

The Impact of Exchange Rate Volatility on Stock Index: Evidence from Pakistan Stock Exchange (PSX)

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Abstract

The exchange rate Volatility is considered to be the most important and persuasive variable that affects the performance of stock index. The stock market plays an imperative role in the growth and development of a country. This study mainly aimed at to empirically examines the Impact of Exchange Rate Volatility on Pakistan Stock Index (PSX). The correlational research design is used in order to demonstrate cause and effect relationship between the variable under studied. The nature of this study was explanatory. Macroeconomics variables have the problem of stationary, autocorrelation and heteroskedasticity, diagnostic test is paramount important while applying regression in order to reach meaningful results so it was necessary to fulfill the assumptions of regression. Augmented Dickey-Fuller test statistic is employed. Two financial variables have been studied where Exchange rate Volatility is used as an independent variable whereas stock index is worked out as dependent variable. Twelve years monthly data from secondary sources, starts from 31st of January, 2003- 31st December, 2015 have analyzed. The study results found that there is positive and statistically significant relationship between Exchange Rate Volatility on Stock Index of Pakistan. Based upon key findings, this study particularly postulates that countries like Pakistan which has an emerging economy the macroeconomics variables i.e. exchange rate Volatility and stock index of Pakistan are associated, thus the public who desire to invest must utilize the information of important macro-economic variable in particular exchange rates volatility in order to predict the behaviour of stock market index.

Key words

Exchange rate volatility, Stock Index, Pakistan, augmented Dickey-Fuller test statistic

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1. Introduction

Exchange rate refers to the currency rate of one country in terms of currency of another country. It can be interpreted in a slightly different standpoint, it is a price. Stocks market movements have deep effects on the nation economy as well as everyday life of people. A downfall in the price of a share more likely has the considerable potential to cause the prevalent economic melt –down. According to Zafar *et al.* (2008) The term Volatility may be defined the deviation in the stock prices varies throughout the time.in stock returns refers to deviation in stock prices varies throughout a time. Currency exchange has been defined by many researchers in past studies. According to Abbas (2010) currency exchange can be defined as the rate of exchange among the currencies of two countries. A stock index or stock market index is a measurement of the value of a section of the stock market. It is computed from the prices of selected stocks (typically a weighted average). It is a tool used by investors and financial managers to describe the

market, and to compare the return on specific investments (Assaf, 2014). It is often argued that a valuable coordination exists among exchange rates and stock index. Specifically in context of large cross border mobility of fund and investments. Two theories are supported in this context that the potentially significant relationship exists among exchange rates and stock index. These approaches are traditional and portfolio approach. These theories have been debated from long period of time, but still different of opinion exists among the researchers. Traditional approach stated that when domestic currency depreciates it facilitates domestic firms so those firms will become more competent as a result their exports will increase which ultimately results to increase in their stock price. So it can be concluded from the preceding theory that increase in exchange rates leads to increase in stock index. Branson (1983) describes portfolio approach which states that positive change in stock index motivates investors to invest more in domestic assets and it will result to increase in the domestic currency. He also proposes that exchange rate is led by stock index while these two variables correlated negatively. He also suggested „stock-oriented“ model of exchange rates, that exchange rate serves to create equilibrium between supply and demand for assets such as stocks and bonds. Franck and Young (1972) was the first study that examined the relationship between stock prices and exchange rates. They use six different exchange rates and found no relationship between these two financial variables.

Initially the share price of a company shows the overall growth and stability of a company. If a firm's share price is continually increasing for a long period of time, it is signal that the firm and its management are doing their best. Furthermore when a company's share prices increases, it is a positive sign for corporations as well as for management teams. Because if share price increases will reduce risk of downsizing. On the other hand if the management of a company is unable to generate return from the investment then they will be confronted to risk of termination. While board of directors which is elected by shareholders, is solely responsible to implement and manage the entire process of downsizing or recruiting. If share prices are stagnant, management will be at the risk of termination. „Management's Benefit“ is another reason for a company to keep the stock price up as much as possible. Many companies offer compensation or benefits with stock option, which allows a manager of a company to buy the company's share at a set price. This price of the share is mostly set on the basis of immediate previous price. Issuance of stock options to managers is considered a good way to align the interests of the executives and the shareholders, because they are interested for rise in share prices over time. The price of the security must rise for the option to gain in value and increase the benefit for the manager. Another important reason for which a company is paying attention to counting its prices is the prevention of a takeover. The company becomes relatively inexpensive when the share price of a company falls and the likelihood of a takeover increases. When every individual member of management team tries to protect him or her from dismissal then he or she will exert high level of efforts to keep the share price

More interestingly, In order to explore any possible bond or combination among the exchange rate and stock indexes, various analysts utilized many aspects. Booth, (1997) and Chan, (2003) highlighted the couples of critical economy's components which can affect market, such as foreign exchange reserves and premium rate, and exchange rates, and cash supply. Brown (1990) and Mukherjee (1995) used unique aspects (inflation, cash supply, cash rates, and government securities) in order to accomplish, the linkage if any sort of exists, between exchange rates and macroeconomic variables.

Exchange rates and stock indexes have great impact on economy of any country and decisions of Investors/economists, these two variables facilitate them to forecast future prices and (Kim, 2003). Movements of exchange rate has great influence on effectiveness of International firms either they import or export (Joseph, 2002). Exchange rates also fluctuates over a period of time likewise movements in stock indexes. According to the study of Kurjhara (2006), the factors such as exchange rate, rate of interest, GDP of a country, level of employment, and companies business listed on stock market, policies of state bank have significant impact on stock market to fluctuate, index is prepared on the basis of those prices.

