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Are Brewery Stocks a Hedge against Inflation? Evidence from Nigeria

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Abstract
This paper investigates the extent to which stocks of breweries listed in Nigerian Stock Exchange (NSE) are a hedge against the expected and unexpected inflation in Nigeria over the period 2000–2011. Unexpected inflation is computed as the difference between the actual inflation and the estimates of the expected inflation. The study used real rate of return on equity and regression analysis to find the stocks that provide positive real return and offer inflation-hedging potentials respectively. The findings revealed that in terms of real return based on shareholders' funds and total return to equity, all the firms were not susceptible to adverse effect of inflation but when based on dividend yield all the firms offered no significant hedge against inflation.

1. Introduction

Inflation creates a perennial concern for government, policymakers, and investors (individuals and firms) generally. It causes uncertainty, decreases the purchasing power of money, and ultimately stunts investment and economic activity. Investors are always on the lookout for alternative investment avenues in a bid to protect the value of their investments. Investors diversify into a number of instruments or assets – financial and real – such as stocks, precious metals, foreign currencies and other durable assets in the bid to hedge against inflation. Following Fisher (1930), finance theory suggests that the returns on stocks are positively related to the expected economic activity. Thus, the relationship between stock returns and inflation suggests that investment in equity markets can provide a good hedge against inflation if the revenue and earnings of a company grow over time. Consequently, while governments and policymakers evolve various policies and strategies (fiscal and monetary), investors on their part jostle for smart ways to protect the purchasing power of their investments.

In particular, long-term investments, such as equities and bonds, are mostly vulnerable to inflation. Hence, long-term investors show much concern about the risk of inflation. Precisely, investors face a common problem: how to maintain the purchasing power of their asset holdings over time and achieve a level of real returns consistent with their investment objectives. Both dimensions of this problem are often considered together, but there remains an active debate regarding the first, namely which asset type provides the most effective hedge against inflation. The focus on inflation-hedging properties, naturally, panders to the fluctuations in inflation itself. The most intense burst of activity in this area followed the persistent rise in inflation through the 1970s to the 1980s. So why focus on inflation hedging now?

Countries like Nigeria with a constant history of inflation have a lot more to contend with after the recent global financial crisis of 2007/2008. The meltdown forced governments all over the world to evolve policy tools aimed at stemming the tidal wave of the raging financial tsunami. These policy tools warranted particularly massive injections of liquidity and quantitative easing, with significant implications for risk of inflation. Even before the crisis, inflation had been rising on a global scale. The economic implications of this crisis juxtaposing wider gaps in productivity have unleashed inflation pressure on already weak economies, like Nigeria. While policymakers are working hard to stabilize output and stave off deflation, inflation however remains a major concern. The apprehension of investors makes inflation hedging an important component of long-run investment policy.

Over the years, investors have been concerned about the negative effects of rising inflation on the purchasing power of their investments. While there are several investment options at the investors' disposal, not all of them have inflation-hedging properties. In particular, following the recent global financial meltdown with the attendant inflation worries spreading, investors are scrambling to find smart ways to protect the purchasing power of their investments.

Traditional versus Evolving Inflation hedges

Since not all investment options have inflation-hedging properties, in general, inflation hedges can be dichotomized into traditional versus evolving approaches. Traditional inflation-hedging vehicles include commodities and commercial real estate. Commodities have enjoyed historical appeal because of their tendency of their prices to keep pace with inflation. For example, the prices of commodities such as agricultural products (cocoa, palm oil, foodstuffs in general), energy (oil and gas), metals (gold, silver, copper) always go up as inflation rises. Sometimes, inflation is induced by the increases in the prices of these goods. Unlike commodities,

TIPS adjust their principal and interest payments regularly (e.g. monthly) according to changes in the Consumer Price Index (CPI), which is the most common measure of inflation. In recent times, wealth management firms and financial advisers (e.g. Nuveen Investments) have cautioned that the so-called traditional inflation hedges may not hold up so well in today's technology-driven markets.

New Instruments for Hedging Inflation

In recent years, as a consequence of innovations in financial markets, financial derivatives and their exotic variants have evolved as new forms of instrument trading as well as investment options with inflation-hedging potentials. Table 1 isolates four asset classes with a potential for inflation-hedging. Although each asset class has unique characteristics with a different role in a portfolio, they can help the portfolio keep track of inflation (Nuveen Investments, 2013). According to Nuveen investments, TIPS have a high correlation to U.S. fixed income but can help diversify the fixed-income portion of a portfolio with an inflation hedge; commodities have a low correlation to both equities and fixed income but can be a volatile addition to a portfolio; commercial real estate provides diversification through low correlation to both fixed income and equities, along with some income potential and; global infrastructure offers attractive returns and lower risk than other asset classes and a higher correlation to equities. Its global equity nature makes it a good inflation-oriented diversifier for the international equity component of a portfolio (ibid).

