

# The Impact Of Inflation On Stock Prices In Two SADC Countries

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## **The Impact of Inflation on Stock Prices in Two SADC countries**

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An important issue is the question if stock markets reflect certain economic fundamentals in allocating capital and determining share prices. Over the past fifteen years, there have been economic events that 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 percent (23%) in one day (Bearley and Myers, 2000), the Mexican crisis in 1994 and the Asian crisis in 1998. These events raise the question to what extent stock market prices reflect fundamental economic variables.

### **The role and function of a stock exchange**

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

- A market need not be a physical location. It is only important that buyers and sellers can communicate with each other. The Johannesburg Stock Exchange and the Namibian Stock Exchange are examples of markets functioning without a physical location. They are markets that are electronically driven. Buyers and sellers only need to communicate with each other in order to form a market.
- A market does not need to own goods and services. It is important to note that a good market provides the necessary information and facilities to ensure the transfer of goods and services.
- A market does not have to specialize in only one product or service. A market can deal in a variety of goods and services. Reilly and Brown (2000) argue that markets are of vital importance to a smooth-operating economy.

Any market must adhere to certain requirements and characteristics to classify itself as a capable market. They are:

- The information the market is supplying must be accurate.
- Market liquidity must be present. Gross and Miller (1988) explain that the equilibrium level of liquidity in the market is determined by the way 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.
- Low transaction cost. The lower the cost per transaction the more efficient the market. This is also referred to as internal efficiency. External efficiency, or as it is been noted in several studies namely the efficient market hypothesis, is when the buyer or seller wants the market price to reflect all available information in respect to the supply and demand factors within the relevant market.

The efficient market hypothesis has an influence on investors as well as 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 they sell. 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 efficient market hypothesis occurs in markets that already reflect all information derived by investigating the history of past trading. This means that if this form holds 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 exploit this data.

The semi-strong form efficient market hypothesis explains that all public information is reflected in the current share price, thus reflecting all publicly available information. This is a controversial form of 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 would already reflect in the share price.

The strong form 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 analyzing the mispriced share. An example of inside information would be information on a takeover that is known.

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

The primary role of a stock exchange is to provide a market where financial instruments, including shares, can be traded in a regulated environment, 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 it performs namely to (Falkena, Fourie & Kok, 1988):

- channel savings into investments,
- to convert investments into cash, thus supplying market liquidity and
- to evaluate and manage securities.

The Johannesburg Stock Exchange is the oldest exchange in Africa. John X. Merriman in 1887 referred to Johannesburg as a “squalid sort of Monte Carlo

where everyone gambles in shares.” The Johannesburg Stock Exchange was established to serve as a market for raising capital publicly.

Besides being affected by the political changes taking place in south Africa in the 1990's, and in particular the lifting of formal and informal financial sanctions against the country, the JSE experienced a major set of reforms in late 1995. These reforms included permitting corporate membership of the exchange for the first time; the introduction of regulations covering the protection of investors and members; the introduction of electronic trading, replacing the old open outcry system; and the permitting of negotiable brokerage fees. Furthermore, foreign investors have been exempt from paying withholding tax on dividends since October 1995. Together, these reforms should contribute to greater transparency and efficiency on the JSE.

The Namibian Stock Exchange was formed as an association of Namibian businesses and individuals who contributed N\$10 000 to raise the capital and start-up funds to establish a local stock exchange. It operates under license of the Ministry of Finance. The following regulations and associations govern the Namibian Stock Exchange:

- The Stock Exchange Association. It consists of 37 associate members who represent the 37 bodies in commerce who sponsored the establishment of the Namibian Stock Exchange.
- The Executive Committee, which represents the interest of all the stakeholders in the Namibian Stock Exchange.
- Subcommittees for example the Listings Committee which meets regularly.
- The Stock Exchange Control Act as amended, 1992 by which the Namibian Stock Exchange is regulated.

The Namibian Stock Exchange used computerized screen trading from the start and signed an agreement with the Johannesburg Stock Exchange in 1998 to become the first Southern African Development Community (SADC) country to make use of its electronic trading system (JET System). There are no capital gains tax levied on capital gains and a 10 percent (10%)

withholding tax is charged on dividends. Other than special permission to take over a bank, foreigners are under no restrictions. The Namibian foreign Exchange Regulations are the same as that of the Republic of South Africa as the Namibian Dollar is trading on a one to one basis to the South African Rand.

