Does Stock Returns act as Hedge against Inflation in Pakistan? An empirical Analysis

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Abstract

Pakistan is a developing country and persistently experienced rapid shocks and trends in stocks returns and inflation especially from last two decade. Though, inflation is not a real economic activity, however most of the economist and policy ^{makers} believe that rapid changes in price level disturb economic activities that create uncertainty and instability in overall economy. That's why, this study attempts to empirically investigate Fisher hypothesis that stock returns act as hedge against inflation in case of Pakistan using monthly time series data for the period of 2000:I-2016:IV. The results of the study significantly support Fisher hypothesis and found that both in short and long run stock returns act as hedge against inflation in Pakistan. Further, the study also found bi-directional relation between stock returns and inflation. The ARDL regression analysis, Granger Causality, ARDL bound testing, ARDL co-integration and long form, diagnostic and stability tests were applied as an analytical technique.

Keywords: Fisher Hypothesis, Stock Returns, Inflation, ARDL Approach, Granger Causality and Stability Analysis.

Background of the Study

The close connection is assumed to be present among domestic inflation rate and stock returns. In case the money value reduces during hyperinflation, at that point inflation rate affects risk ratio of stock exchange. The risk here is characterized as reduction in returns on securities, while securities' return or value is defined in financial terms; at that point a decrease in the value of money amid high inflation suggests a decrease in stock returns value. Hypothetically, the connection between stock returns and inflation rate is underlined on theoretical economics. Economic hypothesis sets that inflationary trends dissolve money value of currency, consequently influencing a given unit of cash to buy less products.

According to Fisher Theory (1930) nominal returns depends on expected real interest rate and expected inflation. Bodie (1976) deeply analyzed the work of Fisher and stated that actual stock returns is the function of unexpected and expected returns from variation in rate of inflation as well as nominal returns on stocks. The theoretical literature of finance in this regards states that a nominal and present return on stock prices depends upon the future dividends and dividends depend on real economic activities. Though, inflation is not a real economic activity and most of the economist and policy makers believe that rapid changes in price level disturb economic activities that create uncertainty and instability in overall economy. Fisher theory (1930) proposed that there is direct or positive relation between stock price returns and expected inflation. Many researchers had found positive and considerable relation between stock returns and expected

inflation that strongly supports Fisher Hypothesis (Reilly et al., 1970; Bodie, 1976; Geske & Roll, 1983; Crosby & otto, 2000).

The negative relationship between inflation rate and stock returns is therefore; in accordance with hypothesis proposes recommendations that high inflation rate raises the average cost for basic necessities and a shift of assets from investment activities to consumer utilization. This prompts to decrease in demand for dividends and securities and hence prompts decrease in the volume of trades stock securities as well as stock exchange returns. (Fama, 1981; Ozurumba 2012).

Specifically, local rate of inflation affects stock exchange returns due to high inflation in a particular time period; individuals effortlessly perceive that securities exchange is in a condition of risk or trouble, subsequently, individuals are laid off from their employments, which could result in low output production. In case individuals are laid off, they tend to change their assets to utilization of fundamental necessities of life and give up interest and business in capital market. This is due to the diminishing value of money whereupon stock returns are based, and accordingly individuals' rationality disallows to invest resources into stocks market as it no longer seems profitable to them. Based upon this, individuals would quit buying shares and in few cases, manage their speculations which would reveal in lessened trade volumes and values of most securities in the stock exchange market. This is acceptable into corporate benefit which thus, leads dividends to reduce. In case if dividends diminish, the anticipated returns of stocks diminish, accordingly making stocks deteriorate in value. (Fama, 1981).

Contribution of the Study

The literature on the connection between stock returns and inflation has been analyzed by various researches. In spite of the fact that it is yet too early to judge the stock returns and inflation rate's relationship, an ever increasing number of writings demonstrate that this association fluctuates over various time spheres. The empirical analyses are diverse, impartial, positive and negative. Insignificant or negative associations have been originated in inflation declaration analysis; most of the earlier studies didn't found significant relationship between stock returns and inflation, however, found affirmative and significant relationship in the long run. Furthermore, empirical outcomes as well demonstrate that the connection between stock returns, inflation and inflationary economies or differs in the short run analysis.

