-term debt would reduce longer-term rates by about 17 basis points, suggesting an elasticity of about 0.4 basis points per billion dollars purchased, at least for longer-term securities. First, their model assumes that it is only the relative amounts of Treasury securities at different maturities that matters—proportional changes in the total amount of outstanding debt are assumed to have no effect. Second, they do not account for expectations of changing supply, instead assuming that only currently outstanding debt has effects. Moreover, although the Hamilton-Wu specification allows changes in supply to have separate effects on the level, slope and curvature of the yield curve, it still focuses on a rather limited set of constant maturity yields, ignoring potentially interesting variation across securities.

Fischer, A. M., and A. Ranaldo. (2011) the study aims at testing the hypothesis that the global currency volume increases on days when the Federal Open Market Committee meets. Their objectives were to test for abnormal trading in global FX markets on FOMC Days and to determine the strength of FOMC policy surprises as a driver of FX volume. They use data set from the continuous Linked Settlement (CLS) Bank. They find strong evidence that trading volume increases in the order of 5% across currency areas on FOMC days during 2003 to 2007. This result holds that irrespective of the size of price changes in currency markets and FOMC policy shocks. The new evidence of excess FX trading on FOMC days is inconsistent with standard models of the asset market approach with homogeneous agents.

Dong-Eun Rhee (2012) This study analyzes the effects of US unconventional monetary policies implemented during the global financial crisis, such as quantitative easing and the Federal Reserve's policy commitment regarding the course of short term interest rates from 2008 to 2012. It discusses the significance and implications for the QE3. They also try to recommend that the effects of the quantitative easing policy on the stock market and foreign exchange market are not statistically significant. This study uses event study methodology. They prove that QE1 and 2 lowered the 10 year treasury yield and yields on two year treasuries increased as the Federal Reserve sold short term treasuries. They conclude that the Global liquidity is expanding due to not only the QE3 but also the Outright Monetary Transactions by the European Central Bank and the extension of quantitative easing of central banks in the UK and Japan. They also provide a caution in dealing with all these.

Brett W. Fawley and Christopher J. Neely (2013) The article describes the circumstances of and motivations for the quantitative easing programs of the Federal Reserve, Bank of England, European Central Bank, and Bank of Japan during the recent financial crisis and recovery. Their findings were that the European Central Bank and Bank of Japan focussed their programs on direct lending to bank while the Federal Reserve and Bank of England expanded their respective monetary bases by purchasing bonds. They have also described and compared QE programs across central banks and related maturity extension programs of the BOJ, the BOE, the Fed, and the ECB.

Carlo Rosa (2013) This article uses data set to examine the effect of the FOMC minutes release on U.S. asset prices. They prove that the release is shown to significantly affect the volatility of the U.S. asset prices and their trading volume, with the magnitude of the effects economically and statistically significant. The asset price response to the FOMC minutes has declined since 2008, suggesting greater transparency by the committee. The release of the minutes is shown to induce "higher than normal" volatility across different asset classes. To gauge the importance of the minutes' release, they compare the increase in the variance of U.S. asset prices attributed to the minutes with the response brought about by the release of the FOMC balance-of-risk statement, the nonfarm payroll macroeconomic announcement, and the Institute for Supply Management (ISM) manufacturing index (a purchasing survey of the U.S. manufacturing sector). The financial market effect of the FOMC minutes is similar to that of the ISM manufacturing index, although smaller than the market effect induced by the FOMC statement and nonfarm payrolls, often referred to as the "king" of announcements by market participants. Third, they document that the asset price response to the minutes has declined in the recent period. One potential interpretation of this finding is that the statement has become more informative and that the FOMC has put more effort into greater transparency by releasing information in a timelier manner. The findings suggest that the release of the minutes induces significantly "higher than normal" volatility on asset prices, especially at the time of the release, and up to roughly one hour after the announcement. Treasuries, especially at shorter maturities, are the most affected asset class, closely followed by U.S. dollar exchange rates, whereas the response of stock prices is less pronounced, though still significantly higher than it is on nonevent days, and shorter-lived. To conclude the high frequency reaction of asset prices to news announcements represents a simple and precise tool for assessing how information is impounded into security prices. The magnitude of these effects is similar to the financial market effect of a macroeconomic release such as the ISM manufacturing index, but smaller than the market effect induced by the release of the FOMC statement and nonfarm payrolls.