## **Inflation**

Inflation is the pervasive and sustained rise in the aggregate level of prices for goods and services measured (Morris and Morris, 1999). Repetitive price increases erode the purchasing power of money and other financial assets with fixed values, creating serious economic distortions and uncertainty. Inflation results when actual economic pressures and 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.

### **How is Inflation Measured?**

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

The first source is the Consumer Price Index (CPI) - a measure of price changes in consumer goods and services such as petrol, food, clothing and car's. It is one of the most used statistics to identify periods of inflation or deflation. It usually has a big impact on the movement of stock prices on the day that it is released.

The most common uses of the Consumer Price Index (CPI) is that it is used 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 copulation is applied.

The Consumer Price Index (CPI) has certain advantages, as it is an explicit price index that is readily available. The published Consumer Price Index (CPI) figures are not revised and the use of a long time series is possible. Taking this into account the Consumer Price Index (CPI) of each of the selected countries will be used as measure for inflation.

The second source is the Producer Price Index (PPI) - A family of smaller indexes that measures the average change over time in selling prices by domestic producers of goods and services. PPI's measure price change from the perspective of the seller and manufacturer. The PPI looks at three areas of production Industry-based, Commodity-based, Stage-of-processing based companies.

### **Inflation and stock prices**

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

Consider first a world with no inflation and a company 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 stock ( $P_0$ ) is calculated by dividing the dividend ( $D$ ) by the required rate of return ( $k_s$ ). The formula expressed mathematically is as follows:

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

Suppose now that expected inflation increases. This brings about two fundamental changes. First, the cash flows of the company may change as general inflation acts on both revenues and expenses. Second, the discount rate will change to a nominal rate ( $k_{nom}$ ) defined by:

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

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 stock ( $P_{0n}$ ) will change to:

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

How is the discount rate determined? The discount rate depends on three criteria: inflation, the demand pressure and risk (<http://stocksense.com/val2.html>). The inflation in the market is usually determined by the government. In South Africa, the CPI is used to measure inflation. We can clearly see a relationship between an increase in inflation and a decrease in the stock 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 stock decreases. Since  $k_s$  are the denominator in the above equations, any increase in the denominator will decrease the current price.

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:

- 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:



$$1 + r = (1 + R)(1 + I) \quad (5)$$

$$r = R + I + RI$$

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. RI is small and can therefore be ignored. Equation (5) changes to:

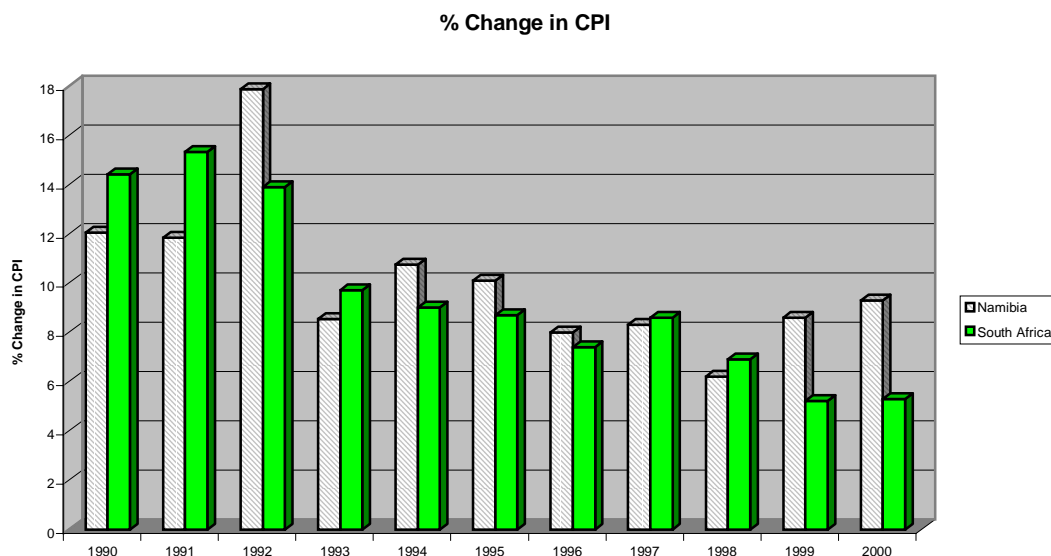
$$r = R + I \quad (6)$$

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

### Inflation in the SADC countries

It is necessary to track the historical inflation levels in the three SADC countries used in the research in order to determine the impact of inflation on stock prices. Figure 1 represents the consumer price indexes (CPI) of South Africa and Namibia for the period from 1990 until 2000.