In any case, in perspective of the extensive variety of contradictory empirical analyses on how inflation rates in developing markets influence the rate of stock returns, one can't make conclusions from them with any negligible acceptable level of certainty. Additionally, given the continuous insecure advancement of the Pakistan's securities exchange occasioned by rise in rates of inflation and combined with the effect of the current worldwide financial crisis, there is a developing enthusiasm for looking at its effect on stock returns for the case of the Pakistan's Stock Market. Likewise, the various writings on inflation rate and stock returns in Pakistan have not attained the consideration it deserves. Thus, the present dissertation attempts to determine empirically the effect of rate of inflation on stock returns in the Pakistan's stock market with the passage of time and to check whether there is any evidence from time series data for the inflation return-drove speculation in case of Pakistan.

Objectives of the Study

The aim and objectives of this study are

➢ To empirically regress the relation of expected inflation and stock returns as well as Fisher hypothesis in case of Pakistan.
➢ To examine that whether stock returns act as hedge against inflation in Pakistan?
➢ Moreover this study will also endeavors the short and long run relation between stock returns and inflation as Pakistan is a developing country and persistently experienced rapid shocks and variation both in stock returns and price level since past two decades.
➢ To investigate the causal relation between stock returns and inflation.

Literature Review

Beside that some studies supports Fisher Hypothesis, there is enormous and lucid contrast exists in empirical literature on the relation of stock returns and expected inflation. Some studies found that stock returns significantly construct bridge against inflation, some studies found weak while some studies found negative relation between stock returns and expected inflation. Numerous studies found that stock returns didn't played the role of hedge against inflation in various economies.

Some of the earlier literature that found optimistic and noteworthy role of stock returns as hedge against inflation that strongly supports Fisher Hypothesis was the studies of (Firth, 1979; Schotman & Mark, 2000; Crosby & otto, 2000; Lee et al., 2000; Choudhary, 2001; Rapach, 2002; Luintel & Paudyal, 2006; Ding, 2006; Lee, 2010; Francis & Tewari, 2011). Some studies applied parametric as well as non-parametric tests in their methodologies and found strong relation between stock returns and expected inflation. The well-known studies in this regard were of (Akash et al., 2011; Alagidede & Panagiotidis, 2010; Martina, 1998). Ahmad and Mustafa (2003) has applied Information Maximum Likelihood (FIML) methodology using both monthly and annual time series data and found that stock returns successfully hedge against inflation.

Some empirical studies support Fisher hypothesis and found strong link between stock returns and expected inflation via Granger Causality approach. Some renowned studies exists in which granger causality test has applied (Rafique et al., 2013; Ali et al., 2010; Ihsan et al., 2007; Mehr, 2005; Nishat & Shaheen, 2004; Naeem & Rasheed, 2002; Hussain & Mehmood, 2001; Abdalla et al., 1997; Nishat & Saghir, 1991) and found strong causal relation between stock returns and expected inflation. Hasan and Javed (2009) found bi-directional causal relation between stock returns and expected inflation. Luintel and Paudyal (2006), Spyrou (2001) and Olesen (2000) found long run relation between stock returns and expected inflation, while (Rapach, 2002; Anari & Kolari, 2001) didn't find any long run relation between expected inflation and stock returns.

Uwubanmwen and Eghosa (2015) examined the impact of inflation rate on stock returns. The study found negative and weak impact of inflation on stock returns in case of Nigeria. Al-Khazali and Pyun (2002) empirically examined the relationship between stock returns and inflation for nine Pacific Basin countries and found that in long run stock returns successfully make bridge against inflation, but found negative correlation in short run. Shanmugam and Mishra (2009) also found negative correlation between expected inflation and stock price returns in case of India. Spyrou (2004) empirically examined relation between stock price returns and inflation for emerging countries that include Mexico, Brazil, Chile, Argentina, South Korea, Malaysia, Turkey, Thailand, Philippines and Hong Kong and found considerable role of stock returns against inflation.

