Equities as an Effective Hedge against Inflation: Empirical Evidence from Pakistan

*Afsar Ali Khan

**Muhammad Awais

***Haussaun A. Syed

*Muhammad Fayaz

Abstract

Inflation stance of world economy has change significantly and many of the investors now believe that there may be further spike in inflation in medium term. Capital markets serve as a medium to help mobiles the funds from one hand to another and aid in production of more goods and services. Due to political instability, spiking inflation and uncertain climate due to war on terrorism and other security issues, financial markets are not being able to get investors' trust resulting in lack of investment. Inflation which is measured by consumer price index (CPI) shows the overall upward movement in prices of goods and services. The rising prices in response to general inflation can protect investors by increasing the value of stocks in the equity market without affecting their real return. Pakistani economy largely remained impervious to the global financial crisis due to lower exposures to international finance faced multifaceted challenges on external and internal fronts mainly campaign against terrorism, unstable law and order situation, lingering energy shortages and non-materialization of external inflows. This work is limited to developed economies and less work has been done in the developing economies. In this way; this study will contribute a valuable insight regarding this relationship in the Pakistani context.

Key Words: Equities, Hedging, Inflation, Investors, Capital Markets, Political Instability

Introduction

Global financial crisis of 2007-2008 affected the confidence of international markets and institutions which in turn retarded the overall balance of payments across the world and economic developments. These crises felt to developing countries at the times when they were already having slower growth in their economies resulting in sluggish process of investments in good and service production and repercussion on process of investment and consumer markets.

*Ph.D Scholar, Department of Management Sciences, National University of Modern Languages (NUML), Islamabad, Pakistan

**Ph.D. Scholar, Iqra University Islamabad Campus, Pakistan

***Masters of Business Economics, Wilfrid Laurier University, Canada

This together with hike in oil and commodity prices led to decline in aggregate demand and raised inflation the world over. Resilience of Pakistani economy has been tested several times by one crisis after another. As Pakistan was experiencing war on terrorism and political instability, the effect was felt severely that in August 2008, Consumer Price Index moved to a record percentage of 25.8.

Additionally, the unprecedented calamity of floods in 2010 and torrential rain in Sind in 2011 contributed further stress on economy. Economic growth showed a decline during some past year. Budget deficit is stimulating a further decline in economic growth and boosting in inflation. According to the Annual Report of State Bank of Pakistan 2011, fiscal position of the FY11 turned the deficit to 6.6% of GDP while the target of deficit was set to be 4% of GDP. An increase of 1% in budget deficit brings 6-7 percent inflation in developing economies, Agha and Khan (2006).

A premium of inflation is added by the investors in real rate of returns when they base their required returns. It affects the attitude of investors in making the decision in a period of inflation, requiring more premiums on the equities, leaving behind the less investment in risky securities and more investments in inflation free securities for example in real assets (Martein 1978). According to Fischer (2011), during the period of higher inflation, investors tend to invest in fixed securities and get risk averse during investment process. Inflation creates uncertainty, decreases the value of money, and ultimately affects investment causing slowdown of economic activity. People tend to purchase stocks, precious metal, foreign currency and other durable assets to hedge against inflation. The theory suggests that stock returns should be positively related to the expected economic activity. The relation between stock returns and inflation suggests that investment in equity markets can act as a good hedge against inflation if the revenue and earnings of a company grow over time. This relationship is consistent with Fisher (1930) theory which asserts that a fully perceived change in inflation would be reflected through a rise in the nominal interest rates. That is, stock returns and inflation move in the same direction, in the long run. But in the late 1970's the relation between inflation are found significantly negative. For example, Schwert (1981) examined a negative relation between inflation and stock market.

The relationship between stock market returns and inflation has been subject to the extensive research especially in developed countries (Gerrit & Yace, 1999). This study also gains popularity among the researchers in the emerging markets after the back to back financial crises which results in high inflation. There are always risks associated with financial investment in any country. Stock market is a place in which there is no exception of risk for any investor. Investors always want to minimize the risk of their investment while gaining profit.

The biggest risk which is associated with the investment is mostly the rise in inflation, which results as the decrease in the purchasing power of any asset. Once the trend of equity market is

known to investors it becomes very easy to speculate the market. The aim of this study is to examine the impact of inflation on the stock market returns.

