

The impact of inflation and stock prices in two SADC countries

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Abstract

Economic events and key economic variables affect stock markets on a daily basis. Inflation is one such economic variable that influences share prices to some extent. This article focuses on two SADC countries, South Africa and Namibia, and measures the impact of inflation on share market prices in these countries. It can be concluded from the study that neither South African nor Namibian companies can offer investors a perfect hedge against inflation.

Key words

Inflation
Inflation hedge
Share prices

Fisher Effect
SADC

1 Introduction

An important issue in allocating capital and determining share prices is whether stock markets reflect certain economic fundamentals. Over the past fifteen years, there have been economic events that have had an impact on both developed and emerging stock markets. The most prominent of these events were the 1987 Wall Street crash, in which the Dow Jones Industrial Average fell 23% in one day (Bearly and Myers 2000); the Mexican crisis in 1994; and the Asian crisis in 1998. The purpose of this study is to determine whether top-performing companies that are listed on the Johannesburg Securities Exchange and on the Namibian Stock Exchange can provide a perfect hedge against inflation as an economic variable.

The study commences by considering the role and function of a stock market, and focuses on the Johannesburg Securities Exchange and the Namibian Stock Exchange. Thereafter, inflation and the measurement thereof are defined. The relationship between share prices and inflation

is examined by focussing on the dividend discount model and the Fisher Effect.

2 The role and function of a stock market

A market can be defined as a place where buyers and sellers meet to transfer goods and services (Reilly and Brown 2000). It is important to note that:

- It is not necessary for a market to have a physical location. It is only important for buyers and sellers to be able to communicate with each other. The Johannesburg Securities Exchange and the Namibian Stock Exchange are examples of markets that function without a physical location. They are markets that are electronically driven.
- A market does not have to own goods and services. It is, however, important to note that a good market provides the information and facilities needed to ensure the transfer of goods and services.
- A market does not have to specialise in a particular product or service, but can deal in a variety of goods and services. Reilly and Brown (2000) argue that markets are vitally important for the smooth operation of an economy.

Any market should adhere to certain requirements and characteristics in order to be classified as a capable market. The relevant characteristics and requirements are:

- The information that the market supplies should be accurate.
- Market liquidity should prevail. Bodie *et al* (2001) explain that the equilibrium level of liquidity in the market is determined by the way that market makers adjust to the supply and demand for immediacy in the market. Another component of a liquid market is the continuity of prices within the market. A market is liquid, or continuous, if large price changes do not occur between trades.
- A further requirement is low transaction costs. The lower the cost per transaction, the more efficient the market. This characteristic is also referred to as internal efficiency. External efficiency or, as it is referred to in several studies, the efficient market hypothesis, exists when the buyer or seller or both want the market price to reflect all available information in respect to the supply and demand factors within the market concerned.

The efficient market hypothesis has an influence on investors and on companies. Ross, Westerfield and Jaffe (1999) argue that, because all information is immediately reflected in prices, investors should only expect to receive the normal rate of return. On the other hand, a company should expect to receive the fair or present value of the shares

it sells. In other words, “a market is efficient with respect to some particular information if that information is not useful in earning a positive excess return.” (Corrado & Jordan 2000). There are three traditional forms of market efficiency, namely the weak, semi-strong and strong efficient markets.

The weak form of the efficient market hypothesis prevails in markets that already reflect all information derived from investigating the history of past trading. This means that if this form prevails, the current price of a share reflects its own past prices and that studying past prices in order to identify the mispriced share would not be applicable, because the data is widely known and investors would have already exploited this data.

The semi-strong form of the efficient market hypothesis states that all public information is reflected in the current share price, thereby reflecting all publicly available information. This is a controversial form of the efficient market hypothesis, because the identification of a mispriced share would be based on financial information that is already available to the public in the form of financial statements. This situation would already be reflected in the share price.

The strong form of the efficient market hypothesis states that information of any kind, including insider information, is reflected in the share price. This information would therefore be of no use in analysing the mispriced share. An example of inside information would be information on a takeover that is known.