Economy of growing countries is considered much unstable than the economy of developed markets, and risk and return theory describes that foreign investors can generate more returns in developing countries as compared to developed countries. Many investors expand their investment more toward growing economies in order to reduce risk. The regularity authority can play active part to stabilize the stock market when it is come to know that stock indexes are affecting exchange rates. Investors can forecast about one market by using information about the relationship among two financial markets. If we

consider the impact of exchange rates on Pakistan's economy and KSE index or relationship among two, due to increase in exchange rates importer will get positive impact and negative effect on exporter. When domestic currency gets stronger importer get advantage and they can better compete in international and domestic markets which results in their profitability (Yau and Nieh, 2006). The relationship between (ER) and (SI) has been studied widely for last three decades. However results are diversified between the relationships of two variables. In this study two currencies USD and PKR has been studied to examine their relationship in KSE 100 index. This Study is focusing on the relationship of exchange rates and stock index of KSE 100 index currently known as Pakistan Stock Exchange

It is important for policy makers, and the investment community to realize the relationship between exchange rates and stock index, because this changing worldwide environment. In order to manage risk effectively, association between exchange rates and stock index plays a vital role for the management, because currency (mutual funds, hedge funds and other professionally managed portfolios), is placed as an asset in the portfolio due to little or less barriers of capital flow in the global economy, on the other hand need to understand relationship between exchange rates & Stock indexes has been increased to reduce the portfolio risk.

1.1. Problem statement

Stocks market movements have deep effects on the nation economy as well as everyday life of people. A downfall in the price of a share more likely has the considerable potential to cause the prevalent economic melt –down (Assaf, 2014; Adjasi, 2008). According to Zafar *et al.* (2008) The term Volatility may be defined the deviation in the stock prices varies throughout the time. in stock returns refers to deviation in stock prices varies throughout a time. On daily basis Pakistan stock indices fall and rise and there is sometimes upward and downward propensity. These trends are subjects to change. This study typically focuses on the Impact of Exchange Rate Volatility on Stock Index in case of Pakistan Stock Exchange. Although, many studies done, on this topic in developed countries of the world but little evidence have found as far as developed countries are concerned. So there is a need to fill this crevice by studying the impact of Impact of Exchange Rate Volatility on Stock Index in case of Pakistan Stock Exchange.

1.2. Research questions

Following questions will be answered in the research.

1. *Is there any relationship between Exchange Rate Volatility and on Stock Index of Pakistan?*
2. *What is the impact of Exchange Rate Volatility on Stock Index of Pakistan?*

1.3. Objectives of the study

The objectives of the study are as follows;

1. *To empirically scrutinize the relationship between Exchange Rate Volatility and Stock Index of Pakistan?*
2. *To probe the impact of Exchange Rate Volatility on Stock Index of Pakistan?*

1.4. Significance of study

The movement in exchange rate has impact on daily human life. Firm's decisions directly or indirectly influenced by the movements in exchange rates either in domestic or global environments. So, presence in global market without studying the movement of ER is not an easy task.

1. *Understanding the possible relationship between exchange rates and stock index will facilitate the national as well as international organizations to manage their foreign exchange exposure.*
2. *This information is useful for portfolio investors to hedge or forecast their returns from foreign investments.*
3. *Regulatory authorities can take proactive steps to protect financial markets from disasters.*

2. Literature review

This section enlightens on studying Exchange Rate Volatility and on Stock Index of Pakistan. According to Abbas (2010) currency exchange can be defined as the rate of exchange among the currencies of two countries. A stock index or stock market index is a measurement of the value of a section of the stock market. It is computed from the prices of selected stocks (typically a weighted average). It is a tool used by investors and financial managers to describe the market, and to compare the return on specific investments (Assaf, 2014).

Aggarwal (1981) explored the relationship between changes in the dollar exchange rates and change in indices of stock prices. He uses monthly U.S. stock price data and the effective exchange rate for the period 1974-1978. His results, which were based on simple regressions, showed that stock prices and the value of the U.S. dollar is positively related and this relationship is stronger in the short run than in the long run. Two types of models basically present the relationship between exchange rates and stock index of a stock market (Dornbusch and Fischer, 1980). The flow-oriented exchange rate model, states the movement in the exchange rates effect stock market. Branson & Frankel (1983) suggest second model known as stock oriented exchange rate model. This model reveals that appreciation in stock market captured the attention of foreign investors in stock market. When they acquire local currency then demand for the local currency increases which results in appreciation in the value of local currency.

In addition to this, every day we hear about variations in the stock indexes in the news. This is often reported in the news that stock index are fall or rises due to instable of political and economic conditions. So, a major portion of research in finance has been conducted to explore the key elements of stock index. But it is not easy to measure political occurrences or changes, and most of previous studies have focused on the variables such as financial and economic for which data is available from any secondary source. Stock market is reflection of country's economy. From last few decades the importance of stock market over the world wide has created a Gap for research in economic growth and stock market development. It is found that production of industry, rate of interest, consumer index price, and level of inflation, along with exchange rate, and stock indexes are determined on the basis of macro-economic factors. Investors' community usually believes that stock market prices are influenced by economic events. Hence it is find out that macro-economic factors have impact on investor's decision toward investment, and encourage many researchers to find out the relationship among stock indexes and macro-economic variable exchange rate impact on stock index, the findings of the majority of studies conducted in developed markets have not been tested in regions such as Pakistan. We conjecture that the studies conducted in developed markets may not necessarily have any application in the context of Pakistan because; the financial markets in Asian countries unlike developed markets are characterized by weak corporate governance/control and inadequate disclosure. As a result research on relationship among exchange rates and stock index has become inspiring and motivating.