This study is significant for the investor who have fears to invest in the capital markets prevailed by high inflation. This study for the first time analyze the hedging ability of equities sector wise which will give the investors the information that which sector provide hedging against inflation. This study additionally used for the first time return on equity as measure of equity return to check the hedging ability of stocks against inflation. For this purpose this study took a long data period from 1975 to 2010 to examine the relationship between inflation and equity returns.

The purpose of the study is to investigate the hedging ability of common stocks against inflation. For this purpose this study will investigate the relationship between inflation and stock returns by using the market returns and accounting returns as proxies of stocks returns sectors wise.

Literature Review

Fisher's (1930) hypothesis states that expected rate of return is composed of real return plus expected rate of inflation. He indicated that there should be one to one relationship between expected inflation and nominal interest rates. He further stated that the real interest rates are independent from the changes in the expected inflation because the real interest rate is determined by the real factors. This is called Fisher effect or hypotheses. Generalizing this hypotheses to common stocks we can say that increase in inflation will result in the increase in the prices of stocks in the nominal form and has no effect on the stocks real value. Bodie (1976) supported this view and said that common stock are hedged against inflation because they have claim on the real asset therefore any change in the price level will not affect the common stock real returns. This means that earnings will increase with the inflation rate and the real return of equities will remain unchanged in long run. But he found out the negative relation of real return on equities to both unanticipated and anticipated inflation. He concluded that investors must sell short the stocks to protect him against inflation.

These general arguments help the investors to consider a positive relationship between the inflation and stock returns. But empirically evidence is totally mixed and the literature is not reached on any common consciences. The empirical findings of stock market returns and inflation relationship could be divided into three categories.

1) Positive relationship between inflation and stock returns which supports the Generalized Fisher hypotheses. Most of them support the Generalized Fisher hypotheses in long run [for example, (Firth, 1979; Boudoukh & Richardson, 1993; Spyrou, 2004; Rapach, 2002; Horobet & Dumitrescu, 2009; Anari & kolari, 2001; Elsharif, 2010; Adam & Frimpong, 2010; Eita, 2012; Luintal & Pyudyal, 2006; Kakilli et al., 2011; Schotman & Schweitzer, 2000)].

2) Negative relationship between inflation and stock returns which contradicts the Generalized Fisher Hypothesis for example, (Fama & Schwert, 1977; Fama, 1981; Reilly, 1997; Engsted & Tanggaard, 2000; Schwert, 1981; Loannides et al., 2002; Geetha et al., 2011; Wei, 2007; Shanmugam & Misra, 2008; Francis & Tewari, 2011; Amihud,1996)].

3) No relationship found between inflation and stock returns for example (Floros, 2004; Pearce & Roley, 1988; Jung et al., 2007).

Fama and Schwert (1977) conducted a study in this regard to estimate the hedging ability of various assets to the expected and unexpected inflation. They found out that US government bonds and private residential real estate where completely hedge against the expected and unexpected inflation. But they found out that common stocks returns have negative relationship with both expected and unexpected component of the inflation.

Anari and kolari (2001) found that the long run Fisher elasticity of stock prices with regard to goods prices which exceeds from unity range, which confirms the fisher effect. They also found that the response of stock returns to the changes on the prices of goods shows initially negative response but this negative response vanishes and become positive in the long run. Boudoukh & Richardson (1993) found that nominal stock returns and inflation are positively related with each other in the long horizon.

Elsharif (2010) found the results which supports the Generalized Fisher Hypothesis that the real return is independent from the changes in inflation and is positive. Therefore they concluded that the common stocks are hedged against the ravages of inflation in Malaysia.

Reilly (1997) used the dividend discount model to investigate that common stock are hedged against inflation or not. He found the negative relationship of inflation with the implied growth rate and concludes that common stocks are poor inflation hedge.

Engsted and Tanggaard (2000) they analyzed the relationship between the expected inflation, expected stocks and bond returns at both short and long horizons. They came with the result that the relationship among inflation and expected returns at all horizons are quite weak.

