

**Exchange rate spillover effect on Stock Returns: Evidence from Pakistan****Ribbat Khan**

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**Abstract**

*Volatility spillover is measured as the transferal of variability among different financial markets. The objective of this study is to see if there is any effect volatility spillover among exchange rates and stock returns in Pakistan or not. For this purpose the secondary data ranging from April 2010 – April 2020 is collected and analyzed using multivariate dynamic conditional correlation GARCH (DCC-MGARCH) model. It is observed that there is a notable volatility spillover impact between the two. This study can be used by different investing firms and individual investors incorporating the spillover impact in order to hedge and diversify their portfolios. It can also be used by educational institutions for teaching and training purposes. It can also help the policymakers providing recommendations regarding spillover effect between the concerned markets.*

**Key words:** DCC-MGARCH, spillover, exchange rates, stock returns.

**Introduction**

Many factors including economic and business liberalization, exchange rate interaction, international integration and globalization have ignited the interests of researchers to explore the dependency of stock market returns on foreign exchange rates across the World. The major point of focus is that domestic foreign investors tend to build efficient, diversified portfolios and hedging strategies. And this became a base for a giant amount of research done on developing as well as developed economies. Two of the major determinants of economic activities are the stock market and currency market of a country (Oloyin & Abdulhakeem, 2019). One of the key macroeconomic variables of any economy is exchange rate. It is the rate at which different currencies can be interconverted. The abrupt variations in exchange rates can influence imports and exports of a country (Ahmad, Rehman, & Raof, 2010). The competitiveness of industries and value of a firm is also influenced by exchange rate movements and are reflected in stock returns of that country (Hartmann & Pierdzioch, 2007). Industry competition is related to the movements of exchange rates and in turn affects stock returns (Griffin & Stulz, 2001). Many traditional models were constructed to describe the link between changes in exchange rates and performance of stock markets. It is observed that competitiveness of a firm is influenced by varying exchange rates as both earnings of a firm and cost of funds are affected due to the fact that many firms, in order to finance their operations, borrow funds in international currencies (Dornbusch & Fischer, 1980). The interdependence between stock returns and exchange rates have been generated due to increased demand of different foreign currencies and the equity flows. Due to this interrelation between stock market and foreign exchange market, there is an increased spillover effect between the two. (Ghouse, Ashraf & Habeeb, 2021). Engle et al (1990) define “volatility spillover effect” as the causality in variance between different markets. The linkage between exchange rates and the returns of stocks can be studied using two approaches, first, if there is an appreciation in a local currency that would lead to decreased revenue of the firm as exporting goods become unattractive and there is a decreased demand of foreign goods and services (Gavin, 1989). Secondly, Portfolio balance models can be used to study this relationship where the major focus is on capital account transactions. A bullish market would be attractive for foreign investors whereas in case of bearish market investors would tend to sell their stocks in order to move out of that country by converting their money into foreign currency. (Mishra, 2004)

**Literature Review**

To see the impact of exchange rates on stock returns “flow oriented model” can be used (Jebran & Iqbal, 2016). According to this model there is a direct linkage between stock prices and exchange rates. The main idea behind this model is that a country's trade balance determines its exchange rate. According to the model, inputs and real income are affected by exchange rates in a way that it affects competitiveness amongst different countries and trade balances. To explain this phenomenon, depreciation of a country's local currency

is used as an example which shows that depreciation would lead to cheaper exports which is a positive sign for domestic firms as they become more competitive. The greater the number of exports, the greater would be the prices of stock of the domestic firms as exports intensify the firm's domestic wealth (Dornbusch & Fischer, 1980). Not only exports and imports are influenced by uncertainty in exchange rates but also the performance of international portfolios as variations in exchange rates are considered as a non-diversifiable factor (Eun & Resnick, 1988). Previous literature has shown mixed findings. Some countries had significant positive effect of varying exchange rates on stock returns; some had negative impact while some had no impact at all. Yang and Doong (2014) in their research of G-7 countries studied the volatility spillover effect among exchange rates and prices of stocks and it was seen that there was a notable spillover effect among prices of stock and exchange rates but there wasn't any significant spillover impact from the exchange rates to stock returns. It was based on the study of Kanas which generated the same results for six industrial countries i.e. France, Germany, Canada, United States, Japan and United Kingdom (Kanas, 2000). The significant effect of volatility spillover was seen among the exchange rates and returns of stocks in Ghana. To see this impact EGARCH or Exponential Generalized Autoregressive Conditional Heteroscedasticity model was used. The independent variables of this study were exchange rates, Treasury bill rates, inflation, money supply and trade deficit and stock prices were taken as the dependent variable. (Charles et al, 2008). Additionally a significant effect of exchange rate volatility was examined on the sector indexes of Japanese stock market by using a bivariate GJR- GARCH model (Jayasinghe and Tsui, 2008). Ahmad et al (2010) in their research have shown a positive influence of changes in exchange rates on stock returns in Pakistan stating if there is an increase in exchange rates it would lead to higher stock returns. Moreover a strong negative impact of exchange rates was seen on stock returns of Turkish banks (Kasman et al, 2011).