III. PROBLEM STATEMENT

According to Fama (1987), capital markets are efficient in three forms, mainly weak form of efficiency, semi-strong form of efficiency and strong form of efficiency. The present study aims at testing the principles of semi-strong form of market efficiency by examining the impact of Federal Reserve meeting with respect to quantitative easing on Indian stocks and indices listed on BSE and NSE. The study tries to examine whether the announcements or events are incorporated into the stock prices, thus making actual announcements insignificant or whether these announcements took the markets by surprise by allowing for earning abnormal profits by traders adopting various trading strategies.

IV. OBJECTIVES OF THE STUDY

The study is undertaken to fulfil the following objectives:

A. To evaluate the volatility and abnormal gains associated with select broader indices using Event study methodology

B. To trace the movements in broader indices consequent to the Federal Reserve meetings and after.
C. To examine the impact of meetings on Indian stock markets.

V. HYPOTHESES OF THE STUDY

The hypothesis tested with is:

H_o: There is no difference in mean of abnormal returns before and after the announcement date
H_1: There is difference in mean of abnormal returns before and after the announcement date

VI. DATA REQUIREMENTS OF THE STUDY

FOMC holds eight regularly scheduled meetings during the year. In order to study the impact of these meetings on the stock indices, BSE Sensex index which is the barometer of the Indian stock markets was considered for the study. Daily closing stock price data over a period of one year January, 2013 to 15th, December, 2013 was considered for the study. The data for BSE Sensex Index was collected from Bseindia.com website. For the study, the Federal Open Market Committee (FOMC) meetings during the year 2013-14 were considered. The FOMC meeting dates are as follows;

2013 FOMC Meetings	
Month	**Date**
January	29
March	19
April-May	30
June	18
July	30
September	17
October	16

Table 1: FOMC meetings for the year 2013-14
Source: Authors

VII. METHODOLOGY

This study is based on Event Study Methodology (Brown and Warner, 1985). Event study methodology is based on the concept of market efficiency. If the markets are efficient, security prices would be able to reflect all currently available information, and thus price changes will reflect only new information. Thus importance of an event is understood by examining the price changes during the period in which the event occurs.

Event Study Methodology describes the technique of empirically assessing the impact of a particular event on a firm's stock price or industry's average stock price represented by indices.

The event study methodology enables to compute cumulative abnormal returns (CAR) of the respective share indices during the days surrounding the announcement. To statistically understand whether there was significant difference in the distribution pattern of abnormal returns before and after the announcement, parametric t-test was conducted. If there existed possibility to gain abnormal returns due to the announcement, then the markets can be said to inefficient.

Analysing the impact of any particular event is difficult, since stock prices respond to wide range of macroeconomic news such as forecasts of corporate profitability, Gross Domestic Product, inflation rates, interest rates, global news etc. Isolating the part of a stock price movement that is attributable to a specific event is always a challenge.

To isolate the stock price movements from the specific event, general approach followed is to find a proxy for what the stock's return would have been in the absence of the event. The abnormal return due to the event is estimated as the difference between the stock's actual return and this benchmark. The approach followed in this study, is to find the normal returns using the asset pricing model such as the CAPM. The researchers often use the 'market model' or the single- index model, which holds that stock returns are determined by a market factor and a firm-specific factor.

The stock return, r_{it}, during a given period *t*, would be expressed mathematically as

$$\bar{r}_{it} = \alpha_i + \beta_i \bar{r}_{mt} + \xi_{it}$$

where

$\bar{r}_{it}$ =expected return of stock price returns on day t

$\bar{r}_{mt}$ =Market's rate of return during the period

β_i = systematic risk component or it measures sensitivity to the market return

α_i = Intercept term or average return of the stock in case of zero market return

ξ_{it} =white noise error term on day t with zero mean and constant variance.