Schwert (1981) analyzed the reaction of stock market to the newly announced inflation. He found out that the reaction of the stock prices to the announcement of unanticipated inflation in the consumer price index was negative but this reaction was small in size.

Shanmugam and Misra (2008) investigate this relation in the Indian economy for the period of 1980 to 2004. They found the negative relationship between the stock returns and inflation and this negative inflation-stock return relation occurs as a result of unexpected element of the inflation. Francis and Tewari (2011) they examine that whether the Fisher effect They found out that in long run there exists a negative relationship between the inflation and equity returns in the

Ghana stock market. In long run however there are several studies which confirm the positive relationship between the inflation and stock returns and confirm the hedging ability of the equities.

Anari and kolari (2001) investigate the positive association of inflation and stock returns i-e Fisher effect by taking stock prices and the prices of goods data of the six industrial countries. They found that the long run Fisher elasticity of stock prices with regard to goods prices which exceeds from unity range, which confirms the fisher effect.

Boudoukh and Richardson (1993) analyzed the data of both US and UK form the period of 1820 to 1988. They conclude that nominal stock returns and inflation are positively related with each other in the long horizon.

Elsharif (2010) investigate the relationship between the inflation, money supply and real returns for Malaysian stock market. The results of all these models support the Generalized Fisher Hypothesis that the real return is independent from the changes in inflation and is positive. Firth (1979) investigates the relationship between common stock returns and inflation by using UK data. He tested the basic Fisher hypothesis in UK and found some support in favor of Fisher hypothesis.

Akmal (2007) examines the relationship between the stock returns and inflation in the Pakistani scenario and found the results supporting that the equities are hedged against inflation over long run, but he also found that equities are not hedged against inflation in short run. Shahbaz and Islam (2010) also found the result supporting the positive relationship between inflation and stock returns both in long and short run.

The most of the above mentioned studies examines the Fisher hypothesis but they describe only the nature of relationship and do not explain the causes of the negative relationship between inflation and stock returns which remain a puzzle. Although there are several explanation of this negative relationship emerged later. Feldstein (1985) proposed an explanation of this negative relationship. He argued that inflation increases the earnings of the firms in nominal form but on the other hand it also increases the tax burden on the firms, which reduces its after tax real returns and leads to low returns which results in decrease in value of firms equity. Fama (1981) empirically examined this inverse relationship between inflation and stock returns and said that it is due to proxy hypothesis.

Proxy hypothesis holds that the inverse relationship between equity returns and inflation is due to positive relationship between future economic growth and equity returns and an inverse relationship between inflation and future economic growth. Taking this point of view, inflation could be the proxy for economic growth and the negative relationship between equity returns and inflation are therefore should be interpret with care. Yeh and Chen (2009) explained the Fama

proxy hypothesis and argued that the purpose of the revised correlation is that when there is negative relationship between inflation and real activity and positive relationship between stock return and real activity, in such situation the negative relationship between stock returns and inflation holds. They also commented that the flow of this relationship is not direct. On the other hand Ram and Spancer (1983) reject the Fama (1981) proxy hypothesis which suggests the inverse relationship among inflation and real economic activity. They found strong empirical evidence which supports the Phillips curve analysis which states that there is positive association among inflation and real economic activity. The another hypothesis known as Reserve Causality Hypothesis is presented by Geske and Roll (1983) which explain the negative relationship between inflation and stock returns. They point out that the fiscal and monitory linkages explain the negative relationship among inflation and stock returns. This hypothesis states that the decrease in real activity not only reduces the stock returns but it also decreases the government revenues and it raises the fiscal deficit. To cover that deficits government through its central bank may borrow or issue new currency, which cause inflation. Thus due to monitory and fiscal linkages associated with inflation and stock return this negative relationship persists between them. According to money-illusion hypothesis presented by Modigliani and Cohn (1979) to explain this negative relationship between unexpected inflation and stock returns. They argued that unexpected inflation increases the nominal interest rates if the investors used these higher nominal interest rates to discount the future earnings and ignored the positive effect of inflation on the nominal earnings, their result will be incorrect and this behavioral error will undervalue the stocks.

