

IMPACT OF INFORMATION FLOW ON STOCK MARKET MOVEMENT: EVENT STUDY ON THE DISSEMINATION OF TIMELY INFORMATION IN INDIAN ECONOMY

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ABSTRACT

There has been significant work in the area of efficient market theory, information spill over, long and short term memory of time series data, rationality of markets and linkages of economic variables to the stock market returns. This study connects the all these dimensions market and thereby empirically testing the impact of information flow and information processing ability of the market using an Event Study approach. The findings suggest that inflation, oil prices, money supply, gold prices have a significant impact on the volatility of stock market. The amount of variation shown by all of them taken together is low as observed in the combined regression equation. Thus, it leads to an opportunity for future research on what other factor accounts for the stock volatility apart from these macro-economic factors.

Keywords: EMH, Event Study, Economy, Stock Market Variability

I. INTRODUCTION

The business around the world is affected by the economic environment in which it operates. Each and every movement in the environment has some or the other effect on the business entity. Information plays an important part in the shaping up of business environment. The spontaneity of information and assimilation by the business entities or the counter parties involved in any sort of business transactions impacts the business or the value of a business.

The value of a business is nowadays estimated by the market capitalization of the businesses, the market price at which the stock/equity of the business is being traded. These trades are the architects of the stock market movements. The soundness of the economy is often evaluated by the stock market valuations; the reason is, better the economic environment, better would be the buoyancy in the market. Clearly the information from the economic environment is the antecedent of the changes in the stock market movements. In the present study we investigate the relationship between timely economic information and the stock market movement.

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OBJECTIVE

The objective of this study is to investigate the various economic factors which affect the stock market volatility. We study various events like inflation, crude oil prices, money supply M2, etc. announcements using the event study approach to detect its impact on the stock market, if there is any. We study the impact of periodic announcements made by Reserve Bank of India (The Indian Central Bank) on the stock market (NSE/BSE).

RATIONALE

Rationally, any additional information in the market will have its due impact on the stock prices and will be subsequently reflected. There is a flow of periodic government policy data in the economic environment which affects the businesses and thereby their valuations. The variables that we are trying to observe for the volatility of the market are the macroeconomic variables, which should not be affecting specifically any specific industry as such. In case if they do, the in depth analysis by taking the volatility of industry wise stocks can be done. But, we are refraining from any such analysis at the moment and trying to analyze the impact of the information flow using the opening and closing of the stock market index (Sensex/Nifty). The event study method will provide an accurate representation of the impact of the variables, as it would be analyzing the time series data which is assumed to reflect all the past information available in the market in the current value.

The rest of the paper is constructed as follows. Section II discusses the prior literature and theoretical framework. Section III describes the methodology applied and model estimation which is followed by section IV discussing the key results and findings. Conclusion, study limitations and policy implications are discussed in the final section.

II. REVIEW OF LITERATURE

Based on rational expectation, as we usually assume, the stock market prices should reflect the available information in the price. For example, if there is an increase in inflation then, the stock price should appreciate by appropriate amount so that the value of the money depleted by inflation can be nullified. This expectation is in tandem with the Irving Fisher's hypothesis (1930), which states that expected rates of return is the real return rate which has been compensated for the rate of inflation. Intuitively investors should be fully compensated for erosion in purchasing power (inflation) or any other information which erodes or appreciates the stock price for the investor. In this study, we try to see if the stock markets react to certain set of information which intuitively appeals to a rational investor that either he should be compensated for the appreciation or depreciation.

Modigliani and Cohn (1979), Shiller (1979, 1981), Brainard, Shoven and Weiss (1980), and Summers (1982) are of the view that stock market's value / level can't be justified on the basis of economic realities. They pose the question if at all stock market rationally reflects the fundamentals. Though, Summers (1986) agrees availability of literature which supports the fact that new information is immediately reflected in the stock market, he is unable to conclude the same on the basis of efficient market hypothesis. This forms an important area for those who want to investigate the correlation of stock market volatility to the economic variables.

