

## Determinants of Interest Rate : Empirical Evidence from Pakistan

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### Abstract

The main focus of this research study will be to determine the main factors that influence interest rates and different economic variables that cause interest rate to fluctuate in an economy in short run. Different economic indicators have different impact on interest rates at a different pace. How these indicators respond to different economic situations and to what extent it brings changes in the rate of interest. The two selected and vastly adopted and acceptable indicator for calculating interest rate are CPI and exchange rates. These two variables are used in regression equation to indicate the effect and their influence on our dependent variable i.e. Interest rate, with the help of software SPSS. 6- Years secondary data was taken from SBP and SECP on monthly basis from 2005 to 2010. The positive and a very strong relationship has been found among the variables.

**Keywords:** KIBOR, CPI, Interest rate, and Inflation

### 1. Introduction

#### 1.1 Overview

We may not always realize it, but interest rates play an important role in our everyday lives and can greatly affect our buying power. Consequently, the overall trend of interest rates can have a major effect on our investments, thus, as an investor it is important to pay close attention to different trends in interest rate. Major shifts in direction, be increase or decrease, should cause you to review present investments as well as point towards potential investment opportunities. Normally interest rate mean everything stated by State Bank of Pakistan (from now onwards SBP) funds rate to any of the Treasury bill yields to the 10 year fixed deposit rate. Since these rates move together, the term interest rate means any bank lending rate. Or, interest rate means any rate a lender charge, as a percentage of the principal, to anyone who borrows or use an asset. Interest rates are normally calculated on annual basis known as the annual percentage rate (APR). The assets that are borrowed could include cash, consumer goods, and assets such as car, building, and raw material. Interest rates control the flow of money in an economy. Normally when interest rates are high in an economy, it will control the inflation rate but at the same time it has a negative impact on economy by slowing down the economic activities. Whereas, low interest rate speedup the economic performance but could lead to inflation in an economy. So therefore, it is not only important to keep an eye on increase and decrease of interest rate but also to consider the different reaction of other economic indicators in an economy. As already discussed in this study about the importance of interest rate, it's very important for Government and Financial institutes to get some extra information about the variables that can affect interest rates to fluctuate. Another benefit that this article is going to provide, is to the investors, before planning their investment plan, they can get some background information about interest rates determinants so that their planning is done more efficiently and effectively. Different authors conducted numerous researches about interest rates and monetary policy, every research was mostly concerned with impact of interest rate, what changes will bring interest rate in an economy. This article is solely concerned with determinants of interest rates.

#### 1.2 Definition of KIBOR

Karachi Inter Bank Offer Rate (KIBOR) is a rate given by expert and specialized institutions on weekly, monthly and 1, 2 and 3 yearly basis to all the commercial banks of Pakistan to charge their customers accordingly. KIBOR is inflation adjusted rate, and banks add extra 2% to 3% in KIBOR to charge their customers to earn profit.

#### 1.3 Definition of Inflation

Refers to an increase in general price level in a country in a particular time period. Or inflation is generally considered as an inordinate rise in general prices in a country.

#### 1.4 Definition of Exchange Rate

An exchange rate (also known as FOREX rate, FX rate or Foreign Exchange Rate) is defined as the rate at which one currency is exchanged with another currency. Or it is the value of one currency in-term of another currency. For example an inter-bank exchange rate of 86 Pakistani Rupee (Rs Rupee) to United State Dollar (US \$) means US\$1 will be exchanged for each Rs 86.

## 2. Purpose/Aim of Research

To study the determinants of Interest Rate.

### 2.1 Hypothesis

H<sub>1</sub>: Inflation in an economy has a positive impact on interest rates.

H<sub>2</sub>: Exchange rate fluctuation has a positive impact on interest rates.

