Global Integration and Rupee Depreciation: Are Times Good Forward?

Pushpa B[*] and Deepak R[†]

Abstract

The S&P BSE Sensex has plunged over 1,000 points so far in August, weighed by a host of factors, including weakness in the currency, possible tapering of US Fed's bond-buying program and threats of ratings downgrade. The Indian rupee has depreciated by over ten per cent since May 2, 2013 against the US dollar, and eleven per cent against the Euro. Depreciating currency will adversely impact capital-intensive sectors and firms with foreign borrowings and those who import raw materials heavily. Automobiles, capital goods, petroleum, power and telecom companies will bear the brunt of a weak rupee. But sectors such as software services and pharma, with major export revenues, will benefit. The rupee's decline in the last six months has deep consequences for the Indian economy and various asset classes. Thus in the study, we examined the impact of rupee depreciation on broad and sectoral indices of BSE and NSE markets. Sample T-tests for means and variances were conducted on both the price returns and volume changes to understand the behavior of stock market in unison. The study finds conclusive evidence of impact of rupee depreciation on indices considered. The impact observed is found to be more severe when compared to previous

[*] Assistant Professor in Accounts and Finance, M P Birla Institute of Management (MPBIM), Bangalore, India; pushpabv75@gmail.com
[†] Assistant Professor in Finance, (MPBIM), Bangalore, India; dnaikr@gmail.com

depreciations, which points towards integration of global markets with Indian markets in more positive sense than ever. Thus co-integration tests were conducted to analyze the long term relationship between Major Indian and global indices.

Keywords: Rupee Depreciation, Integration, Indices, BSE, NSE

1. Introduction:

In the past few months, the Indian Rupee has depreciated significantly against the U.S.D marking a new risk for the Indian economy. The gloom surrounding the recent rupee fall has been unnerving for investors. The near 11% fall in the currency between January and July is hurting large parts of India Inc. For stock investors, the rupee's roller-coaster ride over the last few weeks has added another layer of uncertainty in a market whose movements over the last few months have anyway been as unpredictable as during any time in recent history. Foreign investors, already nervous about India's high current account deficit, or CAD, fell for the rising dollar bond yields as a result of the Fed's actions and took money out of India to invest there. It is believed that the Rupee depreciation will have really unsettling consequences for the Indian economy as it will add further pressure on the overall domestic inflation. India, being an import intensive economy, will have to bear the burden of higher domestic costs and higher fiscal and current account deficits. Many macroeconomic variables like inflation rate, stock prices, interest rates, high fiscal deficit, lack of reforms, global uncertainties etc. are said to have an impact on the exchange rates (Singhal, 2012). Especially with the rise in the world trade and capital movements, exchange rate has become the most vital determinant of a country's relative economic health. Indian rupee is witnessing extreme volatility mainly the fall and it may take some more time to stabilize and analysts believe that this sharp depreciation in the currency will impact the earnings of some sectors materially. A weak currency has historically had an adverse impact on equity markets, given their sensitivity to FII flows. Any expectation of structural weakness in the rupee sours their return expectations. This can lead to outflows, which can further pressure

the rupee. Hence, the regulators need to calm the markets by taking measures to boost capital flows and manage expectations. However, on an aggregate basis, companies in the listed space may see positive earnings as they operate in sectors that benefit from a weaker currency. Previous studies have proven correlation and some de correlation between rupee/ exchange rates and stock prices. Smith (1992); Solnik (1987) and Aggarwal (1981) have found a significant positive relationship between stock prices and exchange rates while Soenen and Hennigar (1998) have reported a significant negative relationship between the two. Franck and Young (1972), Bartov and Bodnor (1994) have found very weak or no association between stock prices and exchange rates. Abdalla and Murinde (1997) have found causation runs from exchange rates to stock prices, but Ajayi and Mougoue (1996) have proved a reverse causation. Bi-directional causality between the two in the short run is proved by Bahmani-Oskooee and Sohrabian(1992).