The deviation of actual return from the expected return is regarded as the abnormal return. The determination of the abnormal return in a given period is expressed mathematically as shown below;

$$AR_{it} = r_{it} - (\alpha_i + \beta_i \bar{r}_{mt})$$

Where, AR_{it} = abnormal return of stock 'i' on day 't'

r_{it} = actual return on stock 'i' on day 't'

The abnormal return is the stock's return over and above what one would predict based on broad market movements in that period, given the stock's sensitivity to the market.

The parametric't' test for the equality of means for the abnormal returns before and after the announcement date is conducted to test the hypothesis of no difference in the means of abnormal returns. The Parametric't' test was conducted to test for the equality of means at 95 percent level of significance, for the abnormal returns during 15 days prior and 15 days after the announcement date. The two tailed critical 't' value was found to be 2.20 which was compared with the t-statistic to accept or reject the null hypothesis

In the methodology, FOMC meetings dates were considered as the "event day". 30 days surrounding the event day (15 days before and 15 days after the event) has been denoted as "event window". 15 days prior to the last day of the event window (-16 to -30 days from the event day) has been considered the "estimation window/benchmark period". BSE 500 index was taken as proxy for the overall market. Totally 105 event study methodology and 105 parametric tests were considered to analyse the impact of FOMC meetings on Indian stock markets.

VIII. ANALYSIS AND FINDINGS

The analysis and discussion of the impact of recent FOMC meetings on Indian economy is approached through the following points:

a) An overview of results obtained through event study methodology
b) Broader and sectoral indices performance during the period of study
c) Volatility and abnormal gains of broader and sectoral indices during the period of study

Every investors believes in the fact that the markets are efficient in nature and the current market prices reflect the true intrinsic value of the companies. The markets are found to be efficient in three forms namely weak form, semi-strong and strong form of efficiency. In the study seven FOMC meetings dates were considered to prove whether the Indian markets are efficient or not in semi-strong form. The results of the Event study methodology and parametric tests are provided in Table 2 to Table 8.

We observe that from over 105 event studies and 105 parametric tests, the Indian markets seem not be semi-strong form efficient in nature. The mean returns before and after the announcements seem not to be significantly different in nature. Most of the results obtained accept the null hypothesis of no significant changes in the mean returns before and after the FOMC meetings.

Table 9 below shows that till the announcement day for around 7 days, the abnormal returns tend to increase or decline at faster rate as observed for all FOMC meetings and either increase or decrease with lesser pace respectively after the announcement date. The same was observed in case of variances around the event date considering all the indices. On an average, seven day prior to the FOMC meetings, the average mean returns tend to decline by around 0.03 percentage. Since most of the FOMC meetings in the year 2013 have been addressing towards to tapering, the average mean returns after the FOMC meetings too have been seen to be negative at around 0.02 percent. The variability observed in terms of variance of the returns before the

announcement is found to lower at around 1.02 percent when compared to 1.04 percent in the later periods. An important point to be noticed is the intensity of changes occurring across all the indices over the period of time. We can observe that mean returns and variances seem to be more volatile in the later half of the year compared to the beginning of the year. As there is growing confidence among the investors towards discontinuing the bond-buying programme by the Federal reserve, the emerging markets especially India stock markets seem to be very cautious.

	Average mean returns before announcements (ALL INDICES)	Average mean returns after the announcements (ALL INDICES)	Average mean standard deviation before announcements (ALL INDICES)	Average mean standard deviation after the announcements (ALL INDICES)
29-Jan-13	-0.063235015	-0.032888492	0.738653703	0.40924424
19-Mar-13	-0.001713505	-0.017016378	0.557120831	0.960828439
30-Apr-13	0.085741337	0.025650265	0.995455738	0.518844258
18-Jun-13	-0.188467458	-0.187153855	1.193729677	0.834410173
30-Jul-13	-0.054297989	0.027687761	1.346746685	2.715788886
17-Sep-13	0.069234859	0.01844973	1.984385559	1.35881832
16-Oct-13	-0.060599928	0.005575603	0.598542802	0.686525892

Table 9: Average mean returns and mean standard deviation before and after FOMC meetings
Source: Authors

To study the topic in depth, the mean returns were observed across various indices since they are the barometer of individual industries. As observed in Table 10, the mean returns before and after the announcement has been shown with values and blue lines. The blue lines indicate the intensity of changes in the average mean returns of each index before and after the FOMC announcements. We can observe that the major positive impact of the announcements has been more in terms of variability mainly in Auto sector, Banking sector, Consumer goods and Reality sector. Whereas sectors such as consumer durables and information technology stocks seem to react negatively to the announcements.

