THE CAUSAL RELATIONSHIP OF INTEREST RATE AND STOCK PRICES: EMPIRICAL EVIDENCE FROM PAKISTANI MARKETS

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ABSTRACT

This study is focusing on the relationship between stock returns of the Karachi Stock Exchange (KSE) and the short term interest rates in Pakistan. The stock returns are calculated from Karachi Stock Exchange 100 index, and monthly rates of six monthly T-bills for the period of 1994 to 2014 are used for short term interest rates. . At first, we find out the significant short term and long term relationships between stock returns and the interest rates through the error correction mechanism and co-integration test. Then Granger Casualty test is used to test that either the stock prices cause the interest rates or the interest rates cause the stock returns. Thus we find no significant relation between these two variables in either direction. So interest rate is not a Granger cause of stock returns and stock returns are also not a Granger cause of interest rates in Pakistan.

Key Words: Interest rate, Stock returns, Granger Causality test, Cointegration analysis, Error Correction mechanism, Karachi Stock Exchange.

INTRODUCTION

The exposure of stock returns to that of interest rate volatility is an important factor in the overall risk assessment of a particular stock. Intensive amount of research has been done on the relationship between stock return and that of interest rate volatility. This relationship is also much important in the monetary policy implementation, risk management techniques and it also affects the valuation of securities. In theory, the interest changes potentially alter the stock returns but the degree of change is different for various stocks. The financial market deregulation and liberalization of the financial institutions in Pakistan over the last two decades, have totally changed the financial markets fundamentals. In this scenario, the interest rate and its volatility has gained much importance in Pakistani context in terms of pricing of a security and its risk assessment.

The valuation of firms assets is also directly affected by the interest rate changes as such fluctuations bring apparent changes in the market prevailing discount rate and this also affects the firms' cash flow. In this context the interest rate changes and the varying levels of financial leverage act as a contributing factor in the estimation of interest rate risks. By virtue of interest rate risks, the firms taxable profits and its total worth is directly affected by the interest rate changes. Interest rate is also an important factor in the determination of the cost of capital of the firm. The investment pattern of the firms is affected by the interest rate changes as it brings changes in the cost of capital of the firm.

LITERATURE REVIEW

Ramlal (2007) studied the relationship of stock market and the macroeconomy for the various Caribian countries. The Vector Autolatregressive models (VAR) were used for the causality relationships of the time series data. The Error Correction Mechanism (ECM) and Vector Error Correction Mechanism (VECM) were used for cointegration purposes. The conclusion suggested that there is a long run relationship between macroeconomy and stock market in Barbados, Trinidad and Tobago while in the case of Jamica both the short run and long run relationships were confirmed. So in the case of Jamica it was suggested that the relationship of stock market and macroeconomy must be taken into account while devising the economic policies at the national level.

Khrawish et al (2010) examined the relationship of interest rate and stock market capitalization during a period of 1990 to 2008 for Aman Stock Exchange. The ordinary least square (OLS) regression models were used to test the relationship of the stock market and interest rate. The results concluded that there is a strong positive relationship between the interest rate and the stock market capitalization for Aman Stock exchange. The results of the regression models also concluded a negative relationship between market prevailing interest rates and the government development stock rates.

Alam and Uddin (2009) suggested a negative relationship between interest rate and stock prices for a group of fifteen developed and underdeveloped countries. This relationship was tested during a period of 1998 to 2003 using various regression models. This test of market efficiency revealed that the interest rate and and its changes negatively affects the interest rate except for Malaysia where no such relationship was found between interest rate and stock prices. While these variables were positively related in case of Japan.

Ali et al (2010) examined the various macroeconomic fundamentals and the stock prices for Pakistan during a period of 1990 to 2008. The Joahanson's cointegration test and the Granger Causality test was used to test this relationship. The results revealed that industrial production index and the inflation rate in Pakistan have dependency with the stock prices. Contrary to this the currency exchange rate, money supply and balance of trade have no dependency with the stock prices in Pakistan.

Bhattacharya and Mukherjee (2005) studied the stock prices and the different macroeconomic indicators in the Bombay Stock Exchange of India for a period of 1992 to 2001. The Granger Causality test and the cointegration test were used in this respect. It was also found that the stock prices were derived by the industrial production index. While the Granger Causality test had confirmed the relationship of inflation rate and stock prices from both the directions.

Campbel and Amer (1993) carried out a corelational study of stock returns and bond returns with that of stock dividend expectations, interest rate, inflation rate and the excess bond returns and stock returns. The findings of the study revealed that the stock return variances are a function of changes in excess stock returns. The particular study also confirmed that stock return changes are not a function of long term interest rate.

Cifter and Ozun (2008) have revealed the dynamics of interest rate changes and stock prices in the Istanbul Stock Exchange during a period of 2003 to 2006.The Johanson's cointegration test and the Granger Causality test were used to explore the dynamics of such a relationship. The result showed that the interest rate changes in the Turkish stock market determine the stock returns, a negative relationship is confirmed between the two variables.