A depreciation of the local currency makes exporting goods attractive and leads to an increase in foreign demand and hence revenue for the firm and its value would appreciate and hence the stock prices. On the other hand, an appreciation of the local currency decreases profits for an exporting firm because it leads to a decrease in foreign demand of its products. However, the sensitivity of the value of an importing firm to exchange rate changes is just the opposite of that of an exporting firm. In addition, variations in exchange rates affect a firm's transaction exposure. That is, exchange rate movements also affect the value of a firm's future payables (or receivables) denominated in foreign currency. Therefore, on a macro basis, the impact of exchange rate fluctuations on stock market seems to depend on both the importance of a country's international trades in its economy and the degree of the trade imbalance.

Another way of explaining the relationship between exchange rates and stock prices is through following the capital account transactions. Like all commodities, exchange rates are determined by market mechanism, i.e., the demand and supply condition. A blooming stock market would attract capital flows from foreign investors, which may cause an increase in the demand for a country's currency. The reverse would happen in case of falling

stock prices where the investors would try to sell their stocks to avoid further losses and would convert their money into foreign currency to move out of the country. There would be demand for foreign currency in exchange of local currency and it would lead to depreciation of local currency. As a result, rising (declining) stock prices would lead to an appreciation (depreciation) in exchange rates. Moreover, foreign investment in domestic equities could increase over time due to benefits of international diversification that foreign investors would gain. Furthermore, movements in stock prices may influence exchange rates and money demand because investor's wealth and liquidity demand could depend on the performance of the stock market.

Between 2005 and 2012, 75% of the times rupee and Sensex moved in similar direction. Therefore, movement in the rupee has become extremely critical for the direction of the Indian stock markets. There is a chance that three out of four times markets will go up if the rupee goes up and fall if the rupee falls.

The weakness of the rupee is also haunting the equity markets. Investors in the emerging markets have suffered more than those in the developed world, a comparison of benchmark indices indicates. Indices were down in October, Russia's RTS has shed 36 per cent; Brazil's Bovespa lost almost 25 per cent and the Korea's Kospi came down 24.6 per cent. In India, the 30-share Sensex has fallen close to 24 per cent and the broader Nifty almost 27 per cent. Dubai Financial Market has dropped more than 28 per cent.

The rupee's decline in the last six months has deep consequences for the Indian economy and various asset classes. It may have an adverse impact on sectors that are dependent on imported commodities and technologies for their functioning as landed cost of imports may become dearer and may thus escalate operating costs and depress profit margins. The transmission of these increased costs to consumers may also lead to renewed inflationary pressures. Moreover, companies that may have subscribed to dollar-denominated borrowings may find it expensive to service their loan commitments. Also, while the domestically-oriented companies may remain largely unperturbed by the declining rupee, yet, they too may find the inflationary impact inimical to their business interests. Export-oriented sectors may witness a higher

value turnover. The rupee's decline increases price competitiveness of Indian products in the overseas markets, which may aid the volume-led growth of exports of these sectors. We may therefore see increased investment preference for such sectors in the allocation decisions. The defensive bias in the market will continue for some time with overweight positions in domestic consumption and overseas services related sector viz. FMCG, Pharma, IT and utilities. Any improvement on the policy front may see large liquidity inflows into the markets leading to a sharp recovery. The interesting question to answer is why stock markets worry so much every time there is a pressure on the rupee, especially when large numbers of countries are working hard to keep their currency undervalued? The probable reason may be that some gradual appreciation or depreciation is not a problem but since India runs an exceptionally high level of current account deficit (CAD), the worry is that the rupee can see a sharp dip, but the liquidity in the global financial system to remain comfortable. The CAD is expected to remain above the level of comfort for some time and, therefore, rupee will remain under pressure. It will depend largely on the quantum of inflows. Since there is a significant correlation between the movement of rupee and the Indian stock market, this increased level of dependence of rupee on the foreign capital inflows will keep playing in the market.

A sector wise study gives a clear idea that export oriented sectors which include software services, pharmaceutical and aquaculture benefit from the rupee depreciation while engineering goods, gems, jewellery sectors may have limited gains due to import of raw materials. Falling rupee increases the margin of export oriented sectors. Companies such as Oil marketing companies, those who are net importers and those who have unhedged external borrowings also face the heat. Manufacturing companies are the worst hit as they are net importers and they have loans and claims to international banks and will either have to pay more to settle the loans or refinance the debt with high cost local loans. The biggest hit were consumer durables, realty, metals and banking, which fell between five and eight per cent.