Table 1: Distinctive Characteristics of Four Inflation Hedges

Inflation Hedge	TIPS	Commodities	Commercial Real Estate (REITs)	Global Infrastructure
Inflation-fighting features	Return adjusted to most common measure of inflation – CPI	Return adjusted on the basis of demand for goods and services that affects demand for commodity inputs Rising prices of commodities, such as oil, can also be driver of inflation	Property values tend to adjust to inflation Rent increases often tied to CPI	Replacement values of infrastructure assets adjust to inflation Regulated contracts often have built-in inflation adjustments, such as toll roads and utilities Includes companies that can benefit from rising prices
Potential reward/risk	Lowest volatility Lowest returns	Highest volatility Highest returns	High volatility High returns	Moderate volatility Moderate returns
Correlation	Low correlation relative to equity, but higher to fixed income	Low correlation to both equity and fixed income	Low correlation to fixed income; moderate correlation to equity	Low correlation to fixed income; low correlation to equity
Portfolio construction	Can replace a portion of fixed income allocation to add inflation hedge	Overall portfolio diversifier and inflation hedge to be used in moderation due to high volatility	Overall portfolio diversifier that adds inflation hedge and some income	Can replace a portion of international/world equity allocation
Underlying investment categories	Government-backed bonds whose principal and interest payments adjust to monthly changes in the CPI; backed by the full faith and credit of the federal government	Raw materials used to create products (oil, natural gas, metals, and agricultural products) that can be traded on an exchange	Securities issued by REITS (companies that own and operate commercial real estate)	Securities issued by companies that own, operate, or build infrastructure assets (e.g., toll roads, airports, energy distribution, waste management)

Source: Nuveen Asset Management, 2013

A large literature exists about the inflation-hedging potentials of various classes of assets, including stocks, bonds, Treasury bills, commodities, and real estate (see for example, Bodie, 1976; Boudoukh & Richardson, 1993; Campbell & Vuolteenaho, 2004; Gorton & Rouwenhorst, 2006; Worthington & Pahlavani, 2007;

Hoevenaars *et al*. 2008; Bekaert & Wang, 2010; and Bruno & Chincarini, 2010). Equity stocks are by far the most widely studied asset class with inflation-hedging properties. These studies argue that stocks provide protection against increases in the general price level, especially pension funds, whose liabilities usually dovetail with inflation. While every country experiences inflation, the rates vary from one country to another. In most advanced economies, inflation rate is relatively moderate to a low single digit level unlike the trend in developing economies like Nigeria where inflation rate is often in double digit figures.

The effect of inflation is profound and this makes it a major challenge in investment decisions. For example, a prolonged period of inflation results in a change in the foreign exchange value of the currency. Because of the negative impact of inflation on the economy and citizens' incomes, every government tries to mitigate the incidence through appropriate monetary and fiscal policies. Inflation occasions a chain of reactions with debilitating consequences on the citizens and the economy as a whole. With inflation or expected inflation, there will be unrelenting increases in prices of goods and services, continuous decline not just in the value of the local currency but also in profits and earnings from investments of economic entities (including households). The urge to defer current consumption to future date for investment purposes will wane, and prices of real and financial assets will skyrocket.

In Nigeria, inflationary pressure has been dense and persistent and the nation is yet to break out from this vicious circle. In the 1990s, inflation spiked from 13% in 1991 to 46% 1992 and to 72.8% in 1995. From then, it steadily declined to 6.9% in 2000 before rising to 10.8% in 2011 and has remained within +2% brackets since then. Several industrialized economies had witnessed raging inflationary pressure as at 1974, with inflation rates in UK, France, Italy, Holland, Belgium, Japan, and the USA at 20, 14, 20, 10, 13, 24, 12 percent, respectively (Griffith, 1976). Inflation in Nigeria has been attributed to a number of factors, including low productivity, excess liquidity in the financial system, perennial high cost of funds, continued depreciation of the Naira, poor or weak infrastructure (especially, epileptic electricity supply, poor transportation network, high cost of transportation amidst high pump price, incongruous fiscal and monetary policies, and weak and corrupt governance.