Ologunde A.O et al (2006) studied the relationship between interest rate and the stock market capitalization rate in Nigeria Stock Exchange for a period of 1981 to 2000. By using the regression models the results revealed that the interest rate positively affects the stock market capitalization rate and negatively affects the government development stock rate.

Maysami et al (2004) examined the relationship of various macroeconomic fundamentals with that of stock returns sector indices in Singapore market. The Vector Error Correction mechanism has been used to test the cointegration among the variables for the sector indices of hotel index, finance index and property index. The results suggested that there is cointegration between property index with the macroeconomic indicators used in the study.

Nishat and Shaheen (2008) carried out a study of the impact of macroeconomic variables and stock returns in Karachi Stock exchange during a period of 1973 to 2004. Vector error correction model was used to asses this relationship. The results revealed that the macroeconomic indicators are a granger cause of stock price changes in the Karachi Stock Echange. The same empirical relationship was tested by Bargiato and Dritsaki (2005) in Athens Stock Exchange. The Johansen's cointegrtaion test and the Granger Causality tests were applied in this respect. The results confirmed cointegration among the target variables while the Granger Causality confirmed a significant causal relationship.

Other empirical studies that have been carried out to confirm the interest rate changes on the stock return movements are Rahman (2009), Wong (2006), Cifter (2008), Ahmed (2008) and Arango (2007).

METHODOLOGY

It is an empirical study for the determination of the interrelationship between the stock returns of Karachi Stock Exchange (KSE) and the short term interest rates in Pakistan. This relationship will be determined by estimating a causal relationship between interest rate and the stock returns of Karachi stock exchange (KSE 100 index). For this purpose Grange Causality test will be applied to estimate the causal relationship between these two variables. Cointegration analysis will be applied to estimate the long term relationship between the two variables of this research study. Data of this research study will be taken from the State Bank of Pakistan website, Karachi Stock Exchange website and from the IFS software. The monthly treasury bills will be used as a proxy for interest rate; KSE 100 index will be used as a proxy for stock returns. A monthly data for

all these variables will be taken from 1994 to 2014. Data stationarity for all these time series data will be estimated using the Augmented Dickey Fuller (ADF) test. The monthly stock returns will be calculated from KSE index returns, estimated as

$$SR = 100 \times \ln(SIt/SIt\text{-}1)$$

Where SR shows the monthly stock returns of the KSE and SI shows the monthly stock index of KSE.

EMPIRICAL ANALYSIS:

Augmented Dickey Filler Test (ADF):

The monthly treasury bills (t-bills) and the stock returns were checked for stationarity by using the ADF test for stationarity. The results as given in equation 1 and equation 2 show that both the time series data of t-bills and stock returns were found to be non stationary at level.

……equation 1

ADF of T-Bills		
d_d_t_bills = 0.00511 -0.861 d_t_bills_1		
t-value	0.118	-11.33
p-value	0.9032	4.59e-011

……..….equation 2

ADF of SR		
d_SR = 60.494 -0.003234 SR_1		
t-value	1.152	-0.3618
P-value	0.2839	0.9002

By taking the first difference for both the time series of the target study, both the t-bills and stock returns data were found to be stationary at first difference as shown in equation 3 and equation 4. Now the data completes all the requirements for further analysis.

……..…..equation 3

d_t_bills = 0.1345 -0.01385 t_bill_1		
t-value	1.210	-1.133
p-value	0.2473	0.6876

……..…equation 4

d_d_SR = 37.34 -0.841 d_SR_1		
t-value	1.105	-12.23
p-value		

Co-integration Test:

Cointegration analysis is used in order to ascertain a long term relationship between stock returns of Karachi Stock Exchange and the short term interest rates in Pakistan. For this purpose an OLS regression has been estimated between stock returns and the short term interest rates. The residuals from this regression were then regressed against the lagged values of stock returns. In the second regression the first difference was found to be significant as the tau value is greater than the 5% significant level as has been shown in equation 6 and equation 5. The F-Statistic in the model shows significance of both the models as a whole. The R2 of the model is 98% which shows a very high explanatory power of the model. These statistics show that 98% of the variations in the stock returns are explained by the short term interest rates in Pakistan. Hence it is proved that there exists a cointegration between these two variables of the study.

…….equation 5

Co integration		
SR = 6318.95 – 132.454t-bills		
t-value	7.7325	-1.8724
R^2 =	0.014733	
F- Statistic = 4.202344		

…….equation 6

uhat = 44.1061 + 0.987617 uhat_1
tau- Value 1.1881 109.2279

Error Correction Mechanism:

Error correction mechanism is a system which shows that short term relationship between two variables are fed from the long term relationship with these variables. The stock returns were regressed against the short term interest rates. The residuals from this regression were saved and named as uhat. The difference stock returns were regressed against the uhat and the difference short term interest rates (t-bills) as shown in equation 7 and equation 8. The p-values of uhat and t-bills were found to be highly significant. The R2 of the model is 85%, hence it is proved that there exists a short term relationship between the stock returns and the short term interest rates.