## 3. LITRATURE REVIEW

A study was conducted about the determinants of interest spread in Pakistan by Khawaja and Uddin (2007) using panel data of 29 banks. An increase in interest spread implies that either the depositor or the borrower or both stand to lose. This paper explores the determinants of interest spread in Pakistan focusing in particular on supply interest- insensitive deposits to the banks and industry concentration. Another issue addressed in the paper is the growing trend towards Mergers and Acquisition (M&A) in banking industry that is driven in part by the recently introduced Basel Accord 11 to which Pakistan is signatory. To examine the determinants of interest spread for Pakistan's banking industry; the model used is Peria and Mody (2004). The result showed that in interest spread there is a major part of interest-insensitive deposit in the total bank deposits. Apart from that, the mergers among different banks in the banking industry also limited the options for the savers, which again adversely effected interest spread. Another research was conducted in Pakistan to examine the pass-through of changes in Treasury bill rate to Call Money rates, banks deposits rate and bank lending rate by Khan and Khawaja (2007). In this paper it is tested whether the changes in the Treasury bill rate are passed on to money market rate, bank deposit rate and the bank lending rate and if yes at what speed and to what extent. The three main areas that were discussed in this study are degree of pass- through from money market or the policy rate to the deposit and lending rates, the causes of stickiness of deposit/lending rates and finally to check is the pass-through symmetric for upward and downward revision in money market/policy rate. The method used to apply test in this study was simple Auto-regression Distributed Lag (ADL) model. The result showed that the pass-through from money market/T-bill rate to deposit/lending rate exhibit rigidity. The causes of stickiness include menu costs and structural features of financial system. The pass-through was asymmetric for upward and downward revisions in the policy rate. A paper regarding the global economic dynamics in which interest rate directive was subject to the lower bound by Evan (2008). The monetary policy of central bank follows a rule in which interest rate responds more than one-for-one to deviate from the inflation rate from its target. The main focus of this paper is to find out evidences that falling prices and falling output results in deflationary spirals. It is believed, the lower bound on nominal net interest rates has the potential to generate "Liquidity Trap" which is also known as Taylor Rule, with possibly major implications for economic performance. The model that is used is fairly standard representative agent model along the lines of Benhabib, Grohe, Uribe (2001). With the findings in this research paper it was derived that the zero lower bound to interest rates has showed the sign of multiple equilibria and liquidity traps when monetary policy is formed using global Taylor Rule. Alam and Waheed (2006) conducted a research on Pakistan regarding the sectoral or regional effects of monetary shocks, different sectors or regions of the economy respond differently to monetary shocks. This paper takes a first step in investigating the monetary transmission mechanism in Pakistan at a sectoral level. There are two possible levels of disaggregation of an economy, one at the level of final expenditures and other at the level of production. Due to data limitations, however, this paper tends to focus on disaggregated data of sectoral production. The estimation of VAR with three variable are used, the level of output, the level of prices, and a monetary policy indicator. It was concluded that there is a impulse response function to estimate the effects of monetary shock on real activity. Austrian article by Jobst and Kwapil (2008) of interest rate pass-through in Austria is about whether the turbulence in the financial markets and the-according- to banks-resulting difficulties in raising funds in money and capital market has led to a difference in the pass-through of retail interest rates to money market interest rates. The methodology that is used in this article is correlation and co integration relationship between lending rates and the respective market rates. Data was taken from money market interest rates, customer deposits, short-term and long term bonds and lending rates. This study finds that there has been a statistically significant temporary change in the relationship between market and lending rates since July 2007 for some loan categories. There was no evidence that lending rates in Austria have been higher since the turbulence began than would be justified by the pass-through of market rates. Hartman (1980) in his study examines the question of whether long term or short term interest rates should appear in investment demand functions. Three basic models were examined. The first involves a distribution of time lags required to complete investment projects; the second is based on a simple adjusted-costs model: and the third incorporates uncertainty and risk aversion. Their major conclusion is that, except for some special cases which are probably quite unrealistic, both long term and short term interest rates affect investment demand. In another study, Cox, Ingersall, and Ross (1985) developed a equilibrium asset pricing model to study and understand interest rate structure. In this model it was determined that the bond prices are effected by risk aversion, preferences of consumption and investment alternatives. Many of these factors have an effect on the term structure of interest rate and in this manner are included in a way which is fully