The study by Officer (1973) exquisitely identifies the factors, like Money Supply (M2) and index for industrial production, as a source of market variability. The study also tested the Wholesale Price Index's effect on the stock market. The WPI was taken as a proxy for the determining the price factors which affect the stock market. These factors were considered as a part of business fluctuations which affects the market variability. One thing which was evident from the findings was that, there was a significant strong relationship of the aforesaid variables on the market

variability and the role of SEC, Margin requirements and Increase in the listings on the stock exchange had less to do with the market variability.

Nelson (1976) studied the relationship between inflation and rates of return on common stocks. The study was conducted in the purview of Fisher's hypothesis (1930) which suggests investor's would be compensated for the depreciation accounted by the inflation. The study empirically tested the intuition behind the Fisher's hypothesis and tested it in the post war period. The information content of the past data was utilized for checking the strength of relationship between stock returns and inflation. The results obtained were supporting the hypothesis that the stock returns will have inverse relationship with the contemporaneous shifts in expectations of inflation.

Faff and Brailsford (1999) investigated the sensitivity of the Australian Stock Market to Oil Prices using the augmented market model. They observed that the impact was significant on some of the Australian industries and to the extent that it was reflected beyond the stock market. They found significant positive sensitivity in Oil and Gas and Diversified Resource industries. They argue that these effects are long term in nature but some firms have been able to pass on the risks to the customers or hedge them. And the same was cited as a reason for the negative sensitivity.

Chen, Roll and Ross (1986) investigated the relationship between economic forces and stock market. They tested if macroeconomic variables like spread between long and short interest rates, expected and unexpected inflation, industrial production and the spread between high and low grade bonds have any impact on the stock market. Another finding that they came out with was for Oil Price related risk. They argued on the basis of their findings that the Oil Price risks are not separately rewarded in the stock market. The findings were consistent with the efficient market hypothesis and rational expectations theory and depict that stock prices do reflect the exposure to the state variables of economy.

Cheung and Ng (1998) argued for the impact of economic activity on the stock markets on the basis of their empirical findings using the Johansen Co-integration technique. For the study they considered variables like real oil price, real consumption, real money and real output. Taking a cue from the Fama (1990), they observe that there is incremental information captured due to the constraints implied by the co-integration. The negative relationship between oil price and stock returns are observed. The findings did suggest for the co-integration of market indices with aggregate real economic activities.

Heins and Allison (1966) worked upon the notion that there are some factors which affect the stock market volatility. The fluctuations which were measured by them were mainly focused on the business variables like, EPS and PE ratio, stock turnover, and the exchange on which the stock was listed. The major limitation cited by them for their own study was relatively low coefficients of correlation and significantly high unexplained variances. Clearly this poses an opportunity for the researchers to look out for the other reasons accounting for the variances in the stock returns and the economic variables can be taken into consideration for the study.

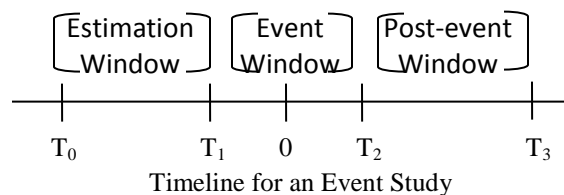
Castanias (1979) argues that efficient market hypothesis and public information jointly would reflect the changes in stock prices. He suggests variability observed in the market is an increasing function of the economic information. He also investigated if markets are efficient processors of macro-information. The findings in the study does suggest that macroeconomic information accompanies abnormally large variability and which in turn reaffirms the fact that market is an efficient processor of macro-information. Based on the above finding, we propose an event study analysis for the various economic factors which affect the stock market movements.

III. METHODOLOGY

When the idea is to measure the impact of an economic event on the stock market, event study is a possible and apt way of doing so. The logic flows from the rationality or efficient market theory, that effects of any event will be immediately absorbed and reflected in the stock prices. The first event study is perhaps the one conducted by James Dolly (1933) where he studied the impact of stock splits on the stock prices. MacKinlay (1997) throws some light on the usage of event study approach in economy and finance. Event study provides an ideal tool for examining the information content of the disclosures.