INDICES	MEAN RETURNS BEFORE ANNOUNCEMENTS	MEAN RETURNS AFTER ANNOUNCEMENTS
BSE AUTO	0.130723301	-0.156477819
BSE BANKEX	0.373141084	0.233335449
BSE SENSEX	0.042015341	-0.004814969
BSE CD	-0.298316139	0.145700654
BSE CG	0.192201052	-0.036672439
BSE FMCG	-0.026538202	-0.126292368
BSE HC	-0.263958667	-0.17070858
BSE IT	-0.525209863	-0.250815695
BSE PSU	0.051510218	0.000102891
BSE METAL	-0.26742183	0.16870388
BSE MIDCAP	-0.067471119	0.008310651
BSE O&G	-0.159202069	-0.094881061
BSE POWER	-0.031116019	-0.15916357
BSE REALTY	0.425091509	0.0818133
BSE SMALLCAP	-0.032600807	0.01965532

Table 10: Average mean returns of individual indices before and after FOMC meetings
Source: Authors

The t-test for equality of the average returns before and after the announcements as shown from table 2 and 8 in the appendix reveal the fact that there exists no significant return in the mean returns to the announcements in BSE Sensex indices. The t-test values of majority of the event study mean returns and cumulative abnormal returns are within the critical value of 2.144, thus accepting the null hypotheses of no impact of the announcements on BSE Sensex indices. Thus we can infer that the markets have already expected the announcement and has adjusted the shares accordingly.

IX. CONCLUSION

FOMC announcements in the year 2013 brought in news which was either positive or negative in nature. Theoretically, Efficient Market Hypothesis believes that the markets are efficient in nature and any new information only should have an impact either positively or negatively on the stock markets. But in reality, it will not hold good. The stock markets tend to predict the announcement of the news through various forward looking (leading) indicators. Emerging markets are considered to be benefited more by the quantitative easing and has always been seen as forward looking indicators by majority of the investors. The research is thus a prelude to the situation where if Federal Reserve decides to discontinue quantitative easing, it might have some impact on few important sectors such as Realty sector, Banking sector, Auto sector, consumer durables sector, consumer goods sector and Information technology sectors. Thus we conclude that though few sectors seem to be impact relatively more to the FOMC meetings announcements in the recent year of 2013, yet overall the Indian markets are found to be resistant to any further quantitative tapering announcements by the Federal Reserve.

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APPENDIX

1ST FOMC MEETING ON 29 JANUARY, 2013	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	-0.003731528	0.214055725	1.212087041	0.314628698	-0.494288719	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	0.285389725	-0.014559291	0.213469846	0.080091964	1.988164646	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	0.039290848	-0.180178691	0.049025816	0.072133248	2.097373946	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	-0.259496248	0.153431504	0.503178822	2.626331142	-0.584249737	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CG	0.907568964	0.112974049	0.607493773	0.278740317	3.00641922	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE FMCG	0.523579165	0.522461666	0.973966566	0.176817267	0.002299534	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	-0.102090915	0.173114176	0.466605193	0.682369908	-0.57354383	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	-1.34764313	-1.326467557	0.746493282	0.212753986	-0.093993321	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE PSU	-0.114694159	-0.287928536	1.235583281	0.405753853	0.359360515	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE METAL	0.270976153	0.351121355	0.155802375	0.083494501	-0.362053859	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE MIDCAP	-0.203376826	0.168699898	0.295988276	0.105398857	-1.612001882	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	-0.302686515	-0.572901536	1.878789362	0.319021015	0.661814636	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE POWER	0.257583142	-0.072453419	0.45812861	0.342034198	1.040113453	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE REALTY	-0.698805016	0.296970073	1.953281083	0.304310147	-1.440278885	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SMALLCAP	-0.200388883	-0.031666794	0.329912219	0.134784491	-0.732700406	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 2: EVENT STUDY METHODOLOGY RESULTS CONSIDERING 29TH JANUARY, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