Karachi stock exchange knows is the part of Pakistan stock exchange, is largest stock market of Pakistan, it was firstly established in 1947, month of September in province of Sindh, and was listed in month of March, 1949. Currently KSE is second major market deals in stock in South Asia. Startup was taken with only 5 companies having Rs37 million paid up capital. While during December 2009, 654 home as well as foreign companies get registered in KSE with U.S \$30 billion market capitalization. Trade startup was taken with 50index, while it was boost up to 100index during 1991. Now days 100index is considered and widely accepted indicator of market performance (Zaheer, 2010). Exchange rates can be explained most simply as "price of nation's currency in term of another currency. Exchange rates can be influenced by stock prices in number of ways. It is also examined that firms having foreign operations like foreign investments, export sales or used import products have direct influence by movements of exchange rates (Zaheer, 2010).

A stock index or stock market index is a measurement of the value of a section of the stock market. It is computed from the prices of selected stocks (typically a weighted average). It is a tool used by investors and financial managers to describe the market, and to compare the return on specific investments (Assaf, 2014). Financial hypothesis proposes that premium rates, supply of cash, expansion, values level, and different models are vital variables in comprehension the conduct of stock costs and anticipating the patterns and developments in return rates. Customary monetary models resist adjustments in return rates can influence balance sheet. Economic theory assumed that possibility of relationship may exist concerning stock index and rate of exchange. Dornbusch and Fisher (1980) projected the flow oriented exchange

model, which identifies those variations in rate of exchange cause variations in stock index. He argues that on the basis of capital mobility interaction concerning stock markets and exchange rates can be described. Furthermore he also describes that fall in stock index results to diminish rate of exchange. Ultimately it results to fell down the wealth of national investors, because of decrease in demand for their money, and also decreases the price of money (i.e. rates of interest). Finally reduction in rate of interest causes to the capital outflow. When international stockholders pull out their capital from host country, it has dramatic impact on currency of host country (i.e. currency will be devaluated). This study was supported by study of (Boyer, 1977). The relationship between (ER) and (SI) has been studied widely for last three decades. However results are diversified between the relationships of two variables both in developed and under devolving countries.

Furthermore, Masson and Branson (1977), Ghartey (1998), Meese and Rogoff (1983), and Wolff (1988) firm through its intensity as communicated in outside cash and at last, benefits and have discovered that there is a possibility of relationship between macro-economic variables and trade charges. Moreover, those companies which operate or work across the geographical borders of the country confront three distinctive types of exposures, to be specific: operating exposure, transaction exposure, and translation exposure. Operating exposure emerges once global exchanges designated in an outside money are finalized in this manner bringing about additions and sufferers; transaction exposure (additionally called bookkeeping exposure) the result of translating foreign currency denominated financial transaction into consolidated financial statements often expressed in the parent country's currency; Firms faces exposure of economy or operating exposure when exchange rates changes. There are fundamentally two hypotheses that connect ER and SP: The traditional approach contends that decrease in currency will bring about higher exports and accordingly business benefits bringing about upper stock charges in the short run.

The transmission component as indicated by this methodology is the intensity of the association's fares, bringing about variations in the estimation of the company's benefits and obligations coming full circle in greater benefits and mirroring its stock index. This finding is credited to Solnick (1987). He contended that when currency increases it is not considered a good signal for local organization, in light of the fact that it will diminish its aggressive capacity to exports; on the other hand a genuine depreciation improves its capacity to fare in the short run. Another hypothetical justification in possible interaction among stock index and trade rates is the portfolio alteration approach. As per this hypothesis, portfolio adjustment [foreign capital inflow and outflows] happen at whatever point there is an adjustment in the stock costs. In the event that stock index is on expanding, they will draw in more outside capital. In any case, a decrease in the stock index will bring about decline in corporate wealth prompting the diminishment in the nation's riches. This may prompt a fall in the interest for cash and money related powers diminish the premium rates to lighten this circumstance. At the point when rates of interest are lower (moderately talking), capital may stream out of the nation to exploit higher rates of interest in other piece of the world bringing about money devaluation. Thusly, as indicated by this hypothesis, lower stock index may prompt coin devaluation. In looking at the relationship between stock index and trade rates, we are faced with the inquiry in regards to whether changes in the stock index influence trade rates or the other way around. A granger (1969) causality test is utilized to approach this inquiry. This model is truly straightforward and being utilized widely as a part of connected monetary examination. Moreover, we sort utilization of unit roots and integration tests to build up or discredit the interaction or association between the rate of exchange and stock index in the context of long run long-run.

When we consider relationship of rates of exchange and stock index in term of Granger Causality, we can say that unidirectional causality is caused in stock index when exchange rates changes. Granger Causality model is founded on the basis that synchronization exists in the literature, that stock prices reflects the current worth of a Firm's future cash flows, hence its represents that condition which results the Firm's money movement which is displayed in the stock price of the firm when market is well-organized as proposed by the efficient market hypothesis.

The previous studies reflect different results which can be categorized into four major branches. Most of the previous researches found unidirectional causality between exchange rates and stock index or vice versa. Other studies found two-way bi-directional causality, or failed to investigate any results among these two variables. The first era of researchers found unidirectional causality among exchange rates to stock index. Frank and Young (1972) were the first, who examined the association of stock index with

exchange rates. On the basis of six different exchange rates they found that no relation exists among exchange rates and stock index. Thus they advised asset approach and discourage both traditional as well as portfolio approach.

Apart from this, Studying the relation between US stock market indexes and a trade-weighted value of the dollar for the period of 1974-78, Aggarwal (1981) found that the stock index and exchange rates are positively correlated. A change in exchange rate cause change in stock prices of Global firms directly and indirectly the stock prices of domestic firms and found that even this relationship is more stronger in short run as compare to the long run. He examined that change in the exchange rates fluctuates the balance sheet of the multinational firms by changing their asset in liabilities denominated in foreign currency, which results in reducing the value of their equity by a proportion change in exchange rates. His findings, to some extent supported by the Economy theory which was introduced by Richard Cantillon between first three decades of 1700s. Soenen and Hanniger (1988) used monthly data on stock index and exchange rates for the period 1980-1986. They found a strong negative relationship between stock prices and vale of U.S dollar exchange rates. Furthermore when they studied the above relationship for different time frame they, they found a statistical significant negative impact of revaluation on stock index. Jorion (1990) studied the relationship between US dollar exchange rates and stock prices of US companies which are working globally. He took the data for the time period of 1971-87. His result demonstrates moderate relationship between US dollar exchange rates and stock prices of US multinational companies.

