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RELATIONSHIP BETWEEN STOCK PRICE AND EXCHANGE RATE IN INDIA

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ABSTRACT

The global meltdown has made a strong pitch for dynamic linkage between exchange rate and stock prices. Because of these crises, the world has noticed that emerging market collapsed due to substantial depreciation of home currency against dollars as well as drastic fall in the stock prices. The study uses daily NIFTY Index and exchange rate (expressed in Indian Rupee per U.S .dollar).The study use daily data for the period from January 2005 to December 2009.The study uses Granger causality test to find the linkage between two variables. The results of Granger causality test, reveals that unidirectional as well bidirectional casual relationship between the two study variables if one goes by individual year.

INTRODUCTION

The relationship between country stock market and its exchange rate market has been a subject of theoretical and empirical investigation in International finance for over three decades. The traditional CAPM says that exchange rate being firm-specific and unsystematic and should be diversifiable and hence would not be considered by markets. However, International CAPM Says that the expected excess returns on risky asset is a linear function of not only their betas, but also exchange rate factor. The extension of traditional CAPM to an international context under the assumption of coupling theory that accounts for exchange rate risks and its covariance with global financial markets.

"Flow-oriented" models (Dornbusch and Fischer 1980) of exchange rate are known as goods market approach. It suggest that change in exchange rate affects the competitiveness of a firm as fluctuations in exchange rates affect the value of the earnings and cost of its fund, as many companies borrow in foreign currencies to fund their operations and hence its stock price. A depreciation of the local currency makes exporting 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. However, the sensitivity of the value of an importing firm to exchange rate is just opposite to that of an exporting firm. So, on a macro basis, the impact of exchange rate fluctuations on stock market seem to depend on both the importance of country international trade in its economy and the degree of its trade imbalance.

Portfolio balance approaches assumes that, like all commodities exchange rates to 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 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.

LITERATURE REVIEW

Several studies have been conducted to examine the effect of changes in exchange rate on the stock prices. Aggarwal (1981) was the first to conduct a study to examine the relationship between stock prices and the floating values of dollars. He found that the value of the US dollar and US stock prices were positively correlated for the period of 1974-1978. Jorion (1990) has explored the sensitivity of a firm's value to exchange rate exposure of US multinationals. This study observes such relationship as positive and it is largely related to the degree of foreign operations. The study has used the rates of foreign sales to total sales as a proxy for foreign involvement.

Apte (1997) has examined the exchange rate exposure of stock prices by considering monthly share prices of 143 firms from CMIE corporate database during 1990 to 1997. Considering trade weighted indices of NEER and REER, the study estimated the exchange beta and regressed it with firm-specific characteristics like exports ration and import ratio. The results obtained from REER and NEER indicate that 32 firms out of 143 samples are having significant exchange rate exposure out of which eight are negative and rest report a positive exposure. Thus, it reveals that exchange rate risk is behaving as a systematic risk over and above market risk in case of many Indian companies.

Apte (2001) further investigated the relationship between the volatility of the stock market and that of the nominal exchange rate in India using daily closing stock market indices of BSE-30 and NSE-50 and daily closing USD/INR exchange rates using EGARCH specification proposed by Nelson (1991). The study addressed the question whether the innovations in stock returns have any impact on the volatility in foreign exchange markets and vice versa. The results reveal that the hypothesis of returns innovations in one market support not only the conditional variance in the same market but also in the other market.

Yamini and Kawadia (2002) have examined the relationship between sectoral indices and exchange rates by considering sectoral indices like BSE-IT, BSE-CG, BSE-FMCG, BSE-CD and BSE-HC. Their results show that the impact of SENSEX on exchange rate is positive and significant on various indices, viz BSE-CG, BE-CP and BSE-CP and BSE-HC. FMCG and IT sectors do not seem to have any significant exchange exposure.

Nath and Samanta (2003) have tested whether returns in stock market are interrelated with returns in capital market considering a period form March 1993 to December 2002, using daily NSE-50 index price and daily INR/USD value. The Granger-causality tests conducted to find the relationship between exchange rate and stock [prices with a lag of 5-days suggest that these two markets did not have any causal relationship. If one goes into specific years to see whether the liberalizations in both the markets have brought them together or not, then even no significant causal relationship is observable between exchange rates and stock prices except for the years 1993, 2001 and 2002, during which period unidirectional causal influence from stock index returns to returns in forex market is detected (with corresponding F statistics significant at 5 percent level of significance). Very mild causal influence in reverse direction is also found in some years (1997, 2002).