Gordon and Hachman (1979) by using traditional present value model they gave suggestion about the conditions which leads towards the positive relationship between inflation and stock returns and also the suggestions which leads towards the negative relationship between inflation and equity returns. Campbell and Shiller (1988) confirmed the presence of two trends; it was also confirmed by the studies conducted by the Schotman and Schweitzer (2000) and Basse (2009). They argued that the positive and negative association between inflation and stock returns is due to two reasons; one trend which leads toward positive relationship is that inflation magnifies the revenues of the companies in nominal form, which increases the expected future dividend which in response affect the stock prices positively.

The other trend which leads to the negative effect of inflation to stock returns is that with increase in inflation the discount rate also increases via the Fisher effect which results in low stock prices due to which the negative relationship between inflation and equity returns are observed. These two alternative trends are known as earning channel and discount rate channel (Sharp, 2002).

Theory suggested that the eearning channel keep safe the investors from the ravages of inflation because the corporate earnings increase with increase in inflation. But Fons and Osterberg

(1986) argued that typically firms are not been able to match the decrease in profit with the decrease in expenses in a disinflationary environment. Sharp (2002) noted that inflation has negative effect on stock prices, the reason is that inflation decreases the growth of expected real earnings and raise the required real return or we can say that the inflation affect the stock returns negatively by lowering the potential of future earnings of corporate sector through the effect on its real growth, and by raise in discount rate. So we can clearly note that the equities are effectively hedged against inflation if there is a positive relationship between corporate earnings and inflation.

Research Methodology

This study explored the relationship between inflation, real growth rate, interest rate and corporate earnings to check the hedging ability of equities against inflation. This study used the annual data from 1975 to2008. By taking the macroeconomics prospective our focus was not on the Return on equity and stock prices of individual firms but we took the aggregate Return on equity (ROE) and Stock Index (SI) of non-financial sectors. Population of this study includes all the non-financial sectors listed on the Karachi Stock Exchange. We selected only five sectors from 1975 to 2008.

There are number of tests to check the relationship between the time series variables. The most widely used methods include fully Ordinary Least Square method, Engle and Granger (1987) test, maximum likelihood base Johansen (1988, 1991) and Johansen- Juselius (1990) tests. In this study we used Unit root test, Descriptive statistics, and Correlation and Auto regressive (AR) model to find out the impact of inflation on equities.

Let's assume that Y is a dependent variable and X is an explanatory variable. Then the linear regression model will be

$$E(Yt) = \alpha + \beta Xt \ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

In above equation E(Yt) is the expected value of "Yt" for a given value of "Xt", and "α and β" are the unknown population parameters. The t in the subscript shows that the data is time series data. The actual value of the dependent variable Yt will not always equal to its expected value of E(Yt) because there are several other factors that can affect its actual behavior. Therefore we write

$$Yt = E(Yt) + \mu t \ldots\ldots\ldots\ldots\ldots\ldots (3.2) \quad \text{Or}$$

$$Yt = \alpha + \beta Xt + \mu t \ldots\ldots\ldots\ldots\ldots\ldots (3.3)$$

In order to examine the impact of inflation, real growth rate and interest rate on the stock index and return on equity of the non- financial sectors listed on KSE. For this purpose we use econometric model by assuming the stock market index and ROE as dependent variables and

inflation, real growth rate and interest rate as explanatory variables. These models are:

Model 1

$$LSIt = \alpha + \beta1\ LINFt + \beta2\ RGRt + \beta3\ IRt + \beta4\ Dtex + \beta5Dcmi + \beta6Dcem + \beta7Dfp + \beta8Dsug + \mu t \ldots\ldots\ldots\ldots (3.4)$$

Model 2

$$ROEt = \alpha + \beta1\ LINFt + \beta2\ RGRt + \beta3\ IRt + \beta4\ Dtex + \beta5Dcmi + \beta6Dcem + \beta7Dfp + \beta8Dsug + \mu t \ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

Where:

LSIt = log of state bank general index of share price at time t.

ROEt = return on equity at time t.

INFt = log of Consumer price index (CPI) at time t.

RGRt = Real GDP growth rate at time t.

IRt = Interest rate at time t.

Dtex = Dummy of textile sector.

Dcmi = Dummy of chemical sector.

