Performance of Common Stock Market and Relationship between Common Stock Return and Inflation: A Bhutanese Case Study

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Abstract

The stock exchange of Bhutan is considered one of the smallest stock markets in the world with market capitalization of BTN 49 billion[1]. Since the inception of the stock exchange in 1993 to facilitate trading of both equity and debt securities, the performance of stock market with respect to the macroeconomic variables have not been studied by academicians and researchers in Bhutan. Similar to the asset-inflation relationship studies conducted in different countries, the objective of this research is in providing insights on the hedging features of the common stock returns against inflation as per the classical Fisher hypothesis postulated by Irving Fisher in 1930s. For this study, we selected nine different companies listed on the stock exchange and grouped them into banks, insurance and industry sectors. The data on the monthly consumer price index inflation rates is retrieved from the website of the National Statistics Bureau of Bhutan, and daily market closing price from website of the Royal Securities Exchange of Bhutan. To test the hypothesis, we used bivariate regression analysis for different groups of sectors. Other relevant information on the descriptive statistics of the nominal common stock returns and its variability with respect to the inflation is also discussed. Our result shows that the nominal common stock return does not act as a hedge against inflation. In addition, our study indicates a weak inverse relationship between the nominal common stock return and inflation, though the result is not statistically significant to support the negative relationship between the two.

Keywords: common stock return, inflation, Fisher hypothesis, bivariate regression

Introduction

Several studies conducted shows that the macroeconomic variables such as interest rate, foreign exchange rate, and inflation rate influence the performance of the stock market. Such variables are key indicators for the stock market participants to think about the assessments of the returns from the stock market. Vast studies have been devoted in studying the relationship between the asset return and these macroeconomic variables since 1950s. According to Fisher

[1]As of December 2021, 1 BTN = 0.013250 USD

hypothesis, the nominal common stock return has a potential to act as a hedge against inflation. It implies that according to Irving Fisher who postulated the Fisher hypothesis in 1930s, the common stock return is a protection against inflation, and investors are compensated with higher returns during high inflation, and with lower returns during the lower inflation situation. The Fisher hypothesis can be tested by regressing the common stock return on inflation. Using various regression methodologies, the positive coefficient for inflation should be the assessment of the hedging property of the common stock return. Therefore, although the relationship between the common stock return and inflation have been empirically tested in other developed, emerging and developing markets, the influence of inflation on the common stock returns have not been undertaken so far in Bhutan with an equity market size of just over BTN 49 billion (i.e. US$ 649 million as of December 2021).

For this study, the relationship between common stock return and inflation will test Fisher's hypothesis that the nominal common stock returns of the banks[2]; insurance firms[3]; and industries [4] are hedged against inflation. The contribution of the study is firstly to provide insights about the common stock returns-inflation nexus over a medium-term from 2014 to 2021, and secondly no such studies on this topic have been conducted in Bhutanese equity market so far.

Literature Review

As per Fisher hypothesis, it suggests that the return on equities are a good hedge against inflation as they represent claim to real assets (Bodie, 1976). As per Bodie (1976), there are two definitions of the security as an inflation hedge, firstly, it should offer protection against inflation meaning elimination or at least reduction of the possibility of the real rate of security's return falling below some specified floor value such as zero, and secondly, the security is inflation hedge if and only if its real return is independent of the rate of inflation. In a regression with nominal rate of return as dependent variable, the coefficient of the rate of inflation as independent variable should be one indicating a zero correlation between the real rate of return on common stock and rate of inflation.

[2]Bhutan National Bank Limited, Druk Punjab National Bank, and Tashi Bank Limited

[3]Royal Insurance Corporation of Bhutan, GIC-Bhutan Reinsurance Co. Limited, and Bhutan Insurance Limited

[4]Druk Ferro Alloys Limited, Penden Cement Authority Limited, and Dungsam Polymer Limited

Studies conducted by Choudhry (2001) on the relationship between stock returns and inflation in four high inflation Latin and Central American countries shows that there exists one-to-one relationship between nominal stock return and inflation implying stocks as a good hedge against high inflation rates. Similarly, empirical studies conducted in Pakistan to understand the relationship between the stock returns and consumer price index using the frequency-based causality and continuous wavelet transform method indicate that the consumer price index inflation and stock returns are found to be independent (Tiwari, Dar, Bhanja, Arouri, & Teulon, 2014). From the result of this empirical study, it is worth noting that in the midst of the economic issues related to energy supply shortages and security issues, and Pakistan as one of the highest inflation countries, the inflation does not erode the stock market return in their country.

