

THE IMPACT OF INFLATION ON STOCK MARKET PERFORMANCE IN ZIMBABWE BETWEEN 1980 AND 2008: AN EMPIRICAL INVESTIGATION

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ABSTRACT

Empirical literature fails to agree on how the performance of the stock market and inflation are related as explained by Fama (1981) and Fisher (1930). The relationship had been mixed and this research makes an empirical investigation on this relationship using Zimbabwean data from 1980-2008. The study employed VECM approach to test the dynamic relationship in the short and long term and to understand the key drivers of each variable. Findings support the Fisher hypothesis but stocks did not offer perfect protection from the effects of inflation over the long period. Each variable was mainly driven by its own lagged variable while the importance of one variable in explaining the variation in the other variables was moderate. Investors should not hold and view equities as long term investments providing them with compensation for loss of purchasing power. They can hold equities as good buys in the short to medium term.

Keywords: Inflation, stock market, Vector Autoregression (VAR), Vector Error Correction (VEC), Forecast Error variance decomposition (FEVD), Impulse response function (IRF)

INTRODUCTION

The stock market is considered as one of the safest destinations for putting one's money during the periods of hyperinflation. The capital market is an important avenue for channeling funds into the needy areas of the economy. The Zimbabwe Stock Exchange (ZSE) performed beyond the expectations of many analysts during the period under review. The country experienced political instability, high unemployment, changes in exchange rates systems, hyperinflation and a lot of company closures between the years 2000 and 2008. In the years 2003/4 the country experienced a banking crisis that negatively affected the stock market. The expectation was that the falling apart of the whole economy would affect the performance of both money and capital markets. But to the surprise of many the stock market index continued to soar during the review period especially during the hyperinflationary phase. The existence of a high period of inflation can be problematic to investors as they expect low payoffs from stocks. Some investors are optimistic even during the period of high inflation.

The Zimbabwean economy performed well after the country obtained independence from its colonial masters in 1980. The rate of inflation was single digit and the rate of unemployment was below 10%. By the end of 1990 the rate of inflation was around 20% and in December 1998 the year on year rate was closer to the 50% mark. The situation began to worsen in 1998 after the country's participation in the Democratic Republic of Congo and the payment of unbudgeted gratuities to the war veterans which saw the inflation rate hitting levels beyond the 50% mark year on year. By the end of 2008 the rate of inflation had reached the 231 million percentage mark. The rising inflationary pressures were attributed to factors like increased printing of notes and coins, depreciation of the Zimbabwe dollar and excessive

budget deficit. This connection between stock market performance and inflation is imperative for investors because stocks are expected to provide protection from the effects of inflation. According to the Fishers (1930) hypothesis shares can act as a hedge against inflation. During the period of high inflation investors acquire more of real than financial assets. Investors are interested in the real as opposed to the nominal value of their investment. During the period of high inflation the rise in the nominal value of shares is a form of compensation for continuous increases in prices which helps to maintain the real value of stocks. This study is of importance to investors in Zimbabwe as we test the applicability of the Fisher's hypothesis and the findings assist investors in coming up with balanced decisions on how to allocate their assets. One of the major questions that still need to be examined is whether or not the known relationship between stock market and inflation held during the period under review. We still need to know the impact of inflation on the stock market performance and to check whether or not inflation was a key driver of the stock market index in Zimbabwe and vice versa. The direction of causality is still questionable between the two variables which are helpful in detecting the possibility of a short run and long run relationship. Literature provides evidence of both a negative and positive relationship between the two variables and direction of causality is not clearly defined. For example literature shows that stock market provides a hedge only in the short term, others say that the stock protects investors from effects of inflation in the long term, while others found a positive or negative relationship (Maku and Atanda (2010), Ibrahim and Agbaje (2013), Omran and Pointon (2010), Emenike and Nwankwegu (2013), Yeh and Chi (2009), Baekaert and Engstrom (2009)). While these researches are further reviewed in the coming sections, the important questions to ask for the Zimbabwean economy are as follows:

- 1) Does the stock market provide a hedge against inflation for investors on the ZSE?
- 2) What is the nature of the relationship between the two variables in the long and short term?
- 3) Is inflation the key driver of stock market performance in Zimbabwe and vice versa?
- 4) What percentage in stock market volatility is explained by inflationary shocks?