In an event study we first need to identify an event of interest and the time frame over which the impact of the event would be observed. This time frame over which the study is being conducted is also termed as an event window. The next step requires us to select the variable on which the impact would be measured. In our case the variable is the stock market / index. The evaluation of the impact is possible only if there is any abnormal volatility/return shown by the index. Next step is the designing of the testing framework where we need to define the null hypothesis and choose the technique in which the volatility / abnormal return of the index would be measured. After this the presentation of the results and findings is needed.

The time line for an event study is depicted in the figure 1.



DATA

The data collected for our study is collected from the RBI Database; except the Oil Price data which was collected from the World Bank Database. The datasets that we considered in our study do get support from the literature barring for the fiscal deficit of the central government, which we have taken for the purpose of exploratory study. We have considered that the ex-ante and ex-post effects of the event can be studied through time series. Especially when we know that these are periodic information which flow in the market at regular intervals. This helps us in arriving at the Time series aggregates of the data over a period Jan 2004 to Oct 2010. These information are disclosed by the government on the very first working day of the month and stock market absorbs that information and the stock prices and the market volatility do represent the same leading to the concept of market efficiency. We have considered an event window of +1 and - 1 day. Now, as the calculation of average residual was for a single day, we make a cumulative effort of that for the whole event window (announcement period). It is defined as cumulative average residual (CAR). The CAR starts at time t₁ and ends at t₂. Hence the total horizon length is (t₂ - t₁ + 1).

$$CAR (t_1, t_2) = \sum_{t=t_1}^{t_2} AR_t$$

The null hypothesis in this regard is that the CAR is equal to zero and the alternative hypothesis is that the CAR is not equal to zero.

Few authors have suggested that there are firm specific determinants that affect the Cumulative abnormal return (CAR). Firm size and ownership structure is one of those factors.

$$CAR (t_1, t_2) = f(\text{firm specific determinants})$$

We take care of the firm specific determinants affecting the stock market by considering an OLS Regression on the dependent variable Market Return (BSE) and the independent variables, Gold Price, CPI, WPI, L2, Fiscal Deficit of the central government, Forex Reserves, REER and OIL Prices.

$$\text{Mkt Ret (BSE Close)} = \alpha + \beta_1 \text{Gold} + \beta_2 \text{CPI} + \beta_3 \text{WPI} + \beta_4 \text{L2} + \beta_5 \text{FiscDef} + \beta_6 \text{Forex} + \beta_7 \text{REER} + \beta_8 \text{Oil} + \varepsilon$$

EXPLANATION FOR VARIABLES

Castanias (1979) conducted an event study where he studied the impact of Federal Reserve Board's routine statistics on the variability of the market. And he did observe a significant variability in the market factor. No significant variability in the market factor was observed due to release of quarterly, monthly or annual WPI and CPI statistics. He argued, there might not be significant information content in the series. We'll check the same if it holds true in the current context as well. The way information is processed nowadays is advanced and the efficiency of markets has increased over a period of time. So, even a small piece of information should reflect variability in the market factor.

Based on Irving Fisher's hypothesis (1930), Nelson (1976) studied if there is any relationship between inflation and rate of returns on common stocks. Monthly CPI was taken as a proxy for inflation in the study. The unanticipated change in the CPI was found to have inverse response from the market. A rise in interest rate is often contemporaneous with an increase in inflation, thereby curbing the investing options and enhancing the savings or in other words investing in risk free avenues. The argument posed by Modigliani and Cohn (1979), that stock market is undervalued due to the illusion of inflation also reveals some sort of relationship between market variability and inflation; which we propose to test in our study.

The dependence of industries on oil and its products as an energy source is pretty evident in all the economies around the world. If not as an energy source, the mode of transportation is dependent largely on the oil as fuel. So, clearly any increase in oil price will lead to risk of input cost or cost of production and make the supplying of finished goods expensive. Faff and Brailsford (1999) investigated the sensitivity of Australian Equity returns to oil price for the period 1983-1986 and found significant sensitivity for the Oil and Gas diversified resource industries. Sometimes the energy expenditure has been up to 14% of GDP in US as reported by Jones and Kaul (1996). With GDP having a significant impact due to oil and gas resources, it is noteworthy to investigate the market variability due to the oil prices. Miller and Upton (1985), Crain and Jamal (1991), Bopp & Lady (1991), Farmer (1993), Moosa & Al-Loughani (1994) and Foster (1996) have done significant work in the valuation and management of the Oil Price risks.