In Sri Lanka, an empirical study conducted by Samarakoon (1996) using the data from 1985 to 1996 provides empirical evidence on the generalized Fisher hypothesis that the nominal returns on common stocks are positively related to expected inflation suggesting that stocks in Sri Lanka are an effective hedge against expected inflation, while on other hand the stock returns and unexpected inflation are inversely related indicating stocks not as a hedge against unexpected inflation.

However, contrary to this Fisher hypothesis, studies conducted by Fama and Schwert (1977) and Lintner (1975) have shown that the rates of return on assets are negatively correlated with the expected rate of inflation. Also, a study conducted in Greece by Spyrou (2001) indicates that the relationship between the stock returns and inflation is negative and significant until 1995, and beyond 1995, the relationship is statistically insignificant which the author argued that it may be due to the increased role of monetary fluctuations. Also, it is now well-established concept through various studies that the sustained inflation has a detrimental effect on the development of both private credit market and equity market, and many quarters of inflation are associated with “crisis” impacting the economy (Barnes, Boyd, & Smith, 1999).

In order to understand asset-return relationship, myriads of exhaustive studies have been conducted since 1953, and one such study has indicated that the monthly returns to a broad group of New York Stock Exchange common stock returns for an example are negatively related with both expected and unexpected component of the consumer price index inflation rate (Bodie, 1976; Fama &

Schwert, 1977; Nelson, 1976). The substantial modification and developments in the financial systems are now required in our generally accepted models of security returns and capital market equilibria to deal with the impacts of inflation on the market performance.

Bruno (1993) and Pindyck and Solimano (1993) examined that the high level of inflation can induce frequent changes in prices which may be costly for firms that can ultimately reduce the optimal cash holdings of the consumers required for trading in common stock market. The fall in the level of per capita income may result in lower cash holding in the consumers forcing them to sell short their tradable shares thereby impacting the stock returns and leading to price instability (Feldstein, 1999). The higher inflation rate will increasingly impact the financial market frictions, reduce liquidity and extend credit, and reduce capital investment (Barnes, Boyd, & Smith, 1999). Furthermore, such level of inflation can cause error in forecasting as a result of price information distortion, which can lead to economic agents to spend more time and resources in gathering information and protecting themselves against the negative implication of the price instability, thereby endangering the efficient allocation of resources.

Methodology

As per Irving Fisher (1930), the nominal interest rate is the sum of an expected real return and an expected inflation rate. If the market is efficient or rational processor of the information available at time $t-1$, it will set the process of any asset j so that the expected nominal return on the asset from $t-1$ to t is the sum of the appropriate equilibrium expected real return and the best possible assessment of the expected inflation rate from $t-1$ to $t$as provided below:

$$E(\tilde{R}_{jt}|\emptyset_{t-1}) = E(\tilde{\imath}_{jt}|\emptyset_{t-1}) + E(\tilde{\Delta}_t|\emptyset_{t-1}) \quad (1)$$

Equation (1) can be rewritten as,

$$E(\tilde{\Delta}_t|\emptyset_{t-1}) = E(\tilde{R}_{jt}|\emptyset_{t-1}) - E(\tilde{\imath}_{jt}|\emptyset_{t-1}) \quad (2)$$

Here, $E(\tilde{\Delta}_t|\emptyset_{t-1})$ is the best possible assessment of the expected value of the inflation rate $\tilde{\Delta}_t$ that can be made on the basis of set of information $\emptyset_{t-1}$ available at $t-1$, $\tilde{R}_{jt}$ is the nominal rate of return on asset j from $t-1$ to t, $E(\tilde{\imath}_{jt}|\emptyset_{t-1})$ is the appropriate equilibrium expected real return on the asset implied by the set of information $\emptyset_{t-1}$available at $t-1$ and tildes denote random variables.

