Do FII Transaction Amounts, F&O Turnover Amounts, & Volatility Influence The Indian Stock Market Index The Nifty?

Rajveer Rawlin
Dayananda Sagar College of Engineering, Bangalore

Nithya Ganesan
Wipro Technologies Private Ltd.

Yamuna Priya
Photon Infotech Private Ltd.
&
Shiva Shekhawat
Infosys Technologies Ltd.

Abstract. The Indian stock market S&P CNX Nifty Index (Nifty) is a well diversified index of fifty companies. Portfolios often use the index as a benchmark and several index funds track the Nifty. Hence it would be helpful in understanding what factors drive the performance of this index. The day-to-day fluctuation in the index can be attributable to several fundamental and technical factors such as macroeconomic releases, earnings releases, global news flow and charting patterns. Foreign Institutional Investors (FIIs) like banks, insurance companies, pension funds and hedge funds and domestic mutual funds, wield significant influence over daily trading volumes. This study attempted to study the effect of FII transaction amounts, derivative turnover amounts and volatility on the performance of the Nifty index. A strong correlation was observed between derivative turnover and the Nifty but the correlation was relatively weaker between the Nifty and FII transaction amounts and volatility. FII and F&O activity established important tops ahead of major tops in the Nifty. Volatility remained low during periods of significant upside in the stock market but spiked up during market declines. Linear and non-linear relationships were fit to study the effect of the three parameters on the Nifty. A non-linear relationship involving all three variables provided the best statistical fit suggesting that interplay of these and other factors possibly drive the performance of the index.

The Indian stock market index the S&P CNX NIFTY (NIFTY) has always been used as a barometer for a country's economic progress. Covering 50 companies and well over 15 sectors of the economy the index has assumed pivotal significance. The Nifty is computed on a free float methodology as of June 26th, 2009. In the last 6 months, the total traded value of all Nifty constituents contributed approximately to 54% of the traded value of all stocks on the National Stock Exchange of India (NSE). Nifty stocks represented about 62.50% of the Total Market Capitalization as on Sept 30, 2009 (nseindia.com). The index figures prominently in a variety of purposes such as benchmarking fund portfolios, index based derivatives and index funds. Additionally with the growing popularity of India as a BRIC (Brazil Russia India China) economy, the index and exchange traded funds and derivatives based on the index have been listed and traded globally on several major stock exchanges such as the New York Stock Exchange (NYSE).

Short term fluctuations in the index are attributable to both technical and fundamental factors. Fundamental factors that impact markets include economic news releases, corporate earnings releases, and changes in interest rates (Cofnas, 2004).

Additionally, technical analysis based on charting patterns and Fibonacci analysis offer short term trend trading opportunities (Cofnas, 2003). Additionally, emerging markets like India tend to benefit from favorable interest rate differentials and a shift in fund flows arising from potential changes in interest rates across the globe (Lien, 2005). These large and favorable interest rate differentials have led to the emergence of what is called the carry trade, which is simply an interest rate arbitrage strategy that borrows in low yielding economies like Japan and invests in high yielding economies like those of the BRIC nations. These fund flows occur through Foreign Institutional Investors (FIIs) and domestic players like banks, insurance companies, pension funds, hedge funds, mutual funds, and investment trust contributing significantly to trading volume on the exchanges.

There is no conclusive evidence as to whether these investors are the cause or effect of market returns (Chakrabarti, 2001; Mukherjee et al., 2002; Griffin et al., 2004). Additionally, Nifty-based derivatives are among the most actively traded on the NSE. Analyzing derivative patterns such as open interest and put call ratios can possibly give an idea of the market trend as a whole. Studies have shown that the introduction of futures contracts in the Indian market has resulted in reducing Nifty volatility (Gupta & Kumar, 2002; Thenmozhi, 2002). The volatility of the Nifty index has been observed to vary significantly at market peaks and troughs. Global volatility is observed to spike in situations governed by fear and panic as was observed during the Great Depression of 1929-1939 (Officer, 1973) and in the most recent credit crisis. Indian market volatility has been shown to be low during periods of growth and high during recessionary periods (Kumar, 2007). The effect of these three parameters namely FII transaction amounts, derivative turnover or futures and options (F&O) turnover and volatility on the performance of the NIFTY index will be examined in this study.

