Impact of Interest Rates on Stock Index: Case of Pakistan Stock Exchange

KIRAN BATOOL*

[1,2] COMSATS Institue of Information Technology, Wah Cantt, Pakistan

Abstract: The purpose of the paper was an attempt to trigger the connection between interest rates (Pakistan inter-bank offer rate) of different maturities and the stock index. PSE-100 index of Pakistan was selected, and its monthly returns were tested with Pakistan inter-bank offer rate rates as the independent variable. For the proposed connection, the model was developed, and certain statistical tests were applied. Monthly stock prices of PSE-100 and Pakistan inter-bank offer rates of 5 different maturities were taken. Descriptive and correlation regression analysis was used to explain the relationship that was significant but inverse. The stock market in Pakistan is highly influenced by political situations prevailing in the country. The stock market is considered an interpreter of the economy. Other than interest rates influence the stock market, one basic factor was selected for study purpose, and conclusions were drawn. This study would help demonstrate the investors' investment decisions who invest their resources in the stock market by borrowing at a prescribed rate.
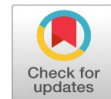
INTRODUCTION

Among the many macroeconomic variables, the interest rate is considered an imperative feature while measuring the economy's health of a particular country. This factor is directly related to the growth of an economy. Long term capital commitments of an economy are measured through market efficiency or level of that efficiency. Policymakers, investors and other major market participants keep a closer view on the level of market efficiency and interest rate movements. In other words, it is a barometer for assessing economy health. There is a considerable amount of research for obtaining a relationship between interest rate movements and stock indices from past decades. It is worthwhile to mention here that different practitioners and academics support direct relationship of interest rate changes and stock returns of the financial sector. At the same time, many other studies evidence no or least impact of such changes on non-financial sector companies worldwide. The selection of interest rate tenure is not subject to low sensitivity.

Interest rate is the cost of capital to use the resource provided. From the provider's perspective, it is the lending rate, while for the taker, it is the borrowing rate. Investors are concerned about the return on their invested resources. Many factors can influence that particular return, or in other words, many risk factors are associated with the return. In a volatile economy stock index is basically subject to interest rate risk. Inflation is linked with interest rate and exchange rate also affects interest rate in a country and vice versa. This research paper focuses on the emerging economy of Pakistan. Three stock exchanges are operating in Pakistan, Pakistan Stock Exchange (PSE), Lahore Stock Exchange (LSE) and Islamabad Stock Exchange (ISE). Pakistan's stock exchanges are considered highly volatile; three financial crises were seen in the past decade: political instability, bad governance, and speculators' grip.

This paper is based on the impact of interest rates on the PSE's stock index. Pakistan inter-bank offer Rates were selected of different maturities. It is an inter-bank rate used in Pakistan; its mechanism replaces the London inter-bank offer rate.

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*Corresponding author: Kiran Batool
†Email: kiranbtl91@gmail.com

Background of the study

Different researchers provided significant results of interest rate changes and their impact on stock indices. According to Sohail and Hussain (2009), a well-monitored and well-organized capital market leads to mobilization of savings and initiative of different new investment projects. It is a good investor's perspective to invest in an efficient market. Interest rate changes and their impact on stock prices is the dimension to measure the efficiency of the market (Alam, Uddin, et al., 2009).

Statement of the problem

Although there were huge debates and provide detailed evidence on the topic of interest rate changes in the economy, there are still opinions that observe the connection (positive or negative) with compliance and arguments. According to Park and Choi (2011), every firm in a country is exposed to interest rate risk and understanding of that risk is important for stockholders because their resources, in other words, investments, are very sensitive to that risk.

Significance of this study

This study is different from all previous studies conducted in Pakistan's volatile economy for interest rate changes and their impact on the stock index and specifically PSE. This research would help practitioners analyze the impact of the macroeconomic variable (interest rate) with a different time frame on the PSE Index.

Research objective

The aspire of the study is
- To ascertain the relationship between interest rates and the stock index.
- To measure the impact of that relationship.

Research question

The purpose of the study was to check the impact of interest rates with different maturities on the stock index (KSE100 index).

LITERATURE REVIEW

According to Bordalo, Gennaioli, Porta, and Shleifer (2019), stock returns can be used to foresee future inflation and interest rates instead of previous studies. They have provided a model that supported the positive and significant relationship between future interest rates and stock returns.