2ND FOMC MEETING ON 19 MARCH, 2013	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	-0.48334606	-0.56176868	0.227629809	1.238070952	0.179812948	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	-0.10790738	0.083455889	0.352539157	0.186004797	-0.66843108	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	-0.07341699	-0.07648195	0.03997694	0.056581059	0.041440655	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	-0.40190504	0.396368698	2.80973487	1.496627546	-1.28424642	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CG	0.251822349	-0.39402155	0.520440783	0.899968767	1.554836885	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE FMCG	0.778548977	0.329501186	0.30052856	0.39737952	1.75107308	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	0.192771618	0.066377975	0.186303275	0.167698346	0.617906157	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	-1.14413623	-0.54754311	0.360419274	0.304441338	-2.91932109	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE PSU	0.343493321	0.303732984	0.158394557	0.305875042	0.175344048	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE METAL	0.068106599	0.222078726	0.452998402	1.076660858	-0.55471572	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE MIDCAP	0.170409829	0.227010699	0.247816148	0.119654032	-0.49531022	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	0.158321073	-0.22577917	0.221872175	0.828580962	1.054156923	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE POWER	0.219940112	-0.05001538	0.290009557	0.888003051	0.682785615	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE REALTY	-0.13734824	-0.30019005	1.89435725	5.719149435	0.180020403	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SMALLCAP	0.138943512	0.277436256	0.293791701	0.727730875	-0.40515258	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 3 : EVENT STUDY METHODOLOGY RESULTS CONSIDERING 19TH MARCH, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

3RD FOMC MEETING ON 30 APRIL, 2013	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	0.527080999	-0.128380708	0.754037302	0.927275664	0.993378481	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	-0.23866728	-0.71164554	0.427116663	0.470580477	1.003386284	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	-0.064638543	-0.001108604	0.030690011	0.010187017	-1.097532042	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	1.150418052	0.54650404	2.98048716	0.692070135	1.139861291	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CG	0.154508617	-0.137094218	1.417748608	1.033902296	0.595920623	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE FMCG	0.038223923	0.166820226	0.785914891	0.734464374	-0.306342961	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	0.056335206	-0.228876069	0.705453544	0.448970086	0.792650278	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	-0.261129952	1.560143295	3.024405469	1.309870173	-1.958136713	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE PSU	-0.17813385	-0.501507085	0.088188328	0.210315234	1.229615775	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE METAL	0.530861607	0.479997938	1.195338531	1.463118901	0.097947029	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE MIDCAP	0.177874192	0.285427791	0.145841936	0.117230572	-0.822018103	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	-0.753229732	-0.514406975	0.957487457	0.110553176	-0.547479911	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE POWER	0.153023943	-0.261672487	0.458678513	0.151858235	1.0881436	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE REALTY	-0.175349065	-0.460644582	1.845523305	0.034513586	0.541719595	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SMALLCAP	0.164141383	0.291196948	0.114924343	0.06775394	-0.798468199	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 4 : EVENT STUDY METHODOLOGY RESULTS CONSIDERING 30TH APRIL, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

4TH FOMC MEETING ON 18 TH JUNE, 2013	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	-0.095141641	-0.434080036	1.018891057	0.637133327	0.556240219	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	0.010101151	-0.029051543	0.258172925	0.196464706	0.281166951	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	0.253745126	0.3159624 2	0.057698329	0.11015224	-0.469826639	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	-1.392867825	-0.692583233	11.18560062	2.223678221	-0.498215054	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CG	0.192613138	-0.567566815	0.319028969	0.449768477	2.274289615	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE FMCG	-0.089768913	-0.079322412	0.300780911	0.60388521	-0.02849866	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	-0.167285814	-0.068995671	0.497951887	0.878220272	-0.228767276	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	-0.083033988	0.24835288	1.644402348	3.468701912	-0.412678408	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE PSU	-0.267246729	-0.224385499	0.102667275	0.127554664	-0.215986011	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE METAL	-0.649244716	-0.570845929	0.914674693	1.011817166	-0.156091496	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE MIDCAP	-0.39999862	-0.663749194	0.045068119	0.346577332	1.126041672	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	0.505410085	0.812157079	0.81165908	0.291426114	-1.006885955	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE POWER	-0.361165264	-0.367529109	0.050480536	1.004326673	0.020085421	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE REALTY	-0.062949183	-0.17917089	0.585068094	0.966511503	0.228598423	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SMALLCAP	-0.220178681	-0.30298228	0.113800318	0.199934774	0.41399754	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 5 : EVENT STUDY METHODOLOGY RESULTS CONSIDERING 18TH JUNE, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