Chen, et.al. (1986) suggest that, as per financial theory, macro economic variables should systematically affect the stock market returns. Officer (1973) suggests that Industrial Production Index covers a good portion of the variables used for the construction of GNP and at the same time it better reflects the business fluctuations of the companies listed on the stock market which in turn would be reflected in the stock market fluctuations. We choose IIP in the current context to empirically test the variability of the stock market. WPI reflects a measure of prices, a test for determining the volatility of the market due to price factors can also give some insight about its contribution to the overall volatility of the market.

The availability of the money in the market will also affect the investment behavior of the market participants. Cash and Demand & Time deposits can be considered at the measure for the Money,

M2 as proposed by Friedman and Schwartz (1970). Officer (1973) did test for the market variability accounted by the money supply or the liquidity factor (M2 / L2) but couldn't conclude anything on the basis of that.

IV. RESULTS

Since the information is disclosed by the government on the very first working day of the month and stock market absorbs that information and the stock prices and the market volatility do represent the same leading to the concept of market efficiency. Intuitively we feel that there should be some abnormal return on the stock market. We try plotting the two returns, Average returns for the period and also the returns on the day of information disclosure. Clearly there are spikes on the dates of information dissemination. Fig. 2:

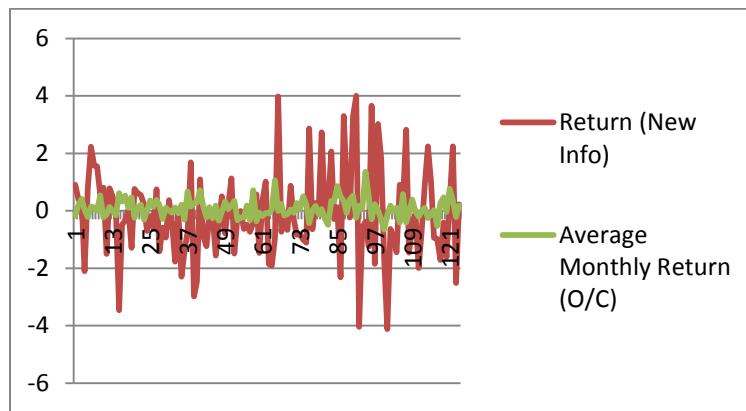


Table: 1

t-Test: Paired Two Sample for Means									
	Gold Prices	CPI	Oil	WPI	L2	Fiscal Deficit	REER	Forex	BSE Close
Mean Returns	0.2589	0.2666	0.1325	0.2045	0.2018	3.7392	0.2630	1.0370	0.2718
N	81	81	81	81	81	81	81	81	81
t-stat	-1.9004	-0.6333	-3.9867	-8.2576	-11.1261	12.9180	-0.5864	5.5188	
p	0.0610	0.5284	0.0001	0.0000	0.0000	0.0000	0.5593	0.0000	

The findings were consistent with the existing literature and do support the impact of macroeconomic disclosures on the market variability. Apart from CPI and REER all the other macroeconomic factors show that there is a significant variability in the market returns in the event window. The reason for CPI may not be supporting the event can be sought as the BSE Sensex data comprises of the most traded 30 Stocks and therefore measuring the impact of inflation would be a better if we consider WPI as a proxy for the same. REER shows insignificant results which can be attributed to the fact that investors investing in the stock market especially the large Institutional investors would not account for the Inflation factor before investing. Nominal Exchange rate can be a better predictor for the market variability. Due to in-availability of data we were unable to confirm this. Surely it can be undertaken by future researchers.