Seidmann (1987) provided the study of the relationship between the increase in the present and future interest rates and fixed prices of stock holding firms and suggested the possible conditions for effective relationship and supply policy in response. Flannery and James (1984) used the taster of commercial banks, stock savings and loan association and studied the relationship between interest rate compassion with respect to the maturity composition of stocks. Usually, market model consists of one factor that is the return on an index, used as a substitute to predict about market but insertion of interest rates has been supported by empirical research as a powerful factor to foretell about market portfolio along with returns.

Sohail and Hussain (2009) find a negative correlation between the Consumer price index and stock returns. The study was on the basis of long and short-run macroeconomic variables and their force on the economy. As Fisher's hypothesis suggested, the real rate of interest and expected inflation are components of the market rate of interest (Fisher, 1965); thus the real rate of interest does not exaggerate in the long run by the inflation rate.

Chatrath, Ramchander, and Song (1997) find a negative connection between stock proceeds and inflation trends in India in their study, whereas, Ratanapakorn and Sharma (2007) investigate the positive relationship between the two. Humpe and Macmillan (2009) are in favour of a negative association. Various studies are conducted to explore the relationship between interest rates, and stock returns; some came across with positive relationship (Ratanapakorn & Sharma, 2007; Wang & Chen, 2020) and some

provided the evidence of inverse relationship of the above two variables (Humpe & Macmillan, 2009). The former study was on S&P 500 and Treasury bill rate of US whereas, the latter was on Treasury bill rate and S&P55 in US.

According to López and Navarro (2013) a Eurozone model index represents total market projected volatility of interest rates. They suggested a methodology for the interest rate trends and their respective volatility for the Eurozone, which is based on most liquid interest rate derivatives that are Floors and Caps. Basically, the methodology suggested is the construction set for the volatility of interest rates. Dinenis and Staikouras (1998) investigated the impact of interest rate changes on stock returns of a sample of 5 financial institutions of the United Kingdom. The sample contained banks, insurance companies, investment companies, investment trusts and finance companies. The model was inclusive of non-financial institutions for comparison purposes. A significant negative relationship was found by using this double index model. Different studies found no relationship or least connection between interest rate changes and non-financial institutions (Brooks & Tsolacos, 1999; Bae, 1990; Chatrath et al., 1997).

Aharony, Saunders, and Swary (1986) suggest that the selection of variable i-e interest rate, is not sensitive to the duration like short term, intermediate or long run. Schwert (1987) investigate that financial institutions are more sensitive to interest rate movements because of their assets and liabilities. Their stock returns are also sensitive to surprising or unexpected interest rate changes. Galai and Masulis (1976) suggested the model for interest rates and stock returns by highlighting the stocks as a call option; thus equities should be affected by interest rates.

Joseph and Vezos (2006) examined the effect of two variables: interest rates and foreign exchange rates on stock returns of financial institution. The study was based on the EGARCH model to clearly watch the daily returns. Data was not fully satisfied after employing statistical modes but generated better fits than other model employed. Further, suggested that effective hedging strategies are required for financial institutions because they lack perfect hedging, and their stock prices are not inclusive of hedging. King and Wadhwani (1990) suggested the volatility transfer hypothesis that financial markets are exaggerated by sudden shocks of volatility. Thus, investors want to invest in other financial assets than common market assets. Banks are also part of these investors.

The volatility of interest has a diverse impact on different institutions, so these financial institutions also vary according to interest rate sensitivity. Saunders and Yourougou (1990) provided evidence that financial institutions are directly affected by interest rates and foreign exchange movements. Stock returns and costs of financial institutions are directly affected by FX and interest rate movements, US has a significant proportion (Madura & Zarruk, 1995). Banks are considered as financial intermediaries; they are highly sensitive to the interest rate movements and trends while working for their clients. Elyasiani and Mansur (2005) examined the volatility of interest rates in the short term and long term with their respective stock proceeds distribution of bank. Estimation was for three portfolios of banks and generated positive significant results. Elyasiani and Mansur (2004) attribute the interest rate volatility and its level with commercial bank's stock returns. Choices are of duration, studies examined the long run, intermediate and short-run interest rates of financial institutions.