5TH FOMC MEETING ON 30TH JULY, 2013	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	1.1526316	0.473142519	0.651475425	1.119099675	2.225299637	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	0.982664114	1.252991056	1.45229529 4	2.119334596	-0.531552857	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	0.176357027	0.005828774	0.047377264	0.11017481	0.907473331	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	-0.748177313	-0.309586733	4.296067411	10.51848273	-0.471451113	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE CG	-1.108036311	-0.688862149	4.398197671	2.468615516	-0.415407711	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE FMCG	-1.766177383	-1.915874491	3.073693554	1.570722199	0.17712645	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	-0.380710468	-0.380186554	0.372271455	0.194910515	-0.001355746	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	0.495575241	-0.2047296	1.160417828	1.42325164	1.286548763	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE PSU	0.164925745	0.370106305	0.196770906	2.216943034	-0.326011005	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE METAL	0.018005615	1.490974434	0.94855377	4.169105117	-1.450306878	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE MIDCAP	-0.260136087	-0.030565005	0.100261901	0.607215812	-0.577604685	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	-0.113566926	0.195136272	0.707864797	2.858430397	-0.635061711	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE POWER	-0.621745435	-0.808724868	0.419788611	3.730587021	0.267998732	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE REALTY	1.584410971	1.064706815	2.340653444	6.781636196	0.528495795	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE SMALLCAP	-0.390490233	-0.099040363	0.035510945	0.848324032	-0.750349287	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 6 : EVENT STUDY METHODOLOGY RESULTS CONSIDERING 30TH JULY, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

6TH FOMC MEETING ON 17TH SEPTEMBER,	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	-0.010596933	-0.151327225	2.70289315	0.276182125	0.189164622	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	1.918468371	0.436919177	6.870840161	2.396214121	1.684259141	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	-0.154833216	-0.14338707	0.12978124 9	0.020224905	-0.070488185	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	0.114461944	0.852161647	2.495041474	4.022348178	-0.802838666	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CG	1.057624249	0.398604896	0.99698463	1.356015762	1.129661643	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE FMCG	0.07498761	0.137716512	1.872980894	0.317016134	-0.130922198	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	-1.155834809	-0.110582671	1.565051116	0.802300682	-1.646906399	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	-2.139545487	-1.031297875	2.193826031	0.918760629	-1.813305883	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE PSU	0.7221057	0.155012183	1.824331253	0.471280664	1.213942582	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE METAL	-1.404670669	-0.531383557	2.437998643	1.510745925	-2.709238481	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE MIDCAP	0.198670521	0.119961059	0.352475911	0.019266944	0.311434399	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	-0.733502188	-0.648649553	0.972813119	0.477543491	-0.138747679	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE POWER	0.340086824	0.591911319	1.006372948	1.284182433	-0.612979703	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE REALTY	1.916997203	0.216767883	4.085955358	6.416275831	1.428034152	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SMALLCAP	0.29410377	-0.015680773	0.258437454	0.093916982	1.315690046	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 7 : EVENT STUDY METHODOLOGY RESULTS CONSIDERING 17TH SEPTEMBER, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