uniform with rational expectation and maximizing behavior. The model resulted in a specific formula for bond prices and which are well-matched for practical study (p.385). Kandel, Ofer, and Sarig (1996) used nominal bonds and prices of index and developed a technique to measure Ex-Ante inflation adjusted interest rate. Using this technique and with the help of new data that was available they right away applied the Fisher Hypothesis which says that inflation is independent of real interest rate. Their result showed a negative relation between inflation and Ex- Ante interest rate. This result disagrees with Fisher hypothesis but relates with study of Tobin & Mundell, Darley, and Feldstein Stulz. With the above results, they also found that inflation risk which is directly related to inflation uncertainty is included in nominal interest rate (p.205). Another study was conducted by Laubach and Williams (2003) on measuring the nature of natural rate of interest. The natural interest rate which is also known as the real interest rate, is dependable with output equivalent also with the usual rate and steady inflation, plays a vital role in macroeconomic studies and monetary policy expectation of real interest rate, however, has gained a little attention. They used the Kalmer Filter to calculate Jointly Time Varying real interest rates and different output with different pattern in growth rate. The result showed a close relation between the real interest rates and different patterns in growth rate, as already expected by theory. The calculation of real interest rate was very inaccurate and subjected to significant errors in measurements (p.1063). Barro and Martin (1990) began their study with the challenge to explain why real interest rates were so high in the 1980s in the major industrialized countries. In order to address this challenge they expended the question to the determination of real interest rates over a longer sample, which turned out to be 1957-1988. In considering how real interest rates were determined they focused on the interaction between investment demand and desired saving in an economy ( ten OECD countries viewed as operating on an integrated capital market) that was large enough to justify closed economy assumption. Within this “world” setting, high real interest rates reflect positive shocks to investment demand (such as improvements in the expected profitability of investment) or negative shocks to desired saving (such as temporary reduction in world income). Their main analysis ends up measuring the first kind of effect mainly by stock returns and the second kind primarily by oil prices and monetary growth. Okina (1999) conducted a study on Japanese economy and tries to explain questions regarding why Bank Of Japan (BOJ) doesn't adopt inflation targeting?, why has the BOJ stubbornly refused to increase the outright purchase of long term government bonds?. This study tries to evaluate questions and criticism regarding the conduct of the BOJ's monetary policy under zero inflation by using the following two criteria; (1) the BOJ will take measures necessary to achieve the sound development of the national economy through the pursuit of price stability in long run; however, (2) the BOJ will not take such measures if the side effects are demand greater than the effects, which makes it difficult to achieve the objective in (1). Fujiki, Hsiao, and Shen (2002) used annual Japanese prefecture data on income, population, demand deposits, and saving deposits from 1992 to 1997 to investigate the issue of whether there exists a stable money demand function under the law of interest rate policy. This evidence appears to support the contention that there does exist a stable money demand function with long run income elasticity greater than one for M 2 and less than one for M 1. Furthermore, they found that Japan's money demand is sensitive to interest changes. However, there was no evidence of the presence of liquidity trap. Interest rates for rural and unorganized money markets in third world societies have not yet been extensively studied. Bottemley (1975) used comprehensive review of agricultural credit literature to explore the relationships between the costs of extending credit, amounts loaned, and borrower's ability to absorb further capital. High costs in administering small loans and resistance to repay suggest the convenience of linkages between lending agencies and marketing boards for the crops upon which loans were made. Village money lenders-cum-traders may be able to operate more efficiently than public agencies, particularly when trained staff was in short supply. In another study Khatkhate (1988) underscores the difficulties of measuring the level of real interest rates and suggests an alternative to approximate real interest rates in Less Developed Countries (LDCs). The rationale for doing so lies in the fact that there needs to be a reasonable relationship between domestic nominal interest rate and adjusted foreign interest rate since, even in LDCs with trade and exchange controls, domestic currency and financial assets were always substituted, legally or otherwise, for foreign currency and financial assets. Pattanaik and Mitra (2001) conducted a study on “Interest rate defence of exchange rate: Tale of Indian rupee”. While the rationale for raising the interest rate to defend an exchange rate under speculative attack is well grounded in economic and financial theories, empirical validation of the effectiveness of such a policy stance has generally been difficult and is shrouded with conflicting findings. In India, besides forex market interventions and use of several administrative measures, the Reserve Bank of India has occasionally resorted to the high interest rate option during major episodes of significant pressures on the external value of the rupee. An empirical assessment suggests that one standard deviation shock to the call rate leads to rupee appreciation in the very second month. Similarly, for one standard deviation shock to net interventions, the exchange rate appreciates gradually by a few paise over five months. The impulse response also suggests that in response to one standard deviation shock the exchange rate appreciates by about 8 paise in the second month, but subsequently the exchange rate depreciates gradually, more than offsetting the initial impact of the hike in interest rate. In another study Mariscal and Howells (2002) try to address the issue regarding the central bank i.e Bank of England and its different policies.

