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IMPACT OF INTEREST RATE ON STOCKS MARKET RETURNS IN PAKISTAN USING ARDL MODEL

Rahmatullah Arbani
Lecturer in Commerce.
Ph.D. Scholar, IBA Sukkur University, Sukkur, Pakistan.
Tanveer Abbas
Accounts Officer
Sukkur IBA University Kandhkot Campus
MS Scholar, Sukkur IBA University, Sukkur, Pakistan.
Hafsa Iqbal
Lecturer in Political Science.
Government Girls Degree College, Jacobabad, Pakistan.

ABSTRACT

This study explored the long and short term effect of interest rate on stock returns in Pakistan for the period of 2000 to 2020. The Stationary of data was analyzed by Augmented Dickey Fuller and Phillips Peron test. This study applied Auto Regressive Distribution Lag (ARDL) model for the purpose of analyzing long and short term relationship. The results revealed that there is no a long-run effects, whereas only short-run effects if interest rate on stock market in the context of Pakistan is found.

INTRODUCTION:

Interest rate is the price of use of borrowing money by borrowers. It is return amount for depositors or investors. Infect, these funds are generated from financial intermediaries like scheduled banks, development banks, mutual funds and insurance companies etc. It is an indicator that determines the flow of funds from savers to borrowers directly, or through financial intermediation. Interest rate falls, when supply of loan able fund is more than the demand of loan able fund and if the demand is more than the supply, interest rate rises. This fluctuation Interest rate adjustments and changes in the amount of loan able funds have an impact on economic indicators (GNP, resource employment, income level, and general price level). However, The stock market, as a vital component of the financial system, is critical to the country's economic progress. Any economy's financial strength is represented by a well-functioning stock market. The stock market's operation is influenced by a variety of economic factors, and investors are always interested in learning how these factors affect stock prices. Among a variety of economic variables, interest rate is regarded as a critical one that has a major impact on stock prices. Interest rate risk is a significant financial and economic element that influences the price of common equities. (Joseph and colleagues, 2006)

Furthermore, The impact of interest rates on investment, according to Keynesians and Monetarists, is still a hot matter of controversy. One school claims that interest rates have no impact on investment, whereas the other claims that interest rates are a significant predictor of investment. The Keynesian school avers that interest rate is explained by the supply and demand of money. This school argues that interest rate is not a strong determinant of investment. So, when money supply increases it decreases interest rate, enhancing investment and employment, and lead to higher economic growth.

In addition to this, Monetarists think that interest rates are a real-economy function that is explained by the demand for and supply of loan able funds. Increases in interest rates lead to a

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drop in investment. They claim that investment demand is inelastic and unnatural. As a result, interest rate fluctuations have a significant impact on investment decisions as well as the determination of asset prices. Businesses and consumers will cut back on spending when interest rates rise. Earnings will suffer as a result, as will stock values. Consumers and corporations, on the other hand, will increase spending when interest rates have decreased dramatically, causing stock prices to climb. Moreover, Stock price predictions based on expected cash flow are discounted by the interest rate, according to the theoretical model given by Chen, Roll, and Ross (Chen et al., 1986). Interest rates have a direct impact on the stock's value during the discounting process. Current interest rates, according to Bernanke and Reinhart (Bernanke & Reinhart, 2004), can influence asset prices. Furthermore, Assefa(2017) indicated that interest rates in third world countries economies have a large impact on stock returns (Assefa et al., 2017) . According to financial theory, interest rate is one of the macroeconomic factors that should have a systematic impact on stock prices return on investment (Chen et al., 1986). As a result, interest is generated. One of the most important factors is the rate. Stock price determinants (Modigliani, Chon, and others, 1979). The purpose of this research is to examine the link between the stock market index and interest rates Pakistan's interest rate fluctuation.