From a macroeconomic standpoint, budget deficits are the fundamental cause of inflation, particularly in countries with prolonged high inflation like developing economies, whose deficits are nearly always financed through money creation. The period immediately following the return to democratic political governance in Nigeria in 1999, witnessed persistent increases in government expenditures and increase in aggregate demand which, in the process, resulted in a general rise in the price level of goods and services as well as increase in interest rates. The economic logic is that government's unguarded expenditures amidst a corrupt system of governance will give rise to persistent fiscal deficits and inflation. The standard macroeconomic theory argues that fiscally dominant governments running persistent deficits would sooner or later finance the deficits via money creation, which naturally have inflationary effects (Dockery, Ezeabasili & Herbert 2012). This view is supported by Fischer & Easterly (1990) who earlier noted that rapid growth in the money supply could be driven by underlying fiscal imbalances, which will detonate rapid inflation. The ensuing higher interest rates will crowd out private investment and thus reduce private sector investment in productive activities less profitable as a consequence of excessive government borrowing from the financial markets. The search for alternative (protected) investment outlets compels investors to jostle for inflation-hedging assets.

Nigeria is chosen for this empirical investigation for a number of reasons. Despite the obvious fact that Nigeria is an oil-rich country with a large inflow of oil revenue, the country has nonetheless experienced prolonged spell of double-digit inflation. In fact, an important feature of the Nigerian economy is the transition to high rates of inflation. In the 1970s, the overall inflation rate averaged 15.3 percent; in the 1980s it increased to an average of 22.9 percent, and in the 1990s the average inflation rate soared to 30.6 percent, but by 2006 the economy experienced a sharp average fall of 18.4 percent in the inflationary trend (Dockery, Ezeabasili & Herbert 2012). These high rates of inflation are caused by the widening fiscal deficits, sources of deficit financing, and the depreciation of the Naira exchange rate (Ezeabasili, Mojekwu & Herbert 2012). The high inflation rates over a prolonged period have resulted in substantial costs and large decline in purchasing power, at the same time as the performance of the economy has declined, exacerbated by poor macroeconomic management and political uncertainty (ibid.).

One of the perennial policy challenges facing Nigeria, and indeed most developing countries, is inflation and how to control it. The challenge of controlling inflation has both monetary and fiscal policy implications. Prior to the recent financial crisis, many developing countries including Nigeria had been grappling with the insidious challenge of unrelenting inflation. The conundrum caused by the financial meltdown forced policy makers and regulators to quickly adopt a number of conventional and unconventional tools as experimental measures to mitigate the tsunamic effects of the global financial crisis. These include a broad range of stimulus packages and quantity easing. While these measures were aimed to resolve one problem – the financial crisis – they nevertheless left in their trail another invidious challenge, inflation. Thus, the crucial consideration for

investment purpose is how to protect investments from the scourge of inflation.
Since the 1990s, equity investment in banking stocks has been on a steady increase in the Nigerian stock market. The main reason for this attraction is the belief that stock market investment acts as a better inflation-hedge than most other investment assets. This constitutes the basis of this research. Precisely, the questions are: Is this belief right or wrong? Is there any evidence to support this assertion from the Nigerian Stock Market? In providing answers to these questions, the remainder of this paper is structured as follows: the next section provides a summary of the previous work and the section that follows deals with the methodology employed in the empirical analysis. The penultimate section takes care of the empirical results and its discussion, while the last section provides the summary of findings, concluding remarks and recommendation.