Benink and Wolff (2000) used the data from the survey to analyze the unforeseen short and long-run interest rates and banking sector profitability. Interest is also considered as a risk because of its shock or if it move in the opposite direction. Interest rate risk management is a crucial factor for financial institutions. (Kane & Unal, 1988) revealed that interest rate is the time-varying factor; hence stock returns are not linear, and their linearity was challenged. Park and Choi (2011) investigated the study of US property insurers stock returns with changes in interest rates by using 1970 two-index model for comparison of three diverse interest rate indexes. The study reveals the dissimilar consequences of real and unexpected interest rates affects.

Sweeney and Warga (1986) attributed Stone's model and high sensitivity of stock proceeds of various companies. Different studies used this model as a modification of the original model by adding two indexes having diverse interest rates and compared with volatility (Bae, 1990; Choi, Elyasiani, & Kopecky, 1992; Saunders & Yourougou, 1990). Saunders and Yourougou (1990) used the modified Stone's model for interest rates sensitivity of stock returns. This model was the variant of the original Stone's

model. An inverse relationship was found. Short-run changes of interest were postulated least sensitive to the stock returns. However, some literature showed a positive correlation between short-run interest rate changes and stock returns, whereas long-run interest rate change impact stock proceeds. Akella and Chen (1990) provided literature on this area.

GARCH-M model is the imperative supposition for finding a negative connection between interest rate changes and stock returns insurance equities values in the long run (Brewer III, Carson, Elyasiani, Mansur, & Scott, 2007). López and Navarro (2013) investigated the study on unstable returns and interest rate sensitivity in Asian markets. GARCH-M was the parameter to analyze time-varying interest rates in different market conditions. Gap was found that changes were not uniform hence before 1997 (Asian financial crisis), the consequences are different from current situation. The current market condition is important to consider interest rate risk and asset pricing. APT model was an important technique in this study. Real Estate Investment Trusts, REITs have a significant impact on interest rates (Brooks & Tsolacos, 1999). Many studies were conducted for property stock returns in UK, US and Asian markets for analysis of unexpected interest rate factor and its relationship with returns. Return on other assets is influenced when the interest rate on bonds changes. The study is in accordance with common stock returns and interest rate factor.

Interest rate is also considered as a resource allocation indicator (Ferrari, Masetti, & Ren, 2018). Along with the above all literature, it cannot be neglected that interest rates is a state factor or is a systematic risk part. Fama and French (1993) introduced the three-factor model for interest rate risk as a time-varying factor having gaps in it. Later four factors model for time-varying loadings of interest rates to reduce asset pricing errors was introduced. In Pakistan, studies were found not specifically on the interest rate and stock returns but taking all macroeconomic variables, and their impact on the economy was studied. In the manufacturing sectors of Pakistan, stock returns were investigated by putting the monetary policy on the other hand along with company-specific factors (Ali, Adeeb, & Saeed, 2014). Interest rate factor was also examined but as a sub-part of State Bank of Pakistan's monetary course of action. (Humpe & Macmillan, 2009) used impulse response analysis to investigate the impact of interest rate shocks on Pakistan's equity market returns and found a negative impact.

Ouma and Muriu (2014) also explored the relationship between stock indexes and macroeconomic variables. Monthly data was analyzed by using Arbitrage Pricing Theory (APT) and Capital Asset Pricing Model (CAPM). There was a significant relationship found.

Critical analysis

Different studies were in favour of a negative relationship between stock returns of the market and the interest rates. According to some practitioners, interest rates cannot determine long-run stock returns or interest rate does not affect the stock index. It is important to mention here that the selection of interest rates and their maturity composition is also important to consider. Maturity composition was also a point of critics. Many studies do not consider time frames of interest rates, or some were in favour of it. Here in this study, Pakistan inter-bank offer Rates were used to check their impact on Pakistan stock index. There are 9 time frames of Pakistan inter-bank offer Rates from which 5 were selected to check their relationship with the stock index.
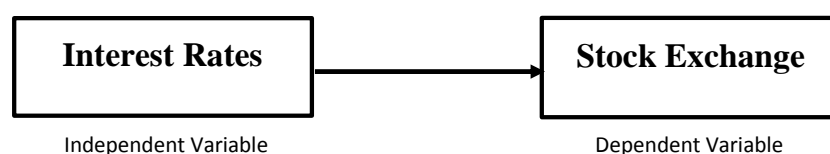
Conceptual framework