The coming sections of this paper are organized in the following order: the review of literature, methodological issues, findings obtained in our analysis and then paper is concluded together with implications useful for policy making and future research work.

LITERATURE REVIEW

The connection between stock prices and inflation is based upon the Fisher (1930) hypothesis which puts across the idea that shares are claims against real assets of the business and they help to protect the investors from the ills of inflation. The nominal prices of shares will fully incorporate the expected inflation such that the relationship between stock prices and inflation will be positive. Thus shares can act as a good protection to investors from the negative effects of inflation in the long term. But the hypothesis by Fama (1981) shows that the relationship between stock market performance with inflation is inverse which was also supported by Yeh and Chi (2009). The following paragraphs shed more light on the findings from literature.

The relationship between stock prices and inflation had attracted much debate in literature from several researchers. Emenike and Nwankwegu (2013) questioned the ability of stock returns to protect investors against inflation using Nigerian data for the period 1985 to 2011. Their model had one independent variable which is inflation (CPI). They used Engle-Granger

two-step method to examine the existence of co-integrating relationship as well as the effect of inflation on stock market performance in the short-run and the speed of error correction. The study showed that stock returns and inflation were co-integrated and hence they converged to long-run equilibrium but the speed of adjustment to equilibrium was slow. The results further showed that inflation did not have significant short-term effects on stock returns. Thus protection to investors was only possible in the long-run as opposed to the short-run. These findings disagreed with Maku and Atanda (2010) but were consistent with Sangmi and Hassan (2013) who found that inflation, in the short run, has a positive but statistically insignificant impact on short-run changes in stock returns. The same relationship was further examined by Ibrahim and Agbaje (2013) in Nigeria using a shorter period from January 1997 to 2010. A different method (Autoregressive Distributed Lag (ARDL) bound test) was employed. It was evident, from their results, that there was a causal relationship over the long term between returns on shares and inflation. The findings using their model further supported the ideas by Emenike and Nwankwegu (2013) as they also found a moderate adjustment towards equilibrium between the variables as such their results found a short run relationship. Their results were consistent with Omran and Pointon (2010) who addressed the same questions using Egyptian data. The study used cointegration analysis and then the Error correction model (ECM) for period from 1980 to 1998 (19 years) which was shorter and longer than Emenike and Nwankwegu (2013) and Ibrahim and Agbaje (2013) respectively. Results were consistent with earlier findings as they showed a significant negative connection between the variables in the long term but they were in contradiction to findings by Emenike and Nwankwegu (2013).

The findings by Daferighe and Sunday (2012) also supported a negative association between inflation and stock prices. The low level of influence of inflation ranged between 14.6% and 0.3% which revealed that stock market investments are regarded as a good hedge against inflation in Nigeria which agrees with results by Emenike and Nwankwegu (2013) in their long run analysis. Pak and Bhatti (2013) examined the relationship between stock returns and inflation rates in the context of the Fisher hypothesis in the three CIS countries – Kazakhstan, Russia and Ukraine. According to their findings there was no long run connection between stock prices and inflation rate. Their conclusion was that stock markets in other countries in the CIS stock markets did not tend to provide a good hedge against inflation which is not agreeable to an earlier study by Daferighe and Sunday (2012). However results by Kimani and Mutuku (2013), using Kenyan 12 year data series agreed with previous researches as they showed that there was a significant negative relationship between the overall stock market performance, inflation, the deposit rate, and net effective exchange rate. A long run connection was found between the variables using their model. Granger Causality test, according to Girma (2012), showed that economic growth Granger-causes inflation which means that economic growth can predict movements in inflation. Cointegration test shows that there existed a long run relationship between economic growth and inflation in Ethiopia. In contrast to findings from literature Falahati et al (2012) found a positive long term connection between inflation and indicators of stock market development. They also supported that there was no threshold for effect of inflation on stock market. Omotor (2010) supported the idea that stock market returns provide an effective hedge against inflation and that the two variables were positively correlated to stock market performance and that co-integration exists. Their study found a unidirectional causal relationship from inflation to stock returns and not the other way round in the long run The results showing the existence of long run connection between inflation with stock returns was also confirmed by Geetha et al (2011) using data for Malaysia, United States and China. In Malaysia and USA the absence