…….....…equation 7

Error Correction Mechanism		
SR = 6237.95 - 143.354 t_bills		
t-value	7.7425	-1.7824
R^2 =	0.014733	
F- Statistic	3.112812	

……..equation 8

d_SR = 1.37646e-013-123.354 d_t_bills+ 1uhat			
P-value	0.76955	0.00011	0.00011
R^2	0.844000000		

Granger Causality:

The Granger Causality test is applied in order to see whether interest rates cause stock returns or interest rate causes the stock return i.e to check wether there is a two way causality with these two variables or not in the case of Karachi Stock Exchange (KSE). Two models are applied to test two way causality between these two variables. The results are given in equation 9 and equation 10.

…..…..equation 9

Granger Test		
d_SR = 42.0641 + 0.172016 d_t_bills_1		
R2	0.098320	
F-Statistic	0.684397	

……...equation 10

d_t_bills = 0.0124604 + 0.118575 d_SR_1		
t-value	0.2502	1.1961
R^2	0.090783	
F-Statistic	1.135092	

The results in equation 9 and equation 10 show that the F-Statistic of the model is smaller than the critical value of the F-Statistic. So neither the stock returns are the Granger cuase of the stock returns nor the interest rates are the Granger cause of the stock returns in the case of Karachi Stock Exchange (KSE).

CONCLUSION

Intensive amount of research has been done on the relationship of the stock markets to that of interest rate. This relationship is also much important in the monetary policy implementation, and risk management practices. In theory the interest changes potentially alter the stock returns but the degree of change is different for various stocks markets. The financial market deregulation and liberalization of the financial institutions in Pakistan over the last two decades habe totally changed the financial markets fundamentals. This paper is all about testing the existence of the short and long run relationship between the interest rate and the stock prices and testing for the casual relationship between the interest rate and stock price. The empirical results show that their exist a significant short run and long run relationship between the interest rate and stock prices as evidenced from the results of Engel Granger co-integration test and Error-Correction Mechanism. But we failed to find out the casual relationship between the interest rate and the stock prices in case of Pakistan. The Engel Granger Casualty method is used to test the casual relationship between the two variables on either side but the results show that nor the interest rate is causing the stock prices nor the stock prices is causing the interstate rate in case of emerging markets like Pakistan.

REFERENCES

Alam and Uddin (2009). Relationship between interest rate and stock price: Emperical evidence from developed and developing countries. International Jiurnal of Business and Management, Vol 4, No 3.

Alsyah Abdul Rehman, Noor Zahirah Mohd Sidek and Fauziah Hanim Tafri (2009). Macroeconomic determinants of Malaysian stock market. African Journal of Business Management, Vol.3, No.3, pp 095-106.

Atilla Cifter and Alper Ozun (2008). Estimating the effects of interest rates on share prices in Turkey using a multi scale causality test. Review of Middle East Economics and Finance, Vol 4, No, 2.

Bargiota and dritsaki (2005). Macroeconomic determinants of stock price movements : An empirical investigation of the Greek Stock Market.

Basabi Bhattacharya and Jaydeep Mukherjee (2005). The nature of the causal relationship between stock market and macroeconomic aggregates in India: An empirical analysis.

Husni Ali Khrawish, Wlid Zakaria Siam and Mohammad Jaradat (2010). The relationships between stock market capitalization rate and interest arte: Evidence from Jordan. Business and Economics Horizons, Vol 2, Issue 2, pp 60-66.

Imran Ali, Kashif Ur Rehman, Ayse Kucuk yilmaz, Mohammad Aslam Khan and hassan Afzal (2010).Causal relationship between macroeconomic indicators and stock exchange prices in Pakistan. African Journal of Business Management, Vol. 4, No.3, pp 312-319.

John Y. Campbell and John Ammer (1993). What moves the stock and bond markets? A variance decomposition for long-term asset returns. The Journal of Finance, Vol, 48, No.1, pp 3-37.

Mohammad Nishat and Rozina shaheen (2008). Macroeconomic factors and Pakistan equity markets.

Ologunde A.O, Elumilade, D.O and Asaolu, T.O (2006). Stock market capitalization and interest rate in Nigeria: A time series analysis. International research journal of finance and economics.

Ramin Cooper Maysami, Lee Chuin Howe and Mohamad Atkin Hamzah (2004). Relationship between macroeconomic variableas and stock market indices. Journal Penguruson, Vol. 24, pp 47-77.

Shahid Ahmed (2008). Aggregate economic variables and stock markets in India.International Research Journal of Finance and Economics, Issue 14.

Varuna L. Ramala (2007). The comovement relationship between the macroeconomy and stock market in the Caribian region.

Wing-Keung Wong, Habibullah Khan and Jun Du (2005). Money, Interest rate and stock prices: New evidence from Singapore and the United States.

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