Nath and Samanta (2003) in another paper examined the extent of integration between foreign exchange and stock markets in India during the liberalization era. Considering NIFTY index and exchange rate of Indian Rupee to Dollar for a period of 10 financial years from April 1993 to March 2003, the study tried t employ two methodologies, Granger's causality in Vector Auto Regression (VAR) context and the Geweke's Feed Back measures. The results show contemporaneous relationship between returns in two markets as very strong (statistically significant at 1 percent level) during four financial, 1998-1999, 1999-00, 2001-02 and 2002-03 and in other years, this relationship as statistically insignificant. The hypothesis of no causal influence of exchange rates and stock prices could be accepted in three years, viz., 1994-95 (10 percent), 1995-96 (1 per cent level) and 1998-99 (10 per cent level). The causal impact in reverse direction is found to be significant in the years 1994-95 (1 percent level), 1996-97(5 percent level) and 2001-02 (1 percent level) and 2002-03 (10 percent level). Thus, the tests reveal the sign of mild-to-strong causal relationship (either contemporaneously or lagged) between returns in foreign exchange and capital markets during some years. However, the Gwewke's feedback measures detect strong causal relationship in each financial year.

Seshiah, Ganesh and Vuyyuri (2003) examined the effect of exchange rates and inflation on stock returns. The entire period of study from 1980-81 to 1999-2000 has been sub-divided into two parts, before and after 1991 to find the effect of liberalizations. Using annual changes in BSE Index, Gold and Silver Returns and inflation rates, the study conducted stepwise linear regression equation. It is found that stock returns and exchange rates during pre-liberalization era have no significant relationship. However, during the post-liberalization period, the degree of dependence of stock returns on exchange rate movements is found significant at 5 percent level. This may be due to huge inflow of foreign portfolio investment into Indian capital markets after liberalizations. This means that exchange rate movements and stock returns volatility are closely related to exchange flows affecting stock returns.

Yamini Karmarkar and Kawadia (2002) have explored the interrelationship between capital market, forex market and bullion market in India. Considering the indices of BSE-Sensex, BSE National and Nifty as the representatives of capital market, the Rupee Dollar exchange rate as indicator of movements in forex market, the study has estimated the response functions. It is observed that there is price integration between stock prices, bullion prices and exchange rates. The growth of stock prices was much more than the growth in bullion prices and exchange rates during the period under study. All these markets are found more stable in the era of economic reforms.

STATIONARY TESTS

Time series data, especially data relating to financial variables exhibit a trend pattern. Therefore, it is necessary to detrend the data so as to apply further test on it. A variable that is being de-trended is said to be stationary series. The two test namely Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are used. When Augmented Dickey Fuller test is taken into consideration we use lagged values of the variable itself whereas Phillip Perron test uses residuals from Dickey Fuller Regression.

AUGMENTED DICKEY FULLER TEST

Consider a simple process given by:

$$Y_t = \alpha_1 Y_{t-1} + U_t \quad .....(1)$$

Where α_1 is a parameter and U_t is assumed to be white noise. Y_t is a stationary series if (-) $1 < \alpha_1 < 1$. If Y_t is a non-stationary series, then variance of Y_t increases steadily with time and goes to infinity. If the absolute value α_1 is greater than one, the series is explosive. Therefore, the hypothesis of a stationary series can be evaluated by testing whether the absolute value of α_1 is strictly less than one. Both the ADF and PP tests take the unit root as the null hypothesis. Since explosive series do not make much economic sense, this null hypothesis is tested against the one-sided alternative.

$$H_0 : \alpha_1 = 1$$
$$H_1 : \alpha_1 < 1$$

The tests for stationarity are carried out by estimating equation (1). The distribution theory supporting the ADF test assumes that the errors are statistically independent and have a constant variance. PP test allows the disturbances to be weekly dependent and heterogeneously distributed. PP value has also been checked for confirmation of stationarity.

GRANGER CAUSALITY TEST

The dynamic linkage is examined using the concept of Granger's Causality Test. Testing causal relationship between two stationary series X_t and Y_t, can be based on the following two equations.

$$Xt = \alpha_0 + \sum_{j=1}^{k} \gamma_j x_{t-j} + \sum_{j=1}^{K} \beta_j y_{t-j} + U_{xt}$$

$$Yt = \alpha_0 + \sum_{j=1}^{k} \gamma_j x_{t-j} + \sum_{j=1}^{K} \beta_j y_{t-j} + U_{yt}$$

Where, k is a suitably chosen positive integer, γ_j and β_j, j = 0, 1, …k are parameters and α's are constants, and U_t's are disturbance terms with zero means and finite variance. The null hypothesis that Y_t does not Granger-cause X_t is not accepted if the β_j's, j>0 in the above first equation are jointly different from zero using a standard joint test. Similarly, X_t Granger causes Y_t, if the γ_j's are j>0, coefficients in the above second equation are jointly different from zero.

CO INTEGRATION TEST

If there exists a relationship between two non-stationary I (1) series, Y and X, such that the residuals of the regression

$$Yt = \beta 0 + \beta 1 Xt + Ut$$

are stationary, then the variables in question are said to be cointegrated. There is a long run relationship towards which they always come back. In other words, if long run relationship exists then errors should be a stationary series and have a zero mean.