Dcem = Dummy of cement sector.

Dfp = Dummy of fuel and power sector.

Dsug = Dummy of sugar sector.

α = Constant.

β = Coefficient.

μt = Error term.

Equities as an Effective Hedge against Inflation: Empirical Evidence from Pakistan

Empirical Results

This chapter discusses the empirical result of this study.

Descriptive Statistics

Table 1. *Descriptive Statistics*

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
LnSI	5.2461	5.2481	6.8941	4.2087	0.5777
ROE	6.2492	7.9752	31.3527	-48.236	12.8340
LnINF	3.6515	3.6308	4.93934	2.3844	0.7487
RGR	5.3588	5.5500	9.00000	1.7000	1.9309
IR	8.7929	7.8550	14.9600	3.4300	3.5279

Table 1 shows the descriptive statistics of the variables. The average stock prices are 5.24 and the volatility in the stock prices are 0.57, which shows that the stock prices are less volatile. The average return on equity is 6.24 and the volatility from the average is 12.83. This shows that return on equity is more volatile. The average inflation during the period is 3.65 and the volatility in the inflation from its average is 0.74. This shows that inflation is less volatile. The Real Growth rate is 1.93 shows less volatility from its average as compare to the interest rate, return on equity and exchange rate having volatility of 3.52, 19.99 and 12.83 respectively. The average broad money shows less volatility of 1.34 from its mean.

Unit Root test

The Table 2 shows the result of the unit root test in order to determine the order of integration between the time series data. For this purpose ADF- Test and Phillips-Perron Tests are conducted to determine the order of integration between the time series data.

Table 2. *Unit Root test*

Variables	ADF-Level	PP-level
SI	-5.8652	-5.4980
ROE	-7.0420	-7.1230
LINF	-3.6231	-3.6729
RGR	-9.8755	-10.0340
IR	-3.8709	-3.6934
LM2	-3.8096	-3.8737
ER	-3.0832	-3.2110
1% Critic Value	-3.46921	-3.4692
5% Critic Value	-2.87851	-2.8785
10% Critic Value	-2.5759	-2.5759

The results of the unit root test clearly shows that all series are stationary at level by testing on both ADF-Test and Phillips – Perron test. The ADF and Phillip-Perron test statistic values of all series are greater than the critical values at 5% level. Therefore it can be easily said that the series are integrated of order zero I (0).

Correlation Matrix

Table 3. *Correlation Matrix of SI*

Variable	SI	LINF	RGR	IR	LM2	ER
LnSI	1					
LnINF	0.3173	1				
RGR	0.3231	-0.0476	1			
IR	0.0463	0.2788	-0.3163	1		

Table 3 shows the result of correlation matrix of stock index with three independent variables LINF, RGR, IR. The result shows that all variables are positively correlated with the dependent variable SI.

Table 4. *Correlation Matrix of ROE*

Variables	ROE	LINF	RGR	IR	LM2	ER
ROE	1					
LINF	-0.1018	1				
RGR	0.2488	-0.0476	1			
IR	-0.222	0.2788	-0.3163	1		

Table 4 shows the results of correlation between ROE and LINF, RGR and IR. The result shows that LINF, IR are negatively correlated with ROE and only the RGR is positively correlated with ROE.

Regression Analysis

Table 5. *Regression Analyses of Stock Price*

Dependent variable: Stock Index

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.81062	0.244136	15.60861	0.0000
LINF	0.242377	0.051914	4.668848	0.0000
RGR	0.108028	0.020377	5.301352	0.0000
IR	0.011946	0.0116	1.029756	0.3047
DTEX	-0.44798	0.117573	-3.81024	0.0002
DCMI	0.055964	0.117573	0.475996	0.6347
DF_P	-0.03273	0.117573	-0.27834	0.7811
DSUG	-0.24277	0.117573	-2.06485	0.0405
R-squared	0.3250			
Adjusted R-squared	0.2958			
F-statistic	11.1438			
Prob(F-statistic)	0.0000			
Durbin-Watson stat	0.8221			

Table 5 shows the results of the SI with the independent variables inflation, RGR and interest rate. The results show that the value of Durbin- Watson is 0.82 which is less than 1.60 indicates that the problem of auto correlation exists in the data.