Fisher hypothesized that the expected real return in equation (1) is determined by real factors such as productivity of capital, time preferences of investor, and risk tastes, and that the expected inflation rate and expected real return are not related. Such assumption developed by Fisher has helped us study the inflation-asset return relationships without having to introduce a complete general equilibrium model for expected real returns in a similar manner considered by Fama and Schwert (1977). To test the hypothesis that the expected real return and expected inflation rates vary independently, and that market is efficient, the regression model in equation (3) is employed.

$$\tilde{R}_{jt} = \alpha_j + \beta_j E\left(\tilde{\Delta}_t \middle| \emptyset_{t-1}\right) + \tilde{\epsilon}_{jt} \quad (3)$$

Where, α_j is regression constant of asset j, β_j is an estimate of the regression coefficient of asset, and $\tilde{\epsilon}_{jt}$ is the error term.

We employ the consumer price index inflation rate determined by the National Statistics Bureau of Bhutan, and daily closing share price of the most traded stocks uploaded on the website of Royal Security Exchange of Bhutan from 2014 to 2021. The selection of publicly listed firms is based on the availability of share price information and the percentage share of the total market capitalization[5]. The background information of the selected listed companies is as shown in Table 1.

Table 1

Information of Selected Publicly Traded Companies as of Dec 2021

Listed Companies	Year of Est.	Sector	Paid-up Shares	Market Cap (BTN)
Bhutan National Bank Limited	1980	Banks	395,032,311	12,309,206,810
Druk Punjab National Bank	2008	Banks	84,002,022	5,598,734,766
Tashi Bank Limited	2010	Banks	60,025,223	2,581,084,589
Royal Insurance Corporation of Bhutan	1975	Insurance	140,000,180	9,940,012,780
GIC-Bhutan Reinsurance Co. Limited	2013	Insurance	110,000,000	3,223,000,000

[5] The nine public listed companies represent 86 percent of the total market capitalization of BTN 49 billion[5] as of December 2021

Bhutan Insurance Limited	2009	Insurance	30,000,000	1,800,000,000
Druk Ferro Alloys Limited	2009	Industry	28,977,620	2,694,918,660
Penden Cement Authority Limited	1974	Industry	34,000,070	3,570,007,350
Dungsam Polymer Limited	2010	Industry	60,025,223	251,993,775

Source: Obtained from Royal Securities Exchange of Bhutan

Using the share price information, the daily return on common stock is calculated by the change in the share price from time $t-1$ to t during the period. From the daily returns, we then calculate the monthly average common stock return for each individual sector. Once we compute the monthly average return and the consumer price index inflation, we employ equation (3) developed by Irving Fisher (1930) to conduct bivariate regression and correlation analysis to study the relationship between the nominal common stock return and inflation for three different sectors (i.e., banks, insurance and industry).

Results

To test the prediction of the Fisher hypothesis, monthly average common stock returns of banks, insurance and industry sectors is regressed on the monthly rates of inflation measured by the consumer price index. Under this section, firstly, the descriptive statistic such as minimum, maximum and mean monthly average common stock returns is discussed. Secondly, brief discussion is made on the variability of the monthly average common stock returns against the inflation for the three different sectors. Finally, the correlation matrix and bivariate regression results are highlighted.

Descriptive Statistics

Table 2 contains the monthly average (along with minimum and maximum) of all three sectors in Bhutan. During the observed period, the minimum and maximum monthly inflation rate is 2.01% and 10.03% respectively with average of 4.74%. Over a period from 2014 to 2021, banks have earned a maximum monthly average stock returns of 6.54 % and suffered minimum loss of 15%. The mean monthly average stock return is 0.02% with standard deviation of 2.05%. However, insurance sector earned a maximum monthly average return slightly lower than banks of 6.16% and suffered a monthly average loss slightly higher than banks by

0.91 %. The mean monthly average common stock return is 0.35 %, higher for insurance sector than banks with standard deviation of 2.41%.