2. Literature Review

There is a general concession that investment in common stocks is a good hedge against inflation. The empirical evidence for this belief has its origin in the seminal work of Irving Fisher (1930) which proposed that expected nominal interest rates should move in tandem with expected inflation. Fama and Schwert (1977) exemplified how the Fisher (1930) proposal could be used to test the inflation hedging characteristics of investment assets. Following Fama & Schwert (1977), many studies have sprung up in determining the inflation hedging characteristics of some investment assets. For example, with a quarterly data set covering the period 1976 and 1986 at the property sector level and Treasury bill rate as a measure of expected inflation, Limmack & Ward (1988) used the Fama and Schwert (1977) framework and found that all commercial property sectors hedge against inflation and that only the industrial sector hedged against unexpected inflation. Brown (1991) used monthly investment property databank returns from 1987 to 1990 to offer evidence that property provides a hedge against both expected and unexpected inflation. Hoesli & Matysiaic (1996) and Tarbert (1996) used cointegration approach on the examination of the inflation-hedging capacity of the UK commercial property and found that it does not exhibit short-term hedging characteristics but show a positive correspondence between property return and expected/unexpected inflation in the long run.
Miles (1996) compared real returns on various types of investment in the U. K. over a period of 50 years and found that most tangible assets - commodities (with the exception of gold), houses, land and equities - generated real returns above the average for all the asset classes, with the highest return generated on equities. The assets whose returns are set in nominal terms such as bonds, bank and building society deposits had the least performance over the period. The findings of Hoesli *et al*. (1995) show that real estate has poorer short-term hedging characteristics than shares, but better hedging characteristics than bonds. Newell (1996) examined the inflation-hedging characteristics of Australian commercial property between 1984 and 1995 and found that both office and retail property provided a good hedge against actual, expected and unexpected inflation in 10 Australian cities studied. Hoesli (1994) used monthly, quarterly, annual and five-year data on common stocks and real estate in Switzerland for the period between 1943 and 1991 and discovered that Swiss real estate provided a better hedge against inflation than common stocks. Hamerlink & Hoesli (1996) employed hedonic and autoregressive models to show that Swiss stocks, bonds, real estate and real estate mutual funds are positively related to expected inflation and negatively related to unexpected inflation.
Hartzell, Shulman & Wurtzebach (1987) carried out study on inflation hedging potential of residential property, commercial property, farmland, REITs, commingled real estate funds and stock exchange listed property firms and report significantly positive coefficients for expected and unexpected components of inflation. Park et al (1990) study on United States of America equity REITs report significantly negative coefficients to both expected and unexpected inflation. Fogler (1984) reports positive impact of including real estate in portfolios of United States of America stocks and bonds. With causality and cointegration analysis on the relationship between inflation and property returns Barkham, Ward & Henry (1996) observe that in the short run, changes in expected and actual inflation affects returns from investments in property. Bello (2005) splitting inflation into actual, expected, and unexpected and applying the Fisher (1930) model and static regression analysis in assessing inflation hedging attributes of ordinary shares, real estate, and Naira-denominated time deposits between 1996 and 2002 discovered that the extent of hedging against actual inflation was highest in ordinary shares, very weak in Naira-denominated time deposits, and non-existent in real estate. However, hedging against expected inflation was seen only in real estate and Naira-denominated time deposits.
The theoretical expectation is that a positive relationship exists between equity stock returns and inflation since equity stock represents residual claims on the firm's assets. A large body of evidence indicates that the stock market tends to perform poorly during inflationary periods (Barnes et al, 1999). The rising inflation in the 1970s inspired a number of studies on the hedging properties of a variety of assets against inflation, especially equity stocks. For example, Bodie (1976), Nelson (1976) and Fama & Schwartz (1977) examined the inflation-hedging properties of common stocks vis-à-vis other financial and real assets in the U.S.
Other notable studies that found negative relationship between equity returns and inflation (both unexpected

inflation and expected inflation) are Reilly, Johnson & Smith (1970), Bodie (1976), Nelson (1976), Fama & Schewart (1977), Moosa (1979), Fama (1981), Day (1984), Prabhakaran (1989), Erb & Harvey (1995), and Chatrath, Ramchander & Song (1996). Thus, contrary to the generally held belief, the empirical literature shows that there is a negative relation between stock returns and inflation, implying therefore that common stocks do not possess inflation-hedging properties.

However, there are studies that have found contrasting evidence to the above conclusion. For example, in a study of 26 countries during the post war period, Gultekin (1983) found support for the hypothesized relationship between stock returns and inflation. Other studies that support the hypothesis of positive relationship between common stocks and inflation include Firth (1979), Boudoukh & Richardson (1993), Martina (1998), Schotman & Mark (20002), Choudhary (2001), Rapach (2002), Luintel &Paudyal (2006) and Ding (2006).

The average conclusion from extant literature redounds to two facts: first, there is no consensus on the empirical relationship between assets, in particular stocks and inflation; and second, definitive details concerning inflation-hedging attributes of stocks and real estate are still unclear. This ambivalent situation calls for more empirical evidence. As Spierdijk & Umar (2013) observed, most studies analyzing the relationship between stock returns and inflation - that is, inflation-hedging properties of stocks - focus mainly on equity indices that represent the aggregate stock market. Thus, assessment of inflation-hedging capacity based on individual stocks, sectoral analysis of equity stocks, or specific sector assets has received little empirical attention. This study seeks to bridge this gap by assessing the inflation-hedging properties of specific sector assets (brewery stocks) as well as the individual stocks. Besides, the lack of empirical consensus on the inflation-hedging properties of common stocks is a sufficient justification for further examination of the phenomenon of interest. As evidenced by the studies cited above, most of them have been in the developed economies, notably USA and Europe.