In order to check the auto correlation in the data we will use Brush- Godfrey serial correlation LM-Test.

Table 6. *Detection of Auto-correlation*

Breush -Godfrey Serial Correlation LM Test:

F-statistic	61.55560	Prob. F(2,160)	0.0000
Obs*R-squared	73.92468	Prob. Chi-Square(2)	0.0000

The result of the Brush- Godfrey serial correlation LM-Test confirms the presence of the autocorrelation in the data, because the value of Prob.Chi- Square is highly significant as the value of $P < 0.05$.

In order to remove the autocorrelation from the data we will use the auto regression model.

Table 7. *Autoregressive Model of Stock Price*

Dependent variable: Stock Index

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.594744	0.51466	6.9847	0.0000
LINF	0.623657	0.087694	7.111778	0.0000
RGR	0.006185	0.011917	0.519001	0.6045
IR	-0.04172	0.024155	-1.72714	0.0861
DTEX	-0.68661	0.453125	-1.51527	0.1317
DCMI	-0.1421	0.300812	-0.47239	0.6373
DF_P	-0.28513	0.369592	-0.77146	0.4416
DSUG	-0.38048	0.40251	-0.94526	0.346
AR(1)	0.837535	0.055609	15.06127	0.0000
R-squared	0.6939			
Adjusted R-squared	0.6786			
F-statistic	45.3357			
Prob(F-statistic)	0.0000			
Durbin-Watson stat	1.7629			

Table 7 shows the result after removing the autocorrelation from the data. The result shows that LINF has positive significant relationship with the stock index. This suggests that with the increase in inflation the SI of the selected sectors will also increases. The coefficient of LINF 0.62

means LINF positively affect SI that is with one unit increase in LINF the SI of selected sectors will also increase by 0.62 keeping all other variables consistent. RGR has the insignificant positive in relation with the SI because the probability value of RGR is P< 0.05. The interest rate (IR) has the negative significant in relation with the SI at the 10% confidence level. The coefficient of IR is -0.04 which shows that one unit increase in IR will decrease the SI by 0.04. Means that increase in interest rate decrease the stock index because investors move their investment from equity market to the bond market and vice versa. The dummy variables of all sectors have the P> 0.05, which means that the effect of all sectors is same on the dependent variable SI. The AR (1) is significant at 5% confidence interval which shows that there is no autocorrelation exists in the data which is also confirmed by the Durbin- Watson value which is 1.76. The value of R-Square is 0.69 which means that the independent explain 69% of the dependent variable. The value Prob (F-statistics) is zero shows that the model is good fit.

Table 8. *Regression Analyses of Return on Equity*

Dependent variable: ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.045695	5.29311	1.520032	0.1305
LINF	-0.86726	1.125542	-0.77053	0.4421
RGR	1.293763	0.441802	2.928374	0.0039
IR	-0.50732	0.251507	-2.01711	0.0453
DTEX	-6.7738	2.549104	-2.65732	0.0087
DCMI	10.89422	2.549104	4.273744	0.0000
DF_P	4.660564	2.549104	1.828315	0.0693
DSUG	-1.10843	2.549104	-0.43483	0.6643
R-squared	0.3157			
Adjusted R-squared	0.2861			
F-statistic	10.6773			
Prob(F-statistic)	0.0000			
Durbin-Watson stat	1.1573			

Table 8 shows that Durbin- Watson stat value is 1.15 which is less than 1.60 shows that the problem of autocorrelation is present in the data.

TO check the presence of autocorrelation in the data we will Brush- Godfrey serial correlation LM- Test.

Table 9. *Detection of Auto-correlation*

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	17.70481	Prob. F(2,160)	0.0000
Obs*R-squared	30.80521	Prob. Chi-Square(2)	0.0000

Table 9 shows the Breush-Godfrey Serial Correlation LM Test indicates the presence of autocorrelation in the data. The value of Prob Chi- Square is highly significant as the $P < 0.05$.

In order to remove autocorrelation we employ the auto regression model.