Ross, Westerfield, Jordan & Firer (2001) note that when the efficiency of a market, for example the Johannesburg Securities Exchange, is studied, it is important to note that there are many shares that are poorly traded as a result of the high percentage of issued capital held by controlling shareholders. The number of shares that are well traded on the Johannesburg Securities Exchange can be as efficient as on markets such as the New York Stock Exchange.

The primary role of a stock exchange is to provide a market on which financial instruments, including shares, can be traded in a regulated environment and without restraint. A stock market is a vital part of any economic system in which ownership can be bought or sold. A stock exchange and its presence in an economic system can be justified by the following functions that it performs (Falkena, Fourie & Kok 1988):

- To channel savings into investments;
- to convert investments into cash, thereby providing market liquidity; and
- to evaluate and manage securities.

The Johannesburg Securities Exchange is the oldest stock exchange in Africa. In 1887, John X. Merriman referred to Johannesburg as a “squalid sort of Monte Carlo where everyone gambles in shares” (Bryant 1987). The Johannesburg Securities Exchange was established to serve as a market for raising capital publicly.

Besides being affected by the political changes that were taking place in South Africa in the 1990’s, and in particular by the lifting of formal and informal financial sanctions against the country, the JSE underwent a major set of reforms in late 1995. These reforms included the permitting of corporate membership of the Exchange for the first time; introduction of regulations regarding the protection of investors and members; introduction of electronic trading, which replaced the open-outcry system; and the permitting of negotiable brokerage fees. Furthermore, since October 1995, foreign investors have been exempted from paying withholding tax on dividends. Together, these reforms should contribute to greater transparency and efficiency on the JSE (<http://www.jse.co.za> 2001).

The Namibian Stock Exchange was formed by an association of Namibian businesses and individuals that contributed N\$10 000 to raise the capital and start-up funds to establish a local stock exchange. It operates under a license of the Ministry of Finance. The following regulations and associations govern the Namibian Stock Exchange (<http://www.nse.com> 2001):

- The Stock Exchange Association comprises 37 associate members that represent the 37 bodies in commerce that sponsored the establishment of the Namibian Stock Exchange.
- The Executive Committee represents the interest of all the stakeholders in the Namibian Stock Exchange.
- Subcommittees, for example the Listings Committee, which meet on a regular basis.
- The Stock Exchange Control Act, 1992, as amended, by means of which the Namibian Stock Exchange is regulated.

The Namibian Stock Exchange has used computerised screen trading from its inception and signed an agreement with the Johannesburg Securities Exchange in 1998 to become the first Southern African Development Community (SADC) country to make use of its electronic trading system (JET System). No capital gains tax is levied and a percentage (10%) withholding tax is charged on dividends. Other than special permission to take over a bank, there are no restrictions on foreigners. The Namibian Foreign Exchange Regulations are the same as the regulations that apply in the Republic of South Africa, because the Namibian dollar trades on a one to one basis to the South African rand.

3 Inflation

Inflation is the pervasive and sustained rise in the aggregate level of prices for goods and services measured over a given period (Morris and Morris 1999). Repetitive price increases erode the purchasing power of money and other financial assets that have fixed values, creating serious economic distortions and uncertainty. Inflation occurs when actual economic pressures and the anticipation of future developments cause the demand for goods and services to exceed the supply available at existing prices or when available output is restricted by faltering productivity and marketplace constraints.

4 How is inflation measured?

There are two major sources of information that government officials and the media use to measure inflation:

The first source is the Consumer Price Index (CPI). It is a measure of price changes in consumer goods and services such as petrol, food, clothing and cars. It is one of the statistics that is used most to identify periods of inflation or deflation. It usually has a large impact on the movement of share prices on the day that it is released (Fourie *et al* 1999).

The most common uses of the Consumer Price Index are to:

- calculate the rate of inflation;
- deflate or inflate another time series or index;
- adjust prices, wages, salaries and other variables for changes in the rate of inflation, if index linkage is applied.