Yet, most developing countries, including African countries, have since the 1980s embarked on a plethora of economic and financial reforms with serious implications for strict monetary and fiscal policies. These efforts notwithstanding, inflation in African countries has been an unrelenting and has continued to pose a serious challenge for both policymakers and investors. Empirical search for inflation-hedging assets will continue to be a fruitful proposition as well as contribution to the debate.

3. Methodology

Like most of previous studies, this study followed the methodology of Fama and Schwert (1977). The form of regression equation typically used in this regard is

$$R_{it} = \alpha_{it} + \beta I_t + e_{it}$$

where: R_{it} represents nominal return on the ith asset during period t, α_{it} is a constant, β is inflation hedging coefficient, I_t is the inflation rate during period t, while e_{it} is a random disturbance.

The decision rule for β is as follows: An asset is a complete hedge against inflation if the value of β is not significantly less than 1. An asset is a partial hedge against inflation if the value of β is between 0 and 1. An asset has zero hedge against inflation if the value of β is not significantly different from zero. An asset has a perverse hedge against inflation if the value of β is negative. The inflation-hedging potential of each brewery stock was assessed against actual inflation. In previous studies, measures of actual inflation were generally derived from the consumer price index (CPI) percentage change, while proxies available to estimate the level of expected inflation included economic variables at the time, such as short-term interest rate, (e.g. 90-day Treasury Bill rates) as in Fama (1995), Fama and Schwert (1977), Hoesli(1994), Limmack and Ward (1988). Others include survey-based inflation forecast as in Newell (1995a, 1995b), Newell & Boyd (1995), and Park, Mullineaux & Chew (1990); autoregressive integrated moving average (ARIMA)-based inflation estimates as in Brown (1991), Fama & Gibons (1982), Hartzell, Shulman & Wurtzebach (1987), Limmack & Ward (1988). The unexpected inflation is usually computed as the difference between the actual inflation and the estimates of the expected inflation. In this study, the actual inflation proxy that was used is CPI percentage change.

Our analysis covers the period 2000-2011. This period not only experienced high inflationary trend but ensured a relatively homogenous phase as well as guarantee sufficient availability of data of the companies' equity stocks. The returns on equity were compiled from the ordinary shares of the three active quoted breweries on the Nigerian Stock Exchange (NSE) using their annual reports and accounts from 2000-2011. The return on equity was computed under four models namely; 1) return on equity based on PAT/Shareholders' funds, 2) return on equity based on sum of dividend yield and capital gain yield, 3) return on equity based on dividend yield before tax, and 4) return on equity based on dividend yield after tax. This segregation is necessary to capture the inflation potential of the stocks in terms of return on equity based on (1) what the enterprise earns on shareholders' funds at its disposal, (2) the sum of earnings of dividend yield and capital gains yield, (3) returns to the shareholders before tax, and (4) net returns to the shareholders after tax.

4. Results and Discussions

Tables 2 to 5 show the four categories of nominal returns on the equity subindices related to the brewery firms from 2000 to 2011.

Table 2: Actual Inflation Rates (%) and Nominal Return on Equity based on Shareholders'funds(%)

Year	Inflation Rates	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	6.90	28.97	171.14	17.11
2001	18.9	32.42	55.32	18.00
2002	12.9	29.31	-125.06	34.89
2003	14.0	43.69	228.35	28.08
2004	15.0	46.80	79.52	18.00
2005	17.9	26.66	63.21	28.79
2006	8.2	35.52	30.37	30.07
2007	5.4	33.79	9.04	43.87
2008	11.6	32.18	2897.94	79.74
2009	12.5	42.95	100.77	59.93
2010	13.7	40.17	-236.44	60.46
2011	10.8	44.50	11.31	48.97
AVE	12.32	36.41	273.79	38.99
STD	4.087	6.91	835.36	19.92

Source: *Inflation rates from CBN Statistical Bulletin 2011 and ROE computed from Annual Reports of the Breweries*