Table 10. *Autoregressive Model of Return on Equity*

Dependent variable: ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.811327	6.82757	1.144086	0.2543
LINF	-0.54216	1.568294	-0.3457	0.7300
RGR	0.953713	0.393816	2.421724	0.0166
IR	-0.57324	0.353947	-1.61958	0.1073
DTEX	-5.50465	4.060957	-1.35551	0.1772
DCMI	13.29632	3.978821	3.341774	0.0010
DF_P	6.692753	4.054317	1.650772	0.1007
DSUG	-0.48137	4.03244	-0.11938	0.9051
AR(1)	0.433474	0.072569	5.973311	0.000
R-squared	0.4407			
Adjusted R-squared	0.4128			
F-statistic	15.7626			
Prob(F-statistic)	0.0000			
Durbin-Watson stat	1.9218			

Table 10 shows the results after applying the auto regression model. After removing the autocorrelation LINF remains insignificant negative in relation with ROE. It means that inflation has no effect on the ROE. RGR is significant and positive in relation with ROE. This means that one unit increase in RGR will bring 0.95 increases in the ROE. The result real growth rate indicates that ROE increases with increase in the RGR. The results also show that the ROE is negatively affected by IR as its value is significant at 10% confidence interval. The dummy variables of the all sectors under investigation have insignificant at 5% confidence interval except the dummy of chemical sector which shows that all sectors have not same effect on the dependent variable ROE. The value of R- square is 0.44, which shows that independent variables explain 44% of variation in the dependent variable. The value of Prob (F-statistics) is zero which shows that model is good fit. The value of Durbin- Watson stat is 1.92 which shows that data is free from autocorrelation.

Conclusion & Recommendation

This study explores the relationship among equity returns and inflation for non-financial sectors in Pakistan by using Autoregressive (AR) model in order to find out that equities are hedged against inflation or not. Inflation hedging have several definitions (a) the stocks are hedge against inflation if the nominal rate of return on equities increases with increase in inflation or the possibility of negative real rate of return must be reduced, (b) According to other definition that the real return must be independent of inflation.

The result of the study shows that inflation has positive and significant relationship with the stock prices, which shows that increase in inflation results as increase in stock prices. This supports our hypothesis that with increase in inflation stock prices and equity returns also increase in nominal form which helps the management to stabilize the real earnings. On the other hand real growth rate has positive but insignificant relationship with the stock index. This show that the stock index is not affected by the change in real growth rate. Interest rate shows negative and significant relationship with stock index at 10% confidence level, this negative relationship of interest rate with stock index shows that when interest rate increases the investors move their investment from equity market to bond market in search of high returns. The results of all dummy variables show that the relationship of all sectors same with the dependent variable. The relationship of inflation with ROE is negative but insignificant, which shows that inflation has no impact on ROE. The real growth rate has positive and significant relationship with ROE. This shows that ROE only increases with increase in RGR because with increase in output of company the company after tax profit also increases. Interest rate has negative and significant relationship with ROE at 10% confidence interval. The dummy variable of all sectors shows same relationship with dependent variable ROE except the chemical sector.

The overall result of this study concludes that the equities are hedged against inflation by using stock index. By using ROE as dependent variable results confirms that inflation has no effect on the ROE which shows that it is independent from changes in inflation. However, ROE is influenced by RGR; this result is in accordance with the first definition of inflation hedging described by the Bodie (1976) that real return must be independent of inflation. By using stock index as dependent variables the results shows that inflation and stock index move in same direction means that with increase in inflation stock index also increase. This result is in accordance with the second definition of inflation hedging described by Bodie (1976), that the stocks are hedge against inflation if the nominal rate of return on equities increases with increase in inflation or the possibility of negative real rate of return must be reduced.

Limitation of the study and future research direction

This research study investigates the relationship between inflation and corporate earnings in the context of hedging ability of stock against inflation. This study analyzes for the first time this relationship sectors wise. Beside the fact that this study gives important contribution to the existing literature but there are some limitation which will be used for future research study. These limitations are:

1. The study uses only yearly data, it should also be checked on the monthly data, because inflation rate announced every month.
2. This study checked the hedging ability of the stock between different non-financial sectors of Pakistan, it should also be checked to in developed and developing countries.
3. There are three measures of inflation in Pakistan, named consumer price index, whole price index and sensitivity price index. They differ from each other with respect to it calculation and date of announcement. Therefore it should be check whether by using other proxies the hedging ability of equities remains same or not.
4. This study only checks the hedging ability of stock against inflation. It is also recommended that researcher also check the hedging ability of other investment opportunities like investment in gold, oil and commodities which are also considered as inflation hedged. This will give more option to investors for safe investment.