However, there were also a number of studies that didn't find consistent results empirically with Fisher Theory. In the empirical studies (Fama, 1981; Zhao, 1999; Adrangi and Chatrath, 2000; Floros, 2004; Hondroyiannis and papapetrou, 2006; kolluri and wahab, 2008; and Liflong et al., 2010) didn't found any evidence of stock returns as hedge against inflation for different countries. Some studies had found evidence of weak hedging of stock returns against inflation (Fama & schewart, 1977; Moosa, 1979; Adams et al., 2004; Saunders & Tress, 2007).

From the cited literature, it is clear that the empirical findings on the role of stock returns and expected inflation is ambiguous having mixed results that increase the scope and needs of an empirical study that may give a clear empirical results on the role of stock returns as hedge against inflation as well as to consistent with Fisher theory or equation of exchange. Though the results of some studies strongly support the Fisher Hypothesis and from empirical findings it can be concluded that stock returns act as hedge against inflation. But there are some studies exists that their findings are against the Fisher hypothesis while some studies found weak correlation between stock returns and inflation in case of different countries.

1. Theoretical Justification and Empirical Model

The Fisher Hypothesis states that nominal interest rate is the function of real interest rate and expected inflation (Fama, 1981), that is

$$i_t = Er_t + E\pi_t + \eta_t \dots\dots\dots\dots\dots\dots\dots(1)$$

In the above equation (1) is the "i_t" is the nominal interest rate, "r_t" is the expected real interest rate and "π_t" is expected inflation (Geetha et al., 2011). The above equation (1) is derived from $r = i - \pi$.

According to economic theory, nominal interest rate is the returns on capital and saving that is also effected by expected inflation (Bodie et al., 2005). So, the equation (1) can be written as

$$SR_t = \pi_t + Er_t + E\pi_t + \eta_t \dots\dots\dots\dots\dots\dots\dots(2)$$

But as real interest rate is also depends on the real value money, that is assumed as stock returns of lag value, so equation (2) becomes

$$SR_t = \pi_t + SR_{t-1} + \pi_{t-1} + \eta_t \dots\dots\dots\dots\dots\dots\dots(3)$$

The equation (3) contains transpose form nominal interest rate in to stock returns that is the function of nominal and real inflation as well as real stock returns. The econometric model that is regressed through ARDL approach be in the form of

$$SR_t = \alpha_0 + \alpha_1 \sum_{t=1}^{t=n} \Delta\pi_t + \alpha_2 \sum_{n=1}^{t} \Delta SR_{t-1} + \alpha_3 \sum_{n=1}^{t} \Delta\pi_{t-1} + \mu_t \dots\dots\dots\dots\dots\dots\dots(4)$$

The above econometric model be regressed thorough Auto-Regressive Distributed Lag (ARDL) introduced by (Pesaran et al., 2001) that check the relationship among variables regardless stationarity, i.e. whether they are stochastic or non-stochastic. The approach possesses numerous merits comparative to previous techniques of co-integration, like no compulsion of pre-checking of the variables for verifying the integration order in the sample. Accordingly ARDL can be