### Data And Methodology

For the purpose of examining volatility spillover effect among exchange rates and stock returns in Pakistani market, we have selected daily data for the last 10 years i.e. covering from April 2010 to April 2020 because 2010-2020 has been seen as the lost decade as Pakistan has seen an economic slowdown according to an online blog that is based on financial information of the country based on authentic sources. Daily data captures more information in comparison with weekly and monthly data that's why it has been used for this research study. We have collected the data for stock returns from Business recorder in local currency i.e. Pakistani Rupee while exchange rate data was taken from CEIC i.e. in terms of US dollar. In order to see the daily volatility spillover effect the daily evidence of data of both stock returns and exchange rates needs to be compared as there are some missing values in the data and for that purpose interpolation method is used. This data is considered as closing rates of both foreign exchange rates and returns on stock for neglecting the time mismatch and to capture the transmission of volatility on daily basis. Moreover, to observe the volatility spillover of Pakistani market we used Pakistan stock exchange (PSX) as the proxy for stock market of Pakistan and the national currency of Pakistani Rupee (Pkr). Additionally, this study uses Dynamic Conditional Correlation Multivariate Generalized Autoregressive Conditional Heteroskedasticity (DCC MGARCH) model introduced by Engle (2002) which basically is obtained by merging linear univariate GARCH model in order to explore volatility spillover. This model captures both asymmetric (negative) and symmetric (positive) shocks as negative shocks are more likely to create greater volatility and simple GARCH model only captures the symmetric shocks. It combines the features of other GARCH model in order to get the volatility effect in a very parsimonious way (Seth & Singhania, 2019). Likewise, if someone wants to obtain the changes occurring in time-varying correlations which are conditional the DCC MGARCH model is used. Additionally, If DCC is compared with simple multivariate GARCH model, this DCC model is found out to be the best and the most accurate one (Engle, 2002). Moreover, a two-step process is needed for the evaluation of DCC model and this method has reduced difficulty in the evaluation. That means, the first step is to use univariate GARCH model for calculating conditional variances of each of the variable. The following step is estimating the parameters for conditional correlation.

**Results And Interpretation:****Table1: Descriptive Statistics**

Variable	Obs	Mean	Std. Dev	Min	Max
Stockreturns	2481	.0000759	.0225465	-1	.0451768
Exchangerates	2481	107.0052	19.8933	83.55	168

Obs=Observations; Std.Dev= Standard deviation

Table 1 tells the Descriptive Statistics of both of the variables i.e. stock returns in Pakistan and foreign exchange rates. Total number of observations of both stock returns and also the exchange rates are 2481. Mean value is .0000759 and 107.0052 for stock returns and exchange rates respectively. Standard deviation of stock returns is .0225465 while exchange rates have the standard deviation of 19.8933. The minimum and maximum values of stock returns are -1 and .0451768 respectively while exchange rates have minimum and maximum values of 83.55 and 168 respectively.

*Table 2: Dynamic Conditional Correlation MGARCH Model*

	Coef.	Std. Err	z	p>[z]	[95% Conf.	Interval]
Stockreturns						
Exchangerates	-.0000843	.0000227	-3.71	0.000	-.0001287	-.0000398
_cons	.0090935	.00024697	3.68	0.000	.0042531	.0139339
ARCH_stockreturns						
_cons	.0005053	.0000143	35.22	0.000	.0004772	.0005335

Coef=Coefficient; Std.Err=Standard Error

The Results Indicate That There Is A Noticeable Volatility Spillover Effect Of Exchange Rates On Stock Returns Of Pakistan As The P-value Is Lesser Than 0.05. The Result Shows The High Significance (p-value = 0.000). The Arch And Garch Both Came Out To Be Significant. The Results Are In Accordance With Similar Studies Conducted In Different Countries Referred In Literature Review Section. Moreover Table 2 Makes It Obvious That There Is A Significant Arch And Garch Effect Without Any Exceptions Showing That Conditional Correlation Exists Among Stock Returns And Exchange Rates. Therefore It Can Be Deducted That There Is A Significant Presence Of Volatility Spillover Between Exchange Rates And Stock Returns In Pakistan Telling If One Market Experiences An Increase Or Decrease, The Other Would Also Experience An Increase Or Decrease.

**Conclusion**

This study investigates the interdependence of exchange rates and returns on stocks of Pakistani market using the daily data ranging from April, 2010 – April, 2020. This study employed multivariate dynamic conditional correlation GARCH model This study shows a significant volatility spillover impact among exchange rates and stock returns of Pakistan recommending that volatility of exchange rates can influence the performance of a company or an industry. Thus, even in the times of financial crisis, Pakistani stock market can be stabilized if the exchange rates are appropriately managed. The main finding of the study suggests that if there is an increase or decrease in one market then it gives rise to the increase or decrease in other market as well due to the significant interaction between both.

**Implication**

This study can be made useful in hedging, international trading strategies, portfolio diversification and financial regulations. Investors can use this study in order to hedge and manage their portfolios actively. Moreover Industrials and different companies should consider the influence of exchange rate variations on the stock returns because there is a significant impact. Furthermore it is believed by some of the emerging countries that economic development is also dependent on exchange rates and if managed properly can be widely beneficial. This study can also be beneficial in providing recommendations in policy making concerning these markets. State bank of Pakistan can also consider the results generated by this study for altering the policy concerning exchange rates as the impact of currency evaluation and devaluation on stock markets can be indicated by this result. As a result an affective policy can be made for minimizing the disadvantageous spillover effects by stabilizing the volatilities in both markets leading to increased portfolio investments as well as foreign direct investments.

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