References

Agha, A. I., & Khan, M. S. (2006). An empirical analysis of fiscal imbalances and inflation in Pakistan. *SBP research Bulletin, 2*(2), 343-362.

Akmal, M. S. (2007). Stock returns and inflation: An ARDL econometric investigation utilizing Pakistani data. *Pakistan economic and social review*, 89-105.

Anari, A., & Kolari, J. (2001). Stock prices and inflation. *The Journal of Financial Research, 4*, 587-602 , 17.

Basse, T., Friedrich, M., & Bea, E. V. (2009). REITs and the financial crisis: Empirical evidence from the US. *International Journal of Business and Management, 4*(11), P3.

Bodie, Z. (1976). Common Stocks as a Hedge Against Inflation. *The Journal of Finance, 31*(2).

Boudoukh, J., & Richardson, M. (1993). Stock Returns and Inflation: A Long-Horizon Perspective. *The American Economic Review, 83*(5), 1346-1355.

Campbell, J. Y., & Shiller, R. J. (1988). The dividend-price ratio and expectations of future dividends and discount factors. *Review of financial studies, 1*(3), 195-228.

Elshareif, E. E. (2010). Stock prices and inflation in Malaysian equity markets. *Khartoum University Journal of Management Studies, 3*(2).

Engsted, T., & Tanggaard, C. (2002).The relation between asset returns and inflation at short and long horizons. *Journal of International Financial Markets, Institutions and Money, 12*(2), 101-118.

Fama, E. F. (1981). Stock returns, real activity, inflation, and money. *The American Economic Review, 71*(4), 545-565.

Fama, E. F., & Schwert, G. W. (1977). Asset returns and inflation. *Journal of financial economics, 5*(2), 115-146.

Feldstein, M. S. (1981). Inflation, capital taxation, and monetary policy.

Firth, M. (1979). The Relationship Between Stock Market Returns and Rates of Inflation. *The Journal of Finance, 34*(3), 743-749.

Fisher, I. (1930). The Theory of Interest Rate, *New York, 43*.

Fons, J. S., & Osterberg, W. P. (1986). Disinflation, equity valuation, and investor rationality. *Federal Reserve Bank of Cleveland Economic Review, 22*, 2-10.

Francis, T., & Tewari, D. D. (2011). Stock returns and inflation: An autoregressive distributed lag (ARDL) econometric investigation on Ghana. *African Journal of Business Management, 5*(26), 10550-10556.

Geske, R., & Roll, R. (1983). The fiscal and monetary linkage between stock returns and inflation. *The Journal of Finance, 38*(1), 1-33.

Gordon, M. J., & Hochman, S. (1978). The impact of inflation on share yields and holding period returns. *Inflation and Capital Markets*, 33-41.

Modigliani, F., & Cohn, R. A. (1979). Inflation, rational valuation and the market. *Financial Analysts Journal*, 24-44.

Reilly, F. K. (1997). The impact of inflation on ROE, growth and stock prices. *Financial Services Review, 6*(1), 1-17.

Schotman, P. C., & Schweitzer, M. (2000). Horizon sensitivity of the inflation hedge of stocks. *Journal of Empirical Finance, 7*(15), 301–315.

Schwert, G. W. (1981). Using financial data to measure effects of regulation. *Journal of law and Economics, 24*(1), 121-158.

Shahbaz, M., & Islam, F. (2010). Stocks as hedge against inflation in Pakistan: Evidence from ARDL approach.

Shanmugam, K., & Misra, B. S. (2008). Stock Returns-Inflation Relation in India. *Financial Research Reivew, 15*.

Sharpe, S. A. (2002). Reexamining stock valuation and inflation: The implications of analysts' earnings forecasts. *Review of Economics and Statistics, 84*(4), 632-648.