However, the study takes the ARDL co-integration technique because variables that are integrated of different order, I(0), I(1) or amalgamation of the both order and robust. It shows long run relationship between the underlying variables in a small sample size. The long run relationship of the underlying variables is detected through the F-statistic (Wald test). The Granger (1981) and, Engle and Granger (1987),Autoregressive Distributed Lag(ARDL) co-integration technique or bound test of co-integration(Pesaran and Shin 1999 and Pesaran et al. 2001) and, Johansen and Juselius(1990) co-integration techniques have become the solution to determining the long run relationship between series that are non-stationary.

LITERATURE REVIEW:

Over the last few decades, there has been a flurry of research into the relationship between interest rate increases and stock returns. Because the financial intermediation business is so interest rate sensitive, the majority of this work has focused on the banking industry.(Pablo.M, Ferrer- b, &Francisco,2015). Stock prices are connected to earnings and macroeconomic variables such as output and inflation dividends.(Gordon, 1959),(Blanchard, 1981).Furthermore, Chen, Roll and Ross (Chen et al., 1986) propose macroeconomic variablesthat are linked with the stock market under the framework of arbitrage pricing theory (APT). Nasseh and Strauss' (Nasseh& Strauss, 2000) findings support the existence of a significant, long-run relationship between stock prices and domestic and international economic activities in six European economies.

Tursoy and Faisal (Tursoy& Faisal, 2018) determine the relationship between stock prices, crude oil, and gold prices in Turkey. Likewise, Granger et al. (Granger et al., 2000) explore the link between two variables in the bivariate form by looking at stock prices and another variable. (Panda & Nanda, 2017) use the cointegration method to determine the short- and long-run interdependence of stock returns in Western Europe and the global market. The relationship between stock prices and interest rates has been extensively researched, with significant findings demonstrating a negative association between the two variables. Finally, Flannery and James (Flannery & James, 1984) investigate the relationship between common stock interest rate sensitivity and the maturity composition of a company's nominal contracts. The return on common stocks is connected with interest rate changes.

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Another study of (Khawaja & Din 2007) They considered real output, inflation, real interest rate, deposit inelasticity with firm level variables, asset quality, market share, administrative costs and liquidity. They concluded that macroeconomic and firm specific variable better clarify the interest rate spread in different banks of Pakistan. Bader and Malawi (2010) examined the effect of interest rate on investment The results indicated that investment was negatively affected by real interest rate. The results highlighted that one percent increase in rate of interest reduced the investment by 44 percent, while income level affects investment positively. The research of (Apergis, & Eleftheriou 2002) shows that an increase in interest rates causes investors to shift their portfolio composition to include bonds. On the other hand, when interest rates fall, investors prefer equities to bonds. The interest rate-stock market link (Bartram, 2002; Ferrer et al., 2010; Reilly et al., 2007; Sweeney and Warga, 1986), this analysis is carried out at the industry level. Various reasons are usually put forward to justify an industry-based approach. First, the formation of industry portfolios provides an efficient way of condensing a sizable amount of information regarding stock price behavior. Second, the use of portfolios helps to smooth the noise in the data produced by transitory shocks in individual stocks, which leads to more precise estimates. Thus, all firms listed on the Spanish Stock Exchange for at least one full year of the sample period are assigned to any of the industries considered. Then, value weighted industry stock indices are constructed from stock prices, adjusted for splits and dividends, of individual firms within each industry portfolio. A broad consensus emerges from this body of literature regarding several relevant issues. Firstly, the empirical research in this area has traditionally provided evidence of a significant negative relationship between movements in interest rates and stock returns of both financial and nonfinancial companies (Dinenis and Staikouras, 1998; Lynge and Zumwalt, 1980; Prasad and Rajan, 1995).

Research Methodology.

Data and Sources

This study considered time series monthly frequency data from 2000to 2020. The data related to stock market is extracted via Datastream whereas macroeconomic variables (such as, Intrest rate, GDP, Unemployment rate and CPI) is taken from official website of World bank data statistics.

Stock returns.