Similarly, the mean monthly average return for industry sector of 0.13% is slightly higher than the banks, however, lower than what the insurance sector earned on average. The maximum monthly average return of industry sector is in the same range with that of banks and insurance sector; however, the minimum monthly average loss was lower than other two sector.

Table 2

Summary of Descriptive Statistics

	N	Min	Max	Mean	Std. Dev.	Skew	Kurtosis
Inflation	96	0.0201	0.1003	0.0474	0.0231	0.7430	-0.7780
Nominal Monthly Average Return							
Banks	96	-0.1500	0.0654	0.0002	0.0205	-3.9890	30.8520
Insurance	96	-0.1591	0.0616	0.0035	0.0241	-3.0160	21.7430
Industry	96	-0.1291	0.0651	0.0013	0.0250	-1.0880	8.0800
Valid N (listwise)	96						

Source: Obtained from SPSS

Variability of the Return against Inflation

Figure 1-3 represent the nominal monthly average returns against inflation for banks, insurance and industry sector. The variation in the maximum and minimum value of the monthly average return for banks with respect to the consumer price index inflation rate is slightly lower compared to insurance sector. In other words, the monthly return for banks was much stable than other two sectors. However, the variation in the monthly average return with respect to the inflation is much prominent for industry sector as seen in Figure 3.