To that respect, Bahmani-Oskooee and Sohrabian (1992) were the first to test granger causality and cointegration to explain the way of mutual relationship between exchange rate and stock index. Monthly data was employed for the period of 1973-1988 on the S&P 500 index and US dollar exchange rates and showed bi-directional causalities, at least in short run. Hence many other researchers applied these econometric procedures in different countries and showed mixed and diverse results. Rittenberg (1993) used the Granger causality tests to find out the relationship between exchange rate changes and price level changes in Turkey. However causality tests are sensitive to lag selection, thus he used three different specific methods for optimal lag selection [i.e., an arbitrarily selected, Hsiao method (1979), and the SMAR or subset model auto regression method of Kunst and Marin (1989)]. In all methods he finds out that causality runs from stock market to exchange rates but he found no feedback that causality runs from exchange rates to stock market.

Ratner (1993) employed cointegration technique to find out the nature of relationship between U.S stock prices and U.S Dollar exchange rate. He concluded that these two financial markets have no relationship because he could not reject the null hypothesis of no cointegration. Hence he supported asset approach. Moreover, Bartov and Bodnor (1994) concluded that a contemporaneous change in the Dollar has little power in explaining abnormal stock returns. They also, found that a little change in the dollar is negatively related with stock run. Regression analysis result shows that change in dollar price has explanatory power with respect to errors in analyst's forecasts of quarterly earnings.

Furthermore, Scacciavillani (1996) found that when items that are exchanged globally, an adjustment in any exchange rates will come about an adjustment in the costs of those wares.

In Addition To This, Ajayi and Mougoue (1996) find out significant relationship in eight industrial economies during the time period of 1985-91. More visibly they disclose a negative short-run and positive long-run effect of increase in domestic stock prices on domestic currency value. Since, currency reduction affects the stock market in a negative way in the short-run. Yu (1997) studied the relationship between exchange rates and stock index from the financial markets of Hong Kong, Tokyo, and Singapore over the period from January 3, 1983 to June 15, 1994. Employing granger causality test his results shows that movement or change in stock prices leads to change in exchange rates in Tokyo and Hong Kong markets. However no such relationship was found in the market of Singapore. When he employed reverse causality from stock prices to exchange rates his results shows such causation in only Tokyo market. Hence there is a bi-directional relationship between these financial variables for Tokyo market. To find out the long run stable relationship among these financial variables in the above Asian markets he also used vector autoregressive model. He finds out strong relationship between exchange rates and stock prices for all three markets.

Besides, Abdalla and Murinde (1997) employed cointegration approach to study long run relationship between stock index and exchange rates for Pakistan, Korea, India and Philippines. They use month data

from January 1985 to July 1994. They concluded that no long run relationship exists for Pakistan and Korea but they find out long run relationship for India and Philippines. To this addition, Clive W.J Granger, (1998) focused on causality among exchange rates and stock prices. For this purpose he used granger causality and Impulse response function methods. He chose financial market of nine Asian countries Indonesia, Singapore, Hong Kong, Philippines, Malaysia, South Korea, Japan, Thailand and Taiwan. He uses daily data for the period January 3, 1986 to November 14, 1997. He found that an exchange rate leads stock prices with positive correlation for Japan and Thailand. Results from Taiwan shows that stock prices lead exchange rates with negative correlation. Singapore market shows no relationship between the financial variables whereas bi-directional causality was found for rest of countries.

Muhammad, (1997) Found a correlation among stock prices and macroeconomic variables i.e. exchange rate. Their results revealed that exchange rates have got a positive correlation with stock returns.

What is more, Bwo-Nung Huang, (1998) carried out study in order to examine the causality among exchange rates and stock prices. For this purpose he used granger causality and Impulse response function methods. He chose financial market of nine Asian countries Indonesia, Singapore, Hong Kong, Philippines, Malaysia, South Korea, Japan, Thailand and Taiwan. He uses daily data for the period January 3, 1986 to November 14, 1997. He found that an exchange rate leads stock prices with positive correlation for Japan and Thailand. Results from Taiwan shows that stock prices lead exchange rates with negative correlation. Singapore market shows no relationship between the financial variables whereas bi-directional causality was found for rest of countries.

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The study led by Ong and Izan (1999) demonstrates that there is a weak relationship between trade rates and stock costs in Australia and the Group of Seven nations. They used nonlinear least square method to understand the relationship among stock prices and exchange rates. They finally concluded that when the currency of one country diminishes it will result in increased its share market, while increase in currency will have negative effect.

Pan *et al.* (2000) found that in seven Asian countries exchange rates had significant effect on stock prices. He took data for the period of 1988-1998. His results show that relationship among exchange rates and stock prices become much stronger after the financial crises in 1997 which correlate with the results of (Granger *et al.* 2000).

