Equity Returns, Inflation and Real Growth in Pakistan

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Abstract

Study investigates the relationship between stockholders' return, real growth rate and inflation using return on equity as measure of shareholders' return. Annual data on intended variables for non-financial companies listed on Karachi Stock Exchange has been collected from 1966 to 2010(44 years). Taking a macroeconomic perspective, study uses aggregate data rather than data for individual firms. Autoregressive Distributive Lag is used to study the relationship. Results revealed that inflation has no relationship with shareholder' return in both long run and short run, while real growth shows significantly positive association with shareholder's return. We concluded on basis of our analysis that inflation has no direct relationship with shareholders' return. Thus, investment in stocks is not an effective hedge against inflation. Study has implications for investors who should invest in stocks by analyzing the real economic activity of the economy rather than inflation. Although, the data was huge enough to study this relationship, we feel that a better statistical approach to study this relationship can provide further insights.

Keywords: Pakistan, inflation, equity, non-financial companies

1. Introduction

Does the investment in stocks provide a real hedge against inflation? The question remains confusing despite many studies tried to address the issue from different perspectives. The discussion on the topic can be traced back to Irving Fisher (1930) who proposed the relationship among nominal interest rate, real interest rate and inflation in his book "The Theory of Interest". Although this relationship was proposed for interest rate, researchers extended it to returns from other risky assets such as stocks. For example Bodie (1976) used the Fisher's proposition to study relationship between inflation and stock returns and concluded that the stocks could be an effective hedge for inflation because stocks are the claims on real assets and worth of real assets is dependent upon their ability to generate future cash flows not their market price, thus any change in equity prices would not affect this claim in real terms. Also according to this explanation, stocks are claims on future earnings, which could be sufficient evidence to confirm that in long run, stock can be an effective hedge for inflation. Many researchers conducted studies to test the Fisher's hypothesis and found that socks can serve as effective hedge for inflation (Reilly, 1997; Rao & Bhole, 1990; Luintel & Paudyal, 2006; Francis & Tewari, 2011; Kolari & Anari, 2001; Boudoukha & Richardson, 1993). It means that any increase in inflation would be accompanied by a corresponding increase in share prices thus investors are paid off for this increase in inflation.

However, results from several studies were reported to be contradicting the Fisher hypothesis. For example, Lintner (1975), Fama (1982), Geske and Roll (1983) and Asprem (1989) found a negative relationship between inflation and real stock returns but, they did not explain this relationship. This anomaly is generally known as "a stock return-inflation puzzle". Feldstein (1980) argued that in an inflationary environment, fake capital gains are generated by appraisal of inventories and depreciation. These gains are taxable and firms have to face increased tax liabilities. These increased taxes reduce real after tax earnings. This consideration of effect of inflation by investor causes a reduction in valuation of common stocks and thus inflation creates negative movement in prices of stocks. Fama (1981) explained negative association of inflation to stock returns on the basis of demand and quantity theory of money. He argues that increase in inflation causes decrease in real economic activity and

money demand. Firms' future profits are negatively affected by reduced economic activity and thus share prices decrease. He attributes this inverse association of stock returns and inflation to "proxy effect" because inflation's unfavorable effect on economic activity is cause of negative relationship between stock returns and inflation. Fama further explains that if effect of real output growth is controlled then the negative relationship between stock returns and inflation disappears. Geske and Roll (1983), presented another explanation of the negative association of stock returns and inflation which is known as "The Reverse Causality hypothesis". They found a reverse causality between inflation and real output. That is a decrease in real activity affects adversely not only the stocks return but also the inflation. According to them decrease in real activity reduces the revenues of government and raises the fiscal deficit. The central bank finances the fiscal deficit which increases the money supply, thus inflation increases.

Although there is abundant literature on this topic but most of these studies focused capital gains (changes in stock prices). Only a couple of studies (Basse, 2009; Basse & Reddemann, 2011) have been found which focus on dividend payments and inflation. Moreover, the majority of these studies are conducted on developed countries particularly the USA. Only few studies are carried out on developing countries. The characteristics of these stock markets are unique such as their unique transmission mechanisms which mediate monetary policies and real activity (Chatrath et al., 1997).