The PSE General (SRET) Index has been chosen as the measure of stock market Performance which captures the monthly price movements of equities at the stock exchange. It is taking as dependent variables

Interest Rate

Interest rate (INT) plays an important role in stock valuation. Investors seek to invest in the market which offers low rate. So, for a country like Pakistan, it is necessary to keep interest rate as low as possible to attract investors.

Consumer price index

The Consumer Price Index (CPI) measures the overall change in consumer prices over time based on a representative basket of goods and services. The CPI It is the most widely used measure of inflation, closely followed by policymakers, financial markets, businesses, and consumers.

Gross domestic product:

The total monetary (GDP) or market worth of all finished goods and services produced inside a country's borders in a certain time period is known as GDP. It serves as a comprehensive

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scorecard of a country's economic health because it is a wide measure of entire domestic production. It is taking as a control variables.

Unemployment rate:

The unemployment rate (UER) is the proportion of the workforce that is unemployed. It's a lagging indicator, which means it rises or falls in response to changes in the economy rather than forecasting them. The unemployment rate is likely to grow when the economy is in poor shape and jobs are scarce. It is taking as control variable. .

Table I:Descriptive Statistics of variables

	SRET	INT	CPI	GDP	UER
Mean	0.0047	9.7083	7.9362	1027.17	3.5897
Median	0.0086	9.5000	7.5986	990.846	1.3050
Maximum	0.2755	15.0000	20.2861	1482.21	9.2140
Minimum	-0.7000	5.7500	2.5293	534.303	0.8350
Std. Dev.	0.0922	2.6274	4.3552	301.9002	3.0231
Skewness	-1.9290	0.1985	0.9613	-0.2237	0.5757
Kurtosis	17.1065	1.9606	3.8856	1.7960	1.6171
Jarque-Bera	2192.26	12.6894	45.9295	16.909	33.1921
Probability	0.0000	0.0017	0.0000	0.0002	0.0000
Sum	1.1595	2388.2	1952.3	252684.9	883.0740
Observations	**246**	**246**	**246**	**246**	**246**

Table II: Correlation

	SRET	INT	CPI	GDP	UER
SRET	1				
INT	-0.0926* (-1.4535)	1			
CPI	-0.1084 (-1.7039)	0.6240*** (-12.4765)	1		
GDP	-0.0841 (-1.3184)	-0.2211*** (-3.5419)	0.0683 (-1.0697)	1 -----	
UER	-0.0566 (-0.8856)	-0.4187*** (-7.2021)	-0.2398*** (-3.8586)	0.8208*** (-22.4531)	1 -----

This table depicts the results of pairwise correlation between variables. Where SRET stands for stock market log returns, log INT stands for interest rate, log CPI stands for consumer price index, log GDP Gross domestic product and log UER unemployment rate. In this table t-stat is represented in parenthesis. ***, **, * represents if coefficient of correlation is significant at 1%, 5%, 10%.

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Above given correlation table shows the relationship among distinct variables of my research topic. This correlation shows the linear relationship. The dependent variable has almost negative correlation ship with other variables.

The structural model to estimate the relationship between interest rate and stock market return of log transformed variables is stated below:

$$SRET_t = c_0 + c_1 INT_t + c_2 CPI_t + c_3 GDP_t + c_4 UER_t + e_t \quad (1)$$

$SRET_t = stock\ return$
$c_0 = constant$
$INT_t = Interest\ rate$
$CPI_t = Consumer\ price\ index$
$GDP_t = Gross\ Domestic\ Product$
$UER_t = umemployment\ rate$
$e_t = error\ term$

The data of concerned variables has been obtained from Monthly Statistical Bulletin of State Bank of Pakistan. Economic Survey of Pakistan, FRED, and MSCI. In the time series realization is used to draw inference about the underlying stochastic process. So to draw inference from the time series analysis, stationarity tests become essential. A stationary test, which has been widely popular over the past several years, is unit root test. In this study Augmented Dickey Fuller (ADF) test applied to estimate the unit root. ADF test to check the stationarity series is based on equation of the below given form:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta\, y_{t-1} + \alpha_i \sum_{t=1}^{m} \Delta y_{t-1} + \varepsilon_t$$

Auto-Regressive Distributed Lag Approach

This study opted Autoregressive Distributed Lag Approach (ARDL) to test co-integration developed by Pesaran, Shin, and Smith (1999). This model has advantage over traditional co-integration model, because of its applicability when the model is a mixture of I(1) and I(0) integrated variables. Second advantage of the model is that it is suitable for relatively small sample size. The basis here for opting ARDL model was to analyze long run and short run effect of Interest rate on stock return in Pakistan stock exchange.