The Consumer Price Index has particular advantages, because it is an explicit price index that is readily available. The published Consumer Price Index figures are not revised and the use of a long-time series is possible. Taking this fact into account, the Consumer Price Index of each of the selected countries was used as a measure of inflation.

The second source of information is the Producer Price Index (PPI). It comprises a family of smaller indexes and measures the average change over time in the selling prices of domestic producers of goods and services. PPI measure price changes from the perspective of the seller and the manufacturer. The PPI takes into account three areas of production, namely industry-based, commodity-based and stage-of-processing based companies.

5 Inflation and share prices

The relationship between share prices, rates of return and inflation is probably best illustrated within the context of the dividend-discount model (DDM). Investors will set the price of a share at time t , S_t , to a point at which the expected return on the share is equal to the required rate of return.

Consider first a world that has no inflation and a company that is expected to generate a real cash flow of C per period in perpetuity. Assume that the firm pays out all free cash flow as a dividend. The current price of a share (P_0) is calculated by dividing the dividend (D) by the required rate of return (k_s). The formula, expressed mathematically, is as follows (Gitman 2000):

$$P_0 = D/k_s \quad (1)$$

Suppose that the expected inflation rate increases. This increase brings about two fundamental changes. Firstly, the cash flows of the company may change as general inflation acts on both revenues and expenses. Secondly, the discount rate will change to a nominal rate (k_{nom}) defined by (Bodie *et al* 2001):

$$k_{nom} = (1 + k_r)(1 + I) \quad (2)$$

where k_r is the real required rate of return, given that expected inflation (I) is at some positive value. If the cash flows grow at a constant growth rate (g), the definition to determine the nominal price of share (P_{0n}) will change to (Gitman 2000):

$$P_{0n} = D_1/k_s - g \quad (3)$$

There is a clear relationship between an increase in inflation and a decrease in the share price. For example, as inflation increases, so does k_r or the required rate of return. As the required rate of return or k_r increases, the price of the share decreases. Since k_s are the denominator in the above equations, any increase in the denominator will decrease the current price.

How is the discount rate determined? The discount rate depends on three criteria: inflation, the demand pressure and risk (<http://stocksense.com/val2.html> 2001). In South Africa, the CPI is used to measure inflation.

Equity will be a hedge against inflation if $P_0 = P_{0n}$ or:

$$D/k_s = D_1/k_s - g \quad (4)$$

Two critical assumptions are needed to conclude that equity is an inflation hedge, namely:

- Nominal cash flows must be equal to real cash flows multiplied by the inflation growth factor; and
- the real interest rate must be independent of expected inflation.

The prediction that equity will act as an inflation hedge is sometimes referred to as the Fisher Effect. The Fisher Effect expresses the nominal rate of interest (r) as the sum of the real rate of interest plus the price change (or the inflation rate) (Jones 2000). Mathematically, the formula is expressed as follows:

$$\begin{aligned}1 + r &= (1 + R)(1 + I) & (5) \\ r &= R + I + RI\end{aligned}$$

Where R is the real rate of interest and I is the rate of inflation per annum expected to prevail over the life of the security. A nominal interest rate can therefore be seen to be the growth rate of money and a real interest rate as the growth rate of purchasing power. Equation (5) therefore changes to (Bodie *et al* 2001):