functional irrespective of order of integration i.e., whether variables are I(1), I(0) or fractionally integrated. The behavior of residuals is plotted in figure (1)
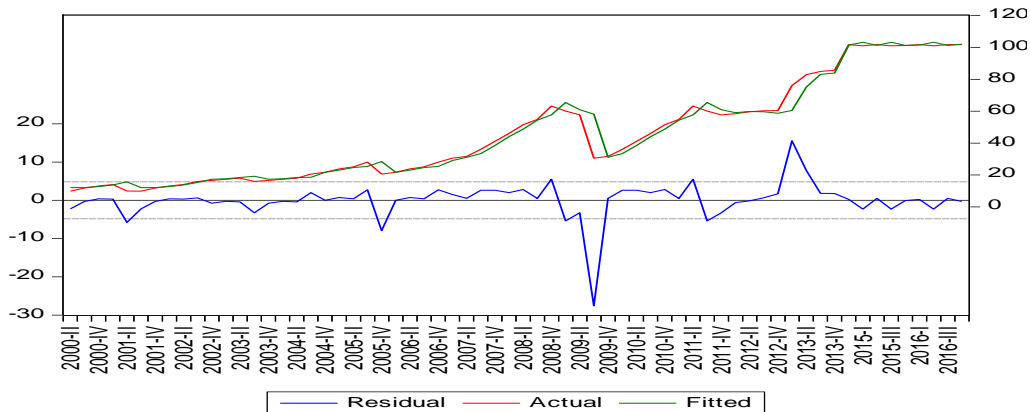

Figure 1: Behavior of Residuals

2. Data Description and Sources

Monthly time series data is used for regression analysis of this study to empirically examine that does stock returns hedge against inflation in Pakistan covering the period of analysis from 2000:1-2016: IV. The Gradient graph of the variables is given in appendix-1 to explain the behavior of variables (inflation, stock return and constant term) that shows the stability of the variables data.

The data is collected from different sources that include Bureau of Statistics, State Bank of Pakistan, The Global Economy, World Development Indicator (WDI) and from different issues of Economic Survey of Pakistan.

For Inflation the Consumer Price Index (CPI) is used as a proxy variable in this study. The data of stock returns is collected from bulletin of SBP, Karachi Stock exchange, Lahore Stock exchange and Islamabad Stock exchange that is available mostly on monthly basis taking KSE base Point 100, Lahore 50 and Islamabad 25.

Methodology, Results and Discussion

Firstly, the data is checked for normality through Jarque-Bera test and Histogram method. The results of the test integrated in figure (2) for inflation and in figure (3) for stock returns shows normality of the data used in this research paper.
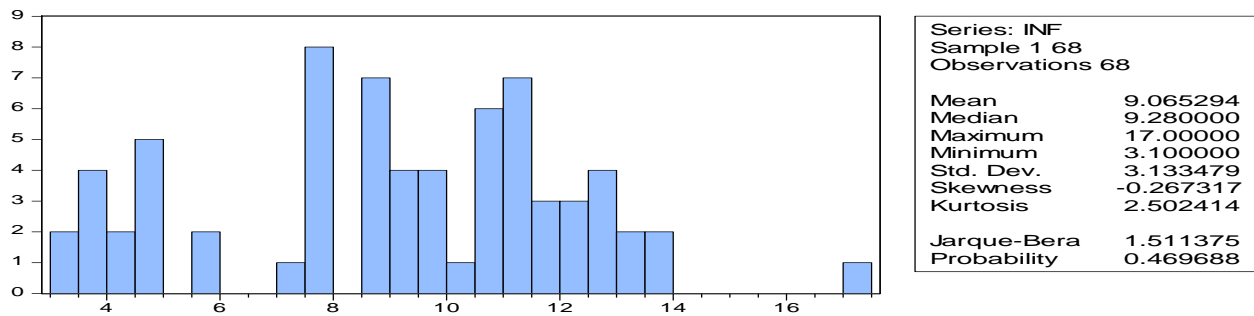