of short run connection between the variables was found in their analysis but in the case for China the short relationship existed.

The reviewed literature showed that the relationship between stock market and inflation can be positive, negative or mixed in both the long and the short run. The causal relationship can be unidirectional or bidirectional and in some cases there is no relationship at all. Thus findings have failed to provide a conclusive position on the nature of the relationship. This gives room for further analysis using data for a developing economy like Zimbabwe to help understand its dynamics.

Methodology and Data

Data

This research used time series data for inflation as represented by the consumer price index (CPI) and stock market performance (SMP) as measured by the industrial index for the period 1980.1 to 2008.12. The period was chosen on the basis of data availability and it is the period before the economy was dollarized which took place in February 2009. The variables had been converted to natural logarithms to help deal with problem of multi co-linearity. All the preliminary tests for time series data were performed: unit root tests, correlation analysis, co-integration analysis, and impulse response function (IRF) and Forecast error variance decomposition (FEVD) tests.

Choice of model

The Vector error correction model was used to check the presence of both long and short run relationship; IRF and FEVD were done to analyze the contribution of shocks of one variable on the other, see previous work by Girma (2012) and Hosseini, Ahmad and Lai (2011). Our model takes the following form:

$$\text{LnSMP}_t = \beta_0 + \beta_1 \text{LnCPI}_t + \varepsilon_t \dots\dots\dots(1)$$

Where:

β_0 is a constant, and β_1 is the sensitivity of inflation to stock market performance and ε_t is the error correction term. The relationship is linear as supported by the views by Fisher (1930).

Empirical results

Results using VECM

The result from modified Dickey Fuller tests showed that the variables employed were stationary at first difference. The modified Dickey fuller test is employed because it is considered more powerful than the augmented Dickey fuller test, Girma (2012) and Rad (2011). The optimal number of lags for our model is four according to Schwarz Bayesian information criterion (SBIC) method, Hannan-Quinn Information criterion (HQIC) method and Sequential likelihood ratio (LR). We use one cointegration equation for our analysis on the nature of the relationship between the variables in long term after imposing Johansen normalization restriction. This had been confirmed using the Trace statistic which accepted a null hypothesis of not more one cointegrating equation.

Table 1: Results from Johansen normalization restriction

Variable	Coefficient (β)	Standard error	z-statistic	p-value
SMP	1			
CPI	0.160	0.173	0.92	0.356
Constant	0.21			

Results vector error correction model using stata 12, two variables Stock market performance (SMP) and inflation (CPI) using annual time series data from January 1980 to December 2008.

Table 2: Adjustment parameters- 1980.1-2008.12

Variable	SMP	CPI
Alpha	-0.0124	-0.0158
p-value	0.285	0.000*

The VECM approach used to determine the adjustment parameters between SMP and CPI using the 1980 to 2008 data set. *Significant at 5%.