The mixed findings from previous studies led the researchers term the relationship between inflation and stock return as "stock return-inflation puzzle". In a vibrant macroeconomic environment, the puzzle may create a doubt in the mind of investors' who are interested to invest in stocks but hesitate due to unclear relationship between stock returns and inflation. This may keep them away from investing in stocks and capital markets may not effectively perform their role of mobilizing the funds for production of more goods and services in the economy.

This study aims to analyze the relationship between inflation and share holders' return in form of return on equity by taking into consideration the real output. Motivation to explore this topic from a different angle comes from three facts 1) previous studies on this topic have shown mix results and this fact is known as "stock return-inflation puzzle". 2) Previous studies have mostly focused on capital gains and dividend payments as a measure of return to equity holders whereas according to our proposition, return on equity can be substituted to cover both capital gains and dividend payments. 3) Most of the studies have focused developed countries like US etc. and according to our best estimates no such study has been conducted in Pakistan.

The study presents a new dimension to the question of whether equities are effective hedge against inflation or not, by introducing return on equity as measure of share holders' return while answering to this question, previous studies have focused either on capital gains or the dividend payments. Moreover, this study would contribute to literature by focusing on developing countries like Pakistan. Studying Pakistani economy is important because it is currently facing some serious challenges due to political instability, spiking inflation and uncertain climate owing to war on terrorism and other security issues. Under such situations, the financial markets are not being able to get investors' trust resulting in lack of investment. The results of this study can help financial markets to win investors' trust back. On the practical side, the investors who are interested to invest in stock market would benefit from this study by getting out of "Stock return-inflation puzzle" and clearing their mind as to whether stocks provide effective hedge or not

2. Literature Review

Fischer (1930) for the first time studied the relationship among real returns, nominal returns and inflation. He presented his theory known as "Fisher Hypothesis". Applying Fisher Hypothesis to stocks, researchers argue that stocks can act as effective hedge against inflation. Researchers explain this mechanism as general price level increase in the economy; it causes an increase in nominal value of shares and thus inflation does not affect the real value of stocks.

Stocks are considered to be an effective hedge against inflation to many investors, because common stocks are considered to be claims on real capital of the company. Financial analysts need to address corporate earnings while examining the relationship between inflation and equity market.

In an inflationary macroeconomic environment, firms are able to increase their revenues. Thus with the growth of inflation, nominal earnings should also grow, enabling management to have stabilized real earnings. These general arguments can help investor to consider such relationship of stock returns and inflation.

But empirical evidences are contrary to the explanation and Fischer hypothesis does not move straight. For example, Fama and Schwert (1977) and Bodie (1976) found a negative association between equity returns and

inflation. This negative association of inflation and equity returns is also empirically examined by many researchers (Cohn & Lessard, 1981; Geske & Roll, 1983; Gultekin, 1983; Marshall, 1992; Amihud, 1996; Engsted & Tanggaard, 2002).

Fama (1981) suggested that in order to estimate the returns, income growth should also be considered. One cannot reject Fischer hypothesis if income growth is included in the function. It is the proxy hypothesis that explains the negative association of equity returns and inflation. Some studies found a long run positive association of dividend and stocks, these findings confirmed that stocks are inflation hedged. For example, Rao and Bhole (1990) reported a positive association of equity returns and inflation in India. Similarly results of several other studies (Kolari & Anari, 2001; Luintel & Paudyal, 2006; Francis & Tewari, 2011) also confirmed a positive relationship in their study. Moreover, Campbell and Shiller (1988) examined dual association of inflation and equity returns. At one end, inflation creates uncertainties compelling investors to require more returns and hence high discount rates leading to low returns, because returns are present value of all expected cash flow. On the other end, inflation magnifies the revenues leading to higher expected returns. Over all net effect remains positive in long run.

To many investors, the negative association of equity returns and inflation is a puzzle. For example a negative association of inflation announcements to the equity market is found by Schwert (1981). He named the inverse association of stock returns and inflation as "inflation-equity returns mystery. Feldstein (1982) claimed that cause of inverse association of stock returns and inflation are the tax laws. Additionally, price system gets distorted due to high inflation and slows down the economic growth (Faria & Carneiro, 2001; Barro, 1996). According to Fama (1981), the inverse association of inflation and stock returns exists because of the proxy hypothesis. Proxy hypothesis states that the negative association of inflation and stock returns is the presence of two other relationships. One is a positive association of future economic growth and equity returns, the second is a negative association of future economic growth and inflation.