METHOD

This study used historical data to study the impact of the independent variables FII transaction amounts, derivative turnover and volatility on the performance of the dependent variable the NIFTY index. Weekly data on the above were obtained and studied in the time frame from January 2005 to February 2010. Historical data on derivative turnover i.e. F&O trading amounts were obtained from the National Stock Exchange of India's web site (www.nseindia.com). Data for FII investment amounts were obtained from the Security and Exchange Board of India (http://www.sebi.gov.in/ FII Trends New.jsp). Only FII investments in equity were considered. For FII and F&O amounts, weekly data were obtained by summing up daily figures. The volatility of the Nifty index (India Vix) was also retrieved from the National Stock Exchange of India (www.nseindia.com). However data on Indian market volatility is not available prior to November 2007. Hence volatility for earlier periods was assessed by looking at the historic volatility of the US S&P 500 index (US VIX) which is available for much earlier periods. The US VIX values were obtained from Yahoo finance (http://finance.yahoo.com/ q/hp?s=^VIX). The relationship between the India Vix and US Vix was studied with the Statistics SPSS 17.0 package. The linear relationship fitted was used to calculate Indian market volatility for earlier periods. Data on the dependent variable the Nifty Index was obtained from the National Stock exchange of India (http://www.nseindia.com/content/indices/ ind_histvalues. htm) which computes the index on a daily basis. Relationship between the dependent and independent variables were statistically analyzed with the Statistics SPSS 17.0 package. Statistical data such as p-values, standard error and regression coefficients such as R-squared and adjusted R-squared were computed from the above analysis. Linear and non-linear relationships were developed from the above.

Table 1: Computation of India Vix from the US Vix

Dependent Variable	Independent Variable	Pearson Coefficient	Sig. (1 tailed)	R	R^2	Adj R^2	Sig. F Change
VIX $_{Nifty}$	VIX $_{S\&P\,500}$	0.721	0.000	0.721	0.52	0.519	0.000

Vix (Ind) = 18.995 + 0.597VIX(US)

Table 2: Linear Relationship, Nifty = F(F&O, FII, Vix)

Dependent Variable	Independent Variable	Pearson Coefficient	Sig. (1 tailed)	R	R^2	Adj R^2	Sig. F Change
Nifty	F&O	0.756	0.000	0.756	0.571	0.570	0.000
Nifty	FII	0.088	0.077	0.088	0.008	0.004	0.155
Nifty	VIX $_{Nifty}$	0.040	0.258	0.040	0.002	-0.002	0.517
Nifty	F&O FII VIX $_{Nifty}$	0.782	0.000	0.782	0.611	0.607	0.000

Nifty = 2877.396 + 0.009 F&O -0.008FII-25.84VIX

Table 3: Quadratic Relationship, Nifty = F(F&O)

Dependent Variable	Independent Variable	Pearson Coefficient	Sig. (1 tailed)	R	R^2	Adj R^2	Sig. F Change
Nifty	F&O	0.756	0.000	0.756	0.571	0.570	0.000
Nifty	$F\&O^2$	0.675	0.000	0.675	0.456	0.454	0.000
Nifty	F&O $F\&O^2$	0.788	0.000	0.788	0.621	0.618	0.000

Nifty =1392.718-2.019E-08F&OSquare+0.017 F&O

Table 4: Non Linear Relationship, Nifty = F(F&O, FII, Vix)

Dependent Variable	Independent Variable	Pearson Coefficient	Sig. (1 tailed)	R	R^2	Adj R^2	Sig. F Change
Nifty	F&O	0.756	0.000	0.756	0.571	0.570	0.000
Nifty	FII	0.088	0.077	0.088	0.008	0.004	0.155
Nifty	VIX $_{Nifty}$	0.040	0.258	0.040	0.002	-0.002	0.517
Nifty	F&O * VIX $_{Nifty}$	0.563	0.000	0.563	0.317	0.315	0.000
Nifty	$F\&O^2$	0.675	0.000	0.675	0.456	0.454	0.000
Nifty	F&O FII VIX $_{Nifty}$ F&O *	0.833	0.000	0.833	0.693	0.687	0.000

FII VIX $_{Nifty}$ F&O * VIX $_{Nifty}$ F&O^2							

$$Nifty = 1735.368 - 5.471E\text{-}05\,F\&OVIX - 22.875\,Vix$$
$$-2.616E\text{-}08\,F\&OSquare + 0.022\,F\&O + 0.05\,FII$$

DISCUSSION AND ANALYSIS

The period of study chosen from 2005 – 2009 was characterized by two distinct halves. The first half witnessed a major economic upswing that saw a global boom in growth and stock markets across the world. The Indian stock market (Nifty Index) was no exception to this, rising an incredible 202% from Jan 1, 2005 to Jan 8, 2008. The rising markets attracted global investors and turnover exploded upwards in the Indian market. Volatility remained low globally.