Figure 1. Conceptual frameowrk
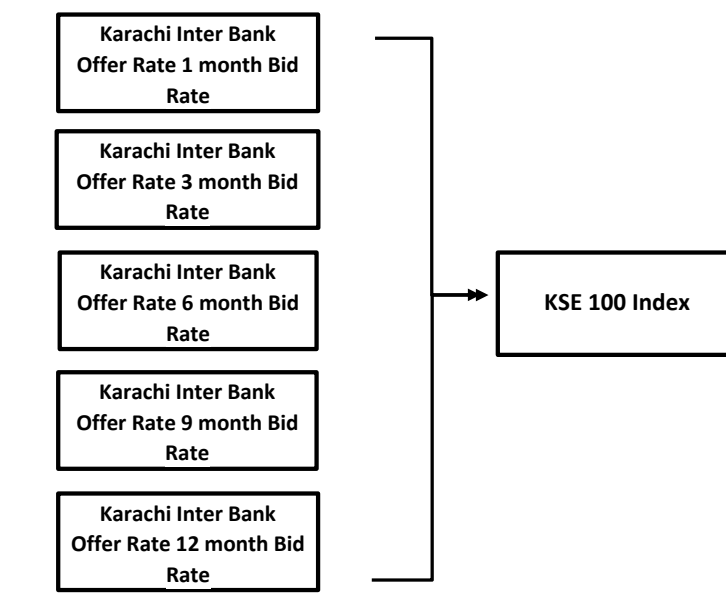
The framework of the study is further classified as:

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┌─────────────────────┐
│  Karachi Inter Bank │
│ Offer Rate 1 month Bid │
│        Rate         │
├─────────────────────┤
│  Karachi Inter Bank │
│ Offer Rate 3 month Bid │
│        Rate         │
├─────────────────────┤                  ┌──────────────────┐
│  Karachi Inter Bank │  ───────────→    │   KSE 100 Index  │
│ Offer Rate 6 month Bid │                │                  │
│        Rate         │                  └──────────────────┘
├─────────────────────┤
│  Karachi Inter Bank │
│ Offer Rate 9 month Bid │
│        Rate         │
├─────────────────────┤
│  Karachi Inter Bank │
│ Offer Rate 12 month Bid │
│        Rate         │
└─────────────────────┘
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Figure 2. Conceptual frameowrk

METHODOLOGY
Research design and data collection

The data collected was secondary data, and we had identified the Pakistan inter-bank offer Rate from the report published by State Bank of Pakistan (SBP). The data for stock index was historical and validated.

Population and sample

In our study, Pakistan stock Index (PSE 100) closing prices were selected. Stock returns were calculated from KSE100 Index monthly prices. Pakistan inter-bank offer Rate Bid rates of five windows were selected as Pakistan inter-bank offer Rate 1 month, 3 month, 6 month, 9 month and 12 months. The purpose of the selection of Pakistan inter-bank offer Rate was that it is considered as a good proxy of riskfree government rates because, according to literature, these risk-free rates are not properly market identified.

Research variables

In previous studies maturity composition of stocks were taken into account as a variable along with interest rates. Different other variables were also used i-e inflation rate for particular economy and monitory policies etc. Basically, there were two variables taken for this study: Pakistan inter-bank offer Rate rates as independent variable and stock returns as dependent variable. The independent variable was tested for its different time brackets or different maturities from 1 month to 12 months. Historical Pakistan inter-bank offer Rates were available of maturities: 1 week, 2 week, 1 month, 3 month, 6 month, 9 month, 12 month, 2 year and 3 year. Bid rates were taken from Bid and Offer Rates.

Selected variables

At its extended form following were independent variables:
- Pakistan inter-bank offer Rate 1 month: Pakistan inter-bank offer Rate 1 month Bid rates
- Pakistan inter-bank offer Rate 3 month: Pakistan inter-bank offer Rate 3 month Bid rates
- Pakistan inter-bank offer Rate 6 month: Pakistan inter-bank offer Rate 6 month Bid rates
- Pakistan inter-bank offer Rate 9 month: Pakistan inter-bank offer Rate 9 month Bid rates
- Pakistan inter-bank offer Rate 12 month: Pakistan inter-bank offer Rate 12 month Bid rates.

Dependent variable was monthly stock returns of PSE-100 index.

Statistical tests

Following tools were used for data analysis; i) Descriptive Statistics, ii) Regression Analysis and Correlation. Regression tests were applied individually on each selected maturity of Pakistan inter-bank offer Rate.