One can observe two trends in different studies, for example, Gordon and Hochman (1978) model suggests the conditions at which a dual correlation of stock returns to inflation can be observed. Campbell and Shiller (1988) confirmed that two trends are presents; it is also confirmed by other researchers (Schotman & Schweitzer, 2000; Basse, 2009; Basse & Reddemann, 2011). It is due to two reasons, one is that firms' revenues increase in nominal terms owing to inflation, this leads to increased expected earnings further leading to positive association of stock returns and inflation. This is known as "earning channel". Second is Fischer effect or higher discount rates due to inflation leaving behind low share prices due to which negative relationship is observed between inflation and equity returns. This is known as "discount rate channel".

As corporate earnings magnify with inflation in nominal terms, earning channel can be the source of protection for investors against unexpected inflation shocks. So through earning channel, in which a positive association of inflation and corporate earnings exist, equities can be useful hedge against inflation. Investors can protect themselves from inflationary pressure by purchasing common shares. So there should be a positive association between inflation and stock holder's return if equities are effective hedge against inflation.

3. Research Methodology and Data Description

3.1 Data Description and Variables

This study explores the relationship between shareholders' return and inflation by taking into consideration the real growth rate. Annual data for non-financial companies listed on Karachi Stock Exchange has been collected from 1966 to 2010 (44 years). Taking a macroeconomic perspective, study uses aggregate data on intended variables rather than data for individual firms. Sources of the data are the State Bank of Pakistan's hand book of statistics on Balance Sheet Analysis of all non-financial companies listed on Karachi Stock Exchange and Pakistan Bureau of Statistics' annual GDP rates.

3.2 Inflation

There is a common belief that the equity market can act as an effective hedge against inflation because stocks represent claims on real capital. Accepting this argument, inflation should lead to higher stock prices by increasing the nominal value of real capital. Additionally, inflation magnifies the revenues of the corporate sector leading to higher earnings which in turn leads to an increase of stock prices.

Inflation is measured using annual inflation rates reported by State Bank of Pakistan. In fact, monetary policy makers in Pakistan use Consumer Price Index (CPI) as measure of inflation so did us. The reference base period of CPI is 1966–2010.

3.3 Return on Equity

As return on equity represents total return to equity holders, study considers return on equity for financial companies. Taking a macroeconomic perspective, individual companies are not the focus of this study so aggregate earnings (Return on Equity) of all non-financial companies are considered. Return on Equity (ROE) is used as a proxy for shareholders' return. Data period for ROE is 1966–2010.

3.4 Real Growth Rates

As proxy hypothesis suggests that negative relationship between inflation and stock returns is due to a positive relationship between stock returns and real output, and a positive relationship between inflation and real output. This study includes real GDP rates as a measure of real output in Pakistan. Pakistan Bureau of Statistics' annual data on Real GDP rates is our data source. Data period for Real GDP rates is 1966–2010.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1 below shows descriptive statistics for data on three variables ROE, INF and RGR. Values of Skewness and Kurtosis are of our primary interest to check the normality of data. As a rule of thumb, the values of Skewness lie between -1 and +1 for all the three variables, thus symmetry of data is indicated. The value of Kurtosis around 3 indicates a normal distribution for given data set.

Table 1. Descriptive statistics

	ROE	INF	RGR
Mean	0.158466	0.098705	0.052773
Median	0.1545	0.0875	0.057
Maximum	0.295	0.238	0.098
Minimum	0.051	0.025	0.016
Std. Dev.	0.053895	0.059417	0.023659
Skewness	0.640281	0.985171	-0.514034
Kurtosis	3.950972	3.186975	3.081277

4.2 Unit Root Test

Unit root test is applied to check stationarity of data. Within unit root test, Augmented Dicky Fuller and Phillip Perron are most widely used tests. As the values of skewness and kurtosis in table 1 showed that our data is normal so we used ADF while Phillip Perron can be used when data is not normal. Table 2 below shows the results of unit root test at intercept, and intercept and trend. It can be seen that return on Equity and Inflation are stationary at first difference while Real growth rate is stationary at level. Values at intercept, and Intercept and trend show similar results, this is another indication of normality of data because for non normal data, intercept and intercept and trend show conflicting results.