Table 3: Actual Inflation Rates(%) and Nominal Return on Equity based on Dividend and Capital gain Yields (%)

Year	Inflation Rates	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	6.90	75.46	-24.24	33.08
2001	18.9	42.01	96.00	32.34
2002	12.9	29.25	43.88	24.98
2003	14.0	69.06	-41.13	19.39
2004	15.0	78.11	-3.61	64.55
2005	17.9	-19.74	10.00	-45.80
2006	8.2	24.92	-1.14	9.40
2007	5.4	11.94	14.94	14.50
2008	11.6	-0.11	661.00	24.50
2009	12.5	6.95	-60.45	3.80
2010	13.7	42.54	79.73	48.45
2011	10.8	40.63	13.49	30.37
AVE	12.32	33.42	65.71	21.63
STD	4.087	30.82	192.84	26.92

Source: *Same as Table 2 above*

Table 4: Actual Inflation Rates (%) and Nominal Return on Equity based on Dividend Yield before Tax (%)

Year	Inflation Rates	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	6.90	8.96	0	6.66
2001	18.9	8.38	0	7.60
2002	12.9	8.69	0	5.96
2003	14.0	6.78	0	2.68
2004	15.0	4.31	0	0.59
2005	17.9	3.20	0	1.84
2006	8.2	3.51	0	3.20
2007	5.4	2.78	0	3.83
2008	11.6	3.77	0	10.23
2009	12.5	11.18	0	3.80
2010	13.7	4.76	0	5.21
2011	10.8	3.82	0	3.48
AVE	12.32	5.85	0	4.59
STD	4.087	2.82	0	2.68

Source*: Same as Table 2 above*

Table 5: Actual Inflation Rate (%) and Nominal Return on Equity based on Dividend Yield after Tax (%)

Year	Inflation Rates	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	6.90	8.06	0	5.99
2001	18.9	7.54	0	6.84
2002	12.9	7.82	0	5.36
2003	14.0	6.10	0	2.41
2004	15.0	3.88	0	0.53
2005	17.9	2.88	0	1.66
2006	8.2	3.16	0	2.88
2007	5.4	2.50	0	3.45
2008	11.6	3.39	0	9.21
2009	12.5	10.07	0	3.42
2010	13.7	4.28	0	4.69
2011	10.8	3.44	0	3.13
AVE	12.32	5.26	0	4.13
STD	4.087	2.54	0	2.41

Source: *Same as Table 2 above*

A test was carried out to determine whether these brewery stocks provide positive real returns on equity over the period. Using the Fisher model, the return on equity in real term is given by the model, $R = (1+NR)/(1+IR) - 1$, where NR represents nominal rate of return on equity, IR represents inflation rate, and R represents real rate of return on equity. Applying the Model, the real rate of return on each of the stocks has been computed and displayed in Tables 6 to Table 9 showing the four classes of return on equity.

Table 6: Real Return on Equity based on Shareholders' Funds (%)

Year	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	20.65	153.64	9.55
2001	11.37	30.63	-0.76
2002	14.53	-122.20	19.48
2003	26.04	188.03	12.35
2004	27.65	56.10	2.61
2005	8.26	39.50	10.08
2006	25.25	20.49	20.21
2007	26.94	3.45	36.50
2008	18.44	2586.33	61.06
2009	27.07	78.46	42.16
2010	23.28	-220.00	41.13
2011	30.42	0.46	34.45
AVE	21.66	234.57	24.07

Source: Computed from Annual Reports of the Breweries

Based on enterprise return on shareholders' funds, Guinness generated positive real return on equity over the 12-year period which range between 30.42% in 2011 to 8.26% in 2005, and this resulted into an average positive real return of 21.66 percent over the period. Similarly, International Breweries exhibited series of real rate of return on equity between 2586.33 and 0.46 percent and an average positive real return of 234.57 percent over a 12-year period, with negative real returns in years 2002 and 2010. Except in year 2001 when Nigerian Breweries recorded -0.76 percent real return, it provided positive real returns in other 11 years which ranged between 61.06 and 2.61 percent, giving an average of 24.07 percent for the period.