First on, the interaction between official and market rate. In their study, they used vector autoregressive error correction model to explore the response to changes in the central bank rate of three short term market rates that have been featured previously in their journal in debates about the demand for endogenous money. In the next section they look at what sort of response the authorities might like to have in an ideal world. They showed first that a direct and proportionate link between official rate and market rates is not necessarily what is wanted, and what is almost certainly required is a complex set of changes in relative rates. The result showed that there is a long-run relationship between three key rates and the level of official rates since 1986 which makes it difficult for the Bank of England to induce lasting changes in relative rates. Iwata (2010) in his study attempt to investigate the latter issue, and in particular, to empirically examine the effect of monetary policy on the term structure of interest rate when nominal short-term rates are close to zero, using Japanese data in the 1990s and early 2000s. It was found that when the policy short rate is already zero interest rate periods, an expansionary monetary policy was suggested to down longer rates, although the effect is much weakened relative to the nominal time. An empirical analysis for Pakistan was conducted by Mukhtar and Zakaria (2007) regarding budget deficit and interest rates. They empirically examined long-run relationship between nominal interest rates and budget deficits for Pakistan using quarterly time-series data for the period 1960 to 2005. They tested the “crowding-out” view against the “Ricardian deficit neutrality” alternative. Regression result showed that budget deficit do not have significant effect on nominal interest rates. These result revealed the existence of the Ricardian Deficit Neutrality in Pakistan. While budget deficit-GDP ratio has significant positive impact on nominal interest rates. These findings support the conventional wisdom of Crowding-Out. The results were also validated by the Granger Causality tests. The theory of interest has been in controversial for a long time in economics and the determination of the interest rate still gives rise to more disagreements among economists than any other branch of general economic theory. So Roos and Szeliski (2003) attempt to answer some of the questions with their study on the determination of interest rates. The study showed that the important factors affecting interest rates are (a) the money supply or liquidity-asset supply, which is largely demand deposits, (b) the business demand for funds measured by the volume of new orders being placed with business in relation to the working capital of corporations, (c) the security markets demand for funds, (d) the government for funds, (e) the banks’ ability to extend credit and (f) the supply of bonds outside of government agencies. Gnan, Scharler and Silgoner (2003) in their study they first try to find and evaluate the possibility of future inflation occurrence and also to check different constituencies of central bank. In the second part of their study they try to find not only long term inflation but also to calculate medium term inflation, which is normally less than 5 years. And lastly to examine whether or not there are measures of empirical inflation which could dissolve in any concept requirement. Their study empirically suggested that the changes in inflation expectation were caused by actual inflation changes. And these changes were majorly caused by measures taken by financial markets, not by consumer expectation of inflation.

#### **4. RESEARCH METHODS**

##### **4.1 Methods of Data Collection**

All data which was used in my research would be collected through secondary sources includes State Bank of Pakistan (SBP) and Security and exchange commission of Pakistan (SECP).

##### **4.2 Sampling Technique**

Secondary data will be used and total information will be collected from secondary sources.

##### **4.3 Sample Size**

6- Years data was taken from SBP and SECP on monthly basis from 2005 to 2010.

##### **4.4 Instrument of data collection**

This research is totally based on secondary data. No any instrument/primary data was used in my research.

##### **4.5 Statistical Technique**

In my research I used Multiple Linear regression (MLR). Multiple linear regression is a statistical model which examines the relationship between two or more explanatory variables and a response variable by fitting a linear equation to observed data.

$$\mu_y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_px_p$$

To examine the data the data Statistical Package for the Social Sciences (SPSS) software is used.

The equation of my model is following:

$$Y = 2.864 + 0.116X_1 - 0.037X_2$$

Where,

Y= Karachi inter-bank offer rate (KIBOR)

X<sub>1</sub>=CPI

X<sub>2</sub>=Exchange Rate

## 5. RESULTS AND IMPLICATIONS

The data of 6 year monthly average was taken from State Bank of Pakistan and Security and Exchange Commission of Pakistan of KIBOR, Inflation (CPI) and exchange rate. The statistical technique that was study for this study was Multiple Linear Regression (MLR). This study tends to focus on the impact of inflation and exchange rate on KIBOR. And data examination was done with the help of Statistical Package for Social Sciences (SPSS).