7TH FOMC MEETING ON 16TH OCTOBER, 2013	MEAN BEFORE ANNOUNCEMENT	MEAN AFTER ANNOUNCEMENT	VARIANCE BEFORE ANNOUNCEMENT	VARIANCE AFTER ANNOUNCEMENT	T-STATISTIC	T-CRITICAL TWO TAIL	ACCEPTANCE/ REJECTION OF NULL HYPOTHESIS
BSE AUTO	-0.17833324	-0.501578141	0.656979878	0.597641944	0.948053611	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE BANKEX	-0.242861661	0.615238398	0.773491092	0.581652666	-2.159704119	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SENSEX	0.117603135	0.045660342	0.051323853	0.094006326	0.566508119	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CD	-0.550646549	0.073608654	0.308558433	0.44126536	-1.612753663	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE CG	-0.110693638	1.019258709	0.631338878	2.195516389	-3.114126542	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE FMCG	0.254839205	-0.045349264	0.377167942	1.461192046	0.509150657	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE HC	-0.290895491	-0.645811247	0.851674702	0.178386996	1.31726049	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE IT	0.803444509	-0.450650307	1.147415143	1.203293348	2.283783464	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE PSU	-0.309878501	0.185689882	0.187745051	0.181716603	-2.906824978	2.446911846	REJECTION OF NULL HYPOTHESIS
BSE METAL	-0.705987402	-0.261015804	1.952683803	0.516455968	-0.754191618	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE MIDCAP	-0.155740842	-0.048610689	0.231230906	0.143914037	-0.479171018	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE O&G	0.124839721	0.290276462	0.077819913	0.282554791	-0.859674931	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE POWER	-0.205535458	-0.145661042	0.672190295	0.904531314	-0.222376626	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE REALTY	0.548683892	-0.065746153	0.881842001	1.196105985	1.686946888	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS
BSE SMALLCAP	-0.014336519	0.018324249	0.176680141	0.319693436	-0.120825051	2.446911846	ACCEPTANCE OF NULL HYPOTHESIS

TABLE 8 : EVENT STUDY METHODOLOGY RESULTS CONSIDERING 16TH OCTOBER, 2013 AS THE EVENT DAY

SOURCE: AUTHORS

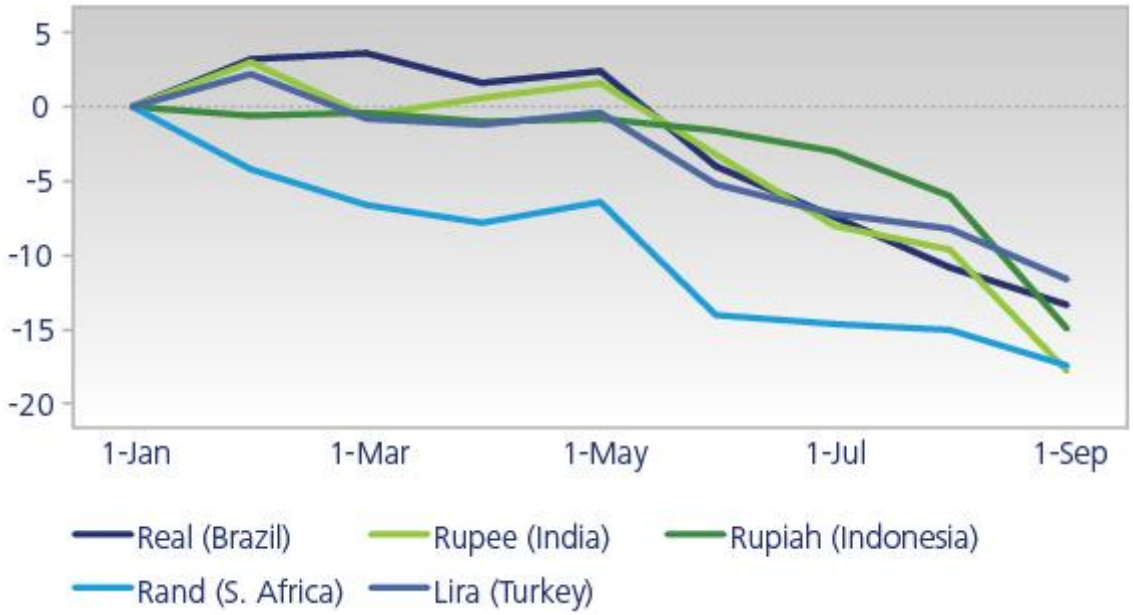

Figure 1: Emerging Economies currency returns versus the US dollar since January 2013. source : Bloomberg, September 2013