Table 7: Real Return on Equity based on Dividend and Capital Gain Yields (%)

Year	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	64.13	-29.13	24.49
2001	19.44	64.84	11.30
2002	14.48	27.44	10.70
2003	48.30	-48.36	4.73
2004	54.88	-16.18	43.09
2005	-31.40	-5.98	-53.68
2006	15.45	-8.63	1.11
2007	6.20	9.05	8.63
2008	-10.49	581.90	11.56
2009	-4.93	-64.84	-7.73
2010	25.36	58.07	30.56
2011	26.92	2.43	17.66
AVE	19.03	47.55	8.54

Source: *Same as Table 6 above*

From the perspective of dividend and capital gain yields Guinness has an average of 19.03 percent for the period and provided reasonable positive real returns in all the years except in 2005, 2008, and 2009 when the global financial meltdown was rampaging Nigerian capital market. Nigerian Breweries towed the same line of Guinness with an average of 8.54 percent and positive real returns in all years excerpt in 2005 and 2009. International Breweries exhibited series of positive and negative real rate of return on equity as can be seen in Table 7 above with an average of 47.55 percent for the 12-year period.

Table 8: Real Return on Equity based on Dividend Yield before Tax (%)

Year	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREWERIES
2000	1.93	-6.45	-0.22
2001	-8.85	-15.90	-9.50
2002	-3.73	-11.43	-6.15
2003	-6.33	-12.28	-9.93
2004	-9.30	-13.04	-12.53
2005	-11.79	-14.53	-12.96
2006	-4.33	-7.58	-4.62
2007	-2.49	-5.12	-1.49
2008	-7.02	-10.39	-1.23
2009	-1.17	-11.11	-7.73
2010	-7.86	-12.05	-7.47
2011	-6.30	-9.75	-6.61
AVE	-5.60	-10.80	-6.70

Source: *Same as Table 6 above*

Assessment based on dividend yields both before and after tax shows that the returns on equity yielded negative real returns. This shows that dividend yields are not a good hedge against inflation in real terms, and this may explain investors' general tendency to sell off when stock prices appreciate.

Table 9: Real Return on Equity based on Dividend Yield after Tax (%)

Year	GUINNESS BREW	INTERNATIONAL BREW	NIGERIAN BREW
2000	1.09	-6.45	-0.85
2001	-9.55	-15.90	-10.14
2002	-4.50	-11.43	-6.67
2003	-6.93	-12.28	-10.17
2004	-9.67	-13.04	-12.58
2005	-12.07	-14.53	-13.11
2006	-4.66	-7.58	-4.92
2007	-2.75	-5.12	-1.85
2008	-7.36	-10.39	-2.14
2009	-2.16	-11.11	-8.07
2010	-8.28	-12.05	-7.92
2011	-6.64	-9.75	-6.92
AVE	-6.12	-10.80	-7.11

Source: *Same as Table 6 above*

The positive average returns shown in Tables 6 and 7 above suggest that equity stocks possess hedging ability against actual inflation. However, Brown (1991) and Newell (1996) argue that this basis of analysis is microanalytically insufficient to conclude that equity stock is an effective hedge against inflation. Consequently, methods such as regression analysis and cointegration approach have been variously suggested in the literature to determine the degree of protection against inflation offered by investment assets (see Worthington & Pahlavani 2007).

Regression Analysis

The regression equation used to determine the degree of protection against inflation is: $R = \alpha + \beta CPI + e$,
where R represents Real return in time t, CPI represents percentage change in consumer price index in time t (i.e actual inflation estimate), β is the inflation coefficient which determines the inflation attributes of each of the banks, while α is a constant.

The regression equation, $R = \alpha + \beta CPI + e$ was used to assess the inflation-hedging performance of these firms against the actual inflation. The analysis is presented in Tables 10 to 13 below.

Table 10: Inflation-hedging Capacity of the Stocks based on Return on Shareholders' Funds

Asset Class	β	E	R	R^2	F	t	DW	Mean	σ	Constant
1. Guinness	.079	0.534	.047	.002	.022	.148	1.686	36.41	6.91	35.439
2. Intn'l Brewery	-12.380	64.510	.061	.004	.037	-.192	2.217	273.79	835.36	426.275
3. Nigerian Brew	-.879	1.515	.180	.033	.336	-.580	.714	38.99	19.92	49.818

Source: Regressed from Table 2 above

While Guinness returns moved slightly in the same direction with inflation, the returns on International Brew and Nigerian Breweries moved in opposite direction, depicted by their **β** in Table 10. Thus, Guinness turned out to have good, albeit small, hedging properties against actual inflation, while International and Nigerian Breweries do not have significant hedging capacity actual inflation. The extent of perverse inflation hedging was highest in the stock of International Breweries with β = -12.38.