2. Literature review:

Aggarwal (1981) explored the relationship between changes in the dollar exchange rates and the changes in indices of stock prices. He uses monthly U.S stock price data and the effective exchange rate for the period 1974-1978. The results from simple regressions showed that stock prices and the value of the U.S. dollar is positively related and is stronger in the short run than in the long run. Solnik (1987) in his paper examined the impact of several variables namely exchange rates, interest rates and changes in inflationary expectation on stock prices. Monthly data from U.S., Japan, Germany, U.K, France, Canada, Netherlands, Switzerland and Belgium were used. It was proved that depreciation has a positive but insignificant influence on the U.S. stock market compared to change in inflationary expectation and interest rates.

Bahmani-Oskooee and Sohrabian (1992) analysed the long run relationship between stock prices and exchange rates. They used Co integration as well as the casual relationship between the two by using Granger causality test. It was proved that there is a dual causal relationship between the stock prices and exchange rate in the short run, but the analysis could not derive any long-run relationship between these variables. Smith (1992) this paper uses a Portfolio Balance Model to examine the determinants of exchange rates by considering the values or equities, stocks of bonds and money as important determinants of exchange rates. The tests prove that equity values have a significant influence on exchange rates and stock of money and bond has little impact on exchange rates. It is concluded that impact of equities is more important than the impact of government bonds and money on exchange rates.

Rittenberg(1993) The study is focused on examining the relationship between exchange rate changes and price level changes in Turkey. Granger Causality tests are used. Since causality tests are sensitive to lag selection, three different specific methods for optimal lag selection ie, an arbitrarily selected, Hsiao method (1979), and the SMAR or subset model auto regression method of Kunst and Marin(1989) are employed. In all the cases it was found that causality runs from price level change to exchange rates changes. Ajayi and Mougoue (1996) show that an increase in

aggregate domestic stock price has a negative short-run effect on domestic currency value but in the long –run any increase in the stock prices have a positive effect on domestic currency value. It was also proved that currency depreciation has a negative short-run effect on the stock market.

Abdalla and Murinde (1997) employed co-integration test to examine the relationship between stock prices and exchange rates for four Asian countries named as India, Pakistan, South Korea and Philippines for a period of 1985 to 1994 and since a long run association was found for India and Philippines they used error correction modeling approach and   detected unidirectional causality from exchange rates to stock prices for India, South Korea and Pakistan and found causality runs from the opposite direction for Philippines.

Christine Jiang and Thomas C. Chiang (2000) tests whether foreign exchange excess returns for the British pound, Canadian dollar, Deutsche mark, and Japanese yen are related to volatility in the currency market and volatility in the stock markets and proves that volatility (measured by standard deviation and variance) from currency markets is significant in explaining the excess returns, suggesting that the excess returns are indeed reward for risk-taking. In addition, shocks in equity markets are found to have a significant impact on currency risk premium as well. In some cases, it was noticed that a non linearity in the risk premium exists and risk premiums for each currency tend to respond to positive and negative shocks differently.

Naeem Muhammed and Abdul Rasheed (2002) this paper tries to provide empirical evidence on the issues whether stock prices and exchange rates are related, the long run and the short – run associations between the two and the direction of causation if they are related. Monthly data from the four south Asian countries Pakistan, India, Bangladesh and Sri Lanka was analyzed using Co integration, Granger Causality tests and error correction modeling approach. The tests prove that there is no long-run and short run relationship between the two for Pakistan and India, no short-run association for Bangladesh and Sri Lanka, a bidirectional long-run

causality between these variables for Bangladesh and Sri Lanka. Further areas for research was identified as applying the same tests using daily or weekly data and employ firm level data for these countries. Bhattacharya and Mukherjee (2003) investigated Indian markets using the data on stock prices and macroeconomic aggregates in the foreign sector including exchange rate and concluded that there is no significant relationship between stock prices and exchange rates. Alan C. Stockman (2004), examined and tested whether dollar depreciation had an effect on inflation or not. The evidence does not support that view: once other factors that predict inflation are also included in the analysis, currency depreciation plays essentially no role at all in predicting future inflation.