Structural model of ARDL is describe as below.

$$\Delta SRET_t = \alpha_0 + \sum_{i=1}^{n1} \beta_i \Delta SRET_{t-i} + \sum_{i=0}^{n2} \gamma_i \Delta INT_{t-i} + \sum_{i=0}^{n3} \delta_i \Delta CPI + \sum_{i=0}^{n4} \pi_i \Delta GDP_{t-i} + \sum_{i=0}^{n5} \lambda_i \Delta UER_{t-i} + \theta_1 SRET_{t-1} + \theta_2 INT_{t-1} + \theta_3 CPI_{t-1} + \theta_4 GDP_{t-1} + \theta_5 UER_{t-1} + \varepsilon_t \quad (2)$$

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ANALYSIS OF FINDINGS.

UNIT ROOT TEST/ STATIONARITY

Before I proceed with the ARDL bounds test, I tested for the stationarity status of all variables to determine their order of integration. This is to ensure that the variables are not *I*(2) stationary so as to avoid spurious results. According to Ouattara (2004) in the presence of *I*(2) variables the computed F-statistics provided by Pesaran*et al.* (2001) are not valid because bounds test is based on the assumption that the variables are *I*(0) or *I*(1). Therefore, the implementation of unit root tests in the ARDL procedure might still be necessary in order to ensure that none of the variable is integrated of order 2 or beyond. I employed ADF dickey-fuller test to obtain the order of integration of each variable as results shown in Table 2, which indicates that two variables GDP and UER are *I*(1), although SRET,CPI,INT are integrated at *I*(0). The ambiguities in the order of integration of the variables lend support to the use of the ARDL bounds approach rather than one of the alternative co-integration tests.

The results in table 2 shows that ADF tests fail to reject the null of non-stationary for all ofthe variables at level except INT and UER . After first differencing the result shows that INT and UER became stationary at the 1% significance level, implying that all the variables are first order integrated I(1). Figure 1 shows stationarity trend after first differencing the variables

Table III: Unit Root Test for Stationarity

	At Level			At First Difference Test	
Variables	**t-stat**	**Result**		**t-stat**	**Result**
SRET	-15.7243	S		-13.07552	S
CPI	-2.052721	NS		-15.59464	S
GDP	-1.394767	NS		-15.76021	S
INT	-2.088083	NS		-7.767046	S
UER	0.132226	NS		-15.77327	S

This table is representing the results of Augmented Dicky fuller test for the null hypothesis of unit root in the series. We reject the null hypothesis if value of t-stat appears more than critical value (±2.8734) at 5% significance level. Where S represent if the series is stationary at 5% significance level and NS stands for non-stationary series.

The results of the bounds testing approach for Co-integration show that the calculated *F-statistics* is 49.84which are higher than the upper level of bounds critical value of 7.52 at the 1 percent level of significance, implying that the null hypothesis of no Co-integration cannot be accepted and there is indeed a Co-integration relationship among the variables in this model. Having found a long-run relationship, I applied the ARDL method to estimate the long run and the short run elasticities (*see* Pesaran*et al*., 2001 and Pesaran and Shin, 1999 for details).