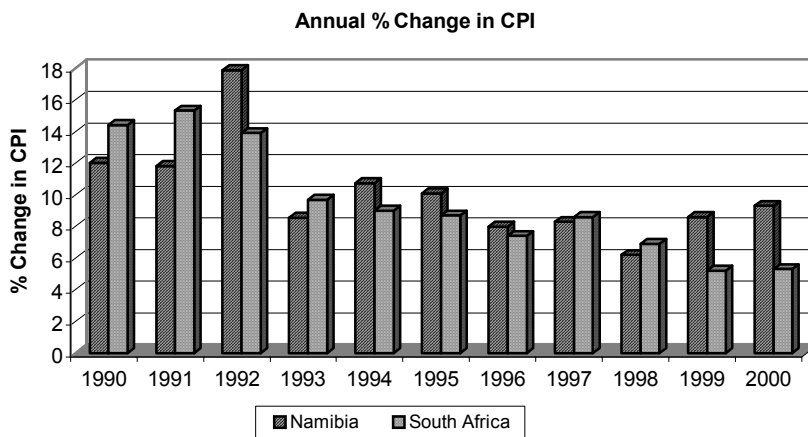
$$R = r - I \quad (6)$$

Generally, the Fisher Effect states that a nominal rate of interest has an embedded inflation premium sufficient to compensate investors.

6 Inflation in the SADC countries

It was necessary to track the historical inflation levels in the two SADC countries that were used in this research in order to determine the impact of inflation on share prices. Figure 1 represents the consumer price index (CPI) for South Africa and for Namibia during the period 1990 to 2000.

Figure 1: CPI for Namibia and for South Africa during the period 1990-2000



Source: <http://sadcbankers.org/> 2001

From figure 1, it can be seen that the CPIs of the two countries varied between a high of 17,88% for Namibia in 1992 to a low of 5,2% for South Africa in 1999. South Africa had a near annual decline (except for 1991 and 2000) in the CPI over the 10-year period. According to figure 1, the impact of inflation should be the least on South African shares, as a result of the relatively lower CPI rates.

7 Empirical findings

To study the effect of inflation on share prices in the real world, the findings of other research was used and basic data obtained from on-line data sources studied.

Theoretically, inflation may affect nominal interest rates, thereby affecting the fundamental share validation formulas mentioned above. As a result, inflation should reduce the price of shares. However, the results are mixed.

In 1982, Eugene Fama investigated the relationship between the change in the nominal interest rate and the change in expected inflation. Fama tested the following equation on a one-month Treasury Bill between 1953 and 1971 (Fama 1982):

$$p = a + b(r) = e \quad (7)$$

Where p is the actual inflation, a is the constant, b is regression, r is the nominal rate and e is the error term.

For the Fisher Effect to hold true, b should equal one. In his investigation, Fama found that $b = 0.98$. It is clear from Fama's results that the Fisher Effect holds true. There is therefore a relationship between inflation and nominal interest rates. Nevertheless, it is necessary to test how empirical evidence of inflation effects the share prices of the selected companies.

To test whether there is a relationship between share prices and inflation, time-series data from the CPI were used as a measure of inflation and the share prices of selected companies were used as a measure of share validation. The companies were selected on the basis of being the top ten companies (2000) in terms of market capitalisation (Data obtained from the Namibian Stock Exchange and JSE SATRIX 40. The Namibian Stock Exchange could only provide data from 1996 onwards; therefore there is a difference in the time series between the two countries. The time series for South Africa was from 1991 to 2000. A regression analysis was performed to determine whether there is indeed a negative correlation between inflation and share prices. If there were a negative correlation, then the fundamental teaching would hold true and the relationship would be negative. Table 1 indicates the change in CPI and share prices for the selected companies in South Africa and Namibia. The price change (PC) is measured as follows:

$$PC = (P_2 - P_1)/P_1 \quad (8)$$

Where P_1 and P_2 represent the share price or CPI index in time one and two respectively.

Table 1: Change in CPI and share prices of selected companies for the period 1991-2000 (South Africa) and 1996-2000 (Namibia)

SA	Anglo	Richemont	Angloplat	Old Mutual	Billiton	Didata	Firststrand	Stanbic	Nedcor	SAB	CPI
1991											
1992	-0.017	0.298	0.067			0.697	0.333	0.482		0.076	-0.093
1993	0.219	0.089	-0.021			1.161	0.955	0.343		0.154	-0.302
1994	0.735	0.037	0.386			0.529	0.837	0.209		0.416	-0.072
1995	-0.107	0.087	-0.176			0.535	0.177	0.206		0.194	-0.033
1996	0.306	0.464	-0.099			1.824	0.731	0.325		0.171	-0.149
1997	-0.056	-0.045	0.026		1558	1.176	0.957	0.177		0.048	0.162
1998	-0.188	0.137	0.030		1280	0.645	0.319	0.071		-0.086	-0.198
1999	0.417	0.609	0.754		2164	-0.042	-0.181	-0.098		-0.131	-0.246
2000	0.231	0.618	0.688	0.221	2835	1.051	0.107	0.363	-0.123	-0.049	0.019