Stavarek, Daniel (2004) investigates the nature of the causal relationships among stock prices and effective exchange rates in four old EU member countries (Austria, France, Germany, and the UK), four new EU member countries (Czech Republic, Hungary, Poland, and Slovakia), and in the United States. Both the long- and short-term causalities between these variables are explored using monthly data. The paper also endeavors to answer the question of whether the linkages between the analyzed economic variables are of similar intensity and direction in old and new EU member countries, and whether or how relationships have changed. The results show much stronger causality in countries with developed capital and foreign-exchange markets (i.e., old EU member countries and the United States). Evidence also suggests more powerful long- and short-term causal relations during the 1993-2003 periods than during 1970-92. Causalities seem to be predominantly unidirectional, with the direction running from stock prices to exchange rates. Finally, we detected strong relations when applying the real effective exchange rate than the nominal effective exchange rate.

Dimitrova (2005) examined the link between the stock market and exchange rates. He asserted that, in the short run, an upward trend in the stock market may cause currency depreciation, whereas weak currency may cause decline in the stock market. A multivariate, open-economy, short-run model that allowed for simultaneous equilibrium in the goods, money, foreign exchange

and stock markets in two countries is used. The focus is specifically on the United States and the United Kingdom over the period January 1990 through August 2004. The empirical results found were weaker than expected. He found support for the hypothesis that a depreciation of the currency may depress the stock market i.e. the stock market will react with a less than one percent decline to a one percent depreciation of the exchange rate. This also implies that an appreciating exchange rate boosts the stock market. As to his other assertion, that a booming stock market would lead to currency depreciation, he did not find support in the data for the US/ UK over 1990-2004. The results were insignificant.Jashim Uddin and Md. Lutfur Rahman (2009) investigates the interactions between stock prices and exchange rate in three emerging countries Bangladesh, India and Pakistan from the monthly average nominal exchange rates of US dollar in terms of Bangladesh Taka , Indian Rupee, Pakistan rupee and montly values of all the three exchanges all share prices and shows that exchange rates and stock prices data series are non stationary and integrated of order one and Johansen test prove that there is no co integrating relationship between stock prices and exchange rates and granger causality test proves there is no way causal relationship between the two.

3. Problem statement:

From the literature review, we can infer that inspite of several problems existing with respect of Indian economy; primary key problem faced during the year 2013 is the impact of rupee depreciation. Irrespective of several steps being considered for the Reserve Bank of India such as raising short term interest rates, squeezing liquidity from banks, raising import duty on gold and non-essential imports, reducing limits on foreign investments and outward remittances by Indian residents, there seems to be no stable floor for rupee atleast for few months. Thus a need was felt to analyse the impact of changes in the returns of thirteen sectoral indices listed on stock exchange, Mumbai (BSE) between January 2013 and September 2013. The study thus would reflect the impact of global factors on Indian rupee and thus the stock indices.

4. Objectives of the study

1. To examine the impact of rupee depreciation of major sectoral indices listed on BSE before and after May 2nd, 2013.

2. To examine the opportunity for investors to form trading strategies in the near future.

5. Hypotheses of the study:

H_{01}: There exists no significant change in the returns of BSE sectoral indices due to rupee depreciation.

6. Data collection:

For the study, the data on exchange rates and BSE Sectoral indices was collected for the period January 2013 to September 2013 from RBI database and BSEindia.com. May 2nd, 2013 was considered as the event day for the study.

7. Methodology:

The index price returns for thirteen sectoral indices were calculated as shown below:

$$r_t = \left(\ln p_t - \ln p_{t-1} \right) * 100$$

Where R_t is the price return in period t, P_t refers to daily closing price of the index at time t and P_{t-1} refers to daily closing price of the index at time t-1.

For the study, parametric T-TEST for testing difference between sample means was considered for the study. Here under the null hypothesis of no difference in the returns and variances before and after the event day, the t-test was conducted at 0.05 level of significance.

The standard error of the difference between the two means since population standard deviation is unknown was calculated as follows:

$$\hat{\sigma}_{\overline{x}_{after} - \overline{x}_{before}} = \sqrt{\frac{\hat{\sigma}^2_{after}}{n_{after}}} + \sqrt{\frac{\hat{\sigma}^2_{before}}{n_{before}}}$$

To estimate the common variance or an unbiased estimator of population variance, the weighted average of sample variances were considered with weights being equal to degrees of freedom used. Thus pooled estimate of population variance was estimated as shown below:

$$s_p^2 = \frac{\left(n_{after} - 1\right)s^2_{after} + \left(n_{before} - 1\right)s^2_{before}}{n_{before} + n_{after} - 2}$$

Thus degree of freedom would be equal to number of sample before and after the event minus two. Because we are doing upper tailed test at 0.05 level of significance, the critical value of t is 1.99.