Figure 1

Monthly Average Nominal Return against Inflation for Banks

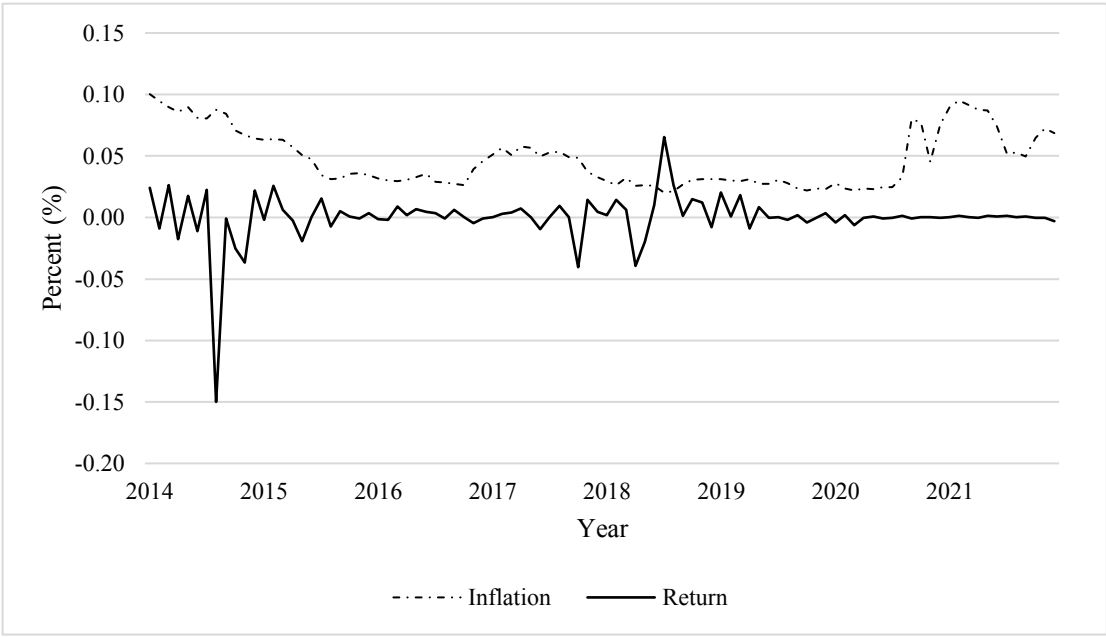


Figure 2

Monthly Average Nominal Return against Inflation for Insurance

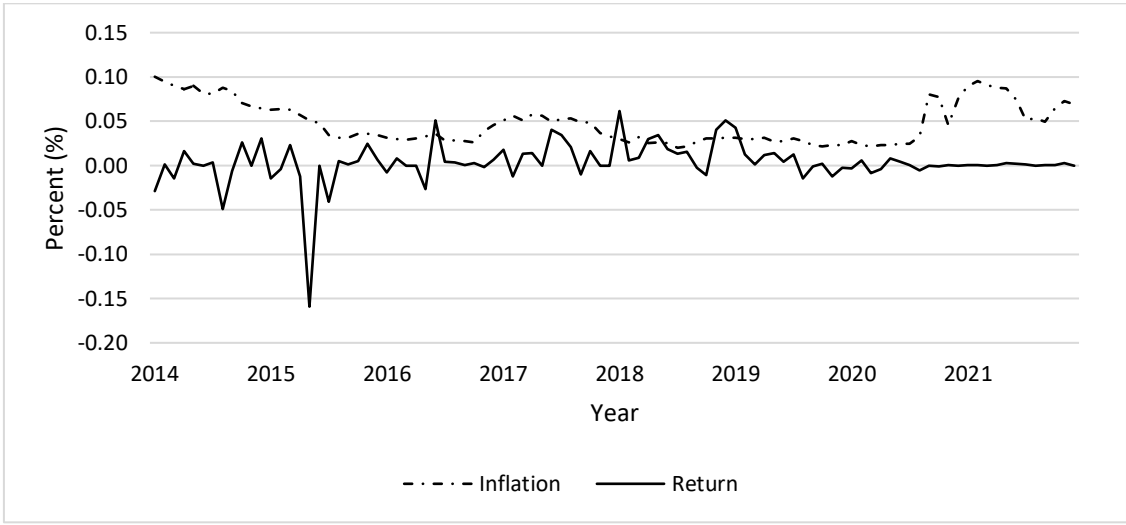
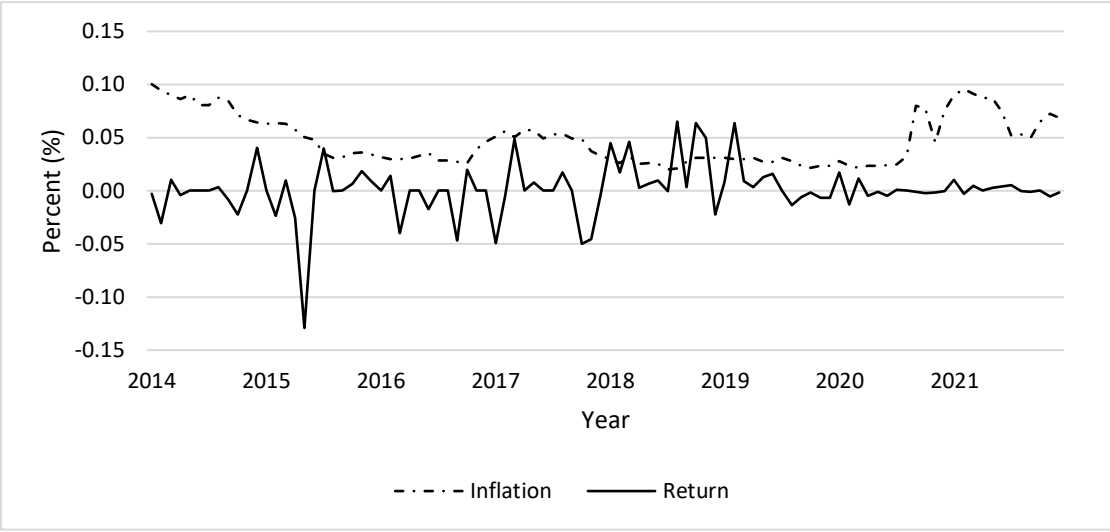


Figure 3

Monthly Average Nominal Return against Inflation for Industry



Correlation Matrix and Regression Result

As indicated in Table 3, the nominal common stock returns for all sectors shows a weak negative correlation with inflation. For the banks and insurance sector, the Pearson correlation coefficient between the common stock return and inflation is in the same range of negative 0.16. However, the correlation coefficient for industry sector is about negative 0.14.