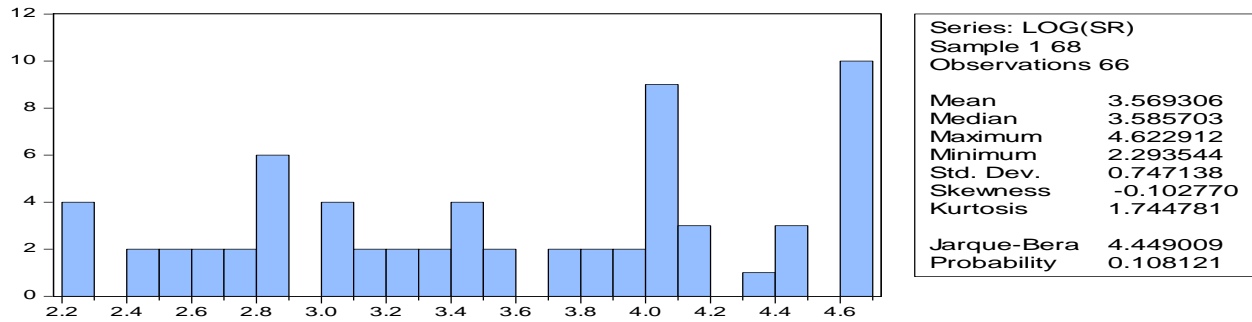Figure 2: Results of Histogram Normality Test for Inflation

Figure 3: Results of Histogram Normality Test for Stock Returns

The data used in this study was then checked for unit root prior to regression analysis to check the order of integration, stationarity and spurious relation in the data. For this purpose the Augmented Dicky-Fuller test is applied and the results are integrated in table (1).

Table: 1. *Augmented Dickey–Fuller* **Test Results**

Variables	Acronyms	ADF Values		Order of Integration
Stock Returns	SR	-3.841372 *	-5.362873 *	I(0)
Inflation	π	-1.246158	-3.563904 *	I(1)

(*) shows rejection of null hypothesis at 5%

The results integrated in above table shows that stock returns is stationary at level {I(0)} and inflation at first difference {I(1)}. Moreover, the unit root test results incorporated in table (1) indicating that there hasn't any spurious relation exist in the variables data. When some variable showing stationarity at I(0) and some I(1) included in the study, we can't apply simple OLS or ECM and VAR.

The ARDL method is applied for regression analysis of the variables to find the relation between the stock returns and inflation as well as that either stock returns can act as bridge against inflation. For that purpose, stock returns is assumed as dependent variable and inflation as independent variable. The results of regression analysis of the variables data is incorporated in table (2).

Table: 2. ARDL Regression Results (Stock Returns as Dependent Variable)

Variables	Acronyms	Coefficient	Std. Errors	t-Statistic	Prob.
Constant	C	0.223516	0.216133	1.034158	0.3106
Inflation	D (π)	0.238944	0.044140	5.413268	0.0000
Lag of Stock Returns	D {$SR_{(-1)}$}	0.310283	0.135068	2.297233	0.0299
Lag of Inflation	D { $\pi_{(-1)}$}	0.271286	0.053837	5.038979	0.0000
Error Correction Term	D(ECT)	-0.769359	0.136801	-5.623947	0.0000
R-squared	0.941736		**Durbin-Watson stat**		1.926739
Adjusted R-squared	0.878943		**Prob(F-statistic)**		0.000000

The results of regression analysis of variable data integrated in table (2) shows that both current and lag value of inflation is positive and highly significant that proves Fisher hypothesis in case of Pakistan identifies that stock returns act as hedge against inflation in Pakistan. The empirical results of this study is consistent with the past studies of (Hussain & Mehmood, 2001;

Ahmad & Mustafa, 2003; Nishat & Shaheen, 2004; Luintel & Paudyal, 2006; Ding, 2006; Bekaert & Engstorm, 2010; Akash et al., 2011; Francis & Tewari, 2011).

The ARDL co-integration is applied and the result incorporated in table (3) indicates that there is strong co-integration between stock returns and inflation in Pakistan.

Table: 3. ARDL Co-integrating Equation

Variables	Coefficient	Std. Errors	t-Statistic	Prob.
D {SR$_{(-1)}$}	0.310283 *	0.135068	2.297233	0.0299
D { $\pi_{(-1)}$}	0.238944 *	0.044140	5.413268	0.0000
CointEq(-1)	-0.079642 *	0.075829	-2.050288	0.0336

(*) shows co-integration equation

Further, this study also applied ARDL long form co-efficient technique and the results integrated in table (4) indicates that there is significant and optimistic relation between stock returns and inflation both in short and long form.