Thus standardized 't' statistic is calculated as shown below:

$$t = \frac{\left(\overline{x}_{after} - \overline{x}_{before}\right) - \left(\mu_{after} - \mu_{before}\right)H_0}{\hat{\sigma}_{\overline{x}_{after} - \overline{x}_{before}}}$$

If the standardized difference between the two samples means lies within the acceptance region, we would accept the null hypothesis of no difference between the means of returns before and after the event day.   The p-values of the t-test were often used to accept or reject the null hypothesis. In the methodology, May 2nd, 2013, was considered as the midpoint for comparison.

8. Findings of the study:

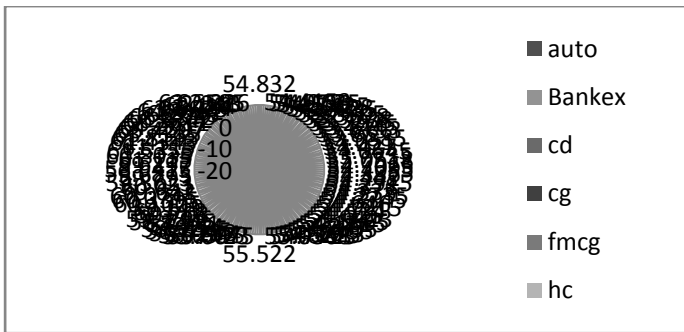### 8.1 mean returns of thirteen sectoral indices during the year 2013.

Fig 1: Performance of sectoral indices with rupee depreciation

Source: Authors

As observed in Figure 1, the fluctuations observed in the sectoral indices are comparatively less before may 2nd, 2013, which is the midpoint of the figure. From January 2013, the rupee is seen to depreciate in a exponential way and the markets have been seen to be very volatile during this period. The market expectation seems to be gradually imbedded in the share prices in tune with the rupee movements in the forex markets. Based on the movements, definitely there seems to be absolute possibility for traders and investors to form trading strategies and make abnormal profits. Thus, it was felt a need to study the returns of the indices over the period. The markets are assumed to be efficient in nature and if efficient the markets will correct for the information with no time and there would exist no opportunity to make abnormal profits. Though severe volatility in the prices have been observed in the recent past, if the markets are efficient, then the mean average abnormal returns should not be different over time. Which means that, though the prices of the sectoral indices seem to be very volatile in the year, the actual returns always nullify themselves giving no single trader an opportunity to make inordinate returns. If this is true, the null hypothesis of no changes in the mean returns before and after May 2nd should be accepted for all the indices considered. As observed in Table 1, For all the indices considered, The null hypothesis is accepted in all cases.

Table 1: Parametric T-test results for all indices returns

sl. no	Index	Before mean returns	After mean returns	volatility before	volatility after	Rejection/ Acceptance of null hypothesis
1	BSE AUTO	-0.05644	-0.10803	1.08509	1.41549	Acceptance
2	BANKEX	-0.00941	-0.42453	1.18379	1.84971	Acceptance
3	CD	-0.04967	-0.33076	1.35143	2.21999	Acceptance
4	CG	-0.14239	-0.40447	1.39761	1.86740	Acceptance
5	FMCG	0.12443	-0.07961	1.02672	1.42282	Acceptance
6	HC	0.07969	-0.01559	0.74954	1.14159	Acceptance
7	IT	0.02333	0.33125	1.89938	1.28901	Acceptance
8	PSU	-0.08834	-0.37809	1.10226	1.52541	Acceptance
9	METAL	-0.32226	-0.13082	1.24705	2.26987	Acceptance
10	O&G	0.03302	-0.10737	1.26109	1.70265	Acceptance
11	POWER	-0.15556	-0.31832	1.13758	1.67092	Acceptance
12	REALTY	-0.13950	-0.55933	2.15189	2.51384	Acceptance
13	TECK	0.02425	0.23065	1.51633	1.17229	Acceptance

Source: Authors

9. Conclusion:

The study supports the market efficiency hypothesis with respect to all the sectoral indices listed on BSE. Thus, if the markets are Efficient, then irrespective of the rapid changes in the exchange rates, the traders cannot make abnormal returns with passive investing strategies. Active revision of the portfolio on a day-to-day basis would be the only way to make abnormal returns. Thus understanding the fundamentals and trading using the knowledge of technical analysis would help investors to exit and enter the markets smoothly.