Table 1 (continued)

Nam	De Beers	Old Mutual	Firststrand	SBIC	Sanlam	Investec	Barlows	Metropolitan Life	Alex Forbes	Fedsure	CPI
1996											
1997				0.216			0.006	1.076		1.102	0.038
1998	-0.284			-0.918		0.049	-0.461	-0.285	0.389	-0.241	-0.253
1999	1.731		0.434	0.469	0.486	0.421	0.785	0.117	0.344	0.007	0.387
2000	0.055	0.178	-0.040	0.199	0.032	-0.139	0.065	-0.127	-0.009	-0.326	0.081

Figure 2 indicates the changes in the CPI and the share prices of selected South African companies.

Figure 2: Changes in the CPI and share prices of selected South African companies for the period 1991-2000

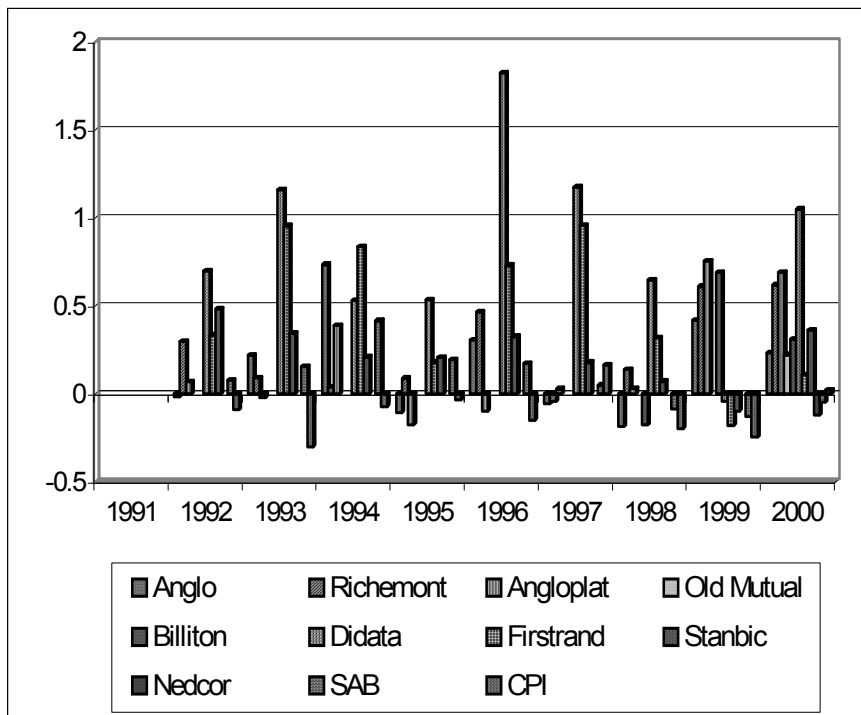


Figure 3 indicates the changes in the CPI and the share prices of selected Namibian companies.

Figure 3: Changes in the CPI and the share prices of selected Namibian companies for the period 1996-2000