Data processing and analysis

Statistical analysis technique was used to provide descriptive statistics and inferential analysis (correlation and regressions) of selected data for nine years. Market stock returns (Rt) were calculated from the monthly price indices such as follows:

$$P_{t \sim} Ln_{(t)} / P_{t-i} \tag{1}$$

Where,
P_t = current price index at period
t = previous price index at period t-i
Ln = natural log

Model

Here the relationship between dependent and independent variable was linear, regression analysis and inferences were drawn.

$$\boldsymbol{Y}_u = a + p\boldsymbol{KIBOR} + e_t \tag{2}$$

Model for research was,

$$R_i - a + pKIBOR_{ij} + pKIBOR_3 = PK1BOR + PK1BOR <_{1/0} + PK1BOR_{j2} m''1'' \tag{3}$$

Where α is the regression constant and Pakistan inter-bank offer Rate 1 month, 3 month, 6 month, 9 month and 12 month were regression coefficients, respectively. These regression coefficients would indicate the amount of change in the value of the dependent variable for a per-unit change in the independent variable. The natural log was also applied on Pakistan inter-bank offer Rates of five different maturities as a solution for absolute form.

Hypothesis testing

The perspective of the research was to determine whether there was any relationship between interest rates and the stock index. For hypothesis testing Regression Analysis Model was used. We have determined some hypothesis of the same structure. The null hypothesis states that there is no significant relationship between interest rates and the stock index, and the alternative hypothesis states that there is a significant relationship between interest rates and the stock index. The hypotheses of the study are:

H1: There is no significant relationship between Pakistan inter-bank offer Rate 1 month rates and stock index.

H2: There is no significant relationship between Pakistan inter-bank offer Rate 3 month rates and stock index.

H3: There is no significant relationship between Pakistan inter-bank offer Rate 6 month rates and stock index.

H4: There is no significant relationship between Pakistan inter-bank offer Rate 9 month rates and stock index.

H5: There is no significant relationship between Pakistan inter-bank offer Rate 12 month rates and stock index.

DATA ANALYSIS

Table 1: Descriptive statistics

Variables	Minimum	Maximum	Mean	Std. Deviation
Pakistan inter-bank offer Rate 1 month	-2.5705	-1.9540	-2.263	.1648
Pakistan inter-bank offer Rate 3 month	-2.5207	-1.8793	-2.239	.1634
Pakistan inter-bank offer Rate 6 month	-2.4805	-1.8676	-2.224	.1597
Pakistan inter-bank offer Rate 9 month	-2.4430	-1.8630	-2.213	.1571
Pakistan inter-bank offer Rate 12 month	-2.4180	-1.8573	-2.202	.1542
KSE100index	8.5880	10.3194	9.4510	.3868

The data was consisting of 108 observations of the PSE-100 index and Pakistan inter-bank offer Rate monthly bid rates data ranging from August 2005 to October 2014 for two variables, and one variable, "Interest Rate" was of five different maturities. Descriptive statistics provides mean, and standard deviation of the variables mean for central tendency and standard deviation for a spread for dispersion; the larger the value, the larger the dispersion. The minimum column shows the minimum value of the variable, and for our study, it is the minimum value of Pakistan inter-bank offer Rate. Likewise the maximum column shows the largest value of that particular time maturity. According to Table 1 mean of Pakistan inter-bank offer Rate 1 month is -2.263, and the standard deviation is .1648, Pakistan inter-bank offer Rate 3 month mean is -2.239 and the standard deviation is .1634, Pakistan inter-bank offer Rate 6 month mean is -2.224 and its standard deviation is .1597. Pakistan inter-bank offer Rate 9 month mean is -2.213, and the standard deviation is .1571, Pakistan inter-bank offer Rate 12 month mean is -2.202 and the standard deviation is .1542. Whereas the mean of PSE-100 index returns is 9.4510, and the standard deviation is .3868.

Furthermore, the maximum mean is of PSE-100 index, and the lowest is of Pakistan inter-bank offer Rate 1 month maturity. The standard deviation of PSE 100 index .3868 is towards the high side, which means larger dispersion, whereas; the lowest standard deviation .1542 is shown in Pakistan inter-bank offer Rate 12 month.

There is not much variation in the means of Pakistan inter-bank offer Rates. Standard deviation is gradually decreasing from Pakistan inter-bank offer Rate 1 month to Pakistan inter-bank offer Rate 12 month. Pakistan inter-bank offer Rate 12 month observes the smallest spread than other four maturities.