Likewise, Maysamhi-Koh (2000), conducted research to find out the relationship between three financial variables exchange rates, interest rates and stock prices. His study finds out that there is relationship exists among these financial variables. By employing cointegration techniques Amare and Mohsin (2000) tested the relationship of stock indices with changes in exchange rates in nine Asian markets. Using monthly data, they found that in period of 1980 to 1998, stock prices of only Singapore and Philippine were positively related to exchange rates. They also included interest rate as a variable in their equation and find out that cointegration exists among these three variables in six of nine countries. Some studies also conducted for industry level ignoring the whole economy. According to the findings of Chamberlain *et al.* (1997) stock prices are very sensitive to the exchange rates in the US market, whereas Japanese market does not shows such sensitivity. The results of Griffin and Stulz (2001), reveals that weekly change in exchange rates had a very little impact on stock indices of industry in developing countries. Results from the study of Rim and Mohidin (2002), shows that industry indices had long-run positive relationship to exchange rates. Results also indicate that exchange rates had long run positive relationship to most indices whereas short run relationship proved negative relationship in both directions. For this purpose the used data before and during the Asian financial crises. Muhammad and Rasheed (2003) conducted study in order to examine the relationship between exchange rates and stock prices by using monthly data for the four Asian markets. Time period for the study was taken from 1994-2000. Their result demonstrates that there is no short run or long run relationship between exchange rates and stock prices in

the financial markets of Pakistan and India. While there is a bidirectional relationship between exchange rates and stock prices in the financial markets of Bangladesh and Srilanka.

Mishra (2004) focused on possible interaction, linkage between exchange rates and stock prices in India. His result demonstrates unidirectional causality between the two financial variables. The performance of variance decomposition analysis shows that return in exchange rates influence demand for money, and due to change in exchange rates stock prices also changes. He also finds out that exchange rate return influence the stock return. Phylaktis and Ravazzollo (2005) focused on the dynamic relationship between stock costs and trade rates in the pacific nations. This study found that stock and outside trade markets are absolutely related and that the US securities exchange acted as a course for these connections. Moreover, these connections were not brought on by remote trade confinements. The recursive appraisals gave proof that the monetary emergency had a temporary effect on the long run co-development of these businesses.

Srivastava A. (2005) conducted study to examine the relationship between two financial variables exchange rate and stock prices in India. For this purpose they considered daily closing prices of stock and daily exchange rates. After that he took natural logarithm of both prices. He studied simple correlation and granger causality test. Correlation results demonstrate week negative relationship between exchange rates and stock prices; whereas granger causality test shows that there is cause and effect relationship between two financial variables.

Tabak (2006) demonstrated that a stock costs lead trade rates with a negative relationship. Mansor and Dinniah (2009) conducted the research in order to study the dynamic co-movement between stock prices of six Asian countries of Malaysia, Thailand, Korea, Hong Kong, Australia and Japan, and macroeconomic variables. Statistics for the Return Series, Unit Root Tests, Engle-Granger Co integration Test, granger co integration Test, Multivariate Johansen Co integration Test, Estimates of the (ECM) – Multivariate are used to find out the results. The result reveals that the relationship among the variables that are exists in only four countries i.e. Korea, Japan Australia Hong Kong and the short run relationship exist between all countries but not in Thailand and Hong Kong.

Nshom (2007) explored the association of exchange rate and stock returns by applying linear regression on 18 performing stocks of London Stock Exchange. He found that significant exposure of stock returns and movement in exchange rates exists for the samples companies included in FTSE 100 index.

Emrah Ozbay (2009) studied the causal relationship between exchange rates and stock return. Granger causality test is used to find out this relationship. He used monthly data from 1998 to 2008 from Turkey. He also applied unit root test for time series date. The result indicates that exchange rate have no impact on the movement of stock prices in Turkey.

Hua Zhao (2009) conducted study in order to examine the dynamic relationship between exchange rates and stock prices in China by using monthly data from January 1991 to June 2009. His result shows that there is no stable relationship among variables in long run. He used Vector auto regression and multivariate generalized autoregressive conditional heteroskedasticity (MGARCH) models to recognize the magnitude but no mean magnitude calculated among variables.

Mohammad and Hussain (2009) explore the relationship between macroeconomic variables and Karachi stock market (KSE) prices. Period for the study was quarterly data from 1986 to 2008. They used asset valuation model, unit root tests for this purpose. The result of Auto Regression and Moving Average shows that past information of macroeconomic factors has effect on the stock prices. They concluded that exchange rate highly affected the stock prices Kutty Gopalan (2010) examined the relationship between exchange rates and stock index in Mexico. He concludes that stock index leads exchange rates in short run whereas no long run relationship was found in long run between these two variables. His result matched with the study of (Oskooee and Sohrabian, 1992).

Zaheer (2010) investigates the dynamics of exchange rates and stock prices in emerging Asian economies. His result leads us toward the short run and long run relationship between exchange rate and stock prices. He used Granger Causality test to find out the short run relationship and Johansen Cointegration technique was applied to find out to find out the long run relationship. Time period for the study ranges from July 1997 to October 2009. He concluded that causality runs from stock market to exchange rates in Sri Lanka Pakistan while from exchange rate to the stock indices in case of India; however bidirectional relationship exists between these two financial variables in case of Indonesia and Korea.

Hence Pakistan and Sri Lanka help the transference channel of portfolio balance approach in short run, while financial market of India helps the transmission of traditional approach in the direction of relationship between capital and currency markets. However, in case of Indonesia and Korea, feedback relationship has been measure among stock prices and exchange rates. This feedback relationship is consistent with findings of (Ajayi and Mougoue, 1996).

Singh and Mehta (2011) conduct research to examine the relationship between Taiwan stock market price and macroeconomic factors. Their study aimed to find the casual relationship between stock market index and macroeconomic factors. For their study they considered macroeconomic factors which include money supply, inflation, GDP, exchange rate and employment rate. Leaner regression was used. Result shows that GDP and exchange rate effect on all portfolio returns but not small company's portfolio. Khalid and Altaf (2011) explore the long run relationship of macro-economic variables and stock runs in Karachi stock exchange. Their study includes monthly data of stock prices from Karachi stock exchange (KSE 100 index) for the period of ten years January 2000 to December 2010. They applied different techniques to investigate the long run relationship among variables. Correlation results did not display any significant relationship among the variables. The results from co-integration test also did not show any long run relationship among variables and Karachi stock exchange stock share. In the case when exchange rate of any currency increases it negatively affect the local markets because it diminishes the benefit of export for that particular country (Yucel and Kurt, 2003). Inversely when exchange rates of a country increases and country are import oriented it will have positive impact on country economy, stock market (Adjasi *et al.*, 2008).