Table 2. Augmented dicky fuller

	Intercept		Intercept and Trend	
	At level	1st Difference	At level	1st Difference
ROE	-2.689886	-7.242735	-3.0022	-7.144415
RGR	-5.472459		-5.502472	
INF	-2.83288	-5.852867	-2.780595	-5.797646
1% level	-3.592462	-3.592462	-4.186481	-4.186481
5% level	-3.592462	-2.931404	-3.51809	-3.51809
10% level	-2.603944	-2.603944	-3.189732	-3.189732

4.3 Diagnostic Tests

Diagnostic Tests are applied to check for serial correlation, functional form, normality and Heteroscedasticity. Results of these tests are shown in Table 3.

Table 3. Diagnostic tests

Item	Test Applied	CHSQ (χ2)	Prob.
Serial Correlation	Lagrange Multiplier Test	.57692	.448
Functional Form	Ramsey RESET Test	.79667	.372
Normality	Test of Skewness and Kurtosis	1.1214	.571
Heteroscadasticiy	White General	.66036	.416

The null hypothesis of all these tests is that the corresponding issue does not exist. For example for serial correlation, Lagrange Multiplier has null hypothesis that serial correlation is not present. Similarly other tests also hypothesize that corresponding issues (Functional form, normality and heteroscadasticiy are not present. The p value for all these tests is more than 0.05 thus we fail to reject the null hypotheses of these tests. Hence we can conclude that our data does not have any of these issues. As the data is stationary at different levels, we applied ARDL to examine the long run relationship as proposed by Pesaran and Shin (1999). Lag length selected is one basis of Schwarz Bayesian Criterion.

4.4 ARDL Approach

Table 4 presents the results of ARDL. General equation for ARDL is as follows:

$$\Delta ROE_t = \beta 0 + \sum \psi i\, \Delta RGR_{t-i} + \sum \beta i\, \Delta INF_{t-i} + \mu_t$$

Table 4. ARDL Estimates based on Schwarz Bayesian Criterion

Regressor	Coefficient	Standard Error	T-Ratio	Prob
ROE(-1)	.81172	.099677	8.1435	.000
INF	.018229	.098335	.18538	.854
RGR	.49604	.25249	1.9646	.050
R-Squared			.46560	
R-Bar-Squared			.43819	
F-stat.			16.9894(.000)	

Value of F-Stat is highly significant at p<0.05 indicating significance of the model. As can be seen in 2nd row of table 4, that coefficient of inflation is insignificant at p>0.05; While Real Growth Rate is statistically significant and positive. Result of the inflation and investor's returns are against our expectation that inflation and return should be positive according to earning channel.

4.4.1 Estimated Long Run Coefficients

Table 5 displays the results long term coefficients under ARDL Approach. Results reveal that inflation has a positive but statistically insignificant long run relationship with earnings (return on equity) while real growth rate is significantly related to return on equity. Thus long run relationship among inflation, return on equity and real growth rate remain same as it exists in short run. However, we further explored this relationship by applying error correction mechanism.

Table 5. Estimated long run coefficients

Regressor	Coefficient	Standard Error	T Ratio	Prob
INF	.096822	.4991	.19396	.847
RGR	2.6347	1.0110	2.6061	.013

4.4.2 Error Correction Mechanism

Error Correction Representation of above long run relationship is reported in following table 6 below. The ECM captures the short-run dynamics of relationship among inflation, real growth rate and return on equity.

$$\Delta ROE_t = \beta 0 + \sum \beta i\, \Delta RGR_{t-i} + \sum \lambda i\, \Delta INF_{t-i} + ECM + \mu_t$$

Table 6. Error correction mechanism

Regressor	Coefficient	Standard Error	T-Ratio	Prob
dINF	.018229	.098335	.18538	.854
dRGR	.49604	.25249	1.9646	.057
ecm(-1)	-.18828	.099677	-1.8889	.0501

$$ECM = ROE - 2.6165*RGR - .091488*INF$$

Error correction results reveal that inflation has statistically insignificant negative relation with the earnings in short run while real growth rate has positive shot term relationship with earnings. The Coefficient of the ECM term suggests that adjustment process is quite fast and 18.8% of the previous year's disequilibrium in earnings from its equilibrium path will be corrected in the current year.