Table: 4. ARDL Long Run Form

Variables	Coefficient	Std. Errors	t-Statistic	Prob.
(π)	0.406087	0.144966	2.801268	0.0095
C	-0.280651	0.177677	-1.579556	0.2572

To confirm the long run relation between stock returns and inflation for Pakistan, this study also applied ARDL bound testing approach and the results of bound testing approach integrated in table (5) confirms the long run relation between stock returns and inflation during the selected period of this study.

Table: 5. ARDL Bounds Test (Null Hypothesis: No long-run relationships exist)

Bounds Test Value		Critical Value Bounds	
Test Statistic	Value	I(0)Bound	I(1)Bound
F-statistic	6.705026*	4.94	5.73

(*) Shows rejection of null hypothesis at 5%

3. Diagnostic and Stability Analysis

Ramsey RESET is applied to check the specification, constancy and normality of the model and the results of the test incorporated in table (6) authenticate that the model is free from mis-specification and stable.

Table: 6. Ramsey RESET Stability Test Results

	Value	Probability
t-statistic	1.282866*	0.2113
F-statistic	1.645744*	0.2113

(*) Shows rejection of null hypothesis

Breusch-Godfrey LM Test was applied for Serial Correlation and the results obtained from the Residual Diagnostic correlation test does not show any sign of auto-correlation as well as of serial correlation nor any spurious relation {results for serial correlation is incorporated in table

(7)}.Further, it could also be concluded from the results that the error term is independent from each other of the corresponding year.

Table: 7. Breusch-Godfrey Serial Correlation LM Test Results

	Value	Probability
F-statistic	0.172191*	0.8425
Obs*R-squared	0.438535*	0.8031

(*) Shows rejection of null hypothesis

Breusch-Pagan-Godfrey Test was applied to check the heteroskedasticity in the model. The regression analysis of Residual Diagnostic test result incorporated in table (8) showing that the model is free from the problem of heteroskedasticity corroborating that the variance between stock returns and inflation as well as of random term is constant.

Table: 8. Heteroskedasticity Test: Breusch-Pagan-Godfrey

	Value	Probability
F-statistic	1.385521*	0.2664
Obs*R-squared	5.446836*	0.2413

(*) Shows rejection of null hypothesis

CUSUM test constitute of cumulative sums making it a sequential distribution, independent or free plotting of cumulative sums in positive and negative directions. It identifies minor shifts by plotting a statistic that includes past and present data values from the procedure. CUSUM test defines two threshold values which defines the negative and positive directions of the coefficients. The data will be significant and reliable if the derived trend line lies between these two threshold lines specified by CUSUM. The results of CUSUM test incorporated in graph (4) shows stability of the results integrated in tables (2) and (4).
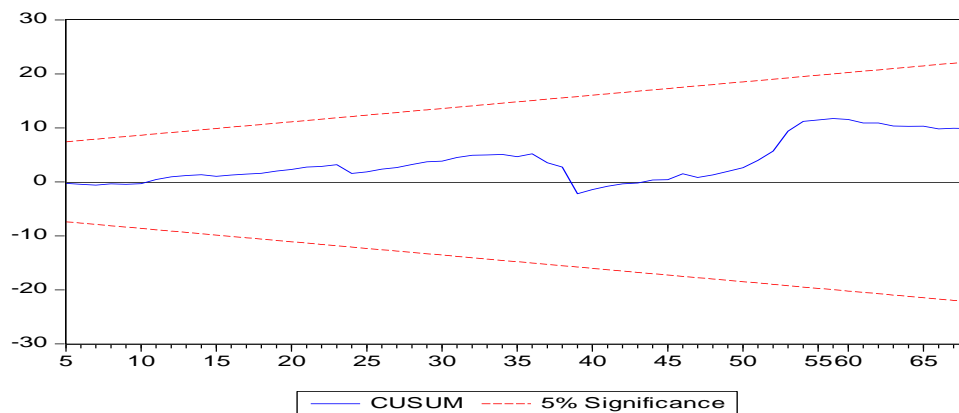