Table 3

Correlation Matrix

	Inflation	Bank	Insurance	Industry
Inflation	1			
Bank	-0.168	1		
Insurance	-0.167	0.185	1	
Industry	-0.142	0.191	.440**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Obtained from SPSS

The parameters of the bivariate linear regression analysis such as, α_j regression constant, β_j regression coefficient or slope estimate, $\tilde{\epsilon}_{jt}$ error term, R^2, $t-statistics$, and significance ($p-value$) are presented in Table 4.

Table 4

Regression Statistics

Coefficient estimates	Banks	Insurance	Industry
α_j	0.0073	0.0118	0.0085
β_j	-0.1491	-0.1740	-0.1537
R^2	0.0281	0.0278	0.0201
$\tilde{\epsilon}_{jt}$	0.0203	0.0239	0.0249
$t-statistics$	-1.6478	-1.6390	-1.3900
$p-value$	0.1304	0.1045	0.1678

Source: Obtained from SPSS

The output in Table 4 indicates that for banks the R square of 3.9% shows that the model approximated 3.9% variation in dependent variable with standard error of 11.3%. Similar weak relationship between the independent and dependent variables is observed with the insurance and industry sector. Although the regression coefficient shows a weak negative relationship between the nominal monthly average return and consumer price index inflation rate, the result is not statistically significant, as the p-value is greater than .05.

Discussion

We test the relationship between the nominal common stock return and inflation for banks, insurance and industry sector using the bivariate regression and correlation analysis. To test the hypothesis that the nominal common stock returns on all three sectors are hedge against inflation, the dependent variable stock return is regressed on independent variable inflation. From the regression result, there exists a weak negative correlation between the stock return and inflation for all three sectors, however depicting insufficient evidence to claim that the inverse correlation exists between the nominal common stock return and inflation for all three sectors ($p > .05$).

The regression coefficient results for all three sectors rejects the null hypothesis that nominal common stock return acts as a hedge against consumer price index inflation. Furthermore, the inverse relationship between the return and inflation implies that the investors are not compensated for increase in general price level through corresponding increase in the nominal stock market returns, thereby

failing to support the Fisher hypothesis i.e., null hypothesis. This negative relationship between the common stock return and inflation are similar to the finding of Shanmugam and Mishra (2009), who empirically tested this relationship in Indian economy from 1980 to 2004. However, Park and Ratti (2000) argue that monetary policy generates statistically significant movements in the inflation and expected real stock returns in the opposite directions, causing negative correlation between the inflation and stock returns. Similarly, Li, Narayan, and Zheng (2010), empirically suggested that the UK stock market fails to hedge against inflation in the short term, and the relations between the stock return and inflation behaves differently in the medium term and during different inflationary regimes.

Conclusion

In conducting this research, we used the bivariate regression to examine that the nominal return on common stock is hedged against consumer price index inflation rate. The study of the relationship between the two are tested using the monthly average return for banking, insurance and industry sectors. As per the Fisher theory, no significant relationship exists between real return and inflation. However, an inverse relationship between real stock return and expected (and unexpected) inflation is possible as per Lintner (1975). Our results support Lintner's findings, although the evidence to support this claim is very insignificant (i.e., Fisher's hypothesis is rejected). Furthermore, the results picked by the regression methodologies might be spurious to support the idea that nominal common stock returns are hedge against inflation.

The usefulness of our findings is limited by several factors, including relatively short time period, stagnation of the market price, and infrequent trading by market participants. More insights for studying the relationship between the common stock return and inflation might be gained by including other macroeconomic variables using advanced regression methodologies. These limitations suggest that further research in this area will be needed before a definitive conclusion on the idea that nominal common stock returns are hedged against inflation. Hopefully, other researcher and academicians in Bhutan will take up similar research study for contribution on the performance of the common stock market out of such simple study findings.

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