Table 11: Inflation-hedging Capacity of the Stocks based on Dividends & Capital Gains

Asset Class	β	E	R	R^2	F	t	DW	Mean	σ	Constant
1. Guinness	-.468	2.379	.062	.004	.039	-.197	1.472	33.42	30.82	39.187
2. Int'l Brew	1.481	14.912	.031	.001	.010	.099	2.380	65.71	192.84	47.463
3. Nigerian Brew	-.743	2.070	.113	.013	.129	-.359	2.471	21.63	26.92	30.776

Source: *Regressed from Table 3 above*

On the basis of Dividends and Capital gains (Table 11), the equity stock of International Breweries, with β = 1.481, corresponds to a modest hedging capacity, while the equity stocks of Nigerian Breweries and Guinness had negative hedging properties, with β = -0.743 and -.468, respectively. The economic relevance of the hedging ability of the equities of the two companies was negative over the period, while that of International Breweries was minor, though strong and positive.

Table 12: Inflation-hedging Capacity of the Stocks based on Dividend Yield before Tax

Asset Class	β	E	R	R^2	F	t	DW	Mean	σ	Constant
1. Guinness	.103	.216	.150	.023	.230	.480	1.355	5.85	2.82	4.571
2. Intn'l Brew	-	-	-	-	-	-	-	-	-	-
3. Nigerian Brew	-.057	.207	.088	.008	.078	-.278	1.481	4.59	2.68	5.298

Source: *Regressed from Table 4 above*

Table 12 isolates the hedging capacity of the stocks based on dividend yield before tax, from which Guinness stock showed a modest positive hedging ability, while Nigerian Breweries had a negative hedging capacity. There were no data for International Brew as observed in Table 4. With respect to dividend yield after tax, Guinness again showed a modest correlation with actual inflation, though with very weak index. Also, Nigerian Breweries showed a negative correlation with inflation. There were no data for International Breweries.

Table 13: Inflation-hedging Capacity of the Stocks based on Dividend Yield after Tax

Asset Class	β	E	R	R^2	F	t	DW	Mean	σ	Constant
1. Guinness	.093	.194	.150	.023	.230	.480	1.358	5.26	2.54	4.113
2. International	-	-	-	-	-	-	-	-	-	-
3. Nigerian brew	-.052	.186	.088	.008	.077	-.278	1.482	4.13	2.41	4.767

Source: *Regressed from Table 5 above*

5. Summary of Findings, Conclusions, and Recommendations

This paper investigated the extent to which brewery stocks are a hedge against the expected and unexpected components of inflation in Nigeria over the period 2000–2011. Our analysis focused on the three most successful stocks in one of the most successful and vibrant industrial sectors in the Nigerian stock market. The stocks of brewery industrial sector are actively traded on the NSE. Given the high inflation rate within the period, 2000-2011, we attempted to test the inflation potential of the equities of the Breweries sub-sector of the Nigerian Stock Exchange. The Fischer's model and regression analysis were employed as tools to capture the hedging potentials of the subject stocks. With the Fischer's model, and based on enterprise return on shareholders' funds, Guinness generated positive real return on equity over the 12-year period which ranged between 8.26% in 2005 to 30.42% in 2011. International Breweries had the highest average positive real return of 234.57%, and Nigerian Breweries recorded an average of 24.07% over the 12-year period.

From the perspective of dividend and capital gain yields, Guinness and Nigerian Breweries somewhat depicted persistent positive real return while International Breweries exhibited series of positive and negative real rate of return on equity. However International Breweries offered the highest average real rate of return on equity of

47.55 percent followed by Guinness with 19.03 percent and Nigerian Breweries with 8.54 percent for the 12-year period. Assessment of inflation hedging based on dividend paid using before and after tax bases reported negative hedge against inflation.

Earlier studies by Wurtzebach, Mueller & Machi (1991) and Brueggeman, Chen & Thibodean (1992) showed that the extent of inflation hedging is a function of the degree of the inflation, that is, whether high or low. From the stocks examined, in terms of return on shareholders' funds, Guinness offered small hedge against actual inflation, while International and Nigerian Breweries had negative hedge against actual inflation. In terms of total return on equity, Nigerian Breweries and Guinness offered negative partial hedge against inflation over the period while International Breweries showed strong positive hedge against inflation. From the perspectives of dividend yield before and after tax, Guinness stood the best of the three in terms of hedge against actual inflation, though with very weak index while Nigerian Breweries had negative hedge.

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