Figure 4: CUSUM Test Stability Result

4. Correlation Analysis

This study also attempts to explores that either is there any causal relation exists between stock returns and inflation in case of Pakistan. For this purpose pair-wise Granger Causality test was applied and the results of the test integrated in table (9) shows bi-directional causality running from stock returns to inflation and from inflation to stock returns. This means that both stock

returns and inflation is highly correlated with each other and stock returns significantly act as hedge against inflation in Pakistan sustain Fisher Hypothesis empirically.

Table: 9.Pairwise Granger Causality Tests Results

Null Hypothesis:	Obs	F-Statistic	Prob.
Inf does not Granger Cause SR	192	2.80484	0.0578
SR does not Granger Cause Inf		3.95832	0.0316

Conclusion

In the course of the most recent couple of years, the real value of regular stocks has been on descent, concurrent with usually growing inflation. In case inflation is one of the elements to responsible for the discouraging execution of stocks then it must lessen anticipated real corporate benefit or raises the requisite rate of profits on stocks, as per the traditional model of stock returns. This research has demonstrated that inflation rate has not been an extremely solid factor in motivating stock returns in the Pakistan's stock market.

Clearly, the degree of perceptive connection between stock returns and rate of inflation has been decreased over past few years subsequently sustaining the idea that a strategic monetary administration which supports stable price adjustment applies a self-fortifying soothing impact on securities exchange instability. Subsequently, relatively high financial stabilization might be characterized among the advantages of unequivocal control of inflation rate. Though, regardless of whether monetary policy specialists may have the capacity to accomplish financial stabilization by means of managing inflation rate focusing on control technique is a matter of concern which must be addressed according to structural approach.

This study empirically attempted to examine the Fisher hypothesis in case of Pakistan that does stock returns act as hedge against inflation in Pakistan? The study applied Unit root test, ARDL regression technique, ARDL co-integration and long form, bound testing approach and granger causality test. The study also applied stability and diagnostic test to check the reliability of the regression results.

The results obtained from empirical analysis of the study indicate that stock returns appreciably act hedge against inflation in Pakistan. The granger causality test shows that bi-directional causality exits between stock returns and inflation.

Recommendations

This study suggested from empirical findings that

(i)   Investment in stock returns can increase returns for the investor as well as that will maintain the steady price preventing the economy from inflation.

(ii)   Common stock that depicts to a claim on real capital might not be a hedge to speedy fluctuating prices in Pakistan. This additionally infers investors in settling on rational portfolio choices don't need to see equity values as long run property against inflation's deterioration of purchasing power. This consideration is suitable in view of present improvements in the Pakistan's capital market which

recommends that equity values may not really be the best performing resource in short run but it will be in the long run.

(iii)   The government and policy makers should provide a friendly environment, information and complete knowledge about stock returns to the individuals to invest more in stock market. This will decrease the transaction demand for money and thus will help to control inflation.

(iv)   Inflation stability adjustment and proper tax assessment and management that consider the awareness into the specialized technical modes of securities exchange exercises. A stabilized pricing system is an absolute mechanism in that administration can use to enhance the local investment atmosphere both in the real sector and in the capital market in common.

(v)   Monetary approach should emphasize at deriving a more rational and stable pricing level that will suit to investors in the stock exchange. Such strategies adapted focuses at control of inflation rate should take into discernment the performance of monetary and real factors particularly as these will go far in furthermore developing of the stock exchange market.

(vi)   It has been contended that inflation increases the real tax rate of corporate capital on account of the levy assessment behavior of deterioration charges and stock changes. In times of increasing prices, the tax framework should observe tax duty and devaluation issues during times of increasing price trends. This will help the organizations to regulate more feasibly to inflation and protect its execution in the stock exchange.

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