Table 1 confirms the existence of an insignificant positive connection between inflation and performance of stock market in the long term which is consistent with results by Ochieng and Adhiambo (2012) and Ozbay (2009). This means that the stock market performance was insensitive to the level of inflation in the long term. But the positive relationship is consistent with Maku and Atanda (2010). The model fits very well and the signs are correct, for example when the value of inflation is above equilibrium it is pulled back towards the level of stock market performance at a rate of 1.6% per month within a 12 months period. There was slow adjustment towards equilibrium between the variables and this is consistent with findings by Emenike and Nwankwegu (2013) and Esmaeli and Gholami (2013). The adjustment parameter for inflation in table 2 is significant and having the opposite sign with the sensitivity variable. The VECM model also showed that there was short run causal relationship between the variables. There was bidirectional causality between the two variables. The rate of inflation was significant during the first lag while stock market performance was significant during the second and third lag at 5% level of significance. Each variable was also found to granger cause itself during the review period suggesting that our variables were sensitive to their own performance in the previous period during the short term. Other researchers found unidirectional causality from stock prices to inflation, Naik and Padhi (2012).

Results using IRF and FEVD

In this section we explain results on the combined tables for FEVD and IRF using the entire sample for the period 1980-2008. Using IRF we analyze the extent to which each variable explained the movements in another during the period. Time is measured in months on the x-axis while percentage changes are measured on the y-axis. We measure how one variable responded to shocks from the other. Findings in Figure 1A-1 showed that the rate of inflation was significantly responsive to impulses from stock market performance. For example within the first 10 months inflation responded negatively to innovations from the stock market and thereafter it would respond positively and consistently even after 24 months. The stock market also responded positively and significantly beyond the period of 24 months from innovations in the consumer price index (proxy for inflation). The result showed that the

variables were important in explaining the movements in one another. Innovations in each variable were important in explaining the other variable. The Zimbabwe stock market failed to take into account all the projected changes in inflation and was therefore not weakly informational efficient which is consistent with results by Muparuri and Chikoko (2013). This means investors that moved with speed would make notable gains by relying on available information.

Figure 1A-1: Impulse response function and FEVD (1980.1-2008.12)