Inferential analysis

Table 2: Descriptive statistics

Variable	PSE 100 Index	KIBOR 1 month	KIBOR 3 month	KIBOR 6 month	KIBOR 9 month	KIBOR 12 Month
KSE100 index	1					
KIBOR 1 month	-.376**	1				
KIBOR 3 month	-.416**	.988**	1			
KIBOR 6 month	-.455**	.976**	997**	1		
KIBOR 9 month	-.489**	.966**	991**	.998**	1	
KIBOR 12 month	-.523**	.955**	.983**	.993**	.998**	1

The correlation table shows the trend of variables or depicts how much they are correlated. The range for correlation coefficients is from -1 to +1. -1 correlation coefficient shows a perfect negative correlation, whereas +1 depicts perfect positive correlation and 0 is for no correlation. Numbers are providing linear relationship directions of variables. Again, for our study, there are only two variables. Here the linear relationship is between stock index PSE 100 and Pakistan inter-bank offer Rate maturities. Correlation table shows the week relationships between Pakistan inter-bank offer Rates and PSE 100 index. As per different studies, a negative correlation between interest rates and the stock index was

found in our research variables, it is also shown by the correlation matrix. There is a negative but week relationship between both variables. Correlation between variables is significant at 0.01 level.

Table 3: Regression analysis

Model	B	t-values	Sig.
Pakistan Inter Bank Offer Rate 1 month	-0.883	-4.178	0.000
Pakistan Inter Bank Offer Rate 3 month	-0.985	-4.712	0.000
Pakistan Inter Bank Offer Rate 6 month	-1.101	-5.255	0.000
Pakistan Inter Bank Offer Rate 9 month	-1.204	-5.771	0.000
Pakistan Inter Bank Offer Rate 12 month	-1.313	-6.324	0.000

Table 3 represents B value, t-value and significance of variables. B column represents values for the regression equation. These values are helpful to predict the dependent variable. This column of estimates gives values for our coefficients. The positive or negative sign helps to identify the association of the dependent and independent variable. The coefficient of Pakistan inter-bank offer Rate 1 month is -0.883, so for every unit increase in Pakistan inter-bank offer Rate, 1 month will result in -0.883 decrease in the stock index. This column indicates when there is a per unit increase in Pakistan inter-bank offer Rates; then there is a decrease in stock indexes or stock returns. The significance level should be below 0.05; it is clear from the table that the independent variable is statistically significant at ¡0.05. All of the five different maturities of the Pakistan inter-bank offer Rate are proved as significant. T-statistics and p-values indicate whether coefficients are different from zero or not. All of the 5 different maturities of the Pakistan inter-bank offer Rate are statistically proved significant. For example, Pakistan inter-bank offer Rate 12 month coefficient is -1.313, and it is significantly different from zero because its p-value is 0.000. According to the table, Pakistan inter-bank offer Rate 1 month, three month, 6 months, 9 months and 12 months all are significant variable's maturities. These time brackets can be used to determine the effects on the PSE 100 index when anyone is concerned about maturities of interest rates in Pakistan. The nullThe null hypothesis for the Interest rate of its different maturities will be rejected, and we will accept the alternate hypothesis for all maturities of the Pakistan inter-bank offer Rate. There is no insignificant relationship between both variables.

Table 4: Model summary

Variable	R	R square	Adjusted R square	Std. Error
Pakistan Inter Bank Offer Rate 1 Month	.376	.141	.133	.3601
Pakistan Inter Bank Offer Rate 3 month	.416	.173	.165	.3534
Pakistan Inter Bank Offer Rate 6 month	.455	.207	.199	.3462
Pakistan Inter Bank Offer Rate 9 month	.489	.239	.232	.3390
Pakistan Inter Bank Offer Rate 12 month	.523	.274	.267	.3312

R square is the total variation because of the independent variable to the dependent variable. In Table 4 R square of Pakistan inter-bank offer Rate 1 month maturity is 0.141 (14.1 %), 3 month maturity is 0.173 (17.3%), for 6 month maturity 0.207 (21%), for 9 month maturity 0.239 (24%) and for 12 month maturity R square is 0.274 (27%). We can conclude that as the time frame for interest rate increases, it results in stock index variation. Pakistan inter-bank offer Rate 12 month has more proportion of variance in the stock index. Adjusted R square is the adjustment for extraneous predictors. The standard error of estimate explains the other variables that have not been taken in the model but have an influence on the dependent variable. As tests were applied separately, therefore, the standard error of estimate for every maturity is different. The standard error of estimate reduces for a given model as maturity increases. The standard error was low for a given model due to the number of variables selected because the larger the size of variables, the lower the standard error of the estimate.