For checking the robustness of the model we run a regression on the dependent variable Market Return and the other independent variables studied in this case. With this approach we try to find out how much of the variance of the market return is explained by all the variables combined. In reality it is pretty difficult to say that the market was affected by just one piece of information, when a list of macroeconomic factors is being released the same day. The results would provide

robustness to our study and also will explain how much of the market variability is actually by the Macroeconomic factor and how much is due to the Microeconomic or Firm Specific factors.

Table: 2

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.027	8	.003	2.716	.011 ^a
	Residual	.089	72	.001		
	Total	.116	80			

a. Predictors: (Constant), FOREX, CPI, FiscalDeficit, REER, Oil, WPI, L2, GoldPrices

b. Dependent Variable: BSEClose

Table: 3

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.006	.009		.692	.491					
	GoldPrices	.073	.255	.035	2.286	.008	-.001	.034	.029	.729	1.371
	CPI	-.319	.965	-.035	-2.331	.007	-.017	-.039	-.034	.947	1.056
	Oil	.390	.100	.416	3.886	.000	.435	.416	.401	.931	1.074
	WPI	-.711	1.344	-.059	-3.529	.006	-.026	-.062	-.055	.851	1.175
	L2	-.059	.892	-.008	-.066	.947	.044	-.008	-.007	.828	1.208
	FiscalDeficit	.000	.010	.003	.029	.977	.052	.003	.003	.892	1.121
	REER	1.059	.596	.209	1.778	.080	.229	.205	.184	.771	1.297
	FOREX	.005	.017	.032	.308	.759	.027	.036	.032	.968	1.033

a. Dependent Variable: BSEClose

The low R² of the OLS model (0.232) indicates that there is a small amount of variability of the market explained by these macroeconomic disclosures. There are other factors which account for maximum amount of market variability. The VIF scores close to 1 indicate that there is no issue of multi-collinearity in the independent variables data set. This was due to the use of Logarithmic returns for the estimation purpose. The data was also found to be stationary and ADF test supported that.

V. SUMMARY & CONCLUSION

Macroeconomic factors influence the market variability of the stock prices and in-turn the market returns. This study connects the macroeconomic and microeconomic dimensions market and thereby empirically testing the impact of information flow and information processing ability of the market. The findings suggest that WPI, oil prices, money supply in the economy (L2), gold prices Fiscal Deficit of the government and Forex Reserves disclosure strengthens the market sentiments and have a significant impact on the volatility of stock market. The amount of variation shown by all of them taken together is low as observed in the combined regression equation. Thus, it leads to an opportunity for future research on what other factor accounts for the stock volatility apart from these macro-economic factors.

VI. LIMITATIONS

Due to the technological enhancements the information dissemination and assimilation has become quite fast as a result the variability in the market prices of the stocks would be instantaneous as soon as the information arises. The event window of +1 / -1 day may be an improper event window. If intraday data is available for study, then the market variability due to macroeconomic factors can be studied in a proper manner.

REFERENCES

A. Craig MacKinlay, (1997). "Event Studies in Economics and Finance", *Journal of Economic Literature*, Vol. 35, Number 1, 13-39.

A. James Heins and Stephen L. Allison, (1966). "Some Factors Affecting Stock Price Variability", *The Journal of Business*, Vol. 39, Number 1, 19-23.

Binder J. John, (1998). "The Event Study Methodologies Since 1969", *Review of Quantitative Finance and Accounting*, Volume 11, Number 2, 111-137.

Brown S, Warner J., (1985). "Using Daily Stock returns, the case of event studies", *Journal of Financial Economics*, Volume 14, Number 1, 3-31.

Charles R. Nelson, (1976). "Inflation and Rates of Return on Common Stocks", *The Journal of Finance*, Volume 31, Number 2, 471-483.

Cox and Portes, (1998). "Mergers in deregulated industries: the uses and abuses of event studies", *Journal of Regulatory Economics*, Volume 14, Number 3, 281-304.

Fama, Eugene F., Lawrence Fisher, Michael Jensen and Richard Roll, (1969). "The Adjustment of Stock Prices to New Information", *International Economic Review*, Volume 10, 1-21.