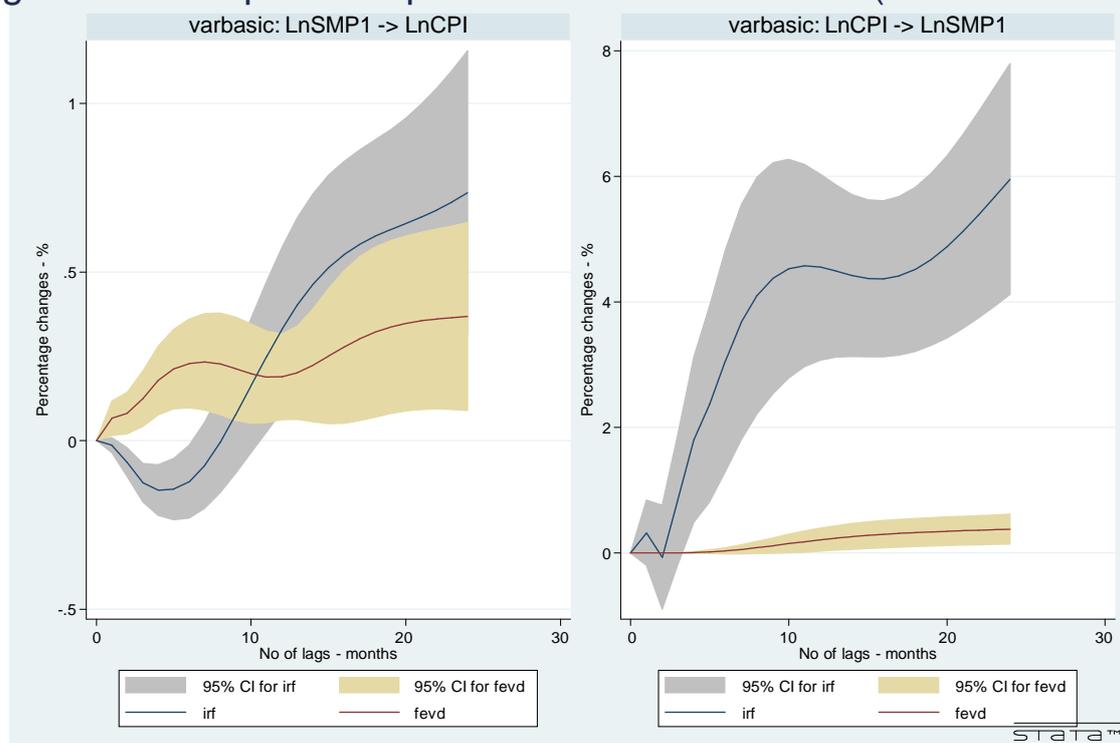


Figure 1A-1 shows results for IRF and FEVD tests using annual time series data set for 1980 to 2008, variables include stock market performance (SMP) and Inflation (CPI). The percentage changes in variables are recorded on the y-axis while time is on the x-axis in number of months.

Our analysis using FEVD helped to understand the contribution of shocks in each variable to the forecast error variance. This helped to show the extent in which variations in inflation would be explained by shocks in stock market index and vice versa. Our results showed that the main driver of stock market performance and inflation were their past their behavior which accounted for more than 90% of variations upto the 8th month and the 2nd month respectively. This would fall to levels between 30-40% after 24 months. Stock market performance accounted for between 6% and 40% of the variations in inflation from the first month until the end of 24 months. The impact of stock market performance on inflation showed a gradual improvement with signs of stability after 24 months. During the first 8 months inflation accounted for less than 10% of variations in stock market performance which would gradually increase up to a high of 37% at the close of the second year. Our findings show that inflation was not the key driver of the bullish performance of the Zimbabwe stock market as expected. Rather past performance was the main wheel behind the rise in stock prices as such investors should look at past movements and make their decisions based this information. The stock market behavior was not the main factor behind the inflationary pressures experienced by the economy but lagged values of inflation. This is true

as researchers suggested the following reasons as causes of rise in inflation: money supply, black market for foreign exchange rate, reckless spending and lagged values of inflation, Makochekanwa (2007), Coomer and Gstraunthaler (2011) and Zivengwa (2011).

CONCLUSIONS AND POLICY IMPLICATIONS

The research empirically determines the connection between stock market performance and inflation in Zimbabwe; investigates how innovations in inflation affect stock market performance and vice versa and to understand the impact of inflation on stock market performance. This was achieved using time series data for 29 years from 1980 to 2008. Stock market performance and inflation were measured using the Zimbabwe stock exchange industrial index and consumer price index respectively. The study intended to test the applicability of Fisher (1930) hypothesis and Fama (1981) hypothesis which supports a positive and negative relationship between the variables respectively. Fisher's hypothesis says that stocks are a good hedge while Fama's hypothesis says that stock prices fail to provide a hedge against the ills of inflation. Findings showed that stock market performance was chiefly dependent on its lagged values and the same was true for inflationary developments. Both variables responded positively to innovations from the other variable during the period of 24 months. Inflation was responsible for less than 10% of variations in stock market performance during the first three quarters of the first year and this would gradually increase up to a high of 37% towards the end of the 24 months period. Our results appear to be consistent with Fishers (1930) which shows a positive relationship between stock prices and inflation which is consistent with studies by Sohail and Hussain (2012) and Hosseini et al (2011). However the relationship was found to be statistically insignificant suggesting that equities did not offer perfect protection from the effects of inflation especially in the long run, this is consistent with results by Pak and Bhatti (2013). This suggests that investors cannot hold and view equities as long term investments providing them with compensation for loss of purchasing power. Thus stocks may not necessarily be performing well over the long term, rather they are good buys over the short to medium term. Investors should acquire stocks with a short term as opposed to a long term view during periods of hyperinflation. Further research work can be done by using different measures of stock performance and by incorporating other control variables especially those under the influence of both monetary and fiscal authorities.

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