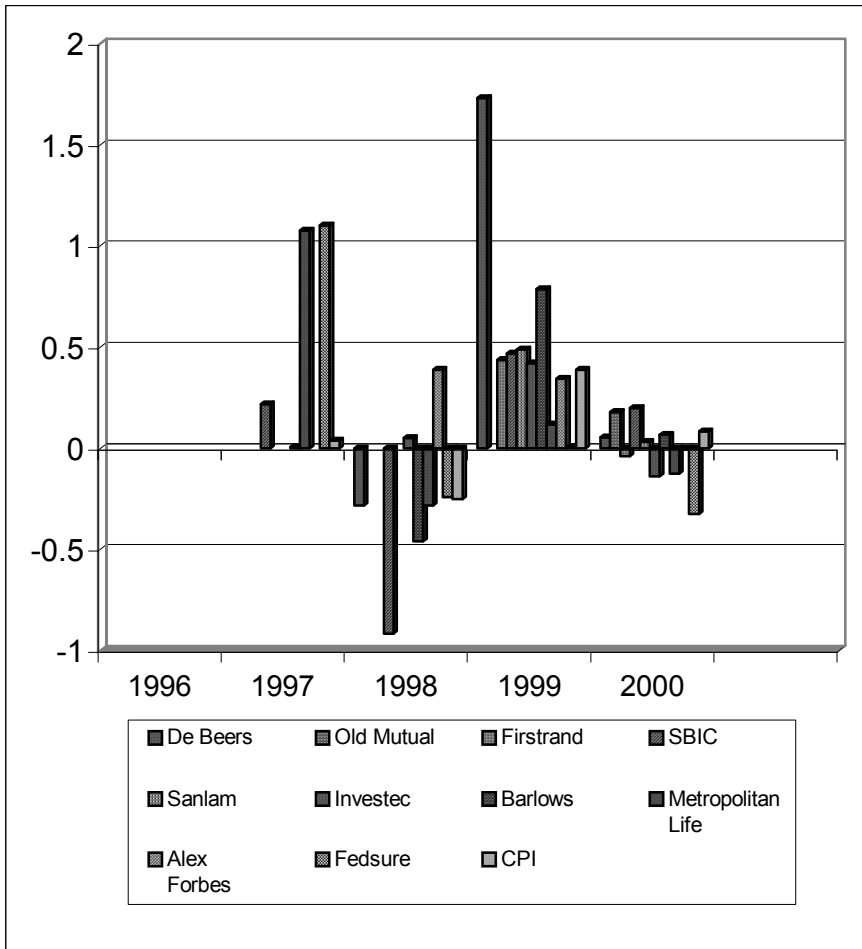


Table 2 indicates the result of the regression analysis to determine the correlation between movements in share prices and CPI.

Table 2: Correlation between changes in the CPI and the share prices of selected South African and Namibian companies.

	Correlation
South African companies:	
Anglo	-0.22
Richemont	-0.24
Angloplat	-0.03
Old Mutual ¹	-
Billiton	-0.1
Didata	0.19
Firststrand	0.16
Stanbic	0.19
Nedcor	-
SAB ²	0.11
Namibian companies:	
De Beers	0.92
Old Mutual	-
Firststrand	1.0
SBIC	0.91
Sanlam	1.0
Investec	0.63
Barlows	0.99
Metropolitan Life	0.21
Alex Forbes	-0.13
Fedsure	0.11

8 Conclusion

Do shares offer a sound hedge against inflation? The results of this investigation vary. Neither of the two selected countries offers a perfect hedge against inflation. The South African experience indicates that the companies listed in the mining sector are correlated negatively with inflation, whereas the selected companies in other sectors (financial services, information technology and food and beverage sectors) reveal a slightly positive correlation between changes in share prices and inflation. In respect of all the selected companies in Namibia (except for

¹ No correlation could be calculated, because the company was listed two years ago and the PC could only be calculated for one period.

² Although De Beers was listed as one of the top ten companies in terms of market capitalisation, the data of historical stock prices were not available from McGregor BFA and SAB was selected instead. The criterion used in the selection was that SAB was one of the top ten companies in 2000 in terms of value traded.

Alex Forbes), there is a strong positive correlation between changes in share prices and inflation.

Shares in some of the companies in South Africa can be used as a hedge against inflation. In addition, the study indicates that it is especially applicable to companies in the mining sector. The main question to be answered in further research is why the mining sector provides a better hedge against inflation in South Africa. On the other hand, the Namibian companies cannot be used as a hedge against inflation, because of the strong positive correlation between their share prices and inflation.

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