References:

Abdalla, I. S. A., and Murinde V. (1997) "Exchange Rate and Stock Price Interactions in Emerging Financial Markets: Evidence on India, Korea, Pakistan and Philippines. Applied Financial Economics 7, 25-35.

Aggarwal, R. (1981) "Exchange Rates and Stock Prices: A Study of U.S. Capital Market under Floating Exchange Rates. *Akron Business and Economic Review*, 7-12.

Ayayi, Richard A, and Mbodja Mougoue (1996) "On the Dynamic Relation between Stock Prices and Exchange Rates, *Journal of Financial Research 19*, 193-207.

Bahamani-Oskooee, M., and Sohrabian A. (1992) "Stock Prices and the Effective Exchange Rate of the Dollar, Applied Economics 24, 459-464.

Bartov,E., and Bodnar F. M. (1994) " Firm Valuation, Earnings Expectations, and the Exchange-Rate Exposure Effect. *Journal of Finance 49*, 1755-1785.

Bhattacharya, B. & Mukherjee, J. (2003). Causal Relationship Between Stock Market and Exchange Rate. Foreign Exchange Reserves and Value of Trade Balance: A Case Study for India, Paper presented at the Fifth Annual Conference on Money and Finance in the Indian Economy, January 2003

Dimitrova, D. (2005). The Relationship between Exchange Rates and Stock Prices: Studies in a Multivariate Model. Issues in Political Economy, 14, 1-25.

Dornbusch, R. and S. Fischer, 1980, "Exchange Rates and Current Account," *American Economic Review* 70, 960-971.

Jiang, C.,and Chiang,T.C.,(2000). "Does Foreign Exchange Risk Premium Relate to the Volatility in the Foreign Exchange and Equity Markets?" *Applied Financial Economics*, 10, 95-104

Naeem M and Abdul R (2002) "Stock Prices and Exchange Rates: Are they Related? Evidence from South Asian Countries", *The Pakistan Development Review*, 41:4 Part II (winter 2002) pp.535-550

Rittenberg,L.(1993) "Exchange Rate Policy and Price Level Changes: Causality Tests for Turkey in the Post –Liberalization Period" *the Journal of Development studies* 29:2, 321-332.

S. Pankaj and Deepti K (2013) " Modeling exchange rate dynamics in India using stock market indices and macroeconomic variables", MPRA Paper No. 45816, posted 4. April 2013 07:59 UTC, Online at http://mpra.ub.uni-muenchen.de/45816/

Singhal, S. (2012) "An Analytical Study on Indian Currency Rupee Depreciation against the U.S. Dollar and Its Economic Impact. , *Journal of Economics and Management*, 1,74-83.

Smith, C. (1992) "Stock market and the Exchange Rate: A Multi-country Approach" *Journal of Marcoeconomics* 14, 607-629.

Smith,C.(1992a) "Equities and the UK Exchange Rate" *Applied Economics* 24, 327-335.

Soenen, L.A., and E.S. Hennigar (1988) "An Analysis of Exchange Rates and Stock Prices: The U.S. Experience between 1980 and 1986. *Akron Business and Economic Review* 7-16.

Solnik, B. (1987) "Using Financial Prices to Test Exchange Rate Models: A Note" *Journal of Finance* 42, 141-149.

Stavarek, D. (2004): Stock Prices and Exchange Rates in the EU and the USA: Evidence of their Mutual Interactions. *Published in: Finance a úvěr - Czech Journal of Economics and Finance* , Vol. 55, No. 3-4 (2005): pp. 141-161

Uddin, J., & Rahman, M. L. (2009). Dynamic Relationship between Stock Prices and   Exchange Rates: Evidence from Three South Asian Countries. *International Business Research*, *2*(2)