Table IV: ARDL Model (1, 3, 0, 0, 0)

	L_o			L_1			L_2	
Variables	**Coef.**	**t-Stat**		**Coef.**	**t-Stat**		**Coef.**	**t-Stat**
Panel A: Results of short-run estimates								
ΔINT	-0.0205	-1.5411		-0.0664***	-3.4753		0.0199	1.4949
ΔCPI	-0.0010	-0.5133						

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ΔGDP	-0.0001	-0.0162						
ΔUER	-0.0037	-0.9258						
Panel B: Results of long-run estimates								
INT	-0.0032	-1.0966						
CPI	-0.0009	-0.5133						
GDP	-0.0001	-0.0162						
UER	-0.0036	-0.9275						
Intercept	0.0565*	1.5695						
Panel C: Results of post-estimation tests								
F	EC_{t-1}	**LM**	**REST**	**CUSM**	**CUSMSQ**	R^2		
49.84	-1.03(-15.71***)	3.34	8.39	Stable	Unstable	9.21%		

*Table 4 depicts the result of the ARDL model. Panel A shows the short run effects of corresponding variables on stock market returns, where Δstands for first difference of the variable and L_0 to L_2 stands for lag order of the corresponding variables. However panel B shows the long term effects of explanatory variables on the stock returns market. Moreover, Panel C depicts the diagnostics tests, here values in brackets represent probability values. F representing the F- statistics value of Bounds Test (for the existence of cointegration); According to (Pesaran et al.,2001) for F- statistics at 1% level of significance, upper-Bound critical-value is 4 when k is 4.(Table C1.iii.,page 300). ***,** and * shows significant at 1%, 5% ,10% significance level respectively.*

Panel C in table 4, is declaring the fitness of the ARDL model. Bound test is use for the fitness of model. The result of this test of my topic suggests the existence of long-run relations in the model as F statistics value is more than upper bound at 1% of significance level. However, another factor, error correction term with negative sign of the coefficient and highly t statistics result is showing the maintenance of equilibrium if there is a short –run deviation from equilibrium. The result of lagrangion multiplier(LM) test is good. The probability value this point is greater than acceptance value. It proves that the model is free from the serial correlation, instability, misrepresentation. However, on the other hand, the value of CUSUM test represents the stability of the model. But CUSUMSQ test result is somehow above the bound acceptance region or above the boarder of acceptance.Representing unstable CUSUMSQ. The figures below are representing the results of CUSUM and CUSUMSQ tests:

