

## **IS INVESTMENT IN STOCKS A GOOD HEDGE AGAINST INFLATION IN SOUTH AFRICA?**

<https://doi.org/10.47743/jopafl-2022-26-20>

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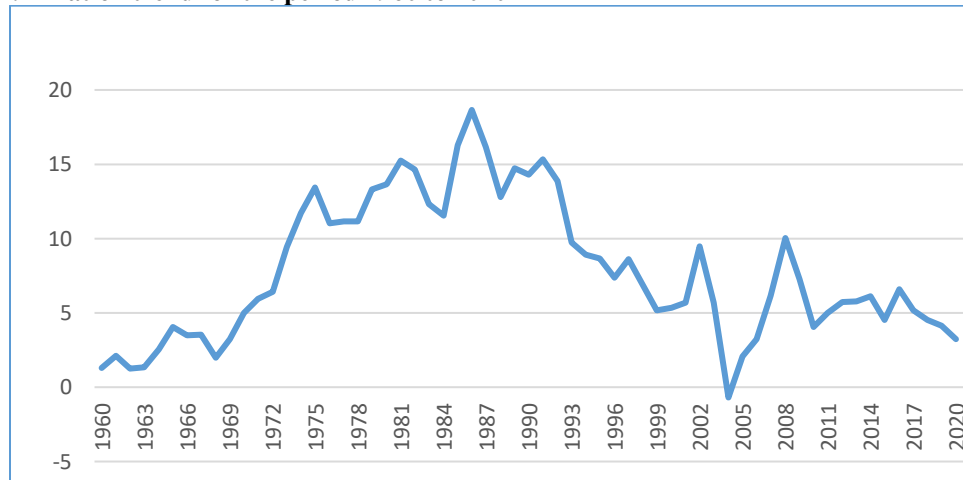
**Abstract:** *This paper examines the relationship between common stocks and price increases in South Africa. The study employed the ordinary least squares (OLS) and autoregressive integrated moving average (ARIMA) methods on monthly data covering the period January 2008 to January 2021. The empirical findings shows that the Fisher's hypothesis holds for the South African market because of the positive relationship between the two variables. Moreover, the overall index (stocks) have a favorable and statistically significant relationship with ex-post inflation. That is, the ex-post model shows that there is hedge against inflation in South Africa even when using the overall index. Similarly, the ex-ante model also depicts a relationship that is positive between the variables and that the overall index is indeed a good hedge against the expected inflation. That is why, overall, the favorable correlation between CPI and stock market returns shows that stock returns in South Africa were a good fence against price hikes.*

**Keywords** *Investment, Common stock, Inflation, hedge, Fisher's hypothesis.*

### **Introduction and background**

Investment is described as putting out money with an objective of generating more from it by means of profit in the future period. Normally, people invest by putting money in an investment portfolio (Gaille, 2020). Despite the existence of various types of investment that one can invest in e.g., stocks bonds investment funds, options, annuities etc. This paper focuses on investing in common stocks because common stocks are shares in a cooperation that gives the holder the right to vote. One of the typical nature of any investor is that they consider a lot of things that may affect the investment's future payment. Inflation is one of the factors being taken into consideration.

**Figure 1: Inflation trend for the period 1960 to 2020**



Source: Author's compilation

Figure 1 shows the inflation trend in South Africa and reveals fluctuations in the variable. The figure shows that inflation was at its highest in the year 1986 where it was 18.65%, it was at its lowest in 2004 where -0.65% (negative). There were fluctuations of increases and decreases in the inflation rate. However, Inflation in South Africa has been relatively constant in recent years, ranging between 3.1 % and 6.3 %. However, after 2008 there was a fluctuation in the inflation rate where the rate has managed to stay in the target that was set in place by the Minister of Finance (Stats SA, 2000). Inflation targeting is a monetary policy in which central bank puts a specific inflation rate as its objective. Inflation targeting allows central banks to react to local economic shocks. The inflation target is set at 3-6 percent. Inflation in South Africa is affected by many factors, for example, a crisis arising because of low growth due to weak demand and an uncertain political future, among other factors. During the year 2020 inflation stood at 3.22. With all these fluctuations, the objective of this study is to establish whether or not investing in stocks hedge against inflation in South Africa.