**Figure 1: CPI of Namibia and South Africa for the period 1990 – 2000**



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

From the figure one can see that the CPI's of the countries varied between a high of 17,88% for Namibia in 1992 to a low of 5,2% in 1999 for South Africa. South Africa shows a near yearly decline (except for 1991 and 2000) in the CPI over the 10-year period. According to the above figure, the impact of inflation should be the smallest on South African stocks, due to the relative lower CPI-rates.

### **Empirical findings**

To study the effects of inflation on stock prices in the real world we will use research performed by other authors and perform a study on some basic data obtained from on-line data sources.

Theoretically — inflation may affect nominal interest rates therefore, affecting the fundamental stock valuation formulas mentioned earlier. As a result, inflation should reduce the price of stocks. However, as we will find, the results are mixed.

In 1982, Eugene Fama tested 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 nominal rate and  $e$  is the error term.

For the Fisher Effect to hold  $b$  should equal one. Fama found in his test that  $b = 0.98$ . It is clear from Fama's results that the Fisher Effect holds true, therefore there is a relationship between inflation and nominal interest rates.

Nevertheless, we must test to see how empirical evidence of inflation effects stock prices.

To test if there is a relationship between stock prices and interest rates we used time series data from the CPI as a measure of inflation and the stock prices of selected companies<sup>1</sup> as a measure of stock validation. The time series was between 1991 and 2000. We used a regression analysis to determine if there is indeed a negative correlation between inflation and stock prices. If there were a negative correlation then the fundamental teaching hold true and the relationship would be negative. Table 1 indicates the change in CPI and stock 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  $P_2$  represents the stock price or CPI index in time one and two respectively.

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<sup>1</sup> The companies were selected on the basis of the top ten companies (2000) based on market capitalization (data obtained from Namibian Stock Exchange and JSE SATRIX 40)



**Table 1: Change in CPI and stock prices of selected companies for the period from 1991 to 2000 (South Africa) and for the period from 1996 – 2000 (Namibia)**

SA	Anglo	Richemond	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
								<b>Metropolitan</b>	<b>Alex</b>		
<b>Nam</b>	<b>De Beers</b>	<b>Old Mutual</b>	<b>Firststrand</b>	<b>SBIC</b>	<b>Sanlam</b>	<b>Investec</b>	<b>Barlows</b>	<b>Life</b>	<b>Forbes</b>	<b>Fedsure</b>	<b>CPI</b>
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 shows the share price and CPI changes for the selected South African companies.

**Figure 2: Share price and CPI changes for selected South African companies for the period from 1991 to 2000**

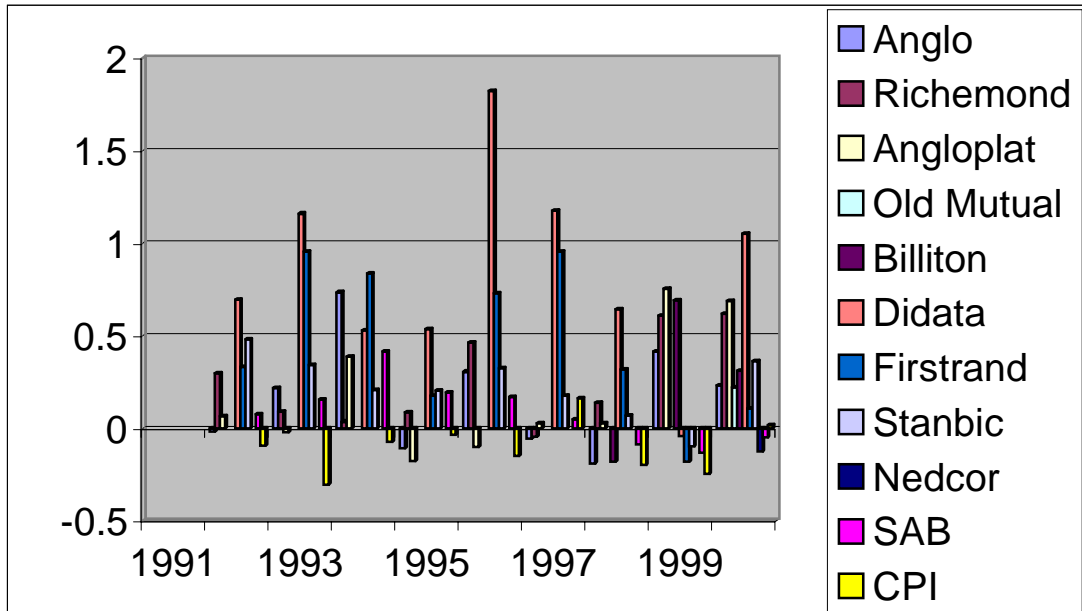


Figure 3 shows the share price and CPI changes for the selected Namibian companies.