Table 5: Pakistan inter-bank offer rate 1 month

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2.265	1	2.265	17.459	.000
Residual	13.750	106	.130		
Total	16.015	107			

ANOVA can be referred to as variance investigation. It shows the fitness of the model, and this fitness is checked through the significance level of the model. The model explains that the dependent variable is affected by the independent variable. The Sum of squares is divided into three sources; 2.265 variances is explained by Pakistan inter-bank offer Rate 1 month, and 13.750 are not explained by this maturity. P-value is linked with F- statistics. The goodness of fit of the model is cleared by the significance column in the table. The lower the number better would be the fit. F-ratio in ANOVA table shows about tests of the overall regression model that whether the model is a good fit for the data. Table 5 explains that dependent variables are statistically significantly predicted by the independent variables. For testing the null hypothesis, p-value is compared with a= 0.05; hence model indicating that Pakistan inter-bank offer Rate 1 month time bracket is statistically significant.

Table 6: Pakistan inter-bank offer rate 3 month

Model	Sum of Square	Df	Mean Square	F Value	Sig.
Regression	2.774	1	2.774	22.202	0.000
Residual	13.242	106	.125		
Total	16.015	107			

For three month Pakistan inter-bank offer Rate 2.774 variance is explained by the independent variable of this particular maturity, and 13.242 is not explained by three month interest rate. P-value is indicating that Pakistan inter-bank offer Rate 3 month is statistically significant.

Table 7: Pakistan inter-bank offer rate 6 month

Model	Sum of Square	Df	Mean Square	F Value	Sig.
Regression	3.310	1	3.310	27.619	0.000
Residual	12.705	106	.120		
Total	16.015	107			

Variance 3.310 is explained by 6 month maturity of Pakistan Inter Bank Offer Rate and this maturity is also statistically significant.

Table 8: Pakistan inter-bank offer rate 9 month

Model	Sum of Square	Df	Mean Square	F Value	Sig.
Regression	3.829	1	3.829	33.310	0.000
Residual	12.186	106	.115		
Total	16.015	107			

9 month Pakistan Inter Bank Offer Rate explained 3.829 variance and is statistically significant.

Table 9: Pakistan inter-bank offer rate 12 month

Model	Sum of Square	Df	Mean Square	F Value	Sig.
Regression	4.387	1	4.387	39.9996	0.000
Residual	11.628	106	.110		
Total	16.015	107			

12 month Pakistan Inter Bank Offer Rate explained 4.387 variance and is significant. Here it is worth mention that 12 month time frame explained high variance and its residual value (variance not explained by independent variable) is lower than above all 4 maturities. Hence we can conclude that investors might be more concerned with higher time frame interest rates than lower maturities. Although all of the 5 time frames are highly significant. Investor may borrow at 12 months maturity rate and invest in stock market.

CONCLUSION AND RECOMMENDATIONS

Previous studies showed a negative relationship between interest rates and the stock returns of the stock market indexes. Somewhere maturity composition also influenced the returns. The purpose of the study was to ascertain the relationship between interest rates and the stock index. PSE-100 index of Pakistan was selected, and its monthly returns were tested with Pakistan inter-bank offer rate rates as the independent variable. There was a highly significant relationship between the variables. The economy can be affected by higher interest rates. The relationship between variables was significant, so the null hypothesis was rejected, and we accepted the alternate hypothesis for all of the selected maturities of Pakistan inter-bank offer Rate. The cumulative effect was not the concern of the study, so every maturity of Pakistan inter-bank offer Rate was tested independently.

Longer maturities of Pakistan inter-bank offer rates like 2 and 3 years can also be tested which were not selected for this study. They might be more influential than selected maturities. Stock returns of the stock indexes may be influenced by many other macroeconomic variables. Other macroeconomic variables like exchange rate, monetary variables and inflation with respect to time or tenure can be taken to obtain the relationship because interest rate is not only the factor which can affect stock returns or stock index. PSE 30 index, Lahore Stock Exchange, Islamabad Stock Exchange ISE 10 can be tested for future research with respect to interbank rates (Pakistan inter-bank offer rate).

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