Fisher, Irving., (1930). "The Theory of Interest", *New York: Macmillan*

Franco Modigliani and Richard Cohn, (1979). "Inflation, Rational Valuation and the Market." *Financial Analysis Journal*, Volume 35, 24-44

Hess, Alan C. and Sanjai Bhagat, October (1986). "Size Effects of Seasoned Stock Issues; Empirical Evidence." *Journal of Business*, 567-584.

Khotari S. P. and Warner Jerold B.,(2006). "Econometrics of Event studies", working paper, Center for Corporate Governance, Tuck School of Business, Dartmouth; Handbook of Corporate Finance: Empirical Corporate Finance, Volume A (*Handbooks in Finance Series*, Elsevier/North-Holland).

Lawrence H. Summers, (1982). "Do We Really Know Financial Markets are Efficient?" *NBER Working Paper* No. 836.

Lawrence H. Summers, (1986). "Does the Stock Market Rationally Reflect Fundamental Values?", *Journal of Finance*, Volume 41, Number 3, 591-601.

Lewellen, W., Loderer, C., & Rosenfeld, A. (1989). *Mergers, executive risk reduction, and stockholder wealth*. Krannert Graduate School of Management.

Worrell, D. L., Davidson, W. N., & Glascock, J. L. (1993). "Stockholder reactions to departures and appointments of key executives attributable to firings", *Academy of Management Journal*, Volume 36, Number 2, 387-401.

Madhavan R, Prescott J, (1995). "Market Value impact of joint ventures: The effect of industry information-processing load", *Academy of management journal*, Volume 38, Number 3, 900-915.

Malatesta P., (1986). "Measuring Abnormal Performance: The Event Parameter Approach Using Joint Generalized Least Squares", *Journal of financial and quantitative analysis*, Volume 21, Number 1, 27-38.

McKenzie A., Thomson M. R. and Dixon B., (2004). "The performance of event study approaches using daily commodity future returns", *The journal of future markets*, Volume 24, Number 6, 533-555.

Nai-Fu Chen, Richard Roll, Stephen A. Ross, (1986). "Economic Forces and the Stock Market", *the Journal of Business*, Volume 59, Number 3. 383-403.

Officer, R. R., (1973). "The Variability of the Market Factor of the New York Stock Exchange," *Journal of Business*, Volume 46, 434-457.

Peterson P, (1989). "Event Studies: A Review of Issues and Methodology", *Quarterly Journal of Business and Economics.*, 36-66.

Pettway R. and Trifts J., (1985). "Do Banks Overbid When Acquiring Failed Banks", *Financial Management*, Volume 14, 5-15.

Praveen P Nayyar, (1993). 'Stock market reaction to related diversification; seeking benefit from information asymmetry and economics of scope', *Strategic Management Journal*, Volume 14, Number 8, 569-591.

Richard P. Castanias, (2012). "Macroeconomic Information and the Variability of Stock Market Prices", *The Journal of Finance*, Volume 34, Number 2, 439-450.

Robert Shiller, (1979). "The Volatility of Long-Term Interest Rates and Expectations Models of the Term Structure.", *Journal of Political Economy*, Volume 87, 1190-1219.

Robert Shiller, (1981). "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?", *American Economic Review*, Volume 71, 421-436.

Robert Shiller, (1981). "The Use of Volatility Measures in Assessing Market Efficiency." *Journal of Finance*, Volume 36, 291-304.

Robert W. Faff and Timothy J. Brailsford, (1999). "Oil price risk and the Australian stock market", *Journal of Energy Finance and Development*, Volume 4, 69 – 87.

Scholes, Myron and Joseph Williams, (1977). "Estimating Betas from Non-synchronous data," *Journal of Financial Economics*, Volume 5, Number 3, 309-328.

William C. Brainard, John B. Shoven and Laurence Weiss, (1980). "The Financial Valuation of the Return of Capital." *Brookings Papers on Economic Activity*, Volume 2, 453-502.

Yin-Wong Cheung & Lilian K. Ng, (1998). "International evidence on the stock market and aggregate economic activity", *Journal of Empirical Finance*, Volume 5, 281–296.