**Figure 3: Share price and CPI changes for selected Namibian companies for the period from 1996 to 2000**

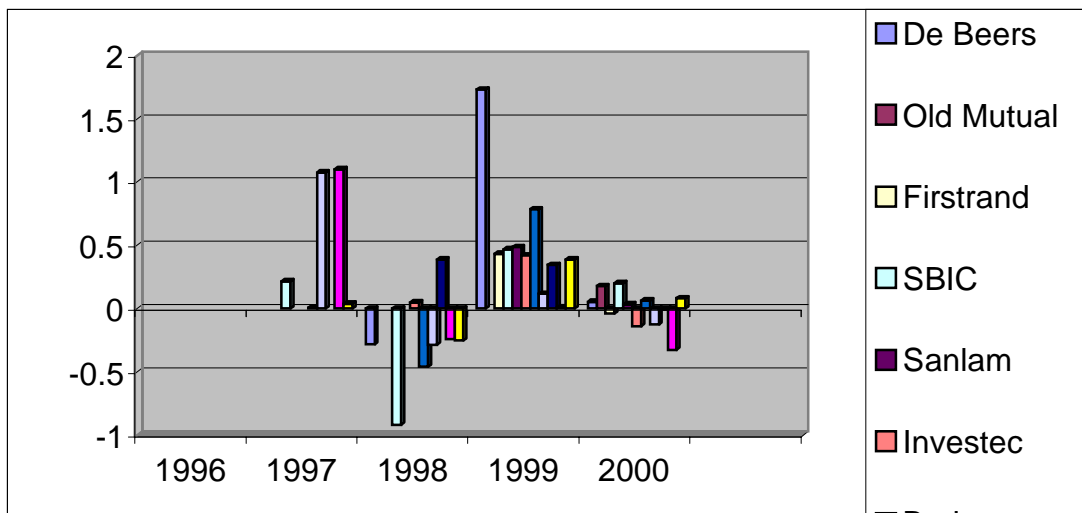


Table 2 indicates the results of the regression analysis in determining the correlation between stock price movements and CPI movements.

**Table 2: Correlation between changes in stock price and CPI for selected South African and Namibian companies.**

	<b>Correlation</b>
<b>South African companies:</b>	
Anglo	-0.22
Richemond	-0.24
Angloplat	-0.03
Old Mutual <sup>2</sup>	-
Billiton	-0.1
Didata	0.19
Firstrand	0.16
Stanbic	0.19
Nedcor <sup>3</sup>	-
SAB <sup>4</sup>	0.11
<b>Namibian companies:</b>	
De Beers	0.92
Old Mutual	-
Firstrand	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

## **Conclusion**

<sup>2</sup> No correlation can be calculated since the company was listed two years ago and the PC could only be calculated for one period.

<sup>3</sup> No correlation can be calculated since the company was listed two years ago and the PC could only be calculated for one period.

<sup>4</sup> Although De Beers was listed as one of the top ten companies based on market capitalization, the data of historical stock prices was not available from McGregor BFA and we chose SAB instead. The selection criteria were because SAB was one of the top ten companies in 2000 based on value traded.

Do stocks offer a good hedge against inflation? Equities represents claims to underlying real assets, and as such, should maintain their value in the face of increases in the general price level.

The result of the study varies. Not one of the two selected countries offers a perfect hedge against inflation. The South African experience shows that the companies listed in the mining sector are negatively correlated against inflation. Whereas the selected companies in other sectors (financial services, information technology and food and beverage sectors) shows a slightly positive correlation between stock price changes and inflation. All the selected companies in Namibia, (except Alex Forbes) shows a strong positive correlation between stock price changes and inflation.

Some of the companies in South Africa can be used as a hedge against inflation. In addition, as the study shows, especially those 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. The Namibian companies, on the other hand cannot be used as a hedge against inflation, because of their strong positive correlation.

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