FIG. I

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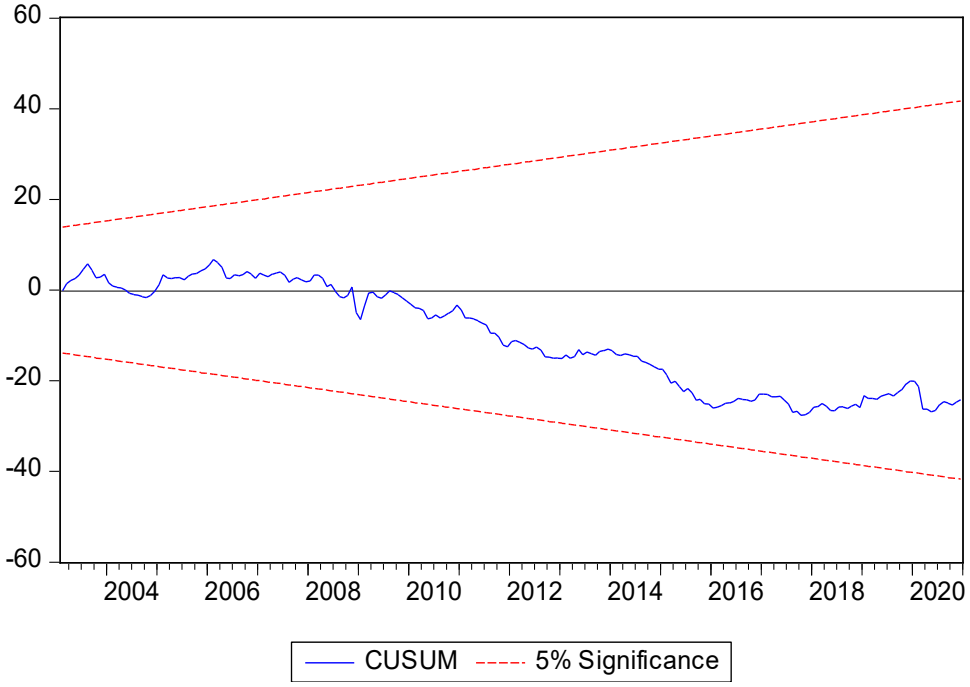
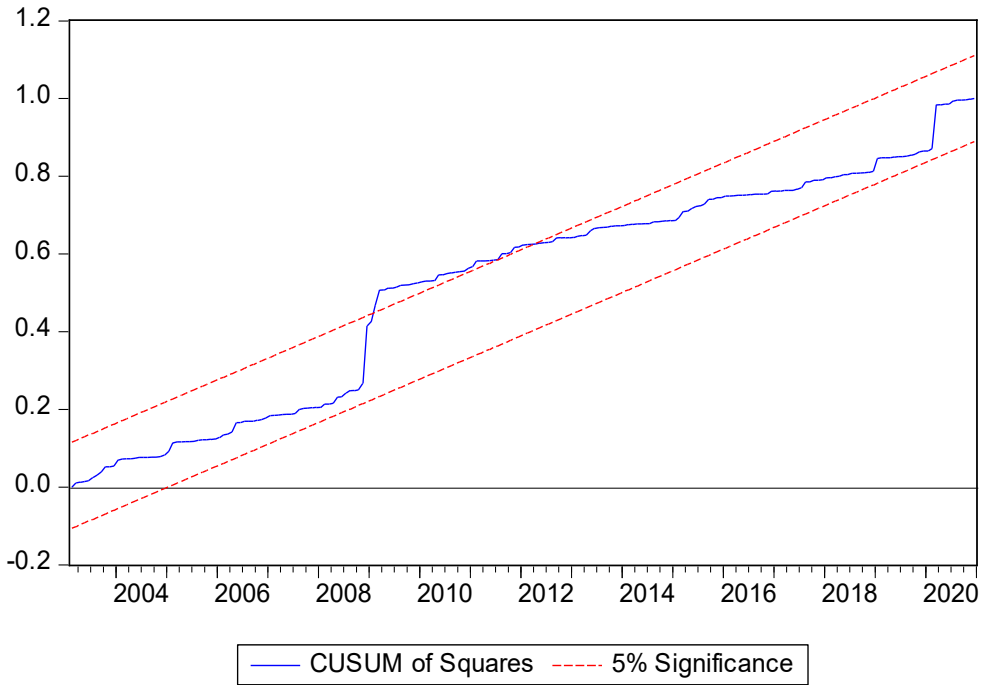


FIG.II



Following Bahmani-Oskooee (2004) the null hypothesis (*i.e.* that the regression equation is correctly specified) cannot be rejected if the plot of these statistics remains within the critical bounds of the 5% significance level. As it is clear from Figures 1 CUSUM is significance in bound values. It shows the stability of the long run coefficient of repressors and it means the interest rate effects the stock market returns. However the CUSUMsq fig.2 is representing a small change that bounds are out of lines. But overall the geographical representation shows that stability of model.

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CONCLUSION

This study aims to look at the influence of interest rate volatility on Pakistani stock market performance. The results of the unit root test demonstrate that all of the variable's data series are integrated at the order one level. Our Johansen approach of co integration test indicates that the variables may have at least one co integrating link. The analysis's findings demonstrate that, over the long term, interest rates have a negative and considerable effect on stock price returns. wherein each period's short-term correction addresses the short-term departure of the market index from its long-term equilibrium level.Before drafting various economic policies, it is recommended that regulators and policymakers take into account the impact of macroeconomic factors, particularly interest rates. The study's conclusions can be used to inform market regulations as the country works to build a thriving capital market and maintain steady economic growth.The study's finding suggests there is no long-run effects of vitality of interest on stock market returns. But there is short run effects of interest on stock markets returns.

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