The second half of the study period witnessed a major economic slump the likes of which have not been seen since the Great Depression. A massive credit crisis erupted in the United States that sparked massive de-leveraging across the globe. This resulted in massive capital outflows across emerging economies like India. With volatility soaring globally and institutional investor interest dwindling, the Indian stock market lost well over 60% of its value between January and October 2008.

Figure 1. Impact of FII Activity on the Nifty


FII Nifty Weekly Data
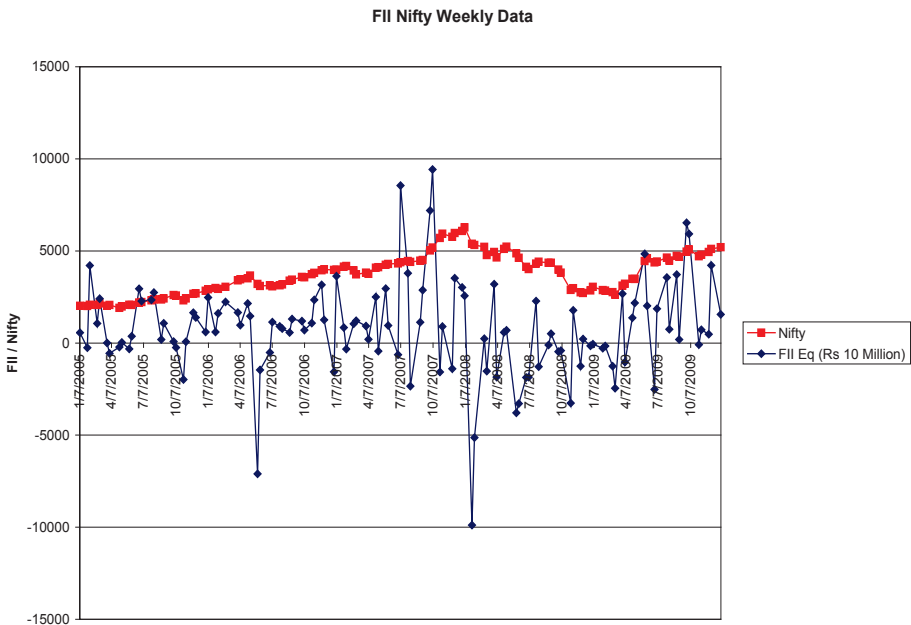
The above chart graphically describes the 5-year weekly performance of both the Nifty and FII Activity. With the index tripling from Jan 2005 to Jan 2008, FII flows rose almost 18 fold. The number of registered FIIs rose 160% from 655 to 1706 from January 2005 to December 2009. However there were plenty of fluctuations along the way. Important tops in FII activity were established in December 2005 and October 2007 with FII activity crossing over 50,000 million Rupees. The stock market correspondingly established tops in May 2006 and January 2008 following which it proceeded to decline by at least 20%. Thus FII activity served as a 3-6 month leading indicator for tops in the Index. Thus the smart money was clearly ahead of major market declines. In fact Griffin et al. (2004) suggested that foreign inflows are predictors of market returns in emerging markets like Thailand, South Korea and India. Major bottoms in FII activity occurred in May 2006, Jan 2008 and October 2008 right around market declines of over 20% with FIIs being net sellers to the tune of 50,000 million Rupees (Figure 1). With FII activity fluctuating significantly between positive and negative territory even during extended periods of gains in the index (July 2006-Jan 2008) and during major falls in the index (Jan 2008-March 2009), it is not surprising to see the poor statistical correlation between the Index and FII activity (Table 2).