The rest of the paper is organised as follows: the next section presents the literature review. Section 3 provides methods and data. Section 4 discusses the empirical analysis and results. Section 5 concludes the study.

## Literature review

The theoretical literature review discussed the various theories such as the Fisher's hypothesis, Proxy theory, Tax effect hypothesis, Money illusion theory and the inflation hypothesis. The section also presents the various empirical studies, where different studies that have looked at similar topic and other related topics are analysed.

### *Theoretical literature*

Fisher's hypothesis has proved a positive correlation between a general increase in prices and common stocks. Fisher's equation expresses the correlation that is between nominal interest rates and anticipated price increases. The equation asserts that the actual interest rates is equal to nominal rate of interest - projected inflation rate so, the real interest

rate drops as inflation rises, except if nominal rate increases the same way as inflation. Since the worth of shares is intrinsically based on underlying assets and capital investments, which should keep a fixed actual value regardless of price increases, the Fisher's hypothesis suggests that stock returns should fluctuate positively with inflation, making stocks an efficient shield against unanticipated price hikes (Moore-Pitt and Strydom, 2017). Till the middle of 1970s, it was widely considered that the Fisher's hypothesis held true, implying that variations in projected inflation rate must be directly correlated with changes in real returns on equities.

To the contrary, the proxy theory shows a negative relationship between the two factors. The hypothesis states that the negative relationship between increased prices and real activity induces the wrong unfavourable correlation between equity and price hikes. The theory was introduced by Fama in the 1980s, it is further explained by money demand and quantitative theory of money. Fama explained that unexpected inflation affect savings negatively and as a result decreased savings lead to a downward shift in demand for stocks (Kawawa, 2018). A fall in demand for stocks will lead to a decrease in stock prices. Fama's conclusion was that the correlation between future cash flows and stock returns determines how macroeconomic variables affect stock returns and price increases thus stock returns will be adversely affected by any variable that increases inflation.

Another theory was given for the correlation between price hikes and stocks is the inflation hypothesis by Geske and Roll (1984) the hypothesis also addresses the pessimistic correlation between the two variables. It was developed around the 1980s. The theory presumes that a decline in economic activities will address various issues with the traditional Big Bang theory, which states that the universe expands slowly throughout time and has a negative impact on stocks. The theory is further discussed and compared with Fisher's hypothesis to see the differences that makes the other show a positive relationship while the other views the correlation negative.

Tax effect hypothesis is also another theory that shows correlation between variables, it was also introduced in the 1980s by Feldstein. The hypothesis stated that business which recorded higher accounting earnings because of inflation are charged because the excess tax incurred lowers the real cash flows. He observed the United States market, because the value of depression and stocks, inflation has false capital gains. Since capital gains are exposed to tax in an inflationary position, businesses have higher tax liabilities. These liabilities that are caused by an increased tax reduce real after-tax earnings. This causes an investor to decrease common stock price to consider the results of price increases. (Kawawa, 2018). Price hikes cause a downfall in stock prices. This theory was analyzed in the US market, and it has not yet been proven if it holds in other countries. The connection between stock market returns and price increases was thoroughly examined in the literature. The proof is contradictory. There are findings that support the Fisher hypothesis, which states that there is a positive association between stock market returns.

#### *Empirical literature*

Muhammad and Faridul (2010) applied the ARDL methodology on the period 1997 till 2008. This was to examine the relationship between stocks and CPI in Pakistan. Specifically, the study looked at whether or not stocks can be a defense mechanism against inflation. The findings revealed that a rise in CPI tends to increase the profits of businesses after a while, actual return is not affected. Thus this study provided relevant and good

information on the behavior of the investors in the Pakistani market. These findings are similar to that of Ibrahim and Agbaje (2013) who found a positive relationship between stocks and inflation in Nigeria. Therefore, the data for the period January 1997 to December 2010 suggests that common stocks are good hedge against price increases.