4.4.3 CUSUM and CUSUMSQ Statistics

CUSUM and CUSUMSQ plots are drawn to check the stability of short run and long run coefficients in the ARDL error correction model. If the plots of CUSUM and CUSUMSQ statistics stay within the critical bonds of 5% level of significance, the null hypothesis of all coefficients in the given regression are stable cannot be rejected.

Figure 1 shows the cumulative sum of recursive residuals whereas Figure 2 displays the cumulative sum of squares of recursive residuals.
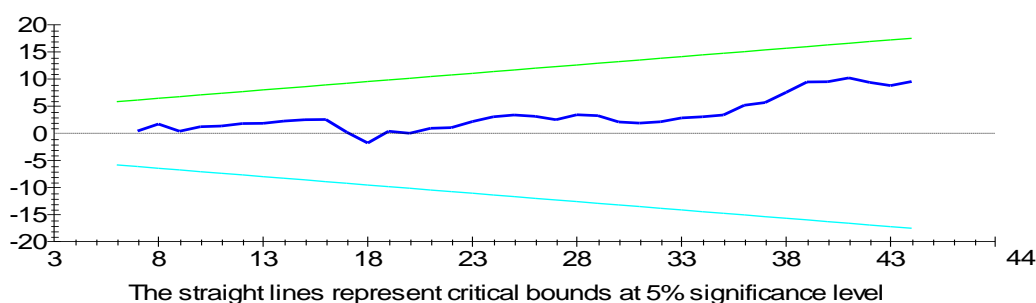

The straight lines represent critical bounds at 5% significance level

Figure 1. Plot of cumulative sum of recursive residuals

The straight lines represent critical bounds at 5% significance level
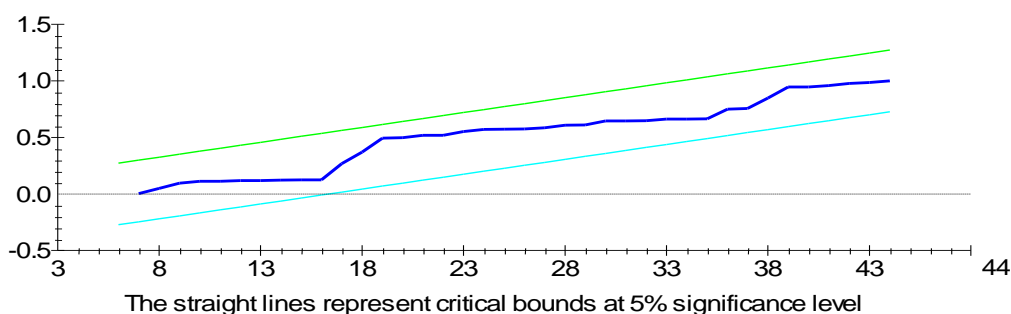
Figure 2. Plot of cumulative sum of squares of recursive residuals

Figure 1 and 2 show that both CUSUM and CUSUMSQ are within the critical bounds of 5% so it indicates that the model is structurally stable.

5. Conclusion

Study attempts to examine the puzzling relationship between inflation and shareholders' return by taking return on equity as measure of shareholders' return. Real Growth Rate is also considered because Fama (1981) proposed relationship between inflation and shareholders' return exists due to two other relationships. The study presents a new dimension to the question of whether equities are effective hedge against inflation or not, by introducing return on equity as measure of share holders' return.

We could not examine the association between inflation and returns of the shareholder while answering to this

question and concluded on basis of our analysis that inflation has no direct relationship with shareholders' return. Effects of real growth are greater in both long and short run. This significant relationship between returns and real growth rates can be justified through Supply-side models. These models are based on the theory that share holder's returns are based on the productivity of the particular real economy and returns cannot fall short or exceed the growth rate of the very economy. Investors should weight real economic activity more when deciding for investment in stocks.

Although, the data was huge enough to study this relationship, we feel that a better statistical approach to study this relationship can provide further insights. Moreover, it would be very interesting to analyze this relationship in different economies to understand this dynamic with some more insights.

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