Figure 2. Impact of Derivative Turnover (F&O Activity) on the Nifty

F&O Nifty Weekly Data
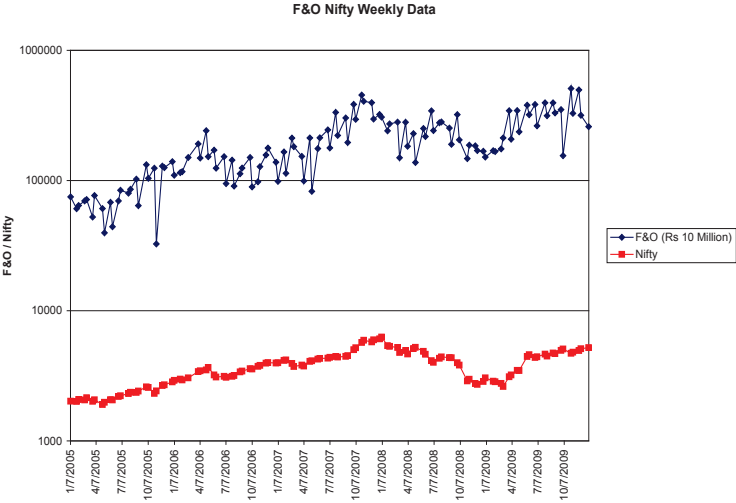
Derivative turnover amount as measured by F&O activity was statistically highly correlated to the Nifty (Table 2). Derivative turnover surged 7-fold in the period of study following the massive rally in the Nifty index. There were major peaks in F&O turnover in April 2006, October 2007 and October 2009. The Nifty declined more than 20% within 3 months of the tops in F&O activity made in April 2006 and October 2007. It could very well be that a speculative frenzy or blow out occurs ahead of major market tops. A new all time high was made in F&O turnover in October 2009 at well over 5 trillion Rupees (Fig 2). It will be interesting to see if another market decline of over 20% follows in the months ahead. Major declines in derivative turnover didn't necessarily happen following major market declines as was the case with FII activity (Fig 1,2).

Figure 3. Impact of Volatility on the Nifty
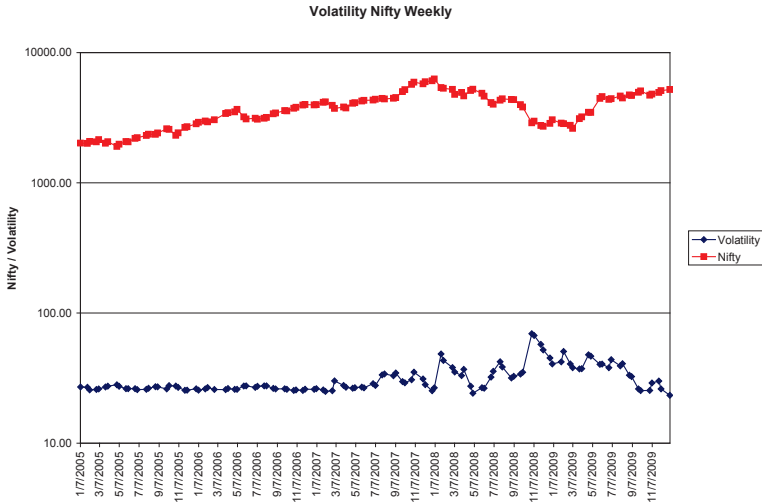
Volatility on the Nifty has been published by the NSE only since November 2007. However, since Nifty volatility is calculated in the exact same manner as the volatility of the S&P 500 index in the United States, we calculated Nifty volatility from S&P 500 volatility. A statistically significant relationship was obtained between Indian and US market volatility (Table 1). Indian market volatility was calculated from this. Volatility tends to remain low during extended periods of growth and spikes higher during recessionary periods or times of crisis (Kumar, 2007). Low volatility often signals complacency after an extended move up in the market and high volatility captures panic in investor sentiment after extensive downside. This was indeed the case here as well, as volatility remained low during the boom period between January 2005 and January 2008 and proceeded to spike higher during market declines following the recessionary between January 2008 and March 2009. High volatility has been associated with low trading volumes (Kiymaz & Berument, 2003; Girard & Biswas, 2007). We find evidence of this in this study as both FII activity and derivative turnover drastically reduced during periods of high volatility (Fig. 1,2). Hence it is not surprising to see a poor correlation between volatility and the Nifty as the inverse relationship is strong only at market extremes (Table 2).

The combined correlation of a non-linear combination of all the above variables discussed provided a better relationship than when the variables were taken individually (Table 4) suggesting a synergistic impact of the above variables on the Nifty.

Conclusion

This study examined the impact of institutional investors (FII activity), derivative turnover (F&O) and volatility (Vix) on the Indian stock market index the Nifty. Both FII and F&O activity peak ahead of market tops indicative of a speculative frenzy before major market declines. Volatility stayed low during extended periods of stock market gains but spiked during periods of crisis or severe downside in the stock market. The best statistical fit was obtained from a non-linear relationship involving all the above variables, suggesting that a complex relationship involving the above and other variables drives the performance of the Nifty index.

Limitations

This study was a weekly study with data over a 5-year period. A longer time frame could have provided better understanding of the relationships involved. Additionally daily data can be more effective in discerning short term patterns and monthly data can help predict long term

relationships better. There are possibly several other factors that drive the Nifty index other than the three variables studied here such as trading volumes, exchange rates etc (Sabri, 2004) which were not included in this study.

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