From a cross-countries' perspective, Alagidede and Panagiotidis (2010) investigate the relationship between stock markets and inflation in six African stock markets for the period 1990 to 2010. Using the monthly stock prices as well as consumer prices, the results showed a long-run relationship between the variables of interest in four countries except for Kenya and Tunisia. In particular, the Fisher elasticities of stock prices in terms of consumer prices are positive and statistically significant. Similarly, Bhatti and Pak (2013) conducted a Fisher hypothesis test on CSI countries-Kazakhstan, Ukraine and Russia, in relation to stock returns and inflation rates for the period 2001 - 2012. The findings revealed that the hypothesis is only valid for Kazakhstan. Moreover, both current and predicted inflation coefficients in Kazakhstan are statistically significant and greater than unity. However, there was no evidence of a long-run relationship amongst the variables. A predominant conclusion from this study was that CIS stock markets do not seem to be good hedges against inflation. The findings of the previous study partially support Syed, Zafar, and Muhammed (2012) study which looked at the relationship between the two variables among the SAARC countries for the period 1971 - 2008. The findings revealed mixed results with some countries showing a positive correlation while others had a negative correlation. The countries included in the study are namely, India, Pakistan, Bangladesh and Sri Lanka.

There are also studies on this subject matter that exist in the South African context. For instance, Eita (2012) examined CPI and stock market gains in South Africa for the period of 1980 till 2008. The study revealed a positive correlation between CPI and stock return meaning that stock prices increase when inflation increases. Furthermore, this study also showed equities are indeed hedge against increase in price given the positive association between the two variables. Similarly, Moores-Pitt and Strydom (2017) looked at the correlation between equities and price hikes in South Africa for the period 1980 – 2015. In the conclusion it was stated that indeed equities can be used as protection against inflation. However, different results were obtained in the study of Kawawa (2019) who found evidence of protection against inflation via investing in stocks from the individual sectors rather than the overall index. Moreover, the relationship that exist between the two variables is positive. Of course it is worth noting that there might be heterogeneous relationship across industry stocks. This conclusion was based on the data for the period 2000 – 2016.

It evident from the latest study of Kawawa (2019) that there is literature gap. For example, there is time gap of five years. Moreover, these studies utilized mostly similar methodologies. However, the most important gap is that of inconclusive results which calls for a renewed study on the subject matter.

## **Research methods and data**

*Analytical framework – ordinary least squares (OLS) and autoregressive integrated moving average (ARIMA)*

In order to meet the set out objective, this study follows the method used by Hau (2017). Looking at the study, two empirical specifications have been estimated, thus the ex-post, which shows the correlation between real CPI and stock returns; it is estimated using basic Ordinary Least Square (OLS). Two empirical specifications that have been estimated, thus the ex-post, which shows the relationship between actual inflation and stock returns.

$$R_t = \alpha_0 + \omega_1 \pi_t + \varepsilon_t \quad (1)$$

Where R represents stock returns,  $\pi_t$  represents inflation,  $\omega$  and  $\alpha$  are coefficients while  $\varepsilon_t$  is the error term.

The second model is the ex-ante, it is estimated using the autoregressive integrated moving average (ARIMA) model to have expected and unexpected CPI. The equation for the relationship is as follows:

$$R_t = \alpha_0 + \beta E_{t-1}(\pi_t) + \gamma UE_{t-1}(\pi_t) + \mu_t \quad (2)$$

Where R represents stock returns,  $\mu_t$  is an error term,  $UE_{t-1}(\pi_t)$  represent unexpected element of CPI given the data available at  $t - 1$ . Three cases for hedging potential can be checked:

- Asset is a complete hedge against expected inflation ( $\beta = 1$ ).
- Asset is a complete hedge against unexpected inflation ( $\gamma = 1$ ).
- Asset is considered as a complete hedge against inflation ( $\beta = \gamma = 1$ ).