KalimUllah and Syed Zulfiqar Ali (2014) empirically investigate the relationship between exchange rate and stock index in Pakistan. Time period for the study was 1997-2013. They used granger causality test to explore the relationship. Their study reveals that bidirectional relationship exists between exchange rates and stock index. It is also suggested that both exchange rates and stock prices move in the same direction and result also support the long run relationship among variables. Hence bidirectional causality among variables proves that there is a flow of information among the two markets and they are consistent and related to each other.

In summing up, Stock indices of Pakistan stock exchange rise and falls on daily basis, there is not upward trend in the indexes sometimes indexes also shows downward trends. More simply it can be summarized that changing in the stock indexes of Pakistan stock exchange is a regular phenomenon. So according to the traditional and portfolio approach discussed in the literature, exchange rates are one of the factors from macro-economic variables which affect the stock indexes of any stock market.

2.1. Theoretical framework

The diagram of theoretical framework is as follows:

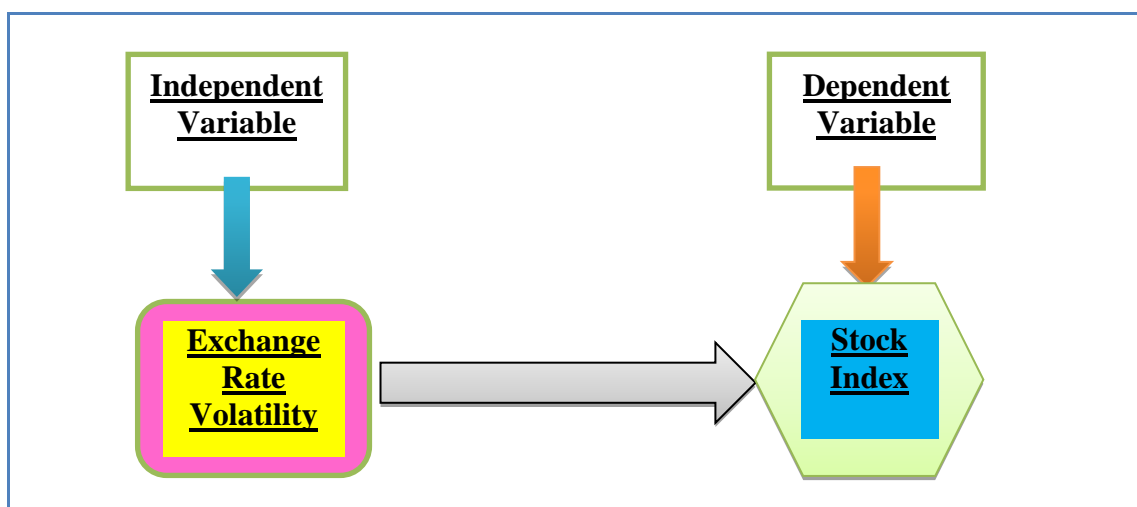


Figure 1. The Impact of Exchange Rate Volatility on Stock Index: Evidence from Pakistan Stock Exchange

2.2. Hypotheses

From the above literature following hypothesis are developed:-

H0: There is no relationship between exchange rates and stock index.

H1: There is a relationship between exchange rates and stock index.

2.3. Literature gap

In general, still there is no consensus on literature of exchange rate impact on stock index. We therefore argue that contradiction on this issue suggests that new approaches and empirical testing to this debate are required. In this study, we examine the relationship of exchange rates and stock index and in Pakistani stock market perspective. Thus, this study will focus on same effect in context of Pakistani stock market, explaining that fluctuation in Pakistan stock exchange indices or prices is either due to change in the exchange rates.

3. Methodology of research

3.1. Data description

This study aimed to investigate the possibility of relationship between the two financial variables ER and Stock index in Karachi stock exchange. For this purposes study uses ten year monthly data which starts from 31st January, 2003 to 31st December, 2015. This study use the monthly data of variable stock market and foreign exchange rates particularly use the two types of proxies for above variables. One of the index values of stock market of Pakistan and rupee per dollar rate can be the proxy for foreign exchange rates. Natural logarithm of the values of both the variables ER and Stock indexes is taken and final value is used to study the relationship. Two different websites are used to obtain the data, one is (www.yahoofinance.com) to obtain the indexes data of PSX 100 index and second is (www.oanda.com) to obtain rupee per dollar exchange rates. To calculate the returns following formula will be used.

Return= $\frac{\text{Previous return}-\text{Expected future returns}}{\text{Immediate previous return}}$

$$\text{Return} = \ln \left(\frac{P_t}{P_{t-1}} \right)$$

Where:

RT= Return of stock exchange 100 index.

Pt denotes the value of stock index at time period t and t-1 respectively.

If stationary among the data exists which means there is pattern among the data than natural logarithm of the data is taken to remove the pattern from the data. This is one of assumption of obtained stock index data.

To obtained exchange rates data the regression analysis that we cannot run the regression analysis without removing the pattern from the date. Pattern means that the respondents have diversified results. To calculate the logarithm for the exchange rates following formula will be used

$$\text{Exchange} = \ln \left(\frac{ER(t)}{ER(t-1)} \right)$$

Where, ER (t) is the exchange rate of t day.

3.2. Model specification

In this study unidirectional regression mode will be used because in this study only one dependent and one independent variable is used. A simple unidirectional equation is:

$$Y = \alpha + \beta X + \varepsilon \quad (1)$$

In this equation: “Y” is dependent variable, “α” is intercept, “β” is coefficient corresponding to independent variable X.

Where:

Y= Monthly Stocks index;
X= Monthly Exchange Rates;
β= Coefficient or Marginal Effect;
ε = Error Term.