### 5.1 Findings and Interpretation of the results

My research is based on 3 variables.

KIBOR= Dependant Variable

CPI= Independent Variable

EXCHANGE RATE= Independent variable

#### Model Summary

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .893 <sup>a</sup> | .797     | .791              | .97749                     |

a. Predictors: (Constant), EXRT, CPI

b. Dependent Variable: KIBOR

The co efficient of determination ( $R^2$ ) is 79.7%. This explains that the variation in KIBOR with respect to CPI and Exchange Rate is up to 79.7%.

#### ANOVA<sup>b</sup>

| Model        | Sum of Squares | df | Mean Square | F       | Sig.              |
|--------------|----------------|----|-------------|---------|-------------------|
| 1 Regression | 259.338        | 2  | 129.669     | 135.711 | .000 <sup>a</sup> |
| Residual     | 65.928         | 69 | .955        |         |                   |
| Total        | 325.266        | 71 |             |         |                   |

a. Predictors: (Constant), EXRT, CPI

b. Dependent Variable: KIBOR

The value of F-statistic is 135.711 which is high and the p-value is 0.000 which is less than 0.05 (level of significance) this implies that the test of ANOVA is significant and the model is valid from the given predictors. Here the significance value (the p-value) is less than 0.05 which means that the constant term as well as the coefficient of independent variables is significant for model. The overall research result shows that there is a positive impact of inflation (CPI) and Exchange rate on KIBOR.

### 5.2 Hypothesis Assessment Summary

#### Coefficients

| Model      | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. | Collinearity Statistics |       |
|------------|-----------------------------|------------|---------------------------|-------|------|-------------------------|-------|
|            | B                           | Std. Error | Beta                      |       |      | Tolerance               | VIF   |
| (Constant) | 1.573                       | .766       |                           | 2.053 | .044 |                         |       |
| 1 CPI      | .180                        | .027       | .445                      | 6.740 | .000 | .675                    | 1.481 |
| EXRT       | .109                        | .013       | .561                      | 8.514 | .000 | .675                    | 1.481 |

a. Dependent Variable: KIBOR

| No. | Hypothesis   | Beta | Accept/Reject |
|-----|--|------|---------------|
| 1   | Inflation in an economy has a positive impact on interest rates.   | .445 | Accept        |
| 2   | Exchange rate fluctuation has a positive impact on interest rates. | .561 | Accept        |

## 6. DISCUSSIONS, IMPLICATIONS, FUTURE RESEARCH AND CONCLUSIONS

In this study data of monthly rates was collected from State Bank of Pakistan (SBP) and Security and Exchange Commission of Pakistan (SECP) for dependant variable KIBOR and independent variables, inflation and exchange rate from 2005 to 2010 and the statistical technique that was used to examine the data was Multiple Linear Regression (MLR). SPSS was used along with Multiple linear Regression to evaluate the impact of the independent variables i.e. inflation and exchange rate on dependent variable KIBOR.

### 6.1 Conclusion

This research study concludes that among the two independent variables inflation and exchange rate both exchange rate and inflation (CPI) has a positive relationship with the dependent variable KIBOR. So we can conclude that an increase in inflation (CPI) and exchange rate will result in an increase in KIBOR and a decrease in inflation (CPI) and exchange rate will reduce KIBOR.

### 6.2 Implications and Limitations

It is very important for Government and Financial institutes to get some extra information about the variables that can affect interest rate to fluctuate. Investors and financial institutions can analyze and observe the behavior of KIBOR more effectively and efficiently with the help of this study. Whereas limitations are concerned this study has few limitations, out of numerous factors that can determine KIBOR only few of those are taken into account due to the shortage of time availability and some security risks involved.

### 6.3 Recommendations

This study was limited to only two factors that affect KIBOR whereas there can be more than two factors which can affect KIBOR. The data was taken for only 6 years from 2005 to 2010 but research can also be conducted for longer time period.

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