#### Data

The JSE and Stats SA provided the monthly time series data. All share indices from 2008 January till 2021 January (monthly data), constructed and provided by the JSE and the inflation for the same period was obtained from Stats SA. L is added at the beginning of all the variables to show that they are in Log terms. LINF represents inflation in logged form and LSTI represents overall index data also in logged form.

### Data analysis and findings

#### Ex-post model

It is important to determine the link between the actual inflation and overall stocks index to show if the stocks provide a complete hedge against inflation. The estimation is done using the ordinary least squares method.

**Table 1: Regression results of stock returns on actual inflation (LSTI as the regressand)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.985257	0.234320	17.00778	0.0000
LINF	1.487643	0.052430	28.37400	0.0000
R-squared	0.839430			
Adjusted R-squared	0.838387			
F-statistic	805.0839			
Prob(F-statistic)	0.000000			

Source: Author's compilation

Table 1 above shows the output estimations for stock returns on actual inflation. The results show a positive inflation coefficient that is 1.488.

$$LNSTI = 3.985 + 1.488LINF \quad (3)$$

From the equation above, an addition of one percent to inflation causes a 1.488 % increase in stocks. This positive correlation between the two variables provides the evidence that supports Fisher’s hypothesis and that there is complete hedging against inflation when using the overall index. The findings supporting the Fisher hypothesis are similar to that of Eita (2012).

*Ex-ante model*

The ex-ante model shows the relationship between expected and unexpected inflation. On the figure below, the study looks at the coefficient of LINF and AR(1) this is from equation above that was specified (equation 3). The variable LINF is the expected inflation which is beta (β) while AR(1) is the unexpected inflation (y).

**Table 2: Regression results of stock returns on expected and unexpected inflation (LSTI as a regressand)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.200256	1.222272	4.254580	0.0000
LINF	1.216218	0.270059	4.503521	0.0000
AR(1)	0.938670	0.024906	37.68801	0.0000
SIGMASQ	0.002032	0.000182	11.18256	0.0000
R <sup>2</sup>	0.979469	Durbin-Watson statistics		2.018889
Adjusted R-squared	0.979064			
F-statistic	2417.136			
Prob(F-statistic)	0.000000			
Inverted AR Roots	.94			

Source: Author’s compilation

For overall index data, Table 2 illustrates the regression results for stock gains on expected and unexpected inflation rates. Expected and unexpected inflation affects the stock return positively. The table demonstrates that the coefficients of predicted inflation share a similar pattern with that of the actual inflation, that is, they both are positive, even though the actual inflation is slightly greater than the expected inflation this suggested that the stocks give protection against actual price increase than expected inflation.

$$LNSTI = 5.2 + 1.22LINF + 0.94AR(1) \quad (4)$$

Equation 4 shows that a 1 % increase in inflation results in 1.22% rise in expected inflation and a 0.94% increase in unexpected inflation. The positive relationship between the variables also proves Fisher’s theory. The support of the Fisher’s hypothesis supports the findings by Kawawa (2019). According to the analysis above stocks are indeed a hedge against inflation in South Africa in the case of the expected inflation.

## Conclusion

The study examines if investing in common stocks is a good hedge against CPI in South Africa. Some studies have seen a relationship that is favorable between CPI and stock prices while others have observed an unfavorable relation of the two variables. However most studies have managed to prove that Fisher's hypothesis holds both in the short term and the long term. The analysis uses monthly data for the period January 2008 until January 2021. The empirical study shows that the overall index data (stocks) have a favorable relationship and statistically significant relationship with ex-post inflation. The ex-post model shows that there is hedge against inflation in South Africa even when using the overall index. Similarly, the ex-ante model also depicts a relationship that is positive between the variables and that the overall index is indeed a good hedge against the expected inflation. That is why, overall, the favorable correlation between CPI and stock market returns shows that stock returns in South Africa were a good fence against price hikes from 2008 up till 2021. The results of the study have implications that can help investors in making their decisions on where to plough their funds in the market of South Africa. However, the scope of the study was limited, the study could have been broadened to analyse the sector-by-sector relationship. This is to seek the connection between price hikes and the inventory market in order to determine if the hypothesis holds.

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