The symbol +/- will represent the direction of relationship and β will show the magnitude strength of relationship between the financial variables exchange rates and stock indexes.

3.3. Hypotheses of the study

H0: There is no relationship between exchange rates and stock index.

H1: There is a relationship between exchange rates and stock index.

3.4. Data analysis procedure

To analyses the data correlation and regression will be used and E-views will be used for calculations and findings.

3.5. Type of study

This study is explanatory in nature in which the relationship between two financial variables is explained. Study will explain the cause and effect of both variables that change in variable brings how much change in other variable.

4. Results and discussion

4.1. Diagnostic test/feel of data

Diagnostic test is important before applying regression analysis because indexes and macro-economic variables have the problem of Stationary, autocorrelation and heteroskedasticity. If we apply directly regression on this data then it will causes spurious or meaningless regression results. Hence, before go for regression analysis first of all we need to fulfill these assumptions of regression.

4.2. Stationary of data

4.2.1. Graphical Method

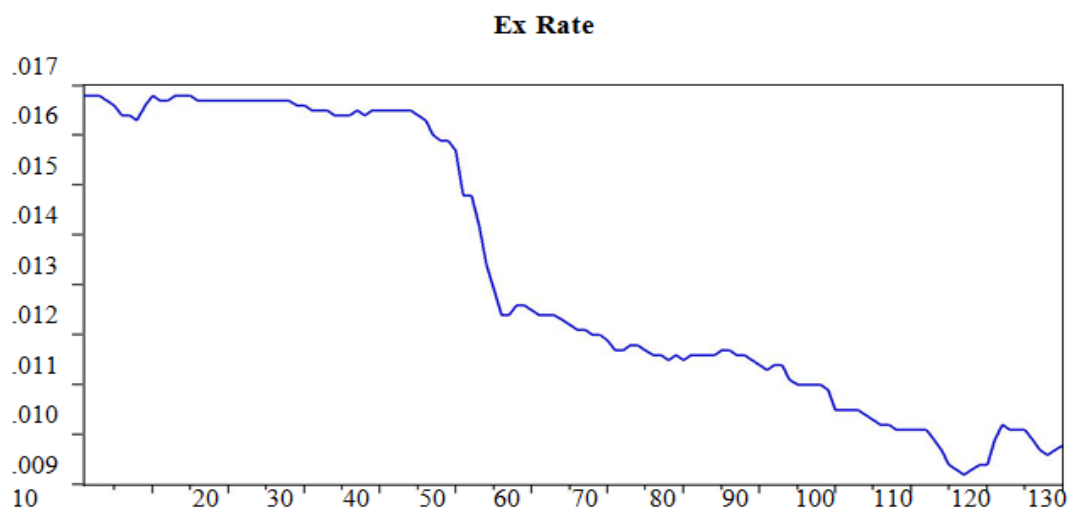


Figure 2. Graphical Method

Interpretation

The above graphical representation of the data of exchange rate shows that there is pattern exists among the data as there is not straight line it is downward slope.

Table 1. ExRate

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.637780	0.7725
Test critical values:	1% level	-4.031309	
	5% level	-3.445308	
	10% level	-3.147545	

4.2.2. Unit Root Test

Interpretation

Both graph and unit root test shows that data is non-stationary because pattern exists in the data.

4.2.3. Results after Removal of Stationary

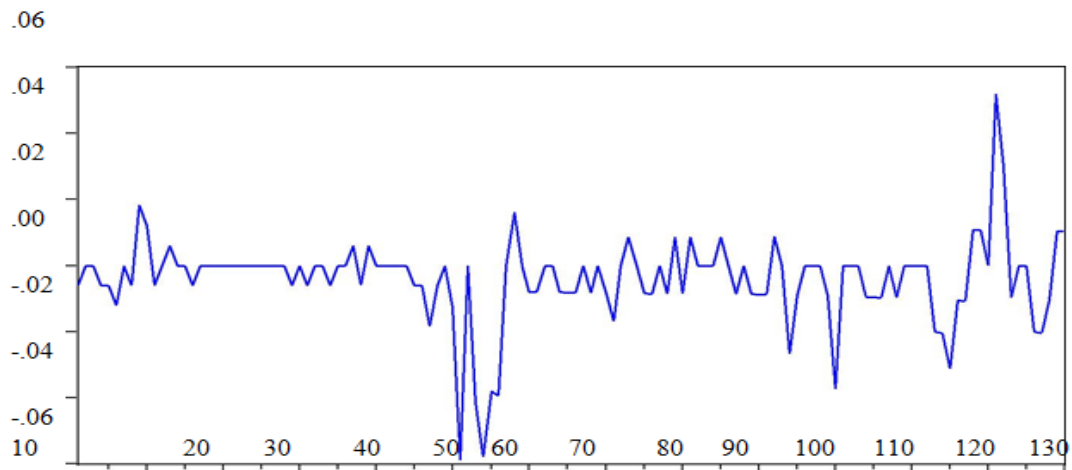


Figure 3. R(ExRate)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.200014	0.0000
Test critical values:	1% level	-4.030729	
	5% level	-3.445030	
	10% level	-3.147382	

Interpretation

Pattern or non-Stationary in data is removed by taking natural logarithm or first difference of the data eliminated. Now the data fulfills the requirement or assumption for the regression analysis.