SOURCES OF DATA

The study uses daily NIFITY Index and Rupee Dollar Exchange Rate to examine the casual relationship between them. The study used daily data for the period from January 2005 to December 2009.The daily adjusted closing values of Nifity index are downloaded from website of NSE and daily Rupee Dollar exchange rate are downloaded from oanda.com. Following the earlier literature, all data serious had been transformed into natural logarithms.

DATA ANALYSIS

The empirical relationships in the long-run, short-run and causality between Nifty Index and Rupee Dollar Exchange rate has been analyzed by adopting the Johansen likelihood co integration test ,error correction mechanism and granger causality test respectively.

The granger causality test requires that all data serious should be stationary, otherwise inferences from the results be spurious because the F-value will have nonstandard distributions. We have checked stationarity of data with the presence and absence of trend terms. The study applies ADF and PP test and the results of which is shown in table I and II.The results table I and II indicates that both the variable had unit root at level serious and found stationary only at first difference only. Therefore, we can test for long-run relationship between these two study variable at level serious because it was found non-stationary. The VAR model selects a lag length of two based on AIC .The results of Johansen (1991) maximum likelihood method reported in table III. As it can be observed from the results, there is no cointegration vector between the two study variable. Further it indicates that in long-run both the variables are not cointegrated, and hence a vector error correction model should not be applied to test short-term relationship among study variables.

The results of granger casualty test between studies variables are presented in Table-IV.we have experimented with a lag of one day from the consideration that one day would be adequate enough to observe the impact of one market on another under the assumption of efficiency of market in observing these information.

The reported F-values and P-values for the full sample period, supports that there exit unidirectional casual influences from Nifty Index to exchange rate. Results of individual year report both unidirectional as well as bidirectional relationship. Excepting 2009, all the years reported unidirectional from stock index to exchange Rate. The reported results for 2009 indicates bivariate casualty between Stock Index an exchange rate. On account of Global melt down flow of fund from FIIs to emerging market including India had increased substantially, that may be attributed to have bivariate casualty between two variables in recent years.

CONCLUSION

The inter-relationship among financial markets had received substantial attention in financial literature. This paper explores one such aspect of dynamic relationship between exchange rate and stock market in Indian Context. The relationship between two variables had been empirically tested in terms of long-run by cointegration and casual relationship by Granger causality test in Indian scenario. The overall study period as well as individual year results (excepting the year of 2009) reported unidirectional relationship from stock market to exchange rate. While in recent years viz 2009, there exists bivariate causality between both the markets. This support the persistence of the goods market approach (Dornbusch and Fisher, 1980) and the portfolio approach (Frankel, 1993) in India in recent years.

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TABLES

Table I : Unit Root Test (At level)

Variables	ADF		PP	
	Intercept	Trend and intercept	Intercept	Trend and intercept
NF	-1.49(1) 0.13	-1.17 (1) 0.08	-1.43(6) 0.15	-1.62(6) 0.10
EX	-1.27(1) 0.20	-1.43(1) 0.15	-1.26(6) 0.23	-1.41(6) 0.18

NF=Nifty Index and Ex= Rupee Dollar Exchange Rate

Table II : Unit Root Test (At First Difference)

Variables	ADF		PP	
	Intercept	Trend and intercept	Intercept	Trend and intercept
NF	-24.82(1)* 0.000	-24.81(1)* 0.000	-33.0(1)* 0.000	-33.0(1)* 0.000
EX	-24.33(1)* 0.000	-24.32(1) 0.000	-32.78(1) 0.000	-24.32(1) 0.000

Note * denotes 1% significance level

Table III: Co integration Test between Log(NF) and Log (EX)

Period	Eigen value	Null Hypothesis	Trace Statistic	Critical Value	
				at 5%	at 1%
Jan 2005-Dec 2009	0.002186	r = 0	4.8994	15.41	20.04
	0.001774	r = < 1	2.1942	3.76	6.65

Table IV: Results of Granger causality Test

Period	Null Hypothesis	F- Values	P- Values
Jan2005 –Dec 2009	Δ log(ER)≠> Δ log(NF)	1.06121	0.30314
	Δ log(NF)≠> Δ log(ER)	198.436	0.00000*
2005	Δ log(ER)≠> Δ log(NF)	2.52957	0.11301
	Δ log(NF)≠> Δ log(ER)	0.00448	0.94666
2006	Δ log(ER)≠> Δ log(NF)	0.43090	0.51217
	Δ log(NF)≠> Δ log(ER)	37.3333	3.9E-09*
2007	Δ log(ER)≠> Δ log(NF)	1.80492	0.18037
	Δ log(NF)≠> Δ log(ER)	31.5374	5.3E-08*
2008	Δ log(ER)≠> Δ log(NF)	0.48747	0.48573
	Δ log(NF)≠> Δ log(ER)	53.2459	4.2E-12*
2009	Δ log(ER)≠> Δ log(NF)	1951.28	0.00000*
	Δ log(NF)≠> Δ log(ER)	660.265	0.00000*

Note: * 1% level of significance.

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Hoping an appropriate consideration.

With sincere regards

Thanking you profoundly

Academically yours

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