4.3. Descriptive Statistics

Table 2. Descriptive statistics

	SI	Ex Rate
Mean	0.014332	0.004192
Maximum	0.202276	0.051825
Minimum	0.448796	0.059034
Std. Dev.	0.074989	0.013268
Skewness	2.096102	0.929175
Kurtosis	13.66730	9.234886
Observations	130	130

Interpretation

Table 2 exhibits the statistical behavior of the data for the period of 2004-2014. The mean is range from 0.004192 (Ex Rate) to 0.014332 (Stock index). Standard deviation which is the measure of dispersion or deviation from mean is range from 0.013268 (Ex Rate) to 0.074989 (Stock index). Sleekness indicates that most of the values are negatively skewed. In case of Kurtosis, if the value is equal to 3 then normal distribution and pattern is called mesokurtic. If the value is > 3 then pattern is called leptokurtic that are associated with simultaneously peaked and fat tail. But when value of kurtosis is less than 3 it is called platykurtic and is associated with simultaneously less peaked and have thinner tail. All the values in the table 1 are showing the leptokurtic behavior that is greater than 3 with the maximum value of 13.6. Furthermore, kurtosis shows that the data is flat and have thinner tail. The data totally consist of 130 observations of exchange rates and stock indexes which include the closing indices of stock run and also the rupee per dollar exchange rates. Data was collected on monthly basis.

4.4. Correlation matrix

Table 3. Correlation Matrixes

	SI	Ex Rate
SI	1.000	
Ex Rate	0.1862	1.000

Interpretation

Table 3 presents results of correlation analysis. Result indicates that exchange rate is positively correlated with stock index.

4.5. Regression analysis

Table 4. Regression analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SI	1.052518**	0.006806	2.754202	0.0067
Ex Rate	0.018744	0.490824	2.144387	0.0339
R-squared	0.034679			
Adjusted R-squared	0.027138			
F-statistic	4.598396			
Prob (F-statistic)	0.033892			

Note: This table presents the results for the Regression Analysis. The dependent variable is the Stock indexes at monthly level. Furthermore, ** and * denotes that the coefficient is statistically significant 5% and 10% respectively.

Interpretation

Table 4 shows results of multivariate regression analysis. The value of F statistics is (4.598396) $p < 0.5$ as shown in table 3 which indicate that exchange rate is better predictor of stock index in our regression model. Coefficient Multivariate regression analysis β indicates that an increase of 1 point in exchange rate leads to 1.05 points increase in stock index. The coefficient of dependent variable (stock index) is positive and statistically significant. Value of r square is 0.04679 in table 3 below which indicate that portion of stock index explained by exchange rate is 3% and remaining 97% can account for other variables .The t statistics for stock index is 2.754202 ($p < 0.05$) which indicate that regression coefficient beta is significantly different from 0.

5. Conclusions

The exchange rate Volatility is considered to be the most important and persuasive variable that affects the performance of stock index. The stock market plays an imperative role in the growth and development of a country. This study mainly aimed at to empirically examines the Impact of Exchange Rate Volatility on Pakistan Stock Index (PSX). The correlational research design is used in order to demonstrate cause and effect relationship between the variable under studied. The nature of this study was explanatory. Macro-economies variables have the problem of stationary, autocorrelation and heteroskedasticity,

diagnostic test is paramount important while applying regression in order to reach meaningful results so it was necessary to fulfill the assumptions of regression. Augmented Dickey-Fuller test statistic is employed. Two financial variables have been studied where Exchange rate Volatility is used as an independent variable whereas stock index is worked out as dependent variable. Twelve years monthly data from secondary sources, starts from 31st of January, 2003- 31st December, 2015 have analyzed. The study results found that there is positive and statistically significant relationship between Exchange Rate Volatility on Stock Index of Pakistan. Based upon key findings, this study particularly postulates that countries like Pakistan which has an emerging economy the macroeconomics variables i.e. exchange rate Volatility and stock index of Pakistan are associated, thus the public who desire to invest must utilize the information of important macro-economic variable in particular exchange rates volatility in order to predict the behaviour of stock market index.

6. Policy recommendations

1. Monetary authorities who control the flow of money in national and international markets supposed to gather the exchange rates relating information to capture the attentions of foreign investors. We, however, suggest that the further significance of our results could possibly be improved upon by applying daily or weekly data.

2. The use of more frequent observations may better capture the dynamics of stock and currency market interrelationships. Another possible extension is to employ the firm level data for other Pakistan stock market and examining the above relationship for those firms that are engaged in international trade (e.g., multinational firms) and for those firms that are not directly affected by exchange rates. The issue of whether stock index and exchange rates are related or not have received considerable attention after the East Asian crisis. During the crisis the countries affected saw turmoil in both currency and stock markets. If stock index and exchange rates are related and the causation runs from exchange rates to stock index, then the crisis in the stock markets can be prevented by controlling the exchange rates.

3. Moreover, developing countries can exploit such a link to attract/stimulate foreign portfolio investment in their own countries. Similarly, if the causation runs from stock index to exchange rates then authorities can focus on domestic economic policies to stabilize the stock market. In terms of policy implications of this research it may be that commodity prices are the „missing link“ between these two variables, with high commodity prices often strengthening both the Pakistani stock market and the domestic currency given the economy strong commodity base. Although this study has shown that the broad relation between stock indexes and the exchange rate during the sample period, the regression model utilized lacks explanatory power as noted above.

1. Again, in terms of policy implications there are wider issues, which suggest that commodity prices might not have had a significant effect on these variables during the sample period.

1. It is also recommended that regulating authorities needs to focus on the information of macro-economic variables while decision making that affects the stock indexes. Because potential explanations include greater investment flexibility in the selection of growth options as well as enhancement of the efficiency of internal capital markets.

2. Last but not the least the investors, fund managers and analysts must incorporate the effect of these macro-economic variables to improve the pricing mechanism towards fundamental value.

7. Limitation of study

1. Other macro-economic factors such as inflation, GDP, interest rate, unemployment rates also influence the stock index but only exchange rate is considered in this study.

2. Time duration is limited for 12 year which is not enough to understand the overall relationship between exchange rates and stock index of Pakistan 100 index.

8. Future option

This research opens up the new doors to the future researchers. Future researcher may conduct research by including more microeconomics viable like inflation, interest rate and by taking more years data.

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